1W

September 21, 2018 Letting

Notice to Bidders Specifications And Proposal

Illinois Department of Transportation

Springfield, Illinois 62764

Illinois Department of Natural Resources
Office of Water Resources
Division of Capital Programs

Contract No. FR-442
Project Name: Tam O'Shanter Golf Course
Pump Station Modification
Niles, Illinois
County: Cook

Illinois Department of
Natural Resources
One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov
Bruce Rauner, Governor
Wayne A. Rosenthal, Director

NOTICE TO BIDDERS

1. **TIME AND PLACE OF OPENING BIDS.** Electronic bids are to be submitted to the electronic bidding system (iCX-Integrated Contractors Exchange). All bids must be submitted to the iCX system prior to 10:00 a.m., Friday September 21, 2018, at which time the bids will be publicly opened from the iCX Secure Vault.

2. **DESCRIPTION OF WORK**. The proposed work is identified and advertised for bids in the Invitation for Bids as:

   1W
   Tam O'Shanter Golf Course
   Pump Station Modification
   Niles, Illinois
   Cook County
   FR-442

   Modification to the golf course watering pump station at the Tam O'Shanter Golf Course in Niles, Illinois. Work includes replacing the pump station wet well, the screening wet well, relocating the intake, modification to the existing pumps and all appurtenant work.

2. **INSTRUCTIONS TO BIDDERS**.

(a) This Notice, the invitation for bids, proposal and letter of award shall, together with all other documents in accordance with Article 101.09 of the Standard Specifications for Road and Bridge Construction, become part of the contract. Bidders are cautioned to read and examine carefully all documents, to make all required inspections, and to inquire or seek explanation of the same prior to submission of a bid.

(b) State law, and, if the work is to be paid wholly or in part with Federal-aid funds, Federal law requires the bidder to make various certifications as a part of the proposal and contract. By execution and submission of the proposal, the bidder makes the certification contained therein. A false or fraudulent certification shall, in addition to all other remedies provided by law, be a breach of contract and may result in termination of the contract.

4. AWARD CRITERIA AND REJECTION OF BIDS. This contract will be awarded to the lowest responsive and responsible bidder considering conformity with the terms and conditions established by the Illinois Department of Natural Resources, Office of Water Resources, Division of Capital Programs in the rules, Invitation for Bids and contract documents. The issuance of plans and proposal forms for bidding based upon a prequalification rating shall not be the sole determinant of responsibility. The Department reserves the right to determine responsibility at the time of award, to reject any or all proposals, to readvertise the proposed project, and to waive technicalities.

By Order of the

Illinois Department of Natural Resources
Office of Water Resources

Loren Wobig, Director

Illinois Department of Natural Resources
Office of Water Resources
Division of Capital Programs

Return with Bid
(If Applicable)

This Annual Proposal Bid Bond shall become effective at 12:01 AM (CDST) on _____ and shall be valid until _____ 11:59 PM (CDST).

KNOW ALL MEN BY THESE PRESENTS, That We _____

as PRINCIPAL, and _____

as SURETY, and held jointly, severally and firmly bound unto the STATE OF ILLINOIS in the penal sum of 5 percent of the total bid price, or for the amount specified in the bid proposal under "Proposal Guaranty" in effect on the date of the Invitation for Bids, whichever is the lesser sum, well and truly to be paid unto said STATE OF ILLINOIS, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH that whereas, the PRINCIPAL may submit bid proposal(s) to the STATE OF ILLINOIS, acting through the Department of Transportation, for various improvements published in the Transportation Bulletin during the effective term indicated above.

NOW, THEREFORE, if the Department shall accept the bid proposal(s) of the PRINCIPAL; and if the PRINCIPAL shall, within the time and as specified in the bidding and contract documents; and if, after award by the Department, the PRINCIPAL shall enter into a contract in accordance with the terms of the bidding and contract documents including evidence of the required insurance coverages and providing such bond as specified with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof; or if, in the event of the failure of the PRINCIPAL to enter into such contract and to give the specified bond, the PRINCIPAL pays to the Department the difference not to exceed the penalty hereof between the amount specified in the bid proposal and such larger amount for which the Department may contract with another party to perform the work covered by said bid proposal, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

IN THE EVENT the Department determines the PRINCIPAL has failed to comply with any requirement as set forth in the preceding paragraph, then Surety shall pay the penal sum to the Department within fifteen (15) days of written demand therefor. If Surety does not make full payment within such period of time, the Department may bring an action to collect the amount owed. Surety is liable to the Department for all its expenses, including attorney's fees, incurred in any litigation in which it prevails either in whole or in part.

In TESTIMONY WHEREOF, the said PRINCIPAL has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____.

_____
(Company Name)

By _____
(Signature and Title)

Notary for PRINCIPAL

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)
by _____
(Name of Notary Public)

(Seal) _____
(Signature of Notary Public)

_____
(Date Commission Expires)

In TESTIMONY WHEREOF, the said SURETY has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____.

_____
(Company Name)

By _____
(Signature of Attorney-in-Fact)

Notary for SURETY

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)
by _____
(Name of Notary Public)

(Seal) _____
(Signature of Notary Public)

_____
(Date Commission Expires)

In lieu of completing the above section of the Annual Proposal Bid Bond form, the Principal may file an Electronic Bid Bond. By signing the proposal(s) the Principal is ensuring the identified electronic bid bond has been executed and the Principal and Surety are firmly bound unto the State of Illinois under the conditions of the bid bond as shown above.

Electronic Bid Bond ID #	Company/Bidder Name	Signature and Title

This bond may be terminated, at Surety's request, upon giving not less than thirty (30) days prior written notice of the cancellation/termination of the bond. Said written notice shall be issued to the Illinois Department of Transportation, Chief Contracts Official, 2300 South Dirksen Parkway, Springfield, Illinois, 62764, and shall be served in person, by receipted courier delivery or certified or registered mail, return receipt requested. Said notice period shall commence on the first calendar day following the Department's receipt of written cancellation/termination notice. Surety shall remain firmly bound to all obligations herein for proposals submitted prior to the cancellation/termination. Surety shall be released and discharged from any obligation(s) for proposals submitted for any letting or date after the effective date of cancellation/termination.

Return with Bid

Illinois Department of Natural Resources
Office of Water Resources
Division of Capital Programs

Proposal Bid Bond

Item No.

Letting Date

Project Name _____

Project Number _____

KNOW ALL PERSONS BY THESE PRESENTS, That We _____

as PRINCIPAL, and _____

as SURETY, and held jointly, severally and firmly bound unto the STATE OF ILLINOIS in the penal sum of 5 percent of the total bid price, or for the amount specified in the bid proposal under "Proposal Guaranty" in effect on the date of the Invitation for Bids, whichever is the lesser sum, well and truly to be paid unto said STATE OF ILLINOIS, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH that whereas, the PRINCIPAL has submitted a bid proposal to the STATE OF ILLINOIS, acting through the Department of Transportation, for the improvement designated by the Transportation Bulletin Item Number and Letting Date indicated above.

NOW, THEREFORE, if the Department shall accept the bid proposal of the PRINCIPAL; and if the PRINCIPAL shall, within the time and as specified in the bidding and contract documents; and if, after award by the Department, the PRINCIPAL shall enter into a contract in accordance with the terms of the bidding and contract documents including evidence of the required insurance coverages and providing such bond as specified with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof; or if, in the event of the failure of the PRINCIPAL to enter into such contract and to give the specified bond, the PRINCIPAL pays to the Department the difference not to exceed the penalty hereof between the amount specified in the bid proposal and such larger amount for which the Department may contract with another party to perform the work covered by said bid proposal, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

IN THE EVENT the Department determines the PRINCIPAL has failed to comply with any requirement as set forth in the preceding paragraph, then Surety shall pay the penal sum to the Department within fifteen (15) days of written demand therefor. If Surety does not make full payment within such period of time, the Department may bring an action to collect the amount owed. Surety is liable to the Department for all its expenses, including attorney's fees, incurred in any litigation in which it prevails either in whole or in part.

In TESTIMONY WHEREOF, the said PRINCIPAL has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____ .

_____
(Company Name)

By _____
(Signature and Title)

Notary for PRINCIPAL

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)
by _____
(Name of Notary Public)

(Seal)

_____
(Signature of Notary Public)

_____
(Date Commission Expires)

In TESTIMONY WHEREOF, the said SURETY has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____ .

_____
(Company Name)

By _____
(Signature of Attorney-in-Fact)

Notary for SURETY

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)
by _____
(Name of Notary Public)

(Seal)

_____
(Signature of Notary Public)

_____
(Date Commission Expires)

In lieu of completing the above section of the Proposal Bid Bond form, the Principal may file an Electronic Bid Bond. By signing the proposal the Principal is ensuring the identified electronic bid bond has been executed and the Principal and Surety are firmly bound unto the State of Illinois under the conditions of the bid bond as shown above.

Electronic Bid Bond ID # | Company/Bidder Name | Signature and Title

Illinois Department of Natural Resources

DBE Utilization Plan

(1) Policy

It is public policy that disadvantaged businesses as defined in the Special Provision shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal or State funds.

(2) Obligation

The contractor agrees to ensure that disadvantaged businesses as defined in the Special Provision have the maximum opportunity to participate in the performance of contracts or subcontracts financed in whole or in part with Federal or State funds. The contractor shall take all necessary and reasonable steps in accordance with the Special Provision to ensure that said businesses have the maximum opportunity to compete for and perform under this contract. The contractor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of contracts.

(3) Project and Bid Identification

Complete the following information concerning the project and bid:

Total Bid _____

Contract DBE Goal _____ (Percent) _____ (Dollar Amount)

Project _____

County _____

Letting Date _____

Contract No. _____

Letting Item No. _____

(4) Assurance

I, acting in my capacity as an officer of the undersigned bidder (or bidders if a joint venture), hereby assure the Department that on this project my company : (check one)

☐ Meets or exceeds contract award goals and has provided documented participation as follows:
Disadvantaged Business Participation _____ percent

Attached are the signed participation statements, form (DNR SBE PS 10/16/17), required by the Special Provision evidencing availability and use of each business participating in this plan and assuring that each business will perform a commercially useful function in the work of the contract.

☐ Failed to meet contract award goals and has included good faith effort documentation to meet the goals and that my company has provided participation as follows:

Disadvantaged Business Participation _____ percent

The contract goals should be accordingly modified or waived. Attached is all information required by the Special Provision in support of this request including good faith effort. Also attached are the signed participation statements, form (DNR SBE PS 10/16/17), required by the Special Provision evidencing availability and use of each business participating in this plan and assuring that each business will perform a commercially useful function in the work of the contract.

_____
Company

By _____

Title _____

Date _____

The "as read" Low Bidder is required to comply with the Special Provision.

Submit only one utilization plan for each project. The utilization plan shall be submitted in accordance with the special provision.

Illinois Department of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702

The Department of Natural Resources is requesting disclosure of information that is necessary to accomplish the purpose as outlined under State and Federal law. Disclosure of this information is **REQUIRED**. Failure to provide any information will result in the contract not being awarded.

Illinois Department of Natural Resources

DBE Participation Statement

Subcontractor Registration Number _____ Letting _____

Participation Statement Item No. _____

(1) Instructions Contract No. _____

This form must be completed for each disadvantaged business participating in the Utilization Plan. This form shall be submitted in accordance with the special provision and will be attached to the Utilization Plan form. If additional space is needed complete an additional form for the firm. Trucking participation items; description must list what is anticipated towards goal credit.

(2) Work:

Please indicate: J/V _____Manufacturer _____Supplier (60%) _____Subcontractor _____Trucking _____

Pay Item No.	Description (Anticipated items for trucking)*	Quantity	Unit Price	Total
				$ 0.00
				$ 0.00
				$ 0.00
				$ 0.00
				$ 0.00
				$ 0.00
			Total	

(3) Partial Payment Items (For any of the above items which are partial pay items)

Description must be sufficient to determine a Commercially Useful Function, specifically describe the work and subcontract dollar amount:
*Applies to trucking only

(4) Commitment

When a DBE is to be a second-tier subcontractor, or if the first-tier DBE subcontractor is going to be subcontracting a portion of its subcontract, it must be clearly indicated on the DBE Participation Statement, and the details of the transaction fully explained.

In the event a DBE subcontractor second-tiers a portion of its subcontract to one or more subcontractors during the work of a contract, the prime must submit a DBE Participation Statement, with the details of the transaction(s) fully explained.

The undersigned certify that the information included herein is true and correct, and that the DBE firm listed below has agreed to perform a commercially useful function in the work of the contract item(s) listed above and to execute a contract with the prime contractor or 1st Tier subcontractor. The undersigned further understand that no changes to this statement may be made without prior approval from the Department and that complete and accurate information regarding actual work performed on this project and the payment therefore must be provided to the Department.

_____
Signature for Contractor __ 1st Tier __ 2nd Tier

Date _____

Contact Person _____

Title _____

Firm Name _____

Address _____

City/State/Zip _____

Phone _____

Email Address _____

_____
Signature for DBE Firm __ 1st Tier __ 2nd Tier

Date _____

Contact Person _____

Title _____

Firm Name _____

Address _____

City/State/Zip _____

Phone _____

Email Address _____

The Department of Natural Resources is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under the state and federal law. Disclosure of this information is **REQUIRED**. Failure to provide any information will result in the contract not being awarded.

E _____

WC _____

CONTRACTOR OFFICE COPY OF CONTRACT SPECIFICATIONS

NOTICE

None of the following material needs to be returned with the bid package unless the special provisions require documentation and/or other information to be submitted.

Illinois Department of Transportation

SUBCONTRACTOR DOCUMENTATION

Public Acts 96-0795, 96-0920, and 97-0895 enacted substantial changes to the provisions of the Code (30 ILCS 500). Among the changes are provisions affecting subcontractors. The Contractor awarded this contract will be required as a material condition of the contract to implement and enforce the contract requirements applicable to subcontractors that entered into a contractual agreement with a total value of $50,000 or more with a person or entity who has a contract subject to the Code and approved in accordance with article 108.01 of the Standard Specifications for Road and Bridge Construction.

If the Contractor seeks approval of subcontractors to perform a portion of the work, and approval is granted by the Department, the Contractor shall provide a copy of the subcontract to the Illinois Department of Transportation's CPO upon request within 15 calendar days after execution of the subcontract.

Financial disclosures required pursuant to Sec. 50-35 of the Code must be submitted for all applicable subcontractors. The subcontract shall contain the certifications required to be made by subcontractors pursuant to Article 50 of the Code. This Notice to Bidders includes a document incorporating all required subcontractor certifications and disclosures for use by the Contractor in compliance with this mandate. The document is entitled State Required Ethical Standards Governing Subcontractors.

RETURN WITH SUBCONTRACT

STATE ETHICAL STANDARDS GOVERNING SUBCONTRACTORS

Article 50 of the Code establishes the duty of all State CPOs, SPOs, and their designees to maximize the value of the expenditure of public moneys in procuring goods, services, and contracts for the State of Illinois and to act in a manner that maintains the integrity and public trust of State government. In discharging this duty, they are charged by law to use all available information, reasonable efforts, and reasonable actions to protect, safeguard, and maintain the procurement process of the State of Illinois.

The certifications hereinafter made by the subcontractor are each a material representation of fact upon which reliance is placed should the Department approve the subcontractor. The CPO may terminate or void the contract approval if it is later determined that the bidder or subcontractor rendered a false or erroneous certification. If a false certification is made by a subcontractor the contractor's submitted bid and the executed contract may not be declared void unless the contractor refuses to terminate the subcontract upon the State's request after a finding that the subcontractor's certification was false.

Section 50-2 of the Illinois Procurement Code (Code) provides that every person that has entered into a contract for more than one year in duration for the initial term or for any renewal term shall certify, by January 1 of each fiscal year covered by the contract after the initial fiscal year, to the CPO or, if the procurement is under the authority of a CPO, the applicable procurement officer of any changes that affect its ability to satisfy the requirements of Article 50 pertaining to the eligibility for a contract award. If a contractor or subcontractor continues to meet all requirements of this Article, it shall not be required to submit any certification or if the work under the contract has been substantially completed before contract expiration but the contract has not yet expired. If a contractor or subcontractor is not able to truthfully certify that it continues to meet all requirements, it shall provide with its certification a detailed explanation of the circumstances leading to the change in certification status. A contractor or subcontractor that makes a false statement material to any given certification required under Article 50 of the Code is, in addition to any other penalties or consequences prescribed by law, subject to liability under the Illinois False Claims Act for submission of a false claim.

A. Bribery

Section 50-5. Bribery.

(a) Prohibition. No person or business shall be awarded a contract or subcontract under this Code who:

(1) has been convicted under the laws of Illinois or any other state of bribery or attempting to bribe an officer or employee of the State of Illinois or any other state in that officer's or employee's official capacity; or

(2) has made an admission of guilt of that conduct that is a matter of record but has not been prosecuted for that conduct.

(b) Businesses. No business shall be barred from contracting with any unit of State or local government, or subcontracting under such a contract, as a result of a conviction under this Section of any employee or agent of the business if the employee or agent is no longer employed by the business and:

(1) the business has been finally adjudicated not guilty; or

(2) the business demonstrates to the governmental entity with which it seeks to contract, or which is signatory to the contract to which the subcontract relates, and that entity finds that the commission of the offense was not authorized, requested, commanded, or performed by a director, officer, or high managerial agent on behalf of the business as provided in paragraph (2) of subsection (a) of Section 5-4 of the Criminal Code of 2012.

(c) Conduct on behalf of business. For purposes of this Section, when an official, agent, or employee of a business committed the bribery or attempted bribery on behalf of the business and in accordance with the direction or authorization of a responsible official of the business, the business shall be chargeable with the conduct.

(d) Certification. Every bid submitted to and contract executed by the State, and every subcontract subject to Section 20-120 of the Code shall contain a certification by the contractor or the subcontractor, respectively, that the contractor or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO may declare the related contract void if any certifications required by this Section are false. A contractor who makes a false statement, material to the certification, commits a Class 3 felony.

The contractor or subcontractor certifies that it is not barred from being awarded a contract under Section 50-5.

B. Felons

Section 50-10. Felons.

(a) Unless otherwise provided, no person or business convicted of a felony shall do business with the State of Illinois or any State agency, or enter into a subcontract, from the date of conviction until 5 years after the date of completion of the sentence for that felony, unless no person held responsible by a prosecutorial office for the facts upon which the conviction was based continues to have any involvement with the business.

(b) Certification. Every bid submitted to and contract executed by the State and every subcontract subject to Section 20-120 of the Code shall contain a certification by the bidder or contractor or subcontractor, respectively, that the bidder, contractor, or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO may declare the related contract void if any of the certifications required by this Section are false.

RETURN WITH SUBCONTRACT

C. Debt Delinquency

Section 50-11 and 50-12. Debt Delinquency.

The contractor or bidder or subcontractor, respectively, certifies that it, or any affiliate, is not barred from being awarded a contract or subcontract under the Code. Section 50-11 prohibits a person from entering into a contract with a State agency, or entering into a subcontract, if it knows or should know that it, or any affiliate, is delinquent in the payment of any debt to the State as defined by the Debt Collection Board. Section 50-12 prohibits a person from entering into a contract with a State agency, or entering into a subcontract, if it, or any affiliate, has failed to collect and remit Illinois Use Tax on all sales of tangible personal property into the State of Illinois in accordance with the provisions of the Illinois Use Tax Act. The bidder or contractor or subcontractor, respectively, further acknowledges that the CPO may declare the related contract void if this certification is false or if the bidder, contractor, or subcontractor, or any affiliate, is determined to be delinquent in the payment of any debt to the State during the term of the contract.

D. Prohibited Bidders, Contractors and Subcontractors

Section 50-10.5 and 50-60(c). Prohibited bidders, contractors and subcontractors.

The bidder or contractor or subcontractor, respectively, certifies in accordance with 30 ILCS 500/50-10.5 that no officer, director, partner or other managerial agent of the contracting business has been convicted of a felony under the Sarbanes-Oxley Act of 2002 or a Class 3 or Class 2 felony under the Illinois Securities Law of 1953 or if in violation of Subsection (c) for a period of five years from the date of conviction. Every bid submitted to and contract executed by the State and every subcontract subject to Section 20-120 of the Code shall contain a certification by the bidder, contractor, or subcontractor, respectively, that the bidder, contractor, or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO shall declare the related contract void if any of the certifications completed pursuant to this Section are false.

E. Section 42 of the Environmental Protection Act

The bidder or contractor or subcontractor, respectively, certifies in accordance with 30 ILCS 500/50-14 that the bidder, contractor, or subcontractor, is not barred from being awarded a contract or entering into a subcontract under this Section which prohibits the bidding on or entering into contracts with the State of Illinois or a State agency, or entering into any subcontract, that is subject to the Code by a person or business found by a court or the Pollution Control Board to have committed a willful or knowing violation of Section 42 of the Environmental Protection Act for a period of five years from the date of the order. The bidder or contractor or subcontractor, respectively, acknowledges that the CPO may declare the contract void if this certification is false.

The undersigned, on behalf of the subcontracting company, has read and understands the above certifications and makes the certifications as required by law.

_____
Name of Subcontracting Company

_____ _____
Authorized Officer Date

RETURN WITH SUBCONTRACT

SUBCONTRACTOR DISCLOSURES

I. DISCLOSURES

A. The disclosures hereinafter made by the subcontractor are each a material representation of fact upon which reliance is placed. The subcontractor further certifies that the Department has received the disclosure forms for each subcontract.

The chief procurement officer may void the bid, contract, or subcontract, respectively, if it is later determined that the bidder or subcontractor rendered a false or erroneous disclosure. A contractor or subcontractor may be suspended or debarred for violations of the Procurement Code. Furthermore, the Chief Procurement Officer may void the contract.

B. Financial Interests and Conflicts of Interest

1. Section 50-35 of the Illinois Procurement Code provides that all subcontracts with a total value of $50,000 or more, from subcontractors identified in Section 20-120 of the Illinois Procurement Code, shall be accompanied by disclosure of the financial interests of the subcontractor. This disclosed information for the subcontractor, will be maintained as public information subject to release by request pursuant to the Freedom of Information Act, filed with the Procurement Policy Board, and shall be incorporated as a material term of the Prime Contractor's contract. Furthermore, pursuant to this Section, the Procurement Policy Board may recommend to allow or void a contract or subcontract based on a potential conflict of interest.

The financial interests to be disclosed shall include ownership or distributive income share that is in excess of 5%, or an amount greater than 60% of the annual salary of the Governor, of the subcontracting entity or its parent entity, whichever is less, unless the subcontractor is a publicly traded entity subject to Federal 10K reporting, in which case it may submit its 10K disclosure in place of the prescribed disclosure. If a subcontractor is a privately held entity that is exempt from Federal 10K reporting, but has more than 400 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any person or entity holding any ownership share that is in excess of 5%. The disclosure shall include the names, addresses, and dollar or proportionate share of ownership of each person making the disclosure, their instrument of ownership or beneficial relationship, and notice of any potential conflict of interest resulting from the current ownership or beneficial interest of each person making the disclosure having any of the relationships identified in Section 50-35 and on the disclosure form.
The current annual salary of the Governor is $177,412.00.

In addition, all disclosures shall indicate any other current or pending contracts, subcontracts, proposals, leases, or other ongoing procurement relationships the subcontracting entity has with any other unit of state government and shall clearly identify the unit and the contract, subcontract, proposal, lease, or other relationship.

2. Disclosure Forms. Disclosure Form A is attached for use concerning the individuals meeting the above ownership or distributive share requirements. A separate Disclosure Form A must be submitted with the bid for each individual meeting the above requirements. In addition, a second form (Disclosure Form B) provides for the disclosure of current or pending procurement relationships with other (non-IDOT) state agencies and a total ownership certification.

C. Disclosure Form Instructions

Form A Instructions for Financial Information & Potential Conflicts of Interest

If the subcontractor is a publicly traded entity subject to Federal 10K reporting, the 10K Report may be submitted to meet the requirements of Form A. If a subcontractor is a privately held entity that is exempt from Federal 10K reporting, but has more than 400 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any person or entity holding any ownership share that is in excess of 5%. If a subcontractor is not subject to Federal 10K reporting, the subcontractor must determine if any individuals are required by law to complete a financial disclosure form. To do this, the subcontractor should answer each of the following questions. A "YES" answer indicates Form A must be completed. If the answer to each of the following questions is "NO", then the NOT APPLICABLE STATEMENT on the second page of Form A must be signed and dated by a person that is authorized to execute contracts for the subcontracting company. Note: These questions are for assistance only and are not required to be completed.

1. Does anyone in your organization have a direct or beneficial ownership share of greater than 5% of the bidding entity or parent entity? YES ___ NO ___
2. Does anyone in your organization have a direct or beneficial ownership share of less than 5%, but which has a value greater than 60% of the annual salary of the Governor? YES ___ NO ___
3. Does anyone in your organization receive more than 60% of the annual salary of the Governor of the subcontracting entity's or parent entity's distributive income? YES ___ NO ___

   (Note: Distributive income is, for these purposes, any type of distribution of profits. An annual salary is not distributive income.)
4. Does anyone in your organization receive greater than 5% of the subcontracting entity's or parent entity's total distributive income, but which is less than 60% of the annual salary of the Governor? YES ___ NO ___

   (Note: Only one set of forms needs to be completed per person per subcontract even if a specific individual would require a yes answer to more than one question.)

A "YES" answer to any of these questions requires the completion of Form A. The subcontractor must determine each individual in the subcontracting entity or the subcontracting entity's parent company that would cause the questions to be answered "Yes". Each form must be signed and dated by a person that is authorized to execute contracts for your organization. **Photocopied or stamped signatures are not acceptable**. The person signing can be, but does not have to be, the person for which the form is being completed. The subcontractor is responsible for the accuracy of any information provided.

If the answer to each of the above questions is "NO", then the NOT APPLICABLE STATEMENT on page 2 of Form A must be signed and dated by a person that is authorized to execute contracts for your company.

RETURN WITH SUBCONTRACT

Form B: Instructions for Identifying Other Contracts & Procurement Related Information

Disclosure Form B must be completed for each subcontract submitted by the subcontracting entity. *Note: Checking the NOT APPLICABLE STATEMENT on Form A does not allow the subcontractor to ignore Form B. Form B must be completed, checked, and dated or the subcontract will not be approved.*

The Subcontractor shall identify, by checking Yes or No on Form B, whether it has any pending contracts, subcontracts, leases, bids, proposals, or other ongoing procurement relationship with any other (non-IDOT) State of Illinois agency. If "No" is checked, the subcontractor only needs to complete the check box on the bottom of Form B. If "Yes" is checked, the subcontractor must list all non-IDOT State of Illinois agency pending contracts, subcontracts, leases, bids, proposals, and other ongoing procurement relationships. These items may be listed on Form B or on an attached sheet(s). Contracts with cities, counties, villages, etc. are not considered State of Illinois agency contracts and are not to be included. Contracts or subcontracts with other State of Illinois agencies such as the Department of Natural Resources or the Capital Development Board must be included.

RETURN WITH SUBCONTRACT

ILLINOIS DEPARTMENT OF TRANSPORTATION

Form A
Subcontractor: Financial Information & Potential Conflicts of Interest Disclosure

Subcontractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by the Section 50-35 of the Illinois Procurement Code (30 ILCS 500). Subcontractors desiring to enter into a subcontract of a State of Illinois contract must disclose the financial information and potential conflict of interest information as specified in this Disclosure Form. This information shall become part of the publicly available contract file. This Form A must be completed for subcontracts with a total value of $50,000 or more, from subcontractors identified in Section 20-120 of the Illinois Procurement Code, and for all open-ended contracts. **A publicly traded company may submit a 10K disclosure (or equivalent if applicable) in satisfaction of the requirements set forth in Form A. See Disclosure Form Instructions.**

The current annual salary of the Governor is $177,412.00.

DISCLOSURE OF FINANCIAL INFORMATION

1. Disclosure of Financial Information. The individual named below has an interest in the SUBCONTRACTOR (or its parent) in terms of ownership or distributive income share in excess of 5%, or an interest which has a value of more than 60% of the annual salary of the Governor. **(Make copies of this form as necessary and attach a separate Disclosure Form A for each individual meeting these requirements)**

FOR INDIVIDUAL (type or print information)

NAME: _____

ADDRESS _____

_____

Type of ownership/distributable income share:

stock _____ sole proprietorship _____ Partnership _____ other: (explain on separate sheet):

% or $ value of ownership/distributable income share: _____

2. Disclosure of Potential Conflicts of Interest. Check "Yes" or "No" to indicate which, if any, of the following potential conflict of interest relationships apply. If the answer to any question is "Yes", please attach additional pages and describe.

(a) State employment, currently or in the previous 3 years, including contractual employment of services.
Yes ___No __

If your answer is yes, please answer each of the following questions.

1. Are you currently an officer or employee of either the Capitol Development Board or the Illinois State Toll Highway Authority? Yes ___No __

2. Are you currently appointed to or employed by any agency of the State of Illinois? If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, provide the name the State agency for which you are employed and your annual salary. _____
_____

3. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, are you entitled to receive (i) more than 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 100% of the annual salary of the Governor?
   Yes ___No __

4. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, are you and your spouse or minor children entitled to receive (i) more than 15 % in the aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of two times the salary of the Governor? Yes ___No __

(b) State employment of spouse, father, mother, son, or daughter, including contractual employment services in the previous 2 years.
   Yes ___No __

If your answer is yes, please answer each of the following questions.

1. Is your spouse or any minor children currently an officer or employee of the Capitol Development Board or the Illinois State Toll Highway Authority? Yes ___No __

2. Is your spouse or any minor children currently appointed to or employed by any agency of the State of Illinois? If your spouse or minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60 % of the annual salary of the Governor, provide the name of your spouse and/or minor children, the name of the State agency for which he/she is employed and his/her annual salary. _____
   _____

3. If your spouse or any minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, are you entitled to receive (i) more than 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 100% of the annual salary of the Governor? Yes ___No __

4. If your spouse or any minor children are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, are you and your spouse or minor children entitled to receive (i) more than 15 % in the aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of two times the annual salary of the Governor?
   Yes ___No __

(c) Elective status; the holding of elective office of the State of Illinois, the government of the United States, any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois currently or in the previous 3 years. Yes ___No __

(d) Relationship to anyone holding elective office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(e) Appointive office; the holding of any appointive government office of the State of Illinois, the United States of America, or any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois, which office entitles the holder to compensation in excess of the expenses incurred in the discharge of that office currently or in the previous 3 years. Yes ___No __

(f) Relationship to anyone holding appointive office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(g) Employment, currently or in the previous 3 years, as or by any registered lobbyist of the State government.
   Yes ___No __

(h) Relationship to anyone who is or was a registered lobbyist in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(i) Compensated employment, currently or in the previous 3 years, by any registered election or reelection committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections.
Yes ___ No __

(j) Relationship to anyone; spouse, father, mother, son, or daughter; who was a compensated employee in the last 2 years by any registered election or re-election committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections.
Yes ___ No __

---

2. Communication Disclosure.

Disclose the name and address of each lobbyist and other agent of the bidder or offeror who is not identified in Section 2 of this form, who is has communicated, is communicating, or may communicate with any State officer or employee concerning the bid or offer. This disclosure is a continuing obligation and must be promptly supplemented for accuracy throughout the process and throughout the term of the contract. If no person is identified, enter “None” on the line below:

Name and address of person(s): _____

_____

_____

_____

RETURN WITH SUBCONTRACT

4. Debarment Disclosure. For each of the persons identified under Sections 2 and 3 of this form, disclose whether any of the following has occurred within the previous 10 years: debarment from contracting with any governmental entity; professional licensure discipline; bankruptcies; adverse civil judgments and administrative findings; and criminal felony convictions. This disclosure is a continuing obligation and must be promptly supplemented for accuracy throughout the procurement process and term of the contract. If no person is identified, enter "None" on the line below:

Name of person(s): _____

Nature of disclosure: _____

_____

_____

_____

APPLICABLE STATEMENT

This Disclosure Form A is submitted on behalf of the INDIVIDUAL named on previous page. Under penalty of perjury, I certify the contents of this disclosure to be true and accurate to the best of my knowledge.

Completed by: ☐ _____ _____

Signature of Individual or Authorized Officer — Date

NOT APPLICABLE STATEMENT

Under penalty of perjury, I have determined that no individuals associated with this organization meet the criteria that would require the completion of this Form A.

This Disclosure Form A is submitted on behalf of the SUBCONTRACTOR listed on the previous page.

☐ _____ _____

Signature of Authorized Officer — Date

RETURN WITH SUBCONTRACT

ILLINOIS DEPARTMENT OF TRANSPORTATION

Form B
Subcontractor: Other Contracts & Financial Related Information Disclosure

Subcontractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by the Section 50-35 of the Illinois Procurement Act (30 ILCS 500). This information shall become part of the publicly available contract file. This Form B must be completed for subcontracts with a total value of $50,000 or more, from subcontractors identified in Section 20-120 of the Illinois Procurement Code, and for all open-ended contracts.

DISCLOSURE OF OTHER CONTRACTS, SUBCONTRACTS, AND PROCUREMENT RELATED INFORMATION

1. Identifying Other Contracts & Procurement Related Information. The SUBCONTRACTOR shall identify whether it has any pending contracts, subcontracts, including leases, bids, proposals, or other ongoing procurement relationship with any other State of Illinois agency: Yes ___ No __
If "No" is checked, the subcontractor only needs to complete the signature box on the bottom of this page.

2. If "Yes" is checked. Identify each such relationship by showing State of Illinois agency name and other descriptive information such as bid or project number (attach additional pages as necessary). SEE DISCLOSURE FORM INSTRUCTIONS:

THE FOLLOWING STATEMENT MUST BE CHECKED

☐ _____ _____
Signature of Authorized Officer Date

OWNERSHIP CERTIFICATION

Please certify that the following statement is true if the individuals for all submitted Form A disclosures do not total 100% of ownership

Any remaining ownership interest is held by individuals receiving less than $106,447.20 of the bidding entity's or parent entity's distributive income or holding less than a 5% ownership interest.

☐ Yes ☐ No ☐ N/A (Form A disclosure(s) established 100% ownership)

STANDARD SPECIFICATIONS

The "Standard Specifications for Road and Bridge Construction," prepared by the Department of Transportation of the State of Illinois and adopted by said Department, April 1, 2016; as amended and supplemented by the "Supplemental Specifications and Recurring Special Provisions," adopted January 1, 2018 (hereinafter referred to collectively as "Standard Specifications"), are incorporated by reference and made a part of this Contract for the Tam O'Shanter Golf Course Pump Station Modification, Niles, Illinois, Cook County, FR-442. (The Standard Specifications can be purchased from the Illinois Department of Transportation or downloaded from their web site.)

SPECIAL PROVISIONS

The following Special Provisions supplement the Standard Specifications, the latest edition of the “Manual on Uniform Traffic Control Devices for Streets and Highways,” the “Manual of Test Procedures for Materials” in effect on the date of invitation for bids, and the Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein which apply to and govern the construction of the “Tam O'Shanter Golf Course Pump Station Modification, Niles, Illinois, Cook County, FR-442” project, and in the case of conflict with any part, or parts, of said Specifications, the said Special Provisions shall take precedence and shall govern.

CONTRACT FR442

INDEX
FOR
SUPPLEMENTAL SPECIFICATIONS
AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2018

This index contains a listing of SUPPLEMENTAL SPECIFICATIONS, frequently used RECURRING SPECIAL PROVISIONS, and LOCAL ROADS AND STREETS RECURRING SPECIAL PROVISIONS.

ERRATA Standard Specifications for Road and Bridge Construction
(Adopted 4-1-16) (Revised 1-1-18)

SUPPLEMENTAL SPECIFICATIONS

Std. Spec. Sec.		Page No.
106	Control of Materials	1
403	Bituminous Surface Treatment (Class A-1, A-2, A-3)	2
404	Micro-Surfacing and Slurry Sealing	3
405	Cape Seal	14
420	Portland Cement Concrete Pavement	24
442	Pavement Patching	26
502	Excavation for Structures	27
503	Concrete Structures	29
504	Precast Concrete Structures	32
542	Pipe Culverts	33
586	Sand Backfill for Vaulted Abutments	34
630	Steel Plate Beam Guardrail	36
631	Traffic Barrier Terminals	39
670	Engineer's Field Office and Laboratory	40
701	Work Zone Traffic Control and Protection	41
704	Temporary Concrete Barrier	42
781	Raised Reflective Pavement Markers	44
888	Pedestrian Push-Button	45
1003	Fine Aggregates	46
1004	Coarse Aggregates	47
1006	Metals	50
1020	Portland Cement Concrete	51
1050	Poured Joint Sealers	53
1069	Pole and Tower	55
1077	Post and Foundation	56
1096	Pavement Markers	57
1101	General Equipment	58
1102	Hot-Mix Asphalt Equipment	59
1103	Portland Cement Concrete Equipment	61
1106	Work Zone Traffic Control Devices	63

CHECK SHEET
FOR
RECURRING SPECIAL PROVISIONS

The following RECURRING SPECIAL PROVISIONS indicated by an "X" are applicable to this contract and are included by reference:

RECURRING SPECIAL PROVISIONS

CHECK SHEET #			PAGE NO.
1		Additional State Requirements for Federal-Aid Construction Contracts	64
2		Subletting of Contracts (Federal-Aid Contracts)	67
3	X	EEO	68
4	X	Specific EEO Responsibilities Non Federal-Aid Contracts	78
5	X	Required Provisions - State Contracts	83
6		Asbestos Bearing Pad Removal	89
7		Asbestos Waterproofing Membrane and Asbestos HMA Surface Removal	90
8		Temporary Stream Crossings and In-Stream Work Pads	91
9		Construction Layout Stakes Except for Bridges	92
10		Construction Layout Stakes	95
11		Use of Geotextile Fabric for Railroad Crossing	98
12		Subsealing of Concrete Pavements	100
13		Hot-Mix Asphalt Surface Correction	104
14		Pavement and Shoulder Resurfacing	106
15		Patching with Hot-Mix Asphalt Overlay Removal	107
16		Polymer Concrete	109
17		PVC Pipeliner	111
18		Bicycle Racks	112
19		Temporary Portable Bridge Traffic Signals	114
20		Work Zone Public Information Signs	116
21		Nighttime Inspection of Roadway Lighting	117
22		English Substitution of Metric Bolts	118
23		Calcium Chloride Accelerator for Portland Cement Concrete	119
24		Quality Control of Concrete Mixtures at the Plant	120
25		Quality Control/Quality Assurance of Concrete Mixtures	128
26		Digital Terrain Modeling for Earthwork Calculations	144
27		Reserved	146
28		Preventive Maintenance – Bituminous Surface Treatment (A-1)	147
29		Reserved	153
30		Reserved	154
31		Reserved	155
32		Temporary Raised Pavement Markers	156
33		Restoring Bridge Approach Pavements Using High-Density Foam	157
34		Portland Cement Concrete Inlay or Overlay	160
35		Portland Cement Concrete Partial Depth Hot-Mix Asphalt Patching	164

CHECK SHEET
FOR
LOCAL ROADS AND STREETS RECURRING SPECIAL PROVISIONS

The following LOCAL ROADS AND STREETS RECURRING SPECIAL PROVISIONS indicated by an "X" are applicable to this contract and are included by reference:

LOCAL ROADS AND STREETS RECURRING SPECIAL PROVISIONS

CHECK SHEET #			PAGE NO.
LRS 1		**Reserved**	168
LRS 2	☐	Furnished Excavation	169
LRS 3	☐	Work Zone Traffic Control Surveillance	170
LRS 4	☐	Flaggers in Work Zones	171
LRS 5	☐	Contract Claims	172
LRS 6	☐	Bidding Requirements and Conditions for Contract Proposals	173
LRS 7	☐	Bidding Requirements and Conditions for Material Proposals	179
LRS 8		**Reserved**.	185
LRS 9	☐	Bituminous Surface Treatments	186
LRS 10		**Reserved**	187
LRS 11	☐	Employment Practices	188
LRS 12	☐	Wages of Employees on Public Works	190
LRS 13	☐	Selection of Labor	192
LRS 14	☐	Paving Brick and Concrete Paver Pavements and Sidewalks	193
LRS 15	☒	Partial Payments	196
LRS 16	☐	Protests on Local Lettings	197
LRS 17	☐	Substance Abuse Prevention Program	198
LRS 18	☐	Multigrade Cold Mix Asphalt	199

SPECIAL PROVISIONS
Tam O'Shanter Golf Course Pump Station Modification

GENERAL

The following Special Provisions supplement the *"Standard Specifications for Road and Bridge Construction" (Standard Specifications)*, and the "*Supplemental Specifications and Recurring Special Provisions"* latest edition. These Special Provisions included herein apply to and govern the proposed improvements designated as the TAM O'SHANTER GOLF COURSE PUMP STATION MODIFICATION and in case of conflict with any part or parts of said specifications; said Special Provisions shall take precedent and shall govern.

In case of conflict between any article of Section 100 of the Standard Specifications and the Instructions to Bidders in these documents, these Special Provisions shall prevail.

DEFINITION OF TERMS

In the application of the Standard Specifications, the Recurring Special Provisions, the BDE Special Provisions, and the GBSP Special Provisions to this Contract, references to the Department of Transportation shall be interpreted to mean the Department of Natural Resources, Office of Water Resources, Division of Capital Programs (Department); except that references to the Department of Transportation within Section 102 - Advertisement, Bidding, Award, and Contract Execution, and references to Department publications - shall continue to mean the Department of Transportation. References to the Division of Highways shall be interpreted to mean the Department of Natural Resources; Office of Water Resources; Division of Capital Programs.

Wherever the word “Engineer” is used, it shall mean the Director of the Office of Water Resources of the Department of Natural Resources of the State of Illinois: or his authorized representative limited by the particular duties entrusted to him, nominally the Manager of the Division of Capital Programs or his delegated representative.

Wherever the words “Right of Way” are used, it shall mean a general term denoting land, property, or interest therein, usually a strip, acquired for or devoted to water resource projects.

Wherever the words “Central Bureau of Construction” or District Office” are used, it shall mean the Department of Natural Resources, Office of Water Resources, Division of Capital Programs.

The advertising for Bids, Prequalification of Bidders, Issuance of Proposals, Proposal Guarantee, and Acceptance and Opening of Bids shall be in accordance with the policies and procedures of the Illinois Department of Transportation. Proposals, Schedule of Prices, Signature Sheet and other bidding or contract requirements as utilized by the Department of Natural Resources; Office of Water Resources; Division of Capital Programs shall apply to this contract.

TABLE OF CONTENTS
SPECIAL PROVISIONS

TITLE	PAGE NO.
LOCATION OF PROJECT	1
DESCRIPTION OF PROJECT	1
PLANS AND DRAWINGS	1
TIME LIMIT	1
CONTRACT CLAIM	1
COMPLETION DATE	2
CONSTRUCTION PROCEDURE	2
SEEDING AND FERTILIZING	3
EROSION CONTROL BLANKET	5
PERIMETER EROSION BARRIER	6
CATCH BASINS AND MANHOLES	6
TEMPORARY COFFERDAM SYSTEM	7
DEWATERING	8
CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED	9
WOOD INFORMATION SIGNS	10
PUMP STATION	10
GENERAL PROVISIONS FOR MECHANICAL WORK	15
BASIC MECHANICAL MATERIALS AND METHODS	21
BASIC MECHANICAL REQUIREMENTS	26
PROCESS PIPING AND APPURTENANCES	37
BASIC ELECTRICAL REQUIREMENTS	42
BASIC ELECTRICAL MATERIALS AND METHODS	52

BUREAU OF DESIGN AND ENVIRONMENT (BDE) SPECIAL PROVISIONS

CONSTRUCTION AIR QUALITY – DIESEL RETROFIT (BDE) 72
MANHOLES, VALVE VAULTS, AND FLAT SLAB TOPS (BDE) 75
PROGRESS PAYMENTS (BDE) 77
WEEKLY DBE TRUCKING REPORTS (BDE) 78

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (DBE) 79

PREVAILING WAGES FOR COOK COUNTY 87

APPENDIX A – PERMITS
APPENDIX B – O&M MANUAL

STATE OF ILLINOIS

SPECIAL PROVISIONS

LOCATION OF PROJECT

The proposed pump station modification is located along the North Branch of the Chicago River at the Tam O'Shanter golf course in the Village of Niles just north of Howard Street. It is located in Township 41N, Range 13E, Section 30.

DESCRIPTION OF PROJECT

This project involves the improvement of a pump station, which pumps water out of the North Branch of the Chicago River. The pump station is used to irrigate the Tam O'Shanter golf course. The pump station improvements will include, but not limited to, raising the existing pump station, replacing the pump station wet well, screening wet well, and relocating the intake and constructing it approximately 2 feet deeper in elevation. A temporary cofferdam system will be required to perform this work. The Contractor shall be required to provide the design of the cofferdam, a dewatering plan, and a cofferdam work plan. The Tam O'Shanter golf course requires that the pump station be operational between April 15 and October 15.

PLANS AND DRAWINGS

The work to be done is shown on the drawings entitled "Tam O'Shanter Golf Course Pump Station Modification".

TIME LIMIT

Time Limit for work. The Contractor's attention is called to the fact that the appropriation for the current fiscal year, from which the cost of this contract will be paid, will lapse at the end of the fiscal year, which is June 30. Continuation of this contract into the next fiscal year will be contingent upon the Illinois General Assembly reappropriating funds for this contract. If funds are not reappropriated, this contract will be terminated on or before the appropriation lapse date.

CONTRACT CLAIM

The following provisions shall be substituted in Article 109.09 of the Standard Specifications.

1. The title District Engineer shall mean Chief of Design, Division of Project implementation.
2. The section titled Procedure shall be as follows:

<u>Procedure</u>

All claims must be submitted to the Manager, Division of Capital Programs.

The Contractor may request an opportunity to present the claim verbally at each of the following levels if the claim has not been satisfactorily resolved at the previous level.

(a) Manager, Division of Capital Programs
(b) Director of Water Resources

All requests for presentation must be made through the Chief of Design, Division of Project Implementation. Requests by the Contractor to present a claim at the second level will be accompanied by two additional copies of the claim with addenda.

Full compliance by the Contractor with the provisions of this Special Provision is a contractual condition precedent to the Contractor's right to seek relief in the Court of Claims. The Director's written response shall be deemed a final action of the Department. Unless the Contractor files a claim for adjudication by the Court of Claims within 60 days after the date of the written response, the failure to so file shall constitute a release and waiver of the claim.

COMPLETION DATE

The Contractor shall complete the work on this project by April 15, 2019.

CONSTRUCTION PROCEDURE

The Contractor's attention is directed to the fact that the Illinois Department of Natural Resources Office of Water Resources has issued a permit for this project. The U.S. Army Corps of Engineers has determined that the project is covered under Regional Permit 8.

The project will also be covered by the North Cook Soil and Water Conservation District Review, and the Village of Niles Permit.

It will be the Contractor's responsibility to familiarize himself/herself with the requirements of the above-mentioned permits and the erosion control plan shown in the plans, and conduct his/her work in accordance with those requirements and the special provisions contained herein. See Appendix A for a copy of these permits. The Village of Niles Permit and the Army Corps Of Engineers permit have not yet been received, but are anticipated by letting date. They will be posted once received.

Should the Contractor desire to use materials, construction methods, or procedures which differ substantially from that authorized by the granted permits and plan, it is the responsibility of the Contractor to obtain approved amendments to the permits and/or the drawings.

All costs incurred by the Contractor in complying with the applicable requirements of the above mentioned permits, and construction/erosion control requirements shall be considered as completely covered by the contract unit prices bid for the various items of work in the proposal.

SEEDING AND FERTILIZING
SECTION S- 25000100

This Special Provision revises Section 250 of the Standard Specifications for Road and Bridge Construction to revise fertilizer and seeding mix. This work shall be performed according to Section 250 except as modified herein.

Delete Article 250.04 and substitute the following:

Fertilizer. Fertilizer having an analysis of 10-6-4, or having a different analysis but still meeting the 5-3-2 ratio requirement, shall be applied at such a rate that each acre to be seeded shall receive a total of 90 pounds of the 3 nutrients. The Engineer may increase or decrease the amount of nutrients required per acre. Fertilizer shall be spread over the seeding area before completion of the ground preparation and incorporated in the soil as a part of the ground preparation operations. The fertilizer shall be a ready-mixed material containing the following nutrients expressed in percent of the total weight of the ready-mixed materials: 10% Nitrogen, 6% available Phosphoric Acid, and 4% water soluble Potash (10-6-4 Analysis).

The following information shall be shown on the fertilizer bags:

1) Name and address of manufacturer;
2) Name, brand or trademark;
3) Number of net pounds of ready-mixed material in the package;
4) Chemical composition of analysis;
5) Guarantee of analysis.

Delete Article 250.06 and substitute the following:

Grass seed shall be fresh, clean, and new crop seed having been tested within 6 months prior to the date of seeding composed of the varieties mixed in proportion by weight as shown and testing the minimum percentage of purity and germination indicated. Seed shall have the equivalent of a minimum of 80 percent pure, live seed. When the percentage of purity multiplied by the percentage germination gives a percentage of pure, live seed less than the 80 percent, the rate of seeding shall be increased proportionately.

$$\text{Adjusted pounds per acre} = \frac{\text{Specified Pounds} \times 80}{\text{Actual Pure, Live Seed Percent}}$$

All seeds used shall be labeled in accordance with U.S. Department of Agricultural Rules and Regulations under the Federal Seed Act in effect at the time of installation of the work involved under seeding operations. All seeds shall be furnished in sealed standard containers. Seed may be mixed by dealers or by approved method on the site. Weed seeds shall not exceed 0.35% by weight of the total amount supplied.

If seed is mixed by dealers, the dealer's guaranteed statement of composition of mixture and percentage of purity and germination of each variety must be furnished. If the Contractor desires to mix the seed at the site, the operation shall be performed under the supervision of

the Engineer. Individual varieties of seed must be delivered in a separate unopened original container and the dealer's guaranteed analysis for each variety must be furnished.

The seed shall be proportioned by weight properly mixed and sown by any approved method which will insure uniform distribution over the areas, except that a farm drill shall not be used. The prescribed seeding shall be sown on the following dates in the IDOT Districts specified below:

In Districts 1 through 6, the planting times shall be April 1 to June 15 and August 1 to November 1. In Districts 7 through 9, the planting times shall be March 1 to June 1 and August 1 to November 15. Seeding may be performed outside these dates provided the Contractor guarantees a minimum of 75 percent uniform growth over the entire seeded area(s) after a period of establishment. Inspection dates for the period of establishment will be as follows: Seeding conducted in Districts 1 through 6 between June 16 and July 31 will be inspected after April 15 and seeding conducted between November 2 and March 31 will be inspected after September 15. Seeding conducted in Districts 7 through 9 between June 2 and July 31 will be inspected after April 15 and seeding conducted between November 16 and February 28 will be inspected after September 15. The guarantee shall be submitted to the Engineer in writing prior to performing the work. After the period of establishment, areas not exhibiting 75 percent uniform growth shall be interseeded or reseeded, as determined by the Engineer, at no additional cost to the Department.

No seed shall be sown during high winds or when the ground is not in a proper condition for seeding, nor shall any seed be sown until the purity test has been completed for the seed to be used, and shows that the seed meets the noxious weed seed requirements. The Engineer shall examine and then approve the equipment to be used. Prior to starting work, seeders shall be calibrated and adjusted to sow seeds at the proper seeding rate. Equipment shall be operated in a manner to insure complete coverage of the entire area to be seeded. The Engineer shall be notified 48 hours prior to beginning the seeding operations so that he can determine by trial runs that a calibration of the seeder will provide uniform distribution at the specified rate per acre. When seed or fertilizer is applied with a hydraulic seeder, the rate of application shall be not less than 1000 gallons of slurry per acre. This slurry shall contain the proper quantity of seed or fertilizer specified per acre. When using a hydraulic seeder the fertilizer nutrients and seed shall be applied in two separate operations.

The optimum depth for seeding shall be 1/4 inch.

Delete the first row of the table in Article 250.07 and substitute the following:

Class-Type	Seeds	lb/acre
1 Lawn Mixture (special)	Ky Bluegrass Perennial Ryegrass	120 80

END OF SEEDING AND FERTILIZING

EROSION CONTROL BLANKET
SECTION S- 25100630

This Special Provision revises Section 251 of the Standard Specifications for Road and Bridge Construction to eliminate the use of Excelsior Blanket for Erosion Control Blanket. This work shall consist of furnishing, transporting, and placing 100% biodegradable erosion control blanket over seeded areas as detailed on the drawings, according to Section 251 except as modified herein.

Delete Article 1081.10(a) Excelsior Blanket

Delete the first paragraph of Article 1081.10 (b) Knitted Straw Mat and substitute the following:

> Knitted Straw Mat. Knitted straw mat shall be long-term, double net erosion control blanket with a machine produced mat of 100 percent coconut fiber with a functional longevity of up to 24 months. The blanket shall be of consistent thickness with the coconut evenly distributed over the entire area of the mat. The blanket shall be covered on its top and bottom sides with 100 percent biodegradable woven natural organic fiber netting. The netting shall consist of machine directional strands formed from 2 intertwined yarns with cross-directional strands interwoven through the twisted machine strands (commonly referred to as Leno weave) to form an approximate 1/2-inch x 1-inch mesh. The blanket shall be sewn together on 1.5 inch centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2 inches to 5 inches from its edge) as an overlap guide for installing adjacent mats. The blanket shall have the following properties: Thickness 0.28 inch, water absorbency 365%, weight 8.8 oz/sy, stiffness 0.11 oz-inch, tensile strength-MD 141.6 lbs/ft, Elongation-MD 14%, tensile strength-TD 222 lbs/ft, elongation-TD 14.3%, maximum permissible unvegetated shear stress 2.35 lbs/sf, maximum permissible unvegetated velocity 10 ft/s; trade name North American Green C125BN or approved equivalent.
>
> Short-term photodegradable erosion control blanket will not be allowed.

Delete Article 1081.10(d) Wire Staples.

Add the following to Article 1081.10 (e) Wood Stakes:

> Biodegradable plastic stakes will be allowed. The biodegradable plastic anchor shall be approximately 6 in (15.24 cm) in length. No metal wire stakes will be allowed.

END OF EROSION CONTROL BLANKET

PERIMETER EROSION BARRIER
SECTION S- 28000400

This Special Provision revises Section 280 of the Standard Specifications for Road and Bridge Construction to revise the perimeter erosion barrier materials. This work shall be performed according to Section 280 except as modified herein.

Delete the second paragraph of Article 280.04 (b) and substitute the following:

> The barrier shall be constructed with filter fabric and shall meet the requirements of Illinois Urban Manual Material Specification 592 Geotextile, Table 1 or 2, Class I with equivalent size of at least 30 for nonwoven and 40 for woven fabric. Silt fence posts shall be either standard steel T posts or wood posts with a minimum cross-section area of 3 square inches.

END OF PERIMETER EROSION BARRIER

CATCH BASINS AND MANHOLES
SECTION S- NR602003

This work shall consist of constructing catch basins and manholes in accordance with Section 602 of the Standard Specifications and Highway Standard numbers 602001, 602016 and 602401 except as shown in the drawings and/or as specified below:

A. The 5' diameter screening catch basin shall:

1. be constructed with a special flat slab top and 5' square floor door.
2. have a special screen fabricated and installed in the catch basin.
3. have the existing butterfly valve salvaged from the inlet of the existing 4' diameter catch basin and installed at the inlet of the proposed 5' diameter catch basin.

B. The 3' diameter catch basin shall be constructed with a flat slab top with a type 1 frame, ballast screen and closed lid. The frame, ballast screen, and lid shall be anchored to the flat slab top as shown in the drawings.

C. The 5' diameter manhole shall have a top section length of at least 8 feet.

Delete the first sentence of Article 602.08 and substitute the following:

> Steps. Steps, when required, shall be copolymer polypropylene with ½" Grade60 Steel reinforcement as manufactured by MA Industries PSI-PF or American Step Co., Inc. ML-10 or approved equal.

Delete the first paragraph of Article 602.16 and substitute the following:

When new construction is specified, this work will be paid for at the contract unit price per each for CATCH BASINS, MANHOLES, INLETS, DRAINAGE STRUCTURES, or VALVE VAULTS, of the type and diameter specified, and with the type of frame and grate or frame and lid or floor door specified, or median inlet number specified, and all screens as called out on the drawings and defined in the details, and all excavation and backfill required for installation.

END OF CATCHBASINS AND MANHOLES

TEMPORARY COFFERDAM SYSTEM
SECTION S- NR502016

Description. This work shall consist of furnishing all labor, materials and equipment necessary to construct, maintain and subsequently remove a Temporary Cofferdam System as required to construct the project.

Construction Requirements. Cofferdams shall consist of watertight enclosures surrounding excavations. When cofferdams are not specified in the contract documents and conditions are encountered where the excavation for the structure cannot be kept free of water for prosecuting the work by pumping and/or diverting water by the use of sheeting or dikes, the Contractor, with written permission of the Engineer, will be permitted to construct a cofferdam.

The cofferdams shall be designed, constructed, and removed with the Engineer's approval. The Contractor is fully responsible for the design of the cofferdam and may propose systems including prefabricated dams, inflatable dams, engineered structural components consisting of timber, standard steel sheet pile sections, structural steel sections, cylindrical metal shells, etc. Earthen embankments or dikes will not be classified as cofferdams.

After having served its purpose, the temporary cofferdam and all associated materials used in conjunction with the temporary cofferdam shall be removed in a manner approved by the Engineer and shall remain the property of the Contractor.

The Contractor must submit a work plan for all work associated with the installation, maintenance, and removal of the coffer dam including, but not limited to all erosion and sediment control and monitoring, concrete placement and demolition, transferring construction materials in and out of the Cofferdam, placement of mud sills, as well as other details left open to choice or not fully detailed on the drawings. The design and method of construction shall provide, necessary clearance for forms, inspection of exterior of the forms, pumping, and protection of fresh concrete from rising water. These drawings shall be prepared and sealed by an Illinois Licensed Structural Engineer and submitted to the Engineer within 14 days from Notice to Proceed and approved prior to the start of construction. The selected cofferdam system must be shown to meet state floodplain regulations and local floodplain ordinances.

Method of Measurement: This work will be measured for payment as a single lump sum item. All diversion structures and appurtenances required for any and all of the proposed and/or required

construction shall be included in the single lump sum item.

Basis of Payment. This work will be paid for at the contact lump sum price for TEMPORARY COFFERDAM SYSTEM, which payment shall constitute full compensation for all labor, equipment, materials, maintenance, cleanup and restoration in the event of cofferdam failure or overtopping, the removal and disposal of all materials, and all other items necessary to complete this work.

END OF TEMPORARY COFFERDAM SYSTEM

DEWATERING
SECTION S- X0426200

This Special Provision revises Section 502.08 of the Standard Specifications for Road and Bridge Construction to define performance criteria for dewatering of a cofferdam. This work shall be performed according to Section 502.08 except as modified herein.

Delete Article 502.08 and substitute the following:

The Contractor shall design, provide, operate, monitor and maintain systems of sufficient scope, size and capacity to control groundwater, surface water, storm water, and all other water flow into excavations and to permit construction to proceed on dry, stable subgrades:

1. Maintain water control systems to ensure erosion control, and stability of excavations and constructed slopes, such that excavation does not flood and that damage to subgrades and permanent structures is prevented.
2. Discharge water into a sediment trap, into a ditch or temporary ditch that leads to a sediment trap, into a sediment containment filter bag, or alternative such that sediment, suspended solids, oils, cement, bentonite, and other contaminants are removed to levels acceptable to authorities having jurisdiction over receiving waters.
3. Prevent surface water from entering excavations by grading, dikes, ditches, and other means.
4. Accomplish control of water and dewatering without damaging existing buildings adjacent to excavation.
5. Remove water control systems when no longer needed.
6. On completing the work, clean out and dispose of all sediments and residues in settling basins and treatment facilities. Dispose of sediments and residues in accordance with applicable regulations.

The Contractor shall submit a Water Control Plan describing the proposed method for control, handling, treatment, and disposal of water. As a minimum, describe the following:

1. Methods of controlling water (such as cutoff, dewatering, sumping), equipment, and power supply.
2. Details of dewatering wells and wellpoints, including location, size, depth, spacing, length and type of screen; pumping capacity; locations of headers and discharge lines; means of discharge and disposal of water; and method of monitoring discharge.

3. Schedule of installation and operation of water control facilities.
4. Means of monitoring groundwater levels and piezometric pressures.
5. Sediment and pollution control facilities
6. Discharge locations to be used.
7. Resubmit, as appropriate, if the system or any part thereof is modified during installation or operation.

END OF DEWATERING

CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED SECTION S- NR664005, S- NR664006

Description. This work shall consist of removing and re-erecting fencing and/or gates at the locations shown on the drawings or as directed by the Engineer.

General Requirements. The Contractor shall remove the fence and/or gates in a work-manlike manner by any suitable means that does not damage the fence. The fence and/or gate shall be removed and re-erected per the drawings or as directed by the Engineer. Re-erection of the existing fence shall be performed per applicable portions of section 664 of the Standard Specifications and per standard 664001.

Method of Measurement. The fence and/or gate removal and re-erection will be measured for payment in place, in feet.

Basis of Payment. The work will be paid for at the contract unit price per foot for CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED, of the height specified, and at the contract unit price per each for CHAIN LINK GATE TO BE REMOVED AND RE-ERECTED, of the opening sizes and types specified, which prices shall include all labor, materials and equipment to complete the work including but not limited to removing and reassembling existing fence, posts and gates, repair or replacement of existing material, cleaning posts, concrete for foundations, and removing and disposing of post foundations. If gates are not the same height as the adjacent fence and have fencing above the top of the gate, the cost of installing that portion of the fence above the gate shall be considered included in the cost of the gate. Damage to the existing fence and/or gate or posts to be reinstalled due to improper construction procedures or carelessness on the part of the Contractor shall be repaired in kind at no cost to the Department.

END OF CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED

WOOD INFORMATION SIGNS
SECTION S- NR720001

Description. This work shall consist of furnishing, fabricating, installing and subsequent removal and disposal of the wood information signs at the locations shown in the drawings or as directed by the Engineer.

General Requirements. The posts shall be installed in a vertical hole not exceeding 12 inches in diameter and not less than three feet deep. The posts shall be centered in the holes and then backfilled with CA6 thoroughly tamped in 12 inch lifts. The post material shall be according to the details shown in the drawings and as described in Article 1007.05 of the Standard Specifications for Road and Bridge Construction.

The signs shall be plumb at all times throughout the duration of the project and readjusted as directed by the Engineer.

Method of Measurement. This work will be measured for payment per each for WOOD INFORMATION SIGNS.

Basis of Payment. This work will be paid for at the contract unit price per each for WOOD INFORMATION SIGNS.

END OF WOOD INFORMATION SIGNS

PUMP STATION
SECTION S- Z0047700

PART 1 GENERAL

1.01 DESCRIPTION

A. This item will consist of the following:
1. Decommissioning, disconnecting, salvaging, and storage of existing pumping equipment;
2. Modifications to the pump system to extend the existing columns and shafts of the 2 turbine pumps and the pipe on the submersible pressure maintenance pump as required to meet the new elevations shown on the drawings;
3. Reinstallation of the modified pumping equipment;
4. Reconnection of all piping, valves, gages, motors, heat exchanger hoses and appurtenances into their original configuration;
5. Reconnection of all electrical power and control wiring into their original configuration; and
6. Furnishing and replacing seals, gaskets, nuts, bolts, and other items shown for

replacement in the drawings.
7. Furnishing and replacing control valve boxes.
8. Commissioning and testing of reinstalled pump system.

B. Work shall be done in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the drawings or as required by the Engineer. The work under this section is subject to the requirements of the contract documents.

C. The parts required to modify the pump system shall be obtained from, and/or recommended by, the original pump system manufacturer, Flowtronex, and shall be the same or better materials, quality and finishes as the components that they are being used to modify.

D. New connection angles shall be bolted to the bottom of the pump system baseplate to provide secure connection to the new wet well.

E. Other items such as the wet well, intake structure, screening manhole, storm sewers, and piping and miscellaneous related work are covered elsewhere in these specifications.

F. The pump station must remain fully operational at all times between April 15th and October 15th.

1.02 RELATED WORK

A. As specified in the following Sections:
1. Section 15010 – General Provisions for Mechanical Work
2. Section 15050 – Basic Mechanical Materials and Methods
3. Section 15100 – Basic Mechanical Requirements
4. Section 15120 – Piping
5. Section 16010 – Basic Electrical Requirements
6. Section 16100 – Basic Materials and Methods
7. Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition

1.03 REFERENCES:
A. UL 778 -Motor Operated Pumps.
B. Hydraulic Institute Standards.
C. NFPA 70 National Electrical Code.
D. NEMA 48 – Motor Frame.
E. ANSI.
F. IEEE – Motor Efficiency.

PART 2 MATERIALS

2.01 CONDUIT AND CABLE

A. Conduit and power cable used to reconnect the power feed to the reinstalled pump shall be Rigid Galvanized Steel Conduit in accordance with Section 16100.

2.02 PIPING

A. Piping and fittings used to reconnect existing piping to the reinstalled pump shall meet the requirements of Section 16100, and shall match existing pipe in size, material, and jointing.

2.03 GROUNDING

A. The reinstalled pump shall be grounded in accordance with Section 16010.

2.04 VALVE BOXES

A. The Contractor shall furnish and replace existing control valve boxes with heavy-duty, weather rated, and waterproof boxes of the same size and cover pattern and markings as existing.
   1. Valve boxes must be precast concrete.
   2. Valve boxes must not have side openings.
   3. Covers must be concrete or steel. Steel covers must be hinged with brass hinge pins for valve boxes containing valves smaller than 2 inches.
   4. Covers must be marked with "CONTROL VALVE" in cast-in letters not less than 1 inch high.
   5. Covers must be 1 piece, except when the weight of the valve box cover exceeds 35 pounds, then the cover must be 2 pieces.
   6. If the valve box covers are steel, they shall be painted green. The Contractor shall submit color to the Engineer for approval.

2.05 SUBMITTALS

A. Contractor shall submit a Pump System Installation Plan which details decommissioning procedures, disassembly of existing pump system, storage of pump system components, reassembly and installation of pump system, and commissioning and testing of reinstalled pump system. This submittal must take into account the original pump system manufacturer's recommendations, and must be submitted within 30 days of Notice To Proceed, and no less than 30 days prior to disassembly of the existing pump system. Contractor may not proceed with disassembly of existing pump system until approval of the Plan is obtained.

PART 3 EXECUTION

3.01 PUMP DECOMMISSIONING INSPECTION:

A. Before commencing work, examine subgrade/sub-surface to determine that they are free of conditions which might be detrimental to proper and timely completion of the work. Start of work must indicate acceptance of the subgrade/sub-surface conditions.

B. Prior to decommissioning and removing pump station, the Contractor shall meet with the Engineer to document the existing operational conditions of all components to be salvaged and reinstalled. If the existing pumping equipment, intended for salvaging and reinstallation, is deemed as damaged from the Contractor's operations, as determined by the Engineer, the Contractor shall furnish and replace in-kind, at the his/her own expense.

C. Prior to decommissioning and removing pump station, the Contractor shall record & document existing as-built conditions, including layout and connections, that deviate from the Plan's and Operation and Maintenance (O&M) Manual's record information, so that he/she may be able to re-assemble the pump station during re-installation.

3.02 PUMP COMMISSIONING

A. Pump commissioning shall be in accordance with article 3.19 of Section 15100 Basic Mechanical Requirements and as directed by the Engineer.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT:

A. The Pump Station Mechanical and Electrical Work, complete, to make the whole construction and installation complete and operational, will be measured in place on a Lump Sum basis, for the entire work required as shown on the Drawings and as specified in these Specifications.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT:

A. Payment for the Pump Station Mechanical and Electrical Work will be made at the Contract Lump Sum Price for PUMP STATION, measured as specified herein. This price will be full compensation for furnishing all materials and for all preparation, decommissioning and salvaging; placing of materials; furnishing and installation of all mechanical modifications, and related electrical, and all other work as may be required to complete the item as shown on the Drawings and specifications; incidental items such as electrical connection materials, control valve handholes, and pipe connectors or extensions, etc.; and all labor, equipment, tools, materials, testing, and incidentals necessary to complete and make operational the work as specified.

B. Excavation, concrete removal, fencing, and structure construction will not be included

in the Lump Sum payment for PUMP STATION; but will be paid for separately under separate items.

C. Electrical power connections, additional conduit, and cable associated with reconnecting the Pump Station's mechanical equipment will be incidental to PUMP STATION, Lump Sum.

D. Communication and cable associated with reconnecting the Pump Station's mechanical equipment will be incidental to PUMP STATION, Lump Sum.

E. Payment will be made under the following item:

ITEM #	DESCRIPTION	UOM
Z0047700	Pump Station	LS

END OF PUMP STATION

GENERAL PROVISIONS FOR MECHANICAL WORK
SECTION 15010

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

B. All sections of Construction Specifications Institute (CSI) mechanical and electrical, Divisions 15 and 16, apply to this section.

1.02 SUMMARY

A. The work under Division 15, Mechanical Work must include all labor, services, materials and equipment and performance of all work required for the installation of all mechanical work as shown on the Drawings and herein specified in the following Sections.

B. Should there be any discrepancies or a question of intent, refer the matter to the Engineer for decision before ordering any equipment or materials or before starting any related work.

C. Where work connects to existing facilities, or to piping or equipment in place, take in-field measurements to align connections properly.

D. Minor items and accessories or devices reasonably inferable as necessary, to the complete and proper installation and operation of any system, must be provided by the Contractor for such system, whether or not they are specifically called for by the Specifications or Drawings.

E. The Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified must be performed or furnished as though mentioned in both Specifications and Drawings. If there is a discrepancy between the Drawings and Specifications as to the quantity or quality to be provided, the greater quantity or the better quality must be provided at no additional cost.

1.03 DEFINITIONS

A. "Piping" includes, in addition to pipe, all fittings, valves, seals/gaskets, and other supports and accessories related to such piping.

B. "Concealed" means hidden from sight in shafts, embedded in construction, or buried.

C. "Exposed" means not installed underground or "concealed" as defined above.

D. "Invert Elevations" means the elevation of the inside bottom of pipe.

E. "Mechanical Work" is all of the work in Division 15.

1.04 SUBMITTALS – Refer to Basic Mechanical Requirements Section 15100.

1.05 QUALITY ASSURANCE

A. For Contractor furnished items, code Ratings, labels or other data which are die-stamped or otherwise affixed to the surface of the equipment must be in visible location.

B. All equipment provided under Division 15 to perform with the least possible noise and vibration consistent with its duty. Quietness of operation of all equipment is a requirement. Any equipment, as determined by the Engineer to be producing objectionable noise or transmitting noise or vibration to the building to be repaired or removed and replaced.

C. All workmanship must be first class in every respect and must be performed only by skilled mechanics.

D. Notify Engineer of broken or open pipes or other damaged pump station equipment discovered during construction.

E. Layout and establish the lines and levels necessary for work.

F. The following Standards must be used where referenced by the following abbreviations:

1. AABC: Associated Air Balance Council
2. ADC: Air Diffusion Council
3. AGA: American Gas Association
4. AIA: American Institute of Architects
5. AMCA: Air Moving and Conditioning Association
6. ANSI: American National Standards Institute
7. ARI: Air Conditioning and Refrigeration Institute
8. ASE: Association of Safety Engineers
9. ASHRAE:American Society of Heating, Refrigeration and Air Conditioning Engineers
10. ASME: American Society of Mechanical Engineers
11. ASTM: American Society of Testing and Materials
12. AWS: American Welding Society
13. EPA: Environmental Protection Agency
14. FM: Factory Mutual Insurance Association
15. HIS: Hydraulic Institute Standards
16. IRI: Industrial Risk Insurers
17. IEEE: Institute of Electrical and Electronics Engineers
18. MCAA: Mechanical Contractors' Association of America
19. NIST: National Institute of Standards and Testing
20. NEBB: National Environmental Balancing Bureau
21. NEC: National Electric Code

22. NECA: National Electric Contractors Association
23. NEMA: National Electrical Manufacturers Association
24. NSC: National Safety Council
25. OSHA: Occupational Safety & Health Administration
26. SAE: Society of Automotive Engineers
27. SMACNA: Sheet Metal and Air Conditioning Contractors National Association
28. TIMA: Thermal Insulation Manufacturers Association
29. UL: Underwriters' Laboratories
30. USDA: United States Department of Agriculture

H. Project Certification:

1. The Contractor shall submit a project certification, guaranteeing that this project was constructed and will operate in accordance with the performance requirements of the Drawings and Specifications. This certification must be signed by a principal of the firm and must be delivered to the Engineer prior to final payment.

I. Drawings:

1. The Drawings are essentially diagrammatic in nature and show general arrangement of the equipment, piping, ductwork, accessories, etc. Because of the small scale of the Drawings, it is not possible to show all offsets, fittings, and accessories, which may be required. The Contractor shall carefully investigate the existing pump station facilities; field conditions; the Drawings, which contains the existing pump station record drawings; the Operations & Maintenance (O&M) Manual, which includes the Manufacturer's Instruction Manual; existing equipment to be salvaged and reinstalled; and exact location of service connections; the intended finished conditions of the work; and arrange work schedule accordingly; and furnish any fittings, piping, and mechanical accessories that may be required to meet such conditions.
2. Any changes from the drawings necessary to make the work conform to the pump station improvements, or to conform to rules of the governing authorities and regulations, must be met without extra cost to the Department.
3. The layout of the piping, equipment, etc., as shown on the Drawings must be checked, and exact locations must be determined by the dimensions of equipment to be installed/re-installed, and Contractor must obtain the Engineers' approval for revised layout before the apparatus is installed.

J. Minor Deviations:

1. The dimensions of equipment hereinafter specified or indicated on the Drawings are intended to establish the outlines and characteristics of such equipment in general. Minor deviations in dimensions will be permitted to allow the manufacturers specified to bid on their nearest stock equipment, provided the specified ratings are met or exceeded.
2. Where manufacturers' catalog numbers or types are mentioned in the Specifications or indicated on the Drawings, they are intended to be used as a guide only and must not be interpreted as taking precedence over the basic rating and duty specified. In

all cases, the Contractor must verify the duty specified with particular characteristics of the equipment they intend to submit for approval.

K. Interferences:

1. Before making any installation, the work of the trades must be coordinated and the necessary changes must be made to avoid interferences or improper effect on work to be performed by any other Section. In the event that interferences develop, the Engineer's decision will be final and no additional compensation will be allowed for moving of misplaced piping, conduit and/or equipment.

1.06 SALVAGING, STORAGE, AND HANDLING - Refer to Basic Mechanical Requirements Section 15100.

1.07 SEQUENCING AND SCHEDULING

A. The Contractor shall notify the Department prior to decommissioning and commissioning the pump station.

B. The Contractor shall sequence the work to include: decommissioning, disassembly of existing pump system, storage of pump system components, reassembly and installation of pump system, and commissioning and testing of reinstalled pump system.

1.08 WARRANTY – Refer to Basic Mechanical Requirements Section 15100.

PART 2 PRODUCTS

2.01 MANUFACTURERS – NOT APPLICABLE

2.02 MATERIALS AND EQUIPMENT

A. Unless otherwise specified, all material and equipment, shown as to be replaced or noted as being provided by the Contractor, must be furnished new.

B. Material and equipment specified by one or more manufacturer's name, trade name and/or model number does not limit a bidder from bidding on other equipment providing the procedure set forth in the Conditions of the Contract and hereinafter specified is followed.

C. Contractor who intends to furnish equipment listed as approved equal must proceed as follows:

1. Obtain Engineer's approval of said equipment.
2. Be fully responsible for said equipment.
3. Include in the Base Bid, all cost for any changes that may be required in his work and/or work of other trades for the proper installation and functioning of said

equipment.

PART 3 EXECUTION

3.02 ALTERATIONS IN EXISTING CONDITIONS / SITE

A. The Contractor shall take particular note of the revisions and alterations of existing services, utilities, etc., due to the new construction, as indicated on the Drawings, and/or as required by alterations to the existing site.

3.03 INSTALLATION

A. The Contractor shall be responsible for all of his work, fitting into place, in a satisfactory and neat workmanlike manner, and acceptable to the Engineer.

B. Unless explicitly stated to the contrary, the Contractor shall install each item of equipment or material hereinafter specified, complete with all necessary fittings, supports, trim, piping, etc., as required for a complete and operating installation.

C. All equipment and materials must be installed according to the manufacturer's instructions unless otherwise specifically directed by the Contract Documents. All piping, valves, connections, and other like items, recommended by the manufacturer or required for proper operation, must be provided without additional cost.

D. Locations of items not definitely fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined, at the site, subject to review.

E. Where there is evidence that parts of the Mechanical Work will interfere with other work, assist in working out space conditions and/or the structure, make necessary adjustments to accommodate the work.

F. Mechanical Work installed before coordinating with other work, so as to cause interference with other work, must be changed to correct such condition without additional cost.

G. Accessibility:

1. Provide access panels in equipment and like items for inspection of interiors and proper maintenance.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT

A. Complying with General Provisions for Mechanical Work will not be measured separately, but will be included in the work performed under Section Z0047700 – Pump Station.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT

A. Complying with General Provisions for Mechanical Work will not be paid for separately, but will be included in the payment for the work performed under Section Z0047700 – Pump Station.

END OF SECTION 15010

BASIC MECHANICAL MATERIALS AND METHODS

SECTION 15050

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

B. All sections of Construction Specifications Institute (CSI) mechanical and electrical, Divisions 15 and 16, apply to this section.

1.02 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.

1. Equipment nameplate data requirements.
2. Field-fabricated metal and wood equipment supports.
3. Installation requirements common to equipment specification sections.
4. Cutting and patching.

1.03 DEFINITIONS

A. Finished Spaces: Unheated spaces, unexcavated spaces, access spaces, etc.

B. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions.

1.04 SUBMITTALS

A. Product Data: For material and equipment, shown as to be replaced or noted as being provided by the Contractor.

B. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with decommissioning, disconnecting, salvaging/storing, re-installation, and commissioning. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

1. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly.
2. Equipment and accessory service connections and support details.
3. Exterior installations.
4. Scheduling, sequencing, movement, and positioning of large equipment during construction.

1.05 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. American Society for Testing and Materials
   a. ASTM A 53-98: Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

2. American Welding Society
   a. AWS A5.8-92: Specification for Filler Metals for Brazing and Braze Welding
   b. AWS D1.1-98: Structural Welding Code--Steel
   c. AWS D10.12-89: Recommended Practices and Procedures for Welding Low Carbon Steel Pipe
   d. Brazing Handbook. 1991.

3. ASME International
   a. ASME B1.20.1-83 (Reaffirmed 1992): Pipe Threads, General Purpose (Inch)
   b. ASME B16.21-92: Nonmetallic Flat Gaskets for Pipe Flanges
   c. ASME B18.2.1-96: Square and Hex Bolts and Screws--Inch Series
   d. ASME B31 Series: Code for Pressure Piping
   e. 1998 ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications"

4. Copper Development Association Inc.
   a. Copper Tube Handbook. 1995.

5. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
   a. MSS SP-107-91: Transition Union Fittings for Joining Metal and Plastic Products

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

1.06 SALVAGING, STORAGE, AND HANDLING

A. Protect salvaged and stored pipes, shafts, railing, top plate, fittings, flanges, pumps, motors and other components from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate phasing and sequencing of all work with the Engineer.

B. Coordinate mechanical equipment re-installation with other components.

C. Coordinate installation of required supporting devices and sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment

requiring positioning.

E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before concealment.

F. Coordinate connection of electrical services.

1.08 WARRANTY

A. Provide warranty on furnished materials and labor for 18 months starting from date of delivery, or one year from date of substantial completion, whichever is longer.

B Refer to Basic Mechanical Requirements Section 15100 for additional Warranties and Guarantees.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, all furnished components, accessories and appurtenances shall be by the original pump system manufacturer, Flowtronex, or per their recommended parts, or approved equal, to insure compatibility and integrity of the individual components, and to provide the specified warranty for all components.

2.02 MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. All materials, such as joining materials, gaskets, seals, connectors, etc., that are to be replaced, shall be in-kind in size and material properties, suitable for chemical, thermal, and performance conditions of the pump station equipment, and the surrounding exterior conditions (such as local weather).

C. Unless otherwise specified, all items of structural steel, bolts, nuts and washers shall be galvanized in accordance with ASTM B 633, with minimum coating weight of 2.0 oz/sf for steel products and hardware; and 1.25 oz/sf for bolts, screws, nuts & washers. Expansion anchors and anchor bolts shall be of Type 304 stainless steel.

D. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

E. Flexible Connectors: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:

1. 2-Inch NPS and Smaller: Threaded.
2. 2-1/2-Inch NPS and Larger: Flanged.
3. Option for 2-1/2-Inch NPS and Larger: Grooved for use with keyed couplings.

2.06 EQUIPMENT INSTALLATION -COMMON REQUIREMENTS

A. Install equipment to provide maximum possible clearance from top of pit, if mounting heights are not indicated.

B. Install equipment according to approved submitted installation plan. For portions of the Work are shown only in diagrammatic form, refer conflicts to Engineer.

C. Install equipment level and plumb, parallel and perpendicular to other components in interior/exterior spaces, unless otherwise indicated.

D. Install mechanical equipment to allow ease in future service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

2.07 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

2.08 CUTTING AND PATCHING

A. Cut, channel, chase, and drill walls, slabs, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT

A. Mechanical Materials will not be measured separately, but will be included in the work performed under Section Z0047700 – Pump Station.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT

A. Mechanical Materials will not be paid for separately, but will be included in the payment for the work performed under Section Z0047700 – Pump Station.

END OF SECTION 15050

BASIC MECHANICAL REQUIREMENTS
SECTION 15100

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Work under this Section is subject to the requirements of the Contract Documents.

B. The scope of Mechanical Work for this Project is:

1. Modify and re-Install the existing vertical turbine main pumps, complete, with submersible pressure maintenance pump, with all valves, piping, and accessories, as shown on Contract Drawings.

C. This Section includes general provisions for Mechanical Work. This Section supplements other Sections within the Mechanical Division 15 and is an overview of all the Mechanical Work that is to be done.

D. This Section describes Basic Mechanical Requirements for Mechanical Systems. The Contractor is to verify the adequacy of all equipment installed.

1.02 RELATED WORK:

A. As Specified in the following Divisions/Sections:

1. Section Z0047700 – Pump Station.

1.03 REFERENCES:

A. Where indicated, comply with requirements and recommendations of the standards or publications listed, except where more detailed and stringent requirements are required by other regulations or specified herein.

1. Building Codes of the State of Illinois.
2. Air Moving and Conditioning Association.
3. American Institute of Architects.
4. American National Standards Institute.
5. American Society of Heating, Refrigeration and Air Conditioning Engineers.
6. American Society of Mechanical Engineers.
7. American Society of Plumbing Engineers.
8. American Society for Testing Materials.
9. American Welding Society.

10. Associated Air Balance Council.
11. Association of Safety Engineers.
12. Cast Iron Soil Pipe Institute.
13. Electronic Industries Association.
14. Environmental Protection Agency.
15. Factory Mutual Insurance Association.
16. Hydraulic Institute Standards.
17. Industrial Risk Insurers.
18. Institute of Electrical and Electronics Engineers.
19. Manufacturers Standardization Society of the Valve and Fitting Industry.
20. Mechanical Contractors Association of America.
21. National Institute of Standards and Testing.
22. National Electrical Code.
23. National Electrical Contractor Association.
24. National Electrical Manufacturers Association.
25. National Environmental Balancing Bureau.
26. National Fire Protection Association.
27. National Safety Council.
28. Occupational Safety and Health Administration.
29. Sheet Metal and Air Conditioning Contractors National Association.
30. Society of Automotive Engineers.
31. Underwriters Laboratories.

1.04 SUBMITTALS:

B. As-built drawings: For the final record of actual construction and final condition, the Contractor must submit "As-Built" drawings, showing installed location of equipment, piping, and layouts. The use of existing record drawing, as a base, is acceptable as long as the Contractor verifies all dimensions and layout corresponding with constructed conditions.

C. Operation and Maintenance Manuals

1. The Contractor shall supplement and update the existing Operating and Maintenance (O&M) Manuals found in Appendix B and Parts Lists with the following:
   (i) Revised dimensions. Provided exploded views for read-ability, as necessary.
   (ii) Updated material/parts list with amended list of new equipment/materials installed.
   (iii) Verify and update any other addition changes of installed pump station, including layout, piping diagram, calibration process, operating characteristics, settings, and actual equipment/materials installed
   (iv) and document any additional revisions to the existing O&M Manual

2. Instructions are to be in typewritten form.

3. Authorized representatives of the original equipment manufacturers must inspect final installation of equipment at the job site and must then submit a letter to the

Engineer stating that the installation is complete and satisfactory and the equipment will operate satisfactorily when operated in accordance with the operation and maintenance manuals.

1.05 QUALITY ASSURANCE:

A. Products must comply with the specified requirements and must provide a quality no less than that of the manufacturer's standard products, as specified by their published product data. Off-the-shelf items must not be assumed to comply with specified requirements. Do not purchase any materials or equipment until the submittals have been reviewed and approved by the Engineer.

B. Except as otherwise indicated, provide replacement items with new products. All products must be free of defects, damage, and harmful deterioration. Provide each product complete with trim, accessories, finishes, guards, safety devices, and similar components recognized as integral to the product or required by governing regulations. To the greatest extent possible and unless otherwise indicated, complete the fabrication, assembly, finishing and testing of products prior to delivery to the site.

C. Contractor Qualifications: Installation of mechanical equipment, specialties and accessories, and repair and servicing of equipment must be performed only by a qualified Contractor. The term qualified must mean experienced in such Work. The Contractor must have successfully completed a minimum of five (5) projects similar in size and scope to this Project. The Contractor must be familiar with all precautions required and must comply with all the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Engineer.

D. Manufacturer Qualifications: The Company manufacturing the products specified in this Division must have a minimum of five years documented experience.

1.06 SALVAGE, STORAGE AND HANDLING:

A. Components and equipment shall be properly identified and inventoried for delivery or salvaging and storing. Items must be adequately packaged to protect and prevent deterioration during delivery, salvaging, storage and handling. Except where prepared and protected specifically for exterior storage, store products in a dry and well-ventilated indoor space. Storage requirements, at the site must be minimized by coordinating the moving of mechanical materials and equipment, with the scheduling and sequencing of the Work.

B. Prepare products for shipping and for moving to storage as follows:

1. Ensure products are dry and protected against rust and corrosion.
2. Protect product ends against damage to threads, flange faces, and weld-end preps.

3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling, set ball and plug valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open; and block swing check valves in either closed or open position.

C. Storage: Use the following precautions during storage:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.

2. If outdoor storage is necessary, support products off the ground or pavement in watertight enclosures.

D. Handling: Do not use component lifting points to lift entire pump assembly. Follow original pump system manufacturer's recommendations for lifting. Do not use valve handwheel and stems as lifting or rigging points. Comply with manufacturer's rigging instructions for handling.

E. Clean flanges and exposed machined metal surfaces and treat with an anticorrosion compound. Protect flanges, pipe openings, and nozzles.

F. Protect bearings and couplings against damage from sand, grit, and other foreign matter.

G. Dry internal parts with hot air or a vacuum-producing device to avoid rusting internal parts. Upon drying, coat internal parts with a protective liquid, such as light oil, kerosene, or antifreeze. Dismantle bearings and couplings, dry and coat them with an acid-free heavy oil, and then tag and store in dry location.

H. Access and storage area:

1. Storage area must be protected from construction traffic.

2. Storage area must be freely accessible to inspect the stored items for any damage or deterioration before final installation.

3. All access route and storage areas must be subject to the approval of the Engineer to reduce interference with site operations.

1.07 SPECIAL REQUIREMENTS:

A. Field Measurements – Before proceeding with the fabrication and re-installation, the Contractor must verify all dimensions and take such measurements as are required for proper fabrication and re-installation of the Work.

B. Coordination – Coordinate Work of this Division with related Work specified in other Divisions of the Contract Documents.

A. ID Plates - If ID plate is missing from existing major component of equipment, the

Contractor shall furnish and install a plate with the manufacturer's name, address, model number and rating, and securely affixed the plate on the component in a conspicuous place.

1.08 WARRANTIES AND GUARANTEES:

A. Except where otherwise specifically included in individual Sections, all Mechanical systems must be provided with guarantees as follows:

1. Guarantee all mechanical systems workmanship and new and re-conditioned materials, to be free from defect for a period of 1 year from the date of final acceptance of the Work. Replace or repair in an approved manner any Work which may prove defective or not in compliance with the Contract Documents without additional cost to the Department and without interference with the Engineer's operation.

2. For new components, as applicable, deliver to the Engineer two (2) copies of all manufacturer's or equipment suppliers' warranties made out in the name of the Niles Park District before final acceptance of the Work.

3. Make all adjustments required to ensure operation of the various systems in accordance with the intent of the Contract Documents.

4. All adjustments to ensure the proper operation of the systems must cover a period of 1 year following final acceptance of the Work. The Contractor must be responsible to make all such adjustments required during this period without delay and without additional cost to the Department.

PART 2 PRODUCTS:

A. Base bid must cover products of specified manufacturers only.

PART 3 EXECUTION:

3.01 PRODUCT INSTALLATION AND RE-INSTALLATION GENERAL:

A. Except where more stringent requirements have jurisdiction, comply with manufacturer's installation instructions and recommendations regarding but not limited to: handling, anchorage, assembly, connections, cleaning, testing, charging, lubrication, start-up and shutdown of equipment within the scope of this Project.

B. All equipment moving parts such as gears, pulleys, belts, links, etc., must be covered or guarded in a manner complying with provisions of all pertinent federal, state or local codes, regulations or laws. All guards must be constructed of metal not thinner than 16 gauge.

C. The Contract Drawings serve as working drawings for the general layout of the

various items of mechanical equipment. However, the layout of equipment, accessories, specialties, and piping systems shown are diagrammatic and do not necessarily indicate every required valve, fitting, trap, elbow, etc. The Contractor must provide such items as required for proper and complete installation of the Work.

D. Where new Work is to be applied to existing surfaces, the Contractor must perform demolition and patching that must produce surfaces that are suitable for the new Work. Patching must be performed in a neat and workmanlike manner. Finished surfaces of patched area must be flush with adjacent existing surfaces and must match the existing adjacent surfaces in texture and finish.

E. The Contractor must provide a union upstream of each screwed valve, trap, or strainer, and on each piece of equipment and wherever needed to dismantle piping.

F. Slope of piping to be in accordance with the Contract drawings.

3.02 EXCAVATION AND BACKFILLING:

A. Refer to Standard Specifications for Road and Bridge Construction Section 202 for Earth and Rock Excavation, Section 205 for Embankment, and Section 208 for Trench Backfilling.

3.03 COORDINATION WITH OTHER WORK:

A. Before making any installation, make necessary and proper arrangement for changes required to avoid interference with or detrimental effect on the operation of systems.

B. No additional cost will be charged to the Department for the Contractor's coordination of Work.

C. All Work must be coordinated with all phases of Project Work. If any Work is installed, so that Project Work that will be installed later, will not have required clearances or will interfere with finished design, the Contractor must make such changes in their Work as directed by the Engineer to permit the proper installation of all Work under the Contract.

D. Where, in the opinion of the Engineer, pre-installation changes are deemed necessary to avoid interferences, the Contractor must make these changes.

E. For locations where several elements of Mechanical or Electrical Work must fit into an available space, the Contactor must prepare coordination shop drawings showing accurate physical dimensions. The Contractor must submit these drawings to the Engineer for review prior to purchase, fabrication, and installation of Work.

3.04 COORDINATION:

A. Piping must be positioned straight and aligned with other Work, located close to walls, and placed out of the way with maximum access to equipment that may need future maintenance.

B. Wherever two or more pipes are to be installed in parallel, this piping must be installed with sufficient space between pipes to allow for the proper application of pipe covering, painting and servicing.

C. No pipe, conduit, or equipment shall be installed where it is supported on, or suspended from, another pipe, conduit, or equipment unless called for in the plans or specifications or approved by the Engineer.

D. Accessibility:

1. Install Mechanical Work to permit removal (without damage to other parts) pumps, fan shafts and wheels, belt guards, sheaves and drives, and other parts requiring periodic replacement or maintenance.
2. Arrange pipes, and equipment to permit ready access to valves, starters, motors, dampers, control components, and to clear the openings of access panels.
3. Arrange Work to facilitate maintenance, repair, or replacement of equipment. Locate operating and control equipment and devices for easy access.
4. All unions, valves, meters, gauges or other equipment requiring frequent readings, adjustments, inspections, repairs, replacements or removals must be conveniently and accessibly located within the finished spaces.

3.05 VISITING THE SITE:

A. The Contractor shall review the Contract Drawings and Specifications, and visit the Project site, to be fully acquainted with all existing conditions before submitting a bid.

B. The Contractor shall not proceed with the Work until all locations have been field verified. The Contractor must fully inspect all physical conditions, site characteristics, means of egress from and access to the pump station and site, and any peculiarities or unusual features of the existing structure and site that may affect the cost of the Work.

3.06 WIRING DIAGRAMS:

A. Existing wiring diagrams are provided in the O&M Manual.

B. Contractor must provide each major piece of electrically connected, controlled or operated equipment with project specific wiring diagrams and instruction, if deviating from existing wiring diagrams. Diagrams and instructions must not be of a general or typical nature but applicable only to the specific job.

C. Contractor must furnish and install all conduits and wiring for all automatic control devices, starters and the thermal toggle switches. All Work must be done in accordance with the Electrical Division of these specifications. Control wiring must be 120 volt or

less. All control wiring must be installed in conduit.

3.07 PERMITS AND FEES:

A. The Contractor will be responsible for obtaining and payments for all permits, licenses, certificates and inspections necessary for the execution and completion of the Work except for those that have been obtained and are provided in the "Construction Procedure" special provisions.

3.08 MECHANICAL SYMBOLS:

A. Mechanical Contract Drawings are diagrammatic and show requirements by the use of symbols. In general, these are recognized industry symbols and of the engineering profession. The symbols used to show mechanical Work are from the "ASHRAE Handbook of Fundamentals".

3.09 PROTECTION OF WORK:

A. The Contractor must be responsible for securing and maintaining materials and equipment stored on the premises in a neat and orderly manner and must keep all pipe and equipment openings closed by means of plugs or caps to prevent the entrance of foreign matter during installation. The Contractor must provide and maintain protection for equipment against damage or loss by factors such as vandalism, natural phenomena, dirt and debris, or any other similar type of injury. Protection must continue until the installation is finished and final acceptance has occurred. Prior to acceptance of the Work, all protective coverings, labels, and other types of protection must be removed and disposed of properly.

B. Any equipment or material damaged or contaminated with foreign matter prior to final acceptance of the Work must be thoroughly cleaned and restored to its original condition or replaced by the Contractor at his/her own expense.

C. Provide protective guards for devices such as thermostats, valves, and switches and where directed by Engineer.

D. Protect all Work against injury by freezing or exposure to the weather while stored or installed in place.

E. Motors exposed to moisture must be completely dried out before connection and start-up. Contractor must be responsible for maintaining the equipment and installation Work until Engineer acceptance.

3.10 CUTTING AND PATCHING:

A. The Contractor must cut and patch concrete as required for the installation of Work. Except under detailed written instructions approved by the Engineer, the Contractor must not cut walls, slabs and other members intended to withstand stress. Cut openings through concrete (for pipe penetrations and similar services) by core drilling

with a diamond drill or by sawing.

B. All cutting and patching and repair of damaged areas of Work must be done in a neat and Workmanlike manner.

3.11 ROTATING EQUIPMENT:

A. Before any rotating equipment is put in operation for testing purposes, it must be properly lubricated, with lubricants only as recommended by the manufacturer. As a minimum, this equipment must include pumps that are part of this Project.

3.12 EXPANSION AND CONTRACTION:

A. All piping must be installed throughout the Project with allowance for expansion or contraction to prevent damage to the equipment and piping. Provide anchors and expansion loops or offsets where required for the proper control of movement.

B. All loops or offsets must be supplemented with adequate guides as close as possible to preserve alignment and pitch.

3.13 HOIST, RIGGING AND SCAFFOLDING:

A. The Contractor must provide all necessary scaffolding, cribbing, tackle, hoists and rigging required for the installation of the Work as needed from the starting to the end of the contract period.

B. Scaffolding and hoisting equipment must comply with requirements of all pertinent federal, state and local codes and laws.

3.14 CORROSION PROTECTION:

A. All equipment furnished under this Division must be corrosion protected by the manufacturer or supplier prior to shipment. All surfaces subject to corrosion must be coated with accepted rust preventing compounds before storing. Where equipment is stored in protective crates and boxes, parts must be sealed in heavy-duty plastic bags or containers.

3.15 PAINTING:

A. The Contractor shall submit a surface preparation plan/painting plan and it must include the method of surface preparation and type of equipment to be utilized for solvent cleaning, abrasive blast cleaning, pressure washing and power/hand tool cleaning in accordance with Standard Specifications for Road and Bridge Construction Section 506, and Article 1008.05 Organic Zinc-Rich Paint System using the Three Coat System Requirement. All referenced requirements indicated herein are to be used for new and existing items to be painted.

B. The Contractor shall thoroughly document the existing condition of the salvaged

components using photographs and/or video so that any items that are damaged or deteriorate during construction or storage can be determined. For the salvaged mechanical equipment, any portions of the paint damaged or deteriorated during construction must be recoated to the satisfaction of the Engineer. Recoating shall include the part being cleaned, primed, painted to match the surrounding paint color and using the same paint system described above, and allowed to dry/cure before re-installation.

C. Do not paint nameplates, labels, tag, stainless steel or chromium-plated items such as valve stems, levers, handles, trim strips, etc.

D. After surface preparation, paint mechanical Work in colors to match adjoining Work where not painted under other Sections of this specification. Apply primer and paint in accordance with Section 506 and Article 1008.05 using the Three Coat System of the Standard Specifications for Road and Bridge Construction. Do not paint over fully factory-finished surfaces unless original color is unacceptable. Do not paint over nameplates, nonferrous hardware, sliding/rotating shaft contact surface, and similar surfaces intended for exposure without painting.

3.16 ANCHORING TO CONCRETE PADS:

A. The Contractor must furnish all anchor bolts of adequate size and length to properly anchor all equipment to be installed. Anchor bolts will be set in concrete bases by the Contractor under supervision of the Engineer.

3.17 OPENINGS:

A. The Contractor must be responsible for locating and providing the proper dimensions for all required openings and caulking.

3.18 FIELD QUALITY CONTROL FOR VALVES:

A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, the Contractor must inspect all valves for leaks. Adjust or replace packing to stop leaks; replace valves if leaks persist.

3.19 START-UP AND ACCEPTANCE TEST:

A. The Contractor must provide a Flowtronex field engineer(s), from the original pump system manufacturer, to start-up the systems and perform a 24 hour Acceptance Test to certify that the systems meet capacity requirements. The Engineer and the Golf Course operating personnel must be present to witness this test and accept the pump station after successful 24-hour operation.

1. The 24-hour Acceptance test must be performed in three (3) 8 hour days during the day shift.

B. Make final corrections or adjustments of systems to refine or improve performances. Provide acceptable testing or inspection devices for accurate observations of system performances. Demonstrate that controls and all other items requiring regular service inspection or maintenance are accessible.

C. Adjust all equipment to perform with the minimum noise and vibration consistent with its duty. Any equipment producing noise that is abnormal, in the opinion of the Engineer, must be repaired and/or replaced with satisfactory equipment at the Contractor's expense.

D. Before the final performance test runs of each mechanical system, where applicable: clean systems both externally and internally; replace dirty filters; flush piping systems: clean strainers and traps; lubricate equipment; and remove excess lubrication. Touch-up minor damage to painted finishes.

3.20 CLEANING

A. All parts of the mechanical materials and equipment shall be left in a clean condition prior to Contractor demobilization. Exposed parts shall be clean of cement, dirt and other materials, and all oil and grease spots shall be removed with a non-flammable cleaning solvent. Such surfaces shall be carefully wiped and all cracks, crevices, and corners scraped out.

B. During the progress of the work, the Contractor shall clean up after his workers and shall leave the premises and all portions of the site in which he is working free from debris and surplus materials.

C. At the completion of the work, all mechanical materials and equipment, that appear noticeably dirty, shall be cleaned to the satisfaction of the Engineer.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT

A. Complying with Mechanical Requirements will not be measured separately, but will be included in the work performed under Section Z0047700 – Pump Station.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT

A. Complying with Mechanical Requirements will not be paid for separately, but will be included in the payment for the work performed under Section Z0047700 – Pump Station.

END OF SECTION 15100

PROCESS PIPING AND APPURTENANCES
SECTION 15120

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Work under this Section is subject to the requirements of the contract documents.

B. Furnish and install replace-in-kind process piping and appurtenances:

1.02 RELATED WORK:

A. As Specified in Sections below:

1. Section Z0047700 – Pump Station

1.03 REFERENCES:

A. ANSI/ASME B16.1 – Standard for Cast Iron Pipe Flanges Fittings, Class 25, 125, 250, and 800.

B. BASNI/ASME B16.3 – Standard for Malleable Iron Threaded Fittings, Class 150 and 300.

C. ANSI/ASME B31.1 – Power Piping.

D. ASTM A47 – Standard Specification for Ferritic Malleable Iron Castings.

E. ASTM A197 – Standard Specification for Cupola Malleable Iron.

F. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

G. AWWA C104 – Standard for Cement -Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

H. AWWA C110 – Standard for Ductile-Iron and Gray (Cast) Iron Fittings, 75 mm (3-inch) Through 1200 mm (48-inch) for Water and Other Liquids.

I. AWWA C111 – Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

J. AWWA C115 – Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.

K. AWWA C150 – Standard for the Thickness Design of Ductile-Iron Pipe.

L. AWWA C151/ANSI A21.51 – Ductile Iron Pipe Centrifugally Cast for Water or Other Liquids.

M. AWWA C219 – Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe.

N. AWWA C600 – Standard for Installation of Ductile Iron Water Mains and Appurtenances.

O. ASTM E23 – Standards for Impact Test for Ductile Iron Pipe.

P. AWWA C151 – Standards for Hydrostatic Test for Ductile Iron Pipe.

Q. ASTM E8 – Standards for Tension Testing for Ductile Iron Pipe.

R. ASTM A438 – Standards for Transverse Testing for Ductile Iron Pipe.

1.04 SUBMITTALS:

A. Refer to paragraph 1.04 of Specifications Section 15100 – Basic Mechanical Requirements.

B. Shop drawings:

1. A complete piping layout with materials of construction referenced to applicable standard specifications.
2. Show pipe sizes, valves, joint details, dimensions, support and hangar location and details.

C. Product Data: Catalogue cuts of pipe, fittings, couplings, and accessories.

1.05 QUALITY ASSURANCE:

A. Refer to paragraph 1.05 of Specifications Section 15100 – Basic Mechanical Requirement.

1.06 SALVAGE, STORAGE AND HANDLING:

A. Refer to paragraph 1.06 of Specifications Section 15100 – Basic Mechanical requirement.

B. Contractor is responsible for the disconnecting, salvage/storage, and handling of products.

C. Accept units on site. The Contractor shall inspect, inventory, and notify the Engineer for any damage/deterioration for equipment/materials that are to be salvaged prior to salvaging.

D. Any equipment or material damaged or contaminated with foreign matter prior to final acceptance of the Work must be thoroughly cleaned and restored to its original condition or replaced by the Contractor at his/her own expense.

E. Load and unload all pipe, fittings, and appurtenances by hoists or skidding, pad slings, hooks, and pipe tongs and use in such a manner to prevent damage to products.

F. Store products in a safe place, free from damage or deterioration. Store gaskets in a cool location, out of direct sunlight. Gaskets must not come in contact with petroleum products.

G. Do not stack ductile iron pipe higher than the limits shown in ANSI C600.

1.07 WARRANTIES AND GUARANTEES:

A. Refer to paragraph 1.08 of Specifications Section 15100 – Basic Mechanical Requirements.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS – GENERAL:

A. All pump station replacement materials, fittings, and appurtenances, as shown on the drawings, or as determined by the Engineer, must be new and unused unless otherwise indicated, and of the replace-in-kind manufacturer, material, size, pressure class, quality, characteristics, performance as existing.

B. All seals, gaskets, nuts & bolts, hoses, and appurtenances that deteriorate with time and weather condition, shall not be salvaged, but shall be replaced-in-kind during re-installation.

C. Temporary Plugs:

1. Exterior Buried Piping: Watertight plugs.
2. All other: Plugs or caps.

D. Testing Materials: Test plugs or caps, blank flanges, pressure pumps, pipe connections, meters, gauges, other required equipment.

2.02 PIPE:

A. Each replace-in-kind pipe piece must bear the manufacturer's serial number and must be certified by the manufacturer for conformance with the applicable standard specifications.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPING – GENERAL:

A. Install interior lines parallel to walls wherever possible. Install piping to accurate lines and grades, and support by approved hangers or supports.

B. Supports must ensure rigidity and prevent shifting or distortion of pipe. Provisions for pipe expansion must be provided where necessary.

C. Before assembly, remove all debris from inside pipe and fittings and from threads.

D. Clean-cut threads of all long tapered screwed joints. Make up screwed joints with approved pipe-joint compound applied to male threads only.

E. Joints that are required to be backed off must be disassembled completely. Wipe clean both pipe and fitting threads. Apply new joint compound and reassemble the connection.

F. Provide a sufficient number of unions for dismantling of all water pipe, valves, and equipment.

G. Where pipe must pass through walls, core drill and seal between pipe and opening using segmented rubber links under compression.

3.02 PIPE PRESSURE TESTS:

A. General.

1. Unless otherwise specified, all piping systems, including small pipe, tubing, nipples, connectors, and other appurtenances that are a part of the systems, must be tested as specified herein.
2. Instruments, controls and any other appurtenances with pressure ratings less than the test pressure of the piping system must be removed or blocked off before testing starts.

B. Process Pipe.

1. All lines that must transmit liquids under pressure from a pump must be tested to a pressure of 150 percent of the maximum system pressure.

C. Test Duration.

1. Unless otherwise specified, test pressure must be maintained for 2 hours. Leaks or defective pipe must be replaced and the tests repeated until piping has no visible leakage. The Contractor must furnish and dispose of material for tests. Test results must be certified by a registered Professional Engineer from a testing company or by Contractor's representative when approved by Engineer.

3.03 CLEANING:

A. Before placing piping in use, the interior must be cleaned of foreign substances. Any stoppage or other damage because of failure to properly clean piping system must be repaired at the Contractor's own expense.

3.04 PIPING PROTECTION:

A. Protect piping, equipment, and materials from damage during construction until final acceptance. Close pipe openings with plug or caps during installation. Cover and protect equipment against dirt, water, chemicals, or mechanical injury, before the final acceptance by the Engineer.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT

A. Process Piping and Appurtenances will not be measured separately, but will be included in the work performed under Section Z0047700 – Pump Station.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT

A. Process Piping and Appurtenances will not be paid for separately, but will be included in the payment for the work performed under Section Z0047700 – Pump Station.

END OF SECTION 15120

BASIC ELECTRICAL REQUIREMENTS
SECTION 16010

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Work under this Section is subject to the requirements of the Contract Documents.

B. Apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications, or vice versa, or any accessories necessary to make the work complete and ready for operation.

C. The Contractor must decommission, disconnect, salvage, re-install, connect, clean, adjust, test and condition all manufactured articles, materials and equipment, and place in service, in accordance with the pump station manufacturer's directions and recommendations except as otherwise noted on the Drawing or specified herein.

1.02 RELATED WORK:

A. As specified in the following sections/divisions:

1. Section Z0047700 – Pump Station

1.03 REFERENCES:

A. Materials and installation must comply with all codes, laws and ordinances of Federal, State and local governing bodies having jurisdiction.

B. In every installation where regulations of electric companies apply, conformance with their regulations must be mandatory and any costs incurred must be included in the Contract.

C. In case of differences between building codes, State and Federal laws, local ordinances and utility company regulations and the Contract Documents, the most stringent must apply.

D. All design, equipment and materials proposed must conform to all acts, laws, rules and regulation of the following organizations:

1. National Electrical Code (NEC) (ANSI/NFPA 70).
2. National Electrical Safety Code (NESC-ANSI C2).
3. American National Standards Institute (ANSI).
4. National Fire Protection Association (NFPA).
5. Institute of Electrical and Electronics Engineers (IEEE).
6. Insulated Cable Engineers Association (ICEA).

7. National Electrical Manufacturers Association (NECA).
8. Illuminating Engineering Society (IES).
9. Underwriters Laboratories, Inc. (UL)
10. Canadian Standards Association (CSA).
11. Occupational Safety and Health Administration (OSHA).
12. Americans with Disabilities Act (ADA).
13. International Association of Electrical Inspectors (IAEI) SOARES – Book on Grounding.
14. International Electrical Testing Association (NETA) NETA – ATS-Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

E. Should Work be performed, which does not comply with the requirements of the applicable building codes, State and Federal laws, local ordinances, industry standards, utility company regulations and the Contract Documents, changes for compliance must be done by the Contractor at no cost to the Department.

F. The Contractor must secure and pay for all permits, governmental fees, taxes and licenses necessary for the proper execution and completion of the electrical work.

G. The Contractor must submit, to governmental agencies and utility companies, Shop Drawings, which are required by these agencies, for the approval.

H. The Contractor will notify the Engineer of any existing materials or apparatus believed to be inadequate, unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction. If the Engineer requires the Contractor to provide any additional or new materials, apparatus or work based on item 1.03 H of this section, and the Contractor did not cause the inadequacy, unsuitability or violation of laws, etc. so notified; the additional or new materials, apparatus or work shall be paid for in accordance with article 109.04 of the Standard Specifications for Road and Bridge Construction.

1.04 SUBMITTALS:

A. Existing components, to be salvaged, then re-installed, and deemed to be re-useable, do not require submittals. The existing pump station's electrical wiring diagrams, schematics, and components are in the O&M Manual, but the Contractor shall verify the in-field existing conditions prior to decommissioning, disconnecting, and/or salvaging.

B. For any new components, the Contractor must submit product data, to the Engineer prior to purchasing and installation. The Contractor shall submit the following for approval for any items that are different, either material, location or installation, than as shown in the O&M manual:

1. Installation design Drawings -schematic, wiring, and one line diagrams; conduit; conduit and cable schedules; grounding; symbols and legends; etc. as needed to convey the location of the intended product installation.

2. Power system short circuit and coordination calculations. The calculations must be performed under the supervision of a Professional Engineer registered in the State of Illinois. The calculations must bear the stamp of the responsible Engineer.
3. The equipment manufacturers' schematic diagrams must be "JIC" ladder type. Schematics must identify all devices, wire codes, and terminal numbers.
4. The equipment manufacturers' wiring diagrams must show terminal blocks for external wiring. Wiring diagrams must identify all devices, wire codes, and terminal numbers.
5. The equipment manufacturers' internal point to point and external wiring diagrams between components within the equipment line up must be provided.
6. Catalog cuts and major electrical equipment manufacturers' Drawings must include, but are not limited to, relays, meters, current and potential transformers, disconnect switches, fuses, contactors and more.
7. Complete descriptive literature, performance and test data and rating data for all equipment must be provided.
8. Instruction books must be provided.
9. Complete and accurate "As Built" Drawings must be provided by the Contractor to the Engineer for verification and drafting.

C. Shop Drawings – Revisions to record drawing schematics or layout shall require shop drawings prior to installation.

1. The Contractor must submit Shop Drawings and Samples in accordance with the Contract Documents and supplementary requirements as stated under each Section of the Specifications.
2. The Contractor must make submittals before any material or equipment is purchased. The submittals must be reviewed by the Engineer for compliance with the Contract Documents.
3. Shop Drawings must include manufacturers' names, catalog numbers, cuts, diagrams, schedules and other such descriptive data specifically prepared for the Work by the Contractor, Subcontractor and/or manufacturer to illustrate that the materials, equipment or system conform to the Contract requirements.
4. Additional submittal requirements are described in individual sections of the Specifications or as determined by the Engineer.
5. Any materials or equipment that are not in accordance with the requirements of the Contract Documents will be rejected for use in this Contract.
6. Any materials or equipment installed without reviewed and accepted submittals must be removed by the Contractor and replaced at the direction of the Engineer and without cost to the Department.
7. Substitutions to listed acceptable manufacturers equipment and material will not be approved until the Contractor has complied with the requirements of the Contract Documents.

D. Installation Drawings

1. The initial copy of all installation Drawings must be submitted to the Engineer for

review. The use of marked-up existing electrical drawings is acceptable as long as it is legible. If determined illegible, the Contractor shall furnish clean installation drawings.

2. The installation Drawings must be made under the direction and supervision of the Contractor and must show all electrical work alterations to the existing electrical system, as shown in the O&M Manuals existing diagrams/ schematics/ layouts. The Contractor shall include all electrical alterations which may include, but not limited to, conduit, wiring, electrical equipment and devices, points where conduit enters or leaves structural slabs and walls, junction boxes, conduit supports and inserts. Symbol representation for home run circuits will not be acceptable. These Drawings must include all embedded conduit drawings, electrical layouts and elevations as well as all circuiting and locations of all electrical equipment.
3. The Contractor must prepare and maintain in current status, a complete set of detailed, completely circuited, and dimensioned electrical installation Drawings for all electrical work included under this Contract. These Drawings must be made at the Contractors expense.
4. No electrical work shall begin until these installation Drawings are so drawn, and thereafter finally accepted by the Engineer.
5. The complete electrical distribution system from the sources, including each branch circuit panelboard, must be shown and dimensioned exactly as to be installed, with all feeders located on the installation Drawings. Major equipment and apparatus must be shown to scale and properly located.
6. The Contractor must provide a separate set of installation Drawings for the power and control; and a separate set of installation Drawings for the special systems.
7. The Contractor must provide a single line diagram describing the power distribution system. This diagram must include ratings for all equipment and cable sizes from the service connection to the Pump Station.
8. Additional installation Drawings may be requested if in the opinion of the Engineer they are required to properly coordinate the Project.
9. The installation Drawings must include schedules for all panelboards. Schedules must depict the bus arrangement of the panelboard, the size of all circuit breakers, the connected load on each breaker, and a description of the load and its location.
10. The installation Drawings must indicate the electrical installation exactly as to be constructed and therefore must be periodically revised to reflect all changes inclusive of those required by the Engineer, those which are or have been found necessary in the field, those which may be suggested by the Contractor and approved by the Engineer, etc.
11. Revisions must be performed when considered necessary by the Engineer or the Contractor in order to facilitate proper coordination.
12. The Contractor must be responsible for the coordination of electrical work with the all other work, in order to avoid possible installation conflicts arising therefrom. It

must be understood that the work shown on the installation Drawings has been so coordinated. In the event of conflicts or interferences that cannot be resolved in the field, the Contractor must request a written clarification from the Engineer.

13. Upon completion, the initial installation Drawings, and all revised installation Drawings thereafter, must be dated and certified as having been fully coordinated by the Contractor. It must then be understood that the work shown thereupon is ready for construction.
14. All installation Drawings must be made in accordance with an approved schedule, prepared by the Contractor, and arranged to coincide with actual construction in such a manner as to allow the latter work to proceed without delay.
15. If, in the opinion of the Engineer, the installation Drawings are in acceptable condition after each has been finally revised and accepted, the Contractor may submit same as the field record as-built Drawings called for elsewhere in the Specifications.

D. The Contractor must submit test reports as described under this Contract.

1.05 QUALITY CONTROL:

A. After all equipment, devices and raceways are re-installed and wires and cables are in place and connected to devices and equipment, the Contractor shall test the system for continuity, proper phase rotation, short circuit, improper grounds, and other defects. Testing must be in accordance manufacturers' recommendations, and individual sections of this Specification.

B. The Contractor must be responsible for protecting all equipment and systems against harmful exposures to, or accumulations of dust and moisture, flooding, corrosion or other forms of damage and must clean and restore damaged finishes as may be required to place installations in a "Like New" condition before acceptance by the Engineer.

1.06 STORAGE AND HANDLING:

A. Equipment and materials must be stored in containers, suitably sheltered from the elements and mechanical injury, but readily accessible for inspection until installed.

1. Items subject to moisture damage must be stored in dry, heated spaces.
2. Manufacturer's directions must be followed in the handling, storage, protection, installation and operation of all equipment and materials.

B. The Contractor must coordinate access with the Engineer for the movement of heavy machinery, equipment and heavy parts brought into the premises.

C. Conduit openings must be kept closed by means of plugs or caps to prevent the entrance of foreign matter.

D. The Contractor must cover all equipment and materials as required to protect them

against dirt, water, chemical, solar, or mechanical damage. The Contractor must also provide any supplementary heating and cooling required to prevent moisture and thermal damage.

E. Equipment must be inherently safe and moving parts must be covered with guards.

F. Equipment in storage having moving parts, which may be damaged or distorted by being idle, must be rotated or exercised periodically and all lubricants must be properly maintained.

G. Additional requirements are described in individual sections of these Specifications.

1.07 WARRANTIES AND GUARANTEES:

A. The following materials have special Manufacturer's Warranties for the periods listed with each item, which may originate, in part or in whole, with the manufacturer or the fabricator. Deliver to the Engineer two (2) copies of all manufacturer's or equipment suppliers' warranties made out in the name of the Niles Park District before final acceptance of the Work.

The Contractor shall warrant that all new materials and all workmanship shall be free from defects for five (5) years from the date of Substantial Completion of the Project.

The Contractor must repair or replace defective materials and workmanship during the Contract Period and for five (5) years from the date of Substantial Completion of the Project. Defective material and workmanship include, but are not limited to, Defective Wiring in Pump Station.

1.08 SPECIAL REQUIREMENTS:

A. Field Measurements -Before proceeding with the re-installation of the Work, the Contractor must verify all field dimensions and take such measurements as are required for proper re-installation of the Work.

B. Coordination -Coordinate work of this Section with adjacent work of other trades.

1.09 CONTRACT DRAWINGS:

A. The Record Drawings, included in the drawings and O&M Manual, are diagrammatic and/or home-run type which are intended to convey the existing condition and indicate the general arrangement and/or sizes of conduit, equipment, fixtures and other layouts.

B. The location of items required by the Contract Documents are not definitely fixed by dimensions and are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the site and will be subject to the review of the Engineer.

C. The Contractor must coordinate the location of the pull boxes, conduit racks, etc. with

the location of the mechanical equipment.

D. The Contractor must lay out the Work, check Drawings of all trades to verify spaces in which Work must be installed, and maintain maximum access and space conditions at all points.

1. Where access or space conditions appear inadequate, the Contractor will notify the Engineer, in writing, before proceeding with installation.
2. Any minor changes in the locations of equipment, conduits, outlets, devices, etc., from those locations as shown on the Record Drawings must be made without extra charge to the Contract. A minor change in location must be considered to be within 10 feet of the location as may be scaled from the Drawings for all interior work and within 25 feet for all exterior work.

1.10 INSTRUCTIONS AND ADJUSTMENTS:

A. Before Final Completion and before final Contract payment is made, the Contractor must demonstrate to the Engineer that the system is functional and operational for all equipment and systems installed.

B. The primary adjustments of the system(s) must be accomplished by the Contractor to the complete satisfaction of the Engineer at the time of completion of the installation.

1.11 OPERATING AND MAINTENANCE MANUAL:

A. Operation and Maintenance (O&M) Manuals: The Contractor shall update the O&M Manual with any supplemental mark-ups, documents, or information, as it pertains to the operating and maintenance changes of the existing system. Instructions are to be in typewritten form.

1. The Contractor shall update the existing Operating and Maintenance (O&M) Manuals and Parts Lists with the following:
   (i) Revised dimensions. Provided exploded views for read-ability, as necessary, to the satisfaction of the Engineer.
   (ii) Updated material/parts list of actual equipment re-installed.
   (iii) Verify and update any other addition changes of installed pump station, including wiring diagrams, schematics, service locations, operating characteristics, settings, and actual equipment/materials installed
   (iv) and document any additional revisions to the existing O&M Manual

2. Authorized representatives of original equipment manufacturers must inspect final installation of equipment at the job site and must then submit a letter to the Engineer stating that the installation is complete and satisfactory and the equipment will operate satisfactorily when operated in accordance with the operation and maintenance manuals.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

a. Contractor furnished materials and equipment must be new and must bear the manufacturer's name, model number and other identification markings.

B. Equipment and materials must be without blemish or defect and must not be used for temporary power purposes, without the Engineer's written authorization.

C. Equipment and materials must comply with the requirements of the Contract Documents.

PART 3 EXECUTION

3.01 INSTALLATION OF WORK:

A. The Contractor must perform all work with trained electricians of the particular trade involved in a neat and workmanlike manner as accepted by the Engineer.

B. With the acceptance of the Engineer and without additional cost to the Department, the Contractor must make minor modifications in the Work as required by structural interferences, by interferences with work of other trades and for proper execution of the Work.

C. Work installed before coordinating with other trades, so as to cause interferences with the Work of such other trades, will be changed as directed by the Engineer, to correct such condition without cost to the Department.

D. The equipment must be installed with ample space allowed for removal, repair or changes to equipment. Ready accessibility to removable parts of equipment and to wiring must be provided without moving other equipment which is to be installed or which is in place.

E. The Contractor must compare the Drawings and Specifications, checking all measurements to determine the intent of the Contract Documents. Any discrepancies will be brought to the Engineer's attention for interpretation.

F. Locations of electrical equipment, etc. are approximate and exact locations must be determined by the Contractor at the Project site.

G. The Contractor must refer to Contract Documents for Record Drawings.

3.02 EQUIPMENT NOISE LIMITATION:

A. Noise levels of electrical devices and equipment must be within acceptable limits as established by NEMA or other valid noise rating agencies. Engineer's acceptance will be based on practical and reasonable considerations of occupancy requirements. As determined by the Engineer, anti-vibration mountings and non-combustible sound-absorbing linings shall be furnished by the Contractor.

B. The Contractor must check and tighten the fastenings of sheet metal plates, covers, doors, and trims to prevent vibration and chatter under normal conditions of use.

3.03 TRANSMISSION OF VIBRATION:

A. Electrical equipment, conduit, and fittings must not be mounted to or supported by elements subject to vibration except by methods which must prevent transmission thereof.

B. Where flexible conduit lengths are utilized as a means of isolating equipment and conduit systems vibration, care must be exercised to assure continuity of ground throughout.

3.04 PROTECTION:

A. The Contractor must protect conduit and wireway openings against the entrance of foreign matter by means of plugs or caps. The use of such materials as tape, plastic bags, paper, rags, etc. is expressly forbidden. For conduits with threaded ends, as required by the Specifications, the Contractor must provide threaded caps for the protection of the conduit end.

B. The Contractor must cover fixtures, materials, equipment and devices furnished or installed under this Contract or otherwise protect against damage, before, during, and after installation.

C. Fixtures, materials, equipment, or devices damaged prior to final acceptance of the Work must be restored to their original condition or replaced at no cost to the Department.

D. Equipment must be inherently safe and moving parts must be covered with guards.

3.05 NEMA RATINGS:

C. NEMA 4X -materials and construction must be employed in all exterior areas, wet areas and in interior areas where wash down may occur, or as noted on the Drawings. When called for this material must be made of Grade 316 Stainless Steel.

D. NEMA 7 & 9 -materials and construction must be employed in those areas so defined by either the Chicago Electrical Code or the National Electrical Code.

3.06 PROJECT SPECIFICS:

A. Furnishing and installing electrical equipment as per Drawings and Division 16. Providing electrical services for mechanical equipment installed under Division 15 including Start up, Testing and Commissioning.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT

A. Complying with Basic electrical requirements will not be measured separately, but will be included in the work performed under Section Z0047700 – Pump Station.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT

A. Complying with basic electrical requirements will not be paid for separately, but will be included in the payment for the work performed under Section Z0047700 – Pump Station.

END OF SECTION 16010

BASIC ELECTRICAL MATERIALS AND METHODS
SECTION 16100

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Work under this Section is subject to the requirements of the Contract Documents.

B. Furnish and install electrical work for retrofitting existing electrical system to accommodate proposed raised and relocated electrical components for the pump station. For retrofit, new and in-kind materials shall be furnished and installed unless otherwise noted.

C. Materials and accessories, indicated schematically by Drawings, schedules and as specified herein may include, but not limited to, the following:

1. Rigid Galvanized Steel Conduit (RGSC)
2. RGS conduit with PVC coating
3. Flexible Metal Conduit (FMC)
4. Liquid-tight Flexible Metal Conduit (LTFC)
5. Underground PVC Conduit
6. Bushings
7. Fittings
8. Boxes

1.02 RELATED WORK:

A. As specified in the following Sections/ Divisions:

1. Section Z0047700 – Pump Station
2. Division 15 – Mechanical
3. Division 16 – Electrical

1.03 REFERENCES:

A. See Specification Section 16010 1.03.

1.04 SUBMITTALS:

A. See Specification Section 16010 1.04.

B. The Contractor must submit with the wire submittal a listing of the code numbers used by the Manufacturer of the wire/cable the Contractor is submitting.

1.05 QUALITY CONTROL:

A. See Specification Section 16010 1.05.

1.06 DELIVERY STORAGE AND HANDLING:

A. See Specification Section 16010 1.06.

1.07 WARRANTIES AND GUARANTEES:

A. See Specification Section 16010 1.07.

1.08 SPECIAL REQUIREMENTS:

A. The Contractor shall review existing system and use in-kind materials to verify all dimensions and take such measurements as are required for proper fabrication and erection of the Work.

B. Coordination -Coordinate Work of this section with related Work specified in the other divisions/sections of the Contract Documents.

PART 2 PRODUCTS

2.01 EQUIPMENT BASES:

A. The Contractor must provide unistruts, hangers, channels, cradles, saddles, etc., for installation of all electrical equipment and apparatus that mount to the pump station. All material and hardware must be galvanized steel suitable for outdoor use.

2.02 VIBRATION ISOLATION:

A. Vibration producing equipment must have either spring elements in the hanger rods or isolation pads under the equipment that is equal to the existing condition.

B. Conduit connections to vibration producing equipment must be made with flexible conduit, using either FMC or LTFC as required.

C. Acceptable manufacturers must be Barry Division of Barry Wright Corp., Consolidated Kinetics Corp. or Mason Industries.

2.03 CONDUIT AND FITTINGS:

A. Rigid Galvanized Steel Conduit (RGSC):

1. Conduit and fittings must be rigid galvanized steel, heavy wall type, hot-dipped galvanized with zinc-coated threads and acceptable agency labeled.
2. Rigid Galvanized Steel conduit and couplings must be threaded, rigid steel, hot-dipped galvanized after fabrication and must be in accordance with UL 6, Federal Specification WW-C-581d and ANSI Standard C80.1.
3. RGSC must be used for all exposed work, unless permitted otherwise in these

Specifications, outdoor conduit runs and for all conduit work installed in slabs.

4. Split, compression or setscrew couplings and connectors are not acceptable. All connections and fittings must be threaded.

B. PVC Coated RGS Conduit

1. PVC coated rigid steel conduit, including elbows and fittings must be made with RGS conduit, conforming to the RGSC Section of this Specification, to which is bonded a Polyvinyl chloride (PVC) coating for the protection of the conduit.
2. The minimum thickness of the exterior coating must be 40 mils.
3. A Urethane chemical coating must be uniformly and consistently applied to the interior of the conduit and fittings. The internal coating must be applied at a minimum thickness of 2 mils.
4. The PVC coated galvanized rigid conduit must be U.L. listed / labeled. The Manufacturer must submit certified test results from a recognized independent testing company validating that their product meets or exceeds the requirements of ASTM D870-02 Testing Water Resistance of PVC Coating Using Water Immersion and ASTM D2247-02 Testing Water Resistance of PVC Coating in 100% Relative Humidity, to signify compliance to the adhesion performance standards.
5. PVC coated conduit must conform to NEMA Standard RN11986.
6. All fittings and components for use with PVC coated conduits must be PVC coated as specified in this Specification. Each coupling must be furnished loose with each length of the conduit and must have a PVC sleeve extending one (1) pipe diameter, or 2 inches, whichever is greater, beyond the end of the coupling. The inside diameter of the sleeve must be the same as the outside diameter of the IPS conduit used with it. The wall thickness of the sleeve must be the same as the PVC coating on the conduit. All screws for fittings which are PVC Coated must be Stainless Steel.
7. PVC coated conduit must be used in chemical environments, and for exterior work and underground where so specified.

C. Any portion of the conduit system that shows corrosion within the guarantee/warranty period must be replaced at no cost to the Department.

D. The minimum conduit size, unless specified otherwise, is 3/4 inch.

E. All conduit fittings must be of the types specified, must be in accordance with UL 514 for normal application, and UL 886 for hazardous applications

F. Acceptable conduit manufacturers must be Allied Tube and Conduit Corp., Wheatland Tube Company or Steel Duct Conduit Products.

G. Acceptable conduit fitting manufacturers must be Appleton, Crouse-Hinds, OZ Gedney, Bridgeport, Regal or T&B.

2.04 FLEXIBLE CONDUIT AND FITTINGS:

A. For Tunnel applications, Liquid-Tight Flexible Metal Conduit (LTFMC) must be Low Smoke, Zero Halogen raceway with Hot dipped zinc galvanized low carbon steel core.

LTFMC must be rated for the temperature environment in which it must be placed.

B. Connectors must be malleable iron or steel with insulated throat, squeeze-type, with annular gripping rib. Particular attention must be given to maintaining ground bond and firm support through flexible connections. Liquid-tight connections must have insulated throats.

C. UL Liquidtight Flexible Metal Conduit Type LFMC.

D. Fittings for FMC must be specifically designed and manufactured for the use with FMC.

2.05 PVC CONDUIT:

A. Non-metallic conduit must be PVC Schedule 40 with concrete encasement where shown on Drawings.

B. PVC conduit, including elbows and couplings, must meet the requirements of NEMA Standard TC2 (latest edition), UL Standard 641, Federal Specifications WC-1094A and must be UL rated and listed for use with 90 degrees C rated conductors in compliance with Article 347 of the NEC. Materials must have flexural strength of 11,000 psi, and compressive strength of 8,600 psi, all at an ambient temperature of 23 degrees C.

C. The conduit must be manufactured from virgin PVC compound that must meet the applicable requirements of ASTM D1784.

D. PVC conduit fittings must meet with the requirements of NEMA Standard TC3 (latest edition), UL Standard 514 supplement and Federal Specification WC-1094A.

E. Standard fittings and cement must be obtained from the conduit manufacturer. Assembly of the PVC conduit system must be in strict accordance with the manufacturer's instructions.

F. Acceptable PVC conduit manufacturers are Carlon (Lamson and Sessions), National Pipe, Cantex, and IPEX.

2.06 BUSHINGS:

A. Bushings for Rigid conduit must be malleable iron body with 150 degrees C insulating ring. Insulator material must be molded in place and must be non-removable.

B. Acceptable manufacturers must be Appleton, Catalog Series BU75I, OZ/Gedney Catalog Series IBC-125.

C. Grounding bushings for RGSC must be Appleton Series GIB75L or OZ/Gedney Series HBLG0722. Bushings must be hot-dipped galvanized or triple coated with an insulating ring molded into the bushing with a 150 degree C rating. Insulating ring must be non-removable.

D. All bushings must be of the threaded type. Set screw or compression type bushings are not acceptable.

2.07 PULL AND JUNCTION BOXES:

A. Pull and junction boxes must be NEMA Type 4X, 316 stainless steel, with stainless steel hinged cover, stainless steel fasteners and stainless steel hardware. Minimum gauge must be 12 ga. for boxes with no dimension larger than 18 inches, and 10 ga. for all other boxes. The welds must be ground or polished to present a clean and neat finish.

B. Junction or pull box covers must be secured with round or flat head machine screws. Where required screws must be of the tamper-proof type.

E. Where required, special junction or pull boxes must be provided in sizes and shapes determined from field measurements as required to make a neat and workmanlike installation.

F. Where required, boxes with metal barriers or separators for grouping of dissimilar conductors for voltage or system must be provided.

G. Where required by the Drawings or job site conditions special finishes must be provided. These may be hot-dipped galvanized, PVC coated, etc. The Contractor must take extreme precaution to insure that the proper finishes are provided.

H. Acceptable manufacturers must be Appleton Electric, Crouse-Hinds, Hoffman, Keystone, A.W. Circle, Chicago Switchboard or IEC.

2.08 OUTLET BOXES:

B. Outlet boxes must generally be 4 inches square or octagonal except as follows:

1. For concrete installation boxes must be suitable and constructed for installation in concrete.
2. In exposed work, suitable boxes must be used for switches and receptacles. The NEMA type must be as described in this Specification.
3. Outlet boxes for use outdoors or in wet/damp locations must be of the threaded hub, weatherproof, cast malleable iron type, with malleable iron cast covers. Covers must be gasketed unless of the threaded type.
4. Where 1-1/4-inch conduit is required, the box size must be a minimum of 4-11/16 inches square.

C. Proper covers on flush mounted boxes must be provided.

D. Device Boxes

1. Outlet boxes on exposed conduit run in wet or damp locations must be a cast iron box with threaded hubs and gasketed cover.
2. The use of single gang boxes is prohibited.

3. Extra deep boxes must be provided for such devices as dimmers, G.F.I.C.'s or where there are more than 4 wires spliced together with a wiring device(s) also contained in the same box.

E. Plaster covers must have threaded ears and must be of suitable depth for the application.

F. The Contractor must provide boxes with metal barriers, baffles or separators for grouping of dissimilar conductors or system separation.

G. Acceptable manufacturers must be Appleton, Raco, Steel Department or Crouse-Hinds.

2.09 EXPANSION JOINTS:

A. The Contractor must provide expansion couplings with 8 inch movement and with bonding jumpers in all conduit crossing building and structure expansion joints.

B. Expansion fittings must be Appleton, XJ with XJB jumpers, Crouse-Hinds or OZ Gedney.

2.11 WIRE AND CABLE -600 VOLT:

A. Wire and cable must be soft copper, properly refined and must have minimum conductivity of 98 percent. Aluminum conductors are not acceptable.

1. Conductors for power must have 600-volt type insulation, must be not less than No. 12 AWG, must conform to the latest code and must bear acceptable agency label.
2. Wire for signal and control systems must be No. 14 AWG stranded unless otherwise indicated on the Drawings, or elsewhere in the Specifications.
3. Factory wired equipment of a manufacturers' standard product line must be wired with the manufacturers' standard wire size and type provided that the wiring meets all applicable Code requirements. This does not apply to custom-built equipment as specified elsewhere in the Specifications.

B. Wire and cable must be delivered to the job site in original packaging or on factory reels. All wire and cable must bear tagging or marking on the finish at regular intervals and consisting of manufacturers' name or code number, as well as the insulation type, voltage rating and acceptable agency listing.

C. Wire and cable must be factory color-coded insulation and must be installed and connected as follows:

1. Color coding for voltage system of 250 volts and less must be

a. "A" Phase -Black
b. "B" Phase -Red
c. "C" Phase -Blue

d. Neutral -White
e. Ground -Green

2. Color coding for voltage system of over 250 volts and less than 600 volts must be

a. "A" Phase -Brown
b. "B" Phase -Orange
c. "C" Phase -Yellow
d. Neutral -Gray
e. Ground -Green

1. Green must be used for grounding only.
2. Three-way and four-way switch travelers must be of a different color from colors stated above and they must be of the same color.

D. The insulation must be applied tightly to the conductor and must be free stripping.

E. Branch circuit wiring must be solid copper No. 12 AWG unless otherwise specified.

F. Wire No. 10 AWG and larger must be stranded copper.

G. Type THHN/THWN thermo-plastic insulated, 90 degrees C dry and 75 degrees C wet rated must be used for power and other wiring not specifically defined for all sizes. Type THHN thermo-plastic insulated 90 degrees C rated must be used for continuous row fluorescent fixture wiring.

H. Type SF-2 silicone insulated glass braid jacket, 200 degrees C< 600-volt rated must be used for fixture wiring and or recessed incandescent fixture wiring and must be No. 12 AWG minimum.

I. Wire and cables 600-volt rated for outdoor use in exposed conduit must be XHHW-2.

J. If any of the cable types are modified by the Drawings, the Drawings must be followed.

K. The 600-volt insulated wires and cables must be factory tested prior to shipment in accordance with the latest ICEA standards for the insulation specified.

L. Samples and reports on the results of shop tests for all wire and cables, descriptive literature for splices and terminations must be submitted and must be treated as a Shop Drawing submittal.

M. Acceptable cable manufacturers for 600-volt rated cable must be American Insulated Wire Corp., Southwire, Cerro, Aetna, and Draka Cableteq.

2.12 CONNECTORS:

A. For connections to bus bars, use copper compression connectors. Connectors must be crimp type. All connectors must be copper. Copper compression connectors must be long barrel, tin plated, closed end compression type. The barrel for each cable lug must be sized for the exact cable size specified. Copper-Aluminum connectors are not acceptable.

B. Mechanical or set screw types are not acceptable. The cables must be terminated with the die type compression tools. The compression connection must be UL rated. Use only those tools which must provide a UL rated connection for the manufacturers product used.

C. Conductors No. 2 AWG and larger must terminate in two-hole solderless lugs.

D. Conductors No. 10 AWG through No. 4 AWG, inclusive, must terminate in one (1)-hole lug.

E. Multiple-hole lugs must have NEMA spacing.

F. Acceptable connector manufacturers must be Burndy Type YA, Anderson Type VHCL, Thomas & Betts Co., Series 54800 and 54900 or Panduit Series LCB.

2.13 TAPE:

A. Tape must be UL approved, black or colors as required, self-fusing jacketing tape, resistant to weather, oils, water and chemicals. Tape must meet or exceed Scotch 33+.

B. Acceptable manufacturers must be Amazon, Plymouth or 3-M.

2.14 WIRE-PULLING LUBRICANT:

A. Where necessary to use a lubricant for pulling wires, the compound must be listed by Underwriters Laboratories. Cable pulling lubricant must be biodegradable, non-flammable, non-toxic compound with a solid residue of not more than 1.5 percent and a viscosity of at least 50,000 C.P.S.

B. Cleaning agents or lubricants that have a deteriorous effect on conductors covering must not be used. Cable lubricant must contain no waxes, greases, silicones or polyalkylene glycol oils.

C. Lubricant must be rated to match temperature conditions at the time of installation.

D. Acceptable manufacturers must be Polywater J, High Performance Cable Lubricant, Ideal or Aqua-Jel 2.

2.15 SUPPORTS:

A. Where conduits are supported with one-hole straps, spacers must be used to provide 1/4 inch minimum clearance between the conduits and supporting surfaces. All hangers, racks and straps must be galvanized steel.
B. Perforated strap hangers are not acceptable. The use of tie wire is not acceptable.
C. Hanger rods for trapeze-type hangers must be made from high tensile strength carbon steel not less than 3/8 inch diameter. The rods must have free-running, burr-free Unified National Coarse threads, with an electro-galvanized finish. Threaded rods used

outdoors, in wet areas or in corrosive areas must be Grade 316 stainless steel.

D. Conduit supports for trapeze hangers must be made from U-shaped steel components which are galvanized. Minimum material thickness must be 12 gauge. Supports must be hot-dipped galvanized or stainless steel for exterior use. For areas of corrosive nature, or where PVC Coated strut is used, PVC coated components must be provided. The use of painted components is prohibited. The miscellaneous components which are required to complete the support materials, except the threaded rod, must have the same finish as the U-shaped channel. Conduit supports must be as manufactured by Unistrut Corp., Kindorf, Powerstrut or B-line.

E. All field cut ends must be treated in a manner which must insure the integrity of the support system immediately after cutting and before installation. The repair must be done with materials which are compatible with the factory finish. In no case must spray on galvanizing be acceptable for PVC or other special finishes.

F. Supports must be held to concrete walls by power-driven fasteners or electro-galvanized steel or stainless steel inserts as manufactured by Ramset, Unistrut Corp. or Hilti. The support type must be determined by the area conditions.

G. In metal stud walls, products such as "Caddy clips" must be used to support conduits. These supports must be of the locking type which have an overstrap to lock the conduit into place. These supports must be held in place with screws which must attach them to the metal stud construction.

H. For 4 inch and 4-11/16 inch boxes, 1/4 inch rods must be the minimum size. Larger size boxes must have hanger rods sized in accordance with the load, but must not be smaller than 1/4 inch.

I. Boxes installed in stud walls must be secured to the studs by attaching to the stud with mounting brackets specifically designed for this purpose. No box will be installed with support supplied on only one side of the box. Acceptable manufacturers are Appleton, Raco, Steel Department or Caddy.

2.16 SPLICES:

A. No splicing will be permitted except in junction boxes, handholes and manholes. Splices and terminations in wire/cable larger than 8 AWG must be made with compression type connectors and lugs. The tools used must provide a UL certified connection. Indenter type compression fittings must not be acceptable. Lugs must be one (1) or two (2)-hole, color keyed. Lug bolting must include a flat washer, Belleville washer and a locknut.

B. Outdoor splices of conductors must be made using heat shrink products which, when properly installed, must produce a completely sealed covering over the connectors or lugs. The tube or jacket must be completely coated with mastic to insure a 100 percent seal to the conductor jacket. The splice, when completed, must be watertight. An acceptable manufacturer of this type product is Raychem Inc. or an approved equal.

C. All splices and pigtail connections in receptacles wiring No. 8 AWG and smaller must be made up with the pre-insulated spring connectors. Acceptable products are Buchanan,

Ideal Wingnut or Scotch Lock 2.

2.17 TERMINAL BOXES:

A. Terminal boxes must be UL 508 Listed for Type 12 and Type 13 or Type 4X. They must conform to NEMA Standards for Types 12 and 13 or Type 4X and they must conform to JIC Standard EGP-1-1967.

B. Each box must have provisions for the mounting of terminals, either on an internally mounted panel, or on metal strips which are provided by the manufacturer expressly for the purpose of attaching terminal strips. Wherever a panel or strips are provided, they must be mounted on studs using lockwashers and nuts.

C. Terminal boxes in non-hazardous environments which are outside, in interior wet areas, in chemical environment where chemicals are stored or mixed with liquids and in corrosive areas must be NEMA Type 4X, 10-gauge minimum for boxes with a dimension over 18 inches, 12 -gauge minimum for smaller boxes, 316 stainless steel with stainless steel hinged door, stainless steel fasteners and stainless steel hardware. Boxes must have provisions for external locks. The welds must be ground or polished to present a neat and clean appearance.

D. Acceptable manufacturers of enclosures are Hoffman, A. W. Circle and IEC.

E. The terminals must be 30 ampere, 600 volt rated, barriered, with pressure plate lugs for termination of control wiring. The terminals must be of modular design and must be held in place in such a manner as to prevent them from becoming loose when adding or removing terminals. Terminal blocks will be acceptable agency listed. Acceptable manufacturers are Buchanan, Allen Bradley, Eaton/CutlerHammer/Westinghouse, G. E., and Square D.

F. The terminal box assembly must be acceptable agency labeled. Identification of terminals and wiring must be per Specification 16195 Identification.

G. Acceptable suppliers of the assembled terminal box are Panatrol, Chicago Switchboard, and Gus Berthold.

PART 3 EXECUTION

3.01 INSTALLATION -GENERAL:

A. Interferences:

1 Locations of conduits, fixtures and equipment must be adjusted and supported to accommodate the work in accordance with field conditions encountered, anticipating potential interferences.

2 The Contractor must determine the exact route and location of each pipe, duct and electrical raceway prior to fabrication.

B. Accessibility

1. The work must be installed to permit removal (without damage to or removal of other parts) of parts requiring periodic replacement or maintenance and as defined

by the Chicago Electrical Code.

2. Conduits and equipment must be arranged to permit ready access to components and to clear the openings of access panels.
3. The Contractor must provide necessary access panels in equipment as required for inspection of interior and for proper maintenance. Access panels must be as specified in other parts of the Contract Documents.

C. Exterior Wall Openings

1. Openings, particularly at or below grade, must be kept properly plugged and caulked at all times, except when being worked on, to prevent the possibility of flooding due to storms or other causes.
2. After completion of work, openings must be permanently sealed and caulked so as to provide leakproof and/or to maintain the fire-rated conditions of the structure penetrated.

3.02 CONDUIT INSTALLATION:

A. All conduits must be installed as required. The conduit system must be installed complete with all accessories, fittings, boxes and supports in an approved and workmanlike manner to provide proper raceways for electrical conductors.

1. All conduit runs shown in the Drawings are shown diagrammatically for the purpose of outlining the general method of routing the conduits to avoid interferences.
2. Conduit systems must be run concealed or exposed as shown or as dictated by job-site conditions.
3. Exposed conduit runs must be installed true, plumb, parallel with or at right angles to adjacent building members, and must present an orderly, neat and workmanlike appearance.
4. Field bends must be carefully made to prevent conduit damage or reduction in internal areas. All bends must be made with equipment specifically made for the purpose of bending conduit. The bending radius must not be less than six (6) times the nominal diameters of the conduit, with carefully matched bends on parallel runs to present a neat appearance. The number of crossovers must be kept to a minimum. Where larger radii are required to meet utility company requirements, etc., they must be provided. Hickey bends are not acceptable.
5. For PVC conduit bends which exceed the radii available the Contractor must field bend the conduit using equipment and methods as directed by the conduit manufacturer. Extreme care must be taken not to deform the conduit.
6. Conduits which are crushed or deformed in any way shall not be installed.
7. All conduits cut on the job must be carefully reamed inside and out to remove burrs. All field cut ends of conduits must be cut square and must be done with the proper tools. The use of tubing cutters is strictly prohibited. Conduits not properly cut will be replaced at no cost to the Department.
8. For PVC coated conduits all field bends must be made using tools specifically designed for the purpose of bending PVC coated conduits. If the Contractor

does not have these tools he must bend the PVC coated conduit using a bend radius one size larger than would normally be used for that size conduit.

9. All threads must be tapered. No running threads will be permitted. Threads on steel conduit must be given a coat of approved compound. All joints must be properly tightened and must be watertight and insure a low resistance ground path in the conduit system.
10. For PVC coated conduits, field cut threads must be done with tools as specified by the manufacturer of the PVC coated conduit. Extreme care must be taken to prevent damage to the PVC coating. The manufacturer's instructions must be followed for this operation. After the threads have been cut, any damage to the coating must be immediately repaired using materials and methods as recommended by the manufacturer. The material thickness of any field repair must be equal to the factory finish which has been damaged. Repairs must be made immediately.
11. The Contractor must exercise extreme care in the assembly of PVC coated conduits. Metal jawed tools will not be used for this assembly. Conduits which are damaged as a result of using improper tools must be removed and replaced by the Contractor at no cost to the Department.
12. All conduits must be carefully cleaned before and after installation and all inside surfaces must be free of imperfections likely to injure the cable. After installation of complete runs, all conduits must be snaked with an approved tube cleaner equipped with an approved cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the conduit. Any conduits through which the mandrel will not pass must be removed and replaced. All conduits installed in interior areas 1 inch and smaller must be cleaned by pulling clean rags thru the conduits. After cleaning, the ends of the conduits must be protected as specified to prevent the entrance of water and other foreign matter. The use of such items as plastic bags, tape, paper, rags, etc. will not be used under any circumstances. Failure to properly protect conduit ends must result in the Contractor having to again mandrel the conduits immediately before installing the wires.
13. Lines of nylon, polyolefin or polypropelene, propelled by carbon dioxide, vacuum or compressed air, must be used to snake or pull wire and cable into conduits. Flat steel tapes or "sparks" type tapes can only be used in conduit runs of 50 feet or less. They will not be used in PVC or PVC coated conduits. Metal cables are expressly forbidden for pulling wire/cable. Nonmetallic pull tapes can be used for all types of conduits.
14. Where conduits are connected to boxes or equipment enclosures, drilled holes or full size knockout openings must provide electrical continuity for grounding and must be assured by the use of bonding type locknuts. Where connections are at slightly eccentric openings, jumper type grounding bushings and wire jumpers must be installed. Should the openings become excessively eccentric, as determined by the Engineer, the box or equipment must be replaced at no cost to the Department. The use of reducers will not be found acceptable under any circumstances.
15. Conduit systems must be installed, with fittings, couplings, connectors, double locknuts, bushings, etc., and made up tight to insure ground continuity throughout the system.

B. As far as practicable, conduit must be pitched slightly to drain to the outlet boxes, or otherwise installed to avoid trapping of condensate. Where necessary to secure drainage, a breather-drain fitting must be installed in the boxes at low points. Each breather drain fitting must be manufactured by Crouse-Hinds Co., Appleton Electric Co., or O.Z. Gedney.

C. The Contractor must furnish and install expansion couplings and bonding jumpers for metallic conduit system where conduits transfer between structurally independent pipes, poles or supports.

D. Flexible conduit installed in wet locations, exterior locations, and at motors must be liquid-tight type.

I. Flexible conduit in ½ inch trade size may be used for connections with a maximum length of 18 inches for such devices as limit switches, for which the use of ¾ inch flexible conduit may not be practical due to the manufacturer providing only threaded hubs of the ½ inch size. In the case of such installations as electric door locks, where only ½ inch provisions are available, the Contractor can install ½ inch conduit from the device to a box located as close as possible.

J. The number of 90 degree bends must be limited to four or a total of 360 degrees including all off sets, sweeps, kicks, etc. This must be between any pull points.

K. The Contractor must be aware that the conduits are sized for cables routed in exposed rigid steel conduits are to be equal to the existing condition at a minimum.

L. Conduit runs entering the pit from outdoors are subject to moisture accumulation due to condensation. After the wires and cables are installed, the end of the conduit continuing into the warmer area must be packed with a non-setting sealing compound.

N. The Contractor must orient outlet boxes for duplex receptacles or multiple gang switches for horizontal mounting.

O. An outlet box must be provided at each location requiring one

1. Outlet box locations as shown on the Drawings must be considered as approximate only, unless noted otherwise on the Drawings.
2. Exact locations must be determined from the Drawings and/or from field instructions and coordination with the work of all other trades.
3. Boxes must be installed true and plumb, so that the covers or plates must be level, and at uniform elevations for the type of wiring devices contained.

P. There must be no more openings made in any box than are required for the conduits entering same. Depths of boxes must be as to allow for easy wire pulling and proper installation of wiring devices.

Q. All boxes must be supported independent of the conduit system. The boxes must be

supported from the building structure. Conduits must not be supported from the boxes.

R. Switches and receptacles must be ganged in a common box only when directed or indicated on the Drawings.

S. Conduit connections to NEMA 12 equipment must be made up with sealing locknuts. Conduit connections to NEMA 4 and NEMA 4X equipment must be made with Myer's type hubs. In no case must the Contractor terminate conduit to a NEMA 4 or 4X component by providing knock-outs and locknuts.

3.03 CONDUIT CONNECTIONS TO EQUIPMENT:

A. The conduit system must terminate at the terminal box or at the conduit connection points of electric motors, devices and equipment. Terminations of conduit at such locations will permit direct wire connections to the motors, electrical devices or other equipment.

B. Conduit connections must be made with rigid conduit if the equipment is fixed and not subject to adjustment, mechanical movement or vibration. A union type fitting must be provided when galvanized rigid steel conduit is terminated at each enclosure or piece of equipment which contains a threaded termination for the conduit. This may be a threaded hub or through a fitting such as a Myers type hub. Conduit terminations using double locknuts do not require union type fitting.

3.04 PULL BOX INSTALLATION:

A. Pull boxes must be installed where shown and where necessary to insure that the installed cable will not be damaged.

B. The Contractor must add pull boxes where needed even through not shown on the Drawings.

C. Junction boxes and pull boxes of the proper size and shape must be provided. Where suitable, standard outlet boxes must be used as junction boxes and pull boxes.

D. Pull boxes and junction boxes must be supported from the building structure and must not be supported by the conduit. Pull/junction box supports must comply with the applicable requirements for supports as contained in these Specifications.

3.05 WIRING INSTALLATION:

A. All cable and wire must be installed in conduit.

B. No splices will be permitted between terminals, except at approved junction or terminal box points. Cable and wire runs must be looped through pull boxes without cutting and splicing where possible. Boxes must be sized to allow cable and wire installation without splices.

C. All hardware, such as cable stanchions, racks, insulators, brackets, structural supports, wall inserts, cable and junction boxes, bolts, connectors, clamps, fittings and other accessories for the installation of wires and cables in buildings, manholes and outdoors must be furnished and installed complete to provide a satisfactory operating installation.

D. All wiring systems must be "pullable" and use of "BX" is prohibited.

E. Branch Wiring

1. Branch circuit wiring for single phase applications must be sized for a voltage drop.
2. The maximum voltage drop for each circuit must be 3 percent for power.
3. The Contractor must use multi-wire circuits utilizing separate neutrals and must follow the color coding established. The Contractor must size the wire in accordance with the following:
   a. Under no circumstances must any switch break a neutral conductor.
   b. Where farthest wiring device is no more than 75 feet from the panel, No. 12 AWG wire must be used between all wiring devices and for home runs.
   c. Where the farthest wiring device is more than 75 feet from the panel, the Contractor will submit voltage drop calculation to the Engineer, prior to sizing the wire. These calculations must show the wire size to be installed by the Contractor.
   d. The minimum wire size must be No. 10 AWG between the panel and the first wiring device or fixture when located more than 75 feet from the panel, with a minimum No. 12 AWG wire being used between all other wiring devices or fixtures.

F. Feeders must be installed with the sizes equal to that of the existing condition and must be connected as required for the proper operation of the equipment they serve.

G. Existing Motors are to be re-installed & re-connected.

1. The Contractor must make all connections necessary to leave motor driven equipment in satisfactory operating condition.
2. The Contractor must re-connect power branch circuit wiring for all motors and starting equipment.
3. The Contractor must verify the actual motor sizes to be installed, and the actual locations, and retrofit and re-connect wiring and equipment of proper sizes as required.
4. At the time when each motor is first operated, the Contractor must check the motor terminal voltages and the amperes in each motor lead to ascertain that, under normal load conditions, the currents do not exceed the nameplate rating on the motor.
5. If the ampere reading in any leads exceeds the nameplate rating of the motor, or if the motor terminal voltages vary more than 5 percent from the nameplate rating of the motor, the Contractor must disconnect the motor and request further instructions from the Engineer.

H. Proper termination of conduits and wires at motors, control panels or other

equipment items must be provided.

I. In the event that conduit and wire sizes increase beyond the motor or equipment manufacturer's normal provisions for conduit and wire terminations, due to voltage-drop or other considerations in motor branch-circuit designs, the Contractor must provide auxiliary termination facilities, with adequate boxes, lugs, terminals, knock-outs, etc., as may be required.

J. Equipment having safety devices such as limit switches, overload relays, high-low water cut-outs, high-low pressure switches, solenoids, pilot devices, flow switches, freeze protection thermostats, etc., must be so wired that they must always be in the control circuits of selector switches regardless of switch position.

K. The only devices that may be shunted out in the manual position of a selector switch are remote pushbutton stations, clocks, timers and thermostats and ductstats of the non-limit type.

3.06 SPLICES AND TERMINATIONS -600-VOLT CABLE:

A. All splices and terminations must be carefully taped and covered using material recommended by the cable manufacturers, to provide insulation equal to that of the conductors.

B. All splices must be made in proper splice or junction boxes. Splices must not be made in power or control panels. Splices must not be pulled into any conduit. Splices must not be made in any fitting.

C. Shielded Cable Grounding

1. Shielded control cables must have the shields grounded at one (1) end. The shield must be insulated from ground and be equal to that of the existing conditions, at each splice.
2. Coaxial cable shields must be insulated from ground throughout the length of the cable run. The shields must be grounded at, and only at, the coaxial connector terminating in the equipment on each end of the cable run.

D. Splices

1. Splices must be performed only by experienced and qualified cable splicers regularly engaged in this type of work.
2. Shielded cables must have the ends of the shielding bonded together across splices to provide a continuous electrical path. Splice will be made with a terminal block and only when approved by the Engineer.
3. All cable runs must be given an insulation resistance test and continuity check at the completion of each splice throughout the length of the cable run.
4. Where a cable is cut preparatory to splicing, the work must proceed without delay. When an unavoidable delay is encountered in completing a splice, the opened cable

must be protected to prevent the entrance of moisture and foreign matter with a heat shrink cap.

5. The Contractor must splice control cables with the splice kits and materials manufactured for the purpose of splicing control wiring and in accordance with manufacturer's instructions. A power cable splice kit or resin must not be used to make a control cable splice, and vice versa, under any conditions.

3.07 WIRING METHODS:

A. All remote mounted devices such as control stations limit switches or pressure switches in a common circuit must have their wires brought back to the terminals on one (1) panel.

B. When multi-conductor cables are used the number of conductors to be provided in each cable shall be such that at least 1 spare conductor must be available for up to 5 conductors in use, 2 spare conductors must be available for 6 to 10 conductors in use, and 20 percent must be available for more than 10 conductors in use. The spare conductors are only required between major electrical equipment.

C. Multi-conductor cable jacket must be pulled back and neatly trimmed to allow conductors to be separated, so they can be terminated to more than one (1) device. The cable must be supported in the panel where it enters the enclosure.

D. Spare conductors must have the ends taped and they must be neatly coiled and tied and left in the bottom of the enclosure. They must be marked as spare conductors.

3.08 ELECTRICAL HARDWARE INSTALLATION:

A. Locations

1. Anchor bolts, sleeves, inserts, hangers and supports required for the work must be furnished and installed by the Contractor.
2. Any expense resulting from improper location or installation must be paid for by the Contractor at no cost to the Department.
3. Where conduit and equipment is to be suspended from poured concrete construction, the Contractor must provide approved concrete inserts in the form work. Expansion shells may be used on precast concrete members but not closer than three (3) inches from the edge. The Contractor must verify the acceptable depth of anchors before beginning work on any pre or post tensioned members.
4. Trapeze type hangers may be used where several conduits are to be installed at the same elevation.
5. The Contractor must provide adequate supports for all conduits and equipment, either suspended from the construction above, or by means of struts to the construction below. Where metal deck pan is used for the concrete floor above, anchors must only be placed in the rib. When the weight of the support system, including the completed electrical assembly, exceeds 100 pounds per hanger the Contractor will submit his design for review to the Engineer.
6. Hangers for support of conduit must be fabricated type, but not of the perforated

iron type, and must conform to the requirements of the Contract Documents.

7. Hangers must be suitable for the weight of the material / equipment being supported. This must include any and all pulling loads, as well as the load of the conductors, which the support may be subject to.
8. The Contractor must provide straps, clamps, threaded rods, turnbuckles and anchors and all miscellaneous specialties for the attachment of hangers and supports to the structure.
9. Vertical conduits must be supported by heavy metal clamps or collars anchored in or to the construction at each floor.

B. Conduit Supports

1. Exposed conduits must be supported in an approved manner. Conduits must not be fastened to or come in contact with any mechanical system pipes, or equipment of other trades, except as approved by the Engineer. In all conduit work, acceptable hangers, racks or a combination thereof must be used as supports.
2. Conduit trapeze supports must be located at intervals not exceeding 5 feet. Single conduits must be supported as required by the Chicago Electrical Code.
3. Conduits must be securely fastened to each trapeze with U-bolts, straps or clamps.
4. When the conduit supports must be attached to the structural concrete, proper anchors must be installed. Anchors must not be closer than 3 inches from the edge of the concrete.
5. The use of anchors containing lead, plastic or wood is strictly prohibited.

C. Sleeves

1. Sleeves must be not less than 1 inch larger than outside diameter of the conduit.
2. Where conduit passes through concrete, the Contractor must caulk sleeves with an appropriate system to insure the complete sealing of the opening to prevent passage of water, dirt or air and to insure the fire rating of the structure penetrated.
3. Sleeves must be set true to line plumb and position and must be so maintained during construction. Where sleeves are provided in poured concrete, the Contractor must inspect same during and after concrete is poured to insure proper position and to correct any deviation at the Contractor's expense.

3.09 PAINTING:

A. The Contractor shall submit a surface preparation plan/painting plan and it must include the method of surface preparation and type of equipment to be utilized for solvent cleaning, abrasive blast cleaning, pressure washing and power/hand tool cleaning in accordance with Standard Specifications for Road and Bridge Construction Section 506 and Article 1008.05 Organic Zinc-Rich Paint System using the Three Coat System Requirement. All referenced requirements indicated herein are to be used for new and existing items to be painted.

B. The Contractor shall thoroughly document the existing condition of the salvaged components using photographs and/or video so that any items that are damaged or deteriorate during construction or storage can be determined. For the salvaged electrical equipment, any portions of the paint damaged or deteriorated during construction must be recoated to the satisfaction of the Engineer. Recoating shall include the part being cleaned, primed, painted to match the surrounding paint color and using the same paint system described above, and allowed to dry/cure before re-installation.

C. Do not paint nameplates, labels, tag, stainless steel or chromium-plated items such as motor shafts, levers, handles, trim strips, etc.

D. After surface preparation, apply primer and finish coats over the surfaces. Omit prime coat where factory prime coat is still acceptable by the Engineer, and coating is substantially without damage. Apply paint under proper environmental conditions. Do not paint over fully factory-finished surfaces unless original color is unacceptable. Do not paint over nameplates, non¬ferrous hardware, sliding/rotating shaft contact surface, and similar surfaces intended for exposure without painting.

3.10 PATCHING:

A. The Contractor must provide all cutting and patching of materials required for the installation of the work herein specified:

1. No structural members must be cut without the approval of the Engineer.
2. Approved cutting must be done with concrete saws or core drills.

B. Patching must be provided by mechanics of the particular trade involved and done in a neat and workmanlike manner.

C. Slots, chases, openings and recesses through top plate, must be cut by the Contractor. The Contractor must see that they are properly located.

D. Slots, chases, openings and recesses in the structure must be cut by a qualified Contractor. The Contractor must patch and repair as required. Where patching or repair becomes excessive at a location, as determined by the Engineer, the Contractor must use skilled craftsmen of the appropriate trade to make the repairs or patching.

3.11 CLEANING:

A. Open ends of conduit and equipment must be properly capped or plugged to keep dirt and other foreign matter from entering.

B. Each length of conduit must remain capped until the conduit connections are required.

C. Trenches must be kept free from water. Conduits must not be laid when conditions of the trench are unsuitable for such work, or the weather will prevent quality work.

D. When work is not in progress, open ends of conduit and fittings must be securely closed so that no water, earth or other substance can enter.

E. When so directed by the Engineer all material being removed must become the property of the Contractor, must be removed from the site and must be legally disposed of off the site by the Contractor.

F. The Contractor must be responsible to keep the areas where work is occurring broom clean at all times.

PART 4 METHOD OF MEASUREMENT

4.01 MEASUREMENT

A. Work in this section will not be measured separately, but will be included in the work performed under Section Z004700 - Pump Station.

PART 5 BASIS OF PAYMENT

5.01 PAYMENT

Work in this section will not be paid for separately, but will be included in the payment for work performed under Section Z004700 – Pump Station.

END OF SECTION 16100

CONSTRUCTION AIR QUALITY – DIESEL RETROFIT (BDE)

Effective: June 1, 2010
Revised: November 1, 2014

The reduction of emissions of particulate matter (PM) for off-road equipment shall be accomplished by installing retrofit emission control devices. The term "equipment" refers to diesel fuel powered devices rated at 50 hp and above, to be used on the jobsite in excess of seven calendar days over the course of the construction period on the jobsite (including rental equipment).

Contractor and subcontractor diesel powered off-road equipment assigned to the contract shall be retrofitted using the phased in approach shown below. Equipment that is of a model year older than the year given for that equipment's respective horsepower range shall be retrofitted:

Effective Dates	Horsepower Range	Model Year
June 1, 2010 1/	600-749	2002
	750 and up	2006
June 1, 2011 2/	100-299	2003
	300-599	2001
	600-749	2002
	750 and up	2006
June 1, 2012 2/	50-99	2004
	100-299	2003
	300-599	2001
	600-749	2002
	750 and up	2006

1/ Effective dates apply to Contractor diesel powered off-road equipment assigned to the contract.

2/ Effective dates apply to Contractor and subcontractor diesel powered off-road equipment assigned to the contract.

The retrofit emission control devices shall achieve a minimum PM emission reduction of 50 percent and shall be:

a) Included on the U.S. Environmental Protection Agency (USEPA) *Verified Retrofit Technology List* (http://www.epa.gov/cleandiesel/verification/verif-list.htm), or verified by the California Air Resources Board (CARB) (http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm); or

b) Retrofitted with a non-verified diesel retrofit emission control device if verified retrofit emission control devices are not available for equipment proposed to be used on the project, and if the Contractor has obtained a performance certification from the retrofit

device manufacturer that the emission control device provides a minimum PM emission reduction of 50 percent.

Note: Large cranes (Crawler mounted cranes) which are responsible for critical lift operations are exempt from installing retrofit emission control devices if such devices adversely affect equipment operation.

Diesel powered off-road equipment with engine ratings of 50 hp and above, which are unable to be retrofitted with verified emission control devices or if performance certifications are not available which will achieve a minimum 50 percent PM reduction, may be granted a waiver by the Department if documentation is provided showing good faith efforts were made by the Contractor to retrofit the equipment.

Construction shall not proceed until the Contractor submits a certified list of the diesel powered off-road equipment that will be used, and as necessary, retrofitted with emission control devices. The list(s) shall include (1) the equipment number, type, make, Contractor/rental company name; and (2) the emission control devices make, model, USEPA or CARB verification number, or performance certification from the retrofit device manufacturer. Equipment reported as fitted with emissions control devices shall be made available to the Engineer for visual inspection of the device installation, prior to being used on the jobsite.

The Contractor shall submit an updated list of retrofitted off-road construction equipment as retrofitted equipment changes or comes on to the jobsite. The addition or deletion of any diesel powered equipment shall be included on the updated list.

If any diesel powered off-road equipment is found to be in non-compliance with any portion of this special provision, the Engineer will issue the Contractor a diesel retrofit deficiency deduction.

Any costs associated with retrofitting any diesel powered off-road equipment with emission control devices shall be considered as included in the contract unit prices bid for the various items of work involved and no additional compensation will be allowed. The Contractor's compliance with this notice and any associated regulations shall not be grounds for a claim.

Diesel Retrofit Deficiency Deduction

When the Engineer determines that a diesel retrofit deficiency exists, a daily monetary deduction will be imposed for each calendar day or fraction thereof the deficiency continues to exist. The calendar day(s) will begin when the time period for correction is exceeded and end with the Engineer's written acceptance of the correction. The daily monetary deduction will be $1,000.00 for each deficiency identified.

The deficiency will be based on lack of diesel retrofit emissions control.

If a Contractor accumulates three diesel retrofit deficiency deductions for the same piece of equipment in a contract period, the Contractor will be shutdown until the deficiency is corrected.

Such a shutdown will not be grounds for any extension of the contract time, waiver of penalties, or be grounds for any claim.

80261

MANHOLES, VALVE VAULTS, AND FLAT SLAB TOPS (BDE)

Effective: January 1, 2018
Revised: March 2, 2018

Description. Manholes, valve vaults, and flat slab tops manufactured according to the current or previous Highway Standards listed below will be accepted on this contract:

Product	Current Standard	Previous Standard
Precast Manhole Type A, 4' (1.22 m) Diameter	602401-04	602401-03
Precast Manhole Type A, 5' (1.52 m) Diameter	602402	602401-03
Precast Manhole Type A, 6' (1.83 m) Diameter	602406-08	602406-07
Precast Manhole Type A, 7' (2.13 m) Diameter	602411-06	602411-05
Precast Manhole Type A, 8' (2.44 m) Diameter	602416-06	602416-05
Precast Manhole Type A, 9' (2.74 m) Diameter	602421-06	602421-05
Precast Manhole Type A, 10' (3.05 m) Diameter	602426	n/a
Precast Valve Vault Type A, 4' (1.22 m) Diameter	602501-03	602501-02
Precast Valve Vault Type A, 5' (1.52 m) Diameter	602506	602501-02
Precast Reinforced Concrete Flat Slab Top	602601-05	602601-04

When manufacturing to the current standards, the following revisions to the Standard Specifications shall apply:

Revise Article 602.02(g) of the Standard Specifications to read:

"(g) Structural Steel (Note 4) 1006.04

Note 4. All components of the manhole joint splice shall be galvanized according to the requirements of AASHTO M 111 or M 232 as applicable."

Add the following to Article 602.02 of the Standard Specifications:

"(s) Anchor Bolts and Rods (Note 5) 1006.09

Note 5. The threaded rods for the manhole joint splice shall be according to the requirements of ASTM F 1554, Grade 55, (Grade 380)."

Add the following paragraph after the first paragraph of Article 602.07 of the Standard Specifications:

"Threaded rods connecting precast sections shall be brought to a snug tight condition."

Revise the second paragraph of Article 1042.10 of the Standard Specifications to read:

"Catch basin Types A, B, C, and D; Manhole Type A; Inlet Types A and B; Drainage Structures Types 1, 2, 3, 4, 5, and 6; Valve Vault Type A; and reinforced concrete flat slab top

(Highway Standard 602601) shall be according to AASHTO M 199 (M 199M), except the minimum wall thickness shall be 3 in. (75 mm). Additionally, catch basins, inlets, and drainage structures shall have a minimum concrete compressive strength of 4500 psi (31,000 kPa) at 28 days and manholes, valve vaults, and reinforced concrete flat slab tops shall have a minimum concrete compressive strength of 5000 psi (34,500 kPa) at 28 days."

80393

PROGRESS PAYMENTS (BDE)

Effective: November 2, 2013

Revise Article 109.07(a) of the Standard Specifications to read:

"(a) Progress Payments. At least once each month, the Engineer will make a written estimate of the quantity of work performed in accordance with the contract, and the value thereof at the contract unit prices. The amount of the estimate approved as due for payment will be vouchered by the Department and presented to the State Comptroller for payment. No amount less than $1000.00 will be approved for payment other than the final payment.

Progress payments may be reduced by liens filed pursuant to Section 23(c) of the Mechanics' Lien Act, 770 ILCS 60/23(c).

If a Contractor or subcontractor has defaulted on a loan issued under the Department's Disadvantaged Business Revolving Loan Program (20 ILCS 2705/2705-610), progress payments may be reduced pursuant to the terms of that loan agreement. In such cases, the amount of the estimate related to the work performed by the Contractor or subcontractor, in default of the loan agreement, will be offset, in whole or in part, and vouchered by the Department to the Working Capital Revolving Fund or designated escrow account. Payment for the work shall be considered as issued and received by the Contractor or subcontractor on the date of the offset voucher. Further, the amount of the offset voucher shall be a credit against the Department's obligation to pay the Contractor, the Contractor's obligation to pay the subcontractor, and the Contractor's or subcontractor's total loan indebtedness to the Department. The offset shall continue until such time as the entire loan indebtedness is satisfied. The Department will notify the Contractor and Fund Control Agent in a timely manner of such offset. The Contractor or subcontractor shall not be entitled to additional payment in consideration of the offset.

The failure to perform any requirement, obligation, or term of the contract by the Contractor shall be reason for withholding any progress payments until the Department determines that compliance has been achieved."

80328

WEEKLY DBE TRUCKING REPORTS (BDE)

Effective: June 2, 2012
Revised: April 2, 2015

The Contractor shall submit a weekly report of Disadvantaged Business Enterprise (DBE) trucks hired by the Contractor or subcontractors (i.e. not owned by the Contractor or subcontractors) that are used for DBE goal credit.

The report shall be submitted to the Engineer on Department form "SBE 723" within ten business days following the reporting period. The reporting period shall be Monday through Sunday for each week reportable trucking activities occur.

Any costs associated with providing weekly DBE trucking reports shall be considered as included in the contract unit prices bid for the various items of work involved and no additional compensation will be allowed.

80302

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (DBE)

Effective: October 15, 2017

FEDERAL OBLIGATION. The Department of Natural Resources, as a recipient of federal financial assistance, is required to take all necessary and reasonable steps to ensure nondiscrimination in the award and administration of contracts. For the purposes of this Special Provision, a disadvantaged business enterprise (DBE) means a business listed in the Illinois Unified Certification Program (IL UCP) DBE Directory.

STATE OBLIGATION. This Special Provision will also be used by the Department to satisfy the requirements of the Business Enterprise for Minorities, Females, and Persons with Disabilities Act, 30 ILCS 575.

CONTRACTOR ASSURANCE. The Contractor makes the following assurance and agrees to include the assurance in each subcontract that the Contractor signs with a subcontractor:

> The Contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

CONTRACT GOAL TO BE ACHIEVED BY THE CONTRACTOR. This contract includes a specific DBE utilization goal established by the Department. The goal has been included because the Department has determined that the work of this contract has subcontracting opportunities that may be suitable for performance by DBE companies. This determination is based on an assessment of the type of work, the location of the work, and the availability of DBE companies to do a part of the work. The assessment indicates that, in the absence of unlawful discrimination, and in an arena of fair and open competition, DBE companies can be expected to perform _**7**_% of the work. This percentage is set as the DBE participation goal for this contract. Consequently, in addition to the other award criteria established for this contract, the Department will only award this contract to a bidder who makes a good faith effort to meet this goal of DBE participation in the performance of the work. A bidder makes a good faith effort for award consideration if either of the following is done in accordance with the procedures set forth in this Special Provision:

> (a) The bidder documents that enough DBE participation has been obtained to meet the goal; or
>
> (b) The bidder documents that a good faith effort has been made to meet the goal, even though the effort did not succeed in obtaining enough DBE participation to meet the goal.

DBE LOCATOR REFERENCES. Bidders shall consult the IL UCP DBE Directory as a reference source for DBE-certified companies. In addition, the Illinois Department of Transportation maintains a letting and item specific DBE locator information system whereby DBE companies can register their interest in providing quotes on particular bid items advertised for letting. Information concerning DBE companies willing to quote work for particular contracts may be obtained by contacting the Illinois Department of Transportation's Bureau of Small Business Enterprises at telephone number (217)785-4611, or by visiting: http://www.idot.illinois.gov/doing-business/certifications/disadvantaged-business-enterprise-certification/il-ucp-directory/index.

BIDDING PROCEDURES. Compliance with this Special Provision is required prior to the award of the contract and the failure of the low bidder to comply will render the bid not responsive.

In order to assure the timely award of the contract, the low bidder shall submit:

(a) The bidder shall submit a DBE Utilization Plan to the Department of Natural Resources on completed Department of Natural Resources forms.

(1) The final Utilization Plan must be submitted within five calendar days after the date of the letting in accordance with subsection (a)(2) of Bidding Procedures herein.

(2) To meet the five day requirement, the bidder may send the Utilization Plan electronically by scanning and sending of faxing to the Department of Natural Resources. The subject line must include the bid Item Number and the Letting date. The Utilization Plan should be sent as one .pdf file, rather than multiple files and emails for the same Item Number. It is the responsibility of the bidder to obtain confirmation of email or fax delivery.

Alternatively, the Utilization Plan may be sent by certified mail or delivery service within the five calendar day period. If a question arises concerning the mailing date of a Utilization Plan, the mailing date will be established by the U.S. Postal Service postmark on the certified mail receipt from the U.S. Postal Service or the receipt issued by a delivery service when the Utilization Plan is received by the Department. It is the responsibility of the bidder to ensure the postmark or receipt date is affixed within the five days if the bidder intends to rely upon mailing or delivery to satisfy the submission day requirement.

The Department will not accept a Utilization Plan if it does not meet the five day submittal requirement and the bid will be declared not responsive. In the event the bid is declared not responsive due to a failure to submit a Utilization Plan or failure to comply with the bidding procedures set forth herein, the Department may elect to cause the forfeiture of the penal sum of the bidder's proposal guaranty, and may deny authorization to bid the project if re-advertised for bids. The Department reserves the right to invite any other bidder to submit a Utilization Plan at any time for award consideration.

(b) The Utilization Plan shall indicate that the bidder either has obtained sufficient DBE participation commitments to meet the contract goal or has not obtained enough DBE participation commitments in spite of a good faith effort to meet the goal. The Utilization Plan shall further provide the name, telephone number, and telefax number of a responsible official of the bidder designated for purposes of notification of Utilization Plan approval or disapproval under the procedures of this Special Provision.

(c) The Utilization Plan shall include a DBE Participation Commitment Statement on Department of Natural Resources form, for each DBE proposed for the performance of work to achieve the contract goal. For bidding purposes, submission of the completed forms, signed by the DBEs and scanned or faxed to the bidder will be acceptable as long as the original is available and provided upon request. All elements of information indicated on the said form shall be provided, including but not limited to the following:

(1) The names and addresses of DBE firms that will participate in the contract;

(2) A description, including pay item numbers, of the work each DBE will perform;

(3) The dollar amount of the participation of each DBE firm participating. The dollar amount of participation for identified work shall specifically state the quantity, unit price, and total

subcontract price for the work to be completed by the DBE. If partial pay items are to be performed by the DBE, indicate the portion of each item, a unit price where appropriate and the subcontract price amount;

(4) DBE Participation Commitment Statements, signed by the bidder and each participating DBE firm documenting the commitment to use the DBE subcontractors whose participation is submitted to meet the contract goal;

(5) If the bidder is a joint venture comprised of DBE companies and non-DBE companies, the Utilization Plan must also include a clear identification of the portion of the work to be performed by the DBE partner(s); and,

(6) If the contract goal is not met, evidence of good faith efforts; the documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor is selected over a DBE for work on the contract.

GOOD FAITH EFFORT PROCEDURES. The contract will not be awarded until the Utilization Plan submitted by the apparent successful bidder is approved. All information submitted by the bidder must be complete, accurate and adequately document that enough DBE participation has been obtained or document the good faith efforts of the bidder, in the event enough DBE participation has not been obtained, before the Department of Natural Resources will commit to the performance of the contract by the bidder. The Utilization Plan will be approved by the Department if the Utilization Plan documents sufficient commercially useful DBE work performance to meet the contract goal or the bidder submits sufficient documentation of a good faith effort to meet the contract goal. The Department shall follow the guidance on good faith effort provided in 49 CFR part 26, Appendix A. The Utilization Plan will not be approved by the Department if the Utilization Plan does not document sufficient DBE participation to meet the contract goal unless the apparent successful bidder documented in the Utilization Plan that it made a good faith effort to meet the goal. This means that the bidder must show that all necessary and reasonable steps were taken to achieve the contract goal. Necessary and reasonable steps are those which, by their scope, intensity and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if they were not successful. The Department will consider the quality, quantity, and intensity of the kinds of efforts that the bidder has made. Mere *pro forma* efforts, in other words, efforts done as a matter of form, are not good faith efforts; rather, the bidder is expected to have taken genuine efforts that would be reasonably expected of a bidder actively and aggressively trying to obtain DBE participation sufficient to meet the contract goal.

(a) The following is a list of types of action that the Department will consider as part of the evaluation of the bidder's good faith efforts to obtain participation. These listed factors are not intended to be a mandatory checklist and are not intended to be exhaustive. Other factors or efforts brought to the attention of the Department may be relevant in appropriate cases, and will be considered by the Department.

(1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBE companies that have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBE companies to respond to the solicitation. The bidder must determine with certainty if the DBE companies are interested by taking appropriate steps to follow up initial solicitations.

(2) Selecting portions of the work to be performed by DBE companies in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime Contractor might otherwise prefer to perform these work items with its own forces.

(3) Providing interested DBE companies with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(4) a. Negotiating in good faith with interested DBE companies. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBE companies that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBE companies to perform the work.

b. A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBE companies is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also the ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidders are not, however, required to accept higher quotes from DBE companies if the price difference is excessive or unreasonable. In accordance with subsection (c)(6) of the above Bidding Procedures, the documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

(5) Not rejecting DBE companies as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.

(6) Making efforts to assist interested DBE companies in obtaining bonding, lines of credit, or insurance as required by the recipient or Contractor.

(7) Making efforts to assist interested DBE companies in obtaining necessary equipment, supplies, materials, or related assistance or services.

(8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBE companies.

(b) If the Department determines that the apparent successful bidder has made a good faith effort to secure the work commitment of DBE companies to meet the contract goal, the Department will award the contract provided that it is otherwise eligible for award. If the Department determines that the bidder has failed to meet the requirements of this Special Provision or that a good faith effort has not been made, the Department will notify the responsible company official designated in the Utilization Plan that the bid is not responsive. The notification shall include a statement of reasons for the determination.

(c) The bidder may request administrative reconsideration of a determination adverse to the bidder within the five working days after receipt of the notification date of the determination by delivering the request to the Director of the Department's Office of Water Resources. Deposit of the request in the United States mail on or before the fifth business day shall not be deemed delivery. The determination shall become final if a request is not made and delivered. A request may provide additional written documentation and/or argument concerning the issues raised in the determination statement of reasons, provided the documentation and arguments address efforts made prior to submitting the bid. After the review by Director, the bidder will be sent a written decision within fifteen working days after receipt of the request for reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. A final decision by the Director that a good faith effort was made shall approve the Utilization Plan submitted by the bidder and shall clear the contract for award. A final decision that a good faith effort was not made shall render the bid not responsive.

CALCULATING DBE PARTICIPATION. The Utilization Plan values represent work anticipated to be performed and paid for upon satisfactory completion. The Department is only able to count toward the achievement of the overall goal and the contract goal the value of payments made for the work actually performed by DBE companies. In addition, a DBE must perform a commercially useful function on the contract to be counted. A commercially useful function is generally performed when the DBE is responsible for the work and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. The Department will follow the specific counting guidelines provided in 49 CFR part 26.55

(a) DBE as the Contractor: 100 percent goal credit for that portion of the work performed by the DBE's own forces, including the cost of materials and supplies. Work that a DBE subcontracts to a non-DBE does not count toward the DBE goals.

(b) DBE as a joint venture Contractor: 100 percent goal credit for that portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work performed by the DBE's own forces.

(c) DBE as a subcontractor: 100 percent goal credit for the work of the subcontract performed by the DBE's own forces, including the cost of materials and supplies, excluding the purchase of materials and supplies or the lease of equipment by the DBE subcontractor from the prime Contractor or its affiliates. Work that a DBE subcontractor in turn subcontracts to a non-DBE does not count toward the DBE goal.

(d) DBE as a trucker: 100 percent goal credit for trucking participation provided the DBE is responsible for the management and supervision of the entire trucking operation for which it is responsible. At least one truck owned, operated, licensed, and insured by the DBE must be used on the contact. Credit will be given for the following:

(1) The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.

(2) The DBE may also lease trucks from a non-DBE firm, including from an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement.

(e) DBE as a material supplier:
(1) 60 percent goal credit for the cost of the materials or supplies purchased from a DBE regular dealer.

(2) 100 percent goal credit for the cost of materials or supplies obtained from a DBE manufacturer.

(3) 100 percent credit for the value of reasonable fees and commissions for the procurement of materials and supplies if not a regular dealer or manufacturer.

CONTRACT COMPLIANCE. Compliance with this Special Provision is an essential part of the contract. The Department shall not credit the participation of a DBE included in the Utilization Plan toward either the contract goal or the Department's overall goal until the amount to be applied toward the goals has been paid to the DBE. The following administrative procedures and remedies govern the compliance by the Contractor with the contractual obligations established by the Utilization Plan. After approval of the Utilization Plan and award of the contract, the Utilization Plan and individual DBE Participation Statements become part of the contract. If the Contractor did not succeed in obtaining enough DBE participation to achieve the advertised contract goal, and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of DBE work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the amended contract goal. All work indicated for performance by an approved DBE shall be performed, managed, and supervised by the DBE executing the DBE Participation Commitment Statement.

(a) NO AMENDMENT. No amendment to the Utilization Plan may be made without prior written approval from the Department. All requests for amendment to the Utilization Plan shall be submitted to the Department 's Project Manager.

(b) CHANGES TO WORK. Any deviation from the DBE condition-of-award or contract plans, specifications, or special provisions must be approved, in writing, by the Department as provided elsewhere in the Contract. The Contractor shall notify affected DBEs in writing of any changes in the scope of work which result in a reduction in the dollar amount condition-of-award to the contract. Where the revision includes work committed to a new DBE subcontractor, not previously involved in the project, then a Request for Approval of Subcontractor form must be signed and submitted. If the commitment of work is in the form of additional tasks assigned to an existing subcontract, than a new Request for Approval of Subcontractor shall not be required. However, the Contractor must document efforts to assure that the existing DBE subcontractor is capable of performing the additional work and has agreed in writing to the change.

(c) SUBCONTRACT. The Contractor must provide DBE subcontracts to the Department upon request. Subcontractors shall ensure that all lower tier subcontracts or agreements with DBEs to supply labor or materials be performed in accordance with this Special Provision.

(d) ALTERNATIVE WORK METHODS. In addition to the above requirements for reductions in the condition of award, additional requirements apply to the two cases of Contractor- initiated work substitution proposals. Where the contract allows alternate work methods which serve to delete or create underruns in condition of award DBE work, and the Contractor selects that alternate method or, where the Contractor proposes a substitute work method or material that serves to diminish or delete work committed to a DBE and replace it with other work, then the Contractor must demonstrate one of the following:

(1) That the replacement work will be performed by the same DBE (as long as the DBE is certified in the respective item of work) in a modification of the condition of award; or

(2) That the DBE is aware that its work will be deleted or will experience underruns and has agreed in writing to the change. If this occurs, the Contractor shall substitute other work of

equivalent value to a certified DBE or provide documentation of good faith efforts to do so; or

(3) That the DBE is not capable of performing the replacement work or has declined to perform the work at a reasonable competitive price. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so.

(e) TERMINATION AND REPLACEMENT PROCEDURES. The Contractor shall not terminate or replace a DBE listed on the approved Utilization Plan, or perform with other forces work designated for a listed DBE except as provided in this Special Provision. The Contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the Contractor obtains the Department's written consent as provided in subsection (a) of this part. Unless Department consent is provided for termination of a DBE subcontractor, the Contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the DBE in the Utilization Plan.

As stated above, the Contractor shall not terminate or replace a DBE subcontractor listed in the approved Utilization Plan without prior written consent. This includes, but is not limited to, instances in which the Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non- DBE firm, or with another DBE firm. Written consent will be granted only if the Department agrees, for reasons stated in its concurrence document, that the Contractor has good cause to terminate or replace the DBE firm. Before transmitting to the Department any request to terminate and/or substitute a DBE subcontractor, the Contractor shall give notice in writing to the DBE subcontractor, with a copy to the Department, of its intent to request to terminate and/or substitute, and the reason for the request. The Contractor shall give the DBE five days to respond to the Contractor's notice. The DBE so notified shall advise the Department and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Department should not approve the Contractor's action. If required in a particular case as a matter of public necessity, the Department may provide a response period shorter than five days.

For purposes of this paragraph, good cause includes the following circumstances:

(1) The listed DBE subcontractor fails or refuses to execute a written contract;

(2) The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contractor;

(3) The listed DBE subcontractor fails or refuses to meet the prime Contractor's reasonable, nondiscriminatory bond requirements;

(4) The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;

(5) The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1200 or applicable state law.

(6) You have determined that the listed DBE subcontractor is not a responsible contractor;

(7) The listed DBE subcontractor voluntarily withdraws from the projects and provides to you written notice of its withdrawal;

(8) The listed DBE is ineligible to receive DBE credit for the type of work required;

(9) A DBE owner dies or becomes disabled with the result that the listed DBE subcontractor is unable to complete its work on the contract;

(10) Other documented good cause that compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the prime Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the prime Contractor can self-perform the work for which the DBE contractor was engaged or so that the prime Contractor can substitute another DBE or non-DBE contractor after contract award.

When a DBE is terminated, or fails to complete its work on the Contract for any reason the Contractor shall make a good faith effort to find another DBE to substitute for the original DBE to perform at least the same amount of work under the contract as the terminated DBE to the extent needed to meet the established Contract goal. The good faith efforts shall be documented by the Contractor. If the Department requests documentation under this provision, the Contractor shall submit the documentation within seven days, which may be extended for an additional seven days if necessary at the request of the Contractor. The Department shall provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated.

(f) PAYMENT RECORDS. The Contractor shall maintain a record of payments for work performed to the DBE participants. The records shall be made available to the Department for inspection upon request. After the performance of the final item of work or delivery of material by a DBE and final payment therefore to the DBE by the Contractor, but not later than thirty calendar days after payment has been made by the Department to the Contractor for such work or material, the Contractor shall submit a DBE Payment Agreement on Department form to the Project Manager. If full and final payment has not been made to the DBE, the DBE Payment Agreement shall indicate whether a disagreement as to the payment required exists between the Contractor and the DBE or if the Contractor believes that the work has not been satisfactorily completed. If the Contractor does not have the full amount of work indicated in the Utilization Plan performed by the DBE companies indicated in the Utilization Plan and after good faith efforts are reviewed, the Department may deduct from contract payments to the Contractor the amount of the goal not achieved as liquidated and ascertained damages. The Contractor may request an administrative reconsideration of any amount deducted as damages pursuant to subsection (h) of this part.

(g) ENFORCEMENT. The Department reserves the right to withhold payment to the Contractor to enforce the provisions of this Special Provision. Final payment shall not be made on the contract until such time as the Contractor submits sufficient documentation demonstrating achievement of the goal in accordance with this Special Provision or after liquidated damages have been determined and collected.

(h) RECONSIDERATION. Notwithstanding any other provision of the contract, including but not limited to Article 109.09 of the Standard Specifications, the Contractor my request administrative reconsideration of a decision to deduct the amount of the goal not achieved as liquidated damages. A request to reconsider shall be delivered to the Department and shall be handled and considered in the same manner as set forth in paragraph (c) of “Good Faith Effort Procedures” of this Special Provision, except a final decision that a good faith effort was not made during contract performance to achieve the goal agreed to in the Utilization Plan shall be the final administrative decision of the Department.

NOTICE: Prevailing Wage Rates

The Illinois Prevailing Wage Act (820 ILCS 130/) requires payment of prevailing wages on State of Illinois public works projects.

As required by this Act, not less than the rates of wages ascertained by the Illinois Department of Labor and as revised during the performance of a Contract shall be paid to all laborers, workers and mechanics performing work under the Contract.

Post the scale of wages in a prominent and easily accessible place at the site of work. If the Illinois Department of Labor revises the prevailing rates of wages to be paid as listed in the specification of rates, the contractor shall post the revised rates of wages and shall pay not less than the revised rates of wages. Current wage rate information shall be obtained by visiting the Illinois Department of Labor web site at http://www.state.il.us/agency/idol/ or by calling 312-793- 2814. It is the responsibility of the contractor to review the rates applicable to the work of the contract at regular intervals in order to insure the timely payment of current rates. Provision of this information to the contractor by means of the Illinois Department of Labor web site satisfies the notification of revisions by the Department to the contractor pursuant to the Act, and the contractor agrees that no additional notice is required. The contractor shall notify each of its subcontractors of the revised rates of wages.

Prevailing Wage rates for Cook County effective Sept. 1, 2017												
Trade Title	**Region**	**Type**	**Class**	**Base Wage**	**Fore-man Wage**	**M-F OT**	**OSA**	**OSH**	**H/W**	**Pension**	**Vacation**	**Training**
ASBESTOS ABT-GEN	ALL	ALL		41.20	42.20	1.5	1.5	2	14.65	12.32	0.00	0.50
ASBESTOS ABT-MEC	ALL	BLD		37.46	39.96	1.5	1.5	2	11.62	11.06	0.00	0.72
BOILERMAKER	ALL	BLD		48.49	52.86	2	2	2	6.97	19.61	0.00	0.90
BRICK MASON	ALL	BLD		45.38	49.92	1.5	1.5	2	10.45	16.68	0.00	0.90
CARPENTER	ALL	ALL		46.35	48.35	1.5	1.5	2	11.79	18.87	0.00	0.63
CEMENT MASON	ALL	ALL		44.25	46.25	2	1.5	2	14.00	17.16	0.00	0.92
CERAMIC TILE FNSHER	ALL	BLD		38.56	38.56	1.5	1.5	2	10.65	11.18	0.00	0.68
COMM. ELECT.	ALL	BLD		43.10	45.90	1.5	1.5	2	8.88	13.22	1.00	0.85
ELECTRIC PWR EQMT OP	ALL	ALL		50.50	55.50	1.5	1.5	2	11.69	16.69	0.00	3.12
ELECTRIC PWR GRNDMAN	ALL	ALL		39.39	55.50	1.5	1.5	2	9.12	13.02	0.00	2.43
ELECTRIC PWR LINEMAN	ALL	ALL		50.50	55.50	1.5	1.5	2	11.69	16.69	0.00	3.12
ELECTRICIAN	ALL	ALL		47.40	50.40	1.5	1.5	2	14.33	16.10	1.00	1.18
ELEVATOR CONSTRUCTOR	ALL	BLD		51.94	58.43	2	2	2	14.43	14.96	4.16	0.90
FENCE ERECTOR	ALL	ALL		39.58	41.58	1.5	1.5	2	13.40	13.90	0.00	0.40
GLAZIER	ALL	BLD		42.45	43.95	1.5	1.5	2	14.04	20.14	0.00	0.94
HT/FROST INSULATOR	ALL	BLD		50.50	53.00	1.5	1.5	2	12.12	12.96	0.00	0.72
IRON WORKER	ALL	ALL		47.33	49.33	2	2	2	14.15	22.39	0.00	0.35
LABORER	ALL	ALL		41.20	41.95	1.5	1.5	2	14.65	12.32	0.00	0.50
LATHER	ALL	ALL		46.35	48.35	1.5	1.5	2	11.79	18.87	0.00	0.63
MACHINIST	ALL	BLD		47.56	50.06	1.5	1.5	2	7.05	8.95	1.85	1.47
MARBLE FINISHERS	ALL	ALL		33.95	33.95	1.5	1.5	2	10.45	15.52	0.00	0.47
MARBLE MASON	ALL	BLD		44.63	49.09	1.5	1.5	2	10.45	16.28	0.00	0.59
MATERIAL TESTER I	ALL	ALL		31.20	31.20	1.5	1.5	2	14.65	12.32	0.00	0.50
MATERIALS TESTER II	ALL	ALL		36.20	36.20	1.5	1.5	2	14.65	12.32	0.00	0.50
MILLWRIGHT	ALL	ALL		46.35	48.35	1.5	1.5	2	11.79	18.87	0.00	0.63

OPERATING ENGINEER	ALL	BLD	1	50.10	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	BLD	2	48.80	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	BLD	3	46.25	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	BLD	4	44.50	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	BLD	5	53.85	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	BLD	6	51.10	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	BLD	7	53.10	54.10	2	2	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	FLT	1	55.90	55.90	1.5	1.5	2	18.05	13.60	1.90	1.30
OPERATING ENGINEER	ALL	FLT	2	54.40	55.90	1.5	1.5	2	18.05	13.60	1.90	1.30
OPERATING ENGINEER	ALL	FLT	3	48.40	55.90	1.5	1.5	2	18.05	13.60	1.90	1.30
OPERATING ENGINEER	ALL	FLT	4	40.25	55.90	1.5	1.5	2	18.05	13.60	1.90	1.30
OPERATING ENGINEER	ALL	FLT	5	57.40	55.90	1.5	1.5	2	18.05	13.60	1.90	1.30
OPERATING ENGINEER	ALL	FLT	6	38.00	55.90	1.5	1.5	2	18.05	13.60	1.90	1.30
OPERATING ENGINEER	ALL	HWY	1	48.30	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	HWY	2	47.75	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	HWY	3	45.70	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	HWY	4	44.30	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	HWY	5	43.10	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	HWY	6	51.30	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
OPERATING ENGINEER	ALL	HWY	7	49.30	52.30	1.5	1.5	2	18.80	14.35	2.00	1.30
ORNAMNTL IRON WORKER	ALL	ALL		46.75	49.25	2	2	2	13.90	19.79	0.00	0.75
PAINTER	ALL	ALL		45.55	51.24	1.5	1.5	1.5	11.56	11.44	0.00	1.87
PAINTER SIGNS	ALL	BLD		37.45	42.05	1.5	1.5	2	2.60	3.18	0.00	0.00
PILEDRIVER	ALL	ALL		46.35	48.35	1.5	1.5	2	11.79	18.87	0.00	0.63
PIPEFITTER	ALL	BLD		47.50	50.50	1.5	1.5	2	10.05	17.85	0.00	2.12
PLASTERER	ALL	BLD		42.75	45.31	1.5	1.5	2	14.00	15.71	0.00	0.89
PLUMBER	ALL	BLD		49.25	52.20	1.5	1.5	2	14.34	13.35	0.00	1.28
ROOFER	ALL	BLD		42.30	45.30	1.5	1.5	2	9.08	12.14	0.00	0.58
SHEETMETAL WORKER	ALL	BLD		43.50	46.98	1.5	1.5	2	11.03	23.43	0.00	0.78
SIGN HANGER	ALL	BLD		31.31	33.81	1.5	1.5	2	4.85	3.28	0.00	0.00

SPRINKLER FITTER	ALL	BLD		47.20	49.20	1.5	1.5	2	12.25	11.55	0.00	0.55
STEEL ERECTOR	ALL	ALL		42.07	44.07	2	2	2	13.45	19.59	0.00	0.35
STONE MASON	ALL	BLD		45.38	49.92	1.5	1.5	2	10.45	16.68	0.00	0.90
TERRAZZO FINISHER	ALL	BLD		40.54	40.54	1.5	1.5	2	10.65	12.76	0.00	0.73
TERRAZZO MASON	ALL	BLD		44.38	47.88	1.5	1.5	2	10.65	14.15	0.00	0.82
TILE MASON	ALL	BLD		45.49	49.49	1.5	1.5	2	10.65	13.88	0.00	0.86
TRAFFIC SAFETY WRKR	ALL	HWY		33.50	35.85	1.5	1.5	2	6.00	7.25	0.00	0.50
TRUCK DRIVER	E	ALL	1	35.60	36.25	1.5	1.5	2	8.56	11.50	0.00	0.15
TRUCK DRIVER	E	ALL	2	35.85	36.25	1.5	1.5	2	8.56	11.50	0.00	0.15
TRUCK DRIVER	E	ALL	3	36.05	36.25	1.5	1.5	2	8.56	11.50	0.00	0.15
TRUCK DRIVER	E	ALL	4	36.25	36.25	1.5	1.5	2	8.56	11.50	0.00	0.15
TRUCK DRIVER	W	ALL	1	35.98	36.53	1.5	1.5	2	8.25	10.14	0.00	0.15
TRUCK DRIVER	W	ALL	2	36.13	36.53	1.5	1.5	2	8.25	10.14	0.00	0.15
TRUCK DRIVER	W	ALL	3	36.33	36.53	1.5	1.5	2	8.25	10.14	0.00	0.15
TRUCK DRIVER	W	ALL	4	36.53	36.53	1.5	1.5	2	8.25	10.14	0.00	0.15
TUCKPOINTER	ALL	BLD		45.42	46.42	1.5	1.5	2	8.32	15.42	0.00	0.80

Legend

M-F OT Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.

OSA Overtime pay required for every hour worked on Saturdays

OSH Overtime pay required for every hour worked on Sundays and Holidays

H/W Health/Welfare benefit

Explanations COOK COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

TRUCK DRIVERS (WEST) - That part of the county West of Barrington Road.

EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date. ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS ELECTRICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice sound vision production and reproduction, telephone and telephone interconnect, facsimile, data apparatus, coaxial, fibre optic and wireless equipment, appliances and systems used for the transmission and reception of signals of any nature, business, domestic, commercial, education, entertainment, and residential purposes, including but not limited to, communication and telephone, electronic and sound equipment, fibre optic and data communication systems, and the performance of any task directly related to such installation or service whether at new or existing sites, such tasks to include the placing of wire and cable and electrical power conduit or other raceway work within the equipment room and pulling wire and/or cable through conduit and the installation of any incidental conduit, such that the employees covered hereby can complete any job in full.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under: Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum;

Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines: ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane: Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.;

Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

TRAFFIC SAFETY

Work associated with barricades, horses and drums used to reduce lane usage on highway work, the installation and removal of temporary lane markings, and the installation and removal of temporary road signs.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION - EAST & WEST

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

Tam O'Shanter Golf Course Pump Station Modification

APPENDIX A

PERMITS

ILLINOIS
NATURAL RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

Office of Water Resources • 2050 West Stearns Road • Bartlett, Illinois 60103

July 7, 2015

SUBJECT: Permit No. NE2015031
Tam O'Shanter Golf Course Pump Station Modification
North Branch of the Chicago River
Cook County, Application No. N20150070

Jim Stoneberg
Niles Park District
6780 West Howard Street
Niles, Illinois 60714

Dear Mr. Stoneberg:

Enclosed is Illinois Department of Natural Resources, Office of Water Resources Permit No. NE2015031 authorizing the subject project. This permit does not supersede any other federal, state or local authorizations that may be required for the project.

Please be advised that the Illinois Department of Natural Resources, Division of Ecosystems and Environment (DEE) participates in the regulatory programs of the U.S. Army, Corps of Engineers (USACE) and may review this project if a USACE Section 10 or 404 permit is required. Issuance of a permit by the Office of Water Resources does not preclude DEE's provision of comments and/or recommendations, primarily related to biological effects of the proposed action, to the USACE and other federal agencies concerning your project.

If any changes of the permitted work are found necessary, revised plans should be submitted promptly to this office for review and approval. Also, this permit expires on the date indicated in Condition (13). If unable to complete the work by that date, the permittee may make a written request for a time extension.

Please contact me at 847/608-3100, ext. 32025 if you have any questions.

Sincerely,

Gary W. Jereb, P.E., Chief
Northeastern Illinois Regulatory Programs Section

GJ:cjp
Enclosure
cc: Chicago District, U.S. Army Corps of Engineers
Adrianna Culcasi, Michael Baker Jr., Inc.
Village of Niles Engineering Dept.
Rick Gosch, IDNR/OWR, Division of Planning ✓

PERMIT NO. NE2015031
DATE: July 7, 2015

State of Illinois
Department of Natural Resources, Office of Water Resources

Permission is hereby granted to:

Niles Park District
6780 West Howard Street
Niles, Illinois 60714

to modify the pump station for the Tam O'Shanter Golf Course in the floodway of the North Branch of the Chicago River in the Northeast Quarter of Section 30, Township 41 North, Range 13 East of the Third Principal Meridian in Cook County,

in accordance with an application dated May 7, 2015, and the plans and specifications entitled:

TAM O'SHANTER GOLF COURSE PUMP STATION MODIFICATION, NILES, ILLINOIS, 2015, TITLE SHEET, UNDATED, SHEETS 5 TO 8 AND 15 OF 28, DATED MARCH 20, 2015, ALL SHEETS RECEIVED MAY 8, 2015.

Examined and Recommended:

Gary W. Jereb, Chief
Northeastern IL Regulatory
Programs Section

Approval Recommended:

Daniel A. Injerd, Director
Office of Water Resources

Approved:

Wayne A. Rosenthal, Director
Department of Natural Resources

This PERMIT is subject to the terms contained herein.

PERMIT NO. NE2015031

THIS PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

1) This permit is granted in accordance with the Rivers, Lakes and Streams Act "615 ILCS 5."

2) This permit does not convey title to the permittee or recognize title of the permittee to any submerged or other lands, and furthermore, does not convey, lease or provide any right or rights of occupancy or use of the public or private property on which the activity or any part thereof will be located, or otherwise grant to the permittee any right or interest in or to the property, whether the property is owned or possessed by the State of Illinois or by any private or public party or parties.

3) This permit does not release the permittee from liability for damage to persons or property resulting from the work covered by this permit, and does not authorize any injury to private property or invasion of private rights.

4) This permit does not relieve the permittee of the responsibility to obtain other federal, state or local authorizations required for the construction of the permitted activity; and if the permittee is required by law to obtain approvals from any federal or state agency to do the work, this permit is not effective until the federal and state approvals are obtained. If construction does not begin within two years of the date of this permit, the permittee must submit the project to EcoCat (http://dnr.illinois.gov/EcoPublic/) for an updated consultation under the Illinois Endangered Species Protection Act and the Illinois Natural Areas Preservation Act

5) The permittee shall, at the permittee's own expense, remove all temporary piling, cofferdams, false work, and material incidental to the construction of the project. If the permittee fails to remove such structures or materials, the Department may have removal made at the expense of the permittee.

6) In public waters, if future need for public navigation or other public interest by the state or federal government necessitates changes in any part of the structure or structures, such changes shall be made by and at the expense of the permittee or the permittee's successors as required by the Department or other properly constituted agency, within sixty (60) days from receipt of written notice of the necessity from the Department or other agency, unless a longer period of time is specifically authorized.

7) The execution and details of the work authorized shall be subject to the review and approval of the Department. Department personnel shall have the right of access to accomplish this purpose.

8) Starting work on the activity authorized will be considered full acceptance by the permittee of the terms and conditions of the permit.

9) The Department in issuing this permit has relied upon the statements and representations made by the permittee; if any substantive statement or representation made by the permittee is found to be false, this permit will be revoked; and when revoked, all rights of the permittee under the permit are voided.

10) In public waters, the permittee and the permittee's successors shall make no claim whatsoever to any interest in any accretions caused by the activity.

11) In issuing this permit, the Department does not ensure the adequacy of the design or structural strength of the structure or improvement.

12) Noncompliance with the conditions of this permit will be considered grounds for revocation.

13) If the construction activity permitted is not completed on or before December 31, 2018 this permit shall cease and be null and void.

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

100 EAST ERIE STREET CHICAGO, ILLINOIS 60611-3154 312.751.5600

December 15, 2014

Ms. Anna Culcasi, PE, CFM
Civil Engineer
Michael Baker International
311 West Monroe, Suite 1350
Chicago, IL 60606

Dear Ms. Culcasi:

Subject: MWRD Watershed Management Ordinance (WMO) Permit Applicability
Tam O'Shanter Golf Course Pump Station Modification
Niles, IL

This is in response to your letter, received December 8, 2014, requesting whether an MWRD WMO permit will be required for the subject project. As described in your letter, the proposed project includes removal and replacement of the intake, screen wet well, and pump wet well of the golf course irrigation pump station that pumps water from the North Branch of the Chicago River. The project is being undertaken by the Illinois Department of Natural Resources (IDNR). Sanitary sewers are not proposed.

The IDNR is a state agency, and therefore exempt from certain development activities as described in §201.1 of the WMO. Additionally, since the proposed work involves maintenance activities and does not include any qualified sewer construction, the subject project will not require a WMO permit. Prior to conducting any work, be sure to contact the local authority to obtain any and all approvals for the project.

If you have any questions, please call Ms. Lynn Kohlhaas at (312) 751-3242.

Very truly yours,

Justine Skawski

Justine Skawski, P.E.
Principal Civil Engineer

LMK/ci
cc: Mousa Nasal, Village Engineer
Village of Niles
Jeff Wickenkamp, Vice President
Hey and Associates, Inc.

North Cook County
Soil & Water Conservation District

2358 Hassell Road, Suite B, Hoffman Estates, Illinois 60169
Phone: 847-885-8830, Fax: 847-885-8843, email: r.mcandless@northcookswcd.org

May 12, 2015

Ms. Anna Culcasi, P.E., CFM
Michael Baker International
311 W. Monroe Street
Suite 1350
Chicago, Il. 60606

Re: Soil Erosion & Sediment Control (SE/SC) Plan Review for the Tam O' Shanter Golf Course Pump Station Modification, Niles, Illinois, U.S. Army Corps of Engineers LRC-2014-552.

Dear Ms. Culcasi,

I have completed my initial review of the Soil Erosion & Sediment Control (SE/SC) Plan Review for the Tam O' Shanter Golf Course Pump Station Modification, Niles, Illinois, U.S. Army Corps of Engineers LRC-2014-552. Typically, when a contractor is responsible for determining "Means & Methods" for an In-Stream Work Plan, I provide a letter of Conditional Approval of the Soil Erosion & Sediment Control Plan, with Final Approval pending the submittal of that plan to me for review and approval. I will follow that procedure with this SE-SC Plan review however, I have one comment on the plans as submitted. On Sheet 16 of 28 in the Cofferdam Notes # 4, the note refers to the contractor selecting the design storm concerning overtopping of the cofferdam. There is a section in the Illinois Urban Manual (IUM) Cofferdam Standard # 803 that relates to this issue. The pertinent section reads as follows;

The diversion or bypass flow shall be sized to safely convey the 2-year peak flow, at a minimum. The cofferdam shall be designed to overtop for any events greater than the 2-year peak elevation, unless higher peak flows are being bypassed. It is the responsibility of property owners and those performing work to safely convey flows to prevent damage to off-site properties.

The contractor should be aware of the IUM standard and follow it accordingly, unless special conditions exist that warrant a deviation from that standard.

Regards,

Rick McAndless, CPESC

APPENDIX B

O&M MANUAL

TAM O'SHANTER GOLF COURSE

SILENT STORM VFD PUMPING SYSTEM

Table of Contents

1. Recommended Periodic Maintenance Practices

2. Manufacturer's Instruction Manual 19-001-200R2

Appendix

A. Original Factory Data

B. Record Drawings of Deepened Facility

This page intentionally left blank.

1. RECOMMENDED PERIODIC MAINTENANCE PRACTICES:

Inspections & Cleaning:

- Staff should observe the operation of the pumps at least weekly to listen for new or unusual noises and to look for leaks. If any mechanical anomalies are observed, then staff should contact the local manufacturers' representative and have them visit the facility, diagnose and address any mechanical deficiencies in the pumps' operation.

- Staff should make a monthly visual inspection of the wet well, screening manhole and stream intake structure to determine whether debris buildup warrants action.

  If, in the opinion of the staff, debris has accumulated to a level sufficient to make a cleaning operation appropriate, three primary options exist, which involve decreasing levels of effort and cost.

  i. Obtain the services of a vacuum truck to remove debris from any or all of the three structures.
  ii. Flush debris from the screening manhole and intake structure with a high pressure hose, if the condition of the wet well does not warrant its cleaning.
  iii. Remove debris from the structures using hand tools, if the level debris present indicates that this limited effort will preserve the efficient operation of the facility.

Manufacturer' Maintenance:

- Manufacturer currently visits the facility annually. During the visit, routine maintenance is provided for the pumps, motors and controls.

  This current practice should continue.

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INSTRUCTION MANUAL
19-001-200R2

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

SILENT STORM VFD Pumping System

NOTE: This product is not intended for use in potable water applications.

FLOWTRONEX

a xylem brand

Acknowledgements

TABLE OF CONTENTS

ACKNOWLEDGEMENTS II

TABLE OF CONTENTS III

WARRANTY INFORMATION 2

SAFETY 3
- SAFETY INSTRUCTIONS 3
- SAFETY REMINDERS 3
- Additional Safety Information 4

GENERAL DESCRIPTION 5
- PRODUCT DESCRIPTION 5
- OPERATIONAL LIMITS 5
- NAMEPLATE INFORMATION 5
- STATION NUMBERING 5
- HANDLING 6
- STORAGE 6
- FIELD CONNECTION DIAGRAMS 6
- GROUND CONNECTIONS 7

INSTALLATION 8
- LOCATION 8
- FOUNDATION 8
- PUMP INSTALLATION 8
  - Prior to Installation 8
  - Installing Assembled Pump Station 8

STATION OPERATION 11
- DOOR SWITCH OPERATION 11
  - System Control Switch 11
  - Individual Pump Switches 11
  - VFD / Bypass Switch 11
  - VFD Selector Switch (Optional On Some Stations) – PUMP 1 / PUMP 2 / PUMP 3 11
  - Low Discharge/Differential Pressure Switch 11
  - Wye Strainer or Filter Switch 12
  - Lake Screen Switch 12
  - Well Pump Switch 12
  - Reset Push Button 12
- AUTOMATIC OPERATION 13
  - Overview 13
  - Line Fill Mode 13
  - System Charging Mode 13
  - Normal Operation 14
  - Manual VFD Operation 16
  - VFD Bypass Operation, Manual mode 16
  - VFD Bypass Operation, Auto mode 17
  - PLC Bypass Operation 18
- SYSTEM SAFETIES 19
  - Automatic Mode of Operation 19
  - Manual Mode of Operation 19
  - Low Discharge Pressure 19
  - High Discharge Pressure 19
  - Low Inlet Pressure 20
  - Loss of Prime 20
  - Low Level Fault 21
  - Phase Failure 21
- INDIVIDUAL PUMP FAULTS 21
  - Overload Protection 21
  - High Pump Temperature (Optional) 22
  - VFD Fault 22

MAINTENANCE 23
- REGULAR MAINTENANCE = INVESTMENT 23
- REGULAR MONTHLY MAINTENANCE INTERVALS 23
- WINTERIZING PUMP STATIONS 24
  - Generalized Instructions for All Pump Stations 24
  - Vertical Stations 25
  - Horizontal Stations 25
  - Spring Restart of Pumping Station 25

TROUBLESHOOTING 26
- LOW DISCHARGE PRESSURE FAULT 26
- HIGH DISCHARGE PRESSURE FAULT 27
- LOW LEVEL FAULT 27
- LOW INLET PRESSURE FAULT 27
- LOSS OF PRIME FAULT 28
- PHASE FAULT 28
- VFD FAULT 28
- MOTOR WON'T START 29

GLOSSARY OF TERMS 30

APPENDIX A — FINAL CHECK LIST 34

APPENDIX B — ELECTRICAL WIRING AND CONTROL SETTINGS FINAL CHECKLIST 35

NOTE: The information contained in this book is intended to assist operating personnel by providing information about the characteristics of the purchased equipment.

It does not relieve the user of their responsibility of using accepted engineering practices in the installation, operation, and maintenance of this equipment.

For additional questions, contact:

XYLEM FLOWTRONEX

8:00 AM to 5:00 PM Central time (800) 786-7480 x3

5:00 PM to 8:00 AM Central time

After Hours technician for emergency assistance. (214) 454-5768

service@flowtronex.com

WARRANTY INFORMATION

Company warrants title to the product(s) and, except as noted below with respect to items not of Company's Manufacturer, also warrants the product(s) on date on shipment to Purchaser, to be of the kind and quality described herein, and free of defects in workmanship and material.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MECHANTABILITY AND FITNESS, AND CONSTITUTES THE ONLY WARRANTY OF COMPANY WITH RESPECT TO THE PRODUCT(S).

If within one year from date of initial operation, but nor more than eighteen months from date of shipment by Company of any item of product(s), Purchaser discovers that such item was not as warranted above and promptly notifies Company in writing thereof, Company shall remedy such non-conformance by, at Company affected part of the product(s). Purchaser shall assume all responsibility and expense for removal, reinstallation, and freight in connection with the foregoing remedies. The same obligations and conditions shall extend to replacement parts furnished by Company hereunder. Company shall have the right of disposal of parts replaced by it.

ANY SEPARATELY LISTED ITEM OF THE PRODUCT(S) WHICH IS NOT MANUFACTURED BY THE COMPANY IS NOT WARRANTED BY COMPANY and shall be covered only the express warrant, if any, of the manufacturer thereof.

THIS STATES PURCHASER'S EXCLUSIVE REMEDY AGAINST COMPANY AND ITS SUPPLIERS RELATING TO THE PRODUCT(S), WHETHER IN CONTRACT OR IN TORT OR UNDER ANY OTHER LEGAL THEORY, AND WHETHER ARISING OUT OF WARRANTIES, REPRESENTATIONS, INSTRUCTIONS, INSTALLATIONS OR DEFECTS FROM ANY CAUSE. Company and its suppliers shall have no obligation as to any product which has been improperly stored and handled, or which has not been operated or maintained according to instructions in Company or supplier furnished manuals.

SAFETY

Read all safety information prior to installation of the Silent Storm Pumping System.

SAFETY INSTRUCTIONS

SAFETY INSTRUCTION

This is a SAFETY ALERT SYMBOL. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury, death!

FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.

DANGER

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury.

CAUTION

Used without the safety alert symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

All operating instructions must be read, understood, and followed by the operating personnel. Flowtronex accepts no liability for damages or operating disorder which are the result of non compliance with the operating instructions.

When the Pumping System components reach the end of life the components should be disposed of or recycled in accordance with local laws.

SAFETY REMINDERS

1. This manual is intended to assist in the installation, operation, and repair of the system and must be kept with the system.
2. Installation and maintenance MUST be performed by properly trained and qualified personnel.
3. Review all instructions and warnings prior to performing any work on the system.
4. Any safety decals MUST be left on the controller and pump.
5. The system MUST be disconnected from the main power supply before attempting any operation or maintenance on the electrical or mechanical part of the system. Failure to disconnect electrical power before attempting any operation or maintenance can result in electrical shock, burns, or death.

ADDITIONAL SAFETY INFORMATION

This pump has been designed for safe and reliable operation. A pump is a pressure-containing device with rotating parts that could be hazardous.

Operators and maintenance personnel must realize this and follow necessary safety measures. Proper safety procedures must be followed. Xylem Flowtronex shall not be liable for damage or delays caused by a failure to observe the instructions in this manual.

Safety Apparel:

- Wear insulated work gloves when handling hot bearings or using bearing heater.
- Wear heavy work gloves when handling parts with sharp edges, especially impellers.
- Wear safety glasses (with side shields) for eye protection, especially in machine shop areas.
- Wear steel-toed shoes for foot protection when handling parts, heavy tools, etc.
- Wear other personal protective equipment to protect against hazardous/toxic fluids.

Coupling Guards:

- Never operate a pump without a coupling guard properly installed.
- Never force piping to make a connection with a pump.
- Use only fasteners of the proper size and material.
- Ensure there are no missing fasteners.
- Beware of corroded or loose fasteners.

Operation:

- Do not operate below minimum rated flow, or with suction/discharge valves closed.
- Do not open vent or drain valves, or remove plugs while system is pressurized.

Maintenance Safety:

- Always lock out power.
- Ensure power is isolated from system and pressure is relieved before disassembling pump, removing plugs, or disconnecting piping.
- Use proper lifting and supporting equipment to prevent serious injury.
- Observe proper decontamination procedures.
- Know and follow company safety regulations.
- Never apply heat to remove impeller.
- Observe all cautions and warnings highlighted in pump instruction manual.

GENERAL DESCRIPTION

PRODUCT DESCRIPTION

A Flowtronex Silent Storm Variable Speed Pumping System is custom built to the requirements provided by the purchaser. The Silent Storm pumping system is a modular variable speed system designed to maintain a constant discharge pressure while providing a variable flow rate to match the water demand of the system. The system minimizes power consumption by combining a variable speed lead pump with constant speed lag pumps. The Silent Storm utilizes a microprocessor-based controller to efficiently manage pump operation to match a wide range of pressure boosting applications.

Silent Storm Variable Speed Pumping Systems are self-contained, pre-assembled and factory-tested pumping plants. Silent Storm utilizes state of the art technology, yet employs a simplistic and straightforward design that makes installation, operation, and maintenance an easy task, even for the most inexperienced of operators.

This manual serves as a guide to understanding the features of Silent Storm Pumping Systems and provides a quick and clear reference for answers to most questions pertaining to its service. Every attempt has been made to explain all facets of system operation and maintenance. However, should you have specific questions not addressed in this manual, you are encouraged to contact your nearest Flowtronex Authorized FlowNet representative, or the factory (800-786-7480 Ext. 3).

OPERATIONAL LIMITS

See pumping system nameplate information for pumping system flow capacity, pressure, full load current and electrical ratings.

Unless special provisions have been made for your pumping systems, the system pressure rating is as follows:

Pump system type	Max discharge pressure
End suction centrifugal	**175 psi**
Vertical turbine	**200 psi**

NAMEPLATE INFORMATION

The system nameplate gives identification and rating information as identified in the figure below.

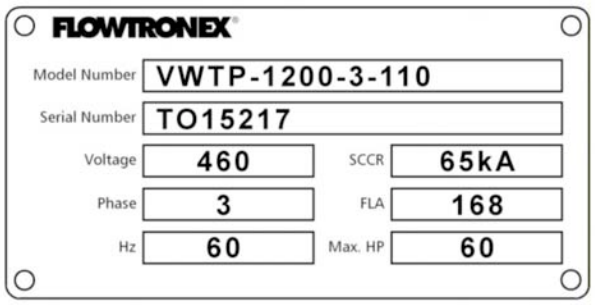

Figure 1: Sample Nameplate

Field	Explanation
Voltage	**Required input voltage**
SCCR	**Short circuit current rating**
Phase	**Number of motor phases**
FLA	**Full load amps**
Hz	**Required frequency (hertz)**
Max. HP	**Maximum horsepower**

Permanent records for this system are referenced by the serial number. Include the serial number with all correspondence and spare parts orders.

STATION NUMBERING

Example: V W T P - 900 - 3 - 120

1. Control Type:

   V = VFD

2. Water Source Type:

   W = Wet Well

   V = Vessel

   C = Can

   F = Flooded

   L = Lift

   B = Boost

   D = Deep Well

S = Submerged Sled pump assembly

M = Floating pump assembly

3. Pump Type:

   C = Horizontal

   S = Submersible

   T = Vertical Turbine

   M = Multi-stage Horizontal (ex. Goulds SSV)

   E = Submersible Trash Pump (ex. Ebara)

4. System Type:

   P = Pump Station

   T = Transfer

   X = Control Package

5. System Gallons per Minute: If a multi-zone system, show all zones with a slash (/) between each. If it is a control package, show the total number of pumps to be controlled.
6. Quantity of Pumps: Include pressure maintenance pump and current pumps - do not include future pumps in model number.
7. System Pounds per Square Inch: If multi-zone system, show all zones with a slash (/) between each zone. Design must assume that all zones run at the same time. Describe in no-uncertain terms the performance of each zone. If the station has spacing for future pumps, always create a model number showing the current conditions service. Make notes in your documentation describing the "current" versus "future" conditions of service. On boosted systems, model number should reflect the differential pressure with notes describing the incoming pressure.

HANDLING

Qualified personnel should unload and handle the unit. Prevent damage due to dropping or jolting when moving the unit. Thoroughly inspect the unit for damage upon receipt. Immediately notify the carrier of transportation damage. Ensure that sensing lines are free of crimps and kinks.

The unit is top heavy due to the position of the equipment. Do not use component eyebolts to lift the pump station.

WARNING: Falling Objects Hazard

Eyebolts, if provided, are designed to lift only the components to which they are attached.

Failure to follow these instructions could result in serious personal injury, death, and/or property damage.

STORAGE

During periods of storage, the unit should be covered to prevent corrosion and contamination from dirt. Store the unit in a clean, dry location to prevent condensation and freezing. After storage, check that it is dry before applying power. Specific component storage instructions must be followed in accordance with the respective equipment manufacturer's recommendations.

CAUTION: Extreme Temperature Hazard

Extreme temperatures are to be avoided. (Below 32ºF and above 110ºF.)

Failure to follow these instructions could result in serious property damage and/or moderate personal injury.

FIELD CONNECTION DIAGRAMS

Actual equipment manufacturers/models installed are system specific. Refer to specific manufacturers' Installation, Operation & Maintenance Manuals for details unique to each component. The pump instruction manual is supplied with the system (if applicable).

Review the wiring diagrams and dimensional drawings prior to unit installation and operation.

NOTE: Electrical supply must match the control panel nameplate specification. Incorrect voltage can cause fire, damaging electrical components and void the warranty.

NOTE: Electrical supply must be installed by a qualified electrician in accordance with all applicable codes, ordinances, and good practice.

GROUND CONNECTIONS

A grounding terminal is provided for a dedicated ground wire connection. All provisions of the National Electrical Code and local codes must be followed.

WARNING: Electrical Shock Hazard

Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

INSTALLATION

LOCATION

Locate the pumping system in a clean, well ventilated, and properly drained location. It is recommended that the location selected facilitates ease of inspection, maintenance, and service. Outside installation requires protection from freezing.

WARNING: Falling Objects Hazard - Heavy Load, May Drop If Not Lifted Properly.

Do not lift the entire unit by component eyebolts. Eyebolts on components are used for factory assembly only and are not intended to lift the complete package.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

FOUNDATION

With proper installation and a suitable foundation, this unit is built to supply years of service. Establish a base of concrete weighing a minimum of 2-1/2 times the weight of the unit. (Check the shipping tickets or the pumping system drawing for unit weight.) Tie the concrete pad in with the finished floor. Use the appropriate anchor bolts to secure the pumping system to the foundation.

Pump packages with electrical conduit below surface may require corrosion protection approved for this condition.

WARNING: Electrical Shock Hazard

Electrical conduit installed below the surface may require a corrosion resistant protective coating to prevent conduit corrosion and electrical shock.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

Place the unit on its concrete foundation, supporting it with steel wedges or shims. These wedges or shims should be put on both sides of each anchor-bolt and midway between the bolts, to provide a means of leveling the base.

After the pumping system has been leveled, install the correct number of anchor bolts and tighten to secure the system.

PUMP INSTALLATION

In most cases, if the pumps have an overall length of less than twenty (20) feet, they are shipped assembled. Only the motor, head shaft, strainer basket, and discharge connection are shipped separately. The following instructions describe installation for assembled pump stations.

Prior to Installation

1. Measure each pump and document on the set/start report.
2. Confirm wet well probe measurements. Measure the distance from the bottom of the wet well to the top of the skid to ensure that pumps were ordered with the correct length. Preferred length is 12 inches above the bottom of the wet well.
3. Tighten all bolts and couplings on the pump before proceeding.
4. Install each pump according to the last digit on the pump identification tag.

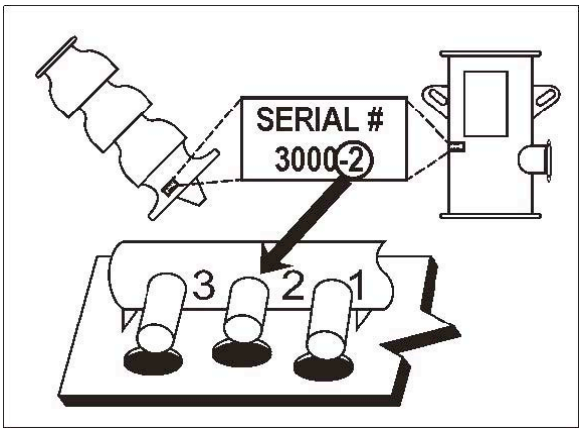

Figure 2: Location of Serial Number and Skid Position

Installing Assembled Pump Station

1. To set pump, use a crane or other adequate lifting device and a cable sling of adequate length. Attach the cable to the lifting lugs (lifting eyes) on either side of the pump.

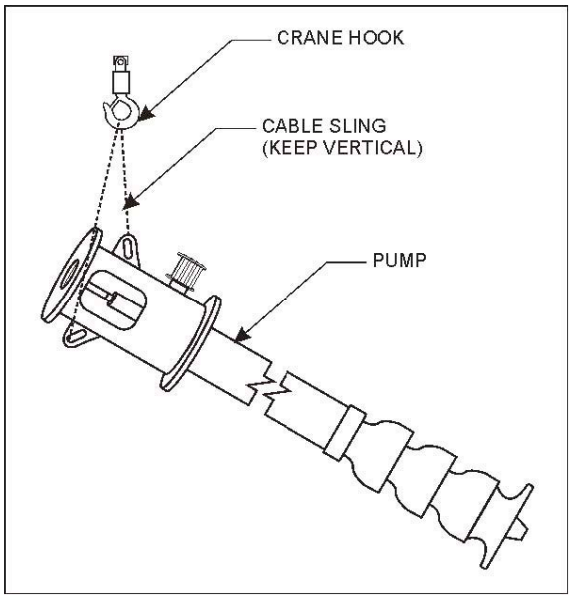

Figure 3: Lifting Pump

2. After the cable-sling is attached to the lifting lugs (lifting eyes) on the pump head, raise the pump to a vertical position. While in this position, install the strainer basket with bolts and clips. Position the pump over its access hole on the skid.

WARNING: Falling Objects Hazard

DO NOT work under heavy suspended object unless there is positive support and safeguards should a hoist or sling fail.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

3. Very slowly, lower the pump through its access, keeping one hand on the pump to detect any bumping by the pump against the edge of its hole or the wall of the wet well. When the pump is properly installed, it should not touch the side of the wet well. Premature bearing failure or destruction of the bowl assembly can result from improper installation.

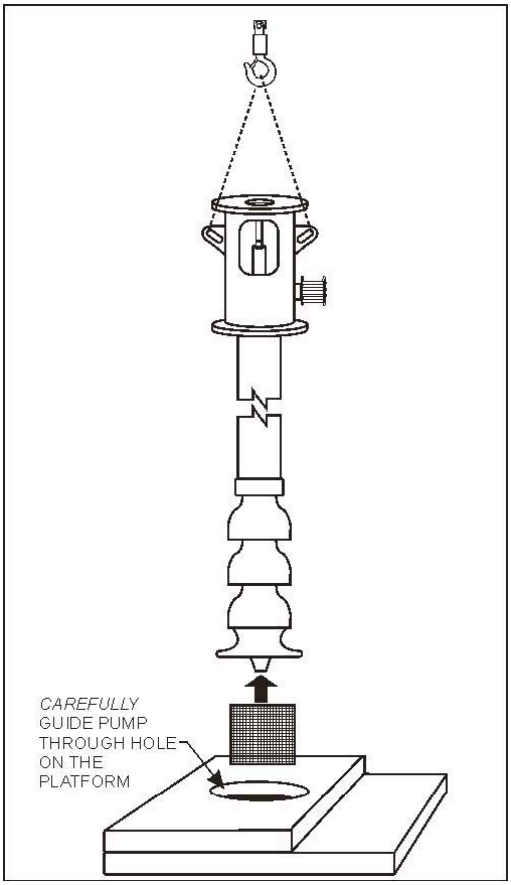

Figure 4: Position Head Over Access Hole on Skid

WARNING: Equipment Damage Hazard

Be prepared to stop lowering the pump IMMEDIATELY if any bump is felt.

It is possible that the pump bowl could catch on the edge of the skid and become unhooked from the cable or other lifting device. Possible serious bodily injury or damage to the pump could result.

Verify and ensure that the safety latch on the hook works properly.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

4. Push the pump slightly off-center when it is being lowered in the wet well to avoid hitting the manifold discharge pipe.
5. Stop lowering the pump when the base of the head is approximately 1/8 to 1/4 inch above the platform.

6. Line up the spool with the pump isolation valve on the manifold-discharge pipe and set the pump on the skid. Start threading the base bolts on the pump head. Slide the Victaulic clamp gasket so that the clamp rides in the gloves on both the isolation valve and the spool. Tighten the Victaulic clamp. Tighten the base bolts.
7. If the pumps are shipped unassembled, refer to the Gould Pumps, Model VIT Installation, Operation, & Maintenance Instructions.
8. Install the vertical hollow shaft motor to the top of the pump's disconnected head. Refer to the Gould Pumps, Model VIT Installation, Operation, & Maintenance Instructions.

WARNING: Falling Objects Hazard

DO NOT work under heavy suspended object unless there is positive support and safeguards should a hoist or sling fail.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

CAUTION: Motor Rotation Hazard

DO NOT install motor shaft, Gib key, or adjusting nut until motor rotation has been verified.

Failure to follow these instructions indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

STATION OPERATION

This section covers the sequence of operation for your station including: Door Switch Operation, Automatic Operation, and System Safeties.

DOOR SWITCH OPERATION

System Control Switch

Allows operator to select how the station operates:

OFF Regardless of individual switch position, pumps do not operate.

AUTO Places the system in

automatic mode.

MANUAL Places the pumps in manual mode. The operator must start and stop the individual pumps using each pump's switch.

Individual Pump Switches

Allows operator to select which pumps operate:

NOTE: Pumps have an OFF/ON switch or a MANUAL/OFF/AUTO switch.

MANUAL These switches start the individual pumps. However, the system MANUAL/OFF/AUTO switch must be placed in the MANUAL position before the individual pump is turned ON. Otherwise, each switch must be cycled OFF, then ON to "arm" the pump for operation.

OFF Selected pump does not operate, regardless of any other switch position.

AUTO Selected pump operates in Automatic Mode provided there is not an individual pump overload trip.

ON Selected pump will operate immediately if the system switch is set to MANUAL, and there are no faults. In AUTO, the pump will come on if there is a demand for it, and the PLC calls for it.

VFD / Bypass Switch

Enables or disables the VFD:

VFD This switch position enables VFD operation in either automatic or manual mode depending on the position of the system switch. VFD is the normal position of the switch.

BYPASS This switch position, places the pump station in either "Automatic VFD Bypass" or "Manual VFD Bypass" mode of operation depending on the position of the MANUAL/OFF/AUTO switch. In this mode, the pumps will start "across the line."

This mode is intended for use only when the VFD is not functional. Turn all pump switches to OFF before placing the system in BYPASS mode.

VFD Selector Switch (Optional On Some Stations) – PUMP 1 / PUMP 2 / PUMP 3

This switch determines which pump runs on the VFD when switch is in the MANUAL mode. However, if this switch is not present, the first pump with VFD capability runs as the VFD pump.

When the switch is in AUTO, the pump selected to run on the VFD has the lowest accumulated run time. Only one pump at a time can run on the VFD (also known as an inverter). Once a pump is running on the inverter, this switch is disabled. If another pump is selected when the inverter is in use, the newly selected pump does not run.

Low Discharge/Differential Pressure Switch

This switch allows the operator to enable or disable either the "Low Discharge Pressure" shut-down circuit, or the filter differential pressure circuit. Only one circuit can be overridden at one time, therefore a three-way switch is used.

LDP OVERRIDE This position prevents a low-discharge pressure fault from shutting down the pump station. Use the LPD OVERRIDE position during the initial pipe filling and when restarting the system from a de-pressurized condition in MANUAL or AUTO mode.

ACTIVE PRESSURE OVERRIDE

This activates both the "low discharge pressure" and "filter differential pressure" protection systems. Normally, the pump station should be left in this position during automatic operation to prevent overloading the pump motors and avoid damaging erosion in the event of a major pipe break.

DIFFERENTIAL PRESSURE OVERRIDE This switch position allows overriding the filter differential pressure switch. This override should be used only temporarily, and is not intended for prolonged operation.

Wye Strainer or Filter Switch

If present on the station, this switch controls the operation of the Wye strainer or filter solenoid.

OFF Prevents the Wye strainer or filter from flushing.

MANUAL The Wye strainer or filter flushes continuously, regardless of other switch settings. The MANUAL position may be used for de-pressurization for maintenance, or when attempting to clean a seriously dirty screen.

AUTO In this position, the Wye strainer or filter flushes for 10 to 15 seconds, 60 seconds after the main VSP, or the first XL (across-the-line) pump, starts. Afterwards, flushing occurs for 10 to 15 seconds after each hour of continuous pump operation. This is the normal position for the switch.

Lake Screen Switch

If present on the station, this switch controls the operation of the solenoid valve, which operates the self-rotating lake inlet screen.

OFF Prevents the Lake Screen from working.

MANUAL Energizes the solenoid continuously regardless of the status of the station. This can be used to de-pressurize the system, or to verify operation of the screen during maintenance.

AUTO Causes the Lake Screen solenoid to open after the main VSP has been operating at least one minute, the minimum flow requirement is met, and the speed test is not trying to stop the VSP. This is the normal position of this switch.

Well Pump Switch

If present on the station, this switch allows the operator to control the operation of a well pump. In most cases, the operation of this pump is completely independent of the operation of the pump station. However, the system is configurable so that the well pump does not run during the lockout period.

OFF Prevents the well pump from running.

MANUAL The well pump runs continuously until the switch is turned OFF.

AUTO The well pump starts and stops based on a separate level switch.

Reset Push Button

This button allows the operator to clear (Reset) any faults within the system once the cause of the fault has been cleared. It is also used for the lamp test.

RESETTING FAULTS Faults must be reset by the reset button, unless the fault automatically resets as described in the System Safeties section. Pressing the reset button clears all fault counters. These counters prevent certain faults from automatically resetting indefinitely. If the fault lamp does not go out after resetting, the cause of the fault is still present and must be resolved before normal operation can continue.

LAMP TEST Pressing this button for five seconds causes all lamps on the front panel to illuminate. Replace any lamps that do not illuminate. For safety reasons, the lamp test needs to be performed on a regular basis.

AUTOMATIC OPERATION

Overview

The primary benefit of Variable Speed Pumping (VSP) Systems is to ensure surge-free starts and stops while maintaining a constant down-stream line pressure with no mechanical pressure-regulating valve. This minimizes pipeline failures due to surges and, not incidentally, reduces the utility bill for the station.

Automatic operation is selected by the system control switch. In automatic operation, all pump activity is determined by the PLC. The position of the individual pump switch lets the PLC know whether or not it is available to run. In most cases, all pump switches are in the ON position. When a pump or a motor is removed from the system, turn the pump switch OFF, and the PLC will not try to run that pump.

The PLC brings one pump on at a time in order to satisfy the start criteria (usually setpoint pressure). Some stations are designed to start and stop the pumps based on remote start signals, level probe signals, or other criteria. The standard start and stop sequence is as follows:

Pressure below setpoint to start Combo 1	5 PSI
Delay time to start Combo 1	0 SEC
Pressure above setpoint to stop Combo 1	5 PSI
Delay time to stop Combo 1	5 SEC
Pressure below setpoint to start Combo 2	10 PSI
Delay time to start Combo 2	0 SEC
Pressure above setpoint to stop Combo 2+	30 PSI
Delay time to stop Combo 2+	90 SEC
Pressure below setpoint to start Combo 3+	5 PSI
Delay time to start Combo 3+	10 SEC

NOTE: The criteria for Combo 4 and above are the same as Combo 3.

The "pressure above setpoint to stop" and "delay time to stop" parameters only apply to Combo 1. The values of 30 PSI and 90 seconds were intentionally selected since they are out of range and will never be used.

There are three (3) main types of auto operation – line fill, system charging, and normal operation.

Line Fill Mode

Line Fill Mode is used when downstream pressure is significantly below setpoint, such as during the initial startup, or when leaks in the lines are repaired. Operation is as follows (performed in order):

System control switch: OFF

All Individual Pump switches: ON

Override/Active switch: LDP Override (Low Discharge Pressure fault disabled)

VFD Bypass switch: VFD

System control switch: AUTO

As soon as the system control switch is turned to the AUTO position, the VSP (Variable Speed Pump) with the lowest run time starts at a reduced speed. When the VSP starts, the startup ramp in the program lowers the setpoint to 2 PSI above the actual downstream pressure. The VFD adjusts the speed of the VSP to reach the desired setpoint. The setpoint ramps up at the rate of 1 PSI every 4 seconds until the normal setpoint is reached.

This feature prevents the VSP from coming up to full speed too quickly, and prevents the lag pump(s) from starting prematurely. This ramp-up feature allows the system to develop a controlled and smooth start up from a completely de-pressurized condition, minimizing pipe breakage from water hammer. Once the pressure above setpoint value is reached, the VSP shuts down. The pump switches can be left in ON and the system control switch left in AUTO. The Override/Active switch should be returned to the ACTIVE position. The station is now in system "charging" mode.

System Charging Mode

If there are no heads open, and the pressure is within the defined range of operation, pressure may slowly drop due to system

leakage, or other small demands. A PM pump is provided to address this issue. Most stations, but not all, include a PM pump. Door switches are set as follows (from end of line fill mode):

System control switch: AUTO

All Individual Pumps switches: ON

Override/Active switch: ACTIVE (Low Discharge Pressure and differential pressure faults enabled)

VFD Bypass switch: VFD

NOTE: As downstream pressure drops to more than 5 PSI below setpoint, the PM pump starts up. It runs until the system pressure builds up to 5 PSI above setpoint, and then shuts off.

Two issues can come into play here. One is cycle time. This refers to the number of times an hour that the PM pump starts and stops (one cycle). If the amount of cycles is excessive, either the system leaks have to be repaired, or the start/stop parameters need to be tuned (normally by dropping the pressure below setpoint to start, or increasing the pressure above setpoint to stop). Must-run times can cause the opposite problem. The PLC determines the must-run time for each pump. If this value is set too high, the PM pump reaches its "pressure above setpoint" and stops before the must-run time setting indicates. This can lead to an over-pressurization situation. Address this problem by lowering the must-run time.

WARNING: Excessive Run Time Hazard

Excessive must-run times, stop times, or stop pressure setting can cause system over-pressurization, pipe damage, and potentially cause personal injury. Consult your service technician or the factory if you are unsure about any settings.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

Normal Operation

Normal Operation occurs when heads are turned on, or a demand for water exists. Door switches are set as follows (from end of line fill mode):

System control switch: AUTO

Pump 1 switch: ON

Pump 2 switch: ON

Pump 3 switch: ON

PM Pump switch: ON

Override/Active switch: ACTIVE (Low Discharge Pressure and differential pressure faults enabled)

VFD Bypass switch: VFD

When the pressure drops 5 PSI below setpoint, the PM pump starts and continues to run until the pressure is 5 PSI above the setpoint. When this pressure is reached, the PM pump turns OFF. If the pressure continues to drop to 10 PSI below setpoint, the VSP starts. Five seconds later, the PM pump turns OFF. This is the operation sequence for Combo 1.

When the VSP starts, the startup ramp in the program lowers the setpoint to 2 PSI above the actual line pressure. The VFD adjusts the speed of the VSP to maintain the discharge or downstream pressure at the setpoint. The setpoint ramps up at the rate of 1 PSI every 4 seconds until the normal setpoint is reached. As the setpoint rises, so does the speed of the VSP. This feature prevents the VSP from coming up to full speed too quickly and prevents the lag pump(s) from starting prematurely. This ramp-up feature allows the system to develop a controlled and smooth startup from a completely de-pressurized condition, minimizing pipe breakage from water hammer. This is the operation sequence for Combo 2.

If the VFD reaches full speed driving the main VSP and the discharge pressure is more than 10 PSI below the setpoint, the demand for water is greater than the capacity of the VSP. An XL (across-the-line) pump starts as the lag pump. This operation sequence occurs during Combo 3.

When an XL pump starts, and the VFD is driving another pump, the inverter (VFD) speed immediately ramps down to the inverter “speed when lag pump starts” setting. This permits the XL pump to start with very little pressure surge, or related water hammer. Once the lag pump is at full speed, the VSP ramps back up to try and maintain setpoint pressure.

If the demand for water is still greater than the capacity of these two pumps, then Combo 4 starts. As occurred in the previous Combo, the inverter (VFD) speed immediately ramps down to the “speed when lag pump starts” setting. The second lag pump starts up and goes to full speed, and the VSP ramps back up to try and maintain setpoint pressure.

This sequence of events repeats for all available Combos.

When the flow decreases, the VFD (inverter) slows down to maintain a constant discharge pressure. Eventually as the speed decreases, a setpoint is reached where the VSP is not pumping any water. The XL pump(s) are supplying all the water required. If the flow continues to decrease, the discharge pressure increases above the setpoint. Slowing the VFD (inverter) does not reduce the pressure because the VSP is not currently pumping any water. Once the pressure reaches 1 or 2 PSI above the setpoint pressure, the Overpressure Accumulator starts counting. Once the count reaches 750, the last XL pump is stopped. If the pressure is well above the setpoint, or increasing rapidly, the pump can stop quickly; in 1 to 2 seconds. If the pressure remains 1 or 2 PSI above setpoint, the pump turns OFF in approximately 20 seconds. When an XL pump stops, the inverter (VFD) speed immediately ramps up to the “speed when lag pump stops” setting. This prevents the system pressure from dropping excessively due to the XL pump shutting off.

Once an XL pump has been stopped, the VSP waits for the time entered in the "delay time to start" before the XL pump is permitted by the program to restart. This feature minimizes pump cycling and pressure surges. The generic value for Combo 3 and up is 10 seconds. If the conditions for starting an XL pump are met after this waiting period, normally 10 seconds, the pump is restarted.

If the flow continues to decrease, each XL pump is stopped in the manner described above, until only the VSP is running. Stopping the last VSP is accomplished by using "Speed Test," which uses a stop method different from stopping an XL pump. Because the inverter speed keeps lowering as the flow decreases, the discharge pressure would never get above the setpoint. In this situation, the VSP would "idle," pump no water, and would never turn off. To shut down the VSP, the system initiates the "Speed Test" whenever the flow is below a predetermined value for 15 seconds. The program then lowers the setpoint by 5 PSI. If the VFD speed falls below a predetermined value and the pressure remains above the reduced setpoint for 15 seconds, the VSP turns OFF, and the setpoint returns to normal. Speed Test returns the station to "System Charging" mode until a new demand for water is created.

Manual VFD Operation

Overview

Manual operation is selected by the system control switch. In manual operation, all pump activity is controlled by the individual pump switches. In the case of multiple pumps available for VFD operation, the VFD select switch determines which pump(s) run in VFD mode. However, some stations do not come equipped with a VFD select switch. In that case, the first pump that is started is always the VFD pump. The speed of the VFD pump is controlled by the speed potentiometer (speed pot). All other pumps run in XL mode (at full speed). The Override/Active switch enables or disables the low-discharge pressure fault.

NOTE: Manual operation is rarely used. However, it does allow for operation of individual pumps for testing purposes.

Sequence of Operation (performed in order)

System control switch: OFF

All Individual Pump switches: OFF

Override/Active switch: LDP Override (Low Discharge Pressure fault disabled). If initial system pressure is high enough, place in Active.

VFD Bypass switch: VFD

VFD Select switch: Pump 1

Speed Potentiometer: Turned 100% counter-clockwise (0 speed)

System control switch: MANUAL

Pump 1 switch: ON

Speed Potentiometer: Turn clockwise to increase speed of pump 1

Pump 2 switch: ON (if required)

Speed Potentiometer: Adjust speed as required to maintain set point pressure.

Pump 3 switch: ON (if required)

Speed Potentiometer: Adjust speed as required to maintain set point pressure.

NOTE: When done, turn OFF all pump switches and place system control switch in OFF. Return Override/Active switch to ACTIVE. If the station can be run in Automatic mode, return the system switch to AUTO and turn ON all pump switches.

VFD Bypass Operation, Manual mode

Overview

This is an abnormal operating mode and would only be used when the VFD (inverter) is not operable but there is a need to irrigate. If the PLC is operable, and PRV (Pressure Reducing Valve) is in the system and functioning, we strongly recommend using Automatic VFD Bypass Mode.

WARNING: Manual VFD Bypass Hazard

This mode of operation should be used as a last resort if there is no DSR, or it is not functioning correctly. Constant operator attendance is recommended when this mode is used. The water demand must be calculated to match the individual pump output as closely as possible. Failure to do so will cause a serious over-pressure condition.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

System Operation (performed in order)

System control switch: OFF

All Individual Pump switches: OFF

Override/Active switch: LDP Override (Low Discharge Pressure fault disabled). If initial system pressure is high enough, place in ACTIVE.

VFD Bypass switch: BYPASS

VFD Select switch: Pump 1

Speed Potentiometer: N/A

System control switch: MANUAL

Pump 1 switch: ON

Allow system pressure to stabilize before turning on additional pumps.

Pump 2 switch: ON (if required)

Pump 3 switch: ON (if required)

NOTE: When done, turn OFF all pump switches and place system control switch in OFF. Return Override/Active switch to ACTIVE.

VFD Bypass Operation, Auto mode

Overview

VFD Bypass mode is an EMERGENCY ONLY mode used when the VFD is inoperative. Monitor station operation closely when in bypass mode due to limited pressure control available. Your station must be equipped with a PRV (Pressure Reducing Valve) in order to run VFD Bypass Mode automatically. This valve now assumes the pressure regulating function that was performed by the VFD in normal operation. Ensure that the PRV is adjusted to maintain your downstream pressure at no more than 12 PSI above setpoint pressure. Verify that the PRV is operating correctly before leaving the station unattended. Check station regularly to ensure continued proper operation. If your station is not equipped with a PRV, do not operate in automatic VFD bypass mode.

WARNING: VFD Bypass Switch Hazard

This mode of operation should be used as a last resort if there is no DSR, or it is not functioning correctly. Constant operator attendance is recommended when this mode is used. The water demand must be calculated to match the individual pump output as closely as possible. Failure to do so will cause a serious over-pressure condition.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

VFD Bypass mode is selected by the VFD / Bypass switch. The system control switch MUST be turned to the OFF position before selecting VFD bypass mode. Operation is similar to normal automatic operation but the start / stop sequences differ greatly. The registers below regulate this.

NOTE: These are generic values and might differ from your station.

Pressure below setpoint to start Combo 1	5 PSI
Delay time to start Combo 1	0 SEC
Pressure above setpoint to stop Combo 1	5 PSI
Delay time to stop Combo 1	5 SEC
Pressure below setpoint to start Combo 2	12 PSI
Delay time to start Combo 2	3 SEC
Pressure above setpoint to stop Combo 2	1 PSI
Delay time to stop Combo 2	60 SEC
Pressure below setpoint to start Combo 3	15 PSI
Delay time to start Combo 3	10 SEC
Pressure above setpoint to stop Combo 3	1 PSI
Delay time to stop Combo 3	30 SEC
Flow setpoint to stop Combo 1	0 GPM
Flow setpoint to stop Combo 2	20 GPM
Flow setpoint to stop Combo 3	80% *
Flow setpoint to stop Combo 4	80% **

80% of the previous combo's maximum output. * If one main pump puts out 500 gpm, you would enter 400 gpm here. ** If two main pumps put out 1000 gpm, you would enter 800 gpm here.

Other significant differences between VFD Bypass and Automatic VFD Operation are as follows:

1. The overpressure accumulator is not used in VFD bypass mode.
2. Flow will dominate stopping main pumps due to low Combo stop pressure settings. The PM pump will continue to operate similarly to VFD mode.
3. VFD Fault and Maximum RPM signals are ignored.
4. Pump starts are caused by pressure drop as in VFD mode, but due to operational differences, the settings are modified from those used in VFD mode.

Sequence of Operation (performed in order)

System control switch: OFF

All Individual Pump switches: ON

Override/Active switch: LDP Override (Low Discharge Pressure fault disabled). If initial system pressure is high enough, place in Active.

VFD Bypass switch: Bypass

VFD Select switch: N/A

Speed Potentiometer: N/A

System control switch: AUTO

When done, place system control switch in OFF. Return Override/Active switch to ACTIVE.

The PM pump continues to charge the system as in Automatic operation. Start and stop sequence is based on pressure.

Once a demand for water exists, the PLC starts the main pump with the lowest run time as an XL (across- the-line) pump, based on the “pressure below setpoint." If the flow capacity of the main pump exceeds the demand for water, pressure increases until the PRV opens and discharges the excess flow back into the water source. As demand for water increases, the PRV closes. If the PRV is completely closed, and the “pressure below setpoint" drops low enough, the PLC brings on the next Combo as required (all in XL mode). The lead pump remains at full speed while the next pump also comes up to full speed. If the cumulative flow capacity of the main pumps in operation exceeds the demand for water, the PRV opens and discharges the excess flow back into the water source. This process is repeated for all available Combos.

Combo shutdown based on flow is made possible by the way flow is read. The location of the flow meter measures only the flow that is actually being used. The flow out of the PRV discharge that is returned into the water source does not count as "measured flow." The result is as demand for water decreases, pressure continues to rise. The PRV opens as required to maintain pressure. As more flow is going out the PRV discharge, less flow is actually being used. When the flow reading drops below the “flow setpoint to stop” value, the pumps shut down in the reverse order that they started. Based on the demand for water, this process continues until all main pumps have shut down, and the station returns to "System Charging" mode.

PLC Bypass Operation

Overview

This is an abnormal operating mode and would be used if the PLC was not operable and there is need to irrigate.

WARNING: PLC Bypass Hazard

This mode of operation should be used as a last resort if there is no DSR, or it is not functioning correctly. Constant operator attendance is recommended when this mode is used. The water demand must be calculated to match the individual pump output as closely as possible. Failure to do so will cause a serious over-pressure condition. The high pressure discharge safety does not function in PLC bypass, and damage to your piping could occur. The only safeties that function in PLC bypass are low discharge pressure and phase fault.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

System Operation (performed in order)

System control switch: OFF

All Individual Pump switches: OFF

Override: LDP Override (Low Discharge Pressure fault disabled). If initial system pressure is high enough, place in Active

VFD Bypass switch: NA

VFD Select switch: NA

Speed Potentiometer: N/A

PLC Bypass switch: BYPASS

System control switch: MANUAL

Pump 1 switch: ON

Allow system pressure to stabilize before turning on additional pumps.

Pump 2 switch: ON (if required)

Pump 3 switch: ON (if required)

NOTE: When done, turn OFF all pump switches and place system control switch in OFF. Return Override/Active switch to ACTIVE.

SYSTEM SAFETIES

Overview

The program in the PLC protects the system by shutting down in either of the “Auto” or “Manual” Modes of operation if it detects any of the following problems:

Alarm or Fault	Automatic Restart?
Low Discharge Pressure	No Automatic Restart
High Discharge Pressure	Automatic Restart
Low Inlet Pressure (Optional)	Automatic Restart
Loss of Prime (Optional)	Automatic Restart
Low Level (Optional)	Automatic Restart
Station Phase Pressure (Optional)	No Automatic Restart
Individual Pump Faults	No Automatic Restart
VFD Fault	Automatic Restart

Table 1: Automatic Restart After Alarm or Fault

Automatic Mode of Operation

"High Discharge Pressure," “Station Phase Failure," "Low Inlet Pressure," "Low Level," "Loss of Prime," and "VFD Fault" allow the system to restart automatically when the fault clears in the automatic mode of operation. The PLC allows three (3) automatic restarts (which can be caused by any combination of these faults) in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). "Low Discharge Pressure" and "Individual Pump Faults," do not allow the system to restart automatically when the fault clears. These faults must be cleared and manually reset before station operation can resume. Individual pump faults require turning the pertinent individual pump switch to the OFF position, and then back ON (called, re-arming). In some instances, an individual pump can trip an alarm without shutting down the entire system, provided another pump is available to operate.

Manual Mode of Operation

All faults are cleared by pressing the Reset button, or by re-arming individual pump faults.

Low Discharge Pressure

The pressure transducer located in your station discharge line communicates the downstream pressure to the PLC. The PLC monitors downstream pressure to determine if the pressure is below the allowable range.

The standard PLC program defines low-discharge pressure as being 25 PSI below setpoint pressure. There is a time delay of 300 seconds (five minutes) before the station faults that is designed to give the system time to build pressure beyond this point. The values might vary on your station.

Based on the values above, if the discharge pressure remains 25 PSI below the setpoint for longer than five minutes, all pumps are shut down. The red station fault light on the control panel door comes on, and the display indicates that a "Low Discharge Pressure fault" has occurred.

This fault does not automatically reset. To clear the fault, press the Reset button. The station runs for another five minutes before determining whether the low discharge pressure condition still exists.

NOTE: If you are attempting to run in automatic line fill mode, place the Override/Active switch in OVERRIDE. Return switch to the ACTIVE position once the pressure is high enough to do so.

If the pump station is simply unable to keep up with the demand, shut the station down, and determine the nature of the problem. Consult the Troubleshooting section of this manual for assistance.

High Discharge Pressure

As with the "Low Discharge Pressure" fault, the PLC monitors downstream pressure to determine if the pressure is out of range, or above the allowable limit.

The standard PLC program defines high-discharge pressure as being 15 PSI above setpoint pressure. There is a time delay of 60 seconds, or one minute, before the station faults that is designed to give the system time to adjust the pressure to below this point. These values might vary on your station.

Based on the values above, if the discharge pressure remains 15 PSI above the setpoint for longer than one minute, the station shuts

down. Once the high pressure condition clears, the station automatically resets, and automatic operation resumes. The PLC allows three (3) automatic restarts in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). The red station fault light on the control panel door comes on, and the display indicates an "Alarm Shutdown Alert." Go to "Alarms," and the display should show that a "High Discharge Pressure fault" has occurred.

NOTE: At this point, shut the station down, and determine what the problem is. Consult the Troubleshooting section of this manual for assistance.

To clear the fault, press the Reset button.

Low Inlet Pressure

This optional safety is usually used on flooded-suction booster pump applications.

Normally, a pressure switch monitors the inlet pressure on the "suction" side of the pump. This switch is located in a box on the lower left side of the control cabinet. The switch is used in conjunction with a relay to inform the PLC that it is unsafe to run. Setting the low inlet pressure condition is accomplished by physically adjusting the pressure switch. There is a 20 second time delay in the PLC.

Once the inlet pressure drops below the switch pressure setting, all pumps shut down after a 20 second delay. Once the low inlet pressure condition clears, the station automatically resets and automatic operation resumes. The PLC allows three (3) automatic restarts in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). The red station fault light on the control panel door comes on, and the display indicates an "Alarm Shutdown Alert." Go to "Alarms," and the display should show that a "Low Inlet Pressure fault" has occurred.

WARNING: Low Inlet Pressure – Station Shutdown Hazard

At this point, shut the station down, and determine what the problem is. Consult the Troubleshooting section of this manual for assistance.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

There are two dials on the pressure switch. The one on the top is the correct adjustment. Turn clockwise to increase the pressure setpoint, counter-clockwise to decrease.

CAUTION: Delta Pressure Setting Hazard

Do not adjust the bottom dial. This is a delta pressure setting, and is not used. This dial must be adjusted fully counter-clockwise (0 position). If you are having trouble with your pressure switch, always verify that this dial is in the 0 (fully counter-clockwise position) before adjusting the top dial.

Failure to follow these instructions indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

WARNING: Minimum Pressure Setting Hazard

The pressure setting is based on the minimum pressure that the pump can safely operate. Do not lower the pressure switch setting without consulting the factory.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

Loss of Prime

This optional safety is usually used on end-suction centrifugal pump applications.

A level probe is placed in the suction piping at a predetermined level. This probe works in conjunction with a relay to inform the PLC that it is unsafe to run. Fault usually signifies a malfunctioning foot valve.

After a second or two, all pumps shut down. If the loss of prime condition clears, the station automatically resets, and automatic operation resumes. The PLC allows three (3) automatic restarts in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). The red station fault light on the control panel door comes on, and the display indicates an "Alarm Shutdown Alert." Go to "Alarms" and the display should show that a "Loss of Prime fault" has occurred.

NOTE: At this point, shut the station down, and determine what the problem is. Consult the Troubleshooting section of this manual for assistance.

To clear the fault, press the Reset button.

WARNING: Equipment Damage Hazard

Do not attempt to bypass this safety, as pump damage will occur.

Failure to follow these instructions could result in property damage and/or moderate personal injury.

Low Level Fault

This safety is used in Vertical Turbine pump applications to signal when the wet well level is too low to permit safe operation of the pumps. Used in conjunction with a relay, three (3) level probes are placed in the wet well. From bottom to top, these are the "reference" (ground) probe, the "low" probe, and the "reset" probe. If the wet well level drops below the "low" probe, the relay sends a signal to the PLC telling it to shut down pump operation. The fault cannot be cleared until the reset probe is under water.

After a five (5) second time delay, all pumps shut down. Once the low level condition clears, the station automatically resets and automatic operation resumes. The PLC allows three (3) automatic restarts in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). The red station fault light on the control panel door comes on, and the display indicates an "Alarm Shutdown Alert." Go to "Alarms," and the display should show that a "Low Level fault" has occurred.

NOTE: At this point, shut the station down, and determine what the problem is. Consult the Troubleshooting section of this manual for assistance.

To clear the fault, press the Reset button.

Phase Failure

This safety utilizes a phase monitor to analyze incoming voltage and determines whether all voltage parameters are acceptable and the phase sequence is correct.

The LED on the phase monitor is lit if there is no fault. If there is a problem, the LED is off.

After approximately one (1) second, all pumps are shut down. Once the phase failure condition clears, the station automatically resets, and automatic operation resumes. The PLC allows three (3) automatic restarts in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). The red station fault light on the control panel door comes on, and the display indicates an "Alarm Shutdown Alert." Go to "Alarms," and the display should show that a "Phase Failure fault" has occurred.

NOTE: At this point, shut the station down, and determine what the problem is. Consult the Troubleshooting section of this manual for assistance.

WARNING: Electrical Shock Hazard

As this is an electrical problem, adhere to all safety procedures during troubleshooting. To clear the fault, press the reset button.

Failure to follow these instructions could result in property damage and/or moderate personal injury.

INDIVIDUAL PUMP FAULTS

There are three faults that are considered Individual Pump Faults. These are overload protection, high pump temperature (optional), and individual pump phase fault (optional).

Overload Protection

Overload Protection is standard on all pump stations. The overload is a safety device that shuts the motor down when amperage exceeds the setpoint of the device.

If the motor amperage exceeds the overload setpoint that pump shuts. In some instances, an individual pump can trip without shutting down the entire system if another pump is available to operate. If so, the PLC will automatically bring the available pump on line. The green light above the pump switch flashes for the pump that was shut down. Go to "Alarms," and the display should show that an "Individual Pump fault" has occurred. The PLC does not differentiate between the different individual pump faults.

WARNING: Overload Hazard

The overloads are located inside the control panel. All safety procedures must be adhered to during the any adjustment or resetting process.

Failure to follow these instructions could result in property damage and/or moderate personal injury.

Resetting the overload is accomplished by pushing in the blue Differential Overloads button on the right front face of the device, and rotating it approximately an eighth of a turn clockwise.

Adjustment of the overload setpoint is performed using the blue dial on the left front face of the device.

Once the overload has been reset, individual pump faults require turning the individual pump switch to the OFF position, and then back ON (re-arming).

High Pump Temperature (Optional)

High pump temperature utilizes a temperature probe inserted into the pump discharge piping. The probe trips when the water temperature reaches 120°F, and then immediately shuts down the pump. The green light above the pump switch flashes, indicating which pump has shut down. Go to "Alarms," and the display should show that an "Individual Pump fault" has occurred.

The temperature probe automatically resets at 105°F. At that time, the pump can be rearmed, and pump operation can continue.

NOTE: If the pump continues to shut down for this issue, shut the station down and determine what the problem is. Consult the Troubleshooting section of this manual for assistance.

VFD Fault

The VFD sends a fault signal (120 VAC) directly to the PLC. The display shows, "Inverter Fault." This is normally a VFD fault. To determine the nature of the problem, you must use the VFD keypad display and review the fault/alarm history. This procedure is outlined in the VFD section of this manual. A list of all inverter fault/alarm codes is found in your VFD manual.

In some instances, the display shows, "Inverter Relay Fault." In this case the PLC failed to get a VFD run signal back from the drive. This could be a problem external to the VFD. Consult the Troubleshooting section of this manual for more details.

After a two (2) second time delay, the VFD pump shuts down. The lag pump(s) continues to run. The PLC allows three (3) automatic restarts in a one-hour period. At the fourth occurrence in a one-hour period, the station shuts down (hard fault). The red station fault light on the control panel door comes on, and the display indicates an "Alarm Shutdown Alert." Go to "Alarms," and the display should show either an "Inverter fault" or an "Inverter Relay fault" has occurred. The fault does not have to be cleared in order to allow auto restart.

Once you have determined what the VFD (inverter) fault is, and have cleared it, press the station Reset button to clear the alarm shutdown status.

MAINTENANCE

REGULAR MAINTENANCE = INVESTMENT

Maintenance is an investment that will pay dividends in the form of improved reliability and durability. Site maintenance checks are a matter of day to day, week to week care that is important to the proper operation of the pumping equipment. Periodic equipment checks will ensure that the recommended lubricants, fluids and service parts are available and planned for. Flowtronex recommends Preventative Maintenance be performed quarterly.

DANGER: Personal Injury Hazard

Performing maintenance work on your pump station can be dangerous. You face the risk of electrical shock or related injuries, and must be trained in the danger of electricity. If you have any doubt, have a qualified technician do the work. Contact the factory for the closest authorized FlowNet service office to you.

Failure to follow these instructions will result in death or serious injury.

REGULAR MONTHLY MAINTENANCE INTERVALS

1. Heat exchanger:
    a. Verify that the flow through the heat exchanger is a solid streamline out of the exhaust line into the wet well. Too little flow reduces cooling capacity.
2. Control panel:
    a. Using the operator interface, verify that all the buttons operate properly. Also review the station operation, fault history, and data log for station operation.
    b. Verify that all surge devices are visually sound. Check the surge device for the station (mounted on the back of the control panel). Black soot on or around the device indicates that it has taken a surge and needs to be replaced.
3. Motor lubrication:
    a. If your motor has an oil bath thrust bearing, you need to ensure that it is filled to the recommended fill line on the sight glass (that is, filled to the minimum line).
    b. If it is a grease filled bearing, ensure that grease is not all over the inside of the motor and down in the bottom of the motor. This could be a sign of over-filling. Refer to the motor manufacturer's lubrication instructions.
4. Pumps - vertical turbine:
    a. Verify that the area surrounding the pump shaft has no silt built up around the head. If there is silt build up, fix it immediately.

CAUTION: Equipment Damage Hazard

Silt buildup is a sign of problems with the wet well and/or intake screen.

Failure to follow these instructions indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

5. Pumps - horizontal:
    a. For a horizontal pump, verify that the mechanical seal is not leaking between the pump and the motor.
6. Exercise the DSR using the following procedure. With system switch and all pump switches in the off position, close the pump station discharge isolation valve. Place the system switch in manual and start a VFD pump. Slowly ramp up the VFD speed. The DSR should open and relieve system pressure when it exceeds set point pressure by approximately 12-15 psi. Adjust DSR as required to meet this requirement. Repeat test at least once to ensure repeatability.
7. Sound and visual checks of whole station:
    a. Just listen. Do you hear any odd sounds rubbing or grinding or maybe

even electrical arcing or that something is in a bind? This can indicate a serious problem.

b. There is going to be some harmonic vibration with the pumps and motor. We are looking for excessive vibration or noise. Can you see a bend in the pump shaft? Do the motor and shaft shake violently? This needs servicing immediately. Do not operate pump if vibration is excessive.

c. Confirm that the building cooling and ventilation systems are operating and clear of all obstructions. Maximum operating range for equipment is 40°C (104°F). Verify that water, grease, oil, hardware, etc. are not leaking or loose on the pump station.

8. Verify that the area surrounding the pump shaft at the pump head has some leakage when the pump is operational.

    a. The correct leakage rate is approximately one drop per second. If the leakage exceeds two drops per second, the packing gears need to be adjusted.

WARNING: Rotating Shaft Hazard

Packing adjustment should be performed by properly trained and qualified personnel.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

9. Station skid:

    a. Visually inspect for leaks in the station piping, valves, and other components.

    b. Visually inspect the piping and skid for any stress cracks in the welds.

    c. Visually inspect the station for loose or damaged paint or areas of rust.

DANGER: Personal Injury Hazard

Pump station maintenance must be performed by properly trained and qualified personnel. Hazards exist for electrocution, shock, rotating components, and pressurized components.

Failure to follow these instructions will result in death or serious injury.

WINTERIZING PUMP STATIONS

CAUTION: Equipment Damage Hazard

Your pumping system must be properly winterized before storage. Failure to winterize the system could result in damage to the pipes, valves, pumps, or other components.

Failure to follow these instructions indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

Generalized Instructions for All Pump Stations

1. Turn all enclosure switches to the OFF position.
2. Open (turn off) all electrical disconnects to the pump station.

DANGER: Personal Injury Hazard

The pumping system must be disconnected from the main power supply before attempting any operation or maintenance on the electrical or mechanical parts of the system.

Failure to follow these instructions will result in death or serious injury.

3. Close all the station discharge isolation valves.
4. Close the pump station inlet isolation valves.
5. Close all auxiliary equipment isolation valves (if applicable).
6. Remove all connections from the heat exchanger inlet and discharge. Force water from the heat exchanger core with compressed air.

WARNING: Pump Pressure Hazard

Pumping system must be isolated from the system and pressure released before disassembly of any piping, valves, or pumps.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

CAUTION: Compressed Air Hazard

Proceed with caution when working with compressed air.

Failure to follow these instructions could result in serious personal injury, death, and/or property damage.

7. Connect hose to hose bib on the pump station. The bib is usually found under the discharge manifold for the pumps, or at the end of the hydro-pneumatic tank.
8. Slowly, open the hose bib ball valve on the pump station. Slowly, open all ball valves on the pump station. Wait until pump station pressure reads 0 PSI before closing the hose bib ball valve.

Vertical Stations

1. Carefully, remove plugs from the pump heads, including the submersible pressure maintenance pump. (See also Appendix A and Appendix B.)

WARNING: Pump Pressure Hazard

Pumping system must be isolated from the system and pressure released before disassembly of any piping, valves, or pumps.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

2. Carefully remove all tubing from the relief valve and/or the control valve, and drain both valves.
3. Carefully remove all tubing from pressure switches and transducers. Make certain that the station piping is completely drained.
4. Drain all valve pilots, including the sensing chamber and all pressure switches.
5. Loosen valve bonnet bolts, loosen the bonnet, and drain the valve bonnet of water.
6. Re-tighten the relief or the control valve bonnets.
7. Fill bonnets with a good-quality, non-toxic (such as, RV [Recreation Vehicle]) antifreeze.

Horizontal Stations

1. Slowly, bleed pressure from the inlet manifold using the ball valve or the hose bib on the isolation ball valve on the pressure gauge. Carefully, remove plug from the inlet manifold and drain.
   NOTE: Do this only if an inlet isolation valve is installed and closed.

WARNING: Pump Pressure Hazard

Pumping system must be isolated from the system and pressure released before disassembly of any piping, valves, or pumps.

Failure to follow these instructions could result in serious personal injury, death, or property damage.

2. If there is not an inlet isolation valve then and you cannot drain the inlet line, close all pump inlet isolation valves.
3. Remove the lowest plug on the pump volute or open the pit cock valve to drain all pumps completely.
4. Carefully, drain all filters and their components, including the flush lines.

Spring Restart of Pumping Station

Prior to restarting the pump station in the spring:

1. Make certain that all tubing is replaced; all connections are tightened; and check that all the drain valves are closed.
2. Open all operating valves and verify that the bonnet is tight.
3. Check that the drain plugs are installed in pumps and piping.

NOTE: Contact Xylem Flowtronex PSI, if you have further questions on winterizing your pump station.

TROUBLESHOOTING

1. If a troubleshooting step needs to be performed by a qualified person, it is labeled "**To be performed by a qualified person only.**"
2. Steps that can be performed by unqualified persons are not labeled.
3. Qualified persons are those who have been trained in avoiding the electrical hazards of working on or near exposed energized parts. Only qualified persons may open the electrical enclosure.
4. Unqualified persons are those with little or no such training.

LOW DISCHARGE PRESSURE FAULT

Cause	Cure
Flow rate greater than station capacity or unable to pressurize the system in refill mode (too many sprinklers on).	Adjust the irrigation demand as required.
	Verify the pressure setpoint. Has this value been changed from the original design? If the setpoint has been increased, the available flow will be lower. Check the pump curve to verify the pump performance.
A large break in the irrigation piping.	Repair the piping.
Low system pressure setting is too high.	Verify n70:0 is set to 300 seconds.
System pressure transducer sensing line is valved off or clogged.	Check the ball valve position, and/or blow out line.
System pressure transducer failure.	Replace the pressure transducer (FlowNet).
All pumps not running.	One of main pump switches in OFF position.
	Consult the motor troubleshooting section if the motor won't start (see Motor Won't Start).
Main pump discharge isolation valve is closed.	Open the valve.
Pump discharge check valve leaks.	Check for foreign objects holding the valve open. Replace the check valve if it is damaged.
DSR is partially or fully open.	The pilot valve is set too low. Adjust as necessary.
	The needle valve on speed control is screwed in (closed) too far. Adjust as necessary.
	There is air inside the relief valve cover. Bleed air off the valve top.
	The ball valve(s) at the inlet and/or cover tapping(s) are closed. Open the valves.
	The optional strainer at the relief valve inlet tapping is clogged. Disassemble and clean.
	There is an obstruction under the relief valve or pilot valve seat. Disassemble and clean.
	There is a leak in the relief valve diaphragm. Replace the diaphragm.
	Bad relief valve or pilot valve seat. Rebuild or replace valve.
Low suction pressure or supply water restriction.	Call the city if the city water pressure is lower than the normal or published value. Check the supply piping for obstruction.

HIGH DISCHARGE PRESSURE FAULT

Cause	Cure
High system pressure setting too low.	Press F1, F8, F11 and verify n70:0 is set to 60 seconds.
System pressure transducer reading high.	Compare display readout to the pressure gauge. Calibrate if possible, and replace transducer if necessary (FlowNet).
Isolation valve for DSR or main discharge is closed.	Open the valve.
DSR will not open fully.	The pilot valve is set too low. Adjust as necessary, 15 PSI over set pressure.
	The needle valve on the DSR is too far open; adjust as necessary.
	The ball valve(s) at the inlet and/or cover tapping(s) closed. Open the valves.
	The indicating stem is bent and/or sticking.
Irrigation demand is reducing too quickly.	Reprogram irrigation to stage down in steps.

LOW LEVEL FAULT

Cause	Cure
Clogged or shut off supply pipe.	Check the supply pipe for restrictions or closed valve.
Clogged inlet screen.	Check and clean the inlet screen.
Problem with level probes.	Inspect probes for correct insertion depth.
	Look for dirty or corroded probes.
	To be performed by a qualified person only. Look for broken probes, probe holder, or wires.
	To be performed by a qualified person only. Check for loose or incorrect probe wiring.
	To be performed by a qualified person only. Verify ground continuity between the station and wet well.
Level relay failure (inside control panel).	**To be performed by a qualified person only.** Check relay for proper operation. Replace as required.

LOW INLET PRESSURE FAULT

Cause	Cure
Normally used on flooded suction horizontal or canned turbine stations	
Inlet pressure switch is set too high.	**To be performed by a qualified person only.** Check the pressure switch setting. (Located on lower left side of outside of enclosure.)
Pressure sensing line to pressure switch is clogged or valved off.	Ensure the valve is open, and blow out line if necessary.
Pressure is actually low – static.	If the city supplied water, check with them.
	If the water is supplied by a tank, check the tank level,

	and verify that the supply valve is open.
	If equipped with a suction manifold strainer, clean as required.
	Ensure the supply piping not clogged or restricted.
Pressure is actually low – dynamic.	Ensure that the flow rate is less than the supply capacity.

LOSS OF PRIME FAULT

Cause	Cure
Normally used on end-suction centrifugal pumps	
System has lost prime or air is trapped in system.	Check the system for prime lead in the foot valve or suction line.
Probe is dirty, corroded, or failed.	Clean or replace the probe as required.
Loss of prime relay failed.	**To be performed by a qualified person only.** Check the relay for proper operation. Replace as required.

PHASE FAULT

Cause	Cure
Previous power failure.	Press the station reset. If the problem is gone, the fault will reset.
Incoming line voltage less than 90% of rated station voltage.	Consult the power company.
Phase monitor voltage set too high.	**To be performed by a qualified person only.** Example – monitor set at 480 V, try 460 V.
One or more dead legs on a 3-phase power line.	**To be performed by a qualified person only.** Check all input fuses.
	Call the power company.
A reversal, shift, or imbalance of the line phases.	Normally occurs after the power company has worked on or replaced the transformer. Call the power company.
Phase monitor failure.	**To be performed by a qualified person only.** If the LEDs on the phase monitor are on, there is no fault. If the LEDs are off, and all voltage and phase conditions are good, the phase monitor needs to be replaced.

VFD FAULT

Cause	Cure
Look at VFD keypad to determine specific fault and consult the VFD manual. ***Codes identified below are some of the more common ABB 550 codes. Consult your specific VFD manual for other drive applications.***	
Fault code 3 – dev overtemp (drive heatsink is overheated).	**To be performed by a qualified person only.** The VFD fan won't come on. If there is no power, check circuit breaker. Check for no continuity across transorb

	(located at wire terminal strip). If the power is good, replace the fan.
	There is no water flow through heat exchanger. Make sure both ball valves are open.
	Water is leaking at the heat exchanger. Repair or replace the coil.
Fault code 2 – DC overvolt (intermediate circuit DC voltage is excessive).	**To be performed by a qualified person only.** Check the input voltage (AC) to the drive. If high, contact the power company.
Fault code 6 – DC undervolt (intermediate circuit DC voltage is insufficient).	**To be performed by a qualified person only.** Check the input voltage (AC) to the drive. If low, contact the power company.
Fault code 7 – AI1 loss (analog 1 input value is less than minimum value).	This can be a nuisance fault. Set parameter 3001 = 0 not sel.
Fault code 9 – motor overtemp (motor too hot, estimated value).	This can be a nuisance fault. Set parameter 3006 = 1050, and 3007 = 115.
Fault code 22 – supply phase (ripple voltage in the DC link is too high).	**To be performed by a qualified person only.** Check the input fuses to the VFD. Review the phase failure section above.

MOTOR WON'T START

Cause	Cure
Individual pump switch light is flashing.	**To be performed by a qualified person only.** The overload for that motor is tripped. Reset, adjust, or replace as required.
	Does the station have a high pump temperature option? Check if the water temperature is greater than 120°F. If it is, the pump is cavitating. If less than 120°F, the probe or relay is bad.
	To be performed by a qualified person only. Does the station have the individual pump phase fault option? See if the phase or voltage to motor is good. Check the motor fuses. Replace that pump's phase monitor as required.
Motor won't start, but the individual pump switch light is off.	If in VFD mode, will motor run XL? If yes, refer to the VFD troubleshooting section. If no, proceed to next step.
	To be performed by a qualified person only. Check the input power to the starter. Ensure correct power on all phases.
	To be performed by a qualified person only. Verify power on all lines to motor.
	To be performed by a qualified person only. Make sure motor terminal connections are not loose or broken.
Motor won't start, but the individual pump switch light is green.	**To be performed by a qualified person only.** Is pump jammed? Disconnect motor from pump, and try to run motor.

GLOSSARY OF TERMS

AC	Alternating Current. The voltage, and therefore current, constantly oscillates positive and negative. For North America, the line frequency is 60 Hz. Some other areas of the world use 50 Hz.
Across-the-line (XL)	Applying 100% of line voltage to a motor during startup and run. A simple large relay with a contact for each power phase (for 3 phase) is used to control the motor OFF/ON.
Analog	A signal that varies in some respect (voltage, current, frequency) in order to convey the value of some real world information (i.e. pressure, flow, temperature etc). A control system can take action based on the value of such a signal. Internally, the signal will be converted to some number based on the value of the signal.
Automatic lake screen	(ALS) A screen on the intake flume of the pump station, between the irrigation pond and the wet well, which is designed to be self cleaning by using a jet of clean water spraying from the inside-out during use.
Booster	A pump designed to increase the pressure of a pressurized irrigation line. This is usually used to move pressurized water from a lower to higher elevation area of the golf course.
Calibration	The act of or specific values used to scale the output of a measurement device to read real-world values.
Canned turbine	See vertical turbine.
Chemical injection	The process of adding chemicals to irrigation water to fertilize or medicate turfgrass.
Combo	A capacity level representing a predefined group of pumps on a station. Normally Combos are defined as follows:
Combo 1	Normally the PM pump.
Combo 2	Lead pump. Normally the VSP.
Combo 3	Lead pump and first lag pump.
Combo 4	Lead pump and two lag pumps.
Control valve	A valve designed to automatically open/close in order to maintain a specific setpoint pressure, flow, or level.
Control variable	A value that a control system monitors in order to perform some useful function.
Conventional	Refers to fixed-speed pump systems using a pressure reducing valve for pressure control.
CPU	Central processing unit. The part of the PLC that stores and allows manipulation of the program, in conjunction with an EEPROM chip.
Cycle time	The number of times an hour that a pump (PM or main pump) cycles on and off.
Cycling	This condition occurs when conditions require a pump to start if no pump is running, but require a pump to stop if a pump is running. This is excessive starting and stopping of one or more pumps and can be damaging to the equipment if allowed to continue.

DC	Direct Current. Such as a battery. The voltage is stable, and does not oscillate (at least intentionally).
Digital	A simple ON/OFF condition. For example, the presence or lack of a 120VAC signal on a wire is a digital condition.
DSR	Downstream Relief Valve is used to limit the maximum allowable downstream pressure.
Equal HP pumps	Also referred to as interchangeable pumps. Defines which pumps are available to start based on lowest run time. VSPs and XL pumps are defined in the PLC program. An XL pump can be an equal HP pump, but it will not start as a lead pump, because the lead pump will always be a VSP.
Filter	A device used downstream of the pumps to clean the water being pumped into the irrigation. These devices are typically self-cleaning, but require hardware/software to self-clean.
Fixed speed	Pumps run at a fixed RPM, defined by the motor windings and the frequency of the line voltage (50/60 Hz).
Flooded suction	A type of system where the pumps (usually centrifugal) are fed by a pond or other body of water at very low pressure (atmosphere, or just a few feet of water column). Pumps for these systems must be carefully selected for low NPSHR (Net Positive Suction Head Requirements) or cavitation and pump damage can occur. Low inlet pressure safety is an excellent choice for these systems.
Foot valve	A device used primarily on horizontal lift applications to maintain pump prime.
Frequency	(Hz) The number of oscillations per second of any system. Typically used to refer to electrical systems, such as AC power line frequency, or variable speed drive output frequency. This frequency defines the speed of an AC motor.
GPM	Gallons per minute. Units of flow for US use.
HSS	High speed switching. Starting pumps with a VFD to reduce inrush current and provide pressure control, but able to switch over to fixed speed so that the VFD is able to start another pump.
Input	A way for a control system to detect real-world occurrences. These can be digital or analog.
Inverter	Another term for Variable Frequency Drive (VFD). Actually, more correctly applied to the output circuitry of the drive, which converts DC voltage to AC voltage.
Lag pump	A pump used later in the pump sequence to support increasing irrigation demand requirements. The term lag simply refers to the fact that it does not start first.
Lake fill	(LLC) A circuit designed to keep a pond or lake at or above some minimum level of water.
Lead groups	Proprietary term used to describe the register(s) that defines which pumps on a station are interchangeable in their pressure/flow characteristics.
Lead pump	The pump in a lead group which is chosen by the controller to start first. This is usually determined by finding the pump in the lead group with the lowest run-time.

Lift	This refers to how high water must be "lifted" to reach the pump suction. Lift stations have even harsher NPSHR than Flooded Suction systems. Loss of prime safety is an excellent choice for these systems. Auto-re-prime systems are available to help maintain a full suction line (CRD reprime, vacuum pumps).
Lock-out	A system which limits the pump systems available pumps and or limits the speed of a variable speed pump during user-defined time of day or day of week.
Low level probe	A device that "shorts" out when removed from water. This removes the signal from the PLC and tells it that the pump is not safe to run due to a low water level condition.
Main pumps	The pumps which are relied on for supplying the irrigation at mid-high flow rates.
Must-run time	The amount of time (in seconds) that the pump must run.
OTIS	Operator Terminal Information System. Accesses PLC data, and displays it. Also allows access to settable registers that you need to program.
Output	A way for a control system to generate real world actions. An output can be a 120VAC signal to turn on a pump, or a varying 4-20 mA signal to control the speed of a VFD. Many types of output are available.
Overload	A condition in which pumps are allowed to produce more flow rate than the motor that drives them is designed for. Also refers to a device in the control panel, which detects this situation and stops the pump in order to protect it.
Over-pressure accumulator	A counter that is used to determine the lag pump shut down sequence.
Overshoot	Indicates that the control variable has exceeded the setpoint value while the controller was trying to correct it.
Phase monitor	A device that analyzes incoming voltage and determines whether all voltage parameters are acceptable and the phase sequence is correct.
PLC	Programmable Logic Controller. A very robust/rugged computer designed for equipment control in harsh environments.
PM pump	Pressure Maintenance Pump. Handles very light flow rates and leaks to prevent the main pumps from cycling.
Pressure switch	This is a normally open or normally closed switch that changes output state when the pressure exceeds the setpoint of the switch.
Pressure transducer	A device that converts actual pressure to a 4-20 mA signal that is input into the PLC which converts it back to an actual pressure reading.
PSI	Pounds per square inch. Units of pressure for US use.
Re-arming	This refers to turning the pertinent individual pump switch to the OFF position, and then back on to clear an individual pump fault.
Register	A memory location in a PLC. These can be used as configuration and storage or temporary storage during mathematical calculations.

Relay	This is a normally open or normally closed device that changes output state when it is energized or de-energized, and sends or removes a 120VAC signal to the PLC.
SCADA	Supervisory Control And Data Acquisition.
Sequential alternation	One of several methods of selecting which pump to use first. This method simply picks #1 the first time, #2 the next and so on. Once all pumps have been selected as "lead" once, the method starts over at #1.
Setpoint	The desired situation for a control variable. If the user wanted the irrigation system to operate at 120 PSI, that would be the setpoint for the controller.
SO_2 Pump	Similar to a water feature pump in operation, but used to pump water through a SO_2 burner to reduce the PH of the local irrigation water supply.
Submersible	A type of pump, some similar to a vertical turbine, others are of a different configuration, but in all cases the motor and pump are close-coupled and actually located in the wet-well, sump or bore hole. In fact, most of these pumps must be covered with water to operate without overheating. The motors used on these pumps are typically less efficient than those used on vertical turbine or centrifugal pumps. Submersible pumps require more water over the pump suction than do turbines; therefore the low water level safety must be carefully set high enough to protect these pumps.
Speed test	The method used to shut down a VSP during normal automatic operation.
Temperature switch	This is a normally open or normally closed switch that changes output state when the temperature exceeds the setpoint of the switch.
Timed alternation	One of several methods of selecting which main pump to use first. This method determines which pump to start first, second, etc by picking the pump with the least run time.
Transfer pump	A pump designed to move water from one reservoir to another.
Units	Gives context to numbers in the PLC. Units describe what the number is about, such as PSI, GPM.
VFD	Variable frequency drive. This allows a pump to run at variable speeds.
VSP	Variable speed pump. Refers to a pump being controlled by the variable frequency drive. In the case of pump systems, variable speed gives the controller the ability to change the output of the station by changing the speed of one or more pumps.
Vertical turbine	A type of pump which has the motor at the top, and the pump hanging on a column of pipe into a wet-well or “bore hole.” These pumps are very efficient and come in a wide range of horsepower/flow/pressure combinations. These pumps are generally not capable of high lift on the suction side. These pumps can be installed in a container, called a “Can”, which allows the pump to be used in-line as a booster. Low Level safety is used on Vertical Turbine sets, can turbines require low inlet pressure, or loss of prime safeties.
Water feature pump	These pumps (of any type) are typically used to pump water through a piping system separate from the irrigation in order to operate man-made creeks, waterfalls, fountains etc. These pumps are usually run strictly by timers or interface relays (See also, lock-out).

APPENDIX A — FINAL CHECK LIST

- ☐ Is the base unit properly leveled and secured?
- ☐ Are all lubrication points properly lubricated?
- ☐ Is the shut-off valve on to the pump suction open?
- ☐ Is the shut-off valve on the discharge line open?
- ☐ Is the piping properly supported so as to prevent strains on the unit?
- ☐ Is the distribution system purged of debris and air? Is the system filled?

CAUTION: Stuffing Box Damage

Do not run pumps dry. Fill and vent the pump volute prior to operation.

Failure to follow these instructions indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

- ☐ Are the pump and driver shafts properly aligned?

Warning: Rotating Shafts

This pumping system must be disconnected from the main power supply before check or performing alignment.

Failure to follow these instructions could result in serious personal injury, death, and/or property damage.

- ☐ Is the pump rotation correct?
- ☐ Is there adequate ventilation and air circulation?
- ☐ Have all piping connections been made? Have all flanged joints been checked for tightness?

APPENDIX B — ELECTRICAL WIRING AND CONTROL SETTINGS FINAL CHECKLIST

☐ Does the feeder line voltage correspond to the unit voltage?

Check the unit nameplate or motor terminal connection.

WARNING: Electrical Shock Hazard

Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices.

Failure to follow these instructions could result in serious personal injury, death, and/or property damage.

☐ Are the feeder wires correctly sized for the load?

☐ Is the unit properly grounded?

WARNING: Conduit grounds are not adequate

A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards.

Failure to follow these instructions could result in serious personal injury, death, and/or property damage.

☐ Have all the power terminals in the control panel been check for tightness?

This is imperative since stranded wires tend to “flow” and become loose after initial installation.

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're 12,500 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

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Let's Solve Water

Xylem Inc.
10661 Newkirk Street
Dallas, TX 75220
Phone: 800-786-7480
www.flowtronex.com
support@flowtronex.com

Appendix
A: Original Factory Data
B: Record Drawings of Deepened Facility

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ORIGINAL EQUIPMENT DATA FROM FACTORY

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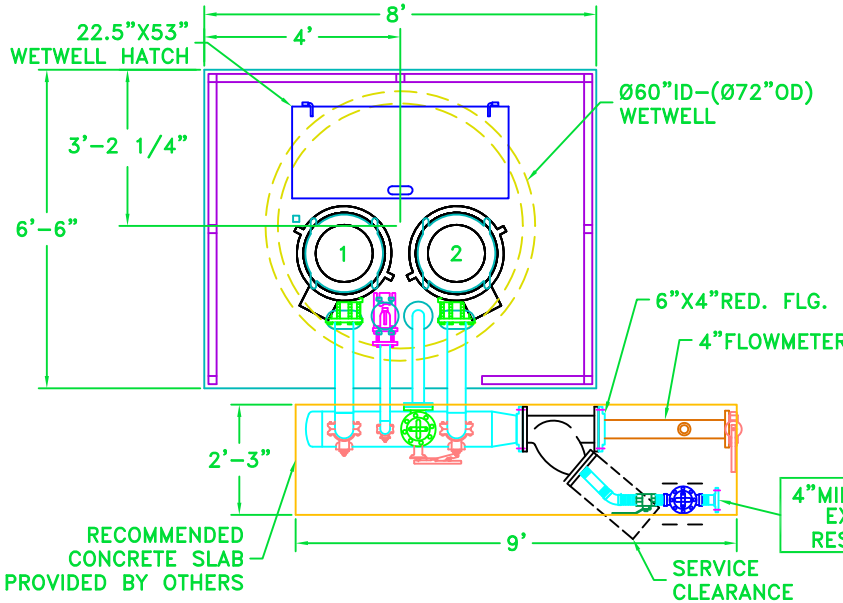
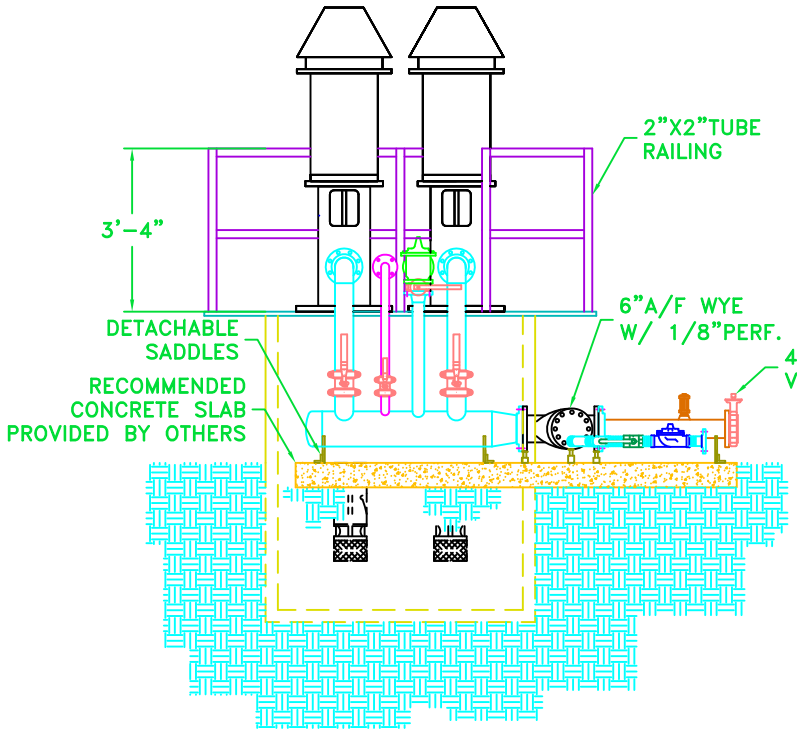
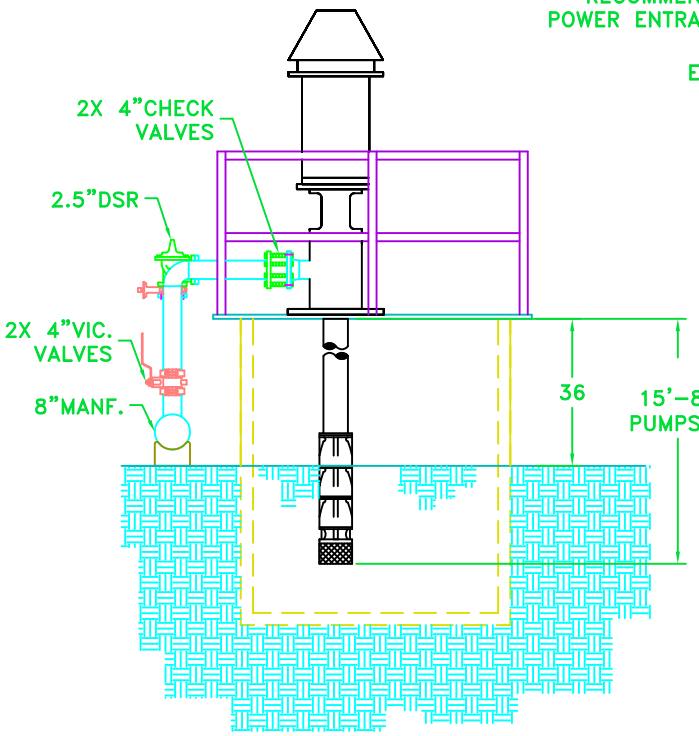


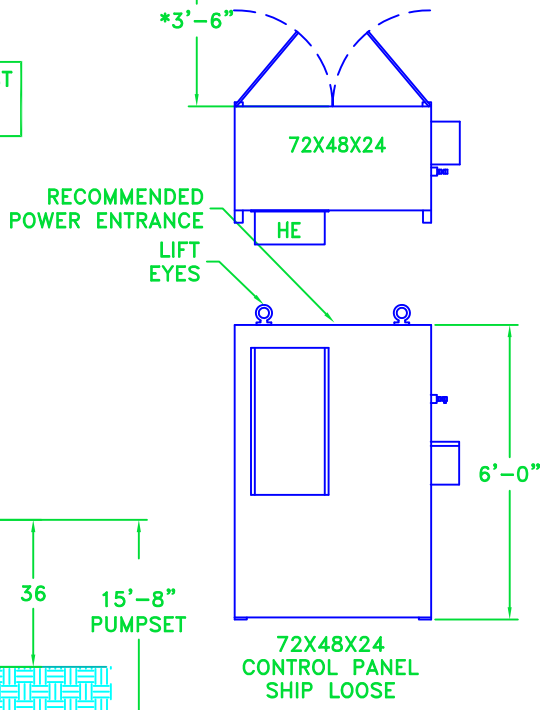
STATION STYLE:	FPX-VWTP-600-3-110
TO PRODUCE:	600 GPM @ 110 PSI
HORSEPOWERS:	(PM) 3 (1) 30 (2) 30
PUMP DISCHARGE SIZES:	(PM) 2" (1) 4" (2) 4"
PUMP ISOLATION VALVES:	(PM) 2" (1) 4" (2) 4"
PUMP CHECK VALVE SIZES:	(PM) 2" (1) 4" (2) 4"
POWER CONDITIONER:	N/A
POWER PACK:	N/A
HEATER:	N/A
MAIN DISCONNECT:	200 AMPS
POWER REQUIREMENTS:	67 KVA 230 V, 60 HZ, 3 PHASE
EXHAUST FAN REQUIREMENTS:	TOTAL TO BE 1008 CFM

NOTE: 1) *MINIMUM TO ANY OBSTRUCTION REQUIRED BY NATIONAL ELECTRIC CODE

4"MINIMUM FLUSH LINE UNDER 100' FLUSH PIPING MUST EXHAUST TO ATMOSPHERE AND CANNOT HAVE ANY RESTRICTIONS. DO NOT PIPE BELOW LAKE SURFACE.







TAM GC

SCALE	DATE	DWG NO.
None	11/19/01	M10970 R2

DRAWN BY: EMILY BETHUNE
APPROVED BY:

	REVISION	BY	DATE
1	UPDATES PER CHANGE ORDER (12/11/01)	M.M.	12/12/01
2	AS BUILT	J.T.	12/21/01
3	.	.	.
4	.	.	.
5	.	.	.
6	.	.	.
7	.	.	.

SPECIAL NOTES
Sales # .
Quote# .

FLOWTRONEX PSI
Pumping Systems
10661 NEWKIRK ROAD, DALLAS, TEXAS 75220, USA 1-800-527-0539

Submersible Pump Buildup

Date: ####### By: John Tucker Job No.: 10970

Rev: Job Name: TAM GC

Pump Data

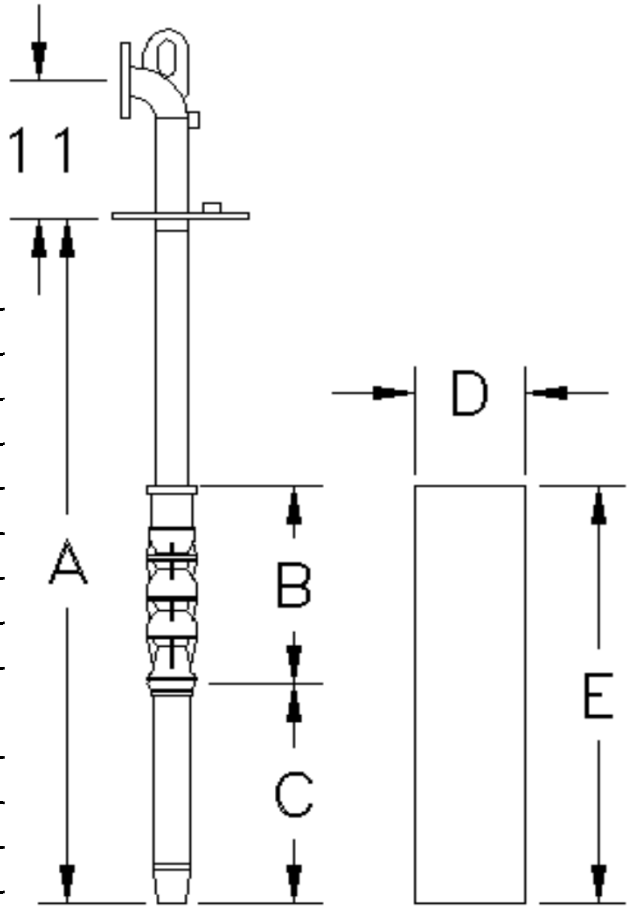
	Feet	Inch
Mfr.:	Grundfos	
Model:	25S30	
Stages:	15	
Trim:		N/A
Bowl Dia:		3.90
Bowl Length (B):	1	6.50
Shaft Dia:		N/A
Col. Pipe Dia.:		2
Head Size:		2
Shroud Dia:		N/A
Shroud Length:		
Shroud Mat'l:	PVC	
OAL:	15	9.00
Probe Length:	13	1.00
Min. FPS:	0.50	
Min. GPM:		

Operating Data

GPM:	31
Disch Press:	110
Fixed Loss:	0.00
VFD Loss:	0.00
Lift Feet:	0.00
Pump TDH:	254
Pump Nos.:	PMP
Serial Nos.:	10970 – PMP

Motor Data

Mfr:	Grundfos	
Volts:	230	
Phase:	3	
Hertz:	60	
Hp:	3	
RPM:	3600	
Dia.:	3.80	
Length (C):	1	8.60
Starting:	XL	



For Shop Use

Motor Ser. No.:

Pump Ser. No.:

Volts/Phase/Hz:

RPM:

kW:

FLA:

SF & SF Amps:

kVA Code:

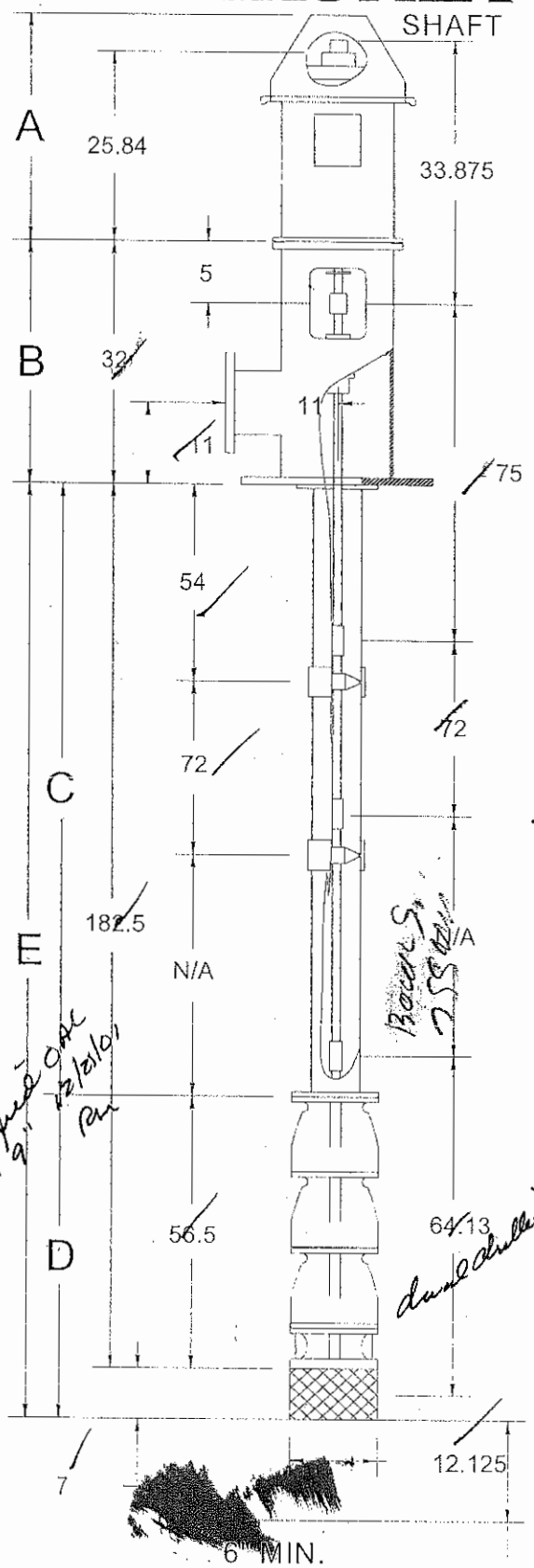
Min. Flow Rate:

Special Notes:

FLOWTRONEX™

Vertical Turbine Pump Buildup

Date: 12/13/01 Rev: 1 By: John Tucker
Job Name: Tam Golf Course
Job #: 10970 Serial #: 10970-1,2
Shop #: C.O.#:



Section A

Motor: New Style Newman
Motor SN:
HP: 30 RPM: 1800 Starting: XL
Oil Cap: Grease Gal. Ship:
CD: 25.84 BD: 10 SRC: 1 NRR: NO
Volts/Phase: 230-3P Freq: 60Hz
Headshaft: 1 X 33.875
Gib Key: 1/4 x 1-3/4
Motor Base Bolts: (4) 3/8 X 1-1/2

Section B

Discharge Head: 410F-VFD PB: 1 X 4.5
Slinger Ring: 1
Pump Base Bolts: (4) 1 X 3-1/2
W/ Nuts & Washers

Section C

Top Shaft: 1 X 75
Top Column: 4 X 53.5 FLG: THD: X
Inter-Shaft: 1 X 72 Pieces: 1
Inter-Shaft: N/A Pieces: 0
Inter-Column: 4 X 71.5 Pieces: 1
Inter-Column: N/A Pieces: 0
All Columns Threaded and Coupled
Spider Bearings: No: 1 Size: 4 X 1
Hanger-Flange Goulds

Section D

Bowl Assy: IDP 10ELM-4" Stages: 6
Trim: 7.42 O.D.
GPM 325 TDH: 275 PSI: 119
Bowl Shaft Thread 1 X 1.5 X 64.13
Basket Stainer 7 x 12.125 Cone:

Section E

Length From Base to Bottom of Strainer
15 Ft. 9 In.

Misc. Specifications

PM Pump is 3 Hp — Build 2 Like Pumps
Motors to Have Space Heaters

All Flowtronex-PSI Vertical Turbine Pumps are assembled with the following materials unless otherwise noted:
Standard - wall - 8 TPI - butt thread column pipe
416SS - 10 TPI - shafting and couplings on a 6-inch stickup
Bronze spider bearings with rubber inserts
Grade 5 plated bolts
Stainless Steel basket strainers

Ingersoll Dresser Pumps

Vertical Turbine Selection Program (VTsP)

Date : 19 Nov 2001
Customer: Tam Golf Course
Project : J-10970
Service :

Selection Criteria:
Capacity: 325 USGPM
Head: 275 FEET
Speed: 1750 RPM
Specific Gravity: 1.00
Bowl Diameter: No Limit
Materials: Bowl: CI/LINED Impeller: BRONZE Shaft: 416SS

The Following Are The Most Efficient Bowl Assemblies

Model	Stgs	RPM	EFF	Horsepower Design	Horsepower Max	List Price	DIA	Thrust Des	Thrust Max	Thrust Up
10ELM	6	1750	81.20	27.79	30.24	2910	7.42	1238	1732	7
10ELL	7	1750	79.27	28.47	28.56	3270	7.50	1238	1909	5
8EHL	13	1750	79.02	28.56	30.24	4470	6.12	1678	2885	12
10EJH	5	1750	77.93	28.96	34.72	2550	7.60	853	924	9
12ELL	4	1750	77.34	29.18	37.04	2990	9.05	1980	2648	11
8EMM	12	1750	76.06	29.67	30.82	4170	6.07	963	1532	7

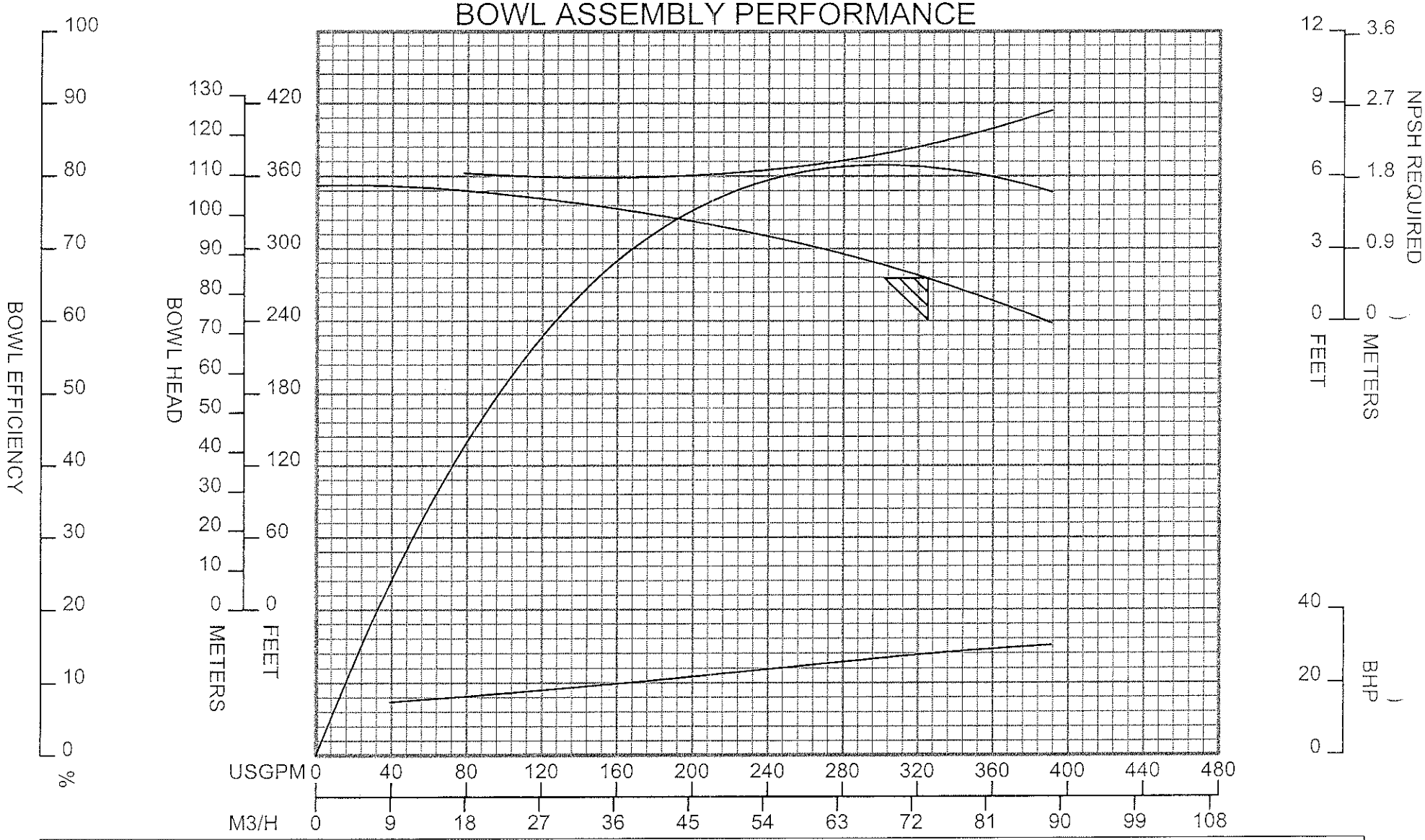
The Following Are The Lowest List Price Bowl Assemblies

Model	Stgs	RPM	EFF	Horsepower Design	Horsepower Max	List Price	DIA	Thrust Des	Thrust Max	Thrust Up
10EJH	5	1750	77.93	28.96	34.72	2550	7.60	853	924	9
10ELM	6	1750	81.20	27.79	30.24	2910	7.42	1238	1732	7
12ELL	4	1750	77.34	29.18	37.04	2990	9.05	1980	2648	11
10ELL	7	1750	79.27	28.47	28.56	3270	7.50	1238	1909	5
8EMM	12	1750	76.06	29.67	30.82	4170	6.07	963	1532	7
8EHL	13	1750	79.02	28.56	30.24	4470	6.12	1678	2885	12

* List Prices Are For Std Materials
** Performance Can Be Enhanced With Underfiling

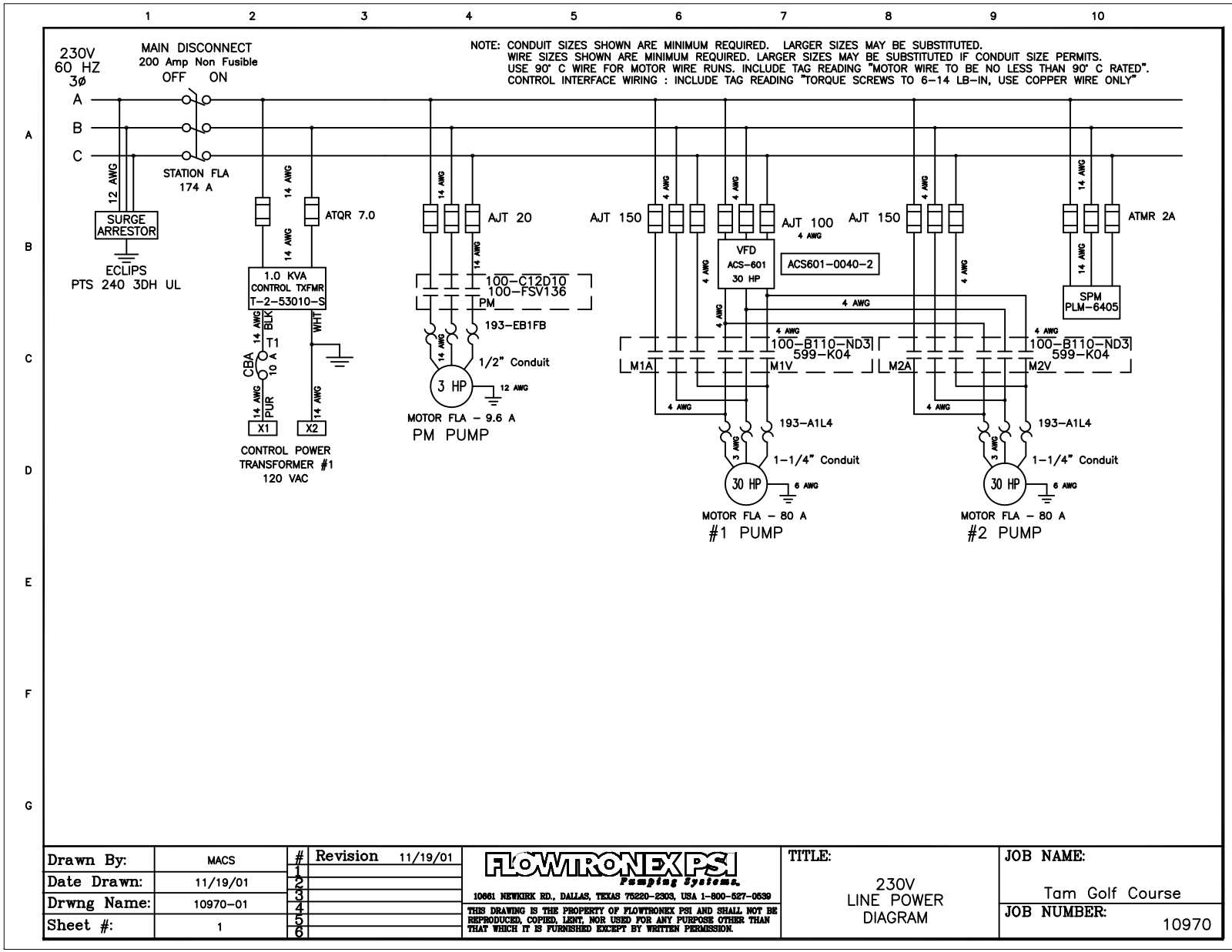
For Guaranteed Efficiency Contact Ingersoll Dresser Pumps (1-410-756-2602)

BOWL ASSEMBLY PERFORMANCE



Customer	: Tam Golf Course	Ingersoll-Dresser Pumps			Pump : 10ELM
Project	: J-10970				Stages : 6
Service	:				Bowl Mat. : CI/LINED
Date	: 19 Nov 2001	Flow (USGPM)	: 325.0	SG : 1.00	Imp. Mat. : BRONZE
Impeller	: Enclosed	Head (FEET)	: 275	RPM : 1750	Shaft Mat. : 416SS

GUARANTEES ARE BASED ON SHOP TEST WHEN HANDLING CLEAR FRESH WATER AT A TEMPERATURE OF NOT OVER 65 F.
CURVES ARE APPROXIMATE. PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY.



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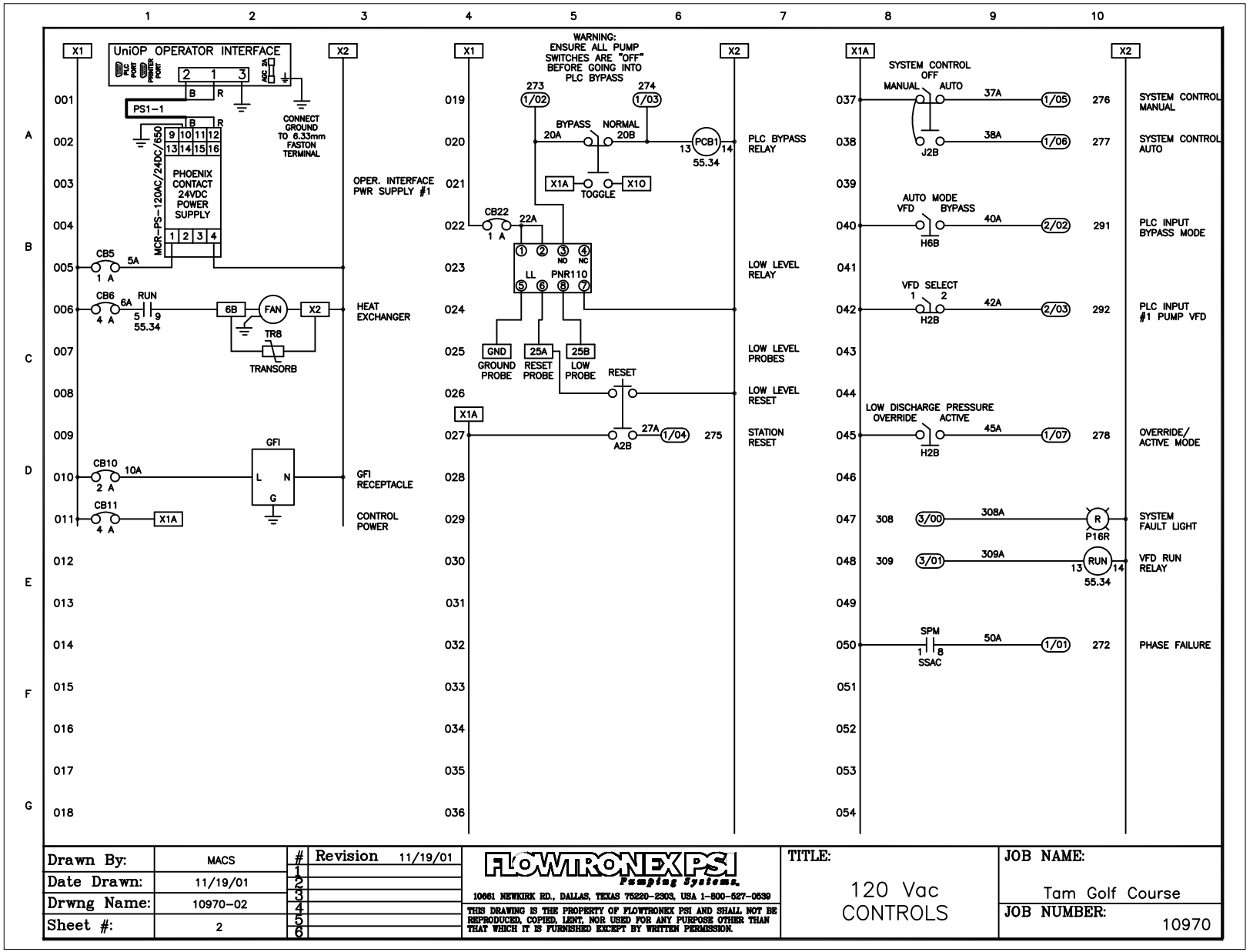

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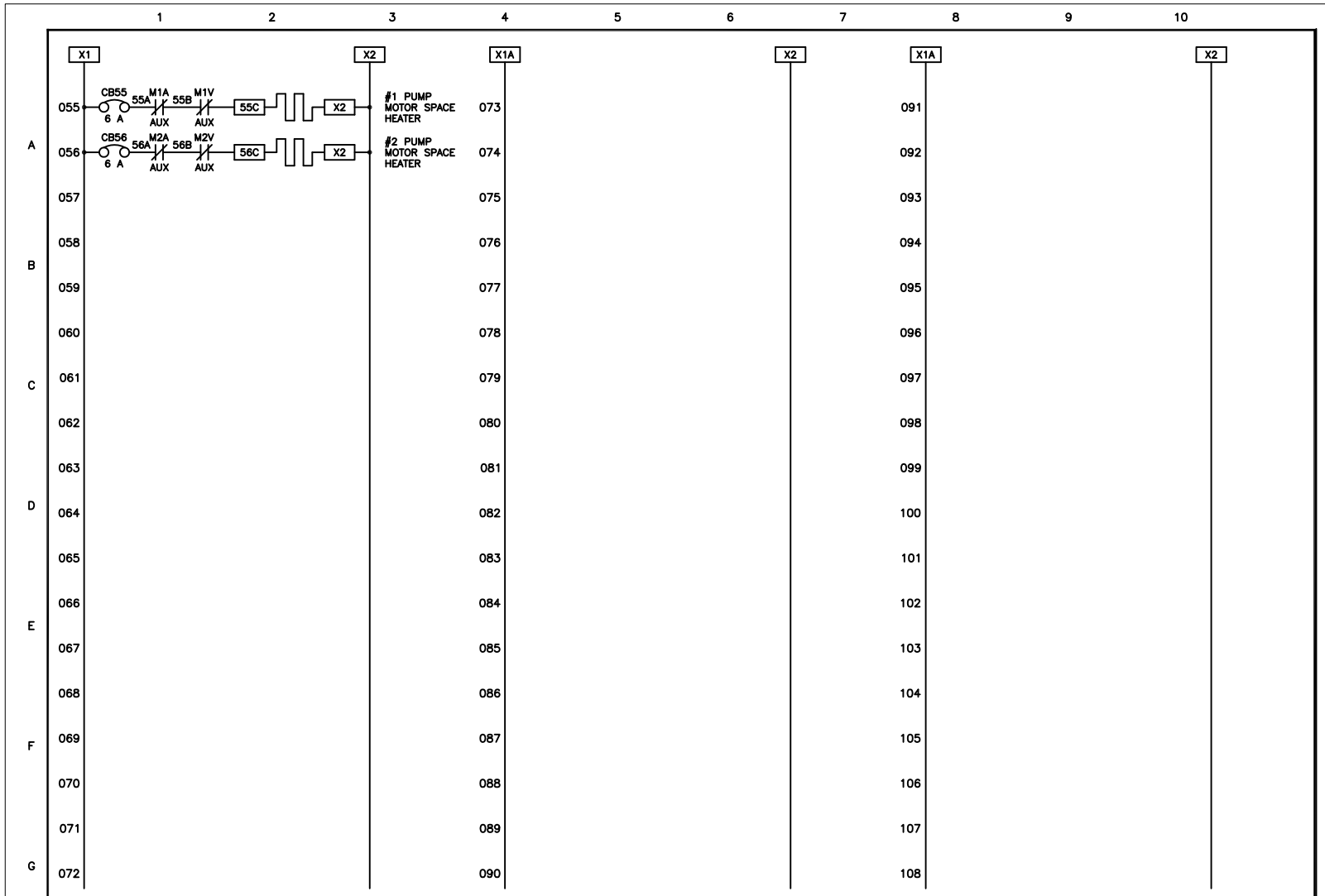

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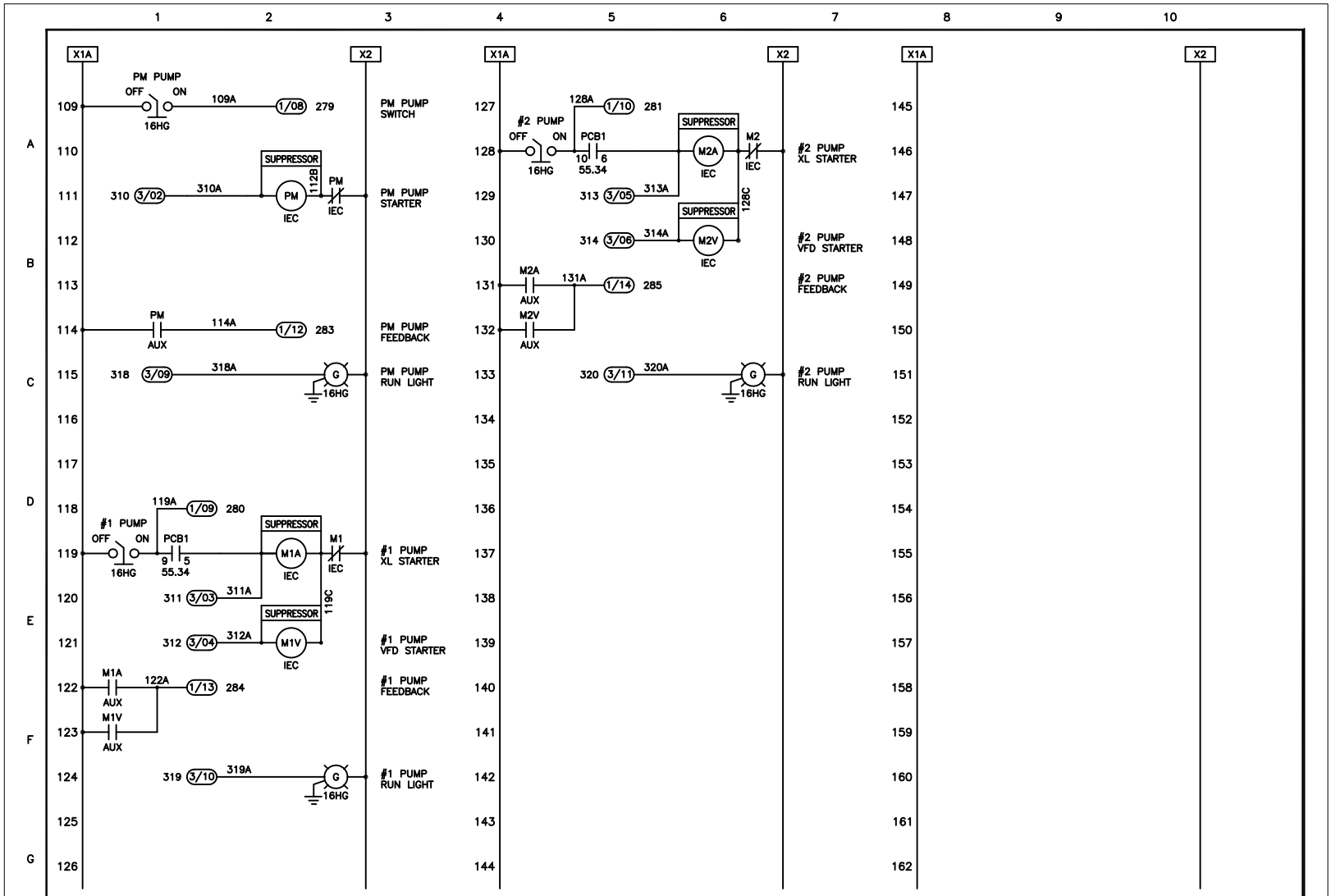

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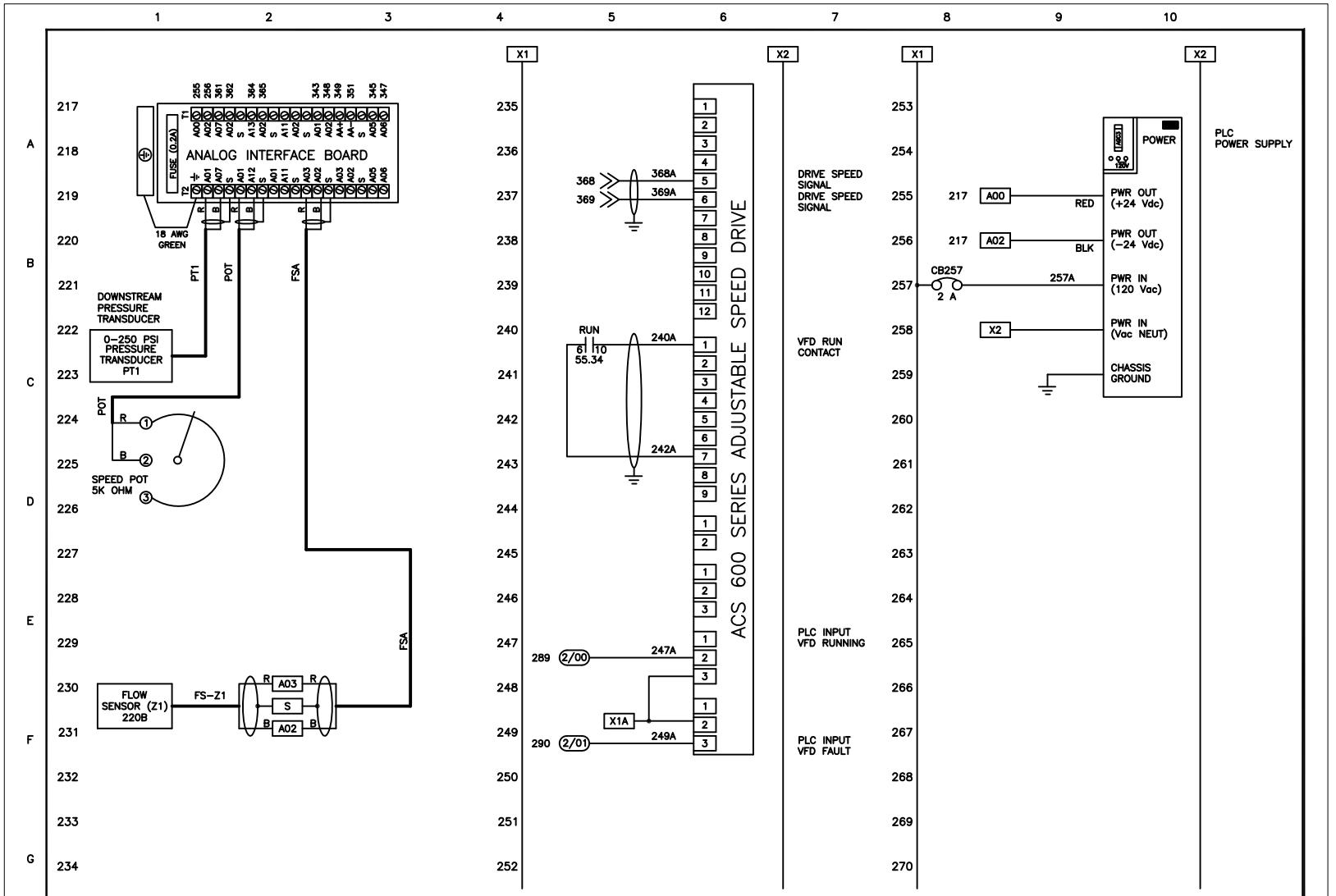
FLOWTRONEX PSI
Pumping Systems.
10661 NEWKIRK RD., DALLAS, TEXAS 75220-2303, USA 1-800-527-0539

TITLE:
120 Vac
MOTOR CONTROLS

JOB NAME:
Tam Golf Course

JOB NUMBER:
10970



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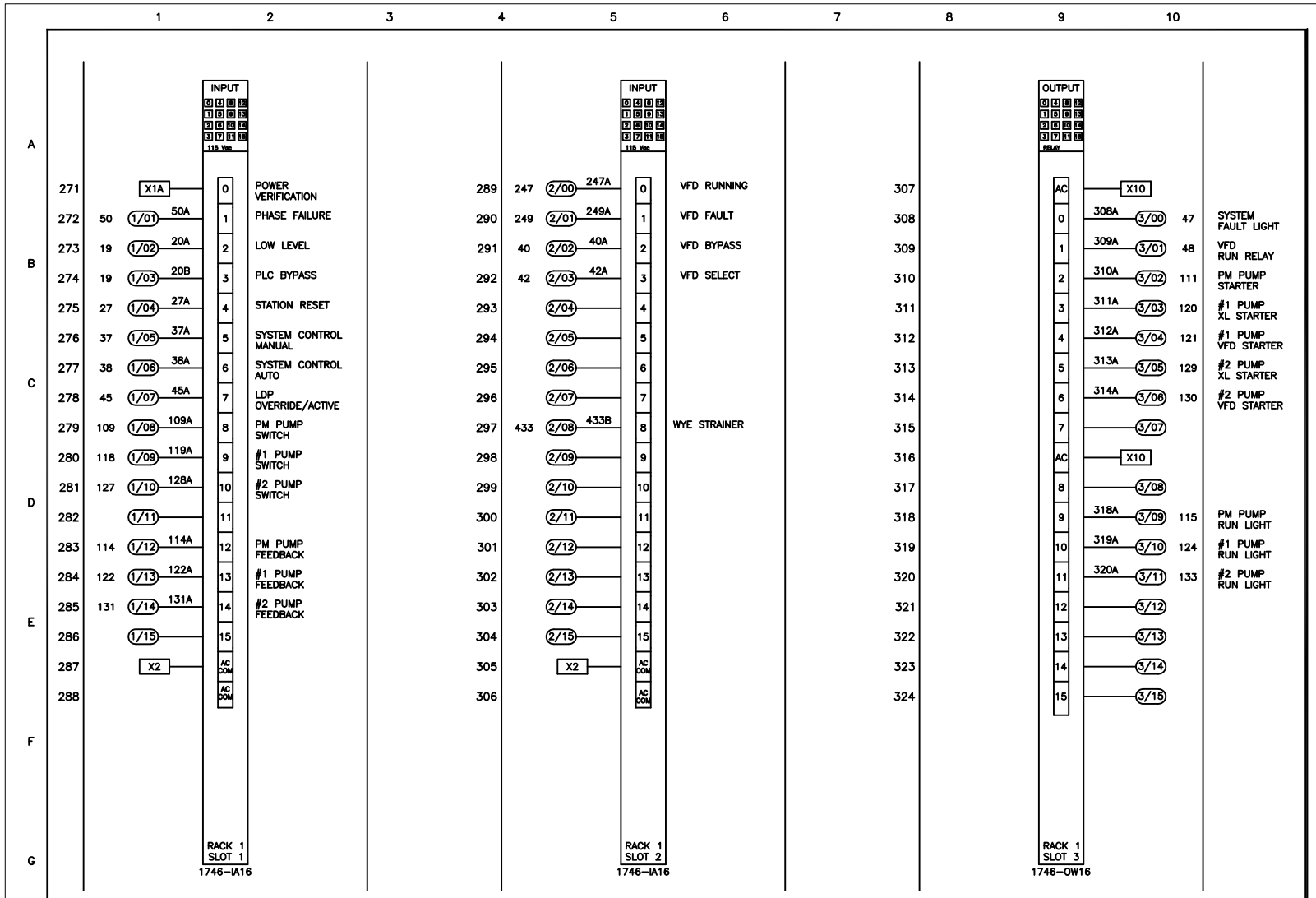

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FLOWTRONEX PSI Pumping Systems.
10661 NEWKIRK RD., DALLAS, TEXAS 75220-2303, USA 1-800-527-0539

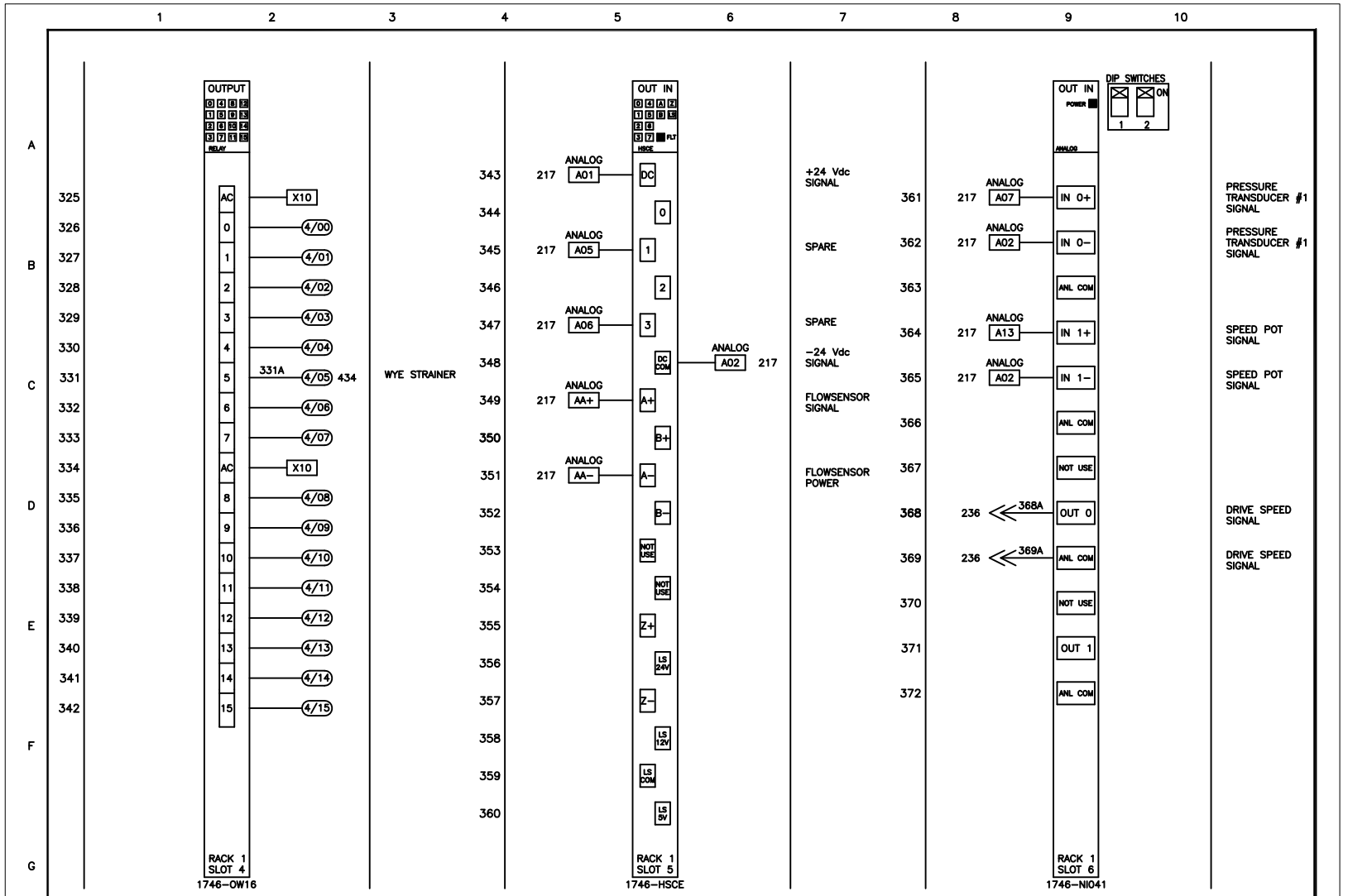
TITLE:

120 Vac
PLC I/O

JOB NAME:

Tam Golf Course

JOB NUMBER: 10970



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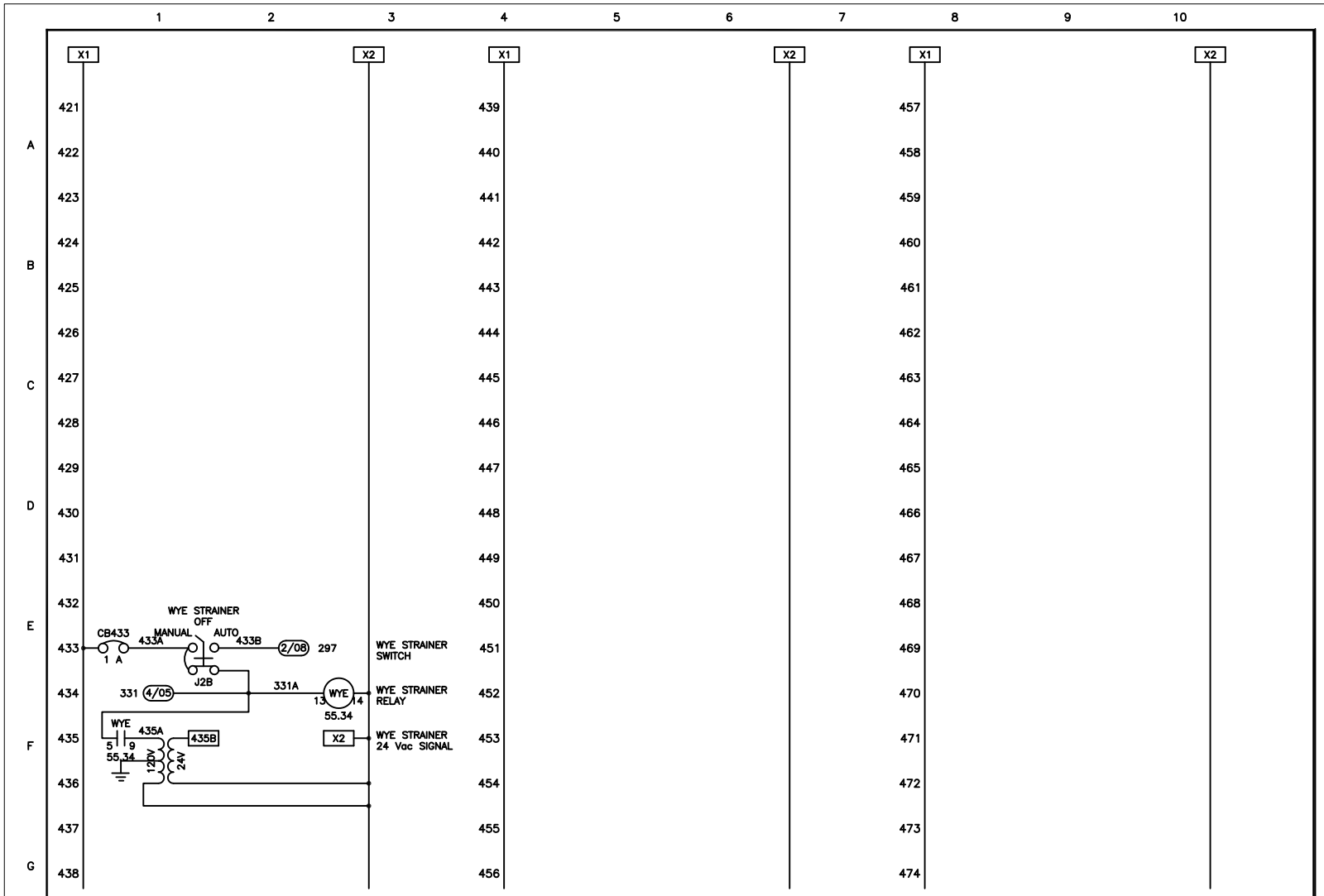

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RECORD DRAWINGS
FROM
FACILITY DEEPENING RELATED TO DAM REMOVAL

To be added by Contractor after completion of as built drawings.

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