



**MILWAUKEE COUNTY
DEPARTMENT OF ADMINISTRATIVE SERVICES
A&E AND ENVIRONMENTAL SERVICES**

**RAWSON AVENUE LIFT STATION
PROJECT #: V025-13807**

EQUIPMENT - SUBMERSIBLE STORMWATER PUMPS AND CONTROLS

**BID NUMBER
133008**

OPENING DATE: 9/09/13

**BID REQUEST
MILWAUKEE COUNTY DEPARTMENT OF ADMINISTRATIVE SERVICES, A&E AND ENVIRONMENTAL
SERVICES**

Contact / Contract Administrator:
Sean Hayes, sean.hayes@milwcnty.com, 414-278-4891
2711 West Wells Street, Room 211, Milwaukee, Wisconsin 53208

Posting Date:
August 30th, 2013

Bids Due:
Monday, September 9th, 2013 @ 2:00PM LOCAL TIME
Milwaukee County Clerk
Room 105-Courthouse
901 North 9th Street
Milwaukee, WI 53233

MILWAUKEE COUNTY DEPARTMENT OF ADMINISTRATIVE SERVICES
A&E AND ENVIRONMENTAL SERVICES

2711 West Wells Street, Room 211, Milwaukee, Wisconsin 53208

Bid Number 133008 - Posting Date: 8/30/13 - Submission Date: 9/09/2013 – Contract Administrator: Sean Hayes 414-278-4891

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COMMODITY:

EQUIPMENT - SUBMERSIBLE STORMWATER PUMPS AND CONTROLS

TIME AND PLACE:

Bidders shall submit sealed bids for furnishing the following to the office of the Milwaukee County Clerk, Room 105 Courthouse, 901 N. 9th Street, Milwaukee, WI 53233 before 2:00 P.M. on 9/09/2013.

Milwaukee County will open bids at 2:00 P.M.

We agree to furnish the above according to your specifications, at prices hereon and according to conditions on this form.

Delivery shall be made not later than indicated on the Pricing Proposal Submittal Form of the accepted bid item(s). (FOB Destination) (Freight Included)

BIDS NOT MANUALLY SIGNED SHALL NOT BE ACCEPTED

Please print the following:

Firm Name _____

Address _____

City & State _____ Zip _____

Phone No. _____

Fax No. _____

Name/Title _____

Signature _____ Date _____

Email _____

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SPECIAL INSTRUCTIONS:

EQUIPMENT - SUBMERSIBLE STORMWATER PUMPS AND CONTROLS

"NO PREVIOUS BID"

FURNISH THE FOLLOWING TO MILWAUKEE COUNTY - SEE ATTACHED SPECIFICATIONS AND REFERENCE PLANS

VENDOR MUST SUPPLY ONE (1) COMPLETE BID PACKET,
INCLUDING DESCRIPTIVE LITERATURE AND COMPLETED SPECS OR BID MAY BE REJECTED.

QUESTIONS RELATED TO THIS SHOULD BE DIRECTED TO SEAN HAYES, SEAN.HAYES@MILWCNTY.COM,
414-278-4891 NO LATER THAN SEPTEMBER 4TH, 2013. RESPONSES WILL BE POSTED AS AN ADDENDUM
IF REQUIRED.

BID NOTES:

Milwaukee County will award the agreement to the lowest qualified, responsive, responsible bidder as defined in chapter 32.20 of the Milwaukee County ordinances.

Cooperative Purchase

Would you be willing to extend the pricing from any contract that may result from this bid to other V.A.L.U.E. members of local government entities in the southeastern Wisconsin area?

Yes _____ No _____

Please be advised that the award of this bid by Milwaukee County is NOT contingent upon your agreement to the above request. If, however, you agree to extend to any other agencies, each agency will be responsible for issuing and administering its own contract and resulting purchase order.

Insurance Requirements

Indemnity

Except for acts done or taken at the direction of or pursuant to county policy or procedures, the contractor agrees to the fullest extent permitted by law to indemnify, defend and hold harmless, the county, and its agents officers and employees, from all loss or expense including costs and attorney's fees by reason of statutory benefits under workers compensation laws, and/or liability for damages including suits at law or in equity, caused by any wrongful, intentional, or negligent act or omission of the contractor, or it's (their) agents which may arise out of or are connected with the activities covered by this agreement.

Insurance

Contractor agrees to provide evidence and maintain proof of financial responsibility to cover costs as may arise from claims of tort and/or vicarious liability arising from employees. Such evidence shall include insurance coverage for workers compensation claims as required by the state of Wisconsin, including employers liability, and business insurance covering general liability and automobile coverage in the following minimum amounts:

Workers Compensation (WI) or statutory proof of all states coverage

Employers liability \$100,000/\$500,000/\$100,000

Comprehensive General Liability

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Bodily injury and property damage \$1,000,000 per occurrence
(incl. personal injury, fire, legal & contractual & products/\$1,000,000 general aggregate completed operations)

Automobile Liability

All autos and/or non-owned

Bodily injury & property damage \$1,000,000 per accident

County shall be named as additional insured, as its interests may appear, and be afforded a thirty (30) day written notice of cancellation or non-renewal. A certificate indicating the above coverages shall be submitted for review and approval by county for the duration of this agreement. Coverages shall be placed with an insurance company approved by the state of Wisconsin and rated "A" per Best's key rating guide. Additional information as to policy form, retroactive date, discovery provisions and applicable retentions, shall be submitted to county, if requested, to obtain approval of insurance requirements. Any deviations, including use of purchasing groups, risk retention groups, etc., or requests for waiver from the above requirements shall be submitted in writing to the county for approval prior to the commencement of activities under this agreement.

Certificate of Insurance is to be sent to the Milwaukee County Procurement Division, 901 N. 9th Street, Milwaukee, WI 53233

Code of Ethics

No person(s) with a personal financial interest in the approval or denial of a contract being considered by a county department or with an agency funded and regulated by a county department, may make a campaign contribution to any county official who has approval authority over that contract during its consideration. Contract consideration shall begin when a contract is submitted directly to a county department or to an agency until the contract has reached final disposition, including adoption, county executive action, proceedings on veto (if necessary) or departmental approval. This provision does not apply to those items covered by section 9.15 unless an acceptance by an elected official would conflict with this section.

Non-Collusion Statement

By signing on this document, vendor/contractor certifies that bid has been made without any connection with any other vendor/contractor and is in all respects fair and without collusion or fraud, and it is made with the understanding that no elected officer or any employee of Milwaukee County is interested therein, directly or indirectly unless otherwise stated.

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GENERAL DIRECTIONS FOR BIDDING

1. How to Bid

All Bids shall be submitted on the official forms included within this document and identified with the firm name and manually signed. Unsigned bids shall not be considered. If these forms do not provide sufficient space, bidders shall attach a sheet supplying the additional information. This sheet shall also be signed as required above to properly identify attachments.

2. How to Amend a Bid Before Due Date and Time

After a bid has been filed at the *Milwaukee County Clerk* and the bidder desires to amend this bid, he may do so before the due date and time by filing an amendment fully identified with the original bid submitted by number, commodity and opening date. All of the conditions and provisions of the Invitation to Bid shall be in effect. *This must be submitted before the date and time for receipt of bid as set forth in the Invitation to Bid. No bids or amendments shall be accepted after the bid opening date and time specified.*

TERMS AND CONDITIONS OF BID

1. Award

The *Purchasing Administrator* reserves the right to award a separate contract for each item unless otherwise specified in the bid; any group of items, or all items; or to reject any or all bids or any portion of any or all bids when, in the opinion of the *Purchasing Administrator*, the best interest of the County will be served thereby.

2. Tie bids

If there are tie bids, award shall be made in accordance with tie bid provisions as outlined in Chapter 32 of the Milwaukee County General Ordinances.

3. Changes in specifications not permitted

Do not change any of the terms of the specifications. Such changes shall constitute a counter offer. Any bids received with such changes shall be rejected.

4. Execution of contract

Successful bidder agrees to enter into contract with Milwaukee County and, when required, to furnish a performance bond of surety company authorized to do business within the State of Wisconsin in the amount specified on the Invitation to Bid, and to complete the affixing thereon of the necessary signatures of contractor and surety and return to the *Procurement Division* within fifteen working days of written request to do so.

5. Delays in delivery

Delays in delivery caused by bona fide strikes, government priority or requisition, riots, fires, sabotage acts of God or any other delay deemed by the Purchasing Administrator to clearly and unequivocally beyond the contractor's control, shall be recognized by the County. The vendor may be relieved of meeting delivery time specified, if vendor files with *Purchasing Administrator* a request for extension of time, signed by a responsible official, giving in detail all the essential circumstances which, upon verification by the Purchasing administrator, Justifies such extension.

6. Patents

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This order is given upon the condition that Milwaukee County is protected by the vendor against all liability, loss or expenses by reasons of any patent or trademark litigation now existing or hereafter instituted, arising out of any alleged infringement of patent or trademark on merchandise hereby ordered, or any part thereof.

7. **Non-Discrimination**

The contractor, lessee, purchaser, etc., agrees not to discriminate against any employee or applicant for employment because of race, religion, color, national origin, age, sex, or handicap, which shall include, but not limited to: recruitment or recruitment advertising; employment; upgrading; demotion or transfer; lay-off or termination; rates of pay or other forms of compensation; selection for training, including apprenticeship. A violation of this provision shall be sufficient cause for the County to terminate the contract, lease, order, etc. pursuant to County Ordinance 56.17 – Non Discriminatory Contracts.

8. **Delivery terms**

Bids shall include delivery costs to the specified delivery point, all transportation charges prepaid and borne by you. Suppliers shall deliver equipment per the DATE DELIVERED on the Pricing Proposal Submission Form of the accepted bid alternatives. This DATE DELIVERED assumes a notice to proceed no later than 9/13/2013. If the notice to proceed is issued later than this date, the DATE DELIVERED is changed accordingly, one day for each day delayed.

9. **Liquidated Damages**

Contractor and Contractor's surety, if any, shall be liable for and pay Owner Six Hundred dollars (\$600) per calendar day or hourly portion thereof, not as penalty, but as liquidated damages, for each calendar day of delay of delivery of EQUIPMENT after the date established for DATE DELIVERED of the accepted BID ALTERNATIVE(S), or extension granted by Owner. This amount is agreed upon because of impracticality and difficulty of ascertaining actual damages to Owner with respect to inconvenience to public, added cost of engineering and supervision and other items such as rent, interest, services, and user benefits.

B. Each day shall be defined as a 24-hour period beginning at 12:01 A.M.

10. **Taxes**

Milwaukee County is exempt from Federal Excise **Tax** and Wisconsin State Sales **Tax**. Bids should be submitted without such **taxes**.

11. **Code of Ethics**

Milwaukee County Code of Ethics states in part, “**No** person may offer to give to any County Officer or employee or his/her immediate family, and no County Officer, or employee or his/her immediate family may solicit or receive anything of value pursuant to an understanding that such officer's or employees' vote, official action or judgment would be influenced thereby.”

12. **New and Unused**

Bids not meeting the minimum requirements specified shall be rejected. All merchandise shall be new and unused unless specified in the specifications.

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13. Funding

If funds are not appropriated for payment of this contract, Milwaukee County may terminate contract at the end of any fiscal year upon 30 days written notice without any early termination penalties, charges, fees or costs of any kind to Milwaukee County.

14. Retention of Records

Contractor agrees to retain all records related to this contract for a period of at least three years from final date of payment under this contract

15. Audit of Records

Contractor shall permit the authorized representatives of the County Auditor, after reasonable notice, the right to inspect and audit all data and records of contractor related to carrying out the contract for a period of up to three years after completion of the contract. If subcontractors and/or associates are utilized, prime contractor shall have a written contractual agreement with County approved subcontractors and/or associates which bind the subcontractor to the same audit contract terms and conditions as the prime contractor.

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SECTION 32.20

(14) Computation of time limits expressed in hours or days shall exclude Saturdays, Sundays, and legal holidays.

32.26 PROTEST AND APPEAL PROCEDURE.

Protests and appeals related to this bid are subject to the provisions of the Milwaukee County Code of General Ordinances, Chapter 32.26,

(Available at http://www.municode.com/Library/WI/Milwaukee_County).

Should bidder discover any significant ambiguity, error, omission or other deficiency in bid process or bid document, they must immediately notify the Contact Administrator in writing, via email, prior to the submission of the bid. The failure of a bidder to notify the Contact Administrator of any such matter prior to submission of its bid constitutes a waiver of appeal or administrative review rights based upon any such ambiguity, error, omission or other deficiency in the document. Milwaukee County reserves the right to waive minor irregularities in proposals. Minor irregularities are defined as those that have no adverse effect on the outcome of the selection process by giving a bidder an advantage or benefit not afforded by other bidder. Milwaukee County may waive any requirements that are not material.

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COVER SHEET FOR PRICING SUBMISSION FORM

In submitting and signing this proposal, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free trade or competition; that no attempt has been made to induce any other person or firm to submit or not to submit a proposal; that this proposal has been independently arrived at without collusion with any other vendor, competitor, or potential competitor; that this proposal has not knowingly been disclosed prior to the opening of the proposals to any other vendor or competitor; that the above statement is accurate under penalty of perjury.

In submitting and signing this proposal, we represent that we have thoroughly read and reviewed this bid and are submitting this response in good faith. We understand the requirements of the bid and have provided the required information listed within the bid.

The undersigned certifies and represents that all data, pricing, representations, and other information, of any sort or type, contained in this response, is true, complete, accurate, and correct. Further, the undersigned acknowledges that MC is, in part, relying on the information contained in this proposal in order to evaluate and compare the response to the bid for:

SUBMERSIBLE STORMWATER PUMPS AND CONTROLS

Vendor's Name

Title

Signature

Date

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VENDOR INFORMATION SHEET

This form must be completed and submitted with bid response. It is intended to provide Milwaukee County with information on the vendor's name, address, contact information and the specific persons who were responsible and have authority for preparation of the vendor's response. Each vendor must also designate a specific contact person who will be responsible and has authority for responding to Milwaukee County if any clarification of the vendor's response should become necessary.

Vendor Name:

Vendor Address:

Phone Number:

FAX:

E-mail:

DUNS Number: _____ (if available)

Vendor Response Prepared By:

Signature:

Submitting Proposer:

Sheet 1/2

Pricing Proposal Submission Form

Base Bid		
Description	Date Delivered	Total Amount
One stormwater lift station pump and associated controls meeting all specifications. Quantity: One (1) Manufacture:	December 19th, 2013	
Model:		
Enclosure of descriptive literature required.		

Base Bid: Total Amount (Written in Words):

Alternative Bid A		
Description	Date Delivered	Total Amount
One additional stormwater lift station pump and associated controls meeting all specifications. Quantity: One (1) Manufacture:	December 19th, 2013	
Model:		
Enclosure of descriptive literature required.		

Alternative Bid A: Total Amount (Written in Words):

Submitting Proposer:

Sheet 2/2

Pricing Proposal Submission Form

Alternative Bid B		
Description	Date Delivered	Total Amount
This item modifies the BASE BID with an earlier DATE DELIVERED. Note the additional cost associated with an earlier DATE DELIVERED of the BASE BID item. Quantity: One (1) Manufacture: Model: Enclosure of descriptive literature required.	December 2nd, 2013	

Alternative Bid B: Total Amount (Written in Words):

Alternative Bid C		
Description	Date Delivered	Total Amount
This item modifies the ALTERNATIVE A with an earlier DATE DELIVERED. Note the additional cost associated with an earlier DATE DELIVERED of the ALTERNATIVE A item. Quantity: One (1) Manufacture: Model: Enclosure of descriptive literature required.	December 2nd, 2013	

Alternative Bid C: Total Amount (Written in Words):

The *Purchasing Administrator* reserves the right to award the **BASE BID** and or any combination of the **BASE BID** and **ALTERNATIVES**; or to reject any or all bids or any portion of any or all bids when, in the opinion of the *Purchasing Administrator*, the best interest of the County will be served thereby.

Possible Bid Selection Alternative Summary		
Selected Bid	Total Number of Pumps	Date Delivered
Base Bid	1	12/19/2013
Base + A	2	12/19/2013
Base + B	1	12/2/2013
Base + A + B + C	2	12/2/2013

SECTION 01340
SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

- A. Section specifies procedural requirements for Work-related (non-administrative) submittals including Shop Drawings, substitutions, product data, samples, test data, operations and maintenance data, and other miscellaneous Work-related submittals.
- B. Administrative Submittals: Procedures concerning items such as listing of manufacturers, Suppliers, Subcontractors, Construction Progress Schedule, schedule of Shop Drawing submissions, bonds, payment applications, insurance certificates, and schedule of values are specified elsewhere.
- C. Work-Related Submittals:
 - 1. Substitutes and "Or Equal" Items:
 - a. Includes material or equipment described in Paragraph 6.05 of General Conditions which CONTRACTOR requests ENGINEER to accept, after Effective Date of the Agreement.
 - 2. Shop Drawings:
 - a. Includes technical data and drawings specially prepared for this Project, including fabrication and installation drawings, diagrams, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form.
 - b. Standard catalog type information prepared without specific reference to Project is not considered as Shop Drawing.
 - 3. Product Data:
 - a. Includes standard catalog type printed information on manufactured materials, equipment and systems that has not been specially prepared for this Project, including manufacturer's product specifications, catalog cuts, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.
 - 4. Samples:
 - a. Includes fabricated and manufactured physical examples of materials, products, and units of work, includes complete units, partial cuts of manufactured or fabricated work, swatches showing color, texture, and pattern, and units of work to be used for independent inspection and testing.
 - b. Mock-ups are special forms of samples too large or otherwise inconvenient for handling in manner specified for transmittal of sample submittals.
 - 5. Test Results:
 - a. Includes source and field quality inspection and test reports, actual performance curves, and certifications of results prepared specifically for equipment, material, and systems provided for this Project.
 - b. Standard catalog charts or standard test results are considered Product Data.
 - 6. Operations and Maintenance Data:

- a. Includes information and directions for operating and maintaining equipment provided and installed for this Project. May be standard for equipment or prepared specifically for this Project.

7. Miscellaneous Submittals:

- a. Work-related submittals that do not fit in previous categories, includes schedules, photographs, guarantees, warranties, certifications, maintenance agreements, workmanship bonds, survey data and reports, physical work records, copies of industry standards, field measurement data, extra materials, keys, and similar information, devices, and materials applicable to Work.

1.02 SUBMITTAL PROCEDURES

A. Scheduling:

1. For pump and controls, submit schedule with bid for shop drawings. Project is being fast-tracked. ENGINEER will place priority on prompt review of shop drawing for pump and controls.
2. In addition, times scheduled shall indicate completion of submittal approval process for substitutions, Shop Drawings, product data, and samples for Project not later than 5 days after effective date of Agreement. Completion of submittal process for above submittals will have been achieved when submittals have been returned to CONTRACTOR with submittal action of either "Approved" or "Approved as Noted." For planning purposes, ENGINEER has set goal of 5 days for review of simple/single discipline submittals, and 10 days for review of complex/multiple discipline submittals after submittals are received in ENGINEER's office. Each resubmittal shall have same review times.
3. Adjust submittal schedule to reflect revisions to Construction Progress Schedule.

B. Coordination:

1. Coordinate preparation and processing of submittals with performance of Work. Coordinate each submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities requiring sequential activity.
2. Coordinate submission of different units of interrelated Work so one submittal not be delayed by ENGINEER'S need to review related submittal. ENGINEER may withhold action on submittal requiring coordination with other submittals until related submittals are provided.
3. Prepare and transmit each submittal sufficiently in advance of scheduled performance of related Work and other applicable activities.

C. Submittal Preparation:

1. Stamp and sign each submittal certifying to review of submittal, verification of material, and equipment, field measurement, field construction criteria, and coordination of information within submittal with Contract Documents.
2. Transmittal Form: Identify following:
 - a. Date of submittal and dates of previous submittals.
 - b. Project title and number.
 - c. Submittal number.
 - d. Contract identification.
 - e. Names of:
 - 1) CONTRACTOR.
 - 2) Supplier.
 - 3) Manufacturer.
 - f. If submittal is for substitute item of material or equipment, identify as "substitute" on transmittal and include "Contractor's Application for Consideration of Substitute" with submittal

- g. Identification of equipment and material with equipment identification numbers, motor numbers, and Specification section number.
- h. Variations from Contract Documents.

D. Resubmittal Preparation:

- 1. Comply with requirements described in Submittal Preparation above, and in addition:
 - a. Identify on transmittal form submittal is resubmission.
 - b. Make corrections or changes in submittals required by ENGINEER'S notations on returned submittal.
 - c. Respond to ENGINEER'S notations:
 - 1) On transmittal or separate page attached to CONTRACTOR'S resubmission transmittal, answer or acknowledge in writing notations or questions indicated by ENGINEER on ENGINEER'S transmittal form returning reviewed submission to CONTRACTOR.
 - 2) Identify each response by question or notation number established by ENGINEER.
 - 3) If CONTRACTOR does not respond to each notation or question, resubmission will be returned without action by ENGINEER until CONTRACTOR provides written response to ENGINEER'S notations or questions.
 - d. CONTRACTOR-initiated revisions or variations.
 - 1) On transmittal form, identify variations or revisions from previously reviewed submittal, other than those called for by ENGINEER.
 - 2) ENGINEER'S responsibility for variations or revisions is established in Article 6.17 of General Conditions.

1.03 SPECIFIC SUBMITTAL REQUIREMENTS

A. General:

- 1. Specific submittal requirements for individual units of Work are specified in applicable Specification section. Except as otherwise indicated in Specification sections, comply with requirements specified below for each indicated type of submittal.
- 2. If ENGINEER has responded to Written Clarification/Interpretation/Request submitted by CONTRACTOR, CONTRACTOR shall include ENGINEER'S response with applicable submittal.

B. Requests for Substitute Items:

- 1. Collect data for items to be submitted for review as substitute items into one submittal for each item of material or equipment in accordance with Paragraph 6.05 of General Conditions.
- 2. Include completed "Contractor's Application for Consideration of Substitution" form as required by Supplementary Conditions.
- 3. Submit with other scheduled submittals for material or equipment allowing time for ENGINEER to evaluate additional information required to be submitted.
- 4. If CONTRACTOR requests to substitute for material or equipment specified, but not identified in Specification as requiring submittals, CONTRACTOR shall indicate substitution submittal in Submittal Schedule.

C. Shop Drawings:

- 1. Submit newly prepared information, with graphic information at accurate scale and name of preparer indicated (firm name). Show dimensions and note which are based on field measurement, identify materials and equipment included in Work, and revisions on resubmittals. Indicate compliance with standards and notation of coordination requirements with other Work. Encircle, bubble or otherwise

indicate selections of products or materials and/or variations from Contract Documents or previous submittals. Highlighting may be used in addition to circling or bubbling of appropriate materials or variations from Contract Documents or previous submittals to direct the attention of the reviewer, but may not be utilized exclusively due to the difficulty in continuity of selections through copying and/or scanning of the submittal. Other acceptable means of selection of materials, products or variations from Contract Documents or previous submittals include striking out selections not included as part of the submittal, providing an arrow pointing directly to the selection or other means that remain after copying and/or scanning.

2. If Drawings prepared by ENGINEER are used in preparation of Shop Drawings, remove ENGINEER's identification.
3. Provide 8 in. by 3 in. blank space for CONTRACTOR and ENGINEER stamps.
4. Submittals:
 - a. Submit 1 reverse sepia reproducible and 1 blue line or black line print for drawings larger than 11 in. by 17 in., reproducible will be returned.
 - b. Submit 2 blue line or black line prints for other drawings.

D. Product Data:

1. Preparation:
 - a. Collect required data into single submittal for each unit of Work or system. Where product data includes information on several similar materials or equipment, some of which are not required for use on Project or not included in submittal, mark copies to show which items are not applicable to Project.
 - b. Where product data must be specially prepared for equipment, materials or systems, because standard printed data is not suitable for use, submit data as Shop Drawing and not as product data.
2. Submittals:
 - a. Submit 6 copies.
 - b. Submittal is final when ENGINEER returns submittal marked "Approved," or "Approved as Noted".
3. Distribution:
 - a. Maintain one set of product data (for each submittal) at Project site, available for reference by ENGINEER and others.

E. Samples:

1. Preparation:
 - a. Provide samples physically identical with proposed materials or equipment to be incorporated into Work. Where variations in color, pattern or texture are inherent in material or product represented by sample, submit multiple units (not less than 3) showing approximate limits of variations.
 - b. Provide full set of option samples where selection by ENGINEER is required.
 - c. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.
 - d. Submit samples for ENGINEER's visual review of general generic kind, color, pattern, texture, and for final check of coordination of these characteristics with other related elements of Work.
 - e. Mock-ups and similar samples specified in Specification sections are recognized as special type of samples. Comply with samples submittal requirements to greatest extent possible.
2. Submittals:

- a. At CONTRACTOR's option, and depending upon nature of anticipated response from ENGINEER, initial submittal of samples may be preliminary or final submittal.
 - b. Preliminary submittal, of single set of samples, required where Specification's indicate ENGINEER's selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary. Preliminary submittals will be reviewed and returned with ENGINEER's "Action" noted.
 - c. Final Submittals: Submit 3 sets of samples in final submittal, 1 set will be returned.
 - 3. Distribution:
 - a. Maintain returned set of samples at Project site, in suitable condition and available for quality control comparisons throughout course of performing Work.
- F. Test Results:
- 1. Preparation:
 - a. Identify each test by Specification section and type of test.
 - 2. Submittals:
 - a. Submit 3 copies.
 - b. Submittal is to confirm that results of tests verify materials, products, and systems comply with Contract Documents and are not for approval.
 - 3. Distribution:
 - a. Unless otherwise required in Specifications, test results shall be submitted to ENGINEER's field office or if ENGINEER has no field office to ENGINEER's office.
- G. Miscellaneous:
- 1. Guarantees, Warranties, Maintenance Agreements, and Workmanship Bonds:
 - a. Refer to Specification sections for requirements. Submittal is considered final when submittal returned by ENGINEER, marked "Approved" or "Approved as Noted."
 - b. In addition to copies desired for CONTRACTOR's use, furnish 2 executed copies. Provide 2 additional copies where required for maintenance data.
 - 2. Certifications:
 - a. Refer to Specification sections for requirement on submittal of certifications. Submit 6 copies. Certifications are submitted for review of conformance with specified requirements and information.
- H. Operating and Maintenance (O&M) Data:
- 1. Organize operations and maintenance information into suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb-tabbed). Include emergency instructions, safety precautions, spare parts listing, copies of warranties, wiring diagrams, recommended "turn-around" cycles, inspection procedures, Shop Drawings, Product Data, and similar applicable information.
 - a. Manufacturer's printed instructions regarding safety precautions for both (a) protection of personnel operating equipment and systems and (b) prevention of damage to equipment and systems.
 - b. Shop Drawings and other submittals included in O&M data shall be corrected to include, in same format and style as original submittal, review comments.
 - c. Data may be submitted on CD Rom if approved by ENGINEER.

2. Binders: Commercial quality D-Ring binder with durable and cleanable plastic covers. Paperboard and laminated paperboard covers are not acceptable.
 - a. Do not fill binders to more than 75% of capacity.
 - b. When multiple binders are used for an item of equipment, organize contents into related groupings. Each binder cover shall bear identification of specific contents.
3. Cover Label: Label each binder cover and spine with typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and following:
 - a. Project title.
 - b. Name(s) of applicable building(s) or structure(s) as shown on Drawings in which equipment located.
 - c. Name of equipment as set forth in Contract Documents.
 - d. Specification section number for equipment as set forth in Contract Documents.
4. Submit after equipment requiring O&M data has been returned "Approved" or "Approved as Noted".
5. Submit 6 copies of each manual.

I. General Distribution:

1. Unless required elsewhere, provide distribution of submittals to Subcontractors, suppliers, governing authorities, and others as necessary for proper performance of Work.
2. Provide copies of submittals bearing ENGINEER'S action stamp to:
 - a. Job site file.
 - b. Record documents file.

1.04 ACTION ON SUBMITTALS

A. ENGINEER's Action:

1. General:
 - a. Except for submittals for record and similar purposes, where action and return on submittals is required or requested, ENGINEER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, ENGINEER will so advise CONTRACTOR without delay.
 - b. ENGINEER will stamp each submittal with uniform, self-explanatory action stamp, appropriately marked with submittal action.
2. Notification of Insufficient Information:
 - a. If information submitted is not sufficient to complete review of submittal, ENGINEER will send transmittal to CONTRACTOR notifying CONTRACTOR that additional information is required.
 - b. Submittal will be placed in an "on hold" status and not returned until CONTRACTOR provides additional information.
3. Unsolicited Submittals: ENGINEER will return unsolicited submittals to CONTRACTOR without reviewing.

B. Action Stamp:

1. Marking: Approved.

- a. Final Unrestricted Release: When submittals are marked as "Approved," Work covered by submittal may proceed provided it complies with Contract Documents. Acceptance of Work depends on that compliance.
2. Marking: Approved As Noted.
 - a. Final-But-Restricted Release: When submittals are marked as "Approved With Noted Exceptions," Work covered by submittal may proceed provided it complies with ENGINEER'S notations or corrections on submittal and with Contract Documents. Acceptance of Work depends on that compliance. Resubmittal not required.
3. Marking: Not Approved.
 - a. Submittal Not Accepted: When submittals are marked as "Not Approved," do not proceed with Work covered by submittal. Work covered by submittal does not comply with Contract Documents.
 - b. Prepare new submittal for different material or equipment supplier or different product line or material of same supplier complying with Contract Documents.
4. Marking: Revise and Resubmit.
 - a. Returned for Resubmittal: When submittals are marked as "Revise and Resubmit," do not proceed with Work covered by submittal. Do not permit Work covered by submittals to be used at Project site or elsewhere where Work is in progress.
 - b. Revise submittal or prepare new submittal in accordance with ENGINEER'S notations in accordance with resubmittal requirements of this section. Resubmit without delay. Repeat if required to obtain different action marking.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

*** END OF SECTION ***

SECTION 11312
SUBMERSIBLE NONCLOG PUMPS
(WET INSTALLATION)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Submersible nonclog pump(s).
2. Pump removal mechanism(s).
3. Control Equipment.

1.02 SYSTEM DESCRIPTION

A. Design and Performance Requirements:

1. Pumping equipment shall comply with Schedule 1 to Section 11312.
2. Equipment shall be suitable for pumping raw unscreened municipal storm water and for service specified in attached Schedule(s).
3. Equipment shall be suitable for continuous operation at maximum fluid temperature of 104°F at all operating speeds specified and without external cooling fluid.
4. Adequately size motor hp so each pump is non-overloading throughout entire pump performance curve.
5. Design motor for up to 15 evenly spaced starts per hr for motors less than 125 hp and up to 10 evenly spaced starts per hr for motors 125 hp and larger.
6. Equipment shall be free from shock, vibration, cavitation, overheating, and noise while operating at specified conditions.
7. Equipment shall be capable of continuous operation without damage while operating under load and unsubmerged.
8. Design equipment for continuous submergence under water without loss of watertight integrity to depth of 65 ft.
9. Design equipment for removal and reinstallation of pumps without need to enter wet well and without removal of fasteners.
10. Design pump removal guide mechanism and permanently mounted discharge connection elbow so no part of pump bears on wet well structure.
11. Connection of pump to permanently mounted discharge elbow shall not leak.
12. Design equipment so parts readily accessible for inspection and repair, easily duplicated and replaced, and suitable for service specified
13. Entire pumping unit, including pump, motor and power cable assembly, shall be suitable for installation in Class I, Division 2, Group D hazardous classified location as approved by Factory Mutual.

1.03 SUBMITTALS

A. General:

1. Submit Product Data and Shop Drawings in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Shop Drawings:

1. Installation drawings and specifically prepared technical data for each pump application.
2. Specially prepared wiring diagrams unless standard wiring diagrams are submitted with product data.
3. Control equipment. Submit in accordance with Section 13400.

C. Product Data:

1. Catalog cuts and product specifications for each product specified.
2. Pump Performance Curves and Data:
 - a. Show head, capacity, hp demand, and pump efficiency curves from shut-off to maximum capacity of pump.
 - b. Show head, capacity, hp demand, and pump efficiency for points specified in Schedule(s) attached.
 - c. Show NPSH required on performance curves.
3. Proposed coating system.
4. Standard wiring diagrams unless wiring diagrams are specially prepared and submitted as Shop Drawings.
5. Catalog cuts and product specifications for control equipment. Submit in accordance with Section 13400.

D. Submit above in accordance with Section 01340.

E. Operation and Maintenance (O&M) Data:

1. Submit in accordance with Section 01340.

1.04 QUALITY ASSURANCE

- A. System responsibility: To ensure proper operating system(s), pump manufacturer shall provide all products specified in this Section including pump(s), pump removal mechanism(s), and control equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flygt.
- B. Or equal.

2.02 MATERIALS

A. Suitable for application specified:

1. Pump Case: Cast iron, ASTM A48, minimum Class 35B.
2. Motor Housing: Cast iron, ASTM A48, minimum Class 35B.
3. Impeller: Cast iron, ASTM A48, minimum Class 35B.
4. Intermediate Housing: Cast iron, ASTM A48, minimum Class 35B.
5. Discharge Base Elbow: Cast iron, ASTM A48, minimum Class 35B.
6. Pump/motor Shaft: Stainless steel.
7. O-Rings: Nitrile or viton.
8. Fasteners: Stainless steel, ASTM A276, Type 316Ti.
9. Lower Seal Faces: Tungsten carbide vs. tungsten carbide or silicon carbide vs. silicon carbide.
10. Upper Seal Faces: Tungsten or silicon carbide vs. carbon (rotating seal ring) or tungsten carbide vs. tungsten carbide, or silicon carbide vs. silicon carbide.
11. Guide Rails and Brackets: Stainless steel, ASTM A276, Type 316.
12. Lifting Chain: Hot-dipped galvanized steel.
13. Oil for all uses: Ecologically safe, paraffin based.
14. Power/control Cable: chloroprene rubber or neoprene.
15. Anchor Bolts: Stainless steel, ASTM A276, Type 316.

2.03 PUMP FABRICATION

A. General:

1. Provide metal-to-metal contact between machined surfaces.
2. Machine and fit mating surfaces with O-rings where watertight sealing is required. Provide sealing by compression of O-rings without specific torque limits.
3. Do not use rectangular cross sectioned gaskets, elliptical O-rings, grease, or secondary sealing compounds.

B. Impeller:

1. Non-clog type, capable of passing minimum spherical solid size specified.
2. Balance statically and dynamically.

C. Wear rings:

1. Provide case wear ring on all pumps. Plate shall have outward spiraling groove.

D. Shaft:

1. Provide common pump/motor shaft. Pump shaft shall be extension of motor shaft. Pump shaft and motor shaft with connection coupling is not acceptable.

E. Shaft seals:

1. Provide 2 totally independent mechanical shaft seals, installed in tandem, each with its own independent spring system.
2. Provide one stationary and 1 positively driven rotating seal ring for each seal.
3. Easily inspected and replaced.
4. Shall not require maintenance or adjustment.
5. Shall not depend on direction of rotation for sealing.
6. Shall not rely on pumped media for sealing.
7. At minimum, install upper seal in oil-filled chamber. Provide drain and inspection plug with positive anti-leak seal easily accessible external to pump.

F. Bearings:

1. Provide upper and lower bearings.
2. Single or double row to provide minimum B-10 life of 40,000 hrs at axial and radial loadings while operating at specified operating conditions.
3. Sealed/shielded-non-regreasable or open regreasable type. Provide re-lubrication ports with positive anti-leak plugs external to pump for open regreasable bearings.
4. Provide lower bearing temperature sensor. Sensor shall be Resistance Temperature Detector (RTD) type. Wire sensor for connection to control panel.

G. Motor:

1. Manufactures standard UL listed or labeled definite purpose motor.
2. 480 v, 3 ph, 60 Hz.
2. Environment: Class I, Div 2, Group D.
3. Horsepower: As specified in Schedule 1 to Section 11312.
4. Housed in air-filled, watertight casing.
5. Moisture resistant, minimum Class H insulation rated for 180°C.
6. Embed 3 thermal switches in windings, 1 per phase, to provide high temperature shutdown protection. Wire switches in series for connection to control panel.

7. Provide one PT-100 type temperature sensor in stator winding.
8. Provide leakage sensor to detect fluid in stator chamber and provide signal for motor shutdown. Wire sensor for connection to control panel.
9. Provide leakage sensor to detect fluid in junction chamber and provide for motor shutdown.
10. Pump memory module shall be provided and installed in junction chamber to record pump run times, number of starts, and unit data.

H. Cooling system: Provide motor cooling to comply with design and performance requirements and as follows:

1. Provide motor with sufficient surface area for ambient only cooling, or
2. Provide cooling jacket encircling stator housing.
 - a. Provide impeller back vanes to circulate liquid through cooling jacket.
 - b. Size cooling jacket ports and channels to be non-clogging.

I. Power/control cable:

1. Size in conformance with National Electric Code (NEC) standards.
2. Provide sufficient length, and supports, to connect to junction box as shown on Drawings without splicing.
3. Provide watertight cable entry seal to comply with design and performance requirements.
4. One power cable and one pilot cable shall be provided.
5. Provide two separate 50-ft lengths of same pilot cable provided with pumps.

2.04 PUMP REMOVAL SYSTEM

- A. Provide guide rail or guide cable system, discharge base elbow, and lifting chain for pump removal. Provide anchor bolts and accessories for complete system. System shall comply with design and performance requirements and as specified.
- B. Guide rail system: Provide 1 or 2 guide rails, upper and intermediate guide brackets for connecting rail(s) to structure, and slide bracket for connecting pump to guide rail(s).
- C. Discharge base elbow:
 1. Provide for automatic, leak-tight connection to pump discharge.
 2. ANSI B16.1 Class 125 flange for connection to piping.
 3. Provide for connection of guide rails or guide cables.
- D. Lifting chain:
 1. Minimum length: Station depth.
 2. Provide shackles and hardware to connect chain to pump at bottom of well and to structure at top of well.
- E. Anchor bolts: Comply with pump manufacturer's requirements.
- F. Pump manufacturer shall verify size of access hatch for pump removal with CONTRACTOR.

2.05 CONTROL EQUIPMENT

- A. Provide control equipment for storm water pumps, including storm water pump control panel, LCP-1, as specified in Section 13400.
- B. Pump supplier shall provide monitoring and status system (MAS) for each pump.

1. All of pump/motor unit protective and monitoring sensors shall be connected to MAS (Monitoring and Status) module. Each pump/motor unit shall be equipped with MAS unit. MAS shall be two-piece product including base module and operator panel.
2. Operator panel shall include soft-touch type navigation keypad, alarm acknowledgement keypad, amber warning lamp, red alarm lamp, and LCD digital display. Digital display shall provide local readout of pump/motor sensor and alarm status and aid in navigation through system during set-up.
3. Base module shall contain processor unit having minimum of 2 Mb of memory for logging of measurements and alarm events, two communications ports, and sufficient terminals for pump/motor unit sensor connection.
4. MAS shall be installed in storm water pump control panel (LCP-1).

2.06 COATING

- A. Manufacture is responsible for surface preparation, priming and finish coating of ferrous metal components in plant prior to shipment. Exposed metal surfaces of equipment and accessories, except stainless steel, shall be painted with manufacturer's standard finish for service conditions listed in Schedule 1.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturers written instructions and approved submittals.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:

1. Supplier's or manufacturer's representative for equipment specified herein shall be present at job site or classroom designated by OWNER for minimum mandays indicated, travel time excluded, for assistance during plant construction, plant startup, and training of OWNER'S personnel for plant operation. Include minimum of:
 - a. 2 mandays for Installation Services
 - b. 1 manday for Instructional Services
 - c. 1 manday for Post-Startup Services
2. Supplier of manufacturer shall direct services to specific system and equipment operation, maintenance, and troubleshooting.

**SCHEDULE 1 TO SECTION 11312
SUBMERSIBLE NONCLOG PUMPS
(WET INSTALLATION)**

Name of Pump(s)	Storm Water Pumps
Tag Number(s)	P-1; P-2
Number of Pumps	2
Fluid Pumped	Storm Water
Fluid pH	6.0 – 9.0
Minimum Spherical Solids Size (in.)	3
Flygt Model Number	NP 3356/605 870
Discharge Size (in.)	14
Motor Horsepower	70
Constant or Adjustable Speed	Constant
<i>Performance Requirement at Rated Speed</i>	
Rated Speed (rpm)	880
<i>Design Operating Point</i>	
Capacity (gpm)	5,200
Head (ft)	37
Minimum Efficiency (%)	80
<i>Maximum Operating Point</i>	
Capacity (gpm)	6,000
Head (ft)	31
<i>Minimum Operating Point</i>	
Capacity (gpm)	4,500
Head (ft)	42
<i>Pump Shutoff Head (ft)</i>	67
<i>Pump Runout Condition</i>	
Capacity (gpm)	7,000
Head (ft)	22
<i>Maximum NPSHR (ft)</i>	25

* * * END OF SECTION * * *

SECTION 13400
PACKAGE SYSTEM I&C PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Instrumentation and control (I&C) panels and remote devices included as part of process package systems specified in other sections.
2. Electrical wiring for components included as part of process package systems specified in other sections.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Provide Run-Fail, alarm, and equipment status functions in conformance with Section 13440.
2. Unless otherwise specified, run signals shall be derived from motor starter normally open auxiliary contacts.
3. Electrical wiring and controls shall conform to Division 16.

1.03 SUBMITTALS

- A. Submit with process equipment systems specified in other sections. Submit each panel in booklet form.
- B. Submit in accordance with Section 01340.

1.04 RESPONSIBILITY AND COORDINATION

- A. Drawings and Specifications are intended to provide overall system functions. Provide equipment necessary to provide complete and operable system whether specifically identified or not.
- B. Inspect and test at factory prior to shipment.
- C. Assume responsibility for additional costs resulting from deviations from Specifications.

1.05 MAINTENANCE

A. Extra Materials:

1. Packaging:
 - a. Obtain spare parts from equipment manufacturer. Do not provide third-party equivalent replacements.
 - b. Package spare parts for protection against dirt, moisture, and static discharge. Label each package as to its contents with description and part number.
 - c. Size packages for convenient storage and handling. Packages should weigh no more than 30 lbs each and be no larger than 30 in. long by 18 in. deep by 18 in. wide, unless individual components exceed these dimensions.
 - d. Do not place spare parts for different equipment items in same package.

2. Parts:
 - a. Pump protection module. Provide spare module for each type used on Project for following:
3. Extra materials identified in Section 13442 for equipment in this section.

PART 2 PRODUCTS

2.01 INSTRUMENTATION AND CONTROL (I&C) EQUIPMENT

- A. Equipment provided in this section shall conform to following:
1. General Provisions for Instrumentation and Controls: Section 13440.
 2. Instrument and Control Panel Construction: Section 13442.
 3. Electronic Panel Instruments: Section 13452.
 4. Panel and Field Devices: Section 13453.
 5. Data Communication Cable: Section 16921.
 6. Uninterruptable Power Supply: Section 13476.

2.02 STORM WATER LIFT STATION PUMP CONTROL PANEL - LCP

- A. General:
1. Provide panel with equipment specified in Section 11312.
- B. Panel:
1. NEMA 12.
 2. Wall Mount.
 3. 120 vac power supply.
- C. Front of Panel Mounted Controls:

Tag No.	Function	Interface
YL-1,-2	Run light	Aux. contact from motor starter
YA-1,-2	Fail light	Pump protection module
ETM-1,-2	Elapsed time meter	Aux. contact from motor starter
TAH-1,-2	High Temperature Fail light	Pump protection module
HS-1,2	HOA switch	
HS-3,4	Reset button	
LAHHH-1	High wet well level	LSHHH
LALLL-1	Low wet well level	LSLLL
UC-1	Duplex pump controller – ITT/Flygt APP 721 Monitoring/Ethernet interface for cell modem	Pump protection modules, floats, Soft starts

D. Rear Panel Mounted Devices:

Tag No.	Description	Interface
LY-1,2	Alarm relays for pump sequence control	
QX-1	Duplex Pump alternator relay with 1-2, 2-1, alternate functions	
UX-1,2	Pump protection module ITT/Flygt MAS 711	Pump monitoring signals from pump.
UPS	UPS for pump protection module power	
HS-5	Pump sequence selector switch	1-2, 2-1, alternate-set at alternate
KC-1,2	Time delay start timers (on power failure) 0-60 seconds	

E. Field Mount Controls:

1. Six wet well mounted level float switches, LSHHH - set 704.0 ft, LSHH - set 702.5 ft, LSH - set 700.5 ft, LSL - set 698.5 ft, LSL - set 696.5 ft, LSLLL - set 695.0 ft.
2. Radio signal transmitter (by others) activated by LSHHH. Will deactivate when LSHHH is not active.

F. Functional Description:

1. With HOA switch of respective pump in HAND pump is requested to run. Pump protection module is enabled and floats are bypassed.
2. With HOA switch of respective pump in OFF pump is off.
3. With HOA switch of respective pump in AUTO:
 - a. Pump start will alternate in lead - lag control scheme based upon last pump turning off when alternator is set to alternate. If Pump 1 was last to turn off, next pump to run will be Pump 2. If alternator is set to 1-2 or 2-1 lead pump selected will always start first. Default setting is alternate.
 - b. Pumps shall be started or stopped based upon wet well levels per following sequence:

	Start	Stop
Lead Pump	LSH	LSLL
Lag Pump	LSHH	LSL

- c. Each pump is provided with time-delay-start timers to prevent simultaneous multiple pump restart after power outage (KC-1,-2).
- d. Activation of temperature switches in respective pump shall activate alarm light TAH-1/-2 cutout respective pump, and require manual reset.
- e. Enable pump protection module data to be read from pump protection modules via pump controller connected to Verizon cell modem.
- f. Controls shall be designed such that after power outage, no manual reset shall be required to restore control system after power is restored.

2.04 SOURCE QUALITY CONTROL

- A. Perform U.L. inspection and certification for each completely assembled panel prior to shipment to job site.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with process package system equipment manufacturer's written instructions and approved submittals.

3.02 FIELD QUALITY CONTROL

- A. Provide U.L. inspection and certification for each panel after installation and wiring is complete and prior to acceptance by OWNER.

- B. Manufacturer's Field Services:

- 1. Provide services as specified in process package systems

* * * END OF SECTION * * *

SECTION 13440
GENERAL PROVISIONS FOR INSTRUMENTATION AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. General requirements for package and non-package Instrumentation and Control Systems unless otherwise specified in other sections.

1.02 DEFINITIONS

- A. Selector Switch: When used under panel component description refers to maintained contact type switches. Loss and return of control power to circuit does not change control mode of requirements in switch position.
- B. Push-button: When used under panel component description refers to momentary contact type switches which, unless specified otherwise, shall require electrical interlock. Loss of control power shall, unless specified otherwise, result in loss of electrical interlock and stoppage of previous mode of operations.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements:
1. Provide run/fail, alarm, and equipment status functions.
 2. Unless otherwise specified, "run" signals shall be derived from motor starter normally open auxiliary contacts.
 3. Unless otherwise specified, discrete input and output signals shall conform to:
 - a. Isolated unpowered (dry) contact closures.
 - b. Power contact from panel receiving signal or device receiving signal.
 4. Unless otherwise specified, input and output analog signals shall conform to:
 - a. 4-20 mA dc.
 - b. For 2-wire transmitter, provide isolated type and power with 24 or 48 vdc at panel or device receiving signal.
 - c. Where isolation is required to interface with particular equipment furnished, provide necessary I/I converters.
 5. For PLC based systems manual control devices, in panel or field, shall be independent from PLC to provide maintenance and redundancy function.
 6. Panels, panel devices, and field devices shall meet or exceed NEMA requirements as follows.
 - a. NEMA 4X: Wet locations or outdoors.
 - 1) Instrumentation and control panels shall be 316 stainless steel.
 - 2) Instruments and device enclosures shall be 316 stainless steel, fiberglass, or ABS plastic.
 - b. NEMA 7: Class I, Division 1 or 2 areas.
 - c. NEMA 12: Other areas.

7. Design Life: Design control system for min. 10 yr life at following temperatures:
 - a. Permit continuous operation with panel external ambient temperatures of up to +40°C (+104°F).
 - b. Outdoor Panels: Permit operation with panel external ambient temperatures of down to -29°C (-20°F).
 - c. Indoor Panels: Permit operation with panel external ambient temperatures of down to +8°C (+40°F).
8. When motor controller disconnecting means is off, deenergize associated equipment devices powered from panel.
9. Electrical wiring and controls shall conform to Division 16.

B. Identify equipment on panel or screens with indication below:

1. Green Light On: Equipment running.
2. Red Light On: Equipment failure when called to run, but not running due to power failure, overload, breaker, disconnect, or remote switch call for equipment to stop.
 - a. Provide parallel "required" contact wired to panel for items such as pumps and valves.
 - b. Provide necessary relay logic and adjustable timers to sense discrepancy between "required" and "running" and activate respective "Run" and "Fail" light from these signals. Provide horn when specified.
3. Amber Light On: Indicate equipment status such as valve open or closed.
4. White Light On: Equipment off.

1.04 SUBMITTALS

A. General:

1. Submit following information tabulated in booklet form for each piece of equipment or system furnished under this section.
2. Table of Contents of Submittals: Include for each booklet when more than 1 item of equipment is included in submittal:
 - a. ENGINEER'S instrument tag number.
 - b. Instrument manufacturer's model number.
 - c. Related piping, electrical, and dimension drawings.
3. Indicate full compliance with specifications or identify any deviations from specifications.

B. Product Data:

1. Construction materials.
2. Ranges.
3. Output/Input signals.
4. Accessories.
5. Mounting location.
6. ENGINEER'S tag number on manufacturer's specifications sheets.
7. Interconnect reference for associated field and panel instruments.
8. Component specification sheets.
9. Catalog cuts.
10. Standard instrumentation wiring diagrams.
11. Installation drawings.

C. Shop Drawings:

1. Panel fabrication and dimension drawings, nameplate legends, ENGINEER'S tag numbers, and wiring and piping schematic drawings. Project specific drawings are required for each panel, typical are not acceptable.
2. Equipment dimension drawings.
3. Equipment terminal and piping connections.
4. Loop-by-loop system electrical schematic showing terminal-to-terminal interconnections between related panel and field instruments.
5. Front of panel layout.
6. PLC I/O module connection diagram for PLC based systems.
7. Ladder/logic system electrical schematic showing wiring of each component, including ranges and set points. Wiring and ladder diagram shall have reference numbers on every line for cross referencing. Each device on ladder shall be cross-referenced with line number as to wherever it is located.
8. Terminal to terminal interconnection drawings showing wiring for panel to panel/MCC and panel to field equipment.

D. Miscellaneous:

1. Certificate of UL or nationally recognized testing laboratory (NRTL) inspection and approval for each completely assembled panel prior to shipment to Project.
2. Include ENGINEER'S tag number when available on each submittal document or page wherever specific component appears.
3. Extra materials list.
4. After panel is installed and UL inspected, submit panel acceptance report.

E. Operation and Maintenance (O&M) Data:

1. Include O&M data for each panel and field device specified in Division 13:
 - a. PLC ladder logic software (electronic and printed) including tags, comments, operational database values and passwords or pass codes.
 - b. Configured software on electronic media to install program on spare PLC processors and programmable controller.
 - c. Bill of materials.
 - d. Instruction Manual: Includes detailed operating sequence descriptions.
 - e. Maintenance Manual: Instructions for maintaining equipment to include calibrating, cleaning, and trouble shooting.
 - f. Front and rear panel layout drawings.
 - g. Name plate data.
2. Submit 1 package:
 - a. Equipment provided under Section 13400.

F. Submit in accordance with Section 01340.

1.05 QUALITY ASSURANCE

A. Standardization:

1. Drawings and Specifications are intended to provide overall system functions. Provide equipment necessary to provide complete and operable system.
2. CONTRACTOR is responsible for costs resulting from deviations from Contract Documents.

B. Items provided under sections referenced to this section shall be listed or labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

C. Regulatory Requirements:

1. National Electrical Code (NEC): Components and installation shall comply with National Fire Protection Association (NFPA) 70.

PART 2 PRODUCTS

2.01 EQUIPMENT MARKERS

- A. Furnish equipment markers with ENGINEER'S equipment name and tag number.

2.02 SOURCE QUALITY CONTROL

- A. Perform UL inspection and certification for each completely assembled panel before shipment to Project site.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in locations indicated on Drawings and in accordance with manufacturer's written instructions and approved submittals.

3.02 EQUIPMENT MARKERS

- A. Fasten to equipment to be visible.

* * * END OF SECTION * * *

SECTION 13442
INSTRUMENT AND CONTROL PANEL CONSTRUCTION

PART 1 GENERAL

1.01 SUMMARY

- A. Comply with Section 13440.

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Wiring and wiring identification.
 - 2. Terminal identification.
- B. Submit in accordance with Section 01340.

1.03 MAINTENANCE

- A. Extra Materials:
 - 1. 5 fuses or 10%, whichever is greater, for each type of fuse.
 - 2. 30% spare unwired terminals; to be shown on panel drawings.
 - 3. 5 lamps or 10%, whichever is greater, for each type of lamp.
 - 4. One intrinsically safe relay and intrinsically safe barrier for each type.
 - 5. One control relay for each type.
 - 6. One lightning and surge protection module for each type.
- B. Panel Space:
 - 1. Include 10 % contiguous usable rear of panel area for future components.

PART 2 PRODUCTS

2.01 CONTROL PANELS

- A. Factory-fabricate, install instruments, plumb, and wire.
- B. Make external connections by way of numbered terminal blocks.
- C. Separate electrical components from pneumatic components by metal barriers.
- D. Conform to ISA standards.
- E. Construct panels to external dimensions as specified, required, or shown. Component arrangement and wiring shall be consistent for like panels.
- F. Fabrication:
 - 1. Minimum Metal Thickness: 14 ga.
 - a. Construct panels so no seams or bolt heads visible when viewed from front.
 - b. Panel cutouts for instruments and other devices, such as lights and switches, shall be cut, punched, or drilled, and smoothly finished with rounded edges.

2. Wherever practical, enclosures shall be manufacturer's standard product.
3. Size to adequately dissipate heat generated by equipment mounted in or on panel.
4. Equip panels mounted outside buildings with thermostatically controlled space heaters capable of maintaining internal temperature of 10°C, ±2°C, with 20 mph wind at ambient temperature of -30°C. Heaters shall operate on 120 vac, 60 Hz power.
5. Install rear of panel devices on subpanel.

G. Doors:

1. Provide front doors except on graphic sections and where otherwise specified.
2. Full height, fully gasketed access doors.
3. Provide with 3-point padlock locking latches.
4. Provide full length, continuous, piano type stainless steel hinges and pins.

H. Service Outlets:

1. Provide 20 amp, 120 v service outlet circuit fused at 5 amps within back-of-panel area. Fuse separate from control power.

I. Temperature Control:

1. For NEMA 1 and 12 Applications:
 - a. Provide louvers or forced ventilation as required to limit internal temperature build-up. Internal panel temperature shall not exceed lowest or highest temperature rating of internal components.
 - b. Mount stamped sheet metal louvers on top and bottom in rear of panels.
 - c. For panels mounted with backs directly adjacent to wall, mount louvers on sides.
 - d. Provide separately fused forced ventilation fans, when required, with washable or replaceable filters. Fan motors shall operate on 120 v, 60 Hz power.
2. For NEMA 4 and 4X Applications:
 - a. Provide thermostatically controlled heat exchanger and circulation fans as required to limit internal temperature buildup within sealed enclosure. Internal panel temperature shall not exceed lowest or highest temperature rating of internal components.
 - b. Heat exchanger shall be of air to air heat pipe type:
 - 1) Manufacturer: Noren Products Inc.
 - 2) Components located outside of control center enclosure shall be suitable for outdoor installation.
 - 3) Fans shall be waterproof and installed in anodized aluminum enclosure.
 - c. Install heat exchanger so that NEMA rating of enclosure is not compromised.
 - d. For outdoor application sunshields may be used to limit internal panel temperature.

J. Fusing:

1. Maximum Fuse Size: 5 amp.
2. Group instruments/devices after separate fusing with maximum of 8 digital input signals/fuse.
3. Fuse power supplies individually.
4. Where 5 amp capacity is exceeded by load requirements, provide additional fuses.
5. For field devices powered by panel, provide separate fuse for each output.

K. Wiring Terminals:

1. Mount and wire panel instruments and components to terminal blocks within panel so installation shall require only setting panel in place and making connections to field wiring and utilities.
2. Provide separately mounted terminal blocks in panel for connection of field wiring to panel.
3. Label with respective loop number as designated on Panel Ladder Logic Drawings or Loop Diagrams.

L. Intrinsicly Safe Components:

1. Provide intrinsicly safe shunt barriers and relays as necessary when field components are located in Class I Division 1 or Division 2 hazardous class field locations.

M. Lightning and Surge Protection:

1. Provide on instrumentation and control signals whose source or destination is outside building.
2. Provide on phone lines and copper data network connections located outside building.
3. Provide on 120-vac power feeds.

N. Wiring Identification:

1. Label panel wiring at each end of conductor with wire number as designated on Panel Ladder Logic Drawings or Loop Diagrams.
2. Labels shall be heat shrinkable vinyl sleeve with permanent embossed letters. Emboss label characters on single sleeve. Heat shrink sleeves on conductors at terminal ends.
3. Conductors Color Codes:
 - a. 120 vac power wiring, line (phase "A"): Black.
 - b. 120 vac power wiring, neutral/common: White.
 - c. 120 vac power wiring, ground: Green.
 - d. 120 vac control wiring, internal power source: Red.
 - e. 120 vac control wiring, external power source: Yellow.
 - f. 24 vdc control wiring, internal or external power source: Light Blue.
 - g. 4-20 mA dc signal wiring, positive lead: White or Red.
 - h. 4-20 mA dc signal wiring, negative lead: Black.
 - i. Data highway cable, signal leads: Manufacturer's standard.

O. Panel Drawing Data Pocket:

1. Mount inside without penetrating panel.
2. Size for holding wiring diagrams.
3. Construct from thermal plastic or metal.
4. Include wiring diagrams.

P. Three-Phase and Motor Control Panel:

1. Through door main disconnect or circuit breaker.
2. Control transformer with primary and secondary fuses or circuit breakers.

2.02 ADDITIONAL REQUIREMENTS FOR FREE-STANDING PANEL CONSTRUCTION

A. Fabrication:

1. Fabricate each panel from sheet steel with 1 piece, 10 ga steel front and 12 ga steel sides, back, and top.
2. Provide steel angle stiffeners on back of panel face to prevent panel deflection under instrument loading or operation.
3. Provide internal structural steel framework for instrument support and panel bracing. Internal framework shall permit lifting of panel without racking or distortion.

4. Provide removable lifting rings designed to facilitate rigging and lifting of panel during installation. Provide plugs to fill lifting ring holes after installation to complete and lifting rings have been removed.
5. Where 2 or more sections of panel are mounted adjacent to one another, bolt together with front faces parallel.

B. Doors:

1. Rear access doors shall extend no further than 24 in. beyond panel when opened to 90° position.
2. For panels with no front doors or rear access, provide 36 in. deep panel with side access doors on each side.

C. Lights:

1. Provide separately fused and switched 100 watt incandescent or equivalent cold start fluorescent back-of-panel lights.
2. Provide one light for every 4 ft or less of panel width.
3. Mount inside and in top of back-of-panel area.

D. Service Outlets:

1. Space evenly along back of panel.
 - a. Panels 4 ft or less: 1 outlet.
 - b. Panels greater than 4 ft: 2 outlets.

E. Instrument Location:

1. Locate instruments designated for back of panel mounting to allow for maintenance and adjustment.
2. Front of panel instrument mounting height shall not exceed 6 ft 6 in., minimum height shall be 4 ft-0 in.

2.03 PANEL FINISH (PAINTED PANELS)

- A. Remove mill scale, rust, grease, and oil. Fill imperfections and sand smooth.
- B. Paint interior and exterior with one coat of epoxy metal primer and 2 finish coats of 2 component type epoxy enamel.
 1. Paint edges of cutouts before installation of instruments and devices.
- C. Dry film thickness shall not be less than 3.0 mils.
- D. Color: Manufacturer's standard gray for exterior and white for interior.

2.04 NAMEPLATES

- A. Provide nameplates for I&C panels and each front-of-panel instrument and device with designations as shown on Drawings and as listed in Specifications.
- B. Panel Designation: Engraved with ENGINEER'S panel tag number and description with 1/2 in. high characters.
- C. Application/Function Nameplate: Locate 3/16 in. characters above or near panel mounted instrument or device consisting of descriptive phrase using nomenclature as listed in Specifications (when available).
- D. Laminated white plastic inscribed with black characters.

- E. Tag Number: Include ENGINEER'S tag number as shown on P&ID's and in Specifications on each nameplate.
- F. Provide aluminum decal with black 3/16 in. characters identifying tag number or device designation. Locate decal on instrument or device or above instrument or device on panel.
- G. Secure front-of-panel and front-of-instrument nameplate with drive screws or self-tapping fasteners.

2.05 SOURCE QUALITY CONTROL

- A. Test wiring and plumbing prior to shipment.
 - 1. Test internal wiring and components to ensure panel is operational prior to shipment.
 - 2. When panels are interwired, interconnect panels at factory and test functionality of system.
 - 3. Simulate field component and instrument inputs at panel terminals. Test panel outputs with suitable test instruments.
 - 4. Pressure test internal piping system and components for leaks and repair before shipping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panels in locations indicated on Drawings and in accordance with manufacturer's written instructions and approved submittals.
- B. Paint: Touch up defects in panel finish after installation.

* * * END OF SECTION * * *

SECTION 13452
ELECTRONIC PANEL INSTRUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Comply with Section 13440.

PART 2 PRODUCTS

2.01 POWER SUPPLY

A. Manufacturers:

- 1. Sola Heavy Duty.
- 2. Phoenix Contact.
- 3. Or equal.

B. Features:

- 1. Solid state converting 120 vac, 60 Hz power into low voltage regulated dc usable for analog instrumentation.
- 2. Output: 24 vdc sized for load.
- 3. Voltage: 120 vac, $\pm 10\%$, 60 Hz, internally fused.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and wire in accordance with manufacturer's written instructions and approved submittals.

* * * END OF SECTION * * *

SECTION 13453
PANEL AND FIELD DEVICES

PART 1 GENERAL

1.01 SUMMARY

- A. Comply with Section 13440.

PART 2 PRODUCTS

2.01 PUSH-BUTTON/SELECTOR SWITCH CONTROL UNITS AND PILOT LIGHTS

A. Manufacturers:

1. Square D.
2. Cutler-Hammer.
3. Allen Bradley.
4. Or equal.

B. Construction:

1. Heavy duty.
2. Oil tight, watertight.
3. Base mounting.
4. Flush panel mounting.
5. Size to mount in 30.5 mm opening without adapter. Smaller units are not acceptable.

C. Pushbuttons:

1. Flush head unless specified elsewhere.
2. Contact Blocks:
 - a. Double break silver contacts.
 - b. ac Ratings: 7,200 va make, 720 va break.
 - c. Single pole, double throw or double pole, single throw.
 - d. Up to 6 tandem blocks.
3. Momentary contact unless specified elsewhere.
4. Non-illuminated.
5. Padlock attachments where required.
6. Legend plates as required for type of operation or as specified elsewhere.

D. Remote Lock-out:

1. Jumbo red mushroom head.
2. Contact Blocks:
 - a. Double break silver contacts.
 - b. ac Ratings: 7,200 va make, 720 va break.
 - c. Single pole, double throw or double pole, single throw.
 - d. Up to 2 tandem blocks.
3. Push/Pull.
4. Maintained contact.

5. Non-illuminated.
6. Padlock attachments constructed of metal. Plastic material is not acceptable.
7. Legend Plates:
 - a. Extra large.
 - b. Red.
 - c. Emergency.

E. Selector Switches:

1. Maintained position unless specified elsewhere.
2. Contact Blocks:
 - a. Double break silver contacts.
 - b. ac Ratings: 7,200 va make, 720 va break.
 - c. Single pole, double throw or double pole, single throw.
 - d. Up to 6 tandem blocks.
3. Operators:
 - a. Number of positions as specified elsewhere.
 - b. Standard knob type unless specified elsewhere.
4. Legend plates as required for type of operation or specified elsewhere.

F. Pilot Lights:

1. Transformer type.
2. LED bulb.
3. Colored lenses as specified elsewhere.
4. Interchangeable lenses.
5. Transformer rated for 120 v, 60 Hz.
6. Push to test.
7. Legend plates as required for type of operation or specified elsewhere.

G. Nameplates:

1. I&C Panel: Section 13442.
2. Control Stations:
 - a. Engraved laminated plastic.
 - b. Letters 3/16 in. high.
 - c. Black letters on white background.
 - d. Identify per equipment controlled.

2.02 GENERAL PURPOSE CONTROL RELAYS

A. Manufacturers:

1. Potter and Brumfield, KU Series.
2. Struthers Dunn.
3. Or equal.

B. Operating Data:

1. Pickup Time: 13 ms maximum.
2. Dropout Time: 10 ms maximum.
3. Operating Temperature: -45°C to 70°C.

C. ac Coil:

1. 120 or 240 vac.
2. Continuous rated.
3. 3.5 va inrush.
4. 1.2 va sealed.
5. 50 to 60 Hz.
6. Minimum Dropout Voltage: 10% of coil rated voltage.

D. dc Coil:

1. 24 or 120 vdc.
2. Continuous rated.
3. Minimum Coil Resistance:
 - a. 24 vdc: 450 ohm.
 - b. 100 vdc: 9,000 ohm.

E. Contacts:

1. Silver cadmium oxide.
2. Gold flashed fine silver, gold diffused for 1 amp or less resistive loads.
3. 4 Form C.
4. 120 vac.
5. 10 amp make, 15 amp break, (inductive).

F. Rated at 10 million operations.

G. Plug-in sockets.

H. Enclosed and protected by polycarbonate cover.

I. Provide relay retaining clips.

2.03 TERMINAL BLOCKS FOR CONTROL WIRING

A. Manufacturers:

1. Phoenix Contact, UK-5N.
2. Allen Bradley, Bulletin 1492.

B. General:

1. 600 v rating.
2. Marker labels on each terminal.
3. Clip-mount on DIN rails.
4. Insulating end caps to support each terminal block assembly.
5. Touchsafe terminal block and accessories.
6. Connection: Captive screw and pressure plate. Connection shall not cause deformation of wire.
7. Contact material and surface: Nickel or tin plated copper alloy. Do not use ferrous metals.

C. Switched Knife Disconnect (when specified):

1. Non-fused.
2. Single-pull, single throw (SPST).
3. Hinged disconnect lever.

D. Fused Indicating (when specified):

1. LED blown fuse indicating light.
2. Hinged disconnect lever.
3. Size fuse for load.
4. 15 amp capacity fuse holder.

2.04 TIMERS

A. 24-hr Clock Timer (Repeat Cycle):

1. Manufacturers:
 - a. Tork Time Controls, DG series.
 - b. Intermatic.
 - c. Or equal.
2. Mounting: Surface.
3. Display: 24-hr. LCD.
4. Contacts: 1 SPDT rated 20 A.
5. Set Points: 288 per 24 hrs.
6. Skip Feature: 1 to 7 day adjustable.
7. Minimum On-Off Time: 5 min.
8. Time cycle programmable by keypad.
9. Power: 120 vac, 60 Hz., lithium backup battery.

B. Elapsed Time Meters:

1. Manufacturers:
 - a. Engler.
 - b. Danaher (Eagle Signal).
 - c. Or equal.
2. Mounting flush panel.
3. Digits: 5, nonreset.
4. Power: 120 vac, 60 Hz.

C. Interval/Duration Timer (Rear of Panel):

1. Manufacturers:
 - a. Potter and Brumfield.
 - b. Danaher (Eagle Signal).
 - c. Or equal.
2. Mounting: Plug-in with dust-tight cover.
3. Type: Integrated circuit.
4. Timing Range: 0.5 sec to 99 min. Field selectable.
5. Contacts: DPDT contacts rated 10 amp.
6. Power: 120 vac, 60 Hz.

D. Interval/Duration Timer (Front of Panel):

1. Manufacturers:
 - a. Danaher (Eagle Signal), CX300 series.
 - b. Or equal.
2. Type: Microprocessor.
3. Timing Range: Five ranges from 200 sec to 200 hr field selectable.
4. Contacts: 10 amp, 120 vac.
5. Controls: Membrane switches for operator to select time.

E. On-Off Delay Timer (Rear of Panel):

1. Manufacturers:
 - a. Potter and Brumfield, CN1 series.
 - b. Danaher (Eagle Signal), DG 100 miniflex series.
 - c. Or equal.
2. Mounting: Plug-in with dust-tight cover.
3. Type: Integrated circuit.
4. Range: 0.1 sec to 9.990 hr. Field selectable
5. Contacts: DPDT contacts rated 10 amp.
6. Set Points: 288 per 24 hrs.
7. Power: 120 vac, 60 Hz.

2.05 FLOAT SWITCHES

A. Manufacturers:

1. Consolidated 9GEF.
2. Anchor Scientific GP.
3. Or equal.

B. Float: 316 stainless steel.

C. Provide sufficient length of nitrile PVC jacketed cable.

D. For Class I, Divisions 1 or 2, hazardous areas, provide intrinsically safe relays in corresponding control panel.

E. Mounting Hardware: 316 stainless steel.

F. Switch: Non-Mercury tilt type switch with minimum rating of 10 million cycles.

2.06 TAGGING

A. Provide Type 316 stainless steel tag on field-mounted units and permanently affix tag to unit.

B. Engrave with process application as listed in Specifications.

C. Include ENGINEER'S tag number as listed in Specifications and on P&ID's.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA "Standard of Installation," and recognized industry practices.
- B. Control Relays:
 - 1. Provide control relays for general purpose logic circuits.
 - 2. Provide motor starter control relays when load exceeds rating of general purpose control relays.

* * * END OF SECTION * * *

SECTION 13476
UNINTERRUPTIBLE POWER SUPPLY (UPS)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Local area network hardware.

1.02 SUBMITTALS

- A. In addition to submittal requirements of Section 16900, provide:
1. Load sizing data for equipment connected to UPS.
 2. Descriptive literature and catalog cut sheets.
 3. Installation details.

1.03 PROJECT/SITE CONDITIONS

- A. Input power: 120 vac utility grade power.

1.04 MAINTENANCE

- A. Extra Materials:
1. One complete UPS, of load rating greater than or equal to load rating of largest UPS.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Powerware, Ferrups series UPS.
- B. Or equal.

2.02 EQUIPMENT

- A. Isolation: Complete isolation from line, with less than 2 pF of effective coupling capacitance.
- B. Voltage Spike Suppression: Greater than 2,000:1. Meets or exceeds IEEE No. 587 requirements. UPS shall maintain specified output voltage when IEEE No. 587 voltage spike applied to input.
- C. Noise Rejection: Common mode greater than 120 dB; transverse mode greater than 60 dB.
- D. Voltage Regulation: $\pm 3\%$ from 10% load to full load, with nominal line input.
- E. Output Ratings:
1. Overload capability, when operating from line, with nominal ac input voltage applied, UPS shall support overload of 25% above full rating (i.e., 125% of rating) for 10 min. Surge capability shall be 150% for 10 sec.
 2. Overload capability, when operating from battery, with nominal dc input, from fully charged battery, UPS shall support overload of 110% for 10 min. Surge capability shall be 150% for 10 sec.

3. Continuous monitoring of output load via microprocessor protects UPS and load before excessive overheating or loss of output voltage regulation occurs.
 4. Power Rating: Various from 1 to 10 kVa as required by connected loads.
- F. Output Wave Shape: Computer-grade sine wave. Less than 5% total harmonic distortion at 50% load to full load.
- G. Output Frequency:
1. 60 Hz on-line with nominal power line grid stability of ± 0.005 Hz.
 2. 60 Hz, ± 0.003 Hz average, 0.05 Hz peak for no more than half cycle. Output frequency tracks input line frequency up to ± 0.5 Hz limits, or ± 3 Hz if wider limit selected for use with motor generator ac source. Inverter turns on if line frequency exceeds selected limit.
- H. UPS bypass selector switch.

PART 3 EXECUTION

3.01 PREPARATION

- A. Condition power as required to provide stable process control system operation.

3.02 INSTALLATION

- A. Enclose power conditioners not mounted in panel within NEMA 12 rated enclosure.

* * * END OF SECTION * * *

SECTION 16921
DATA COMMUNICATION CABLE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Cable for local area networks, Ethernet network and PLC network non-Ethernet.

1.02 SYSTEM DESCRIPTION

- A. Coordinate cable with Section 13400.

1.03 SUBMITTALS

- A. In accordance with Section 13440.

PART 2 PRODUCTS

2.01 ETHERNET NETWORK CONNECTORS

- A. Wire Termination Connectors: RJ45.

2.02 PLC NETWORK NON-ETHERNET CONNECTORS

- A. Wire Termination Connectors: Screw type terminals at equipment.

2.03 CABLE

- A. Industrial Ethernet:
 - 1. Third Party Verified TIA/EIA 568-B.2, Category 5E.
 - 2. ANSI/TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling.
 - 3. 4-pair conductors per network device.
 - 4. Ratings: CMR, CMX – Outdoor, Ethernet/IP Compliant
 - 5. Installation Temperature: -25C to +75C; Operating Temperature: -40C to +75C; Passes -25C cold bend per UL 1581
 - 6. Provide shielding as necessary when network equipment requires.
 - 7. Cable run between network devices shall not exceed 100 meters, including patch/jumper cables.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Ethernet Cable:
 - 1. Install per manufacturers guidelines.

B. Cable Marking:

1. Each copper Ethernet and cable shall be marked with heat shrinkable vinyl sleeves with permanent embossed letters with source and destination.

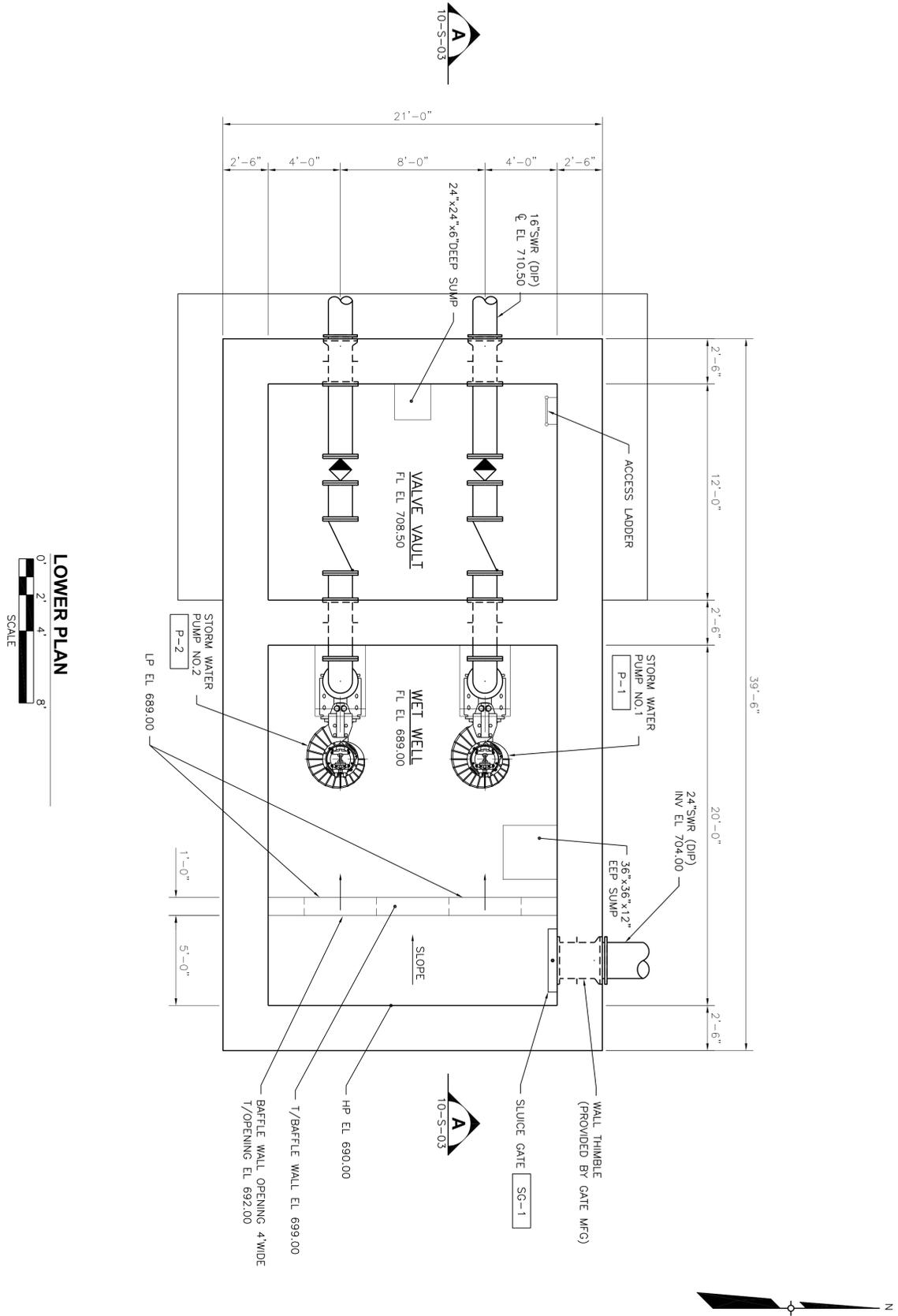
C. Install LAN components in accordance with manufacturer's written instructions and ANSI/TIA/EIA-568-B requirements.

3.02 LAN TESTING

A. Cable Testing:

1. Test copper cable end-to-end by time domain reflectometer after installation.
2. Record test results and provide to OWNER.

* * * END OF SECTION * * *



LOWER PLAN
 SCALE

DATE	SEPTEMBER 2013
PROJECT NO	6030448
FILENAME	10-S-01.dwg
SHEET NO	
DRAWING NO	10-S-01

**RAWSON AVENUE
 STORM WATER LIFT STATION
 MILWAUKEE COUNTY, WISCONSIN**

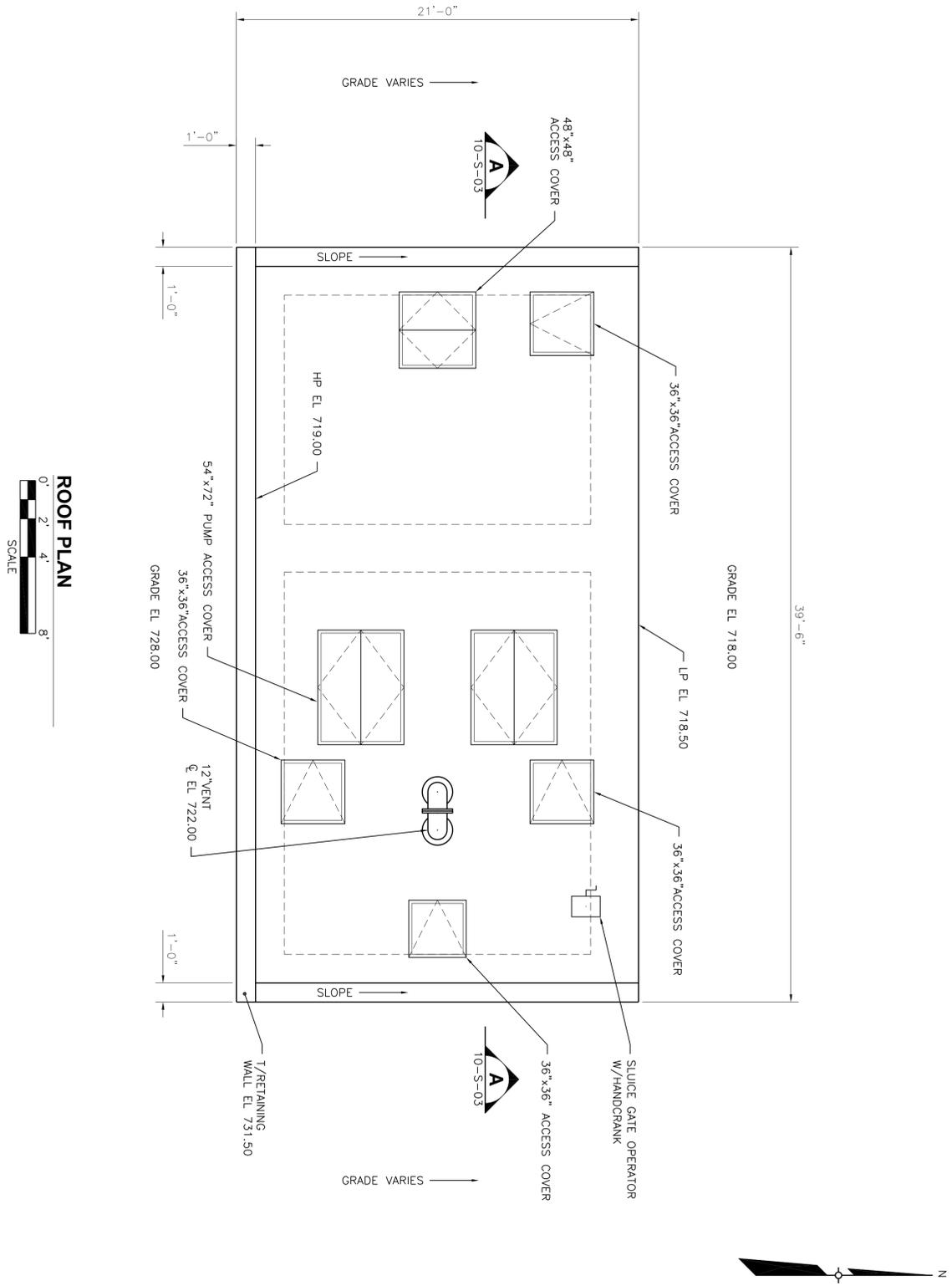
**STORM WATER LIFT STATION
 LOWER PLAN**

Prepared for: Milwaukee County Dept. of Administrative Services
 FACILITIES MANAGEMENT DIVISION
 Architectural, Engineering & Environmental Services
 CITY CAMPUS 2711 W. WELLS ST. 2ND FLOOR MILWAUKEE, WI 53208

Prepared by: **AECOM** **HC** Himalayan Consultants, LLC
 Engineers & Hydrogeologists

Sheboygan, Wisconsin	
DRN	BEH SEPT 2013
DES	EJB SEPT 2013
CHK	ARB SEPT 2013
APP	DEP SEPT 2013

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NO	REVISIONS	DRN CHK DATE



10-S-02
 DRAWING NO
 SHEET NO
 FILENAME 10-S-02.dwg
 PROJECT NO 6030448
 DATE SEPTEMBER 2013

**RAWSON AVENUE
 STORM WATER LIFT STATION
 MILWAUKEE COUNTY, WISCONSIN**

**STORM WATER LIFT STATION
 ROOF PLAN**

Prepared for: Milwaukee County Dept. of Administrative Services
 FACILITIES MANAGEMENT DIVISION
 Architectural, Engineering & Environmental Services
 CITY CAMPUS 2711 W. WELLS ST. 2ND FLOOR MILWAUKEE, WI 53208

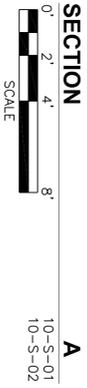
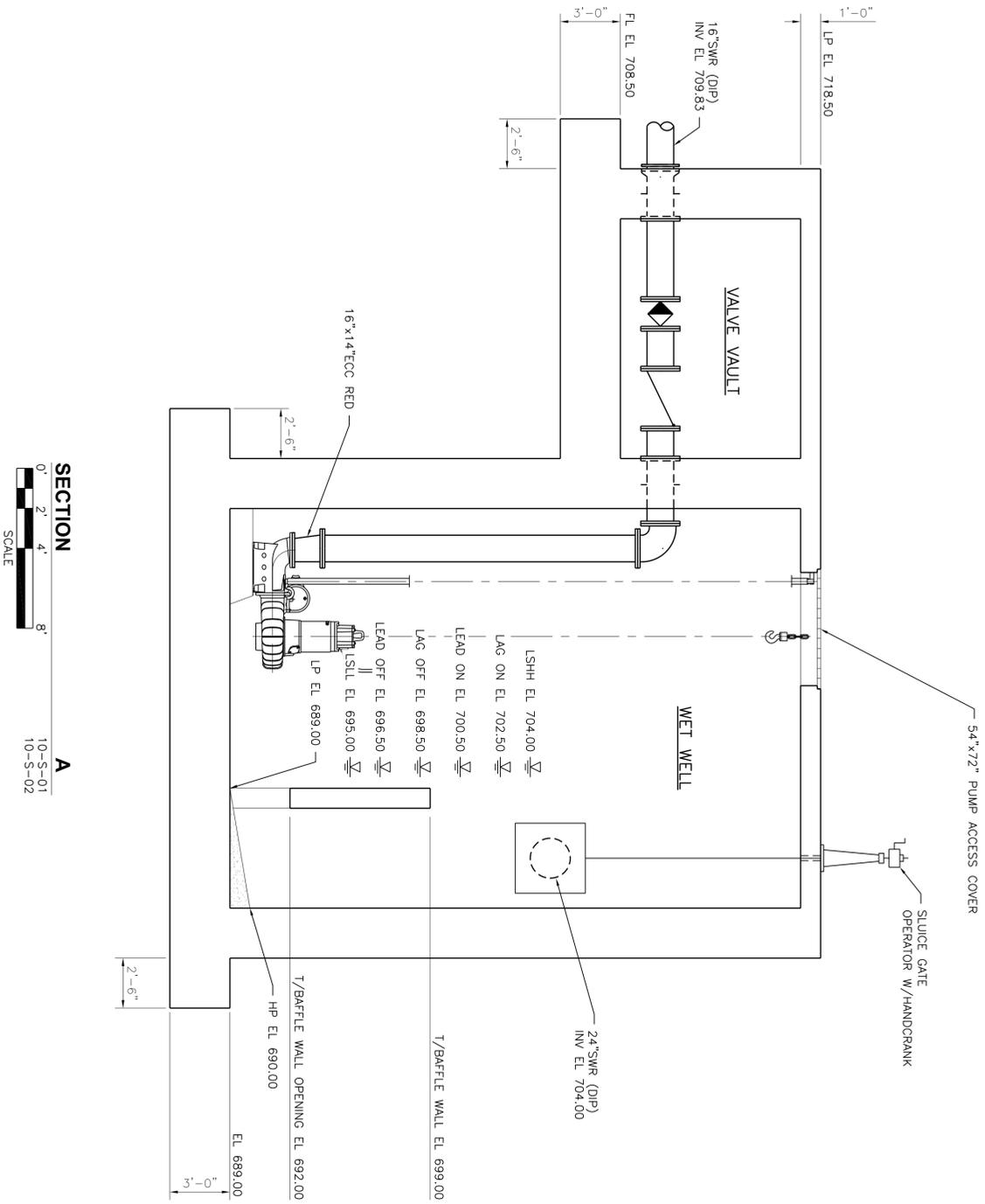
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**RAWSON AVENUE
 STORM WATER LIFT STATION
 MILWAUKEE COUNTY, WISCONSIN**

**STORM WATER LIFT STATION
 SECTION**

Prepared for: Milwaukee County Dept. of Administrative Services
 FACILITIES MANAGEMENT DIVISION
 Architectural, Engineering & Environmental Services
 CITY CAMPUS 2711 W. WELLS ST. 2ND FLOOR MILWAUKEE, WI 53208



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