Jones & Henry
ENGINEERS, LTD.

Turkey Creek Regional Sewer District
Raw Water Supply Well

ADDENDUM 1

October 16, 2026

Plan holders on the Turkey Creek Regional Sewer District, Raw Water Supply Well, are hereby notified of the following amendments to the contract documents. This Addendum is hereby made a part of the Contract Documents.

REFERENCE NOTE

- A Pre-bid meeting was conducted on October 8, 2026. The minutes to the meeting are attached for reference only, see attached.

SPECIFICATIONS

Table of Contents: Delete and replace with attached pages, add 16903 Control Panel
Replace Pages 1 through 2 with the attached Table of Contents.

Indiana 96-Bid for Work: This was missing
Add to Specifications

Section C-01010: Delete and replace with attached pages, Changes to bid item 17 added to site restoration.
Replace Pages 1 through 14 with the attached Section 01010.

Section C-02600: Add attached pages, this section was missing.
Replace Pages 1 through 6 with the attached Section 02600.

Section C-02990: Delete and replace with attached pages, overall changes
Replace Pages 1 through 6 with the attached Section 02990.

Section C-16230: Delete and replace with attached pages, VFD(s) shall be ABB ACQ580-01-047A-2
Replace Pages 1 through 4 with the attached Section 16230.

Section C-16903: Add this section with attached pages
Add Pages 1 through 7 with the attached Section 16903.

DRAWINGS

The drawing changes will be out next week.

RECEIPT OF THIS ADDENDUM MUST BE ACKNOWLEDGED ON PAGE B-1 OF THE BID.

Jones & Henry
ENGINEERS, LTD.

Fluid thinking®
1700 Magnavox Way, Suite 102, Fort Wayne, IN 46804
Phone: 260.482.1920 JHeng.com

Turkey Creek Regional Sewer District

Project: Raw Water Supply Well
Date: October 8, 2026 @ 10:30 am
Location: 4852 N 1200 W, Cromwell, IN 46732

1. **Sign-In,** please complete the sign-in information, **see attached**

2. **Opening:**
No changes can be made at this meeting. Only an addendum can make changes to the construction documents.

3. **Addendum (none at this time):** An addendum will be issued after this meeting.

4. **Communications & Correspondence**

a.	TCRSD	Tim Woodward
b.	Engineers	John Magsam, email at tcrsd-wm@jheng.com
c.	Inspector	J&H

5. **Bid Date:**
   a. Bid to be held for up to 90 days
   b. Form 96 required
   c. Bid includes base bid with one alternate bid item

6. **Bidding**
Bid Date: October 22, 2026 @ 10:00 am to be opened during a public meeting
Deliver Bids to: Turkey Creek Regional Sewer District Wastewater Treatment Plant; 4852 N 1200 W, Cromwell, IN 46732
   a. Include with your Bid:
      i. Bid Pages C-410-1 through C-410-7
      ii. Bid Security
      iii. Evidence to do business in Indiana.
      iv. Form 96
      v. ~~MBE/WBE~~ **OCRA is not requiring this for this contract**
   b. Bid Award determination will be based on Base Bid

   c. Apparent Successful Bidder will be required to complete:
      i. OCRA Requirements in Exhibit 2
         1. Certification of Non-Segregated Facilities & Non-Discrimination
         2. Payroll Reporting (weekly or monthly) for Contractor & all Subcontractors
            a. Wage/Fringe Benefit Certifications
         3. Attachment J, BABA Certification
         4. Bidder's List Form
   d. Davis Bacon Requirements, to be updated Friday before Bid Opening

7. Contract Time / Liquidated Damages (page A-1):

Approximate Start Date	December – Janaury
Substantial Completion	100 days from Notice to Proceed date
Final Completion	110 days from the Notice to Proceed date
Liquidate Damages	$1,000.00 per day

8. Description of the Work

To furnish and install a new raw well and 128 LF of 6-inch water main.

9. General & Supplementary Conditions, (Contractor to review in detail)

a. Insurance Requirements (see pages SC-5):

i. Separate Policy:

ii. Builders Risk

10. Payment:

a. Once a month, third Mondays **Engineer will need 10 days before the board meeting for review. OCRA will take around 30 days from board approval**

11. General:

a. Contractor to notify residents of parking restrictions

b. Pressure testing

12. Other Comments and Discussions

The District currently has a water main project going on at this time. They will be working at the site to replace water main to the plant. The District will assist with coordination for the work.

The District will add a control panel to the project.

Respectfully submitted,



JONES & HENRY ENGINEERS, LTD.

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Turkey Creek Regional Sewer District

Project: **Raw Water Supply Well**

Date: October 8, 2026 @ 10:30 am

Location: 4852 N 1200 W, Cromwell, IN 46732

Name	Representing	Phone Number	Email (optional)
Emily Debrey	TCRSD	260.856.4341	emily@tcrsd.ca
Jim Boone	TCRSD	765-860-4712	jb3540@gmail.com
John Magsam	J+H	260.482.1920	jmagsam@jheng.com
Grant Hole	J+H	765-721-3422	ghole@jheng.com
JEFF HERSHA	J+H	260.437.3907	jhersha@jheng.co
SHANNON McLEOD	BAKER TILLY	BY VIDEO	
Duncan Ortman		BY VIDEO	

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IF ANY OF THE PAGES LISTED ABOVE ARE NOT INCLUDED IN THESE CONTRACT DOCUMENTS, PLEASE ADVISE.

END OF SECTION

RESET FORM

CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R3 / 11-25) / Form 96 (Revised 2025)
Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date *(month, day, year)*:_____

1. Governmental Unit (Owner):_____
2. County:_____
3. Bidder (Firm):_____

   Address: _____

   City/State/ZIPcode:_____
4. Telephone Number:_____
5. Agent of Bidder *(if applicable)*:_____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____and dated _____for the sum of

_____$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

ACKNOWLEDGEMENT

STATE OF _____
) ss
COUNTY OF_____)

Before me, a Notary Public, personally appeared the above-named _____and

swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this _____day of _____

_____
Notary Public

My Commission Expires:_____

County of Residence:_____

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS
(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (1.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____day of _____,subject to the

following conditions: _____

_____

Contracting Authority Members:

_____ _____

_____ _____

_____ _____

PART II

(For projects of $300,000 or more- IC 36-1-12-4)

Governmental Unit: .....

Bidder (Firm) _____

Date *(month, day, year):* _____

These statements to be submitted under oath by each bidder with and as a part of his bid. Attach additional pages for each section as needed.

SECTION A: EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

_____

_____

_____

4. List references from private firms for which you have performed work.

_____

_____

_____

_____

_____

SECTION B: PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

_____

_____

_____

_____

_____

SECTION C: CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION D: CONTRACTOR'S NON - COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION E: OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at _____ this _____ day of _____

_____
(Name of Organization)

By _____

_____
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____
) ss
COUNTY OF_____)

Before me, a Notary Public, personally appeared the above-named _____and swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this _____day of _____

_____
Notary Public

My Commission Expires:_____

County of Residence:_____

Part of State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)

BID OF

_____
(Contractor)

_____
(Address)

_____

FOR

PUBLIC WORKS PROJECTS

OF

_____

_____

_____

Filed _____, _____

Action taken _____

_____

SECTION 01010
DEFINITION OF CONTRACT ITEMS

PART 1 GENERAL

1.01 FOREWORD

A. This Section describes the various Contract Items listed in the Bid.

1.02 WORK NOT INCLUDED

A. Under each Item the Contractor shall furnish all labor, materials, tools, plant equipment, supplies, maintenance of equipment, heating, lighting and power, insurance and bonds, coordination, and all Work and in accordance with the Specifications Parts A, B, and Divisions 1 through 16 of Part C and necessary to complete the Work in accordance with the obvious or expressed intent of the Contract Documents.

B. The removal and proper disposal of debris generated by work under each Item shall be included in that corresponding Item.

1.03 PAYMENT

A. The lump sum and unit prices stated in the Bid shall be payment in full for the completion of all Work specified and described or required to be included in the Contract, complete, and ready for use.

1.04 CONTRACT ITEMS

A. The contract items are defined on the following pages.

ITEM 1
MOBILIZATION AND DEMOBILIZATION

1.01 DESCRIPTION

A. This Item is intended to pay non-recurring cost to the Contractor not recovered under other pay Items of the Contract.

B. This Item shall include, but not be limited to, the cost for moving equipment in and out, performance and payment bonds, insurance, permits, utility connection cost, and other expenses associated with preparation for construction in accordance with the requirements of the Contract Documents.

1.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

1.03 DEFINITION OF ITEM

A. Item 1 – Mobilization and Demobilization.

1.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all work required under Item 1.

1.05 PAYMENT

A. Payment shall be in accordance with the Contract Documents. The Engineer may reduce the amount to be paid under Item 1 if the percentage requested is not represented by the actual amount performed

ITEM 2
GENERAL WORK

2.01 DESCRIPTION

A. Under this Item, the Contractor shall provide all materials, equipment, labor, supervision, and coordination as specified, shown on the Drawings, or otherwise required to complete and place into operation the work for the contract.

B. This Item includes all work shown on the Drawings and Specifications, unless specifically included for payment under other Items.

2.02 WORK NOT INCLUDED

A. Work specifically included for payment under other Items.

2.03 DEFINITION OF ITEM

A. Item 2 - Includes General Work.

2.04 MEASUREMENT

A. The lump sum price stated in the Bid shall be full compensation for all work required under this Item.

ITEM 3
WELL DRILLING

3.01 DESCRIPTION

A. Under this Item, the Contractor shall provide material, equipment, labor, supervision and coordination as specified, shown on the Drawings, or otherwise required to drill one water supply well to the depth specified herein or as indicated on the Drawings.

B. This Item includes, but is not limited to, providing all materials to complete the drilling (mud, water, etc.), collecting and performing sieve analysis of soil samples, keeping daily records, well protection and temporary capping, and removal of lost tools.

3.02 WORK NOT INCLUDED

A. Additional drilling due to failure on the part of the Contractor to reach the depth specified on the Drawings or indicated herein due to negligence, incompetence, or difficulties encountered during the drilling.

B. Work specifically included for payment under other Items.

3.03 DEFINITION OF ITEM

A. Item 3 - Includes Well Drilling.

3.04 MEASUREMENT

A. The quantities to be paid under this Item shall be measured from the natural ground surface to the greatest depth penetrated by the well

3.05 PAYMENT

A. The unit price stated in the Bid shall be full compensation for each lineal foot of drilling.

ITEM 4
GEOPHYSICAL LOG OF BOREHOLE

4.01 DESCRIPTION

A. Under this Item, the Contractor shall provide all material, equipment, labor, supervision and coordination as specified, shown on the Drawings or otherwise required to complete a geophysical log of the borehole.

4.02 WORK NOT INCLUDED

A. Work specifically included for payment under other Items.

4.03 DEFINITION OF ITEMS

A. Item 4 - Includes Geophysical Log of Borehole.

4.04 MEASUREMENT

A. The quantities to be paid under this Item shall be for each log completed and submitted to the Engineer.

4.05 PAYMENT

A. The lump sum price stated in the Bid shall be full compensation for each log required under Item 4.

ITEM 5
FURNISHING AND INSTALLING WELL CASING

5.01 DESCRIPTION

A. Under this Item, the Contractor shall provide material, equipment, labor, supervision and coordination as specified, shown on the Drawings, or otherwise required to complete and place into operation the casing to the depth specified herein or indicated on the Drawings.

5.02 WORK NOT INLCUDED

A. Any secondary casing needed to stabilize the borehole during drilling or other casing material used by the Contractor to complete the actual drilling of the borehole.

B. Work specifically included for payment under other Items.

5.03 DEFINITION OF ITEMS

A. Item 5 - Includes Furnishing and Installation of Well Casing.

5.04 MEASUREMENT

A. The quantities to be paid under this Item shall be the measured vertical linear foot of well casing installed.

5.05 PAYMENT

A. The unit price stated in the Bid shall be full compensation for each linear foot of casing furnished and installed.

ITEM 6
FURNISHING AND INSTALLING WELL SCREEN

6.01 DESCRIPTION

A. Under this Item, the Contractor shall provide material, equipment, labor, supervision and coordination as specified, shown on the Drawings, or otherwise required to complete and place into operation new permanent well screen as indicated on the Drawings or specified herein, including all necessary fittings.

B. This Item also includes providing the gravel pack as specified herein.

6.02 WORK NOT INCLUDED

A. Work specifically included for payment under other Items.

6.03 DEFINITION OF ITEM

A. Item 6 - Includes Furnishing and Installing Well Screen.

6.04 MEASUREMENT

A. The quantities to be paid under this Item shall be the measured linear foot of slotted screen furnished and installed.

ITEM 7
PLUMBNESS AND ALIGNMENT TEST

7.01 DESCRIPTION

A. Under this Item, the Contractor shall provide material, equipment, labor, supervision and coordination as specified, shown on the Drawings, or otherwise required to complete and determine the plumbness and alignment of the completed and encased well.

7.02 WORK NOT INCLUDED

A. Any work necessary for correction of well alignment or plumbness should the test indicate deviation from the standards indicated herein.

B. Work specifically included for payment under other items.

7.03 DEFINITION OF ITEM

A. Item 7 - Includes Plumbness and Alignment Test.

7.04 MEASUREMENT

A. The quantities to be paid under this Item shall be the completed test on a well that meets the requirements specified herein for alignment and plumbness.

7.05 PAYMENT

A. The lump sum price stated in the Bid shall be full compensation for each test required under Item 7.

ITEM 8
WELL DEVELOPMENT

8.01 DESCRIPTION

A. Under this Item, the Contractor shall provide material, equipment, labor, supervision and coordination as specified, shown on the Drawings, or otherwise required to complete well development and clean the well as specified herein or as directed by the Engineer.

B. Included in this Item is the disinfection of equipment and the well prior to development.

C. Included in this item is twenty (20) hours of well development using poly phosphates and/or surfactants, and other chemicals as recommended in AWWA A100 for a complete well development.

8.02 WORK NOT INCLUDED

A. Additional time spent in development due to deficient well construction, improper well screen selection or poor soil sampling and analysis.

8.03 DEFINITION OF ITEM

A. Item 8 - Includes Well Development.

8.04 MEASUREMENT

A. The quantities to be paid under this Item shall be the completed well development as specified herein.

8.05 PAYMENT

A. The lump sum specified in the Bid shall be full compensation for each Well Development required under Item 8.

ITEM 9
WELL DISINFECTION

9.01 DESCRIPTION

A. Under this Item, the Contractor shall provide material, equipment, labor, supervision and coordination as specified, shown on the Drawings, or otherwise required to complete disinfection of the well in a two stage process. The first disinfection shall take place before well development. Final disinfection shall take place immediately before the production pump is installed.

B. It will be the contractor responsibility to assure that the results of the bacteriological samples collected and analyzed by the laboratory have a passing result as specified herein.

C. Contractor shall be responsible for the disposal/discharge of the chlorinated water from the well.

9.02 WORK NOT INCLUDED

A. Disinfection of equipment temporary or permanent that is required to be installed or reinstalled in well for any reason.

9.03 DEFINITION OF ITEM

A. Item 9 - Includes Well Disinfection.

9.04 MEASUREMENT

A. The quantities to be paid under this Item shall be the completion of both stages of the well disinfection (prior to development and before pump installation) as specified herein. Both stages of the test shall be performed and have passing test results for payment to be considered.

9.05 PAYMENT

A. The lump sum price stated in the Bid shall be full compensation for Work required for each Well under this Item.

B. No additional charge will be allowed for additional disinfection necessary to obtain bacteriological samples that are free of bacteria. No additional payment will be made for additional disinfection as may be necessary for equipment or reinstallation.

ITEM 10
TEST PUMP INSTALLATION AND EXTRACTION

10.01 DESCRIPTION

A. Under this Item the Contractor shall provide all material, equipment, transportation, and labor, to install a provisional vertical turbine pump for completing pump/aquifer

tests as specified herein. This Item also includes the extraction of the pump once the tests are completed.

B. Included under this item is any additional time required by the Contractor to test and determine the readiness of the equipment for performing the Well and Aquifer Performance Test.

C. Also included is the furnishing and installing of necessary temporary discharge piping to a distance of at least 200 feet from the well, and furnishing and installing Engineer approved devices for accurately measuring the pumping rate, regulating the flow, and measuring water levels.

10.02 WORK NOT INCLUDED

A. Not included in this item is the collection of drawdown data and the analysis of Water Quality data which are included under a separate Item.

10.03 DEFINITION OF ITEMS

A. Item 10 - Includes Test Pump Installation and Extraction.

10.04 MEASUREMENT

A. The lump sum price stated in the Bid shall be full compensation for Work required for the installation and extraction of the test pump.

10.05 PAYMENT

A. The lump sum for the installation of the pumping unit indicated in the Bid shall be full compensation for all work required under Item 10.

ITEM 11
STEP-DRAWDOWN AND CONSTANT RATE TESTS WITH RECOVERY

11.01 DESCRIPTION

A. This Item shall include all material and labor necessary for collecting time-discharge date and time drawdown data from the well under construction and at least one other observation well.

11.02 WORK NOT INCLUDED

A. Work specifically included for payment under other Items.

11.03 DEFINITION OF ITEMS

A. Item 11a - Includes Step Draw Down Test with Recovery

B. Item 11b - Includes Constant-rate Aquifer Performance Test with Recovery

11.04 MEASUREMENT

A. The quantities to be paid under this Item shall be measured as the actual time spent in pumping and recording drawdown in the wells.

11.05 PAYMENT

A. The quantities to be paid under this Item shall be measured as the actual time spent in pumping and recording drawdown in the wells.

ITEM 12
WATER QUALITY SAMPLING AND ANALYSIS

12.01 DESCRIPTION

A. This Item shall include all materials and labor necessary for the collection of water samples from the well as specified herein, and the chemical analysis of the samples by a State-approved laboratory.

B. Water quality analysis shall be performed for those parameters required by the Indiana Department of Environmental Management.

C. This Item also includes the collection of at least two (2) consecutive safe (total coliform negative) microbiological samples 24 hours apart after installation of the permanent pumping unit.

12.02 WORK NOT INCLUDED

A. Work specifically included for payment under other items.

B. Additional testing required due to inadequate disinfection of the well.

C. Additional testing required due to the removal and reinstallation of equipment in well

12.03 DEFINITION OF ITEM

A. Item 12 - Includes Water Quality Sampling and Analysis

12.04 PAYMENT

A. The lump sum stated in the Bid shall be full compensation for the sample collection and analysis.

ITEM 13
SUBMERSIBLE WELL PUMP AND INSTALLATION

13.01 DESCRIPTION

A. Under these Items, the Contractor shall provide material, equipment, labor, supervision, and coordination as specified or otherwise required to complete and place into operation a submersible well pump as specified herein.

B. These Items includes all work in Parts A, B, and Divisions 1 through 16 of Part C, unless specifically included for payment under other Items.

13.02 WORK NOT INCLUDED

A. Not included in these Items, is the collection of time drawdown data and the analysis of Water Quality data which are included under separate Items.

13.03 DEFINITION OF ITEMS

A. Item 13 – Includes Submersible Well Pump and installation.

13.04 MEASUREMENT AND PAYMENT

A. The lump sum stated in the Bid for Item 13 shall be full compensation for the submersible well pump and installation as specified herein.

ITEMS 14
WATER LINES

14.01 DESCRIPTION

A. Under these Items, the Contractor shall furnish and perform all Work necessary for the installation of the water lines as scheduled, shown on the Drawings and specified, in conformance with relevant sections of the Specifications.

B. These Items shall include all Work to install the waterlines, including but not limited to the following: excavation; backfill; compaction; bedding; pipe materials; fittings; maintenance of trenches; connections to existing water mains; and related Work and materials such as blow offs to perform disinfection, flushing, performing pressure and bacteriological tests as shown on the Drawings and specified in conformance with relevant Sections of the Specifications.

C. These Items shall also include all Work under the Contract unless specifically included for payment under other Items.

D. Connections of new water lines to existing water lines shall be included under these Items, unless specifically included under other items. Temporary supporting of existing utilities, locating of existing utilities, exploratory excavation and backfill required. Items include cutting and removal of existing main to furnish and install all fittings (couplings, tee), and piping to complete the connection.

E. These Items shall include all water main fittings, accessories and appurtenances not included in other pay items. Fittings, including those not shown on the plans required to avoid existing utilities shall be included under these Items.

F. All repairs of existing utilities damaged, as a result of construction, are included under these Items.

14.02 WORK NOT INCLUDED

A. Pavement replacement within the Contract limits is included under other Items.

B. Valves, inserting valves, valve manhole structures are included under other items.

C. All Work necessary to reconnect existing water services are included for payment under other Items.

D. Restoration of landscape surface improvements including seeding, mulching, and fertilizing all disturbed lawn areas shall be included under these Items, unless specifically included under other items.

14.03 DEFINITION OF ITEMS

A. Item 14a – Includes 6-inch Watermain.

B. Item 14b – Includes Water Main Connection

14.04 MEASUREMENT

A. The quantities to be paid for under Items 14a shall be the horizontal length of pipe measured parallel to the axis of the line along the surface of the ground.

B. The quantities to be paid under Items 14b shall be full compensation for each item installed in accordance with the Specifications and Drawings.

14.05 PAYMENT

A. The unit price stated in the Bid for Items 14a shall be full compensation for each linear foot, furnished and installed as specified so measured.

B. The unit price stated in the Bid for Item 14b shall be full compensation for the lump sum of water main connection in accordance with the Specifications and Drawings.

ITEM 15
VALVES

15.01 DESCRIPTION

A. Under these Items, the Contractor shall furnish and perform all Work necessary for the installation of the valves and accessories as shown on the Drawings and specified in conformance with relevant Sections of the Specifications.

B. These Items shall include all Work to install or remove the valves, including but not limited to the following: excavation; pavement removal; saw-cutting; concrete drive, removal; removal and replacement of fences including fabric and posts; hauling excess spoil material from Site; backfill; compaction; bedding; pipe materials; fittings and pipe connections; construction, maintenance and removal of temporary access to the Work area; and related Work such as performing material testing.

C. Inserting valves (cutting-in-valves) shall be included under these Items.

15.02 WORK NOT INCLUDED

A. Pavement replacement within Contract limits is included for payment under other Items.

15.03 DEFINITION OF ITEMS

A. Item 15 – Includes 6-inch Gate Valve.

15.04 MEASUREMENT

A. The quantities to be paid under Items 15 shall be full compensation for each valve and box provided in accordance with the Specifications and Drawings.

15.05 PAYMENT

A. The unit price stated in the Bid for Items 15 shall be full compensation for each valve and box as specified and required.

ITEM 16
ELECTRICAL

15.01 DESCRIPTION

A. Under this Item, the Contractor shall furnish and construct the Electrical system as shown on the Drawings and specified.

B. The Electrical system includes the aerator control panels, disconnects, cables connecting to Contract 4A as shown on the drawings and specified.

16.02 DEFINITION OF ITEM

A. Item 16 – Electrical System

16.03 PAYMENT

The lump sum price stated in the Bid for Item 16 shall be full compensation for the electrical system as shown on the drawings and specified.

ITEM 17
SITE RESTORATION

17.01 DESCRIPTION

A. Under this Item the Contractor shall furnish and install aggregate drive, were shown on the drawings or so ordered by the Owner. This Item includes grading of the area to receive the aggregate drive.

B. Under this Item the Contractor shall furnish and install seeding and mulch were shown on the drawings or so ordered by the Owner. This Item includes planting, fertilizing, watering, and grading of the area to receive seed and mulch.

17.02 WORK NOT INCLUDED

A. All areas outside of project site, damaged by the Contractor, shall have areas grading and pavement and seeding and mulch installed at the Contractor's expense.

17.03 DEFINITION OF ITEMS

A. Item 17 - Includes Site Restoration.

17.04 MEASUREMENT

A. The quantities to be paid for under Item 17 shall be lump sum for grading, aggregate drive, seeding and mulch where indicated on plans and specifically ordered by the Owner.

17.05 PAYMENT

A. The Item 17 shall be full compensation for lump sum for site restoration.

ITEM 18
FENCE & GATE

18.01 DESCRIPTION

A. Under this item the Contractor shall remove the existing 6ft. high chain link fence and gate were ordered by the Owner and shown on the drawings. This Item includes existing fence, posts, brackets, rails, angle brackets, barbed wire and concrete bases.

B. Under this item the Contractor shall furnish and install the 6ft. high chain link fence and gate were ordered by the Owner and shown on the drawings. This Item includes connecting into the existing fence, posts, brackets, rails, angle brackets, barbed wire and concrete bases.

18.02 DEFINITION OF ITEMS

A. Item 18a – Remove Existing Chain Link Fence & Gate.

B. Item 18b – 6-foot Chain Link Fence.

C. Item 18c – 18-ft. x 6-ft. Double Sliding Gate.

18.03 MEASUREMENTS

A. The quantities to be paid for under Item 18a and 18b shall be the measured quantity in lineal feet as specifically ordered by the Owner, specified and shown on the drawings.

B. The quantities to be paid for under Item 18c shall be for each gate with posts and accessories installed as specifically ordered by the Owner, specified and shown on the drawings

18.04 PAYMENT

A. The Item 18a & 18b shall be full compensation for each lineal foot of fence and each gate installed.

B. The Item 18c shall be full compensation for lump sum for gate as shown on the drawings and specified.

END OF SECTION

SECTION 02600
PAVEMENTS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the construction pavements, and berms of various designated types as shown or scheduled on the Drawings, specified or directed.

B. This Section includes preparation of the base and subgrade construction of pavements and base courses, adjustment of manhole castings, and valve boxes to conform to new pavement courses, and other work and materials incidental to the construction of pavements, curbing and walks.

1.02 OWNER'S STANDARDS AND SPECIFICATIONS

A. Driveways, parking areas, and street pavement and berms disturbed by construction shall be restored in accordance with the Owner's present standards and specifications.

1.03 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Manufacturers' and suppliers' material certificates.

b. A sieve analysis (ASTM C136) shall be furnished for each material source.

2. Information for the Record:

a. Delivery tickets from the asphalt and aggregate suppliers shall be given to the inspector at the unloading site. Tickets shall include (as a minimum) name of source, date, type of material, and weight.

b. Test results and certificates.

PART 2 PRODUCTS

2.01 AGGREGATE BASE AND SURFACE

A. The aggregate shall meet the requirements of INDOT Item 301.02 (size No. 53).

B. Aggregate surface shall meet the requirements of INDOT Item 303.02 size No. 53 for roadways and Size No. 73 for driveways and shoulders.

2.02 SEAL COAT

A. Seal coat shall meet the requirements of INDOT Item 404 Type 3 for single layer and Type 7 for double layer.

B. The bituminous material shall meet the requirements of INDOT Item 404.02.

C. The aggregate shall meet the requirements of INDOT Item 404.03 (Size No. 8 or No. 11).

2.03 TACK COAT

A. The tack coat shall meet the requirements of INDOT Item 406.

B. The tack coat material shall meet the requirements of INDOT Item 406.02.

2.04 PRIME COAT

A. The prime coat shall meet the requirements of INDOT Section 405.

B. The prime coat material shall meet the requirements of INDOT Item 405.02.

2.05 ASPHALT CONCRETE BASE, LEVELING AND SURFACE COURSES

A. Bituminous Material - The asphalt shall meet the requirements of INDOT Item 402.03 (PG 64-22 Performance Grade).

B. Aggregate - The aggregate shall meet the requirements of INDOT Items 402.03 and Table 904.03(a) of the Class specified for Base, Intermediate, or Surface mixture.

C. Design Mix

1. Asphalt concrete base mix shall meet the requirements of INDOT Item 402.04 (Type A or B Base mixture).

2. Asphalt concrete mix for leveling course shall meet the requirements of INDOT Item 402.04 (Type A or B Intermediate mixture).

3. Asphalt concrete mix for wearing course and overlays shall meet the requirements of INDOT Item 402.04 (Type A or B Surface mixture).

2.06 CONCRETE (CAST-IN-PLACE)

A. All concrete used shall be as specified in INDOT Item 502.04.

B. Other materials required for placing concrete shall be as follows:

C. Joint Sealer:

1. Rubber-Asphalt Joint Sealer – INDOT 906.2(a)4.

   a. Hot Applied Sealer – INDOT 906.02(a)2.

   b. Cold Applied Sealer – INDOT 906.02(a)1.

2. Preformed Elastic Joint Sealer – INDOT 906.02(a)3.

3. Preformed Filler – INDOT 906.01.
    a. Fiber Filler - AASHTO M213.
    b. Sponge Filler - AASHTO M153, Type I.
4. Curing Materials:
    a. Burlap Cloth – INDOT 912.01 (a).
    b. Sheet Materials – INDOT 912.01 (c), (d), or (f)
    c. Transparent Membrane – INDOT 912.02.
    d. White Membrane – INDOT 912.01(e).

2.07 PAVEMENT MARKING N/A

PART 3 EXECUTION

3.01 COORDINATION

A. All soil subgrade under pavements, driveways, curbs, curb and gutter, and walks shall be compacted in accordance with Section 02200.

B. All service boxes, manholes, inlets and other structures shall be adjusted or reconstructed to the required grades in both new and resurfacing pavement areas.

3.02 PAVEMENT INSTALLATION

A. All construction shall be in conformance with applicable portions of INDOT Specifications, except as otherwise specified or called for herein.

B. Unless otherwise directed by Engineer all aggregate bases which are to receive bituminous courses shall be primed as specified. Prime Coat application rate of 0.05 to 0.10 gallon per square yard.

C. A tack coat at a rate as specified shall be applied to all existing pavements which are to be overlaid, and between subsequent courses when directed by the Engineer.

3.03 TRANSITION JOINTS FOR BITUMINOUS CONCRETE PAVEMENT OVERLAY

A. Types of Transition Joints:

1. Transition joints shall be either butt type or feathered type as directed by the Engineer.
2. Butt joints shall be used on State and Federal roads and main thoroughfares and feathered joints used elsewhere unless otherwise specified.
3. Butt Joints:

a. When a butt joint is called for on the Drawings or specified, the old surface shall be cut back for at least 3 feet to a depth of at least 1 inch for the full width of the joint and pavement installed.

b. A bituminous seal shall be placed on the finished surface at the junction of the new and old pavements.

4. Feathered Joint:

a. Feathered joints shall be constructed by manually raking the paving material to a smooth transition from the full depth material to the existing pavement surface.

b. Existing pavement surface shall be bond-coated to include the transition area.

c. Feathering shall be done by a workman skilled in the operation and shall be approved by the Resident Project Representative.

3.04 CURBING N/A

3.05 CONCRETE SIDEWALK N/A

3.06 CONCRETE DRIVEWAYS

A. Concrete driveways shall be constructed in conformance with applicable portions of INDOT Section 610.

B. Dowelled contraction joints shall be placed at a maximum spacing of 20-feet. Lesser spacing shall be used on irregular areas as directed by the Engineer.

C. Expansion joint filler 1/2-inch thick shall be installed at intervals of 24-feet maximum. One-inch expansion joint filler shall be installed between the driveway and any fixed structure.

3.07 BITUMINOUS AND AGGREGATE DRIVEWAYS

A. Bituminous driveways and parking lots shall be constructed as shown on the Drawings and/or indicated in Part 4 using materials specified for asphalt concrete pavements. Placement shall be in accordance with INDOT Section 610.

B. Aggregate driveways and parking lots shall be constructed as shown on the Drawings and in accordance with INDOT Section 610, using aggregate surface material.

C. Replacement of bituminous or aggregate driveways and parking lots shall conform to Section 01565 and this Section but in no case, be inferior to that being replaced.

3.08 MILLED ASPHALT BASE

A. Where shown on the Drawings, existing asphalt pavement shall be milled or pulverized, then spread, graded, and compacted as the subbase or base for a new paved roadway. Except as modified herein, all Work shall be performed in accordance with INDOT Section 613 - Salvaged Road Materials, and related sections.

B. The milled pavement shall be free of contamination and uniform in composition. The gradation and physical characteristics of the material shall be similar to INDOT Table 904.03(e) Size No. 53 (as specified for subbase or aggregate base), except variations will be allowed to the extent that the material can be graded and compacted to the satisfaction of the Engineer. All objectionable material and unacceptably large pieces shall be removed and disposed of as directed.

C. To improve stability, the milled asphalt may be mixed with asphalt cement or asphalt emulsion at a rate and by a method approved by the Engineer. If ordered by the Engineer, water shall be added in a manner that will not soften the subgrade, to aid in compaction and prevent segregation of the material.

3.09 INSPECTION

A. Laboratory services shall be in accordance with the requirements of Section 01410 and shall include:

1. A compaction test on the subgrade, aggregate base, and each layer of asphalt shall be performed for every 300 square yards of material placed.

2. Asphalt Concrete:

   a. Plant Certification - The laboratory shall certify or furnish recent certification (within one year) from INDOT that the plant meets State requirements.

   b. Plant Inspection - For the first day of production and for every day when more than 100 cubic yards of material is being delivered to the project, the laboratory shall provide a representative at the plant who will inspect the plant, make mix design adjustments, check the temperature, and take the required samples.

   c. Quality Control Testing - A sample of the mix shall be taken for each 200-cubic yard of bituminous material or fraction thereof delivered to the project. An extraction test AASHTO T164-70 and a mechanical analysis AASHTO T30-70 shall be performed on the mix samples.

3. Cast-in-Place Concrete:

   a. Concrete shall be tested in accordance with Section 03305, Cast-in-Place Concrete.

3.10 PROTECTION

A. No heavy construction vehicle shall operate on any pavement after it has been installed.

B. Traffic shall be prohibited on newly installed asphalt pavement until it has cooled sufficiently to avoid marking.

C. Asphalt Pavements:

1. Bituminous mixtures shall be transported and placed in accordance with INDOT Item 402.12.

D. Concrete Pavements,:

1. Concrete shall be mixed, transported, placed, and finished only within the temperature limitations specified in INDOT Item 502.11.

2. No concrete shall be mixed, transported, placed, or finished when the temperature of the base, subgrade, or air is below 40 degrees F or whenever, in the opinion of the Engineer, the temperature may fall below 40 degrees F within 24 hours after the concrete has been placed.

3. The Contractor shall take such precautions as are necessary to protect the concrete from rain.

4. The Contractor shall protect the concrete from freezing for no less than seven days or until such time that specimen beams have attained a modulus of rupture of at least 600 psi.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 02990
WELL CONSTRUCTION

PART 1 GENERAL

1.01 SCOPE

A. These Specifications includes the construction of water supply wells as shown on the Drawings and specified herein, including but not limited to the drilling, construction, sampling, casing, grouting, developing, testing, and disinfection of the well.

B. The Contractor shall furnish all labor, materials, tools, equipment, fuel, lubricants, accessories, and services necessary to complete the construction of wells in the manner specified. The Work shall not be limited to the exact extent described in the Specifications and Drawings, but shall include all incidental work necessary and customary for completion of the project.

C. The Contractor shall be responsible for the movement of their drilling equipment on and off the Site, and shall take all necessary measures to minimize damage to property. Particular care shall be taken in cultivated fields during wet weather.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's product information and supporting factory test reports for well casing.

   b. Method of joining well casing and manufacturers recommendations including all appurtenances.

   c. Manufacturer's product information including but not limited, product characteristics, Material composition, mixing portions for cement grout for sealing of annual space of well.

   d. Method for mixing and placing the cement grout for sealing well annular space.

   e. Well Development procedures to be used.

2. Information for the Record:

   a. A copy of the Drillers log shall be submitted to the Engineer and provided to all appropriate regulatory agencies.

   b. Copies of all reports and permits submitted to any regulatory agency shall be submitted to the Engineer.

c. Results of all tests performed, including but not limited to pump tests, and plumbness and alignment; shall be submitted to the Engineer.

d. Manufacturer's warranty on the well screen and any other products used in the construction of the well.

e. Current Welding certificates.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor shall be an active water-well contractor and have constructed not less than 5 wells of comparable size within the past five years. Documentation of such experience is required prior to the award of contracts.

2. The equipment used for the Work shall be in first class condition, and be of a size and capacity as required to do the Work properly and expeditiously. The Engineer reserves the right to order equipment removed from the job site if it does not conform to these requirements, and to require the Contractor to furnish equipment suitable for the Work.

B. All procedures shall meet or exceed the Water Well Standards, AWWA A100, The Recommended Standards for Water Works, National Groundwater Association recommendations, and requirements of the State of Indiana.

C. The construction and materials of the Work shall conform to AWWA A100 and USEPA Manual of Water Well Construction Practices, EPA-570/9-75-001, except as modified herein. In addition, the Contractor shall comply with all requirements of the local Health Department, and with regulations of IDEM.

D. Only approved, uncontaminated, potable quality water shall be utilized for drilling purposes in order to avoid contamination of the aquifer and biasing of future water quality samples.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. The well may be drilled using any approved drilling method; cable-tool drilling or dual rotary method is acceptable. The Contractor shall have equipment of adequate size and reliability for proper and timely execution of drilling and sampling as may be required.

2.02 MATERIALS AND PRODUCTS

A. Casing:

1. Permanent seamless steel casing pipe shall be new steel pipe meeting ASTM A53 quality standards and specifications, and the requirements of the American Pipe Institute's (API) "Steel Water Well Pipe."

2. Casing shall be carbon steel pipe of nominal 20-foot lengths, with wall thickness and weights as specified in AWWA Standards for Water Wells.

3. The casing shall be of the diameters and lengths shown on the Drawings. Casing lengths are estimated; final length will be determined by the Contractor and the Engineer, based on the specific characteristics of the well-site.

4. The casing shall be legibly marked on each length, by the manufacturer, with all of the following information:

   a. Name of the manufacturer.

   b. Kind of pipe (continuous welded, electric resistance welded or seamless).

   c. Weight of schedule.

   d. Nominal or outside diameter.

   e. Specification number.

   f. Heat or lot number.

   g. A certification mark that verifies compliance with standard ANSI/NSF 61 certification for use in a public water system well.

B. Well Screen:

1. Well screen shall be installed in a well completed in unconsolidated or incompetent geologic formations.

   a. Screen shall be constructed of stainless steel and shall be of the wire-wound variety with a slot size of 0.02 inch.

   b. The screen shall have size of openings determined upon sieve analysis of the aquifer formation, or filter pack, in accordance with standard “AWWA A100-97, Water Wells”.

   c. The screen shall have uniform openings and be of such length that the maximum entrance velocity, at the design capacity, is 0.1 feet per second.

   d. The screen shall provide sufficient column and collapse strength to withstand installation and borehole pressures.

   e. Screen joints between screen sections and blank casing shall be welded, or threaded and coupled.

   f. The screen shall be provided with a bottom plate or wash-down bottom fitting of the same material as the screen. The screen shall have centralizers outside the top and bottom of the screen to ensure an even filter-pack.

   g. The screen shall be installed in a manner that minimizes corrosion caused by contact with dissimilar steel casing.

C. Gravel Pack:

1. Selection of the gravel pack shall be the responsibility of the Contractor with approval from the Engineer. The gravel shall be placed and stored at the Site in an appropriate manner to avoid contamination. Gravel in contact with the ground shall not be used.

2. Gradation of the gravel-pack shall be based on sieve analysis of the formation, and shall retain at least 50% of the finest aquifer material to be filtered. The uniformity of the gravel pack shall not exceed 2.5. Selection of the gravel-pack must be approved by the Engineer.

3. The gravel-pack material shall have an average specific gravity of not less than 2.5, with no more than 1%, by weight, of the material having a specific gravity of 2.25 or less.

4. Thin, flat, or elongated pieces, the maximum dimension of which exceeds three times the minimum, shall not be in excess of 2%, by weight.

5. Not more than 5% of the gravel shall be soluble in hydrochloric acid.

D. Sealing materials shall be bentonite grout. The sealing material shall be placed in the annular space between the casing and the borehole to the depth specified on the drawings. The annular space shall have a radial thickness of no less than 2 inches. The sealing material shall be placed in manner that ensures a complete seal of the annular space between the casing and the bore hole. The method used shall be approved by the Engineer.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide the Engineer with a schedule of construction. The Contractor shall notify the Engineer or Engineer's Representative daily of proposed construction activity

B. The Contractor shall maintain all Work areas neat and orderly, and shall clean, restore, and maintain the well site in an orderly fashion during performance of the Work of this Section, to the approval of the Engineer. The Contractor shall properly clean the premises and remove all unused materials, tools, and equipment from the Site upon completion of the Work.

3.02 PREPARATION AND PROTECTION

A. The Contractor shall use all means necessary to protect the wells and materials before, during, and after installation and to protect the installed work and materials of other trades. This shall include protection of the wells during the construction period.

1. If a well is filled with debris or otherwise damaged during the course of the Work, correction of the damage shall be accomplished by the Contractor at no additional cost to the Owner.

B. It shall be the responsibility of the Contractor to conduct all drilling operations in such a manner that no undesirable migration of water shall take place in the bore hole between water-bearing formations. The Contractor also shall take all necessary precautions during the construction period to prevent contaminated water, petroleum derivatives, or other harmful materials from entering the wells either through the bore hole opening or by seepage through the ground surface.

1. If, in the opinion of the Engineer, the well becomes contaminated or water of undesirable physical or chemical characteristics enters the well or water-bearing formation drawn upon, the Contractor shall, at their expense, perform such Work and supply such casings, seals, sterilizing agents or other material as may be required to eliminate the contamination.

C. Any bits, drills, or other tools lost or stuck in a borehole shall be removed at the Contractor's expense; if foreign material cannot be removed satisfactorily, the hole shall be abandoned according to the provisions of this Section and a new hole shall be drilled without compensation for Work related to the failed attempt at the well construction and abandoned hole.

D. A temporary cover for each well shall be provided on each well casing until such time as the pumping equipment is installed. Temporary guards shall be placed around the wells as required to protect them from operations by others.

E. All drilling equipment and materials shall be cleaned and disinfected with sodium hypochlorite solution of 200 ppm, and in accordance with AWWA C654 prior to use, to prevent contamination of the aquifer.

1. If disinfection of equipment and materials is performed at the construction site, the Contractor shall provide a means for intercepting and properly disposing of the sodium hypochlorite solution.

2. If disinfection is performed off-site, the Contractor shall notify the Engineer at least 48 hours prior to disinfecting and shall make provisions for either the Engineer or their representative to observe the disinfection process.

F. Well Disinfection:

1. After the well has been completely constructed and before the pump test, it shall be thoroughly cleaned of all foreign substances, including tools, timbers, rope, debris of any kind, cement, oil, grease, joint dope, or other undesirable materials. The casing pipe shall be thoroughly cleaned to remove oil, grease, or joint dope. The well then shall be disinfected with a chlorine solution in accordance with all State regulatory requirements and directions of the Engineer.

2. The quantity of chlorine compounds used shall be sufficient to produce a minimum of 100 parts per million (ppm) available chlorine in solution when

mixed with the total volume of water in the well, including the gravel pack volume (if applicable).

3. The disinfecting agent shall be uniformly applied throughout the entire water depth of the well; the dispersion of the disinfectant shall be assisted by pouring into the well a volume of water equal to the volume of the screen, after the disinfected test pump has been placed.

4. The disinfecting agent shall be left in the well for a period of at least 12 hours before pumping to clean the well of said agent. Disinfection of the well shall be repeated at the time of placement of the permanent pumping unit. Such second disinfection shall conform to the requirements herein for disinfection after development.

3.03 ERECTION AND INSTALLATION

A. Casing/Welding:

Casing lengths shall be joined watertight by a method appropriate to the material used, as selected by the Contractor and approved by the Engineer, so that the resulting joint shall have the same structural integrity as the casing itself.

1. If the casing is welded, the standards of the American Welding Society shall apply. Proof of the welder's qualifications may be requested by the Engineer prior to any welding.

2. If threaded and coupled joints are used, couplings shall be API or equivalent, made up so that when tight all threads will be buried in the lip of the coupling.

3. All surfaces to be welded shall be smooth, uniform, and free from fins, tears, and other defects which might adversely affect the quality of the welds. Surfaces to be welded also shall be free from loose scale, slag, rust, moisture, grease, paint, or other material.

4. No welding shall be performed when the ambient temperature is lower than Zero (0) degree F; when the surfaces to be welded are wet or exposed to rain, snow, or ice; or during high winds unless the welding operator and the Work are properly protected.

    a. When the base metal of any steel is below 32 degrees F, the base metal, within 3 inches of the weld, shall be preheated to at least 70 degrees F and maintained at that temperature during the weld.

5. Finished welds shall be of the specified size, of uniform cross section, and reasonably smooth. They shall be free from cracks, pits, craters, undercutting, overlapping, and excessive porosity and slag inclusions. Defective portions of base and weld metal shall be removed down to sound metal and replaced with sound metal. Badly shaped welds shall be removed and replaced or otherwise repaired to the satisfaction of the Engineer.

6. Welded joints shall form a structurally sound and watertight joint. Well welded joints may include butt-welds, band rings, flared joints or welding collars. Butt-welds shall be made using a guide. Steel pipe that is equal to or less than 4 inches in diameter shall have a minimum of two weld passes. Steel pipe that is 6 to inches in diameter shall have a minimum of three weld passes. Steel pipe that is greater than 10 inches in diameter or greater shall have a minimum of four weld passes.

    a. Welding procedures shall be in accordance with specifications in the "American Welding Society" manual, "AWS D10.12M/D10.12:2000, Guide for Welding Mild Steel Pipe", for plain end well casing pipe that are 8 inches nominal pipe size or less, and with wall thickness up to 0.5 inch; or

    b. Welding procedures shall be in accordance with specifications in standard "AWWA C206-97, Field Welding of Steel Water Pipe", December 1, 1997, catalog number 43206.

B. Sample Collection: N/A

C. Gravel Pack:

1. The minimum thickness to allow proper installation of the gravel-pack material shall be 4 inches.

2. The gravel-pack material shall be placed in the annular space adjacent to the well screens and shall extend at least 20 feet above the well screen.

3. The gravel-pack shall be disinfected and placed immediately in the well in an adequate manner to ensure continuity of the gravel pack without bridging, voids, or segregation.

D. Well Development:

1. Prior to development, the Contractor shall disinfect the well with sodium hypochlorite solution and in accordance with AWWA 654. The solution shall produce a 100-ppm solution in the well.

2. The development time shall be as required to bring the well to an efficiency of at least 80% (as defined by standard practices) and to produce water in a sand free condition at the design capacity.

    a. During development, the Contractor shall recognize that the screens specified have a collapse strength which is at the low end of the acceptable range, and shall plan accordingly. Any screen which is collapsed or breached during development shall be replaced and subsequent Work redone, at no additional cost to the Owner.

3. The development process shall be accomplished by high-velocity, horizontal water jetting and simultaneous air-lift pumping.

4. The jetting tool shall be 1/2 inch less than the inside diameter of the screen. The minimum exit velocity of the jetting fluid at the nozzle shall be 200 feet per sec.

5. The jetting procedure shall proceed from the bottom of the screen to the top and shall be continuously rotated at a speed of 1 rpm with a withdrawal rate of no greater than 10 minutes per foot of screen.

6. The eductor pipe for ail-lift pumping shall be placed no more than 5 feet above the top of the jetting tool during development. Pumping from the well shall be at a rate of 10 to 20% more than the volume of water introduced through the jetting tool.

7. Water used for jetting shall be potable and free of turbidity and coliform.

8. Sediment falling to the bottom of the screen during the jetting procedure shall be removed by either pumping or bailing.

E. Well Grouting:

1. Upon completion of the pump/aquifer test of the well, the Contractor shall grout the annular space around the outside of the outer casing.

2. The bentonite grout shall be mixed and placed at the depth specified on the drawings through a tremie pipe. When making the tremie pour, the tremie pipe shall be lowered into the bottom of the zoned being grouted, and raised slowly as the grout material is introduced.

3. The tremie pipe shall be kept full continuously from start to finish of the grouting procedure, with the discharge end of the tremie pipe continuously submerged in the grout until the zone to be grouted is completely filled.

4. Any surface casing will be withdrawn at this time, keeping the grout level as specified in the event of settlement of the grout during removal of the Work casing.

F. Well Abandonment:

1. If the Contractor fails to attain the specified depth or the depth ordered by the Owner or Engineer, or should the Contractor choose to abandon the hole because of lost tools, improper alignment, or any other reason, the Engineer shall be notified in accordance with the requirements of this Section.

2. All casing shall be removed insofar as is practical and the bore hole shall be plugged with materials prescribed and prepared in accordance with all State regulatory requirements and as directed by the Engineer. Care shall be exercised to preserve the water quality and to prevent the vertical migration of water.

3. If the well is abandoned at the option of the Contractor, no compensation will be made for the abandonment.

3.04 INSPECTION, START-UP AND TRAINING

A. Plumbness and Alignment:

1. Plumbness and alignment shall be demonstrated by lowering into the well, to the depth required by the Engineer, a section of pipe or a dummy 40-feet long. The outside diameter of the pipe or dummy shall not be more than 1/2 inch smaller than the diameter of that part of the casing, liner or hole being tested. Measurements of plumbness and alignment shall be taken at 5-foot intervals and shall include observations regarding the passage of the device through the well section.

    a. If a dummy is used, it shall consist of a rigid spindle with 3 cylindrical rings, 12 inches in length. The rings shall be truly cylindrical and be located one at each end, and one at the center of the spindle. The spindle shall be sufficiently rigid to maintain true alignment of the rings.

    b. The Contractor will have the option to utilize any special instrument developed for measuring misalignment in wells such as inclinometers or drift indicators, upon previous approval of the Engineer.

2. The Contractor shall furnish the Engineer with the results of the test, including a plot illustrating the drift or deviation from verticality and alignment in relation to depth.

    a. Records of deflection and all other pertinent information shall be kept and made a part of the permanent well log and record.

3. Should the plumb fail to move freely through the specified length of casing, or should the well vary from the vertical in excess of 2/3 of the inside diameter of the well per 100 feet, the plumbness and alignment shall be corrected.

    a. Should the Contractor fail to correct the faulty alignment and plumbness, the well shall be considered defective, and the Contractor shall not be entitled to any payment for the well.

4. In no event, will the provisions with respect to plumbness and alignment be waived. The test shall be conducted under the inspection of the Engineer or their representative.

B. Step Draw Down Test:

1. Immediately upon completion of development of each well, the Contractor shall furnish and install a test pump with a capacity as described in Part 4 of this Section. The pump shall be a submersible pump. The pump intake shall be set no more than five feet above the top of the well screen and the pump discharge head must be installed high enough to insure free access into the well so that satisfactory water-level measurements can be made. The Contractor will be entirely responsible for operation of the pump during all tests and will be required to have at least one operator on duty at all times.

2. A temporary discharge pipeline shall be furnished and installed by the Contractor and shall be of length as required to convey the water to some approved point of drainage. All joints shall be water tight, and a control valve and freely discharging orifice device shall be installed at the end of the pipeline.

A pressure gage to measure discharge pressure at the pump shall be installed. The configuration of the valve, orifice, and clear plastic manometer hose at the discharge end of the pipeline shall be as specified in standard orifice tables, and will be subject to approval of the Engineer. The orifice edge must be in first class condition, free of rust, corrosion, and nicks which might affect its accuracy. The size of the orifice shall be as directed by the Engineer. Flow meters will not be permitted.

3. A step-drawdown test shall be conducted for a period of three hours, as directed by the Engineer. This test shall be conducted as described in Part 4 of this Section. At the end of the test, at least a two hours of recovery data shall be collected. The step test shall be started not earlier than two hours after the last operation of the pump for developing or verifying its operational readiness. It will be the obligation of the Contractor to coordinate all pump tests with the Owner and Engineer.

C. Constant-Rate/Aquifer Test:

1. The second test to be performed is an aquifer test and will be initiated after the completion of the step-drawdown test. Actual pumping rate will be determined by the Contractor and the Engineer based on the results of the step-drawdown test.

2. The aquifer test shall have a duration of not less than 24 hours, or as specified by the Engineer. The test shall be performed after the well has fully recovered from the step-drawdown test and has returned to static conditions existing previous to the step test.

3. The Contractor shall be responsible for the continuous operation of the pump at the specified rate of pumping, provided the water level in the pumping well does not fall below the pump setting specified by the Engineer.

4. The Contractor shall compile a log including the pumping rate and water levels in the pumping well and observation wells as directed by the Engineer.

D. Data Collection (Step Draw Down and Constant-Rate Aquifer):

1. Discharge and drawdown shall be accurately measured and recorded during working hours with a down-hole probe during night hours, all pump tests at the minimum frequencies stipulated in the following schedule:

a. For each stage of the step-drawdown test, and at the beginning of each stage, the schedule is as follows:

1) Every minute for the first 10 minutes.

2) Every two minutes for the next 20 minutes.

3) Every five minutes for the next 30 minutes.

4) Every ten minutes for the remainder of the stage.

b. For the aquifer test, the schedule is as follows:

1) Every minute for the first 10 minutes.

2) Every two minutes for the next 20 minutes.

3) Every five minutes for the next 30 minutes.

4) Every ten minutes for the next 60 minutes.

5) Every 20 minutes for the next 60 minutes.

6) Every hour for the remainder of the test.

2. Recovery data shall be collected after the capacity test, following the schedule proposed for that test. Recovery data shall be collected over the immediate subsequent 24-hour period after pump shutdown.

3. The Contractor will be required to monitor water levels in at least two existing wells during the pump tests. The Contractor will be required to furnish (and store at the Site during the test) sufficient number of water level recording devices so that replacements are available should one or more units fail. The pump and aquifer tests will be performed under the supervision of the Engineer or their representative who shall be notified 48 hours in advance, excluding weekends and holidays, of the date and time the pump tests will be conducted.

4. All water level measurements collected during the pump test shall be recorded using pressure transducers or similar devices. The results of the test shall be provided to the engineer on hard copy and magnetic media.

E. Water Sampling and Analysis:

1. The Contractor shall provide the services of an independent laboratory, certified, to collect water samples required by IDEM for an existing well field.

2. Samples would include:

a. Fluoride

b. Nitrate

c. Nitrite

d. Negative for e coli

e. (2) consecutive passing total coliform samples at least 24 hours apart

PART 4 SPECIAL PROVISIONS

4.01 WELL INFORMATION

A. One well will be drilled to a depth of 76 +/-feet.

B. The diameter of the well casing shall be 12 inches.

C. The well screen will be 10 feet in length with a 0.02 slot size.

4.02 PUMP/AQUIFER PERFORMANCE TEST

A. Step Drawdown Test - The step drawdown test shall consist of three stages, having a duration of one hour each. Pumping rates shall be , and gpm.

B. Aquifer Performance Test - The aquifer performance test shall have a duration of at least 24 hours at an estimated rate of gpm. Final rate will be determined by the Engineer, based on the step drawdown test.

C. Pumping Testing Equipment - For the purpose of conducting the pump tests, the Contractor shall supply a pumping unit capable of yielding 190 gpm with a discharge of 180 feet of TDH.

END OF SECTION

SECTION 16230
VARIABLE FREQUENCY DRIVE (VFD)

PART 1 GENERAL

1.01 SCOPE

A. This Section includes all labor, tools, equipment, and materials necessary to furnish and install VFDs in accordance with the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. A list of materials needed for construction, giving quantities, manufacturer's names and catalog numbers.

b. Manufacturer's technical product sheets on each component to be furnished.

c. Wiring schematics with wire termination points identified, along with factory wiring and external wiring.

d. Furnish motor lead lengths, recommended motors, and filters/ reactors.

2. Information for the Record:

a. Manufacturer's qualifications, including a list of similar installations.

b. Certified copies of factory test procedures and results.

c. Manufacturer's recommended method of installation for the products to be furnished.

d. Manufacturer's recommended spare parts list for components and accessories.

e. Operation and maintenance manuals for equipment provided, including accessories, wiring schematics, maintenance instructions, and drive settings, including hard copy and software to access and program drive.

f. Provide warranty for review; executed copies shall be submitted when completed with copies included in the operation and maintenance manuals.

1.03 QUALITY ASSURANCE

A. Applicable Standards:

1. UL – Provide VFDs which are listed and labeled by UL and comply with applicable UL standards.
2. NEMA – Comply with all applicable NEMA standards and guidelines pertaining to VFDs.
3. IEEE – Comply with IEEE Standards for VFDs.
4. NEC – Comply with latest edition of the NEC Article 430 related to VFDs.

1.04 PRODUCT HANDLING

A. Handle VFDs and components carefully to avoid breakage, impacts, denting, and scratching units. Do not install damaged equipment. Do not store outdoors or without protection from the weather, unless rated for outdoor use.

1.05 GUARANTEE

A. VFDs shall be warranted by the manufacturer for a minimum of 2 years.

PART 2 PRODUCTS

2.01 MATERIALS

A. VFD enclosures shall be industrial grade, totally enclosed, fused, or circuit breaker disconnecting means and rated 480 volt, 3-phase, and 60 Hz unless otherwise noted.

B. VFDs located outdoors, in process areas, damp locations, wet locations, and indoors below grade shall be NEMA 4X stainless steel unless noted otherwise on the Drawings or Specifications. VFDs located indoors in dry, non-process areas above grade shall be NEMA 12 unless noted otherwise on the Drawings or Specifications.

C. The horsepower rating of the VFD shall be determined by the manufacturer and shall be sized to operate the motor to which it is connected at its nameplate full load amperage.

D. VFD shall have Human Machine Interface (HMI) to be able to check parameters, alarms, and setup. The HMI shall be visible and accessible from the front of the VFD enclosure.

E. VFD shall be horsepower rated as a minimum to handle motor size as shown.

F. VFD shall be totally factory assembled and tested before being shipped.

G. Status and bypass control shall be displayed by LEDs and/or by HMI.

H. VFD shall have speed control and torque characteristics to match load.

I. VFD(s) shall be ABB ACQ580-01-047A-2

J. VFD shall accept a 4-20 mA DC current input for speed control.

K. VFD shall provide a 4-20 mA DC current output that is directly proportional to its output frequency.

2.02 ACCESSORIES

A. Provide each disconnect device with a padlockable handle. Each operating handle shall be padlockable with as many as three padlocks with a diameter of 3/8 inch.

B. Provide a START and a STOP pushbutton switch mounted on the front of the enclosure. The START pushbutton shall be momentary action with Normally Open contacts and a flush head operator colored black or green. The STOP pushbutton shall be maintained action, push off/pull on, with a red mushroom head operator.

C. Provide a 2-position, maintained action AUTO/MANUAL selector switch on the front of the enclosure. Also, provide a potentiometer on the front of the enclosure for adjusting the output frequency of the VFD when the switch is in the MANUAL position. If the function of this switch and potentiometer can be provided by the interface module provided with the VFD, then the switch and potentiometer will not be required.

D. Provide an auxiliary control relay with two SPDT contacts and 120 VAC coil. This relay shall be controlled by the START/STOP pushbuttons mounted in the enclosure front and any similar field mounted devices when the 3-position selector switch is in the HAND position.

E. When the 2-position selector switch is in the AUTO position the output frequency of the VFD shall be controlled by a 4-20 mA DC signal provided by the plant control system. The VFD shall also provide a 4-20 mA DC signal output for remote frequency verification.

F. The VFD shall provide contacts wired to terminals for customer use for the following signals: VFD RUNNING and VFD FAULT.

G. The VFD shall accept a START/STOP contact closure signal from the Plant Control System to control its run status when the 3-position selector switch is in the AUTO or PLC position.

PART 3 EXECUTION

3.01 COORDINATION

A. Fuses or circuit breaker shall be sized per manufacturer’s ratings. Contractor shall confirm drive size to match with equipment size before ordering. Contractor shall exercise caution when checking motor rotation (or bumping motor) so as to prevent nuisance fuse blowing or damage to the drive.

3.02 INSTALLATION

A. VFDs shall be wall/rack mounted or floor mounted depending on the size of the VFD and the mounting arrangement from the manufacturer. Mount VFD to allow access for incoming feeds, outgoing motor leads, and all equipment in the VFD. Follow manufacturer’s installation instructions.

B. VFDs shall be easily accessible to check fuses and other components for function and continuity.

3.03 TESTING

A. Prior to energizing VFDs, test wiring for electrical continuity and for short circuits. Ensure proper polarity of connections is maintained and that fuses are checked for continuity and installed properly. Check motor rotation after checking with Engineer for direction and motor coupling.

B. Check that grounding is properly installed in accordance with manufacturer's recommendations and the NEC.

C. The setup and checking of the VFDs shall be included with the drive for the initial field startup, unless otherwise noted. This will include one trip for two days to set up and test drive and include at least 4 hours for training.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 16903
CONTROL PANELS

PART 1 GENERAL

1.01 SCOPE

A. Work under this Section includes the fabrication and installation of all control panels and other enclosures required to provide a complete instrumentation and control package. Panel wiring is also included herein.

B. All control panels furnished or installed under this contract shall meet the requirements of this Section. Panels include, but are not limited to, those designated control panels, interim panels, enclosures, remote I/O panels, or other required enclosures necessary to complete the Work.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Submittals shall show door arrangement and device layout, wireways, subpanel layout, padlock and vault type locking handle, dimensions, legends, terminal blocks and terminations, etc.

b. Panel schematic wiring diagrams shall be provided to show all panel wiring systematically numbered. All devices shall be identified by device symbol designation; all lines and points shall be numbered. Each line shall be identified by function.

c. Furnish manufacturer’s name, catalog numbers, and product specifications for each component and panel to be furnished.

2. Information for the Record:

a. Operation and maintenance manuals.

b. Upon completion of the installation and acceptance by the Owner and Engineer, all electrical (schematic) diagrams, interconnection diagrams, panel layouts, and related support materials shall be corrected and amended to reflect the installed system.

1.03 QUALITY ASSURANCE

A. All control panel enclosures shall be UL listed and designed in accordance with applicable NEMA, ANSI, and UL 508 Standards.

B. All wiring and terminations shall be designed, manufactured, and tested in accordance with the latest applicable standards of the NEC as well as state and local codes.

C. Control panels shall conform to third party safety certification. The assembled control panel shall bear a serialized UL label listed for “Industrial Control Panels” UL 508A. The enclosure, and all components mounted thereto shall conform to UL descriptions and procedures.

PART 2 PRODUCTS

2.01 ENCLOSURES

A. All enclosures shall be Hoffman Enclosures, Inc., Bulletin A4, A12, A19, or A30 as specified or equal.

B. All equipment and controls shall be mounted in metal enclosures designed and manufactured in accordance with the applicable standards of NEMA, ANSI, and UL 508A Standards. Panels shall be floor-mounted, free standing or wall mounted (as determined by manufacturer’s mounting provisions for the size and type of panel).

C. Enclosures in a Control Room shall be NEMA 12 rated. Enclosures not located in a Control Room shall be NEMA 4X rated, nonventilated stainless steel unless noted otherwise.

D. Enclosures shall have a rolled lip around all sides of the opening so that a drip hood is not required.

E. Single door enclosures shall be hinged left with removable hinge pins. All NEMA 12 rated panel doors shall incorporate a vault type handle with 3-point latching mechanism for securing the door in closed position and door locks shall be keyed alike. NEMA 4X rated panel doors shall be furnished with padlock hasp and padlocks, all keyed alike. NEMA 4X rated panel doors shall be held closed with hardware certified compatible with the epoxy resin coating or stainless steel. Only smooth rubber gasket material shall be used for providing the door seal.

F. Double door enclosures shall have a removable center mullion and overlapping doors with three-point latching mechanisms with oil tight keyed locking handles, all keyed alike.

G. Removable “eye” bolts shall be provided to facilitate slinging and handling of enclosures. “Eye” bolts shall be mounted directly to and be part of the enclosure structural members so as to distribute the stresses and weight while slinging.

H. Panels shall have print pockets attached inside the door, as space permits.

I. Cover boxes, enclosures; etc. regardless of size with front mounted devices shall have a hinged door unless noted otherwise.

J. Panel layout and equipment spacing shall be sufficient to allow for device removal and maintenance without disassembly of adjacent devices. Additionally, ample panel gutter space (sides, top, and bottom) shall be provided for training wires and cables.

K. The Contractor shall properly size each enclosure, allowing 20% back panel spare space. Each enclosure shall be sized as specified herein or shown on the Drawings, or to suit

the physical dimensions required for components and heat requirements of the components mounted within, whichever is the largest.

L. Control panel doors shall not exceed 36 inches in width.

M. Control panel depth shall not be less than 8 inches.

N. Floor mounted type enclosures shall be provided with floor stands. The legs of floor-mounted enclosures shall be at least 12 inches high.

2.02 PLC AND REMOTE I/O ENCLOSURES

A. Programmable controller system enclosures shall include, in addition to those general requirements previously listed:

1. Power supply and distribution equipment.
2. All I/O wiring from the modules, including spares, wired to terminal strips.
3. The main processor chassis, I/O chassis as required, power supplies and power strips.
4. A constant-voltage, filtered power supply shall be provided for all AC loads or an uninterruptible power supply.
5. Circuitry and devices for a POWER ON indicating light.
6. A 15 amp, specification grade, duplex receptacle, and interior fluorescent lighting switched by a door operated switch, both powered from a circuit separate from the control voltage circuit.

B. All panel enclosures housing a PLC shall be of sufficient size to house any required analog output power supplies, properly sized wiring channel and wiring terminals sufficient in number to terminate all incoming and outgoing wiring of the enclosures, plus enough spares to wire all spare points in the I/O chassis assuming worst case conditions (all 120VAC inputs).

2.03 POWER, INSTRUMENTATION AND CONTROL WIRING

A. Panel interior control wiring shall be a minimum of No. 16 AWG-MTW, 2/64 PVC insulation, and 90 degrees C rated for AC connections. Nylon jacketed and/or TFFN wire will not be accepted. Thermoplastic wire cover shall be colored:

RED	for AC wires
DARK BLUE	for DC wires
CANARY YELLOW	all foreign wiring inside the panel not being de-energized by the panel feed circuit breaker
GREEN	all ground wire connections
BLACK	for power source
WHITE	for power neutral
LIGHT BLUE	intrinsically safe system

B. Signal conductors shall be as specified in Section 16121.

C. Power wiring shall be 600 volts and as specified in Section 16120. Conductors shall be stranded copper. No wire smaller than No. 12 AWG shall be used for power wiring.

D. All wire in control enclosures shall be identified at each terminal with wire identification tags as specified in Section 16030.

2.04 ENCLOSURE ACCESSORIES

A. Terminal blocks shall be Allen Bradley 1492 - W4 or equal. The Contractor shall allow 20% extra terminal connections in addition to those terminals required for the termination of spare control conductors and instrument cables.

B. Plastic wireway shall be used to train wires in all control panels and enclosures. Wireway fill shall not exceed 20% and shall be run in continuous lengths with snap-on type covers.

C. Each panel shall have a panel grounding bus bonded to the panel enclosure and a braided grounding strap connecting the panel door(s) to the panel enclosure frame.

D. Nameplates and legends shall be per Section 16030.

2.05 FABRICATION

A. Equipment, controls, and devices specified elsewhere and shown on the Drawings shall be mounted in enclosures manufactured in accordance with applicable NEMA, ANSI, and UL 508A Standards. All devices shall be mounted in accordance with the component manufacturer's recommendation. Devices shall be adequately supported and organized so that operation and maintenance access is unrestricted.

B. All necessary inner panels and supporting members shall be provided by the Contractor.

C. To minimize future maintenance problems, all panel enclosures shall be provided by one manufacturer to the extent that it is possible.

D. All panel wiring shall terminate at terminal blocks unless noted otherwise. Wire numbers shall be marked on an integral marker strip in numerical sequence for each individual block.

E. Instrumentation designs shall be such that analog signals that do not leave the enclosure shall be wired direct, without splices or terminals, from instrument to instrument unless accomplished in accordance with other provisions of these specifications.

F. Signal wiring shall be segregated and shielded from control and power wiring, grouped functionally, and arranged neatly to facilitate tracing of circuits.

G. No combination of analog, digital input, or control output wiring should be intermixed within the same bundle or duct. All analog wires shall be justified right while discrete 120 VAC wires shall be justified left.

H. Plastic wiring wraps shall be used to bundle wires, except within wiring ducts. The bundles shall be securely fastened to the steel structure at suitable intervals, not exceeding 12 inches.

I. Required device holes shall be provided by the panel manufacturer and punched prior to coating. No extra holes or field cut holes shall be permitted unless approved by Owner or Engineer.

J. Door or cover mounted panel devices shall not be located less than 30 inches above the finished floor. Door and cover mounted devices (i.e., pushbuttons, pilot lights, selector switches, meters, etc.) mounted in NEMA 12 and 4X enclosures shall, in addition to standard gaskets, be sealed with silicone grease compound as manufactured by Dow-Corning (No. 732) or equal.

K. Panels containing 120 volt power (except canary yellow foreign wiring powered elsewhere) shall have provided inside the enclosure a properly sized fused isolation switch or circuit breaker.

L. Floor mounted and free standing enclosures shall be equipped with an interior, 15 amp, specification grade duplex receptacle and interior fluorescent lighting. A switch shall be provided to control the lighting unless noted otherwise in these specifications. The receptacle and light shall be powered from a circuit separate from the control voltage circuit.

M. Panel shall have sufficient structural reinforcement to ensure a flat plane surface, to limit vibration, and to provide rigidity during shipment, installation, and operation, without distortion or damage to the panel or damage to any instrument mounted thereon. Minimum thickness of panels shall be:

1. Single door wall mounted up to 48-inch high by 36-inch wide by 16-inch deep shall be a minimum of 14-gauge steel.

2. Floor-mounted, wall-mounted and free standing panels larger than the above shall be a minimum of 12-gauge steel with angle reinforcement.

N. Joined edges, corners, and seams shall be of a continuous bead weld (filler or dubbing shall not be permitted), and ground to a finish so as not to be detectable after painting. Spot welds shall be used only to connect flat metal surfaces to structural support bracing to provide rigidity. Panels with any warping due to welding procedures or any other cause shall be rejected.

O. Panels shall be bonderized or cold phosphated before painting. NEMA 12 rated panel shall be primed and factory finished with two coats of ANSI color baked enamel. The color is to be selected by the Owner. NEMA 4X rated panels shall be primed and coated with a powdered resin, heat-cured, 100% solid thermosetting epoxy, unless the enclosure is stainless steel. Interior surfaces shall be high-gloss white, and the exterior surfaces shall be a high-gloss color to be selected by the Owner.

P. The inner-mounting panel shall be a minimum of 12 gauge for single door enclosures and 10 gauge for double door enclosures. The panel shall be mounted with stainless steel fasteners and coated the same as panel interior.

Q. Equipment mounted within free standing and floor-mounted control enclosures shall not be located such that it will be less than 18 inches above the mounting surface (floor, housekeeping pad, platform, etc.) after installation in the field.

R. Indicators and control operators mounted through the exterior of control enclosures shall be at least 30 inches above the walking surface (floor, housekeeping pad, platform, etc.) after installation in the field. The only exception to this rule will be alarm horns, speakers and similar audible devices.

PART 3 EXECUTION

3.01 COORDINATION

A. Panel location and clearances shall be in compliance with the NEC.

3.02 INSTALLATION

A. Each conduit penetration of the panel shall be made in accordance with the manufacturer's recommendations. Each panel penetration shall comply with requirements to maintain NEMA ratings specified. No remaining holes or knockouts will be permitted except for power wiring entrances, signal wiring entrances, and mounting hole for any future panel mounted device(s). Holes shall be covered with a plastic plate. Conduit entrances shall be from the bottom of the enclosure first; then if bottom is not practical, the sides of the enclosure will be used. All panel mounted equipment will be protected from metal shavings, moisture, and debris while working in enclosures.

B. Install wiring between panel mounted devices and field devices as specified in Section 16120.

C. Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and UL 486B.

D. Provide equipment grounding connections for individually mounted units as indicated and as required by the NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

E. Upon completion of installation, inspect devices, and remove paint splatters, other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

F. The bottom of wall-mounted control enclosures shall be at least 18 inches above the floor or platform. Use galvanized or aluminum unistrut when attaching control enclosures to vertical surfaces. Consideration shall be given to compatibility of unistrut and control panel metal surfaces in contact with one another.

G. The mounting of each panel shall allow for a minimum of 30-inch wide by 42-inch deep work area and door opening clearance of 90 degrees in front of panel to accommodate suitable room to open panel door and to provide the necessary work area.

3.03 IDENTIFICATION

A. Identify panel and components in accordance with Section 16030.

B. Individual nameplates shall be labeled to match the single line and schematic drawings.

PART 4 SPECIAL PROVISIONS

4.01 GENERAL ENCLOSURE SCHEDULE

A. The following schedule is intended to aid the Contractor in identifying panels, location, and approximate size. It is intended to supplement the Drawings and Specifications and is not guaranteed to be complete. All enclosures shown on the drawings, specified or as necessary to complete the Work shall be furnished and installed by the Contractor whether or not listed in the schedule.

Panel Name	Location	NEMA Rating	Approx. Size (H x W x D)
CP-1 PUMP CONTROL PANEL	WATER TREATMENT PLANT (MAIN ROOM)	NEMA 4X	14.7” x 4.9” x 8.8”

4.02 RESERVED

4.03 RESERVED

END OF SECTION