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CONTRACT AND SPECIFICATIONS

**RIVERHEAD WATER DISTRICT
TOWN OF RIVERHEAD
SUFFOLK COUNTY, NEW YORK**



WELLHEAD TREATMENT FOR REMOVAL OF MANGANESE AT PLANT NO. 5

Contract W – Well Pump Construction

Contract G – General Construction

Contract P – Plumbing Construction

Contract E – Electrical Construction

H2M Project No.: RDWD1906
NYSEFC Project No.: 18617

TOWN SUPERVISOR

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TOWN COUNCIL

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SEPTEMBER 2021

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The Town Board of the Town of Riverhead on behalf of the Riverhead Water District will receive bids for:

Wellhead Treatment for Removal of Manganese at Plant No.5

Capital Project No. 11

Contract G – General Site & Building Construction

Contract P – Plumbing Construction

Contract E – Electrical Construction

Contract W – Well Rehabilitation

Project No.: RDWD1906 / NYSEFC Project No. 18617

Bids will be received at the office of the Town Clerk, Riverhead Town Hall, 200 Howell Avenue, Riverhead, New York 11901, until **11:00 AM**, on **Thursday, October 21, 2021** at which time and place all bids will be publicly opened and read aloud for:

Plans and specifications may be examined on or after Thursday, September 30, 2021 by visiting the Town of Riverhead website: <http://townofriverheadny.gov> and click on "Bid Requests". Plans and specifications are available in electronic format only from the aforementioned website.

Each proposal must be accompanied by a bid bond in the amount of five percent (5%) of the total bid, or a certified check made payable to the TOWN OF RIVERHEAD as assurance that the bid is made in good faith.

The right is reserved to reject any or all bids, to waive any informality, and to accept the lowest responsible bid.

BY ORDER OF THE TOWN BOARD
TOWN OF RIVERHEAD
SUFFOLK COUNTY, NEW YORK

ACTING AS THE GOVERNING BODY
OF THE RIVERHEAD WATER DISTRICT

TOWN CLERK, TOWN OF RIVERHEAD

DATED: September 30, 2021

END OF SECTION 001113

BIDS FOR PROJECT

The Town of Riverhead, at the Town Clerk's office, will receive SEALED PROPOSALS for:

**RIVERHEAD WATER DISTRICT
Wellhead Treatment for Removal of Manganese at Plant No. 5
PROJECT NO.: RDWD1906**

TIME AND PLACE OF BID

Bids are to be submitted in sealed opaque envelopes, and will be received by the Town of Riverhead, at the Town Clerk's office, Town Hall, 200 Howell Avenue, Riverhead, New York, not later than 11:00 A.M. prevailing time, on **Thursday, October 21, 2021** at which time and place they will be publicly opened and read aloud. Use of the mails shall be at the Bidder's own risk, and the Bidder shall be responsible for physical delivery of the bid at the time and place set for opening of bids

BID ENVELOPE

All proposals and either the certified check or bid bond must be placed in a sealed opaque envelope bearing the Bidder's firm name and address and marked, "PROJECT NO.: RDWD1906, Wellhead Treatment for Removal of Manganese at Plant No. 5 FOR THE RIVERHEAD WATER DISTRICT, TOWN OF RIVERHEAD, SUFFOLK COUNTY, NEW YORK", but otherwise unmarked.

Bid package shall include TWO (2) COPIES each of Section 004105 - Bidder Declaration, 004116 - Proposal, 004313 - Bid Security, 004519 - Non-Collusive Bidding Certification, 004548 - Statement on Sexual Harassment Prevention and 004550 - Qualification of Bidders.

PLANS AND SPECIFICATIONS

Plans and specifications may be examined on or after Thursday, October 21, 2021 by visiting the Town of Riverhead website: <http://townofriverheadny.gov> and click "Bid Requests".

Plans and specifications are available from the aforementioned Town of Riverhead website only. All contractors who intend to submit a bid package are required to register on the web site.

VERBAL ANSWERS

The Town Board, its agents, servants or employees, or the Engineer, will not be responsible in any manner for verbal answers to any inquiries regarding the meaning of the contract drawings or Specifications given prior to the awarding of the contract.

EXAMINATION OF SITE

Bidders must satisfy themselves by personal examination of the location of the proposed work and of the actual conditions and requirements of the work and shall not, at any time after the submission of a proposal, dispute or complain of such estimate or assert that there was any misunderstanding in regard to the depth or character of excavation to be made or the nature of the work to be done.

PROPOSAL

The Proposal contained herein shall be used in making out bids. Any proposal not in accordance with these instructions or containing bids not asked for may be rejected. While separate prices are required for various items under this contract, it is understood that the contract will be awarded as a whole.

As the estimates of quantities of items stated in the Proposal are approximate only, bidders are required to submit their proposal upon and in the following express conditions, which shall apply and become part of every proposal received.

Bids will be compared by total amounts, said total amount being the sum of the products of the quantities multiplied by the unit price bid for the various items, with due consideration being given to the lump sum prices bid for any contingent or optional items. Unbalanced bids will not be accepted.

Each bidder shall fill out in ink, in both words and figures, in the spaces provided, its unit or lump sum bid, as the case may be, for each item in said Proposal for which it is submitting a bid. If there is any discrepancy between the prices in words and figures, the prices in words shall govern as unit and lump sum prices.

A bid which does not include bids for all items in the Proposal may not be considered valid.

If the contract is not awarded by the Town Board within ninety (90) days after the receipt of bids, the obligation of the bidder under this Proposal may terminate at its option and it shall thereupon be entitled to a refund of its certified check or release of its bid bond furnished by it as security with its proposal.

BID BOND OR CERTIFIED CHECK

Each proposal from a Contractor shall be accompanied by a bid bond or certified check on a solvent bank of the STATE OF NEW YORK, in the amount of five percent (5%) of the total bid. Such check shall be made payable to TOWN OF RIVERHEAD, RIVERHEAD, NEW YORK, and the amount thereof shall be the measure of liquidated damages which the Town may sustain by failure, neglect or refusal of the bidder to execute and deliver the contract, should the contract be awarded to it. The checks of all unsuccessful bidders will be returned upon the rejection of bids and the awarding of the contract; also, the check of the successful bidder will be returned upon the execution of the contract and the furnishing of the required bond.

NAME OF BIDDER

Each bidder must state, in its proposal, its full name and business address, and the full name of every person, firm or corporation, interested in same, and the address of every person or firm, or president and secretary of every corporation, interested with it.

QUALIFICATIONS OF BIDDERS

- (1) The Town Board reserves the right to waive any informalities in, or reject any and all bids. The Board reserves the right to reject any and all bids which do not conform to the Proposal.
- (2) All bidders must prove to the satisfaction of the Town Board that they are reputable, reliable and responsible, and that they possess the necessary qualifications (financial, labor, equipment and otherwise) to complete successfully the proposed work.
- (3) In determining the qualifications of a bidder, the Town Board will consider its record in the performance of any contracts entered into by it for the work contemplated or of similar nature, may make such investigation as it deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Board all such information and data for this purpose as the Town Board may request.

- (4) The Town Board shall be the sole judge of the qualifications of the bidders and of the merits thereof and reserves the right to reject any bid if the record of the bidder in the performance of contracts, payment of bills and meeting of obligations to subcontractors, material men or employees is not satisfactory to the Town Board, or if the evidence submitted by, or the investigation of, such bidders fails to satisfy the Town Board that it is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

PERFORMANCE AND MAINTENANCE BOND

The Contractor shall furnish a Performance Bond, Labor and Materials Bond, and a one (1) year Maintenance Bond each in an amount equal to one hundred (100%) percent of the total contract price as security for its faithful performance of this contract, for the payment of all persons performing labor or furnishing materials in connection with this contract. Such bonds shall also cover any penalties, interest charges and assessments levied by any governmental unit for failure to comply with laws and/or regulations governing public work. The Maintenance Bond shall be an assurance that all work and materials provided under this contract shall be maintained for a minimum period of one (1) year. The Maintenance Bond shall be furnished following final completion, and payment under the contract. The contractor shall be required to furnish all guarantees and warranties of manufacturers of products in connection with this contract, but no manufacturer's limitation of time shall act to limit the responsibility of the contractor or its surety hereunder.

The surety must be licensed in the State of New York and have a BEST A rating, or the surety shall present information satisfactory to the TOWN/DISTRICT to permit the TOWN/DISTRICT to accept the bond.

At the time of submission of bonds or at any time thereafter, the TOWN/DISTRICT may evaluate the surety or sureties proposed, and demand a change of surety if it determines that the financial position of such surety does not provide for a proper protection of the interests of the TOWN/DISTRICT. The TOWN/DISTRICT shall be guided by its legal counsel, and insurance industry consultants in determining proper sureties for TOWN/DISTRICT public works contracts. If the TOWN/DISTRICT notifies the contractor in writing that a surety is unacceptable for any reason, then the contractor shall replace the surety and the bond in question within five (5) business days with a surety and bond deemed suitable by the said TOWN/DISTRICT. The premiums charged for all such bonds shall be a cost of the contractor and not the TOWN/DISTRICT. Upon notice to change surety being forwarded to a contractor, no further payments shall be made until a new bond in proper form naming an acceptable surety is provided.

SIGNATURE OF CONTRACTOR

The bidder to whom a contract may be awarded shall attend at the office of the Town Board, with the sureties offered by it, within seven (7) days, Saturdays and Sundays excepted, after date of notification of the acceptance of its proposal, and there sign the contract in quadripartite for the work and furnish approved security for its performance.

In case of failure to do so, the bidder shall be considered as having abandoned the same, and the check accompanying its proposal shall be forfeited to the Town Board, or the penalty of the bid bond shall be invoked.

CONTRACTOR'S INSURANCE

The Contractor shall not commence any work until it has obtained and had approved by the Town all of the insurance specified and required by the Contract.

The Contractor shall not permit any subcontractor to commence any operation on the site until satisfactory proof of carriage of the above required insurance has been posted with, and approved by, the Town Board.

RESPONSIBILITY OF BIDDER

Attention is hereby particularly directed to the provisions of the contract whereby the Contractor will be responsible for any loss or damage that may happen to the work or any part thereof during its progress; and also whereby the Contractor shall make good any defects or faults that may occur during the progress of the work or within twelve (12) months after date of the Engineer's approval of the final payment request.

LABOR RATES

The Contractor shall pay not less than the minimum hourly wage rates on this contract as established in accordance with Section 220 of the Labor Law, as shown on the Wage Schedule and Prevailing Rate Schedule, either shown on the following pages or the current prevailing rates paid at the time of construction.

Each bidder shall submit with its bid a separate sealed list that names each subcontractor that the bidder will use to perform work on the contract, and the agreed-upon amount to be paid to each, for: (i) plumbing and gas fitting, (ii) steam heating, hot water heating, ventilating and air conditioning apparatus and (iii) electric wiring and standard illuminating fixtures. After the low bid is announced, the sealed list of subcontractors submitted with such low bid shall be opened and the names of such subcontractors shall be announced, and thereafter any change of subcontractor or agreed-upon amount to be paid to each shall require the approval of the owner, upon a showing presented to the owner of legitimate construction need for such change, which shall be open to public inspection. Legitimate construction need shall include, but not be limited to, a change in project specifications, a change in construction material costs, a change to subcontractor status as determined pursuant to paragraph (e) of subdivision two (2) of section two hundred twenty-two (222) of the labor law, or the subcontractor has become otherwise unwilling, unable or unavailable to perform the subcontract. The sealed lists of subcontractors submitted by all other bidders shall be returned to them unopened after the contract award.

APPRENTICESHIP PROGRAM

Pursuant to Section 816-(b) of the New York Labor Law, the Riverhead Water District has adopted a Resolution relating to approved apprenticeship programs. If the successful bidder's bid hereunder exceeds the sum of \$250,000.00, such bidder shall, prior to entering into a contract with the District, be required to have an appropriate apprenticeship agreement that has been registered with and approved by the Commissioner of the New York State Department of Labor pursuant to the requirements found in Article 23 of the New York Labor Law. Any subcontractors under this contract shall also, in all respects, comply with these provisions.

COMPLETION OF WORK

Work is required to be completed to the satisfaction of the Engineer, and in substantial accordance with the Specifications hereunto annexed and the Plans therein referred to and the Change Orders amended to the Contract.

RESPONSIBILITY OF CONTRACTOR

Attention is hereby particularly directed to the provisions of the contract whereby the Contractor will be responsible for any loss or damage that may happen to the work or any part thereof during its progress; and also whereby the Contractor shall make good any defects or faults that may occur during the progress of the work or within twelve (12) months after its completion and acceptance. Any progress payments made by the Town during the completion of this contract by the Contractor shall not be a waiver of the foregoing provision.

TOWN BOARD
TOWN OF RIVERHEAD
SUFFOLK COUNTY, NEW YORK

END OF SECTION 002113

BIDDER'S DECLARATION:

The undersigned, as Bidder, declares that the only person or persons interested in this bid or proposal as principal or principals is or are named herein; and that no other person than herein named has any interest in this proposal or in the contract proposed to be taken; that this bid or proposal is made without any connections with any other person or persons making a bid or proposal for the same purpose; that the bid or proposal is in all respects fair and without collusion or fraud; that it has examined the site of the work and the Contract Documents; and fully understands all the same; and it proposes and agrees, if this proposal is accepted, it will contract with the Riverhead Water District in the Contract accompanying this bid to furnish all the material, implements, etc., and perform all the work required in accordance with the Contract Documents; and it will accept in full payment therefore the following sums to wit:

Acknowledgement that the foregoing Bidder's Declaration is true and factual.

SIGNATURE	PRINT NAME	TITLE	DATE

END OF SECTION 004105

Board:

The undersigned hereby offers to furnish all labor, equipment, materials and appurtenances for **Manganese Removal at Plant No. 5 – CONTRACT E – ELECTRICAL CONSTRUCTION**, all in accordance with the plans and specifications prepared by H2M architects + engineers for the following unit and lump sum prices:

ITEM 1 – MOBILIZATION AND DEMOBILIZATION

For mobilization, demobilization, bonds, and insurances. Items not to exceed 5% of total bid.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 2 – ELECTRICAL DEMOLITION WORK

For all electrical demolition work including power and control equipment and all associated components including wiring and conduit at Well No. 5-1 and Well No. 5-2(A) Buildings.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 3 – NEW ELECTRICAL SITE WORK

For all electrical site work including wiring, terminations, conduit and fiber optic cable.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 4 – NEW MOTOR CONTROL CENTER

For furnishing and installing new Motor Control Center at the Well No. 5-1 Building and all associated electrical work.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 5 – NEW ELECTRICAL WORK AT WELL BUILDINGS

For all electrical work at the existing Well No. 5-1 & 5-2A Building, including but not limited to service modifications, equipment wiring, terminations, lighting, wiring, conduit, chemical analyzers, chemical pumps, etc.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 6 – NEW CONTROLS AT WELL BUILDINGS

For all new instrumentation and controls including new PLC hardware and accessories at Well No. 5-1 & 5-2A Building.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 7 – NEW ELECTRICAL WORK AT THE TREATMENT BUILDING

For all electrical work at the new Treatment Building, including but not limited to equipment wiring, terminations, lighting, wiring, conduit, etc.

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 8 – NEW CONTROLS AT THE TREATMENT BUILDING

For all instrumentation and controls at the new Treatment Building.

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 9 – NEW POWER & CONTROLS AT THE ADMINISTRATION BUILDING

For all work associated with modifications and upgrades to power, instrumentation and controls at the District Pulaski Street Administration Building

LUMP
 SUM: _____
 DOLLARS

ITEM 10 - CASH ALLOWANCE

For cash allowances specified in Section 012100 – Allowances, including testing and unforeseen condition.

LUMP (\$25,000.00)
 SUM: Twenty Five Thousand & 00/100
 (Forced Bid Amount of \$25,000.00) DOLLARS

ITEM 11 - ALARM ALLOWANCE

For cash allowances specified in Section 012100 – Allowances, to provide fire and burglary alarm from the Districts specified installer.

LUMP (\$8,000.00)
 SUM: Eight Thousand & 00/100
 (Forced Bid Amount of \$8,000.00) DOLLARS

ITEM 12 - PROJECT RECORD DOCUMENTS & SPARE PARTS

For furnishing project record documents, as-builts, and operation and maintenance manuals as specified in specification Sections 017800, 017823, 017839, and 017843.

LUMP (\$)
 SUM: _____
 (Minimum Bid of \$5,000.00) DOLLARS

TOTAL BASE BID (Sum of All Items)

 DOLLARS (\$)

The Board of the Riverhead Water District reserves the right to award this contract based on either **the total base bid** or any combination of bid items, as may be in the best interest of the Riverhead Water District. The award shall be made to the lowest responsible bidder based upon the bid items awarded. The Board reserves the right to reject any or all bids. The Board reserves the right to award this contract within forty-five (45) days of the bid opening.

Within ten (10) consecutive calendar days after the date of the Notice of Award, the bidder shall execute the contract and furnish the required bonds and insurances. The Notice to Proceed will be issued after the contract has been executed by the Owner.

All work shown and specified in the contract documents and included in this bid shall be completed within **two-hundred fifty (250)** consecutive calendar days from the date of Notice to Proceed.

The District shall have at its disposal the ability to operate both Well Nos. 5-1 and 5-2A between the period of **May 28 through September 15**. This includes all components necessary to operate both wells to system without service interruptions to the Owner's normal operations.

In addition to liquidated damages, specific damages will be assessed and deducted from amounts otherwise due the contractor for additional inspection and contract management time required to be expended by the Engineer should the project be completed beyond the contract completion date. Such deduction shall be in accordance with the billing rates and fees established between H2M and the Riverhead Water District.

The contractor shall coordinate all work with the Owner to minimize disturbances to Owner operations.

The bidder represents herewith that he is aware of the working conditions, has carefully reviewed the proposal and specifications, has checked and certifies the accuracy of the bid.

The undersigned hereby acknowledges receipt of the following addenda (if any):

ADDENDUM NO.	DATED
_____	_____
_____	_____
_____	_____

Each proposal shall be accompanied by either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to five percent (5%) of the total amount of the bid and payable to the Riverhead Water District. The certified check or bid bond shall specify which contract it accompanies.

**SECURITY ENCLOSED FOR THIS SECTION
(TOTAL BASE BID)**

**YES / NO
(Circle One)**

PROPOSAL CERTIFICATION

This Bid is hereby submitted by:

BIDDER: _____

BIDDER'S ADDRESS:

—

SIGNED BY: _____ TITLE: _____

PRINT NAME: _____ DATE: _____

FEDERAL I.D. NO. OR
SOCIAL SECURITY NO.: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but within 24 hours of being contacted.

DAY: _____ NIGHT: _____

EMERGENCY: _____ FAX: _____

EMAIL: _____

Acknowledgement that the Qualification of Bidders section has been fully completed/executed.

SIGNATURE PRINT NAME TITLE DATE

END OF SECTION 004116

Board:

The undersigned hereby offers to furnish all labor, equipment, materials, and appurtenances for **MANGANESE REMOVAL AT PLANT NO. 5 - CONTRACT G – GENERAL CONSTRUCTION**, all in accordance with the plans and specifications prepared by H2M architects + engineers for the following unit and lump sum bid prices:

ITEM 1 – MOBILIZATION AND DEMOBILIZATION

For mobilization, demobilization, bonds, and insurances. *Item not to exceed 5% of total bid.*

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 2 – SITE REMOVALS

For all the work associated with the removal of site features including fencing, asphalt, concrete, clearing, grubbing, etc. Price shall include the cost of work to furnish, coordinate placement of, and install all the items as noted on the plans and specifications.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 3 – WELL NO. 5-1 BUILDING IMPROVEMENTS

For all the work associated with improvements to the existing well building including removals, finishes, ceilings, and all work specified. Price shall include the cost of work to furnish, coordinate placement of, and install all the items as noted on the plans and specifications.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 4 – CONSTRUCTION OF NEW MANGANESE REMOVAL TREATMENT BUILDING

For all the work associated with the construction of the new manganese treatment building including but not limited to: excavation, shoring, suitable fill/materials, disposal of unsuitable material, backfilling, concrete, structural steel, roofing, building foundation, manganese removal vessel support piers, doors, hatches, hardware, louvers, fans, heaters, supports, trim, finishes, coatings, equipment pads, etc. Price shall include the cost of work to furnish, coordinate placement of, and install all the items as noted on the plans and specifications.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 5 – NEW GENERATOR PAD

For all work associated with the construction of the new emergency generator concrete pad.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 6 – NEW GAC EQUIPMENT PAD

For all work associated with the construction of the new GAC equipment concrete pad.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 7 – NEW DISCHARGE BASINS

For all work associated with the new discharge basins including but not limited to: excavation, shoring, suitable fill/materials, disposal of unsuitable material, backfilling, supports, etc. Price shall include the cost of work to furnish, coordinate placement of, and install all items as noted on the plans and specifications.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 8 – SITE IMPROVEMENTS

For all work associated with site improvements, including but not limited to sidewalk, asphalt driveway, fencing, grading, restoration, and seeding. Price shall include the cost of work for furnish, coordinate placement of, and install all items as noted on the plans and specifications.

LUMP
SUM _____ (\$ _____)
DOLLARS

ITEM 9 - CASH ALLOWANCES

For all cash allowances specified in Section 012100 – Allowances including testing and unforeseen conditions.

LUMP SUM Twenty Five Thousand & 00/100 (\$ 25,000.00)
(Forced Bid Amount of \$25,000.00) DOLLARS

ITEM 10 - FURNITURE ALLOWANCES

For all cash allowances specified in Section 012100 – Allowance to provide furniture as directed to the District for the new Communications room.

LUMP SUM Five Thousand & 00/100 (\$ 5,000.00)
(Forced Bid Amount of \$5,000.00) DOLLARS

ITEM 11 - PROJECT RECORD DOCUMENTS & SPARE PARTS

For project record documents, as-builts, operation and maintenance manuals, spare parts etc., as specified in specification Sections 017800, 017823, 017839, and 017843.

LUMP SUM _____ (\$ _____)
 (Minimum Bid of \$5,000.00) DOLLARS

TOTAL BASE BID (Sum of All Items)

 DOLLARS (\$ _____)

The Board of the Riverhead Water District reserves the right to award this contract based on either **the total base bid** or any combination of bid items, as may be in the best interest of the Riverhead Water District. The award shall be made to the lowest responsible bidder based upon the bid items awarded. The Board reserves the right to reject any or all bids. The Board reserves the right to award this contract within forty-five (45) days of the bid opening.

Within ten (10) consecutive calendar days after the date of the Notice of Award, the bidder shall execute the contract and furnish the required bonds and insurances. The Notice to Proceed will be issued after the contract has been executed by the Owner.

All work shown and specified in the contract documents and included in this bid shall be completed within **two-hundred fifty (250)** consecutive calendar days from the date of Notice to Proceed.

The District shall have at its disposal the ability to operate both Well Nos. 5-1 and 5-2A between the period of **May 28 through September 15**. This includes all components necessary to operate both wells to system without service interruptions to the Owner's normal operations.

In addition to liquidated damages, specific damages will be assessed and deducted from amounts otherwise due the contractor for additional inspection and contract management time required to be expended by the Engineer should the project be completed beyond the contract completion date. Such deduction shall be in accordance with the billing rates and fees established between H2M and the Riverhead Water District.

The contractor shall coordinate all work with the Owner to minimize disturbances to Owner operations.

The bidder represents herewith that he is aware of the working conditions, has carefully reviewed the proposal and specifications, has checked and certifies the accuracy of the bid.

The undersigned hereby acknowledges receipt of the following addenda (if any):

ADDENDUM NO.

DATED

Each proposal shall be accompanied by either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to five percent (5%) of the total amount of the bid and payable to the Riverhead Water District. The certified check or bid bond shall specify which contract it accompanies.

**SECURITY ENCLOSED FOR THIS SECTION
(TOTAL BASE BID)**

**YES / NO
(Circle One)**

PROPOSAL CERTIFICATION

This Bid is hereby submitted by:

BIDDER: _____

BIDDER'S ADDRESS:

SIGNED BY: _____ TITLE: _____

PRINT NAME: _____ DATE: _____

FEDERAL I.D. NO. OR
SOCIAL SECURITY NO.: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but within 24 hours of being contacted.

DAY: _____ NIGHT: _____

EMERGENCY: _____ FAX: _____

EMAIL: _____

Acknowledgement that the Qualification of Bidders section has been fully completed/executed.

SIGNATURE PRINT NAME TITLE DATE

END OF SECTION 004117

Board:

The undersigned hereby offers to furnish all labor, equipment, materials and appurtenances for **Manganese Removal at Plant No. 5 – CONTRACT P – PLUMBING CONSTRUCTION**, all in accordance with the plans and specifications prepared by H2M architects + engineers for the following unit and lump sum prices:

ITEM 1 - MOBILIZATION AND DEMOBILIZATION

For mobilization, demobilization, bonds and insurances. *Item not to exceed 5% of total bid.*

LUMP (\$)
SUM: _____
DOLLARS

ITEM 2 – WELLHOUSE REMOVALS

For all labor, materials and equipment necessary to perform removal and disposal of specified items in the Well No. 5-1 & 5-2A building.

LUMP
SUM: _____
DOLLARS

ITEM 3 - NEW MANGANESE REMOVAL TREATMENT SYSTEM

For all labor, materials and equipment necessary for furnishing and installing the new iron treatment system, including but not limited to the carbon steel vessels, face piping, influent piping (from building penetration to face piping), valves, measuring devices, media, coating systems, penetrations, supports, discharge/backwash piping (from face piping to building penetration), waste piping (from face piping to building penetration), air scour system and all equipment associated with the system and its operation. Price shall include the cost of work to furnish, coordinate placement of, and install all new items as specified.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 4 – NEW LARGE MECHANICAL PIPING

For all work associated with the new large piping within existing buildings, including but not limited to materials and equipment necessary for furnishing and installing large mechanical piping, valves, coatings, supports, and accessories, as specified. Price shall include the cost of work to remove and dispose of existing equipment, and to furnish, coordinate placement of, and install all new items as specified.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 5 – SMALL MECHANICAL PIPING, VALVES, AND ACCESSORIES

For all labor, materials and equipment necessary for furnishing and installing interior small mechanical piping in the new Treatment Building, the Well No. 5-1 Building, including but not limited to drainage lines, water service lines, e-shower, hose bibs, coatings, valves, gauges, supports, plumbing specialties, sampling lines, and accessories as specified. Price shall include the cost of work to remove and dispose of existing equipment; and to furnish coordinate placement of, and install all new items specified.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 6 – CHEMICAL TREATMENT SYSTEM MODIFICATIONS

For all work associated with the chemical treatment systems, including but not limited to, chemical pumps, small piping, valves, pump tables, chemical storage tanks, shelves containment systems, penetrations, sleeves, accessories etc. for calcium hydroxide, sequestration and calcium hypochlorite treatment systems. Price shall include the cost of work to remove and dispose of existing equipment; and to furnish, coordinate placement of, and install all new items as specified.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 7 – SITE PIPING, VALVES AND ACCESSORIES

For all work associated with site piping, including but not limited to, water service lines, chemical piping, water main, waste lines, new goose-necks, connection to discharge basins, site piping cut-ins, valve, sleeves, thrust blocks, retaining glands, fittings, service taps, accessories, trenching, backfill and restoration. Price shall include the cost of work to remove and dispose of existing equipment as required; and to furnish, coordinate placement, and install all new items as specified.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 8 – STARTUP AND TESTING

For startup and testing of all systems and equipment furnished under this contract, as specified in Section 17500.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 9 - DISINFECTION

For disinfection and water quality testing for all plant process piping, chemical treatment systems, manganese removal vessels and site piping, in accordance with Section 331140. The contractor shall continue disinfecting at no additional cost to the Owner, until acceptable results have been received and approved by NYS Department of Health for a fully functional plant site.

LUMP (\$)
SUM: _____
DOLLARS

ITEM 10 - CASH ALLOWANCES

For all cash allowances as specified in Section 012100 – Allowances, including testing and unforeseen conditions.

LUMP (\$50,000.00)
 SUM: Fifty Thousand & 0/100
 (Forced Bid Amount of \$50,000.00) DOLLARS

ITEM 11 - PROJECT RECORD DOCUMENTS & SPARE PARTS

For furnishing project record documents, as-builts, and operation and maintenance manuals as specified in specification Sections 017800, 017823, 017839, and 017843.

LUMP (\$)
 SUM: _____
 (Minimum Bid of \$5,000.00) DOLLARS

TOTAL BASE BID (Sum of All Items)

 DOLLARS (\$)

The Bidder shall be aware that this project has received funding from the New York State Environmental Facility Corporation and therefore, requirements of this organization must be adhered to. Please see Appendix A of this specification, which includes the specific requirements of the Environmental Facilities Corporation Program.

The Bidder shall supply with the bid documents the expected useful life and removal efficiency of the carbon used for this bid.

The Board of the Riverhead Water District reserves the right to award this contract based on either the total base bid, total alternate bid, or any combination of bid items, as may be in the best interest of the Riverhead Water District. The award shall be made to the lowest responsible bidder based upon the bid items awarded. The Board reserves the right to reject any or all bids. The Board reserves the right to award this contract within forty-five (45) days of the bid opening.

Within ten (10) consecutive calendar days after the date of the Notice of Award, the bidder shall execute the contract and furnish the required bonds and insurances. The Notice to Proceed will be issued after the contract has been executed by the Owner.

All work shown and specified in the contract documents and included in this bid shall be completed within **two-hundred fifty (250)** consecutive calendar days from the date of Notice to Proceed.

The District shall have at its disposal the ability to operate both Well Nos. 5-1 and 5-2A between the period of **May 28 through September 15**. This includes all components necessary to operate both wells to system without service interruptions to the Owner's normal operations.

In addition to liquidated damages, specific damages will be assessed and deducted from amounts otherwise due the contractor for additional inspection and contract management time required to be expended by the Engineer should the project be completed beyond the contract completion date. Such

deduction shall be in accordance with the billing rates and fees established between H2M and the Riverhead Water District.

The contractor shall coordinate all work with the Owner to minimize disturbances to Owner operations.

The bidder represents herewith that he is aware of the working conditions, has carefully reviewed the proposal and specifications, has checked and certifies the accuracy of the bid.

The undersigned hereby acknowledges receipt of the following addenda (if any):

ADDENDUM NO.	DATED
_____	_____
_____	_____
_____	_____

Each proposal shall be accompanied by either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to five percent (5%) of the total amount of the bid and payable to the Riverhead Water District. The certified check or bid bond shall specify which contract it accompanies.

**SECURITY ENCLOSED FOR THIS SECTION
(TOTAL BASE BID)**

**YES / NO
(Circle One)**

PROPOSAL CERTIFICATION

This Bid is hereby submitted by:

BIDDER: _____

BIDDER'S ADDRESS:

SIGNED BY: _____ TITLE: _____

PRINT NAME: _____ DATE: _____

FEDERAL I.D. NO. OR
SOCIAL SECURITY NO.: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but within 24 hours of being contacted.

DAY: _____ NIGHT: _____

EMERGENCY: _____ FAX: _____

EMAIL: _____

Acknowledgement that the Qualification of Bidders section has been fully completed/executed.

_____ SIGNATURE	_____ PRINT NAME	_____ TITLE	_____ DATE

END OF SECTION 004118

Board:

The undersigned hereby offers to furnish all labor, equipment, materials and appurtenances for **Manganese Removal at Plant No. 5 – CONTRACT W - WELL PUMP CONSTRUCTION**, all in accordance with the plans and specifications prepared by H2M architects + engineers for the following unit and lump sum prices:

ITEM 1 - MOBILIZATION AND DEMOBILIZATION

For mobilization, demobilization, bonds and insurances. *Item not to exceed 5% of total bid.*

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 2 - AQUIFER AND WELL TESTING

For preliminary aquifer testing, well caliper survey, plumbness/deviation testing, and alignment (dummy) testing at Well No. 5-1 and Well No. 5-2(A).

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 3A - REMOVAL OF PUMPING UNIT AT WELL NO. 5-1

For all work associated with removing existing motor and discharge head, and removing and legally disposing of well pump, column pipe, suction pipe, probe line, airline, and miscellaneous equipment, as specified.

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 3B - REMOVAL OF PUMPING UNIT AT WELL NO. 5-2A

For all work associated with removing existing motor and discharge head, and removing and legally disposing of well pump, column pipe, suction pipe, probe line, airline, and miscellaneous equipment, as specified..

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 4 - TELEVISION INSPECTION

For performing two (2) television inspections (pre and post cleaning), for each well, and providing the Engineer with two (2) DVD copies of each inspection.

PRICE PER (\$)
 INSPECTION: _____
 DOLLARS

TOTAL: (\$)
 FOR 4 _____
 INSPECTIONS DOLLARS

ITEM 5 - WELL WIRE BRUSHING, CLEANING, AND AIR LIFTING

For wire brushing, cleaning, and air lifting of Well No. 5-1 and Well No. 5-2(A).

PRICE PER
CLEANING: _____ (\$ _____)
DOLLARS

TOTAL: _____ (\$ _____)
FOR 2 DOLLARS

ITEM 6A - NEW WELL PUMPING AND ACCESSORIES WELL No. 5-1

For furnishing and installing new well pumping unit, suction pipe, and accessories for Well No. 5-1.
Price shall include cost to reinstall existing discharge heads and all incidentals.

LUMP (\$ _____)
SUM: _____
DOLLARS

ITEM 6B - NEW WELL PUMPING AND ACCESSORIES WELL No. 5-2A

For furnishing and installing new well pumping unit, suction pipe, and accessories for Well No. 5-2A
Price shall include cost to reinstall existing discharge heads and all incidentals.

LUMP
SUM: _____
DOLLARS

ITEM 7 - NEW COLUMN PIPE

For furnishing and installing new column pipe, line shafts, bearings, bearing retainers, and accessories as specified for Well No. 5-1 and Well No. 5-2(A).

PRICE (\$ _____)
PER
FOOT _____
DOLLARS

TOTAL
PRICE: _____ (\$ _____)
(150 Feet) DOLLARS

ITEM 8A - NEW ELECTRIC MOTOR WELL NO. 5-1

For furnishing and installing new premium efficiency electric motor for Well No. 5-1.

LUMP (\$ _____)
SUM: _____
DOLLARS

ITEM 8B - NEW ELECTRIC MOTOR WELL NO. 5-2A

For furnishing and installing new premium efficiency electric motor for Well No. 5-2(A).

LUMP (\$ _____)
SUM: _____
DOLLARS

ITEM 9 - PUMP TESTING AND DISINFECTION

For disinfection and water quality sampling in accordance with specification Section 331140 and well pump testing, including starting and adjusting for Well No. 5-1 and Well No. 5-2(A).

LUMP (\$)
 SUM: _____
 DOLLARS

ITEM 10 - CASH ALLOWANCES

For all cash allowances as specified in Section 012100 – Allowances, including testing and unforeseen conditions.

LUMP (\$50,000.00)
 SUM: Fifty Thousand & 0/100
 (Forced Bid Amount of \$50,000.00) DOLLARS

ITEM 11 - PROJECT RECORD DOCUMENTS & SPARE PARTS

For furnishing project record documents, as-builts, and operation and maintenance manuals as specified in specification Sections 017800, 017823, 017839, and 017843.

LUMP (\$)
 SUM: _____
 (Minimum Bid of \$5,000.00) DOLLARS

TOTAL BASE BID (Sum of All Items)

 DOLLARS (\$)

The Bidder shall be aware that this project has received funding from the New York State Environmental Facility Corporation and therefore, requirements of this organization must be adhered to. Please see Appendix A of this specification, which includes the specific requirements of the Environmental Facilities Corporation Program.

The Bidder shall supply with the bid documents the expected useful life and removal efficiency of the carbon used for this bid.

The Board of the Riverhead Water District reserves the right to award this contract based on either the total base bid, total alternate bid, or any combination of bid items, as may be in the best interest of the Riverhead Water District. The award shall be made to the lowest responsible bidder based upon the bid items awarded. The Board reserves the right to reject any or all bids. The Board reserves the right to award this contract within forty-five (45) days of the bid opening.

Within ten (10) consecutive calendar days after the date of the Notice of Award, the bidder shall execute the contract and furnish the required bonds and insurances. The Notice to Proceed will be issued after the contract has been executed by the Owner.

All work shown and specified in the contract documents and included in this bid shall be completed within **ninety (90)** consecutive calendar days from the date of Notice to Proceed.

The District shall have at its disposal the ability to operate both Well Nos. 5-1 and 5-2A between the period of **May 28 through September 15**. This includes all components necessary to operate both wells to system without service interruptions to the Owner's normal operations.

In addition to liquidated damages, specific damages will be assessed and deducted from amounts otherwise due the contractor for additional inspection and contract management time required to be expended by the Engineer should the project be completed beyond the contract completion date. Such deduction shall be in accordance with the billing rates and fees established between H2M and the Riverhead Water District.

The contractor shall coordinate all work with the Owner to minimize disturbances to Owner operations.

The bidder represents herewith that he is aware of the working conditions, has carefully reviewed the proposal and specifications, has checked and certifies the accuracy of the bid.

The undersigned hereby acknowledges receipt of the following addenda (if any):

ADDENDUM NO.

DATED

_____	_____
_____	_____
_____	_____

Each proposal shall be accompanied by either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to five percent (5%) of the total amount of the bid and payable to the Riverhead Water District. The certified check or bid bond shall specify which contract it accompanies.

**SECURITY ENCLOSED FOR THIS SECTION
(TOTAL BASE BID)**

**YES / NO
(Circle One)**

PROPOSAL CERTIFICATION

This Bid is hereby submitted by:

BIDDER: _____

BIDDER'S ADDRESS:

SIGNED BY: _____ TITLE: _____

PRINT NAME: _____ DATE: _____

FEDERAL I.D. NO. OR
SOCIAL SECURITY NO.: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but within 24 hours of being contacted.

DAY: _____ NIGHT: _____

EMERGENCY: _____ FAX: _____

EMAIL: _____

Acknowledgement that the Qualification of Bidders section has been fully completed/executed.

SIGNATURE PRINT NAME TITLE DATE

END OF SECTION 004116

Enclosed is a certified check or bid bond for five percent (5%) of the total amount of the bid as required in the foregoing "Information for Bidders".

The Bidder hereby agrees to appear with its sureties at the office of the Riverhead Water District within ten (10) calendar days after due notice from the Board of the Riverhead Water District that the Contract has been awarded to it and is ready for signature; such notice to be given in writing within forty five (45) days of opening of the bids; and, on the signing of such Contract by the Bidder, to furnish the indemnifying bonds as provided in the Contract.

The Bidder hereby further agrees that in the event of its failure or refusal to enter into a contract in accordance with this bid within ten (10) days after due notice from the Board that the Contract has been awarded to it and is ready for signature, as given in accordance with the Contract Documents and/or its failure to execute and deliver the bond for the full amount of the Contract price, as provided in said Contract Documents, the Bidder's check or bid bond which is herewith deposited with the Board (at the option of said Board) become due and payable as ascertained and liquidated damages for such default; otherwise, said check or bid bond will be returned to the undersigned.

The full names and residences of all persons and parties interested in the foregoing bid as principals are as follows:

NAME

ADDRESS

_____	_____
_____	_____
_____	_____

NAME OF BIDDER: _____

BUSINESS ADDRESS OF BIDDER: _____

Telephone number where the bidder or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but no later than twenty four (24) hours:

DAY: _____ EVENING: _____

DATED AT: _____ THE _____ DAY OF _____, 20____

END OF SECTION 004313

Riverhead Water District**Suffolk County, New York**

Bidders shall submit to the Owner the names of the Subcontractors which the Bidder proposes to use on the project. The Owner reserves the right to disapprove the use of any proposed subcontractor and in such event the Bidder shall submit the name of another Subcontractor in the like manner and in the time specified by the Owner. Such disapproval shall not result in additional costs to the Owner. The Owner reserves the right to reject any bid if the name of the proposed Subcontractors, or additional subcontractor information, is not submitted as required.

BIDDER:

FIRM NAME: _____

ADDRESS: _____

PREPARED BY: _____

SIGNED BY: _____

TITLE: _____

END OF SECTION 004350

1.0 - INDEMNITY

The Contractor and all subcontractors performing work in connection with this Contract shall HOLD HARMLESS, INDEMNIFY and DEFEND the Owner and Engineer, their consultants and each of their officers, agents and employees from any liability, claims, losses or damage including reasonable costs of defense arising out of or alleged to arise from the Contractor's or subcontractor's negligence in the performance of the work described in the Contract Documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer or their officers, agents and employees.

2.0 - LIMITATION OF LIABILITY

The Contractor and all subcontractors agree to limit the liability of the Owner and the Engineer due to the Engineer's professional negligent errors or omissions such that the total aggregate liability of the Engineer to those named shall not exceed Fifty Thousand Dollars (\$50,000) or five percent (5%) of the Contract award amount, whichever is greater.

3.0 - NO CLAIM FOR DELAY

The Contractor and all subcontractors agree to HOLD HARMLESS from any and all claims for loss or damages of any nature against the Owner or Engineer for delays in commencement, performance or completion of the Contract, regardless of whether said delays are, or may be, caused by the Owner, Engineer or any governmental agency.

END OF SECTION 004355

NON-COLLUSIVE BIDDING CERTIFICATE

Pursuant to Section 103-D of the General Municipal Law, the Contractor makes the following statement under penalty of perjury, and by submission of this bid or proposal, the Bidder certifies that:

(a) this bid or proposal has been independently arrived at without collusion with any other bidder or with any competitor or potential competitor; (b) this bid or proposal has not been knowingly disclosed and will not be knowingly disclosed prior to the opening of the bids or proposals for this project to any other bidder, competitor or potential competitor; (c) no attempt has been or will be made to induce any other person, partnership or corporation to submit or not to submit a bid or proposal; (d) the person signing this bid or proposal certified that he has fully informed himself regarding the accuracy of the statements contained in this certification, and under the penalties of perjury, affirms the truth thereof, such penalties being applicable to the Bidder as well as to the person signing in its behalf; (e) attached hereto (if a corporate bidder) is a certified copy of resolution authorizing the execution of this certificate by the signatory of the bid or proposal on behalf of the corporate bidder.

Resolved that _____
(Name of Corporation)

be authorized to sign and submit the bid or proposal of this corporation for the following project:

Wellhead Treatment for Removal of Manganese at Plant No. 5
(Name of Project)

and to include in such bid or proposal the certificate as to non-collusion required by Section 103-D of the General Municipal Law as the act and deed of said corporation; and for any inaccuracies or misstatements in such certificate, this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by _____

at a meeting of its Board of Directors held on the _____ day of _____, 20__

(Seal of the Corporation) Secretary: _____

Respectfully submitted,

FIRM NAME: _____

FIRM ADDRESS: _____

SIGNED BY: _____

TITLE: _____

END OF SECTION 004519

Vendor Responsibility Questionnaire begins on the following page.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

You have selected the For-Profit Construction questionnaire, commonly known as the "CCA-2," which may be printed and completed in this format or, **for your convenience, may be completed online using the [New York State VendRep System](#).**

COMPLETION & CERTIFICATION

The person(s) completing the questionnaire must be knowledgeable about the vendor's business and operations. An owner or official must certify the questionnaire and the signature must be notarized.

NEW YORK STATE VENDOR IDENTIFICATION NUMBER (VENDOR ID)

The Vendor ID is a ten-digit identifier issued by New York State when the vendor is registered on the Statewide Vendor File. This number must now be included on the questionnaire. If the business entity has not obtained a Vendor ID, contact the IT Service Desk at ITServiceDesk@osc.state.ny.us or call 866-370-4672.

DEFINITIONS

All underlined terms are defined in the "New York State Vendor Responsibility Definitions List," found at <http://www.osc.state.ny.us/vendrep/documents/questionnaire/definitions.pdf>. These terms may not have their ordinary, common or traditional meanings. Each vendor is strongly encouraged to read the respective definitions for any and all underlined terms. By submitting this questionnaire, the vendor agrees to be bound by the terms as defined in the "New York State Vendor Responsibility Definitions List" existing at the time of certification.

RESPONSES

Every question must be answered. Each response must provide all relevant information which can be obtained within the limits of the law. However, information regarding a determination or finding made in error which was subsequently corrected or overturned, and/or was withdrawn by the issuing government entity, is not required. Individuals and Sole Proprietors may use a Social Security Number but are encouraged to obtain and use a federal Employer Identification Number (EIN).

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

BUSINESS ENTITY INFORMATION

<u>Legal Business Name</u>		<u>EIN</u> _____		
Address of the <u>Principal Place of Business</u> (street, city, state, zip code)		<u>New York State Vendor Identification Number</u>		
		Telephone ext.	Fax	
		Website		
Authorized Contact for this Questionnaire				
Name		Telephone ext.	Fax	
Title		Email		
Additional <u>Business Entity</u> Identities: If applicable, list any other <u>DBA</u> , <u>Trade Name</u> , <u>Former Name</u> , Other Identity, or <u>EIN</u> used in the last five (5) years, the state or county where filed and the status (active or inactive).				
Type	Name	EIN	State or County where filed	Status

I. BUSINESS CHARACTERISTICS

1.0 <u>Business Entity</u> Type – Check appropriate box and provide additional information:			
a) ☐ <u>Corporation</u> (including <u>PC</u>)	Date of Incorporation		
b) ☐ <u>Limited Liability Company</u> (<u>LLC</u> or <u>PLLC</u>)	Date Organized		
c) ☐ <u>Limited Liability Partnership</u>	Date of Registration		
d) ☐ <u>Limited Partnership</u>	Date Established		
e) ☐ <u>General Partnership</u>	Date Established	County (if formed in NYS)	
f) ☐ <u>Sole Proprietor</u>	How many years in business?		
g) ☐ Other	Date Established		
If Other, explain:			
1.1 Was the <u>Business Entity</u> formed in New York State?			☐ Yes ☐ No
If “No,” indicate jurisdiction where the <u>Business Entity</u> was formed:			
☐ United States	State		
☐ Other	Country		

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

I. BUSINESS CHARACTERISTICS			
1.2 Is the <u>Legal Business Entity</u> publicly traded?			☐ Yes ☐ No
If "Yes," provide the <u>CIK code</u> or Ticker Symbol:			
1.3 Is the <u>Business Entity</u> currently <u>registered to do business in New York State</u> ?			☐ Yes ☐ No
<i>Note: Select "Not Required" if the Business Entity is a Sole Proprietor or General Partnership</i>			☐ Not Required
If "No," explain why the <u>Business Entity</u> is not required to be <u>registered to do business in New York State</u> :			
1.4 Is the responding <u>Business Entity</u> a <u>Joint Venture</u> ? Note: If the submitting <u>Business Entity</u> is a <u>Joint Venture</u> , also submit a separate questionnaire for each <u>Business Entity</u> comprising the <u>Joint Venture</u> .			☐ Yes ☐ No
1.5 If the <u>Business Entity's Principal Place of Business</u> is not in New York State, does the <u>Business Entity</u> maintain an office in New York State?			☐ Yes ☐ No
<i>(Select "N/A" if <u>Principal Place of Business</u> is in New York State.)</i>			☐ N/A
If "Yes," provide the address and telephone number for one office located in New York State.			
1.6 Is the Business Entity a New York State certified <u>Minority-Owned Business Enterprise</u> , or <u>Women-Owned Business Enterprise</u> , or <u>New York State Small Business</u> , or federally certified <u>Disadvantaged Business Enterprise</u> ?			☐ Yes ☐ No
If "Yes," check all that apply: ☐ New York State certified <u>Minority-Owned Business Enterprise</u> (MBE) ☐ New York State certified <u>Women-Owned Business Enterprise</u> (WBE) ☐ <u>New York State Small Business</u> ☐ Federally certified <u>Disadvantaged Business Enterprise</u> (DBE)			
1.7 Identify each person or business entity that is, or has been within the past five (5) years, <u>Principal Owner</u> of 5.0% or more of the firm's shares; a Business Entity Official; or one of the five largest shareholders, if applicable. <i>(Attach additional pages if necessary.)</i> <u>Joint Ventures</u> : Provide information for all firms involved.			
Name <i>(For each person, include middle initial)</i>	Title	Percentage of ownership (Enter 0%, if not applicable)	Employment status with the firm
			☐ Current ☐ Former
			☐ Current ☐ Former
			☐ Current ☐ Former
			☐ Current ☐ Former

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

II. AFFILIATE and JOINT VENTURE RELATIONSHIPS		
2.0 Are there any other <u>construction</u> -related firms in which, now or in the past five years, the submitting <u>Business Entity</u> or any of the individuals or business entities listed in question 1.7 either owned or owns 5.0% or more of the shares of, or was or is one of the five largest shareholders or a director, officer, partner or proprietor of said other firm? <i>(Attach additional pages if necessary.)</i>		☐ Yes ☐ No
Firm/Company Name	Firm/Company EIN (If available)	Firm/Company's Primary Business Activity
Firm/Company Address		
Explain relationship with the firm and indicate percent of ownership, if applicable (enter N/A, if not applicable):		
Are there any shareholders, directors, officers, owners, partners or proprietors that the submitting <u>Business Entity</u> has in common with this firm?		☐ Yes ☐ No
Individual's Name <i>(Include middle initial)</i>	Position/Title with Firm/Company	
2.1 Does the <u>Business Entity</u> have any <u>construction</u> -related <u>affiliates</u> not identified in the response to question 2.0 above? <i>(Attach additional pages if necessary.)</i>		☐ Yes ☐ No
Affiliate Name	Affiliate EIN (If available)	Affiliate's Primary Business Activity
Affiliate Address		
Explain relationship with the affiliate and indicate percent of ownership, if applicable <i>(enter N/A, if not applicable)</i> :		
Are there any shareholders, directors, officers, owners, partners or proprietors that the submitting Business Entity has in common with this affiliate?		☐ Yes ☐ No
Individual's Name <i>(Include middle initial)</i>	Position/Title with Firm/Company	
2.2 Has the <u>Business Entity</u> participated in any <u>construction-related Joint Ventures</u> within the past three (3) years? <i>(Attach additional pages if necessary.)</i>		☐ Yes ☐ No
Joint Venture Name	Joint Venture EIN (If available)	Identify parties to the Joint Venture

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

III. CONTRACT HISTORY

3.0 Has the Business Entity completed any construction contracts? ☐ Yes ☐ No

If "Yes," list the ten most recent construction contracts the Business Entity has completed using Attachment A – Completed Construction Contracts, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3294s.doc.

If less than ten, include most recent subcontracts on projects up to that number.

3.1 Does the Business Entity currently have uncompleted construction contracts? ☐ Yes ☐ No

If "Yes," list all current uncompleted construction contracts by using Attachment B – Uncompleted Construction Contracts, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3295s.doc.

Note: Ongoing projects must be included.

IV. INTEGRITY – CONTRACT BIDDING

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

4.0 Been suspended or debarred from any government contracting process or been disqualified on any government procurement? ☐ Yes ☐ No

4.1 Been subject to a denial or revocation of a government prequalification? ☐ Yes ☐ No

4.2 Had any bid rejected by a government entity for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid? ☐ Yes ☐ No

4.3 Had a proposed subcontract rejected by a government entity for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid? ☐ Yes ☐ No

4.4 Had a low bid rejected on a government contract for failure to make good faith efforts on any Minority-Owned Business Enterprise, Women-Owned Business Enterprise or Disadvantaged Business Enterprise goal or statutory affirmative action requirements on a previously held contract? ☐ Yes ☐ No

4.5 Agreed to a voluntary exclusion from bidding/contracting with a government entity? ☐ Yes ☐ No

4.6 Initiated a request to withdraw a bid submitted to a government entity or made any claim of an error on a bid submitted to a government entity? ☐ Yes ☐ No

For each "Yes," provide an explanation of the issue(s), the Business Entity involved, the relationship to the submitting Business Entity, the government entity involved, project(s), relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses.

V. INTEGRITY – CONTRACT AWARD

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

5.0 Defaulted on or been suspended, cancelled or terminated for cause on any contract? ☐ Yes ☐ No

5.1 Been subject to an administrative proceeding or civil action seeking specific performance or restitution (except any disputed work proceeding) in connection with any government contract? ☐ Yes ☐ No

5.2 Entered into a formal monitoring agreement, consent decree or stipulation settlement as specified by, or agreed to with, any government entity? ☐ Yes ☐ No

5.3 Had its surety called upon to complete any contract whether government or private sector? ☐ Yes ☐ No

5.4 Forfeited all or part of a standby letter of credit in connection with any government contract? ☐ Yes ☐ No

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

V. INTEGRITY – CONTRACT AWARD

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

For each “Yes,” provide an explanation of the issue(s), the Business Entity involved, the relationship to the submitting Business Entity, the government entity/owners involved, project(s), contract number(s), relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses.

VI. CERTIFICATIONS/LICENSES

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

6.0 Had a revocation or <u>suspension</u> of any business or professional permit and/or license?	☐ Yes ☐ No

6.1 Had a denial, decertification, revocation or forfeiture of New York State certification of <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> or a federal certification of <u>Disadvantaged Business Enterprise</u> status, for other than a change of ownership?	☐ Yes ☐ No

For each “Yes,” provide an explanation of the issue(s), the Business Entity involved, the relationship to the submitting Business Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses.

VII. LEGAL PROCEEDINGS/GOVERNMENT INVESTIGATIONS

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

7.0 Been the subject of a criminal <u>investigation</u> , whether open or closed, or an indictment for any business-related conduct constituting a crime under local, state or <u>federal</u> law?	☐ Yes ☐ No

7.1 Been the subject of:	
(i.) An indictment, grant of immunity, <u>judgment</u> or conviction (including entering into a plea bargain) for conduct constituting a crime; or	☐ Yes ☐ No
(ii.) Any criminal <u>investigation</u> , felony indictment or conviction concerning the formation of, or any business association with, an allegedly false or fraudulent <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> , or a <u>Disadvantaged Business Enterprise</u> ?	☐ Yes ☐ No

7.2 Received any <u>OSHA</u> citation, which resulted in a final determination classified as <u>serious</u> or <u>willful</u> ?	☐ Yes ☐ No

7.3 Had a <u>government entity</u> find a willful prevailing wage or supplemental payment violation?	☐ Yes ☐ No

7.4 Had a New York State Labor Law violation deemed willful?	☐ Yes ☐ No

7.5 Entered into a consent order with the New York State Department of Environmental Conservation, or a <u>federal</u> , state or local government enforcement determination involving a violation of <u>federal</u> , state or local environmental laws?	☐ Yes ☐ No

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

VII. LEGAL PROCEEDINGS/GOVERNMENT INVESTIGATIONS

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

7.6 Other than previously disclosed, been the subject of any <u>citations</u>, notices or violation orders; a pending administrative hearing, proceeding or determination of a violation of: • <u>Federal</u>, state or local health laws, rules or regulations; • <u>Federal</u>, state or local environmental laws, rules or regulations; • Unemployment insurance or workers compensation coverage or <u>claim</u> requirements; • Any labor law or regulation, which was deemed willful; • Employee Retirement Income Security Act (ERISA); • <u>Federal</u>, state or local human rights laws; • <u>Federal</u>, state or local security laws?	☐ Yes ☐ No

For each "Yes," provide an explanation of the issue(s), the Business Entity involved, the relationship to the submitting Business Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses.

Note: Information regarding a determination or finding made in error, which was subsequently corrected or overturned, and/or was withdrawn by the issuing government entity, is not required.

VIII. LEADERSHIP INTEGRITY

If the Business Entity is a Joint Venture Entity, answer "N/A - Not Applicable" to questions in this section.

Within the past five (5) years has any individual previously identified or any individual currently or formerly having the authority to sign, execute or approve bids, proposals, contracts or supporting documentation on behalf of the Business Entity with any government entity been:

8.0 <u>Sanctioned</u> relative to any business or professional permit and/or license?	☐ Yes ☐ No ☐ N/A
8.1 <u>Suspended</u>, <u>debarred</u> or <u>disqualified</u> from any <u>government contracting process</u>?	☐ Yes ☐ No ☐ N/A
8.2 The subject of a criminal <u>investigation</u>, whether open or closed, or an indictment for any business-related conduct constituting a crime under local, state or <u>federal</u> law?	☐ Yes ☐ No ☐ N/A
8.3 Charged with a misdemeanor or felony, indicted, granted immunity, convicted of a crime or subject to a judgment for: (i.) Any business-related activity, including but not limited to fraud, coercion, extortion, bribe or bribe-receiving, giving or accepting unlawful gratuities, immigration or tax fraud, racketeering, mail fraud, wire fraud, price-fixing or collusive bidding; or (ii.) Any crime, whether or not business-related, the underlying conduct of which related to truthfulness, including but not limited to the filing of false documents or false sworn statements, perjury or larceny	☐ Yes ☐ No ☐ N/A

For each "Yes," provide an explanation of the issue(s), the individual involved, the relationship to the submitting Business Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

IX. FINANCIAL AND ORGANIZATIONAL CAPACITY			
9.0 Within the past five (5) years, has the <u>Business Entity</u> or any <u>affiliate</u> received any <u>formal unsatisfactory performance assessment(s)</u> from any <u>government entity</u> on any contract?			☐ Yes ☐ No
<i>If "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business Entity</u>, the <u>government entity</u> involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</i>			
9.1 Within the past five (5) years, has the <u>Business Entity</u> or any <u>affiliate</u> had any <u>liquidated damages</u> assessed over \$25,000?			☐ Yes ☐ No
<i>If "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business Entity</u>, relevant dates, the contracting party involved, the amount assessed and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</i>			
9.2 Within the past five (5) years, has the <u>Business Entity</u> or any <u>affiliate</u> had any <u>liens, claims or judgments</u> over \$25,000 filed against the <u>Business Entity</u> which remain undischarged or were unsatisfied for more than 90 days? (Note: Including but not limited to tax warrants or liens. Do not include UCC filings.)			☐ Yes ☐ No
<i>If "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business Entity</u>, relevant dates, the Lien holder or Claimants' name(s), the amount of the <u>lien(s)</u> and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</i>			
9.3 In the last seven (7) years, has the <u>Business Entity</u> or any <u>affiliate</u> initiated or been the subject of any bankruptcy proceedings, whether or not closed, or is any bankruptcy proceeding pending?			☐ Yes ☐ No
<i>If "Yes," provide the <u>Business Entity</u> involved, the relationship to the submitting <u>Business Entity</u>, the bankruptcy chapter number, the court name and the docket number. Indicate the current status of the proceedings as "Initiated," "Pending" or "Closed." Provide answer below or attach additional sheets with numbered responses.</i>			
9.4 What is the <u>Business Entity's</u> Bonding Capacity?			
a. Single Project		b. Aggregate (All Projects)	
9.5 List <u>Business Entity's</u> Gross Sales for the previous three (3) Fiscal Years:			
1st Year (Indicate year) Gross Sales	2nd Year (Indicate year) Gross Sales	3rd Year (Indicate year) Gross Sales	
9.6 List <u>Business Entity's</u> Average Backlog for the previous three (3) fiscal years: (Estimated total value of uncompleted work on outstanding contracts)			
1st Year (Indicate year) Amount	2nd Year (Indicate year) Amount	3rd Year (Indicate year) Amount	
9.7 Attach <u>Business Entity's</u> most recent annual <u>financial statement</u> and accompanying notes or complete Attachment C – Financial Information, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3296s.xls . (This information must be attached.)			

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
FOR-PROFIT CONSTRUCTION (CCA-2)**

X. FREEDOM OF INFORMATION LAW (FOIL)

10.0 Indicate whether any information provided herein is believed to be exempt from disclosure under the Freedom of Information Law (FOIL).

☐ Yes ☐ No

Note: A determination of whether such information is exempt from FOIL will be made at the time of any request for disclosure under FOIL. Attach additional pages if necessary.

If "Yes," indicate the question number(s) and explain the basis for the claim.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

Certification

The undersigned: (1) recognizes that this questionnaire is submitted for the express purpose of assisting New York State government entities (including the Office of the State Comptroller (OSC)) in making responsibility determinations regarding award or approval of a contract or subcontract and that such government entities will rely on information disclosed in the questionnaire in making responsibility determinations; (2) acknowledges that the New York State government entities and OSC may, in their discretion, by means which they may choose, verify the truth and accuracy of all statements made herein; and (3) acknowledges that intentional submission of false or misleading information may result in criminal penalties under State and/or Federal Law, as well as a finding of non-responsibility, contract suspension or contract termination.

The undersigned certifies that he/she:

- is knowledgeable about the submitting Business Entity's business and operations;
- has read and understands all of the questions contained in the questionnaire;
- has not altered the content of the questionnaire in any manner;
- has reviewed and/or supplied full and complete responses to each question;
- to the best of his/her knowledge, information and belief, confirms that the Business Entity's responses are true, accurate and complete, including all attachments, if applicable;
- understands that New York State government entities will rely on the information disclosed in the questionnaire when entering into a contract with the Business Entity; and
- is under an obligation to update the information provided herein to include any material changes to the Business Entity's responses at the time of bid/proposal submission through the contract award notification, and may be required to update the information at the request of the New York State government entities or OSC prior to the award and/or approval of a contract, or during the term of the contract.

Signature of Owner/Official _____

Printed Name of Signatory _____

Title _____

Name of Business _____

Address _____

City, State, Zip _____

Sworn to before me this _____ day of _____, 20____;

_____ Notary Public

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT A – COMPLETED CONSTRUCTION CONTRACTS

Vendor Name:

NYS Vendor ID:

Question 3.0: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontracts on projects up to that number:						
1.	Agency/Owner		Award Date	Amount		Date Completed
	Contact Person	Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
2.	Agency/Owner		Award Date	Amount		Date Completed
	Contact Person	Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
3.	Agency/Owner		Award Date	Amount		Date Completed
	Contact Person	Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
4.	Agency/Owner		Award Date	Amount		Date Completed
	Contact Person	Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
5.	Agency/Owner		Award Date	Amount		Date Completed
	Contact Person	Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT A – COMPLETED CONSTRUCTION CONTRACTS

Vendor Name:

NYS Vendor ID:

Question 3.0: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontracts on projects up to that number:						
6.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
7.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
8.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
9.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
10.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**

Question 3.1: List all current uncompleted construction contracts:									
1.	Agency/Owner		Telephone No.		Designer Architect and /or Design Engineer			Award Date	Completion Date
	Contact Person								
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount		Amount Sublet to others		Uncompleted Amount		
	Agency/Owner				Award Date		Completion Date		
2.	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount		Amount Sublet to others		Uncompleted Amount		
	Agency/Owner				Award Date		Completion Date		
	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
3.	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount		Amount Sublet to others		Uncompleted Amount		
	Agency/Owner				Award Date		Completion Date		
	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
4.	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount		Amount Sublet to others		Uncompleted Amount		
	Agency/Owner				Award Date		Completion Date		
	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**

Question 3.1: List all current uncompleted construction contracts:									
5.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			
6.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			
7.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			
8.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:

NYS Vendor ID:

Question 3.1: List all current uncompleted construction contracts:									
1.	Agency/Owner		Telephone No.		Designer Architect and /or Design Engineer			Award Date	Completion Date
	Contact Person								
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount	Amount Sublet to others			Uncompleted Amount		
	Agency/Owner							Award Date	Completion Date
2.	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount	Amount Sublet to others			Uncompleted Amount		
	Agency/Owner							Award Date	Completion Date
	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
3.	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount	Amount Sublet to others			Uncompleted Amount		
	Agency/Owner							Award Date	Completion Date
	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
4.	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable		
			Total Contract Amount	Amount Sublet to others			Uncompleted Amount		
	Agency/Owner							Award Date	Completion Date
	Contact Person		Telephone No.		Designer Architect and /or Design Engineer				

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**

Question 3.1: List all current uncompleted construction contracts:									
5.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			
6.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			
7.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			
8.		Agency/Owner			Award Date			Completion Date	
		Contact Person	Telephone No.	Designer Architect and /or Design Engineer					
		Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable			
				Total Contract Amount	Amount Sublet to others	Uncompleted Amount			

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**

Question 3.1: List all current uncompleted construction contracts:													
9.	Agency/Owner		Telephone No.		Designer Architect and /or Design Engineer								
	Contact Person												
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable									
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount								
10.	Agency/Owner		Telephone No.		Designer Architect and /or Design Engineer								
	Contact Person												
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable									
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount								
<table border="1" style="width: 100%;"> <tr> <td colspan="5">Grand Total All Uncompleted Contracts</td> <td colspan="2">\$0.00</td> </tr> </table>							Grand Total All Uncompleted Contracts					\$0.00	
Grand Total All Uncompleted Contracts					\$0.00								

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION

NYS Vendor ID: _____

As of Date: _____

ASSETS

Current Assets

1. Cash		\$	_____	-
2. Accounts receivable - less allowance for doubtful accounts	\$	_____	-	
Retainers included in accounts receivable	\$	_____	-	
Claims included in accounts receivable not yet approved or in litigation	\$	_____	-	
Total Accounts Receivable		\$	_____	-
3. Notes receivable - due within one year		\$	_____	-
4. Inventory - materials		\$	_____	-
5. Contract costs in excess of billings on uncompleted contracts		\$	_____	-
6. Accrued income receivable				
Interest	\$	_____	-	
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Accrued Income Receivable		\$	_____	-
7. Deposits				
Bid and Plan _____	\$	_____	-	
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Deposits		\$	_____	-
8. Prepaid Expenses				
Income Taxes	\$	_____	-	
Insurance	\$	_____	-	
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Prepaid Expenses		\$	_____	-
9. Other Current Assets				
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Other Current Assets		\$	_____	-
10. Total Current Assets				\$ _____ -
11. Investments				
Listed securities-present market value	\$	_____	-	
Unlisted securities-present value	\$	_____	-	
Total Investments				\$ _____ -

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION

NYS Vendor ID: _____

12. Fixed Assets

Land	\$	-	
Building and improvements	\$	-	
Leasehold improvements	\$	-	
Machinery and equipment	\$	-	
Automotive equipment	\$	-	
Office furniture and fixtures	\$	-	
Other (list) _____	\$	-	
	\$	-	
Total		\$	-
Less: Accumulated depreciation		\$	-
Total Fixed Assets - Net			\$ -

13. Other Assets

Loans receivable			
Officers	\$	-	
Employees	\$	-	
Shareholders	\$	-	
Cash surrender value of officers' life insurance	\$	-	
Organization expense – net of amortization	\$	-	
Notes receivable - due after one year	\$	-	
Other (list) _____	\$	-	
	\$	-	
Total Other Assets			\$ -

14. TOTAL ASSETS

\$ -

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION**

NYS Vendor ID: _____

LIABILITIES

Current Liabilities

15. Accounts payable	\$	_____	-
16 a. Loans from shareholders - due within one year	\$	_____	-
16 b. Other Loans - due within one year	\$	_____	-
17. Notes payable - due within one year	\$	_____	-
18. Mortgage payable - due within one year	\$	_____	-
19. Other payables - due within one year			
Other (list) _____	\$	_____	-
_____	\$	_____	-

Total Other Payables - due within one year	\$	_____	-
20. Billings in excess of costs and estimated earnings	\$	_____	-
21. Accrued expenses payable			
Salaries and wages	\$	_____	-
Payroll taxes	\$	_____	-
Employees' benefits	\$	_____	-
Insurance	\$	_____	-
Other	\$	_____	-
Total Accrued Expenses Payable	\$	_____	-
22. Dividends payable	\$	_____	-
23. Income taxes payable			
State	\$	_____	-
Federal	\$	_____	-
Other	\$	_____	-
Total Income Taxes Payable	\$	_____	-
24. Total current liabilities	\$	_____	-
25. Deferred income taxes payable			
State	\$	_____	-
Federal	\$	_____	-
Other	\$	_____	-
Total Deferred Income Taxes	\$	_____	-
26. Long Term Liabilities			
Loans from shareholders - due after one year	\$	_____	-
Other Loans - due within one year			
Principle	\$	_____	-
Interest	\$	_____	-
Notes payable - due after one year	\$	_____	-
Mortgage - due after one year	\$	_____	-
Other payables - due after one year	\$	_____	-
Other (list) _____	\$	_____	-
_____	\$	_____	-

Total Long Term Liabilities	\$	_____	-

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION**

NYS Vendor ID: _____

27. Other Liabilities

Other (list) _____	\$ _____
_____	\$ _____
_____	_____

Total Other Liabilities

\$ _____

28. TOTAL LIABILITIES

\$ _____

NET WORTH

29. Net Worth (if proprietorship or partnership)

\$ _____

30. Stockholders' Equity

Common stock issued and outstanding	\$ _____
Preferred stock issued and outstanding	\$ _____
Retained earnings	\$ _____
Total	\$ _____
Less: Treasury stock	\$ _____

31. TOTAL STOCKHOLDERS' EQUITY

\$ _____

32. TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY

\$ _____

END OF SECTION 004546

IRAN DIVESTMENT ACT CERTIFICATION

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to paragraph (b) of subdivision 3 of section 165-a of the state finance law.

Dated: _____

(Name of corporation or partnership)

(Signature of Individual)

(Officer stating title) (Partner)

(Print Name of Individual)

END OF SECTION 004547

I have been advised that the Board of the Riverhead Water District requires that vendors and contractors submitting a competitive bid on a purchase or public works contract or a proposal on a purchase or public works contract that does not require competitive bidding file with the Owner at the time of bid or proposal submission a statement in the form required for contractors by the State of New York under State Finance Law § 139-I relative to compliance with requirements for employer sexual harassment preventions programs.

On behalf of myself and my firm or corporation I make the following statement.

By submission of this bid or proposal, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of section two hundred one-g of the labor law.

I recognize that my failure to submit this statement may result in the rejection of my bid.

If I need to qualify this statement under State Finance Law § 139-I, subparagraph (3) I hereby state the reasons why I must qualify this statement:

I have been advised that pursuant to State Finance Law § 139-I this statement and my signature below shall be deemed to have been authorized by the board of directors of my firm or corporation, and such authorization shall be deemed to include the signing and submission of such bid or proposal and the inclusion of such statement as the act and deed of the corporation.

I, hereby affirm under the penalties of perjury that the foregoing statement is true.

Signature

Print Name

State of New York)
) ss.:
County of)

On the ____ day of _____ in the year 20__ before me personally came
_____ to me known, who, being by me duly sworn, did depose
and say that he/she/they reside(s) in _____

_____ (place of residence);
that he/she/they is (are) the _____ (office
held) of the _____ (name of
corporation), the corporation described in and which executed the above
instrument; that he/she/they know(s) the seal of said corporation; that the seal
affixed to said instrument is such corporate seal; that it was so affixed by
authority of the board of directors of said corporation, and that he/she/they
signed his/her/their name(s) thereto by like authority.

NOTARY PUBLIC

END OF SECTION 004548

**Riverhead Water District
Suffolk County, New York**

The Owner may make such investigation as the Owner deems necessary to determine the responsibility of any Bidder or to determine the ability of any Bidder to perform the Work. Bidders shall furnish to the Owner all information and data required by the Owner, including complete financial data, within the time and in the form and manner required by the Owner. The Owner reserves the right to reject any bid if the evidence required by the Owner is not submitted as required or if the evidence submitted by or the investigation of any Bidder fails to satisfy the Owner that the Bidder is responsible, or is able or qualified to carry out the obligations of the Contract or to complete the Work as contemplated. At the discretion of the Owner, any bidder may be required to complete and submit the enclosed New York State Vendor Responsibility Questionnaire to assist in determining the bidder's qualifications.

The following is a list showing the name of the Owner, Location, Date of Construction, General Description of Work, Amount of the Contract and Contract Period for projects of similar nature in size, construction method and construction procedure, which have been completed by the undersigned as the prime contractor, and which have been in operation for a period of not less than one year, (minimum of five such projects).

PROJECT NO. 1

Owner: _____

Contact Name and Phone Number: _____

Location: _____

General Description: _____

Contract Amount: _____

Contract Period: _____

PROJECT NO. 2

Owner: _____

Contact Name and Phone Number: _____

Location: _____

General Description: _____

Contract Amount: _____

Contract Period: _____

PROJECT NO. 3

Owner: _____

Contact Name and Phone Number: _____

Location: _____

General Description: _____

Contract Amount: _____

Contract Period: _____

PROJECT NO. 4

Owner: _____

Contact Name and Phone Number: _____

Location: _____

General Description: _____

Contract Amount: _____

Contract Period: _____

PROJECT NO. 5

Owner: _____

Contact Name and Phone Number: _____

Location: _____

General Description: _____

Contract Amount: _____

Contract Period: _____

The following is a list of the major areas of construction work under this contract to be performed by subcontractors to the bidder, showing the Type of Work and the name of the Owner, Location and Date of Construction for work of similar nature in size, construction method and construction procedure, which have been completed by the undersigned, and which have been in operation for a period of not less than one year, (minimum of five such projects).

Subcontractor Name: _____

Type of Work: _____

<u>Owner</u>	<u>Contact Name</u>	<u>Phone Number</u>	<u>Location</u>	<u>Contract Amount</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Subcontractor Name: _____

Type of Work: _____

<u>Owner</u>	<u>Contact Name</u>	<u>Phone Number</u>	<u>Location</u>	<u>Contract Amount</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Subcontractor Name: _____

Type of Work: _____

<u>Owner</u>	<u>Contact Name</u>	<u>Phone Number</u>	<u>Location</u>	<u>Contract Amount</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Subcontractor Name: _____

Type of Work: _____

<u>Owner</u>	<u>Contact Name</u>	<u>Phone Number</u>	<u>Location</u>	<u>Contract Amount</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

The Riverhead Water District reserves the right to reject any and all bids which do not include a completed qualifications section and/or do not meet the necessary qualifications criteria, for both prime contractor and subcontractors, as described within this qualifications section, for construction work to be performed and completed as required by the contract documents.

BIDDER

FIRM NAME: _____

ADDRESS: _____

PREPARED BY: _____

SIGNED BY: _____

TITLE: _____

END OF SECTION 004550

I have been advised that this project has received funding from the New York State Environmental Facility Corporation and therefore, requirements of this organization must be adhered to.

By submission of this bid or proposal, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, that the bidder will comply with the provisions of New York State Executive Law Article 15-A, 5 NYCRR Parts 140-145, Executive Law Article 17-B, 9 NYCRR Part 252, 40 CFR Part 33, Titles VI and VII of the Civil Rights Act of 1964, 40 CFR Part 7, 41 CFR Part 60-1 Subpart A, and 41 CFR Part 60-4, and other requirements prescribed by the New York State Environmental Facilities Corporation ("EFC") relating to the participation of minority- and women-owned business enterprises ("MWBs"), the participation of service-disabled veteran-owned business enterprises ("SDVOBs"), equal employment opportunities ("EEO"), and affirmative action, throughout the life of the project. Specific requirements of the Environmental Facilities Corporation Program are included in Appendix B.

I, hereby affirm under the penalties of perjury, that the foregoing statement is true. My signature below shall be deemed to have been authorized by the board of directors of my firm or corporation, and such authorization shall be deemed to include the signing and submission of such bid or proposal and the inclusion of such statement as the act and deed of the corporation. I recognize that my failure to submit this statement may result in the rejection of my bid.

BIDDER:

FIRM NAME: _____

ADDRESS: _____

SIGNED BY: _____

TITLE: _____

END OF SECTION 004553

It is the Contractor's responsibility to inform the Engineer in advance when a situation arises that forces the Contractor to cancel work for a given day. For example, if the Contractor informs the Engineer that he will be on the job on a certain day and then has to cancel the appointment because he cannot obtain certain materials or equipment, it is the Contractor's responsibility to inform the Engineer of these latest developments and to let him know that construction observation services will not be needed for that day.

In the event that the Engineer is not given ample warning of such a cancellation and, as a result, unnecessary time is spent sending field personnel out to the project site to observe the previously scheduled construction, sufficient funds will be deducted from monies due the Contractor to reimburse the Engineer for his wasted time.

By the same token, sufficient funds will be deducted from monies due the Contractor to reimburse the Engineer for any services rendered in the field or in the office regarding work that had to be performed a second time due to substandard work on the part of the Contractor on the original work.

END OF SECTION 004555

SECTION 005209 – CONTRACT

CONTRACT IN QUADRUPLICATE FOR Wellhead Treatment for Removal of Manganese at
Plant No. 5 FOR THE TOWN OF RIVERHEAD, SUFFOLK COUNTY, NEW YORK, dated _____
_____, 20____, BY AND BETWEEN THE TOWN BOARD OF THE TOWN OF RIVERHEAD, SUFFOLK
COUNTY, NEW YORK, acting for and in behalf of the RIVERHEAD WATER DISTRICT (herein called the
TOWN DISTRICT), and _____
(herein called the CONTRACTOR).

WITNESSETH, that the TOWN DISTRICT and the CONTRACTOR, in consideration of the
premises and of the mutual covenants, considerations and agreements herein contained, agree as
follows:

This Contract is hereby awarded to the CONTRACTOR, as per Town Board Resolution No.
_____ dated _____, for the work and material called for under his bid in the Proposal section of the
Contract and designated as Items: _____

and if required by the District, Items: _____

for the sum of: _____(\$ _____)

for the unit and/or lump sum price(s) as listed in the Proposal herein.

1. CONTRACT DOCUMENTS AND DEFINITIONS

The Notice to Bidders, Information for Bidders, Proposal, General Conditions, Contract, Specifications and Plans, together with any Addenda, shall form part of this Contract, and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The titles, headings, headlines and marginal notes contained herein are solely to facilitate reference to the various provisions of the contract documents and in no way affect, limit or cast light upon the interpretation of the provisions to which they refer. Whenever the term "contract documents" is used, it shall mean and include this Contract, the Plans, Specifications, any Addenda, and the Notice to Bidders, Information for Bidders, General Conditions and Proposal. In case of any conflict or inconsistency between the provisions of the Contract and those of the Specifications, the provisions of the Contract shall govern.

WORK: The term WORK, as used herein, refers to all of the work proposed to be accomplished at the site of the project and all such other work as is in any manner required to accomplish the completed project, and includes all plant, labor, materials, supplies, equipment and other facilities and acts necessary or proper for or incidental to the carrying out and completion of the terms of this Contract. The term WORK PERFORMED shall be construed to include material delivered to and suitably stored at the site of the project.

EXTRA WORK: The term EXTRA WORK, as used herein, refers to and includes all work required by the TOWN DISTRICT which, in the judgment of the Engineer, with the Town's approval, involves changes in or additions to work required by the Plans, Specifications and any Addenda in their present form.

SUBCONTRACTOR: The term SUBCONTRACTOR, as used herein, shall mean any person, firm or corporation applying labor and material for work at the site of the project, but not including the parties to this Contract.

ENGINEER: In the performance of the work, the TOWN DISTRICT shall be represented by its Consulting Engineer H2M architects + engineers (herein called the ENGINEER).

NOTICE: The term NOTICE, as used herein, shall mean and include written notice. Written notice shall be deemed to have been duly served when delivered to, or at the last known business address of, the person, firm or corporation for whom intended or to his, their, or its duly authorized agents, representatives or officers, or when enclosed in a postage prepaid wrapper or envelope addressed to such person, firm, or corporation at his, their, or its last known business address and deposited in a United States Mail Box.

DIRECTED, REQUIRED, APPROVED, ACCEPTABLE: Whenever they refer to the work, or its performance, "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import shall imply the direction, requirement, permission, order, designation or prescription of the Engineer, and "approved", "satisfied", or "satisfactory", "in the judgment of", and words of like import, shall mean approved or acceptable to, or satisfactory to, in the judgment of the Engineer.

2. SCOPE OF THE WORK

The Contractor will furnish all plant, labor, material, supplies, equipment and other facilities and things necessary or proper for or incidental to, the work contemplated by this Contract as required by, and in strict accordance with, the applicable Plans, Specifications and Addenda prepared by the Engineer and/or required by and in strict accordance with, such changes as are ordered and approved pursuant to this Contract, and will perform all other obligations imposed on him by the Contract.

3. COMPENSATION TO BE PAID TO THE CONTRACTOR

A. Agreed Prices: It is understood and agreed that the Contractor will accept as payment in full the summation of products, of the actual quantities in place upon the completion of the work, as determined by the Engineer's measurements by the unit prices bid, no allowance being made for anticipated profit or for reason of variations from the estimated quantities set forth in the Proposal.

B. Extra Work and/or Changes: The TOWN DISTRICT may, at any time, by a written order, and without notice to the sureties, require the performance of such extra work or changes in the work as it may find necessary or desirable. The amount of compensation to be paid to the Contractor for any extra work, as so ordered, shall be determined as follows:

- (1) By such applicable unit prices, if any, as set forth in the contract; or
- (2) If no such unit prices are set forth, then by unit prices or by a lump sum mutually agreed upon by the TOWN DISTRICT and the Contractor; or
- (3) If no such unit prices are set forth, and if the parties cannot agree upon unit prices or a lump sum, then by actual net cost in money to the Contractor of the materials, permits, wages, or applied labor, premium for Workers' Compensation Insurance, payroll taxes required by law, rental for plant and equipment used (excluding small tools) to which total cost will be added 20 percent as full compensation for all other items of profit, costs and expenses, including administration, overhead, superintendence, insurance, insurance other than Workers' Compensation Insurance, material used in temporary structures, allowances made by the Contractor to subcontractors, additional premiums upon the Performance Bond of the Contractor and the use of small tools.

4. TIME OF ESSENCE

Inasmuch as the provisions of this Contract relating to the time for performance and completion of the work are for the purpose of enabling the TOWN DISTRICT to proceed with the construction of a public improvement, in accordance with a predetermined program, such provisions are of the essence of this Contract.

5. COMMENCEMENT OF WORK

The Contractor agrees that he will commence work within ten (10) consecutive calendar days after signing this Contract, and that the day he commences work shall constitute the first of the consecutive calendar days allowed for completion of the work.

6. TIME FOR COMPLETION

The time for completion of this Contract shall be within the number of calendar days stated in the Bid Proposal and the date of such completion shall be the date of the certificate of completion hereinafter specified.

Work on the tank may commence on or about September 15, 2021. The tank will be expected to be returned to service by May 1, 2022 as the tank must be available for service at that time.

The TOWN DISTRICT reserves the right to order the Contractor to suspend operations when, in the opinion of the Engineer, improper weather conditions make such action advisable, and to order the Contractor to resume operations when weather and ground conditions permit. The days during which such suspension of work is in force are not chargeable against the specified completion time.

7. LIQUIDATED DAMAGES FOR DELAY

The time limit being essential to and of the essence of this Contract, the Contractor hereby agrees that the TOWN DISTRICT shall be, and is hereby authorized to deduct and retain out of the money which may be due or may become due to said Contractor under this agreement, the sum of ONE THOUSAND DOLLARS (\$1,000.00) per day, which amount is hereby agreed upon, fixed and determined by the parties hereto as the LIQUIDATED DAMAGES, including overhead charges, services, inspector's wages, and interest on the money invested, that the TOWN DISTRICT will suffer by reason of such default, for each and every day during which the aforesaid work may be incomplete over and beyond the time herein stipulated for its completion, provided, however, that the TOWN DISTRICT shall have the right to extend the time for the completion of said work.

8. EXTENSIONS OF TIME - NO WAIVER

If the Contractor shall be delayed in the completion of his work by reason of unforeseeable causes beyond his control and without his fault or negligence, including but not restricted to Acts of God or of any public enemy, acts or neglect of the TOWN DISTRICT, acts or neglect of any other Contractor, fires, floods, epidemics, quarantine restrictions, strikes, riots, civil commotion or freight embargoes, the period herein above specified for completion of his work shall be extended by such time as shall be fixed by the TOWN DISTRICT.

No such extension of time shall be considered a waiver by the TOWN DISTRICT of its right to terminate the Contract for abandonment or delay by the Contractor as hereinafter provided or relieve the Contractor from full responsibility for performance of his obligations hereunder.

9. CONTRACT SECURITY

A. The Contractor shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the total contract price as security for the faithful performance of this Contract, and for the payment of all persons performing labor or furnishing materials in connection with this Contract.

B. Additional or Substitute Bond - If, at any time, the TOWN DISTRICT shall be or become dissatisfied with any surety or sureties, then upon the Performance Bond, or if, for any other reason, such bond shall cease to be adequate security to the TOWN DISTRICT, the Contractor shall, within five (5) days after notice from the TOWN DISTRICT, substitute an acceptable bond in such form and sum, and signed by such other surety as may be satisfactory to the TOWN DISTRICT. The premiums on such bonds shall be paid by the Contractor. No further payments shall be deemed due, nor shall be made until the new surety shall have been qualified.

C. Prior to release of the Performance Bond, the Contractor shall deliver to the TOWN DISTRICT a Maintenance Bond equal to one hundred percent (100%) of the total Contract price, including all extras. This Maintenance Bond shall remain in full force and effect for a period of one (1) year after the date of the Engineer's approval of the final payment request and such bond, which shall be executed by the Contractor and issued by a reliable, solvent surety company authorized to do business in the State of New York shall guarantee to the TOWN DISTRICT that the Contractor shall promptly remedy any defects or faults that may occur within twelve (12) months after completion and acceptance of the work performed by the Contractor pursuant to this Contract.

10. CONTRACTOR'S INSURANCE

The Contractor shall not commence any work until he has obtained and had approved by the TOWN DISTRICT all of the insurance required under this Contract, as enumerated herein:

Compensation Insurance

Public Liability and Property Damage Insurance

Contractor's Protective Liability and Property Damage Insurance

Owner's (TOWN DISTRICT) and Engineer's Protective Public Liability
and Property Damage Insurance

Automobile Public Liability and Property Damage Insurance

The Contractor shall not permit any subcontractor to commence any operation on the site until satisfactory proof of carriage of the above required insurance has been posted with, and approved by, the TOWN DISTRICT.

A. Workers Compensation Insurance - The Contractor shall take out and maintain, during the life of this Contract, Workers' Compensation Insurance for all of his employees employed at the site of the project, and in any case of any of the work being sublet, the Contractor shall require the subcontractor similarly to provide Workers' Compensation Insurance for all of the latter's employees, unless such employees are covered by the protection afforded by the Contractor.

B. Commercial General Liability and Insurance - The Contractor shall take out and maintain during the life of this Contract such insurance as shall protect him and any subcontractor performing work covered by this Contract for claims for damages for personal injury, including accidental death, as well as from claims for property damage which may arise from operations under this Contract, whether such operations be by himself or by any subcontractor, or by any one directly or indirectly employed by either of them, and the amounts of such insurance shall be as follows:

(1) Comprehensive General Liability Insurance in the amount not less than ONE MILLION DOLLARS (\$1,000,000.) each occurrence and TWO MILLION DOLLARS (\$2,000,000.) general aggregate.

(2) Umbrella Liability for bodily injury and property damage in an amount not less than FIVE MILLION DOLLARS (\$5,000,000.)

C. Commercial General Liability and Umbrella Liability - The above policies for commercial general liability and umbrella liability insurance must be so written as to include Contractor's Protective Liability Insurance to protect the contractor against claims arising from the operations of any subcontractor.

The above policies for Commercial General Liability insurance must name the Town of Riverhead, The Riverhead Water District, its employees, public officials, officers, agents, etc., as additional insureds on a primary and non-contributory basis for General Liability, Automobile Liability and/or Excess Umbrella Liability. That additional insured status must be evidenced by a copy of endorsement CG 20 10 10 01, "additional insured – owners, lessee or contractors – scheduled person or organization" endorsement (see attached sample) or its equivalent and copy of endorsement CG 20 37 10 01, "additional insured – owners, lessees or contractors - completed operations" endorsement (see attached sample), or its equivalent.

D. Blanket Waiver of Subrogation – The above policies for workers' compensation insurance as well as comprehensive general liability insurance, automobile insurance, and excess umbrella liability insurance shall include waiver of transfer of rights of recovery against the Town of Riverhead, The Riverhead Water District, and H2M architects + engineers. Such waiver of subrogation shall be evidenced by certificate of insurance or copy of endorsement to the appropriate policy.

E. Owner's Protective Liability Insurance – (TOWN DISTRICT, and/or TOWN BOARD, TOWN OF RIVERHEAD as OWNER and H2M architects + engineers as engineer) – If the Town of Riverhead, Riverhead Water District deem necessary, the Contractor shall furnish to the TOWN DISTRICT with respect to the operations he or any of his subcontractors perform, a regular Owner's

Protective Liability Insurance Policy for and in behalf of the TOWN DISTRICT and/or TOWN BOARD, TOWN OF RIVERHEAD as OWNER, providing for a limit of not less than ONE MILLION DOLLARS (\$1,000,000.) each occurrence, a total limit of TWO MILLION DOLLARS (\$2,000,000.) general aggregate for all damages arising out of bodily injuries to, or death of, two or more persons in any one accident; and regular Protective Property Damage Insurance providing for a limit of not less than ONE HUNDRED THOUSAND DOLLARS (\$100,000.) for all damages. The insurance must fully cover the legal liability of the TOWN DISTRICT, TOWN BOARD, TOWN OF RIVERHEAD as OWNER and H2M architects + engineers as ENGINEER. The coverage provided under this policy must not be affected if the TOWN DISTRICT performs work in connection with the project either for, or in cooperation with, the Contractor or as an aid thereto, whether the same be a part of the Contract or separate therefrom, by means of its own employees or agents, or if the TOWN DISTRICT directs or supervises the work to be performed by the Contractor.

F. Commercial Automobile Liability - The Contractor shall take out and maintain during the life of the Contract such automobile public liability insurance as shall protect him and any subcontractor performing work covered by this Contract from claims for damages for personal injury, including accidental death as well as from claims for property damage which may arise from operations under this Contract, whether such operations be by himself or by any subcontractor, or by any one directly or indirectly employed by either of them and the amounts of such insurance shall be as follows:

(1) Automobile Public Liability Insurance in an amount not less than ONE MILLION DOLLARS (\$1,000,000.) for bodily injuries, including wrongful death per occurrence.

(2) Umbrella Liability for bodily injury and property damage in an amount of not less than FIVE MILLION DOLLARS (\$5,000,000.).

11. PROOF OF CARRIAGE OF INSURANCE

The Contractor shall furnish the TOWN DISTRICT with certificates of each insurer insuring the Contractor or any subcontractor under this Contract, except with respect to subdivision D. of paragraph 10. In respect to this paragraph, the Contractor shall furnish the TOWN DISTRICT with the original insurance policy and a copy to the Engineer.

Both certificates, as furnished, and the insurance policy, as required, shall bear the policy numbers, the expiration date of the policy and the limit or limits of liability thereunder. Both the certificates and the policy shall be further endorsed to provide the TOWN DISTRICT and Engineer with any notice of cancellation at least ten (10) days prior to the actual date of such cancellation.

12. COMPLIANCE WITH LABOR AND PENAL LAWS

The Contractor hereby expressly agrees to comply with all the provisions of the Labor Law and any and all amendments thereto, insofar as the same are applicable to this Contract. The Labor Laws, as amended, provide that no laborer, worker or mechanic in the employ of the Contractor, subcontractor or other person doing or contracting to do the whole or a part of the work contemplated by this Contract, shall be permitted or required to work more than eight (8) hours in any one calendar day, except in cases of extraordinary emergency caused by fire, flood, or danger to life or property; that no such person shall be employed more than eight (8) hours in any day or more than five (5) days in any week, except in such emergency; that the wages to be paid for a legal day's work as hereinbefore defined, to laborers, workers, or mechanics upon the work called for under this Contract, or for any materials used upon or in connection therewith shall not be less than the prevailing rate for a day's work in the same trade or occupation in the locality within the State where such work is to be done and each laborer, worker, or mechanic employed by the Contractor, subcontractor, or other person about or upon the work shall be paid the wages herein provided; that employees engaged in the construction outside the limits of cities and villages are no longer exempt from the provisions of the Labor Laws which required the payment of the prevailing rate of wages and the eight (8) hour day.

SECTION 005209 – CONTRACT

Section 220A of the Labor Law, as amended by Chapter 472 of the Laws of 1932, provides that before payment is made by or on behalf of the State or any City, County, Town or Village or other civil division of the State, of any sums due on account of a contract for a public improvement, it is the duty of the Comptroller or the financial officer of the Municipal Corporation to require the Contractor and each and every subcontractor to file a certified statement in writing, in satisfactory form, certifying to the amounts then due and owing to any and all laborers for daily or weekly wages on account of labor performed upon the work of the Contract, setting forth therein the names of the persons whose wages are unpaid and the amount due each, respectively.

Section 220B of the Labor Law, as amended, provides that any interested person who shall have previously filed a protest in writing objecting to the payment to any Contractor or subcontractor to the extent of the amount or amounts due or to become due to him for daily or weekly wages for labor performed on the public improvement for which the Contract was entered into, or if, for any other reason, it may be deemed advisable, the Comptroller of the State or other financial officer of the Municipal Corporation may deduct from the whole amount of any payment on account thereof the sum or sums admitted by any Contractor or subcontractor in such statement or statements so filed to be due and owing by him on account of labor performed and may withhold the amount so deducted for the benefit of the laborers for daily or weekly wages, whose wages are unpaid as shown by the verified statements filed by any Contractor or subcontractor and may pay directly to any person the amount or amounts so shown to be due for such wages.

Section 220C of the Labor Law, as amended, provides the penalty for making a false oath or verification.

Section 220D of the Labor Law provides that the advertised specifications for every Contract for the construction, reconstruction, maintenance and/or repair of highways to which the State, County, Town and/or Village is a party shall contain the provision stating the minimum rate of hourly wage that can be paid, as shall be designated by the Industrial Commissioner, to the laborers employed in the performance of the Contract, either by the Contractor, subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the Contract, and the Contract shall contain a stipulation that such laborers shall be paid not less than such hourly minimum rate of wage. Any person or corporation that willfully pays after entering into such Contract less than such stipulated minimum hourly wage scale shall be guilty of a misdemeanor and, upon conviction, shall be punished for a first offense by a fine of Five Hundred Dollars (\$1,000.00) or by imprisonment for not more than thirty (30) days, or by both fine and imprisonment for a second offense by a fine of One Thousand Dollars (\$1,000.) and, in addition thereto, the Contract on which the violation has occurred shall be forfeited; and no such person or corporation shall be entitled to receive any sum or nor shall any officer, agent or employee of the State pay the same or authorize its payment from the funds under his charge or control to any person or corporation for work done upon any contract, on which the Contractor has been convicted of second offense in violation of the provisions of this Section.

The minimum wage rates established by the Industrial Commissioner, State of New York, for this Contract, are as set forth in the INFORMATION FOR BIDDERS.

All excavation shall be done in compliance with Article 36 of the General Business Law and notices given as provided by GBL Section 761.

13. PAYMENT OF EMPLOYEES

The Contractor and each of his subcontractors shall pay each of his employees engaged in work on this project under this Contract in full (less deductions made mandatory by law) in cash and not less often than once each week.

14. ESTIMATES AND PAYMENTS

A. Monthly: At the end of each calendar month during the progress of the work, the Contractor shall submit a payment requisition to the Engineer. The Engineer will review the requisition and prepare a payment request based on the estimated amount of work performed and the quantity of materials furnished, based on the prices set forth in the Proposal. In consideration of the work done and the materials furnished, the TOWN DISTRICT will pay or cause to be paid to the Contractor the amount estimated by the Engineer as due him less a sum equal to five percent (5%) of such amount and less such additional amount as may be necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. The making of any such estimate or payment made thereon shall not be taken or construed as an acceptance by the Engineer or the TOWN DISTRICT of any work so estimated and paid for. The amount of the monthly estimate remaining unpaid will be retained by the TOWN DISTRICT as a guarantee that the Contractor will faithfully and completely fulfill all obligations imposed by the Contract and Specifications, and against any damages incurred by the TOWN DISTRICT by reason of any failure on the part of the Contractor to fulfill all conditions and obligations herein contained. All partial payments are subject to correction in any subsequent payment. The retained amounts shall be paid as set forth in the following subsection B.

B. Final: Thirty (30) days after the Contractor shall have substantially completed the work required of it under the Contract the Engineer will prepare an approval of Final Payment Request. Thereafter the TOWN DISTRICT will pay to the Contractor the remaining amount of the Contract balance less a sum equal to two (2) times the value of any remaining items to be completed and less an amount necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. As the remaining items of work are satisfactorily completed or corrected, the TOWN DISTRICT shall promptly pay, upon receipt of a requisition for these items less an amount necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. Any claims, liens and judgments referred to in this section shall pertain to the project and shall be filed in accordance with the terms of the applicable Contract and/or applicable laws.

C. In order to secure the performance of the covenant of the Contractor, prior to release of the Performance Bond, the Contractor shall deliver to the TOWN DISTRICT a Maintenance Bond equal to one hundred percent (100%) of the total Contract price, including all extras. This Maintenance Bond shall remain in full force and effect for a period of one (1) year after the date of the Engineer's approval of the Final Payment Request and such bond, which shall be executed by the Contractor and issued by a reliable, solvent surety company authorized to do business in the State of New York shall guarantee to the TOWN DISTRICT that the Contractor shall promptly remedy any defects or faults that may occur within twelve (12) months after completion and acceptance of the work performed by the Contractor pursuant to this Contract.

D. Measurements for Payment: The Engineer shall make due measurement of the work done during the progress of the work and his estimate shall be final and conclusive evidence of the amounts of work performed by the Contractor under, and by virtue of, this agreement, and shall be taken as the full measure of compensation to be received by the Contractor. When requested by the Contractor, the Engineer shall measure, re-measure or re-estimate any portion of the work; but the expense of such re-measurement or re-estimating shall, unless material error be proved, be paid for by the Contractor.

E. Should all work not be completed and final payment request not submitted within one (1) year after the punch list has been issued, the TOWN DISTRICT will be under no obligation to make final payment.

15. ACCEPTANCE OF FINAL PAYMENT CONSTITUTES RELEASE

The acceptance by the Contractor of the final payment shall be, and shall operate as a release to the TOWN DISTRICT from all claims and all liabilities to the Contractor for all things done or furnished in connection with this work, and for every act and neglect of the TOWN DISTRICT and other relating to, or

arising out of, this work, excepting the Contractor's claims for interest upon the final payment, if these payments be improperly delayed. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or the Performance Bond.

16. CONSTRUCTION REPORTS

The Contractor shall submit to the Engineer prior to the commencing of any work under this Contract a detailed schedule and plan of operation, indicating the manner in which the Contractor proposes to prosecute the work, and a time schedule therefore. Such schedules are not intended to bind the Contractor to a predetermined plan or procedure, but rather to enable the Engineer to coordinate the work of the Contractor with work required of and to be performed by others.

The Contractor shall furnish the Engineer with periodic estimates for partial payments as required elsewhere in the contract documents and, in addition thereto, will furnish the Engineer with a detailed estimate for final payment. Prior to being eligible to receive final payment under this Contract, the Contractor shall furnish the Engineer with substantial proof that all bills for services rendered and materials supplied have been paid. The enumeration of the above reports in no way relieves the Contractor of his responsibility under existing Federal or State laws of filing such other reports with agencies other than the TOWN DISTRICT as may be required by such existing laws or regulations.

17. INSPECTION AND TESTS

All material and workmanship shall be subject to inspection, examination and test by the Engineer and other representatives of the TOWN DISTRICT at any time during the construction and at any and all places where manufacturing of materials used and/or construction is carried on.

Without additional charge, the Contractor shall furnish promptly all reasonable facilities, labor and materials necessary to make tests so required safe and convenient.

If, at any time, before final acceptance of the entire work, the Engineer, with the TOWN DISTRICT's approval, considers necessary or advisable an examination of any portion of the work already completed, by removing or tearing out the same, the Contractor shall, upon request, furnish promptly all necessary facilities, labor and materials for such examination. If such work is found to be defective in any material respect, due to the fault of the Contractor or any subcontractor, or if any work shall be covered over without the approval or consent of the Engineer, with the TOWN DISTRICT's approval, whether or not the same shall be defective, the Contractor shall be liable for the expenses of such examination and of satisfactory reconstruction.

If, however, such approval and consent shall have been given, and such work is found to meet the requirements of this Contract, the Contractor shall be recompensed for the expense of such examination and reconstruction in the manner herein provided for the payment of costs of extra work pursuant to a Change Order signed by the TOWN DISTRICT and the Contractor.

The selection of laboratories and/or agencies for the inspection and tests of supplies, materials or equipment shall be subject to the approval of the Engineer. Satisfactory documentary evidence that the material has passed the required inspection and test must be furnished the Engineer prior to the incorporation of the material in the work.

Any rejected work shall be removed from the site of the project completely at the expense of the Contractor.

18. PLANS AND SPECIFICATIONS - INTERPRETATIONS

The Contractor shall keep at the site of the work one (1) copy of the Plans and Specifications signed and identified by the Engineer. Anything shown on the Plans and not mentioned in the Specifications or mentioned in the Specifications and not shown on the Plans shall have the same effect as if shown or mentioned respectively in both. In case of any conflict or inconsistency between the Plans

and Specifications, the Plans shall govern. Any discrepancy between the figures and drawings shall be submitted to the Engineer, whose decision therein shall be conclusive.

19. SUBSURFACE CONDITIONS FOUND DIFFERENT

Should the Contractor encounter subsurface conditions at the site materially differing from those shown on the Plans or indicated in the Specifications, he shall immediately give notice to the Engineer of such conditions before they are disturbed; the Engineer shall thereupon promptly investigate the conditions and if he finds that they materially differ from those shown on the Plans or indicated in the Specifications, he shall at once make such changes in the Plans and/or Specifications as he may find necessary.

Any increase or decrease of cost resulting from such changes will be adjusted in the manner provided herein for adjustment as to extra and/or additional work and changes shall be by Change Order executed by the TOWN DISTRICT and Contractor.

20. CONTRACTOR'S TITLE TO MATERIALS

No material or supplies for the work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the work.

21. SUPERINTENDENCE BY CONTRACTOR

At the site of the work the Contractor shall employ a Construction Superintendent or Foreman who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Engineer and shall be one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll.

22. PROTECTION OF WORK, PERSONS AND PROPERTY

Precaution shall be exercised at all times for the proper protection of all persons, property and work. The safety provisions of applicable laws, building and construction codes shall be observed. Machinery equipment and all hazards shall be guarded or eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable law. The Contractor shall furnish entirely at his own expense any and all additional safety measures deemed necessary by the TOWN DISTRICT or its Engineer to adequately safeguard the traveling public. The Contractor shall give notice to the owners of all utilities which may serve the area and request their assistance in predetermining the location and depth of the various pipes, conduits, manholes and other underground facilities.

The Contractor shall, at all hours of the day, safely guard and protect his own work and adjacent property from any damage and shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the contract documents, or by the TOWN DISTRICT or its duly authorized representatives.

The Contractor shall provide and maintain such watchers, barriers, lights, flares and other signals, at his own expense, as will effectively prevent any accident in consequence of his work for which the TOWN DISTRICT might be liable. The Contractor shall be liable for all injury or damage caused by his act or neglect, or that of his employees.

23. PATENT RIGHTS

As part of his obligation hereunder and without any additional compensation, the Contractor will pay for any patent fees or royalties required in respect to the work or any part thereof and will fully indemnify the TOWN DISTRICT for any loss on account of any infringement of any patent rights, unless

prior to his use in the work of a particular process or a product of a particular manufacturer, he notifies the TOWN DISTRICT in writing that such process or product is an infringement of a patent.

24. REPRESENTATIONS OF CONTRACTOR

The Contractor represents and warrants:

A. That he is financially solvent and that he is experienced in and competent to perform the type of work involved under this Contract and able to furnish the plan, materials, supplies and/or equipment to be furnished for the work; and

B. That he is familiar with all Federal, State and Municipal Laws, ordinances and regulations which may in any way affect the work of those employed hereunder, including but not limited to any special acts relating to the work; and

C. That such work required by these contract documents as is to be done by him can be satisfactorily constructed and used for the purpose for which it is intended and that such construction will not injure any person or damage any property; and

D. That he has carefully examined the Plans, Specifications, and the site of the work, and that from his own investigation he has satisfied himself as to the nature and location of the work, the character, location, quality and quantity of surface and subsurface materials, structures and utilities likely to be encountered, the character of equipment, and other facilities needed for the performance of the work, the general local conditions which may in any way affect the work or its performance.

25. AUTHORITY OF THE ENGINEER

In the performance of the work, the Contractor shall abide by all orders and directions and requirements of the Engineer and shall perform all work to the satisfaction of the Engineer, at such time and places, by such methods, and in such manner and sequence as he may require. The Engineer shall determine the amount, quality, acceptability and fitness of all parts of the work, shall interpret the plans, specifications, contract documents and any extra work orders and shall decide all other questions in connection with the work. Upon request, the Engineer shall confirm in writing any oral orders, directions, requirements or determinations. The enumeration herein or else-where in the contract documents of particular instances in which the opinion, judgment, discretion or determination of the Engineer shall control, or in which work shall be performed to his satisfaction or subject to his approval, or inspection, shall not imply that only matters similar to those enumerated shall be so governed and so performed, but without exception all the work shall be governed and so performed. Nothing herein shall be construed to give the Contractor a claim for extra work unless prior thereto an appropriate Change Order has been executed by the TOWN DISTRICT and Contractor for such work.

26. SURVEYS

The Contractor shall provide all layouts, measurements, lines, and grades necessary for the execution of the work, and will furnish the necessary stakes and spikes for laying out such lines and grades and the unskilled labor necessary to place same and/or assist in measuring.

27. CHANGES AND ALTERATIONS

The TOWN DISTRICT reserves the right to make alterations in the location, line, grade, plans, form or dimensions of the work, or any part thereof, either before or after the commencement of the construction. If such alterations diminish the amount of work to be done, no claim for damages or anticipated profits will be warranted on the work which may be dispensed with. If such alterations increase the amount of work, such increases shall be paid for according to the quantity of work actually done and at the unit prices for such work as contained in the schedule of prices.

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If such alterations decrease the amount of work, such decreases shall be a credit to the TOWN DISTRICT based on the quantity of work not performed as agreed to by the TOWN DISTRICT and the Contractor and at the unit prices for such work as contained in the Schedule of Prices.

28. CORRECTION OF WORK

All work and all materials, whether incorporated into the work or not, all processes of manufacture and all methods of construction shall be, at all times and places, subject to the inspection of the Engineer who shall be the final judge of quality, materials, processes of manufacture and methods of construction suitable for the purpose for which they are used. Should they fail to meet his approval they shall be forthwith reconstructed, made good and replaced and/or corrected as the case may be, by the Contractor at his own expense. Rejected materials shall immediately be removed from the site.

If, in the opinion of the Engineer, it is not desirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the contract documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as, in the judgment of the Engineer, shall be equitable.

The Contractor expressly warrants that his work shall be free from any defects in materials or workmanship, and agrees to correct any defects, settlements, or shrinkages which may appear within one (1) year following the date of the final payment request. Neither the acceptance of the completed work nor payment therefor shall operate to release the Contractor or his sureties from any obligations under or upon this Contract or the Performance Bond.

29. WEATHER CONDITIONS

The Contractor will and will cause his subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If any work or materials shall have been damaged or injured by reason of the failure on the part of the Contractor or any of his subcontractors to protect his, or their work, such work and materials shall be removed and replaced at the expense of the Contractor.

30. THE TOWN DISTRICT'S RIGHT TO WITHHOLD PAYMENTS

The TOWN DISTRICT may withhold from the Contractor so much of any approved payments due him as may, in the judgment of the TOWN DISTRICT, be necessary:

A. To assure the payment of just claims then due and unpaid of any persons supplying labor or materials for the work.

B. To protect the TOWN DISTRICT from loss due to defective work not remedied; or

C. To protect the TOWN DISTRICT from loss due to injury to persons or damage to the work or property of other contractors or subcontractors or others, caused by the act or neglect of the Contractor or any of his subcontractors. The TOWN DISTRICT shall have the right, as agent for the Contractor, to apply any such amount so withheld in such manner as the TOWN DISTRICT may deem proper to satisfy such claims or to secure such protection. Such application of such money shall be deemed payments for the account of the Contractor.

31. THE TOWN DISTRICT'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If:

A. The Contractor shall file for any form of bankruptcy relief or make an assignment for the benefit of creditors; or

B. A receiver or liquidator shall be appointed for the Contractor for any of his property and shall not be dismissed within twenty (20) days after such appointment, or the proceedings in connection therewith shall not be stayed on appeal within the said twenty (20) days; or

C. The Contractor shall violate any provision of this Contract; or

D. The Contractor shall fail or refuse to regard laws, ordinances, regulations, or the instructions of the Engineer and/or the TOWN DISTRICT.

then, and in any such event, the TOWN DISTRICT without prejudice to any other rights or remedy it may have, and after seven (7) days written notice to the Contractor and Contractor's Surety may terminate the employment of the Contractor and take possession of the premises and all material, tools and appliances therein, and complete the work by contract or otherwise, as the TOWN DISTRICT solely may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished.

If the unpaid balance of the compensation to be paid the Contractor hereunder shall exceed the expense of so completing the work (including compensation for additional managerial, engineering, administration, legal, testing and observation services and any damages for delay), such excess shall be paid to Contractor.

If the expense shall exceed the unpaid balance, the Contractor and his sureties shall be liable to the TOWN DISTRICT for such excess.

32. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the work shall be stopped by order of the Court or any public authority, Federal or State agency, for a period of three (3) months through no act or fault of the Contractor or any of his agents, servants, employees, materialmen, or subcontractors, the Contractor may, upon ten (10) days notice to the TOWN DISTRICT, discontinue his performance of the work and/or terminate the Contract.

Upon termination by the Contractor the TOWN DISTRICT may take possession of the work and complete the work by Contract or otherwise, as the TOWN DISTRICT solely may deem expedient.

If the Contract is terminated by the Contractor, the liability of the TOWN DISTRICT to the Contractor shall be for all work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment, including reasonable profit and damages.

33. RESPONSIBILITY OF WORK

The Contractor agrees to be responsible for the entire work embraced in this Contract until its completion and final acceptance, and that any unfaithful or imperfect work that may become damaged from any cause, either by act or commission or omission to properly guard and protect the work that may be discovered at any time before the completion and acceptance shall be removed and replaced by good and satisfactory work without any charge to the TOWN DISTRICT and that such removal and replacement will be performed immediately on the requirement of the Engineer, notwithstanding the fact that it may have been overlooked by the proper inspector, and partial payment made thereon. It is fully understood by the Contractor that the inspection of the work shall not relieve him of any obligation to do sound and reliable work as herein prescribed, and that any omission to disapprove of any work by the Engineer at or before the time of a partial payment or other estimate shall not be construed to be an acceptance of any defective work.

34. USES OF PREMISES AND REMOVAL OF DEBRIS

The Contractor expressly undertakes at his own expense:

A. To take every precaution against injury to persons or damages to property.

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B. To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any of his subcontractors, or other contractors.

C. To place upon any of the completed work only such superimposed loads as are consistent with the safety of that portion of the work.

D. To frequently clean up all refuse, rubbish, scrap materials and debris caused by the operations to the end that at all times the site of the work shall present a neat and orderly and workmanlike appearance.

E. Before the Engineer's approval of the Final Payment Request, to remove all surplus material, temporary structures, plants of any description and debris of any and every nature resulting from his operations and to put the site in a neat and orderly condition.

35. POWER OF THE CONTRACTOR TO ACT IN AN EMERGENCY

In case of an emergency which threatens loss or injury to property and/or safety to life, the Contractor will be permitted to act as he sees fit without previous instructions from the TOWN DISTRICT. He shall notify the TOWN DISTRICT thereof immediately thereafter and any compensation claimed by the Contractor due to extra work made necessary because of his acts in such emergency shall be submitted to the TOWN DISTRICT for approval and Change Order executed by the TOWN DISTRICT and the Contractor.

Where the Contractor has not taken action but has notified the Engineer of an emergency indicating injury to persons or damage to adjoining property or to the work being accomplished under this Contract, then upon authorization from the Engineer to prevent such threatened injury or damage, he shall act as instructed by the Engineer. The amount of reimbursement claimed by the Contractor on account of any such action shall be determined in the manner provided herein for the payment of extra work and shall be incorporated into a Change Order executed by the TOWN DISTRICT and Contractor.

36. SUITS AT LAW

The Contractor shall indemnify and save harmless the TOWN DISTRICT from and against all suits, claims, demands or actions for any injury sustained or alleged to be sustained by any party or parties in connection with the construction of the work or any part thereof, or any commission or omission of the Contractor, his employees or agents or any subcontractors and in case any such action shall be brought against the TOWN DISTRICT, the Contractor shall immediately take care of and defend the same at his own cost and expense.

37. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and, if through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

38. SUBLETTING, SUCCESSOR AND ASSIGNS

The Contractor shall not sublet any part of the work under this Contract, nor assign any money due him hereunder without first obtaining the written consent of the TOWN DISTRICT. This Contract shall inure to the benefit of and shall be binding upon the parties hereunder and upon their respective successors and assigns, but neither party shall assign or transfer his interest herein in whole or in part without consent of the other.

SECTION 005209 – CONTRACT

IN WITNESS WHEREOF, the parties hereto have set their hands and seals the day and year first above written.

RIVERHEAD WATER DISTRICT:

BY: _____ (TOWN SEAL)
YVETTE AGUIAR, SUPERVISOR

CONTRACTOR:

BY: _____

TITLE: _____ (SEAL)

STATE OF NEW YORK)
) ss:
COUNTY OF SUFFOLK)

On the ____ day of _____, 20__, before me personally came YVETTE AGUIAR, to me known, who being by me duly sworn, did depose and say that he is the duly elected SUPERVISOR of the TOWN OF RIVERHEAD, COUNTY OF SUFFOLK, NEW YORK, and that at a meeting of the Town Board of the Town of Riverhead, duly held on the ____ day of _____, 20__, the said Board, also acting in its capacity as the Governing Body of the Riverhead Water District, authorized the said SUPERVISOR to execute all and any contracts on behalf of the Board; that he knows the seal of said Town, and that the said Water District seal is also the seal of the Town of Riverhead; that the seal affixed to the foregoing instrument is its corporate seal; that it was affixed thereto by order of the said Board, and that he signed his name thereto and executed the said instrument on behalf of the said Water District by like order and authority.

NOTARY PUBLIC

SECTION 005209 – CONTRACT

ACKNOWLEDGMENT OF CONTRACTOR, IF A CORPORATION

STATE OF NEW YORK)
) ss:
COUNTY OF)

On this _____ day of _____, 20__, before me personally came and appeared _____, to me known, who by me being duly sworn, did depose and say that he resides at _____ that he is the _____ of _____, the Corporation described in and which executed the foregoing instrument, that he knows the seal of said corporation, that one of the seals affixed to said instrument is such seal, that it was so affixed by order of the Directors of said Corporation, and that he signed his name thereto by like order.

NOTARY PUBLIC

ACKNOWLEDGMENT OF CONTRACTOR, IF A PARTNERSHIP

STATE OF NEW YORK)
) ss:
COUNTY OF)

On this _____ day of _____, 20__, before me personally came and appeared _____, to me known, and known to me to be one of the members of the firm of _____, described in and who executed the foregoing instrument, and he acknowledged to me that he executed the same as and for the act and deed of said form.

NOTARY PUBLIC

END OF SECTION 005209

Wage Rates begin on the following page.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Riverhead Water District

Noah Williard, Water Resource Engineer
538 Broad Hollow Road
4th Floor East
Melville NY 11747

Schedule Year 2021 through 2022
Date Requested 09/10/2021
PRC# 2021009505

Location Riverhead Water District
Project ID# RDWD1906
Project Type Removal of manganese through filtration for Plant No. 5; modifications of the existing well building and piping, and construction of a new treatment building; associated electrical work;

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2021 through June 2022. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission; a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion [online](#).

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the ["Request for a dispensation to work overtime" form \(PW30\)](#) and ["4 Day / 10 Hour Work Schedule" form \(PW 30.1\)](#).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid

or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment. Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed \$100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds \$25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers' compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of \$50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Riverhead Water District

Noah Williard, Water Resource Engineer
538 Broad Hollow Road
4th Floor East
Melville NY 11747

Schedule Year 2021 through 2022
Date Requested 09/10/2021
PRC# 2021009505

Location Riverhead Water District
Project ID# RDWD1906
Project Type Removal of manganese through filtration for Plant No. 5; modifications of the existing well building and piping, and construction of a new treatment building; associated electrical work;

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____		
Name: _____		
Address: _____ _____		
City: _____	State: _____	Zip: _____
Amount of Contract: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	☐ (01) General Construction	
Approximate Completion Date: ____/____/____	☐ (02) Heating/Ventilation	
	☐ (03) Electrical	
	☐ (04) Plumbing	
	☐ (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to \$1,500 for a first offense and up to \$5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, www.labor.ny.gov. <https://labor.ny.gov/formsdocs/ui/IA999.pdf>

If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website www.labor.ny.gov or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

**To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

Required Notice under Article 25-B of the Labor Law

**Attention All Employees, Contractors and Subcontractors:
You are Covered by the Construction Industry Fair Play Act**

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor, **you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

- **Civil Penalty**
 - First offense: Up to \$2,500 per employee
 - Subsequent offense(s): Up to \$5,000 per employee
- **Criminal Penalty**
 - First offense: Misdemeanor - up to 30 days in jail, up to a \$25,000 fine and debarment from performing public work for up to one year.
 - Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a \$50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

IA 999 (09/16)

Attention Employees

THIS IS A: **PUBLIC WORK PROJECT**

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of
the Labor Laws
of 2007:

**These wages are set by law and must be posted
at the work site. They can also be found at:**
www.labor.ny.gov

If you feel that you have not received proper wages or benefits,
please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please
contact the Office of the NYC Comptroller at (212) 669-4443, or
www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is \$250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.*)
- Training roster, attendance record or other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is \$3 million in Bronx, Kings, New York, Queens and, Richmond counties; \$1.5 million in Nassau, Suffolk and Westchester counties; and \$500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirements on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Suffolk County General Construction

Asbestos Worker

09/01/2021

JOB DESCRIPTION Asbestos Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021

Asbestos Worker \$ 44.00
Removal & Abatement Only*

NOTE: *On Mechanical Systems that are NOT to be SCRAPPED.

SUPPLEMENTAL BENEFITS

Per Hour:

Asbestos Worker \$ 8.70
Removal & Abatement Only

OVERTIME PAY

See (B, B2, *E, J) on OVERTIME PAGE

Hours worked on Saturdays are paid at time and one half only if forty hours have been worked during the week.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentice Removal & Abatement Only:

1000 hour terms at the following percentage of Journeyman's rates.

1st	2nd	3rd	4th
78%	80%	83%	89%

SUPPLEMENTAL BENEFIT

Per Hour:

Apprentice
Removal & Abatement \$ 8.70

4-12a - Removal Only

Boilermaker

09/01/2021

JOB DESCRIPTION Boilermaker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour: 07/01/2021

Boilermaker \$ 63.38
Repairs & Renovations 63.38

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Boilermaker 32% of hourly
Repair \$ Renovations Wage Paid
+ \$ 25.38

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

OVERTIME PAY

See (D, O) on OVERTIME PAGE

Repairs & Renovation see (B,E,Q)

HOLIDAY

Paid: See (8, 16, 23, 24) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 12, 15, 16, 22, 23, 24, 25) on HOLIDAY PAGE

NOTE: *Employee must work in pay week to receive Holiday Pay.

**Employee gets 4 times the hourly wage rate for working Labor Day.

REGISTERED APPRENTICES

Wage per hour:

(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

Apprentice(s)	07/01/2021 32% of Hourly Wage Paid Plus Amount Below

1st Term	\$ 19.41
2nd Term	20.26
3rd Term	21.11
4th Term	21.96
5th Term	22.82
6th Term	23.68
7th Term	24.52

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter

09/01/2021

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2021

Piledriver	\$ 56.93
Dockbuilder	\$ 56.93

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	\$ 53.33

OVERTIME PAY

See (B, E2, O) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour

(1)year terms:

1st	2nd	3rd	4th
\$23.37	\$28.97	\$37.35	\$45.74

Supplemental benefits per hour:

All Terms:	\$ 35.33

8-1556 Db

Carpenter

09/01/2021

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2021

Carpet/Resilient

Floor Coverer \$ 54.75

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS

Per hour: \$ 46.97

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wage per hour - (1) year terms:

1st	2nd	3rd	4th
\$ 24.55	\$ 27.55	\$ 31.80	\$ 39.68

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 16.19	\$ 17.69	\$ 21.29	\$ 23.29

8-2287

Carpenter

09/01/2021

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2021

Marine Construction:

Marine Diver \$ 71.80

Marine Tender 51.34

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 53.33

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 11, 13, 16, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms.

1st year	\$ 23.37
2nd year	28.97
3rd year	37.35
4th year	45.74

Supplemental Benefits
Per Hour:

All terms \$ 35.33

8-1456MC

Carpenter

09/01/2021

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2021

Building

Millwright \$ 57.00

SUPPLEMENTAL BENEFITS

Per hour:

Millwright \$ 54.60

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18,19) on HOLIDAY PAGE.

Overtime See (5,6,8,11,13,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$30.74	\$36.19	\$41.64	\$52.54

Supplemental benefits per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$35.03	\$38.73	\$43.08	\$49.84

8-740.1

Carpenter

09/01/2021

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:

07/01/2021

Timberman

\$ 52.05

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2021

\$ 52.78

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms:

1st	2nd	3rd	4th
\$21.42	\$26.53	\$34.18	\$41.84

Supplemental benefits per hour:

All terms \$ 35.06

8-1556 Tm

Carpenter

09/01/2021

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

PARTIAL COUNTIES

Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.

Putnam: South of but including the following, Cold Spring, Tompkins Corner, Mahopac, Croton Falls, east to Connecticut border.

Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES

Per hour: 07/01/2021 10/18/2021

Core Drilling:

Driller \$ 41.74 \$ 42.27

Driller Helper 32.92 33.47

Note: Hazardous Waste Pay Differential:

For Level C, an additional 10% above wage rate per hour

For Level B, an additional 10% above wage rate per hour

For Level A, an additional 10% above wage rate per hour

Note: When required to work on water: an additional \$ 0.50 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Driller and Helper \$ 29.40 \$ 30.60

OVERTIME PAY

OVERTIME: See (B,E,K*,P,R**) on OVERTIME PAGE.

HOLIDAY

Paid: See (5,6) on HOLIDAY PAGE.

Overtime: * See (5,6) on HOLIDAY PAGE.

** See (8,10,11,13) on HOLIDAY PAGE.

8-1536-CoreDriller

Carpenter - Building / Heavy&Highway

09/01/2021

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021

Carpenter
(Building) \$ 50.16

Carpenter
(Heavy Highway) \$ 50.16

"NOTE" ADD 15% to straight time hourly wage for NEW YORK STATE D.O.T. and other GOVERNMENTAL MANDATED Off-Shift Work.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday, with one-half (1/2) hour allowed for a lunch period.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Both Carpenter
Categories \$ 33.58

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One(1) Year Terms at the following:

Per Hour:

1st	2nd	3rd	4th	5th
\$ 23.87	\$ 28.02	\$ 30.10	\$ 32.18	\$ 36.34

Supplemental Benefits

Per Hour:

All Terms: \$ 18.40

4-Reg.Council Nass/Suff

Electrician

09/01/2021

JOB DESCRIPTION Electrician

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021

Electrician
Electrical Maintenance \$ 44.54

Traffic Signal 45.50

"PLEASE NOTE"

Applicable to "EXISTING ELECTRICAL SYSTEMS" including, but not limited to TRAFFIC SIGNALS & STREET LIGHTING. Not used for addons.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday, with one-half (1/2) hour allowed for a lunch period.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Electrician 12% of Hourly
Wage Paid + \$19.50

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

OVERTIME PAY

See (B, E2, K, P) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One(1) Year Term(s) at the following Percentage
of Journeyman(s) Wage:

1st	2nd	3rd	4th	5th	6th
40%	50%	60%	70%	80%	90%

Supplemental Benefits:

07/01/2021

1st	3% + \$3.65
2nd	8% + \$4.19
3rd	9% + \$5.20
4th	10% + \$ 6.96
5th	11% + \$10.91
6th	12% + \$14.01

NOTE: Percentages are on "Hourly Wage Paid"

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

4-25m

Electrician

09/01/2021

JOB DESCRIPTION Electrician

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021

Tree Trimmer/Remover	
Line Clearance Specialist	\$ 36.82
Groundman*	\$22.09

These rates apply to all tree trimming/removal contracts including but not limited to "Electrical Line Clearance"/"Long Island Railroad Right of Ways".

For Building Construction or Road/Highway Construction Contracts, Heavy & Highway Laborer and Operating Engineer classifications Apply.

* Note: Groundman Classification not to exceed 20% of the company(s) workforce on Project. Please contact local office for clarification.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Tree Trimmer	20.50% of Hourly
Line Clearance Specialist	Wage Paid +
and Groundman	\$11.57

NOTE: "Hourly Wage Paid" shall include any and all premium(s) paid

OVERTIME PAY

See (B, E, P, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 16, 23, 24, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 16, 23, 24, 25, 26) on HOLIDAY PAGE

4-1049/Tree

Electrician

09/01/2021

JOB DESCRIPTION Electrician

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021

Electrician/Wireman	\$ 55.00
HVAC Controls	55.00
Fire Alarms	55.00

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Electrician/Wireman (all categories)	16% of Hourly Wage Paid

+ \$ 30.86

NOTE: "Hourly Wage Paid" shall include any and all premium[s]

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One(1) Year Terms at the following Percentage of Journeyman(s) Wage:

1st	2nd	3rd	4th	5th	6th
35%	35%	40%	45%	60%	75%

Indentured After 4/25/2020:

35%	35%	37.5%	40%	60%	75%

Supplemental Benefits Per Hour:

07/01/2021

1st	3% + \$5.15
2nd	8% + \$6.32
3rd	9% + \$7.45
4th	10% + \$8.74
5th	13% + \$10.97
6th	14% + \$17.23

NOTE: Percentages are on "Hourly Wage Paid"

NOTE: "Hourly Wage Paid" shall include any and all premium(s).

4-25

Electrician

09/01/2021

JOB DESCRIPTION Electrician

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021

Electrician

Pump & Tank \$ 42.65

SUPPLEMENTAL BENEFITS

Per Hour:

Electrician

Pump & Tank 16% of *Wage
paid + \$22.35

*Wage Paid includes any and all Premiums

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

1 Year Terms at the Following:

Per Hour:

1st	2nd	3rd	4th	5th	6th
\$15.90	\$16.90	\$17.90	\$18.90	\$25.59	\$29.86

SUPPLEMENTAL BENEFITS

Per Hour:

1st	13% of *Wage paid + \$5.40
2nd	16% of *Wage paid + \$5.90
3rd	16% of *Wage paid + \$6.15
4th	16% of *Wage paid + \$6.50
5th	16% of *Wage paid + \$18.22
6th	16% of *Wage paid + \$19.16

*Wage Paid includes any and all Premiums

4-25 Pump & Tank

Electrician	09/01/2021

JOB DESCRIPTION Electrician

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour:	07/01/2021
Telephone and Integrated Tele-Data System Electrician	\$ 38.18

This rate classification applies to ALL Voice, Data & Video work.: Excluding Fire Alarm Systems and Energy Management Systems (HVAC Controls), in those cases the regular Electrician rate applies. To ensure proper use of this rate please call Nassau Offices at (516)228-3912 or Suffolk Offices at (631)687-4882.

SUPPLEMENTAL BENEFITS

Per Hour:

Tele-Data Electrician	16% of Hourly Wage Paid + \$19.85

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 15, 16, 25) on HOLIDAY PAGE

4-25tela

Electrician Lineman	09/01/2021

JOB DESCRIPTION Electrician Lineman

DISTRICT 4

ENTIRE COUNTIES

Nassau, Queens, Suffolk

WAGES

For Utility Distribution & Transmission Line Construction:		
Per Hour:	07/01/2021	4/03/2022
Lineman/Splicer	\$ 61.21	\$ 63.20
Material Man	53.25	54.98
Heavy Equip. Operator	48.97	50.56
Groundman	36.73	37.92
Flagman	27.54	28.44

For Natural Gasline Construction:

Per Hour:	
Journeyman U.G.Mech	\$ 50.10

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Utility Distribution & Transmission Line Construction:

	07/01/2021	4/03/2022
All Classifications	32.75% of Hourly Wage Paid + \$ 14.00	32.75% of Hourly Wage Paid + \$ 14.45

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

Natural Gasline Construction:

Per Hour: 07/01/2021

Journeyman U.G.Mech. 28% of Hourly
Wage Paid +
\$14.60

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

OVERTIME for Natural Gas Mechanic:(B,G,P)

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 16, 23, 25, 26) on HOLIDAY PAGE

Same as Above for Natural Gas Mechanic.

REGISTERED APPRENTICES

1000 hour Terms at the following Percentage of Journeyman's Wage.
(Lineman Only)

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFIT:	07/01/2021	4/03/2022

All Terms	31.75% of Hourly Wage Paid + \$ 14.00	31.75% of Hourly Wage Paid + \$ 14.45

4-1049 Line/Gas

Elevator Constructor

09/01/2021

JOB DESCRIPTION Elevator Constructor

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

PARTIAL COUNTIES

Rockland: Entire County except for the Township of Stony Point

Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per hour:

	07/01/2021	03/17/2022
Elevator Constructor	\$ 72.29	\$ 75.14
Modernization & Service/Repair	56.77	59.09

Four(4), ten(10) hour days may be worked at straight time during a week, Monday thru Friday.

NOTE- In order to use the '4 Day/10 Hour Work Schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 IS NOT SUBMITTED you will be liable for overtime payments for work over the allotted hours per day listed.

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor	\$ 41.92	\$ 43.914

Modernization & Service/Repairs 41.082 42.787

OVERTIME PAY

Constructor See (D, M, T) on OVERTIME PAGE.

Modern/Service See (B, F, S) on OVERTIME PAGE.

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

*Note:1st Term is based on Average wage of Constructor & Modernization.

Terms 2 thru 4 Based on Journeymans wage of classification Working in.

1 YEAR TERMS:

1st Term*	2nd Term	3rd Term	4th Term
50%	55%	65%	75%

SUPPLEMENTAL BENEFITS

Elevator Constructor

1st Term	\$ 34.05	\$ 34.772
2nd Term	34.91	35.606
3rd Term	36.30	37.052
4th Term	37.70	38.497

Modernization & Service/Repair

1st Term	\$ 34.00	\$ 34.672
2nd Term	34.50	35.195
3rd Term	35.83	36.571
4th Term	37.15	37.938

4-1

Glazier

09/01/2021

JOB DESCRIPTION Glazier

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per hour: 7/01/2021 11/01/2021

Glazier	\$ 58.60	+ \$1.25
*Scaffolding	59.55	
Glass Tinting & Window Film	29.60	
**Repair & Maintenance	29.60	

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 24' or more, but not pipe scaffolding.

**Repair & Maintenance- All repair & maintenance work on a particular building, whenever performed, where the total cumulative contract value is under \$148,837. All Glass tinting, window film, regardless of material or intended use, and all affixing of decals to windows or glass.

SUPPLEMENTAL BENEFITS

Per hour: 7/01/2021

Journeyworker	\$ 36.04
Glass tinting & Window Film	21.19
Repair & Maintenance	21.19

OVERTIME PAY

See (B,H,V) on OVERTIME PAGE.

For 'Repair & Maintenance' and 'Glass Tinting & Window Film' see (B, B2, I, S) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE
For 'Repair & Maintenance' and 'Glass Tinting & Window Film' Only
Paid: See(5, 6, 16, 25)
Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES

Wage per hour:
(1) year terms at the following wage rates:

7/01/2021

1st term	\$ 20.72
2nd term	28.66
3rd term	34.67
4th term	46.62

Supplemental Benefits:

(Per hour)

1st term	\$ 16.58
2nd term	23.57
3rd term	26.09
4th term	30.91

8-1087 (DC9 NYC)

Insulator - Heat & Frost

09/01/2021

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour:	07/01/2021	06/01/2022

Insulators		Additional
Heat & Frost	\$ 69.01	\$ 1.00/Hr

SUPPLEMENTAL BENEFITS

Per Hour:

Insulators	\$ 35.16
Heat & Frost	

OVERTIME PAY

See (B, E, *Q, V) on OVERTIME PAGE

* Triple time for Labor Day (If worked)

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages:

1 year terms.

Wages Per Hour:

1st	2nd	3rd	4th
\$ 27.60	\$ 34.50	\$ 41.40	\$ 48.30

Supplemental Benefits:

\$ 14.06	\$ 17.58	\$ 21.09	\$ 24.61

4-12

Ironworker

09/01/2021

JOB DESCRIPTION Ironworker

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:	07/01/2021

Ironworker Rigger \$ 67.99

Ironworker Stone
Derrickman \$ 67.99

SUPPLEMENTAL BENEFITS

Per hour: \$ 41.44

OVERTIME PAY

See (B, D1, *E, Q, **V) on OVERTIME PAGE

*Time and one-half shall be paid for all work on Saturday up to eight (8) hours and double time shall be paid for all work thereafter.

** Benefits same premium as wages on Holidays only

HOLIDAY

Paid: See (18) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 25) on HOLIDAY PAGE

*Work stops at schedule lunch break with full day's pay.

REGISTERED APPRENTICES

Wage per hour:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th
07/01/2021	\$33.55	\$47.94	\$53.34	\$58.74

Supplemental benefits:

Per hour:				
07/01/2021	\$21.18	\$31.45	\$31.45	\$31.45

9-197D/R

Ironworker

09/01/2021

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:	07/01/2021	01/01/2022
		Additional
		\$ 1.25

Ornamental	\$ 46.15
Chain Link Fence	46.15
Guide Rail	46.15

SUPPLEMENTAL BENEFITS

Per hour:
Journeyworker: \$ 60.05

OVERTIME PAY

See (B, B1, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentices hired before 8/31/2018:

(1/2) year terms at the following percentage of Journeyman's wage.

5th Term	80%

Supplemental Benefits per hour:	
5th Term	54.03

Apprentices Hired after 9/1/18:

1 year terms	
1st Term	\$ 20.63
2nd Term	24.22
3rd Term	27.80
4th Term	31.38

Supplemental Benefits per hour:

1st Term	\$ 17.89
2nd Term	19.14
3rd Term	20.40
4th Term	21.66

4-580-Or

Ironworker**09/01/2021**

JOB DESCRIPTION Ironworker**DISTRICT 4****ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

PER HOUR:

07/01/2021

01/01/2022

Ironworker:

Structural \$ 54.20

Additional \$ 1.75/Hr.

Bridges

Machinery

SUPPLEMENTAL BENEFITS

PER HOUR PAID:

Journeyman \$ 82.35

OVERTIME PAY

See (B, B1, Q, *V) on OVERTIME PAGE

*NOTE: Benefits are calculated for every hour paid

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

6 month terms at the following rate:

1st	\$28.21
2nd	\$28.81
3rd - 6th	\$29.42

Supplemental Benefits

PER HOUR PAID:

All Terms \$56.90

4-40/361-Str

Ironworker**09/01/2021**

JOB DESCRIPTION Ironworker**DISTRICT 4****ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour:

07/01/2021

Reinforcing &

Metal Lathing \$ 56.25

"Base" Wage \$ 54.70

plus \$ 1.55

"Base" Wage is used to calculate overtime hours only.

SUPPLEMENTAL BENEFITS

Per hour:

Reinforcing & \$ 38.30

Metal Lathing

OVERTIME PAY

See (B, E, Q, *X) on OVERTIME PAGE

*Only \$22.00 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half	\$ 45.08
Double Time	\$ 51.33

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 13, 18, 19, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

1st term	2nd term	3rd term	4th Term
Wage Per Hour:			
\$ 22.55	\$ 28.38	\$ 34.68	\$ 37.18
"Base" Wage			
\$ 21.00	\$ 26.80	\$ 33.10	\$ 35.60
plus \$1.55	plus \$1.58	plus \$1.58	plus \$1.58

"Base" Wage is used to calculate overtime hours ONLY.

SUPPLEMENTAL BENIFITS

Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 18.17	\$ 21.34	\$ 22.00	\$ 20.50

4-46Reinf

Laborer - Building

09/01/2021

JOB DESCRIPTION Laborer - Building

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021

Building Laborer \$ 41.65

Asbestos Abatement Workers 38.05
(Re-Roofing Removal see Roofer)

SUPPLEMENTAL BENEFITS

Per Hour:

Building Laborer \$ 30.46
Asbestos Abatement Worker 17.75

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

See also(H)for Fire Watch on OVERTIME PAGE

Asbestos Worker See (B, H)

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

Asbestos Worker see (5,6,8 & 28)

REGISTERED APPRENTICES

Regular Hours Work Terms

Term #1	1 hr to 1000hrs
Term #2	1001hrs to 2000hrs
Term #3	2001hrs to 3000hrs
Term #4	3001hrs to 4000hrs

Wages per hour:

1st Term	\$ 18.00
2nd Term	22.10
3rd Term	27.27
4th Term	31.98

Benifits per hour

1st Term	\$ 21.00
2nd Term	22.94
3rd Term	22.94
4th Term	22.94

4-66

Laborer - Heavy&Highway

09/01/2021

JOB DESCRIPTION Laborer - Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Laborer (Heavy/Highway):

GROUP # 1: Asphalt Rakers, Concrete Curb Formsetters.

GROUP # 2: Asphalt Shovelers, Roller Boys and Tampers.

GROUP # 3: Basic Laborer, Power Tool(Jackhammer), Landscape Construction, Traffic Control Personnel(flaggers)

WAGES PER HOUR:

07/01/2021

GROUP # 1

Total Wage Paid \$ 56.72

"Base Wage" 48.56

GROUP # 2

Total Wage Paid \$ 55.25

"Base Wage" 47.09

GROUP # 3

Total Wage Paid \$ 50.78

"Base Wage" 42.62

NOTE: "Base Wage" for Premium/Overtime calculation Only. \$8.16 is difference between "Base" and "Total".

Additional 30% to "Base Wage" for all hours worked on New York State D.O.T. and/or other Government Mandated Off-Shift Work.

Hazardous Material Work add an Additional 10% of base wage.

SUPPLEMENTAL BENEFITS

Per Hour:

ALL GROUPS \$ 33.89

After Forty (40)paid hours in a work week

OVERTIME PAY 21.24

OVERTIME PAY

OVERTIME PAY

See (B, E2, F) on OVERTIME PAGE

NOTES: Premium/Overtime Pay to be calculated on "Base Wage" ONLY

Example Group# 3: \$42.62 X Time and One Half = \$63.93 + \$8.16 = \$72.09

HOLIDAY

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (1) on HOLIDAY PAGE

REGISTERED APPRENTICES

1000 hour(s) Terms at the following Percentage of the "Base Wage" except

4th Term calculate at Total Wage Paid.

1st 0-1000/Hrs.	60%
2nd 1001-2000/Hrs.	70%
3rd 2001-3000/Hrs.	80%
4th 3001-4000/Hrs.	90%

Supplemental Benefits per hour:

All APPRENTICES \$ 33.89
After Forty(40) paid hours in a work Week
21.24

4-1298

Mason

09/01/2021

JOB DESCRIPTION Mason

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021

Brick/Block Layer \$ 63.94

Base Wage for OT Calculation 53.65

SUPPLEMENTAL BENEFITS

Per Hour:

Brick/Block Layer \$ 29.55

OVERTIME PAY

See (A, E, E2, Q) on OVERTIME PAGE

Note: OT Calculated on Base Wage plus \$ 10.29/hr.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(800 hour) Terms at the following Percentage of Journey workers "Base Wage" plus \$ 6.39/hr.:

1st	2nd	3rd	4th	5th
50%	60%	70%	80%	90%

Supplemental Benefits per hour:

All Apprentices \$ 20.70

4-1Brk

Mason - Building

09/01/2021

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2021 12/06/2021 06/06/2022

		Additional	Additional
Tile Setters	\$ 61.07	\$ 0.48	\$ 0.72

SUPPLEMENTAL BENEFITS

Per Hour:

\$ 24.91*
+ \$10.01

* This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

Tile Setters:
(750 hour) term at the following wage rate:

Term:	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6501-7000
07/01/2021	\$20.84	\$25.66	\$32.68	\$37.50	\$40.99	\$44.30	\$47.82	\$52.63	\$55.35	\$59.34

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$12.55* +\$0.66	\$12.55* +\$0.71	\$15.16* +\$0.81	\$15.16* +\$0.85	\$16.16* +\$1.23	\$17.66* +\$1.28	\$18.66* +\$1.63	\$18.66* +\$1.68	\$16.66* +\$5.83	\$21.91* +\$6.32

* This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52A

Mason - Building	09/01/2021

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Building

	07/01/2021	01/01/2022
Wages per hour:		
Mosaic & Terrazzo Mechanic	\$ 58.46	Additional \$ 0.85
Mosaic & Terrazzo Finisher	\$ 56.86	

SUPPLEMENTAL BENEFITS

Per hour:

Mosaic & Terrazzo Mechanic	\$ 26.11* + \$11.73
Mosaic & Terrazzo Finisher	\$ 26.11* + \$11.71

*This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (A, E, Q) on OVERTIME PAGE

Deduct \$6.80 from hourly wages before calculating overtime.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Easter Sunday is an observed holiday. Holidays falling on a Saturday will be observed on that Saturday. Holidays falling on a Sunday will be celebrated on the Monday.

REGISTERED APPRENTICES

Wages per hour:

(750 Hour) terms at the following wage rate.

	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2021	\$ 25.82	\$ 28.40	\$ 31.00	\$ 33.58	\$ 36.16	\$ 38.74	\$ 43.91	\$ 49.08

Supplemental benefits per hour:

07/01/2021	\$13.06*	\$14.37*	\$15.67*	\$16.98*	\$18.28*	\$19.59*	\$22.20*	\$24.81*

+ \$9.27 + \$10.19 + \$11.12 + \$12.04 + \$12.97 + \$13.90 + \$15.75 + \$17.60

Apprentices hired after 07/01/2017:
Wages Per hour:

	1st 0- 1500	2nd 1501- 3000	3rd 3001- 3750	4th 3751- 4500	5th 4501- 5250	6th 5251- 6000
07/01/2021	\$ 22.63	\$ 29.10	\$ 31.00	\$ 36.16	\$ 41.32	\$ 46.48

Supplemental Benefits per hour:

	1st \$4.59* +\$6.49	2nd \$5.90* +\$8.34	3rd \$15.67* +\$11.12	4th \$18.28* +\$12.97	5th \$20.89* +\$14.83	6th \$23.50* +\$16.67
07/01/2021						

*This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/3

Mason - Building **09/01/2021**

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2021 01/01/2022

Building-Marble Restoration: Additional

Marble, Stone & Terrazzo Polisher, etc \$ 46.16 \$ 1.10

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:

Building-Marble Restoration:

Marble, Stone & Polisher \$ 29.11

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

*ON SATURDAYS, 8TH HOUR AND SUCCESSIVE HOURS PAID AT DOUBLE HOURLY RATE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1ST TERM APPRENTICE GETS PAID FOR ALL OBSERVED HOLIDAYS.

REGISTERED APPRENTICES

WAGES per hour:

900 hour term at the following wage:

	1st 1- 900	2nd 901- 1800	3rd 1801- 2700	4th 2701
07/01/2021	\$32.28	\$36.91	\$41.51	\$46.16

Supplemental Benefits Per Hour:

07/01/2021	\$26.47	\$27.34	\$28.29	\$29.11

9-7/24-MP

Mason - Building	09/01/2021

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Wages:	07/01/2021	01/03/2022
		Additional
Marble Cutters & Setters	\$ 61.73	\$ 0.95

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker	\$ 37.76

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage Per Hour:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6751	6751-7500
\$ 24.70	\$ 27.77	\$ 30.87	\$ 33.94	\$ 37.03	\$ 40.11	\$ 43.20	\$ 46.29	\$ 52.46	\$ 58.64

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 20.01	\$ 21.43	\$ 22.83	\$ 24.25	\$ 25.65	\$ 27.07	\$ 28.47	\$ 29.88	\$ 32.70	\$ 35.51

9-7/4

Mason - Building	09/01/2021

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2021	12/06/2021	06/06/2022
		Additional	Additional
Tile Finisher	\$ 46.89	\$ 0.39	\$ 0.58

SUPPLEMENTAL BENEFITS

Per Hour:

\$ 21.91*
+ \$9.84

*This portion of benefits subject to same premium rate as shown for overtime wages

OVERTIME PAY

See (B, E, Q, *V) on OVERTIME PAGE

Work beyond 10 hours on a Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

9-7/88A-tf

Mason - Building	09/01/2021

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2021	01/01/2022
Marble, Stone, etc.		Additional
Maintenance Finishers:	\$ 26.73	\$ 0.68

Note 1: An additional \$2.00 per hour
for time spent grinding floor using
"60 grit" and below.

Note 2: Flaming equipment operator
shall be paid an additional \$25.00 per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Marble, Stone, etc	
Maintenance Finishers:	\$ 14.00

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

*Double hourly rate after 8 hours on Saturday

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1st term apprentice gets paid for all observed holidays.

REGISTERED APPRENTICES

WAGES per hour:

07/01/2021

0-750	\$21.37
751-1500	\$22.09
1501-2250	\$22.81
2251-3000	\$23.52
3001-3750	\$24.61
3751-4500	\$26.04
4501+	\$26.73

Supplemental Benefits:

Per hour:

0-750	\$ 11.24
751-1500	\$ 11.60
1501-2250	\$ 11.97
2251-3000	\$ 12.35
3001-3750	\$ 12.84
3751-4500	\$ 13.63
4501+	\$ 14.00

9-7/24M-MF

Mason - Building / Heavy&Highway

09/01/2021

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2021	01/03/2022
Marble-Finisher	\$ 48.87	Additional \$ 0.61

SUPPLEMENTAL BENEFITS

Journeyworker:
per hour

Marble- Finisher	\$ 35.25

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

* Work beyond 8 hours on a Saturday shall be paid at double the rate.

** When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

Mason - Building / Heavy&Highway

09/01/2021

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021

Cement Mason \$ 51.97

SUPPLEMENTAL BENEFITS

Per Hour:

Cement Mason \$ 33.71

Overtime Rate* \$ 54.42

OVERTIME PAY

See (*B1, Q, V) on OVERTIME PAGE

* Applies to 9th and 10th hours and up to the 10th hour on Saturday

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 13, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following Percentage of Journeyworkers Wage.

1st Term 50%

2nd Term 60%

3rd Term 70%

Supplement Benefits per hour paid:

1st Term \$ 16.86 OT Rate \$ 27.22

2nd Term \$ 20.23 OT Rate \$ 32.66

3rd Term \$ 23.60 OT Rate \$ 38.10

4-780

Mason - Building / Heavy&Highway

09/01/2021

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

NOTE: Shall include but not limited to Precast concrete slabs (London Walks)Marble and Granite pavers 2'x 2' or larger.

Per Hour:

07/01/2021

Stone Setter \$ 68.23

Base Rate \$52.06

Stone Tender \$ 50.64

Base Rate \$43.49

SUPPLEMENTAL BENEFITS

Per Hour:

Stone Setter \$ 36.75

Stone Tender \$ 20.70

OVERTIME PAY

See (*C, **E, Q) on OVERTIME PAGE

Base Rates are use to Calculate Overtime Premiums then adding in:

\$16.22/Hr. for Stone Setter and \$7.15/Hr. for Stone Tender

* On weekdays the eighth (8th) and ninth (9th) hours are time and one-half all work thereafter is paid at double the hourly rate.

** The first nine (9) hours on Saturday is paid at time and one-half all work thereafter is paid at double the hourly rate.

HOLIDAY

Paid: See (*18) on HOLIDAY PAGE

Overtime: See (5, 6, 10) on HOLIDAY PAGE

Paid: *Must work first 1/2.

REGISTERED APPRENTICES

Per Hour:

Stone Setter(800 hour) terms at the following Percentage of Stone Setters Base wage rate per hour plus \$7.69:

1st	2nd	3rd	4th	5th	6th
50%	60%	70%	80%	90%	100%

Supplemental Benefits:

All Apprentices \$ 23.25

4-1Stn

Mason - Heavy&Highway

09/01/2021

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour:	07/01/2021	07/01/2022
		Additional
		\$ 2.25

Pointer, Caulkers & Cleaners \$ 57.03

SUPPLEMENTAL BENEFITS

Per Hour:

Pointer, Cleaners & Caulkers \$ 30.31

OVERTIME PAY

See (B, E2, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms at the following wage rates.

1st	2nd	3rd	4th
\$ 28.92	\$ 32.58	\$ 37.63	\$ 45.44

Apprentices Supplemental Benefits:

(per hour paid)	\$ 15.11	\$ 19.66	\$ 23.41	\$ 24.41

4-1PCC

Operating Engineer - Building

09/01/2021

JOB DESCRIPTION Operating Engineer - Building

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

BUILDING CATEGORIES:

CLASS " AA "CRANES:

ABI Machine (150,000lbs and over or 149,999lbs and under when driving steel sheet piles),Crane, Truck Crane, Derrick, Dragline, Dredge, Crawler Crane, Tower Crane & Pile Driver, Vertical Drill Rig (115,000lbs and over and 114,999lbs and under).

CLASS "A":

ABI Machine (149,999 and under used for augering and drilling), Asphalt Spreader, Backhoe Crawler(360 swing), Barrier Machine, CAP (ice machine), Cherrypicker CAP (over 70 tons), CMI or Maxim Spreader, Concrete Pump, Directional Boring, GradAll, Grader, Hydraulic Cherrypicker/Crane (2seats), Hoist (3drum or multi platform), Laser Screed, Loading Machine (Bucket/CAP 10yds or more), Milling Machine (Large), Pipeline Welder, Plant Engineer, Power Winch (stone setting/structural steel), Powerhouse, Scoop Carry-All Scraper (in tandem), Sideboom Tractor (includes tank work), Track Alignment Machine, Stone Spreader (self propelled), Striping Machine (long line/truck mounted), Tree Grapple, Zamboni.

CLASS "B":

Backhoe (other than 360), Belt Screte, Boom Truck, Bulldozer, Boring Machine/Auger, Cherry Picker(under 70 Tons), Conveyor-Multi, Curb Machine (asphalt or concrete), Dinky Locomotive, Drill Rig (dowels)Fork Lift, Hoist (2 Drum), Loading Machine & Front End Loader, Mechanical Compactors (machine drawn), Mulch Machine(Machine Fed), Post Hole/Auger, Power Wincher (Not Included in Class "A"), Asphalt Roller, Hydraulic Pump with Boring Machine, Scoop, Carryall/Scaper, Skid Loader/Skid Steer/Bobcat, Trenching Machine, Vermeer Cutter, Work Boat, Inspection/Safety Boat.

CLASS "C":

Concrete Finish/Saw/Spreader, Dirt Roller, Hoist (1 drum), Interior Hoist, Milling Machine (small), Oiler Truck Crane (pile work), Power Broom, Vactor Truck, VacAll.

CLASS "D":

Boiler (thermoplastic), Concrete Breaker, Conveyer, Curing Machine, Fork Lift or Walk Behind (power operated), Generator, Hydra Hammer, Compactors (mechanical or hand operated), Maintenance Engineer (small equipment/well point/welding & burning), Mechanic (field man), Micro-Trap with Compressor, Oiler (Truck Crane Boom 100ft or more) Power Winch Truck Mounted (Stone Setter/Struct.Steel), Pin Puller, Portable Heaters, Power Buggies, Pump (double action diaphragm), Pump (4 inch or over), Pump (hydraulic/submersible) Jet Pump, Pulvi-Mixer, Ridge Cutter, Shot Blaster.

CLASS "E":

Batching Plant, Compressor (structural steel/2 or more battery), Generator (small), Grinder, Ground Heater, Power Grinder, Mixer with Skip, Mulching Machine (hand fed), Oiler, Pipeline Welder Helper, Power Washer, Pumps (up to 3 inch/single action 1 to 3 inches), Pump (gypsum), Root Cutter, Stump Chipper, Track Tamper, Tractor (caterpillar or wheel), Trenching Machine (hand), Welding Machine (pile work/structural steel), Deckhand on Work/Inspection/Safety Boat.

	07/01/2021	6/01/2022 Additional
Class "AA"	\$ 84.13	\$ 3.50
Cranes: Boom length over 100 feet add \$ 1.00		
" " " 150 " " \$ 1.50 " "		
" " " 250 " " \$ 2.00 " "		
" " " 350 " " \$ 3.00 " "		
Class "A"	70.90	3.10
Add \$3.50 for Hazardous Waste Work		
Class "B"	66.53	2.99
Add \$2.50 for Hazardous Waste Work		
Class "C"	64.17	2.93
Add \$1.50 for Hazardous Waste Work		
Class "D"	48.77	2.50
Add \$1.00 for Hazardous Waste Work		
Class "E"	46.67	2.44

SUPPLEMENTAL BENEFITS

Per Hour:

All Classes	\$ 39.30
Overtime Rate	35.10

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

"NOTE" Employee must be Employed day before

and day after Holiday to receive Holiday Pay.

REGISTERED APPRENTICES

One(1) Year Terms at the following Rate:

1st Term	\$ 28.00
2nd Term	29.00
3rd Term	30.00

Supplemental Benefits per hour:

All Apprentices	\$ 15.64
Overtime Rate	5.60

4-138

Operating Engineer - Building / Heavy&Highway

09/01/2021

JOB DESCRIPTION Operating Engineer - Building / Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021 08/01/2021

Well Driller \$ 39.30 \$ 39.45

Well Driller Helper 34.17 34.17

Hazardous Waste Differential
Added to Hourly Wage:

Level A	\$ 3.00	\$ 3.00
Level B	2.00	2.00
Level C	1.00	1.00

Monitoring Well Work
Add to Hourly Wage:

Level A	\$ 3.00	\$ 3.00
Level B	2.00	2.00

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021 08/01/2021

Well Driller & Helper 10% of straight time rate plus \$ 12.50 10% of straight time rate plus \$ 13.50

Additional \$ 4.25/Hr. for Premium Time Hours Worked

OVERTIME PAY

See (B2, P, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 16, 23) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 23) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentices at 12 Month Terms

Wages Per Hour: 07/01/2021 08/01/2021

1st Term	\$ 28.00	\$ 28.00
2nd Term	29.00	29.00
3rd Term	30.00	30.00

SUPPLEMENTAL BENEFITS

Per Hour:

1st Term	10% of Wage + \$ 13.50
2nd Term	10% of Wage + \$ 13.50
3rd Term	10% of Wage + \$ 13.50

Additional \$4.25/Hr. for premium time hours worked.

4-138well

Operating Engineer - Heavy&Highway

09/01/2021

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

HEAVY and HIGHWAY CATEGORIES:

CLASS "AA" CRANES:

ABI Machine (150,000lbs and over), ABI Machine (149,000lbs and under driving steel sheets), Crane, Truck Crane, Derrick, Dragline, Dredge, Crawler Crane, Tower Crane, Pile Driver.

CLASS "A":

ABI Machine (149,000lbs and under for Augering or Drilling), Asphalt Spreader, Backhoe Crawler (360 Swing & over 150,000lbs), Backhoe Crawler (360 Swing & under 149,000lbs), Barrier Machine, Cherrypicker Cap (over 70 tons), CMI or Maxim Spreader, Concrete Pump, Directional Boring, Grader, Gradall, Hoist (3 drum or multi-platform), Hydraulic Cherrypicker/crane (2 seats), Loading Machine (bucket 10 yds. or more), Laser Screed, Milling Machine (Large), Pipeline Welder, Plant Engineer. Power Winch-Stone Setting/Structural Steel or Truck Mounted, Powerhouse, Scoop-Carryall-Scaper in Tandem, Side Boom Tractor, Side Boom Tractor (Tank Work), Stone Spreader(self propelled), Striping Machine (long line/truck mounted), Tree Grapple, Tank Work, Track Alignment Machine.

CLASS "B":

Backhoe (other than 360), Belt Screte, Boom Truck, Bulldozer, Boring Machine/Auger, Cherry Picker (under 70 tons), Conveter-Multi, Curb Machine Asphalt/Concrete, Dinky Locomotive, Drill Rig for Dowels, Field Mechanic, Fork Lift, Hoist (2 Drum), Loading Machine, Loading Machine (Front End), Mechanical Compactors (Machine Drawn), Mulching Machine (Machine Fed), Post Hole/Auger, Power Winch (other than structural steel), Pump Hydraulic (with boring machine), Asphalt Roller, Scoop (carry-all, scraper), Skid Loader/Steer, Vermeer Cutter, Work Boat, Inspection & Safety Boat.

CLASS "C":

Concrete Finish/Saw/Spreader Machines, Dirt Roller, Hoist (1 drum), Interior Hoist, Oiler Truck Crane(Pile work), Power Broom, Small Milling Machine, Vactor Truck/VacAll Truck.

CLASS "D":

Boiler (Thermoplastic), Concrete Breaker, Conveyor, Curing Machine, Fireman, Fork lift (walk behind), Generator, Hydra Hammer, Maintenance Engineer (small equipment/Well Point/Welding & Burning), Compactors (hand operated), Pin Puller, Portable Heaters, Power Buggies, Pulvi Mixer, Pumps (double action/4 inch and over/Hydraulic/Submersible & Jet), Ridge Cutter, Robotic Unit Operator(Trenchless Pipe Rehab-Cleaning & Television of Sewers/CCTV Inspection), Shotblaster.

CLASS "E":

Batching Plant (On Job Site), Compressor (structural steel/2 or more in battery), Generator(small), Grinder, Ground Heater(boilers), Power Grinder, Mixer (with skip), Mulching Machine (hand feed), Oiler, Pipeline Welder Helper, Power Washer, Pump(up to 3 inches/Gypsum/Single action 1 to 3 inches), Root Cutter, Stump Grinder, Track Tamper, Tractor (caterpillar or wheel), Trenching Machine (hand), Welding Machine (Pile Work/Structural Steel), Deckhand (on Work/Inspection/Safety Boat).

	07/01/2021	6/01/2022 Additional
Class "AA"	\$ 83.36	\$ 3.48
Cranes: Boom Length over 100 feet add \$ 1.00 per hour		
" " " 150 " " \$ 1.50 " "		
" " " 250 " " \$ 2.00 " "		
" " " 350 " " \$ 3.00 " "		
Class "A"	73.89*	3.22
*Add \$3.50 for Hazardous Waste Work.		
Class "B"	69.10*	3.07
*Add \$2.50 for Hazardous Waste Work.		
Class "C"	66.66*	3.01
*Add \$1.50 for Hazardous Waste Work		
Class "D"	50.88*	2.56
*Add \$1.00 for Hazardous Waste Work		
Class "E"	48.74	2.50

"NOTE": ADD 30% to straight time hourly wage for NEW YORK STATE
D.O.T. and other GOVERNMENTAL MANDATED off-shift work.

SUPPLEMENTAL BENEFITS

Per Hour:

ALL CLASSES \$ 39.55

Note: OVERTIME AMOUNT 34.60

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 8, 15, 20, 22, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 8, 15, 20, 22, 25, 26) on HOLIDAY PAGE

"Note" Employee must be employed day before and day after
a holiday to receive holiday pay.

REGISTERED APPRENTICES

Wage per hour:

REGISTERED APPRENTICES

One(1) Year Terms at the following Rate:

1st Term \$ 28.00

2nd Term 29.00

3rd Term 30.00

SUPPLEMENTAL BENEFITS:

APPRENTICES 15.64

Note: Overtime Amount 5.60

4-138

Operating Engineer - Heavy&Highway

09/01/2021

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Party Chief - One who directs a survey party

Instrument Man - One who runs the instrument and assists Party Chief

Rodman - One who holds the rod and in general, assists the survey party

Categories cover GPS & Under Ground Surveying

Per Hour: 07/01/2021

Heavy Highway/Building

Party Chief \$ 74.54

Instrument Man 56.52

Rodman 48.28

SUPPLEMENTAL BENEFITS

Per Hour:

Heavy Highway/Building \$ 36.60

Premium*:

Heavy Highway/Building \$ 45.67

Premium**:

Heavy Highway/Building \$ 54.75

* Applies to instances where 1-1/2 regular rate are paid

**Applies to instances where 2 times the rate are paid.

OVERTIME PAY

See (B, *E, Q) on OVERTIME PAGE

* Doubletime paid on the 9th hour on Saturday.

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

4-15D-N/S co.

Operating Engineer - Marine Dredging

09/01/2021

JOB DESCRIPTION Operating Engineer - Marine Dredging

DISTRICT 4

ENTIRE COUNTIES

Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES

These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2021	10/01/2021
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	\$ 41.42	\$ 41.42
CLASS A2 Crane Operator (360 swing)	36.91	36.91
CLASS B Dozer, Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	35.82	35.82
CLASS B2 Certified Welder	33.72	33.72
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	32.80	32.80
CLASS C2 Boat Operator	30.89	31.74
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	25.66	26.37

SUPPLEMENTAL BENEFITS

Per Hour:
THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

	07/01/2021	10/01/2021
All Classes A & B	\$11.98 plus 8% of straight time wage, Overtime hours add \$ 0.63	\$11.98 plus 8% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$11.68 plus 8% of straight time wage, Overtime hours	11.68 plus 8% of straight time wage, Overtime hours

add \$ 0.48

add \$ 0.48

All Class D

\$11.38 plus 8%
of straight time
wage, Overtime hours
add \$ 0.33

11.38 plus 8%
of straight time
wage, Overtime hours
add \$ 0.33

OVERTIME PAY

See (B2, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Survey Crew - Consulting Engineer

09/01/2021

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Dutchess: That part in Dutchess County lying South of the North City line of Poughkeepsie.

WAGES

Feasibility and preliminary design surveying, any line and grade surveying for inspection or supervision of construction.

Per hour: 07/01/2021

Survey Classifications

Party Chief \$ 45.83
Instrument Man 38.17
Rodman 33.34

SUPPLEMENTAL BENEFITS

Per Hour:

All Crew Members: \$ 20.60

OVERTIME PAY

OVERTIME:.... See (B, E*, Q, V) ON OVERTIME PAGE.

*Doubletime paid on the 9th hour on Saturday.

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

9-15dconsult

Operating Engineer - Trenchless Pipe Rehab

09/01/2021

JOB DESCRIPTION Operating Engineer - Trenchless Pipe Rehab

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

IMPORTANT NOTE: This Category & Classifications are now located in
Operating Engineers/Heavy Highway & Laborers/ Heavy Highway.

Per Hour:

07/01/2021
(SEE)

Robotic Unit Operator Operator(class D)

Technician/Boiler, Generator Operator(class D)

AM Liner/Hydra Seal Laborer(Grp#3)

Hobas Pipe, Polyethylene Pipe or
Pull and Inflate Liner

Laborer(Grp#3)

OVERTIME PAY

HOLIDAY

4-138TrchPReh

Painter

09/01/2021

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2021

Brush \$ 50.30*

Abatement/Removal of lead based
or lead containing paint on
materials to be repainted. 50.30*

Spray & Scaffold \$ 53.30*

Fire Escape 53.30*

Decorator 53.30*

Paperhanger/Wall Coverer 52.93*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour: 07/01/2021

Paperhanger \$ 31.83

All others 29.81

Premium 33.40**

**Applies only to "All others" category, not paperhanger journeyworker.

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rate.

Per hour: 07/01/2021

Appr 1st term... \$ 19.56*

Appr 2nd term... 25.12*

Appr 3rd term... 30.42*

Appr 4th term... 40.65*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental benefits:

Per Hour: 07/01/2021

Appr 1st term... \$ 14.72

Appr 2nd term... 18.23

Appr 3rd term... 21.06

Appr 4th term... 26.67

8-NYDC9-B/S

Painter

09/01/2021

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Putnam, Suffolk, Westchester

PARTIAL COUNTIES

Nassau: All of Nassau except the areas described below: Atlantic Beach, Ceadhurst, East Rockaway, Gibson, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on the South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave., Rockville Centre is the boundary line up to Lawson Blvd. turn right going west all the above territory. Starting at Union Turnpike and Lakeville Rd. going north to Northern Blvd. the west side of Lakeville road to Northern blvd. At Northern blvd. going east the district north of Northern blvd. to Port Washington Blvd. West of Port Washington blvd. to St. Francis Hospital then north of first traffic light to Port Washington and Sands Point, Manor HAVen, Harbour Acres.

WAGES

Per hour: 07/01/2021
Drywall Taper \$ 50.30*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour: 07/01/2021
Journeyman \$ 29.81

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages - Per Hour: 07/01/2021

1500 hour terms at the following wage rate:

1st term	\$ 19.56*
2nd term	25.12*
3rd term	30.42*
4th term	40.65*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental Benefits - Per hour:

One year term (1500 hours) at the following dollar amount.

1st year	\$ 14.72
2nd year	18.23
3rd year	21.06
4th year	26.67

8-NYDCT9-DWT

Painter - Bridge & Structural Steel

09/01/2021

JOB DESCRIPTION Painter - Bridge & Structural Steel

DISTRICT 8

ENTIRE COUNTIES

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per Hour:

STEEL:

Bridge Painting:	07/01/2021	10/01/2021
	\$ 51.50	\$ 53.00
	+ 8.63*	+ 9.63*

ADDITIONAL \$6.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

NOTE: All premium wages are to be calculated on base rate per hour only.

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK:

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:	07/01/2021	10/01/2021
	\$ 10.90	\$ 10.90
	+ 30.00*	+ 30.60*

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage - Per hour:

Apprentices: (1) year terms

	07/01/2021	10/01/2021
1st year	\$ 20.60	\$ 21.20
	+ 3.45*	+ 3.86*
2nd year	\$ 30.90	\$ 31.80
	+ 5.18*	+ 5.78*
3rd year	\$ 41.20	\$ 42.40
	+ 6.90*	+ 7.70*
Supplemental Benefits - Per hour:		
1st year	\$.25	\$.25
	+ 12.00*	+ 12.24*
2nd year	\$ 10.90	\$ 10.90
	+ 18.00*	+ 18.36*
3rd year	\$ 10.20	\$ 10.90
	+ 24.00*	+ 24.48*

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

Painter - Line Striping

09/01/2021

JOB DESCRIPTION Painter - Line Striping

DISTRICT 8

ENTIRE COUNTIES

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per hour:

Painter (Striping-Highway):	07/01/2021	07/01/2022
Striping-Machine Operator*	\$ 30.32	\$ 31.53
Linerman Thermoplastic	36.93	38.34

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour paid:	07/01/2021	07/01/2022
Journeyworker:		
Striping Machine Operator:	\$ 10.03	\$ 10.03
Linerman Thermoplastic:	10.03	10.03

OVERTIME PAY

See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rates:

	07/01/2021	07/01/2022
1st Term:	\$ 12.50	\$ 12.61
2nd Term:	18.19	18.92
3rd Term:	24.26	25.22

Supplemental Benefits per hour:

1st term:	\$ 9.16	\$ 10.03
2nd Term:	9.16	10.03
3rd Term:	9.16	10.03

8-1456-LS

Painter - Metal Polisher

09/01/2021

JOB DESCRIPTION Painter - Metal Polisher

DISTRICT 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuylar, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2021
Metal Polisher	\$ 37.13
Metal Polisher*	38.23
Metal Polisher**	41.13

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Journeyworker:
All classification \$ 10.64

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year term at the following wage rates:

07/01/2021

1st year \$ 16.00
2nd year 17.00
3rd year 18.00

1st year* \$ 16.39
2nd year* 17.44
3rd year* 18.54

1st year** \$ 18.50
2nd year** 19.50
3rd year** 20.50

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year \$ 7.39
2nd year 7.39
3rd year 7.39

8-8A/28A-MP

Plasterer

09/01/2021

JOB DESCRIPTION Plasterer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per hour:

	07/01/2021	08/01/2021
Building:		
Plasterer/Traditional & Spraying Fireproofing	\$ 50.73*	\$ 51.00*

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2021	08/01/2021
Journeyworker	\$ 22.37	\$ 23.15

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

*When calculating overtime pay, subtract \$5.00 from wages.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages:

(per hour)

800 hours term:

	07/01/2021	08/01/2021
1st term	\$ 28.04	\$ 28.19
2nd term	30.59	30.59
3rd term	35.69	35.88
4th term	38.23	38.43

Supplemental Benefits:

(per hour):

(800) hours term:

	07/01/2021	08/01/2021
1st term	\$ 14.27	\$ 14.70
2nd term	15.14	15.60
3rd term	16.89	17.43
4th term	17.76	18.35

9-262

Plumber	09/01/2021

JOB DESCRIPTION Plumber

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021 05/01/2022

Plumber/ PUMP & TANK	\$ 45.74	\$ 46.49

SUPPLEMENTAL BENEFITS

Per Hour:

Plumber	\$ 31.89	\$ 33.64

OVERTIME PAY

See (B, B2, E2, Q, *V) on OVERTIME PAGE

(V) For Sundays & Holidays if Worked Only

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One(1) Year Terms at the Following

Percentage of Journeyman's wage:

1st Term	30%
2nd Term	40%
3rd Term	50%
4th Term	60%
5th Term	70%

Supplemental Benefits Per Hour:

1st Term	\$ 19.97	\$ 21.72
2nd Term	20.61	22.36
3rd Term	21.43	23.43
4th Term	21.81	23.56
5th Term	25.04	26.79

4-200 Pump & Tank

Plumber	09/01/2021

JOB DESCRIPTION Plumber

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour: 07/01/2021 11/01/2021

Plumber	\$ 54.88	\$ 55.48

SUPPLEMENTAL BENEFITS

Per Hour:

Plumber	\$ 46.53	\$ 46.93

OVERTIME PAY

See (A, E, Q, *V) on OVERTIME PAGE

CODE "V" is only for SUNDAYS and HOLIDAYS THAT ARE WORKED

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One(1) Year Terms at the following percentage of Plumbers Rate:

1st Term	2nd Term	3rd Term	4th Term	5th Term
30%	40%	50%	60%	70%

Supplemental Benefits per hour:

	07/01/2021	11/01/2021
1st Term	\$ 33.01	\$ 33.41
2nd Term	35.32	35.72
3rd Term	36.69	37.09
4th Term	38.18	38.58
5th Term	39.76	40.16

4-200

Plumber

09/01/2021

JOB DESCRIPTION Plumber

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour:

07/01/2021

Plumber

MAINTENANCE ONLY

\$ 35.05

Maintenance: Correction of problem(s) with the existing fixture or group of fixtures, preventive repairs or servicing of said fixtures

SUPPLEMENTAL BENEFITS

Per Hour:

Plumber

Maintenance

\$ 19.30

OVERTIME PAY

See (B, B2, J) on OVERTIME PAGE

HOLIDAY

Paid:

See (1) on HOLIDAY PAGE

Overtime:

See (5, 6, 15, 16) on HOLIDAY PAGE

4-200 Maintenance

Roofer

09/01/2021

JOB DESCRIPTION Roofer

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour

07/01/2021

05/01/2022

ROOFER/Waterproofer

Additional

Total Wage

\$ 51.25

\$ 2.00

to be Paid

"Base" Wage

\$ 45.25**

SUPPLEMENTAL BENEFITS

Per Hour:

ROOFER/Waterproofer

\$ 34.36

OVERTIME PAY

Per Hour:

NEW ROOF SEE (B,E,Q)

RE-ROOF SEE (B,E,E2,Q)

NOTE:** Overtime Pay to be calculated on "BASE" Wage then add \$6.00.

(Example: \$45.25 x time and one half = \$67.87 + \$6.00 = \$73.87)

HOLIDAY

Paid:

See (1) on HOLIDAY PAGE

Overtime:

See (5, 6, 13, *16, **25) on HOLIDAY PAGE

Note: Time and One Half the Hourly Base Rate + \$6.00 if worked.

REGISTERED APPRENTICES

(1) Year terms at the following Percentage of Roofers/Waterproofers Base Wage.

1st 40%	2nd 50%	3rd 70%	4th 80% + \$4.50/Hr.

Supplemental Benefits per hour:

07/01/2021

1st Term	\$ 9.68
2nd Term	11.96
3rd Term	24.22
4th Term	27.60

4-154

Sheetmetal Worker

09/01/2021

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour:	07/01/2021	8/01/2021
Sign Erector	\$ 52.29	\$ 53.97

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2021	8/01/2021
Sign Erector	\$ 51.26	\$ 53.15

OVERTIME PAY

See (A, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:
6 month Terms at the following percentage of Sign Erectors wage rate:

1st 35%	2nd 40%	3rd 45%	4th 50%	5th 55%	6th 60%	7th 65%	8th 70%	9th 75%	10th 80%

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2021

1st \$ 14.34	2nd \$ 16.26	3rd \$ 18.17	4th \$ 20.10	5th \$ 28.02	6th \$ 30.47	7th \$ 33.72	8th \$ 36.27	9th \$ 38.77	10th \$ 41.29

8/01/2021

1st \$ TBD	2nd \$ TBD	3rd \$ TBD	4th \$ TBD	5th \$ TBD	6th \$ TBD	7th \$ TBD	8th \$ TBD	9th \$ TBD	10th \$ TBD

4-137-SE

Sheetmetal Worker

09/01/2021

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021

Sheetmetal Worker	\$ 57.61

Temporary Operation or
Maintenance of Fans
47.33

SUPPLEMENTAL BENEFITS

Per Hour:

Sheetmetal Worker

\$ 48.90

Maintenance Worker

48.90

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE

For Maintenance See Codes B,E, Q & V

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:Wages

Six(6) Month Terms As Follows:

1st & 2nd Term	\$ 20.20
3rd & 4th Term	25.96
5th & 6th Term	31.72
7th & 8th Term	40.37
9th Term	46.11

Per Hour: Supplemental Benifits

1st & 2nd Term	\$ 17.98
3rd & 4th Term	24.64
5th & 6th Term	29.06
7th & 8th Term	35.66
9th Term	40.10

4-28

Steamfitter

09/01/2021

JOB DESCRIPTION Steamfitter

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021

AC Service/Heat Service \$ 42.85

Refrigeration, A/C, Oil Burner and Stoker Service and Repair.

Refrigeration Compressor installation. (Not to exceed 5 Hp.)

Air Condition / Heating Compressor installation up to 15hp (Not to exceed 15 tons on any job).

SUPPLEMENTAL BENEFITS

Per Hour

AC Service/Heat Service \$ 19.46

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

1 year terms

Wages per hour:

1st Term	\$ 20.75
2nd Term	25.04
3rd Term	29.17
4th Term	35.22

Benefits per hour:

1st Term	\$ 12.99
2nd Term	14.24

3rd Term 15.53
4th Term 17.29

4-638B-StmFtrRef

Steamfitter **09/01/2021**

JOB DESCRIPTION Steamfitter

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2021

Sprinkler/Steam \$ 66.11
Fitter

Temporary 50.26
Heat & AC
Fitter

Note: Add 15% to Hourly Wage for "Contracting Agency" Mandated Off Shift Work.

SUPPLEMENTAL BENEFITS

Per Hour:

Sprinkler/Steam \$ 51.24
Fitter

Temporary 42.09
Heat & AC
Fitter

Note: Add 15% to Hourly Benefit for "Contracting Agency" Mandated Off Shift Work.

OVERTIME PAY

All overtime which is defined as work after 7 hours a day plus Saturday, Sunday and Holidays are subject to the amounts below*:

*Note: The posted overtime rates are applicable after 8 hours plus Saturday, Sunday and Holidays for Temporary Heat & AC Fitter on Fire Protection/Sprinkler contracts under \$3,000,000.00 and HVAC/Mechanical contracts under \$30,000,000.00:

Sprinkler/Steam Wages \$ 132.22 Benefit \$ 100.50
Temp Heat/AC Wages \$ 100.52 Benefit \$ 82.20

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

1 year Terms at the Following:

WAGES per hour:				
1st Term	2nd Term	3rd Term	4th Term	5th Term
\$ 26.48	\$ 33.09	\$ 42.99	\$ 52.90	\$ 56.20
Enrolled After 07/01/2017		\$ 39.69	\$ 46.30	\$ 52.90

SUPPLEMENTAL BENEFIT per hour:				
1st Term	2nd Term	3rd Term	4th Term	5th Term
\$ 21.00	\$ 26.06	\$ 33.60	\$ 41.16	\$ 43.68
Enrolled After 07/01/2017		31.08	36.14	41.16

Premium Time Amounts:				
\$ 40.32	\$ 50.38	65.40	80.44	85.46
Enrolled After 07/01/2017		60.38	70.44	80.44

4-638A-StmSpFtr

Teamster - Asphalt Delivery **09/01/2021**

JOB DESCRIPTION Teamster - Asphalt Delivery

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour:

Heavy Construction Work:

Shall include the supply of Asphalt for construction, improvement and modification of all or any part of Streets, Highways, Bridges, Tunnels, Railroads, Canals, Dams, Airports, Schools, Power Generation Plants, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER

07/01/2021

Asphalt Delivery \$ 41.255

Light Construction Work:

Shall include the supply of Asphalt for construction of Single & Multi Family Homes, Town Houses, Apartment Buildings, including Driveways, Streets and Curbs within those projects. Parking Lots, Office Buildings, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER

Asphalt Delivery \$ 35.99

SUPPLEMENTAL BENEFITS

Per Hour:

Heavy Construction Work

TRUCK DRIVER

Asphalt Delivery \$ 50.3125

Light Construction Work

TRUCK DRIVER

Asphalt Delivery \$ 13.05

OVERTIME PAY

See (B, *B2, E, **I, P, ***R, ****U) on OVERTIME PAGE

(NOTE) PREMIUM PAY of 25% on straight time hours for New York State D.O.T. and or other GOVERNMENTAL MANDATED off shift work.

Note: (B,E,P,T&*U) Apply to Heavy Construction.

Note: (B2,I,T&*U) Apply to Light Construction.

Note: (*U) Only applies after 8 hours worked on holiday.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, *16, **25) on HOLIDAY PAGE

NOTE: (*16) Paid at Double if Worked; (**25) Paid at Double if Worked.

4-282

Teamster - Building

09/01/2021

JOB DESCRIPTION Teamster - Building

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour:

Truck Driver (Building Demolition & Debris)

07/01/2021

Trailers \$ 35.77

Straight Jobs \$ 35.47

SUPPLEMENTAL BENEFITS

Per Hour:

All Classifications

\$ 38.85

OVERTIME PAY

See (B, E, S1) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 12, 15, 25, 26) on HOLIDAY PAGE

4-282

Teamster - Delivery of Concrete

09/01/2021

JOB DESCRIPTION Teamster - Delivery of Concrete

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour:

Heavy Construction Work:

Shall include the supply of Ready-Mix Concrete for construction, improvement and modification of all or any part of Streets, Highways, Bridges, Tunnels, Railroads, Canals, Dams, Airports, Schools & Power Generation Plants, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER

07/01/2021

Concrete Delivery

\$ 40.005

Light Construction Work:

Shall include the supply of Ready-Mix Concrete for construction of Single & Multi Family Homes, Town Houses, Apartment Buildings, including Driveways, Streets and Curbs within those projects. Parking Lots and Office Buildings, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER

07/01/2021

Concrete Delivery

\$ 36.815

SUPPLEMENTAL BENEFITS

Per Hour:

Heavy Construction Work

07/01/2021

Concrete Delivery

\$ 45.475

Light Construction Work

07/01/2021

Concrete Delivery

\$ 15.355

OVERTIME PAY

NOTE: Heavy Construction:B2,I

Light Construction:B,E,P

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, *16, **25) on HOLIDAY PAGE

NOTE: (*16) Paid at Double if Worked. (**25) Paid at Double if Worked.

4-282ns

Teamster - Heavy&Highway

09/01/2021

JOB DESCRIPTION Teamster - Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Nassau, Suffolk

WAGES

Per Hour:

Heavy Construction Work:

Shall include the construction, improvement or modification of all or any part of Streets, Highways, Bridges, Tunnels, Railroads, Canals, Dams, Airports, Schools, Power Generation Plants.

07/01/2021

Site Excavating
(Chauffeurs)

\$ 41.255

Light Construction Work:

Shall include the construction, improvement and modification of Single & Multi Family Homes, Town Houses, Apartment Buildings, including Driveways, Streets and Curbs within those projects. Parking Lots and Office Buildings.

Site Excavating
(Chauffeurs)

\$ 35.99

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Heavy Construction Work
Chauffeurs

\$ 50.3125

Light Construction Work
Chauffeurs

\$ 13.05

OVERTIME PAY

See (B, *B2, E, **I, P, ***R, ****U) on OVERTIME PAGE

(NOTE) PREMIUM PAY of 25% on straight time hours for NEW YORK STATE D.O.T. and or other GOVERNMENTAL MANDATED off shift work.

Note: (B,E,P,T & *U) Apply to Heavy Construction.

Note: (B2,I,T & *U) Apply to Light Construction.

Note: (*U) Only applies after 8 hours work on holiday

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, *16, **25) on HOLIDAY PAGE

NOTE: (*16) Paid at Double if Worked. (**25) Paid at Double if Worked.

4-282

Welder

09/01/2021

JOB DESCRIPTION Welder

DISTRICT 1

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour 07/01/2021

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

- (AA) Time and one half of the hourly rate after 7 and one half hours per day
- (A) Time and one half of the hourly rate after 7 hours per day
- (B) Time and one half of the hourly rate after 8 hours per day
- (B1) Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday.
Double the hourly rate for all additional hours
- (B2) Time and one half of the hourly rate after 40 hours per week
- (C) Double the hourly rate after 7 hours per day
- (C1) Double the hourly rate after 7 and one half hours per day
- (D) Double the hourly rate after 8 hours per day
- (D1) Double the hourly rate after 9 hours per day
- (E) Time and one half of the hourly rate on Saturday
- (E1) Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
- (E2) Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E3) Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
- (E4) Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E5) Double time after 8 hours on Saturdays
- (F) Time and one half of the hourly rate on Saturday and Sunday
- (G) Time and one half of the hourly rate on Saturday and Holidays
- (H) Time and one half of the hourly rate on Saturday, Sunday, and Holidays
- (I) Time and one half of the hourly rate on Sunday
- (J) Time and one half of the hourly rate on Sunday and Holidays
- (K) Time and one half of the hourly rate on Holidays
- (L) Double the hourly rate on Saturday
- (M) Double the hourly rate on Saturday and Sunday
- (N) Double the hourly rate on Saturday and Holidays
- (O) Double the hourly rate on Saturday, Sunday, and Holidays
- (P) Double the hourly rate on Sunday
- (Q) Double the hourly rate on Sunday and Holidays
- (R) Double the hourly rate on Holidays
- (S) Two and one half times the hourly rate for Holidays

- (S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
- (T) Triple the hourly rate for Holidays
- (U) Four times the hourly rate for Holidays
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.
- (X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

- (1) None
- (2) Labor Day
- (3) Memorial Day and Labor Day
- (4) Memorial Day and July 4th
- (5) Memorial Day, July 4th, and Labor Day
- (6) New Year's, Thanksgiving, and Christmas
- (7) Lincoln's Birthday, Washington's Birthday, and Veterans Day
- (8) Good Friday
- (9) Lincoln's Birthday
- (10) Washington's Birthday
- (11) Columbus Day
- (12) Election Day
- (13) Presidential Election Day
- (14) 1/2 Day on Presidential Election Day
- (15) Veterans Day
- (16) Day after Thanksgiving
- (17) July 4th
- (18) 1/2 Day before Christmas
- (19) 1/2 Day before New Years
- (20) Thanksgiving
- (21) New Year's Day
- (22) Christmas
- (23) Day before Christmas
- (24) Day before New Year's
- (25) Presidents' Day
- (26) Martin Luther King, Jr. Day
- (27) Memorial Day
- (28) Easter Sunday

(29) Juneteenth



New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By:

(Check Only One)

☐

Contracting Agency

☐

Architect or Engineering Firm

☐

Public Work District Office

Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone: ()

Fax: ()

E-Mail:

2. NY State Units (see Item 5)

☐ 01 DOT

☐ 02 OGS

☐ 03 Dormitory Authority

☐ 04 State University
Construction Fund

☐ 05 Mental Hygiene
Facilities Corp.

☐ 06 OTHER N.Y. STATE UNIT

☐ 07 City

☐ 08 Local School District

☐ 09 Special Local District, i.e.,
Fire, Sewer, Water District

☐ 10 Village

☐ 11 Town

☐ 12 County

☐ 13 Other Non-N.Y. State
(Describe)

3. SEND REPLY TO ☐ (check if new or change)
Name and complete address:

Telephone:()

Fax: ()

E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

☐ New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR
THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title _____

Description of Work _____

Contract Identification Number _____

Note: For NYS units, the OSC Contract No. _____

6. Location of Project:
Location on Site _____

Route No/Street Address _____

Village or City _____

Town _____

County _____

7. Nature of Project - Check One:

- ☐ 1. New Building
- ☐ 2. Addition to Existing Structure
- ☐ 3. Heavy and Highway Construction (New and Repair)
- ☐ 4. New Sewer or Waterline
- ☐ 5. Other New Construction (Explain)
- ☐ 6. Other Reconstruction, Maintenance, Repair or Alteration
- ☐ 7. Demolition
- ☐ 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- ☐ Construction (Building, Heavy Highway/Sewer/Water)
- ☐ Tunnel
- ☐ Residential
- ☐ Landscape Maintenance
- ☐ Elevator maintenance
- ☐ Exterminators, Fumigators
- ☐ Fire Safety Director, NYC Only
- ☐ Guards, Watchmen
- ☐ Janitors, Porters, Cleaners, Elevator Operators
- ☐ Moving furniture and equipment
- ☐ Trash and refuse removal
- ☐ Window cleaners
- ☐ Other (Describe)

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature



NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

**LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE
AWARDED ANY PUBLIC WORK CONTRACT**

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: <https://applications.labor.ny.gov/EDList/searchPage.do>

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 08/27/2021

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	NYC	*****9839	A.J.S. PROJECT MANAGEMENT, INC.		149 FIFTH AVENUE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	*****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		AMJAD NAZIR		2366 61ST ST BROOKLYN NY 11204	12/15/2016	12/15/2021
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	NYC		ANTHONY J SCLAFANI		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		ANTHONY PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10323	01/23/2017	01/23/2022
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	DOL		ARVINDER ATWAL		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	*****6683	ATLAS RESTORATION CORP.		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	NYC	*****5532	ATWAL MECHANICALS, INC		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	*****2591	AVI 212 INC.		260 CROSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	*****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL	*****1449	BRRESTORATION NY INC		140 ARCADIA AVENUE OSWEGO NY 13126	09/12/2016	09/12/2021
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****8809	C.B.E. CONTRACTING CORPORATION		310 MCGUINNESS BLVD GREENPOINT NY 11222	03/07/2017	03/07/2022
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026

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DOL	DOL	****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	****1143	CARMODY BUILDING CORP	CARMODY CONTRACTIN G AND CARMODY CONTRACTIN G CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****8809	CBE CONTRACTING CORP		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL	****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANO A/K/A CHRIS PAPASTEFANO		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		DALJIT KAUR BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL		DANICA IVANOSKI		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DEBBIE STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DF CONTRACTORS OF ROCHESTER, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DF CONTRACTORS, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC		DIMITRIOS TSOUMAS		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022

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DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****3242	DONALD R. FORSAY	DF LAWN SERVICE	1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DONALD R. FORSAY		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC		DUARTE LOPES		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL	****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	NYC	****4269	EAST PORT EXCAVATION & UTILITIES		601 PORTION RD RONKONKOMA NY 11779	11/18/2016	11/18/2021
DOL	DOL	****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	NYC	****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL	****7403	F & B PAINTING CONTRACTING INC		2 PARKVIEW AVENUE HARRISON NY 10604	09/26/2016	09/26/2021
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FRANK BENEDETTO		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		FRANK BENEDETTO		C/O F & B PAINTING CONTRA 2 PARKVIEW AVENUEHARRISON NY 10604	09/26/2016	09/26/2021
DOL	DOL	****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	NYC	****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	NYC	****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		GREAT ESTATE CONSTRUCTION, INC.		327 STAGG ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DOL	****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	DOL	****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES LIACONE		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023

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DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JESSICA WHITESIDE		C/O BRRESTORATION NY INC 140 ARCADIA AVENUEOSWEGO NY 13126	09/12/2016	09/12/2021
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATT BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P.O BOX 100 200 LATT BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	AG	*****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JOSEPH FOLEY		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL	*****5062	K R F SITE DEVELOPMENT INC		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	NYC		K.S. CONTRACTING CORP.		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL	*****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KENNETH FIORENTINO		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	DOL	*****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL	*****4505	LARAPINTA ASSOCIATES INC		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	08/14/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022

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DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	08/14/2017	08/14/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DA	****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL		M ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		M. ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL	****1784	MADISON AVE CONSTRUCTION CORP		39 PENNY STREET WEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL	****2196	MAINSTREAM SPECIALTIES, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC		MARTINE ALTER		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		MARVIN A STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MCLEAN "MIKKI BEANE"		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN "MIKKI" DRAKE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN M DRAKE-BEANE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL	****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024
DOL	NYC	****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024

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DOL	NYC	****3826	MOVING MAVEN OF NY, INC.		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	NYC	****3550	MOVING MAVEN, INC		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DA	****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	NYC		NICHOLAS FILIPAKIS		7113 FORT HAMILTON PARKWA BROOKLYN NY 11228	12/09/2016	12/09/2021
DOL	DOL	****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTI ON, INC.	444 SCHANTZ ROAD ALLEN TOWN PA 18104	09/17/2020	09/17/2025
DOL	DOL	****6966	NORTH COUNTRY DRYWALL AND PAINT		23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL	****0065	NORTHEAST LANDSCAPE AND MASONRY ASSOC		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL	****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	NYC	****0818	ONE TEN RESTORATION, INC.		2366 61ST ST BROOKLYN NY 11204	12/15/2016	12/15/2021
DOL	NYC		PARESH SHAH		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	NYC	****9422	PELIUM CONSTRUCTION, INC.		22-33 35TH ST. ASTORIA NY 11105	12/30/2016	12/30/2021
DOL	DOL		PETER M PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL		PIERRE LAPORT		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	****1543	PJ LAPORT FLOORING INC		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	NYC	****5771	PMJ ELECTRICAL CORP		7113 FORT HAMILTON PARKWA BROOKLYN NY 11228	12/09/2016	12/09/2021
DOL	DOL	****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC	****4532	PROFESSIONAL PAVERS CORP.		66-05 WOODHAVEN BLVD. REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	****2633	RAW POWER ELECTRIC CORP		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	AG	****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	****9148	RICHARD TIMIAN	RICH T CONSTRUCTI ON	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003

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DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		3 GAYLORD ST AUBURN NY 13021	11/15/2016	11/15/2021
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	NYC		ROBERT HOHMAN		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL		RYAN ALBIE		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	****3347	RYAN ALBIE CONTRACTING INC		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	NYC	****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC		SANDEEP BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	****9751	SCW CONSTRUCTION		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	NYC	****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****0816	SOLAR ARRAY SOLUTIONS, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	DOL	****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL	****9751	STEPHEN C WAGAR		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	NYC		STEVEN GOVERNALE		601 PORTION RD RONKONKOMA NY 11779	11/18/2016	11/18/2021
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		STEVEN TESTA		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	NYC	****5863	SUKHMANY CONSTRUCTION, INC.		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024

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DOL	DOL	*****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	*****6789	TEST1000		P.O BOX 123 ALBANY NY 12044	03/01/2021	03/01/2026
DOL	DOL	*****5570	TESTA CORP		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****8311	TRIPLE B FABRICATING, INC.		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL	*****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL	*****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	*****7361	VIALE HOLDINGS, INC.	MOVING MAVEN	1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		VIKTAR PATONICH		2630 CROSEY AVE BROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		WAYNE LIVINGSTON JR	NORTH COUNTRY DRYWALL AND PAINT	23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM C WATKINS		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		WILLIAM DEAK		C/O MADISON AVE CONSTR CO 39 PENNY STREETWEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL	*****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	NYC		ZAKIR NASEEM		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	NYC	*****8277	ZHN CONTRACTING CORP		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022

END OF SECTION 007343

PART 1 - GENERAL

1.01 BRIEF PURPOSE OF PROJECT / GENERAL

- A. The purpose of the project is to rehabilitate the existing Well Nos. 5-1 and 5-2(A) and to provide a new treatment building and manganese removal system for Well No. 5-1 of the Riverhead Water District, located on Middle Road in Riverhead, New York. This project will include well pump replacements, modification to electrical, mechanical, and HVAC components in the existing Well No. 5-1 Building, construction of a new Treatment Building, addition of manganese treatment vessels, interior and site piping, and site work.
- B. This Section provides an abbreviated summary of the work for the Construction Contracts associated with the Owner's program to construct the project.
- C. Each Contractor shall coordinate the work of their specific Contract with that of other Prime Contractors.
- D. All work shown and specified in the Contract Documents shall be the work of this Construction Contracts. The Owner anticipates awarding four (4) prime contracts for the project as detailed and described in these specifications and on the accompanying plans.
- E. Each Contractor has been provided with copies of all relevant construction drawings for related construction contracts whose work may directly effect and impact the work under this Contract.
 - 1. Each Contractor shall provide a complete and operational project in anticipation of these affects and impacts.
 - 2. It is each Contractor's responsibility to investigate the work that will be performed by others and consider such in the conduct of his/her work.

1.02 NOMENCLATURE

- A. Where the terms "Engineer/Architect", "Architect/Engineer", "Engineer", or "Architect" are used throughout these Contract Documents, they shall mean the firm of H2M architects + engineers as may be abbreviated by H2M or H2M Group.
- B. The terms "Contractor" and/or "Prime Contractor" where used within the body of a specific Construction Contract, (i.e.; Contract G, Contract E, Contract P, and Contract W), shall refer to the individual or company who has entered into an agreement with the Owner to perform the work contained within those Contract Documents. The lack of word capitalization shall be incidental.
- C. The General Construction Contractor may be referred to as the "General Contractor", "Prime General Contractor", "Contract G Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract G.
- D. The Electrical Construction Contractor may be referred to as the "Electrical Contractor", "Prime Electrical Contractor", "Contract E Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract E.
- E. The Plumbing Construction Contractor may be referred to as the "Plumbing Contractor", "Prime Plumbing Contractor", "Contract P Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract P.
- F. The Well Construction Contractor may be referred to as the "Well Contractor", "Prime Well Contractor", "Contract W Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract W.

1.03 ABBREVIATED SUMMARY OF CONTRACT G WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Engineer, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 - 1. Preliminary site work including: utility mark-out, erection of safety fencing, erosion control facilities, clearing and grubbing.
 - 2. New site drainage structures and piping.
 - 3. Excavation, removal of excess and/or unsuitable excavated material, sheeting reinforcement, import of suitable material, soil compaction and testing.
 - 4. Construction of new Treatment Building, including but not limited to: all concrete footings/foundations, louvers, heaters, exhaust fans etc.
 - 5. Modifications to existing Well No. 5-1 building, including but limited to: roofing, temporary sanitary facilities, exhaust fan etc.
 - 6. Construction of new manganese support piers at new treatment building. Placement to be coordinated with Contract P.
 - 7. Construction of new Discharge Basins including but not limited to: excavation, shoring, disposal of unsuitable material, etc.
 - 8. New generator concrete pad.
 - 9. New GAC concrete pad.
 - 10. Site restoration including final grading and placement of topsoil and seeding.
 - 11. Asphalt removal new paving of driveway areas.
 - 12. New sidewalks and concrete curbing.
 - 13. Removal of existing fencing and install new fencing.
 - 14. Testing and balancing systems.
 - 15. Provide project closeout submittals and record documentation as specified
 - 16. All other work shown and specified within the Contract Documents for Contract G.

1.04 ABBREVIATED SUMMARY OF CONTRACT E WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each Contractor shall coordinate, through the Owner/Engineer, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 - 1. Provide, install, maintain, and repair, if necessary, temporary power and light throughout the site and to the Owner/Engineer's field office. Temporary power shall be provided at location(s) selected by the Engineer based on input by the General Contractor.
 - 2. Arrange for and install of temporary electric service.
 - 3. New secondary feeders, power distribution, and instrumentation control wiring. New electrical conduit, wire, fittings, boxes, panels, and electrical accessories.
 - 4. All clearing, excavation, filling, and backfilling associated with the installation of underground conduit, duct bank, or wiring. Final restoration by Contract G

5. New lighting fixtures, wiring and associated equipment.
6. Removal of existing components as noted.
7. New well starters.
8. New generator.
9. New Motor Control Center.
10. Furnish, install and power primary flow elements, transmitters, flow recorders and install interconnecting wiring where said devices are to be provided as work of Contract E. Install and power primary flow elements, transmitters, flow recorders and install interconnecting wiring where said devices are to be provided as work of other contracts.
11. New instrumentation including switches, transmitters, and recorders for flow and pressure, and pH and Chlorine analyzers.
12. Wiring connections to all electrical equipment (including equipment furnished by others).
13. Connections to PLC for all control and telemetry equipment and devices.
14. Testing, programming and adjusting of all electrical systems.
15. Startup participation for the various equipment and systems of the project. Provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation. Provide systems and equipment training for Owner personnel.
16. Project closeout submittals.
17. All other work shown and specified in the Contract Documents for Contract E.

1.05 ABBREVIATED SUMMARY OF CONTRACT P WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Engineer, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 1. Site work including utility mark-out, excavation, earth movement, sub-grade preparation, removal of excess and/or unsuitable excavated material, and import of suitable material, as necessary to install and construct all the work defined within the Contract documents.
 2. Modify and remove existing site piping as noted.
 3. Removal of existing interior piping, valves, and mechanical equipment, as noted from existing Well No. 5-1 Building.
 4. Removal of existing buried piping (water main, blow-off lines) as noted from existing Well No. 5-1 Building and site piping associated with Well No. 5-2(A).
 5. New large mechanical piping, valves, supports and accessories for manganese treatment in new Treatment Building. Venturi meter placement to be coordinated with Contract E.
 6. New buried site piping, valves, and accessories.
 7. New manganese removal system including vessels, internal piping, face piping, valves, interior/exterior coating system, gravel, media, etc.
 8. New waste water piping to discharge basins and associated work. Coordinate with Contract G.
 9. Remove existing and install new chlorine and lime pumps, lime mixer motor, and accessories.
 10. Surface preparation and coating of all mechanical piping.
 11. Modify small piping in existing Well No. 5-1 Building.
 12. Remove existing and install new tablet chlorinator, new lime tank, new injection ports and piping in existing Well No. 5-1 Building.
 13. Remove and install new water sampling lines in existing Well No 5-1 Building.

14. Remove and install new pressure monitoring lines in existing Well No. 5-1 Building.
15. New water service line to new Treatment Building.
16. Testing and adjusting of mechanical systems.
17. Disinfection and water quality testing.
18. Startup participation for the various equipment and systems of the project. Provide complete services to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation. Provide systems and equipment training for Owner personnel.
19. Project closeout submittals.
20. All other work shown and specified in the Contract Documents for Contract P.

1.06 ABBREVIATED SUMMARY OF CONTRACT WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Engineer, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 1. Startup participation for the various equipment and systems of the project and provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation.
 2. Remove existing well pump, discharge head, motor, column pipe, accessories and associated equipment.
 3. Perform well cleaning; wire brushing, bailing, and air lifting operations.
 4. New well pump, column pipe, discharge head, motor, accessories, and associated equipment for Well Nos. 5-1 and 5-2(A).
 5. Perform initial and final well and pump tests and inspections.
 6. Disinfection and water quality sampling.
 7. Project closeout submittals.
 8. All other work shown and specified in the Contract Documents for Contract W.

1.07 PARTIAL LISTING OF SPECIFIC CONTRACT REQUIREMENTS

- A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but are not limited to, the following:
 1. Guidelines and requirements for the "Owner", Riverhead Water District (RDWD).
 2. Guidelines and requirements of the New York State Department of Environmental Conservation (NYSDEC).
 3. Guidelines and requirements of the local Health Department.
 4. Guidelines and requirements of the utility companies.
 5. Local laws and ordinances of the Riverhead Water District and the Town of Riverhead.
 6. Local gas utility requirements for new services, connections, alterations and related work.
 7. Local electrical utility requirements for alterations and related work.

1.08 PARTIAL LISTING OF OVERALL CONTRACT REQUIREMENTS

- A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but is not limited to, the following:
 1. Debris removal and daily and final cleaning up.

2. Coordination with the Owner and other contractors who have been awarded work by the Owner.
 3. Coordination with utility companies necessary to schedule connection of services, and management of the installation.
 4. Site utilization and management so as not to disrupt the Owner's ability to operate the existing facilities in a safe and efficient manner.
 5. Facilities to be used during the contract period that are to be used by the Owner or his representatives and others involved with constructing the project.
 6. Product and equipment storage and handling requirements.
 7. Starting and adjusting of the equipment and systems required under the project.
 8. Site safety in accordance with all applicable federal, state, and local regulations.
 9. Project submittals, meetings, professional photographs, testing services, work plans, schedules, shop drawings, closeout procedures and documents, manuals, as-built drawings, and final commissioning of the work shall be provided as required by the Contract.
 10. Provide and maintain, at all times, temporary roadways for site access to all parties involved with the project.
 11. Site utilization and management so as to allow other prime contractors to perform work in conjunction with this project and to afford them equal opportunity and space to complete their contractual obligations with the Owner as solely defined by the Engineer.
 12. To not hinder the Owner's ability to deliver a safe and potable water supply.
- B. The Owner has or will award other construction contracts associated with this project.
- C. It is anticipated that work of all the contracts will coincide with work of this Contract.
- D. Each Contractor shall coordinate the work between the various construction contracts, through the Owner/Engineer, as required to complete the contract requirements in accordance with the requirements contained in Section 013100.

1.09 OWNER SUPPLIED PRODUCTS AND UTILITIES

- A. The Owner will not be supplying equipment, labor, or tools for the project.
- B. The Owner will be supplying products or materials for the project as follows:
1. Products shown on the Drawings or specified elsewhere.
- C. The Owner will pay for electricity usage. The restrictions on electrical usage shall be as follows:
1. Power tool usage during specified working hours will only be permitted.
 2. Dewatering and trash pumps and portable heaters will not be permitted.
 3. Power to the Owner/Engineer's trailer, if applicable.
 4. Power to the Contractor's trailer will be permitted.
- D. The Owner reserves the right to stop paying for electrical usage at any time if, in the opinion of the Owner/Engineer, the Contractor causes excessive electrical charges or does not conserve electricity to the maximum extent possible in the opinion of the Engineer. All Contractors shall conserve electricity during the course of construction.

1.10 EXISTING CONDITIONS

- A. The Drawings show certain information that has been obtained by the Owner regarding various pipelines, utilities and structures that exist at the location of the project both below and at grade.
- B. The Owner and the Engineer expressly disclaims all responsibility for the accuracy or completeness of the information given on the Drawings with regard to existing facilities.

- C. In the case where the Contractor discovers an obstruction not indicated on the Drawings or not described via specification reference, then the Contractor shall immediately notify the Engineer of the obstructions' existence.
- D. The Engineer will determine if the obstruction is to be relocated or removed.
- E. Compensation for this extra work will be paid for in accordance with the provisions in the Contract for "Extra Work".

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 011100

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Site access and control of areas outside of site.
- B. Contractor use of the premises.
- C. Contractor storage, parking and deliveries.
- D. Work hours, employee conduct and miscellaneous employee requirements.
- E. Contract requirements related to maintaining Owner's current operations and excess inspection required.
- F. Suggested construction sequence.

1.02 SITE ACCESS AND CONTROL

- A. Contractors shall use the designated entrance to the site as shown on the drawings. If no site entrance is designated, Contractors shall use an entrance designated by the Owner's Construction Representative.
 - 1. The Owner may permit, solely at the Owner's discretion, the temporary use of another entrance for site access.
 - 2. The Owner will only review requests made by the Contractors for an exception to the designated site entrance if made in writing at least 72 hours in advance of each of the times desired for use.
- B. All contractors to maintain the entrance area clear of materials, vehicles and any other obstacle or debris. Failure to do so will result in a minimum back charge of \$750 per occurrence.
- C. The area around the site is a municipal facility. The Owner intends to be a good neighbor. Contractors shall not close any road for any period in time. The Contractors shall take whatever measures are necessary to not cause any inconvenience to the area's residents
- D. All Contractors are responsible to employ methods to prevent construction materials and/or debris from leaving the site. All Contractors are responsible to routinely monitor the areas surrounding the site during the day as well as at the end of the work-day and to immediately clean up any area to its previous condition.
- E. The Contractors shall employ methods to prevent the transmission of dirt from vehicles driving on exposed areas of the site from reaching the surrounding roadways. The Contractors will be responsible to immediately clean the roadway, should the measures being taken by the Contractors not satisfactorily control the transmission of any dirt to the roadway.
- F. Any damages to areas outside the site, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.
- G. The Contractors shall comply with all state and local requirements for allowable weight limits of vehicles on all roads.
- H. The Owner reserves the right to back charge the Contractors for all costs associated with maintaining the grounds as well as maintaining areas outside the site, which may be disturbed by the Contractors should the Contractors fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

- I. The Contractor shall not close any road for any period in time unless approved ahead of time by appropriate road agency. The Contractor shall take whatever measures are necessary to not cause any inconvenience to the area's residents.
- J. Keep all existing driveways, roads, and parking areas free and clear of materials and equipment. Do not unreasonably encumber the work area with materials and equipment.
- K. The Contractors are responsible for cleaning up the work area. Failure to maintain a clean work site daily, will result in others performing the work and the Contractor being back charged for the cleaning cost plus construction administration fees.
- L. Do not discard or dispose of any waste on-site.
- M. The Contractors shall be responsible for managing dust.

1.03 CONTRACTOR USE OF THE PREMISES

- A. Premises, for the purpose of this Contract, shall mean the site, buildings and other structures located within the property line or in any temporary or permanent construction easements identified on the plans.
- B. The Contractors shall use and manage the premises and the associated construction activities as follows:
 - 1. To not hinder the Owner's ability to operate their facilities. _____
 - 2. To allow other Prime Contractors to install their work and complete their contractual obligations in the time period specified.
 - 3. To allow for stockpiling of construction material and debris without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
 - 4. To allow for the stockpiling of excavated soil and imported fill, when called for, without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
 - 5. To allow utility companies to install their work.
 - 6. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
 - 7. To allow for the safe, unimpeded travel way of the Owners vehicles, Owner's Construction Representative's vehicles, Engineer's vehicles, construction vehicles and heavy construction equipment about the entire site.
- C. Contractors shall maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibility of the Contractors.
- D. Contractors shall provide temporary handrails, as required, for their work or for work put in place by their Contract that will require temporary handrails. Construction of temporary handrails shall be as specified in Section 015000.
- E. Contractors shall be responsible for protecting Owner's property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and misc. equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by Owner's Construction Representative.
- F. Contractors shall protect all of the physical structures, property and improvements upon the site from damage by their Work and shall immediately repair or replace damage caused by

construction operations, employees or equipment employed by the Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.

- G. Limit use of the site to the areas shown on the Contract Drawings and the adopted Site Utilization Plan. Confine operations to permit others working on the site easy access to all areas of Work.
- H. Keep all existing operations areas, driveways, roads, and parking areas free and clear of materials and equipment. Do not unreasonably encumber the site with materials and equipment. Confine stockpiling of excess excavated material, materials and equipment to areas selected under the Site Utilization Plan or as designated by the Owner's construction representative. Locate storage sheds and trailers to areas designated in the plan or by the Owner's Construction Representative.
- I. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material on the site.
- J. The construction site space is limited and it shall be the General Contractor's responsibility to manage the site during the entire construction period with input from all concerned parties as to meeting their needs. Equal consideration of the needs of others with that of the Contractor's shall be provided as judged by the Owner.
- K. Due to the limited site area available for construction, staging areas shall be relocated several times during the various stages of construction. Additional compensation for relocating staging areas, equipment and material storage, and trailers are not to be considered an extra cost to the Contractor as this is an anticipated expense that shall be considered at the time of the bid.
- L. Contractors are responsible for cleaning up their own materials and debris. Failure to maintain a clean work site daily, will result in other performing the work and Contractors being back charged for the cleaning cost plus construction administration fees.
- M. Refer to Section 015000 - Temporary Facilities and Controls for minimum rubbish removal requirements.
- N. Do not discard or dispose of any waste on-site.
- O. Open fires will not be permitted on the site.
- P. Install erosion control measures as indicated in the Contract. The Contractor shall confine stormwater runoff to the site.
- Q. The General Contractor shall be responsible for managing dust as specified in Section 015719.

1.04 CONTRACTOR STORAGE, PARKING AND DELIVERIES

- A. Contractors must provide exterior storage containers when required. Final location of storage container shall be determined by the Owner.
- B. Do not unreasonably encumber the premises with materials and equipment. Do not store material in existing buildings. Store all equipment and materials to allow the Owner's employees to operate and conduct their business safely.
- C. Confine premise storage areas to locations designated by the Owner. Immediately repair or replace damaged facilities to the satisfaction of the Owner and to a condition that existed before

the damage occurred as determined by preconstruction photographs, or if photographs are unavailable, to that deemed by the Owner.

- D. No materials storage will be permitted within the buildings at any time during construction.
- E. Storage of chemicals and paint materials shall be outside the existing or new structures and shall follow manufacturer's storage/handling guidelines.
- F. Compressed gas containers shall be properly stored and secured per OSHA, to the satisfaction of the Owner. Failure to do so will result in a \$250 back charge, per occurrence.
- G. Contractors shall provide minimum of 48 hours advance written notice to the Owner's Construction Representative for deliveries of materials, site visits by inspectors, manufacturer's representatives or any other occasion that impacts the use of the site. Contractors shall be responsible for any costs that are incurred by the owner, for failure to meet previously agreed upon appointments or work schedules.
- H. Deliveries sent to the Owner will not be signed for or unloaded by the Owner. They will be directed to the construction site and if no employee is on site, the delivery will be rejected, at the contractor's expense.
- I. Night deliveries of equipment (past the designated quitting time) will not be permitted. Do not schedule trucking companies to deliver equipment or wait for the job site to open. Delivery trucks shall not obstruct the site entrance, shall not sit within the neighborhood causing an obstruction or perceived nuisance, nor be left idling on or off the site for any period of time.
- J. Parking shall be in the designated areas of the site only. All automotive type vehicles are to be locked when parked or unattended to prevent unauthorized use. Do not leave vehicles or equipment unattended with the motor running or the ignition key in place. Any vehicles or trucks in non-designated areas may be towed at contractor's expense.

1.05 WORK HOURS, EMPLOYEE CONDUCT AND MISCELLANEOUS EMPLOYEE REQUIREMENTS

- A. The Contractors will be permitted to schedule working days and hours as specified in the General Terms and Conditions, if no times are specified therein then the work hours shall be Monday - Friday 8:00 am - 4:00 pm.
- B. Employees are to act in a professional manner. Any employee using inappropriate language or who is disruptive to the work environment will be banned from the site.
- C. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.
- D. Employees shall not converse with local residents or Owner's employees.
- E. Any employee found under the influence of any drug or alcohol will be banned from the site.

1.06 CONTRACT REQUIREMENTS RELATED TO MAINTAINING OWNER'S CURRENT OPERATIONS AND EXCESS INSPECTION REQUIRED

- A. The Contractors shall schedule working days and hours as specified. The Contractors shall pay all excess costs for inspection services provided by the Owner/Engineer for working beyond the times specified.

- B. The hourly rate paid for inspection services beyond normal working hours shall be at a maximum billing rate of \$180 per hour, which shall be used to compute the overtime hourly charge.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 011400

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Allowance pricing for the following items:
 - 1. Independent Laboratory Testing Allowance.
 - 2. Contingency Account.
- B. This Section covers the requirements for use of the cash allowances listed above contained in the proposal (Bid Forms, Price Schedule) and included in the Contract Price bid by the Contractor and defines and stipulates the charges that will be paid for out of the stipulated allowances.
- C. The Contractor shall include the cash allowances stipulated in this Section in the amount bid.
- D. Eligible costs described in this Section, and Sections referenced herein, will be the only costs paid for out of the stipulated allowances.
- E. All other costs associated with the project as specified and/or shown, including but not limited to the delivery, installation and all Contractor overhead and/or collateral expenses are to be distributed among the other portions of the work and shall be included in other bid items.

1.02 SUBMITTALS

- A. Make all submissions under the provisions of Section 013300.
- B. For each type of product/material specified to be furnished under allowance pricing provide documentation of the unit pricing on manufacturer's letterhead certifying pricing of the product/material.
- C. Submit additional backup information to substantiate the invoiced amount(s) as the Engineer may require for review and approval, prior to order or payment of item.
- D. Provide written breakdowns for extra work as the Owner may require.

1.03 CHANGES TO STIPULATED (CASH) ALLOWANCE

- A. If the actual cost of services differs from the cash allowance, then the Contract Price will be adjusted accordingly.

1.04 PAYMENTS TO BE MADE OUT OF TESTING ALLOWANCE

- A. Include the cash allowance amount indicated in the proposal for independent testing laboratory services specified in Section 014500.
- B. The actual invoiced charges of the testing laboratory, including testing companies where called for, incurred for field and laboratory tests, as specified only in Section 014500 - Quality Control, shall be paid for out of the cash allowance.
 - 1. Any other requirement specified herein throughout these specifications for providing the services of an independent testing laboratory, underground utility location company, or similar outside independent service are to be borne by the Contractor.
 - 2. All costs for quality control services are to be included as part of the Contract Price (as-bid).
- C. One (1) week prior to each partial payment, submit a certified invoice from each company listing and detailing the total costs incurred since the last invoice.

1. The invoice shall be on company letterhead signed by an authorized representative of the company and shall include man-hours, tests conducted, date of tests and associated costs and fees.
 2. Payment for costs will not be made unless the information is provided and certified. Payment for costs will not be made unless the typed test data reports have been received by the Engineer.
 3. In the case of pipe toning, flags must be set to delineate the route of underground pipes and utilities prior to submission of partial payment request.
- D. If in the event test results (provided by the independent testing laboratory) show non-compliance with these specifications, then at the option of the Contractor and only with the approval of the Owner, he may re-test samples to verify the original test results at his/her own expense.
- E. Costs for re-testing failed components of the work, when ordered by the Engineer, will not be paid for out of the cash allowance and will be directly borne by the Contractor.

1.05 PAYMENTS TO BE MADE OUT OF CONTINGENCY ACCOUNT

- A. Include the cash allowance amount indicated in the proposal for use upon the Owner's instructions for additional improvements beyond those identified in the contract documents and for unforeseen conditions.
- B. The Owner will draw funds from the contingency account only upon prior written approval by the Owner's Construction Field Representative and Engineer.
- C. Funds remaining at project closeout shall be credited to the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 012100

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes the requirements for substitution of specified products during construction.
- B. *The Engineer will consider requests for substitutions only within **thirty (30)** days from the date of the Notice to Proceed with the exception of the generator, automatic transfer switch and generator enclosure where substitutions shall be in accordance with Section 2.02.*
- C. Only products not specifically named in the bid are eligible for substitution in accordance with the requirements contained herein these specifications.
- D. Products named by the Bidder, at the time of bid, shall be furnished and installed and substitutions will not be considered by the Owner/Engineer for those products named in the bid.

1.02 CONTRACTOR'S OPTIONS

- A. For products specified only by reference standard, select any product meeting that standard.
- B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with the Specifications.
- C. Where products are not named, then submit products that meet the specifications.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

- A. Name - The Drawings and Specifications list acceptable manufacturers, commercial names, trademarks, brands and other product, material and equipment designations. Such names are provided to establish the required type, quality and other salient requirements of procurement.
- B. Equals - An item equal to that named or described on the Drawings or in the Specifications may be provided by Contractor if accepted by the Engineer.
- C. A request for product substitution constitutes a representation that the Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Shall provide the same warranty for the Substitution as for the specified Product.
 - 3. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by material suppliers and vendors.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Shall reimburse the Owner and the Engineer for review or redesign services associated with re-approval by authorities.
 - 6. Shall reimburse the Owner for all additional engineering services claimed by the Engineer for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Engineer's professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates.

- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- E. Substitution Submittal Procedure:
 - 1. The Contractor shall submit the REQUEST FOR SUBSTITUTION FORM for consideration including all required information.
 - 2. The Contractor shall use the form included within this Section.
 - 3. All forms shall be type written.
 - 4. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
- F. The burden to prove product equivalence rests on the Contractor.
- G. The Engineer will notify Contractor in writing of decision to accept or reject request and at that time the Contractor can make a formal submittal in accordance with the requirements contained in Section 013300.
- H. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

2.02 SUBSTITUTIONS OF ENGINE GENERATOR, AUTOMATIC TRANSFER SWITCH AND GENERATOR ENCLOSURE

- A. Bidders considering substitute engine generator systems, transfer switches and generator enclosure manufacturers not listed in the specifications shall provide complete submittal data for review and acceptance, as indicated in the specifications, no later than 10 days after the bid date. No substitute equipment manufacturers will be considered accepted or reviewed after this date.
- B. If substitute is submitted within 10 days after the bid date and additional product data is required to determine if the proposed equipment is equal, said additional product data shall be submitted no later than 10 days. No further product data will be accepted after this date.
- C. All proposed substitutions shall be submitted by the bidder. Any proposed substitutions submitted directly by supplier and/or manufacturers will not be reviewed or returned.
- D. Failure to comply with the required submittal and substitution requirements as described in Section 2.01 will result in rejection of the substitution, without further review.
- E. Acceptance of Substitute Equipment: If accepted, the contractor shall be responsible for all additional costs to Contract E for generator concrete foundation, any necessary revisions to plans and specifications, drawings and project documentation; and changes related to equipment spacing, pad sizes, mounts, electrical wiring, ventilation equipment, fuel, exhaust components, etc., as well as any engineering costs, resulting from said substitution. If a brand name other than that specified is proposed for use, the supplier must provide a locally available system for the Owner and Engineer to review and inspect, as well as witness testing to show compliance with the specifications. Also, the supplier must furnish a list of completed installations, including name, address and telephone number of at least five comparable installations which can prove the proposed products have operated satisfactorily for three years.

PART 3 - EXECUTION

NOT USED

This space left intentionally blank.

REQUEST FOR SUBSTITUTION FORMProject: Wellhead Treatment for Removal of Manganese at Plant No. 5

Substitution Request Number: _____

Contractor: _____

Address: _____

To: _____ Date: _____

H2M Project Number: RDWD1906Owner: Riverhead Water District

Contract Name: _____ Contract No.: _____

Specification Title: _____

Section: _____ Page: _____ Article/Paragraph: _____

Drawing No(s): _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____

Trade Name: _____ Phone #: (____) _____

Installer: _____ Address: _____

Phone #: (____) _____

History: ___ New product ___ 2-5 years old ___ 5-10 years old ___ More than 10 years old

Differences between proposed substitution and specified product:

___ Point-by-point comparative data attached

Reason for not providing specified item (Attach separate sheet if necessary):

Typical Similar Installation:

Project: _____

Engineer / Architect: _____

Address: _____

Owner: _____

Date Installed: _____

Submit complete installation list on separate sheets.

Proposed substitution affects other parts of Work: ☐ No ☐ Yes

Explain: _____

Gross Savings to Owner for accepting substitution: \$ _____

Proposed substitution changes Contract Time: ☐ No ☐ Yes

Add / deduct (circle): _____ days

Supporting data attached for evaluation of the proposed substitution:

☐ Product Data ☐ Photos ☐ Drawings ☐ Tests ☐ Reports ☐ Samples☐ Other (explain): _____

Attached data includes description, specifications, drawings, photographs, performance and test data adequate for evaluation of request; applicable portions of data are clearly identified.

Attached data also includes a description of changes to Contract Documents that proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. Proposed Substitution has been fully checked and coordinated with Contract Documents.
2. Proposed Substitution does not affect dimensions shown on Drawings.
3. Proposed Substitution does not require revisions to any other Prime Contractor's work.
4. The undersigned will pay for changes to building design, including Architectural and Engineering design, detailing, and construction costs caused by requested Substitution.
5. Proposed Substitution will have no adverse affect on other trades, construction schedule, or specified warranty requirements.
6. Maintenance and service parts will be locally available for proposed substitution.
7. The undersigned further states that the function, appearance, and quality of proposed Substitution are equivalent or superior to specified item.

This request for product substitution also constitutes a representation that I, as the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality of the specified Product.
2. Shall provide the same warranty for the Substitution as for the specified Product.
3. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Shall reimburse the Owner and the Engineer for review or redesign services associated with re-approval by authorities.
6. Shall reimburse the Owner for all additional engineering services claimed by the Engineer for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Engineer's professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates.

Contractor's Authorized Representative (Typewritten): _____

Authorized Signature: _____

Date: _____

END OF SECTION 012500

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work under this Section specifies the procedures used to process partial payments and the Final Payment Request.

1.02 TIME FOR COMPLETION

- A. Inasmuch as the provisions of the Contract relating to the time for performance and completion of the Work are for the purposes of enabling the Owner to proceed with the construction of a public improvement in accordance with a predetermined program, and inasmuch as failure to complete the Work within the period herein specified may result in damage or loss to the Owner, time is of the essence of the Contract.
- B. Time for completion of the Work shall be in accordance with that stipulated in the Contract Documents.
- C. The date for completion will be calculated from the date shown on the Notice to Proceed. The Contractor shall execute the Work with diligence from day to day, and complete it within the time fixed.
- D. For the purpose of defining the date of substantial completion, the Project will be considered complete when all Work covered by the Contract has been performed and all installations and equipment have been tested and are ready for permanent use. Removal of the Contractor's equipment and other minor adjustments which do not prevent use of the Project will not be a factor in establishing the date of substantial completion.
- E. Notwithstanding the foregoing, the Engineer will establish the date of substantial completion when the project is accepted and ready for operation, and no large or major items of work are as yet outstanding. At such time, the Engineer will issue a punch list, itemizing the items of work remaining. The punch list will include "minor" items only, as defined solely by the Engineer. Any prior punch lists, which include "major" or significant items, as defined by the Engineer, shall not be a criterion in establishing the date of substantial completion.

1.03 PARTIAL COMPENSATION

- A. At the Owner's discretion, the Contractor may receive compensation for materials and products delivered to the site yet not installed providing:
 - 1. A canceled check or paid bill from the supplier is submitted to the Engineer indicating that the Contractor has paid the supplier for the material or equipment.
 - 2. The material or piece of equipment is properly stored and protected from the elements and/or vandalism in accordance with the manufacturer's written requirements for long term storage.
 - 3. A certificate of insurance is provided for the material or piece of equipment in the event of a fire, vandalism, theft, etc.
 - 4. A bill of material is delivered to the Engineer at the time of delivery itemizing the subject material or equipment. Payment will be made for on-site material and/or equipment in the amount of 80% of the gross amount of the paid invoice. This payment will be subject to the normal retainage of the partial estimate.
 - 5. The Engineer has agreed to the pre-purchasing of the materials.
- B. The Contractor may not receive compensation for materials and products stored in the Contractor's yard or shop unless permitted by the Owner.

1.04 APPLICATIONS FOR PAYMENT

- A. The Contractor shall review the percentage of work completed during the payment period with the Engineer, based on the bid items in the proposal. The Engineer shall make the final decision on the percentage of work completed.
- B. The form of application for payment shall be AIA Document G702, application and certificate for payment supported by AIA Document G703, Continuation Sheet.
- C. Submit one (1) copy of each payment application, completed, signed and notarized.
- D. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- E. The payment application shall include a Contractor Invoice and an Owner Claim Voucher.
- F. Provide completed Labor Affidavit Form for each pay period included in the certified payroll reports for each payment application for both the contractor and any subcontractor(s).
- G. Submit payment application to Engineer no later than the first day of each month. Payments received after the first day of each month shall be reviewed and processed after the first day of the following month. Only one application for payment will be reviewed and processed each month.
- H. Submit certified payroll receipts for all workers and subcontractors. Payroll receipts shall be submitted with every application for payment. All payroll receipts shall be certified correct and notarized by a Notary in the State of New York. Application for Payment will not be processed unless all payroll receipts are received.
- I. Contractor shall pay all workers and have all subcontractors pay all workers the prevailing New York State Wage Rates.
- J. Owner may conduct on-site interviews with all workers to verify payments of prevailing wage rates are enforced.
- K. The Engineer shall submit the documentation along with an Engineer's Payment Report to the Owner for payment.
- L. Retainage in the amount of 5% will be held from each partial payment. Retainage will only be released upon full completion of the project and will be included in the final payment.

1.05 ACCEPTANCE OF FINAL PAYMENT REQUEST

- A. The Contractor shall be conclusively deemed to have accepted the Final Payment Request as a correct statement of the total liability of the Owner and of the compensation paid and to be paid to the Contractor by the Owner unless within seven (7) days after delivery of his copy of the Final Payment Request to him, the Contractor shall return such copy to the Owner together with a statement of his objections to such request and of any claim for damages or compensation in excess of the amounts shown on the Request. The acceptance by the Contractor of the Final Payment Request approved by the Owner shall constitute a release and shall discharge the Owner from all further claims by the Contractor arising out of or relating to the Contract, including but not limited to, a release from all impact costs.

1.06 SCOPE OF PAYMENTS

- A. The Contractor shall receive and accept the compensation as herein provided, in full payment for furnishing all materials, labor, tools, and equipment and for performing all work contemplated

and embraced under the Contract, also for all loss or damage arising out of the nature of the Work or from the action of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the Work, and for all risks of every description connected with the prosecution of the Work, until its final acceptance by the Owner, also for all expenses incurred by, or in consequence of, the suspension or discontinuance of the said prosecution of the Work as herein specified, and for all actual or alleged infringements of patent, trademark, or copyright, and for completing the Work and the whole hereof, in an acceptable manner, according to the Plans, Specifications, and other Contract Documents. The payment of any partial or final estimate shall in no way or in no degree prejudice or affect the obligation of the Contractor, at his own cost and expense, to renew or replace all defects and imperfections, or damages. The Engineer shall be the judge, and the said Contractor shall be liable to the Owner for failure so to do.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION 012900

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Schedule of Values

1.02 SCHEDULE OF VALUES

- A. Submit for approval prior to the start of the work a Schedule of Values that indicates a breakdown of the labor, materials and equipment and other costs used in the preparation of the bid. This schedule shall be in sufficient detail to indicate separate figures for such items as excavation, concrete, equipment and all other items making up the lump sum price. The cost breakdown shall be separately itemized for each lump sum bid item in the project.
- B. Where the cost breakdown includes items for bond payment, insurance payment, job set-up, or job mobilization, these items will be paid based on paid invoices and copies of cancelled checks.
- C. Submit a Schedule of Values to the Engineer for review and approval within fifteen (15) calendar days from the date shown on the Notice to Proceed.

1.03 FORM OF SUBMITTAL

- A. Submit typewritten Contract Cost Breakdown on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or EJCDC 1910-8-E. The Engineer reserves the right to revise the form or provide a form prepared by the Engineer.
- B. Use the Table of Contents of the Contract Specifications as a basis for format for listing costs of work for Sections under Divisions 01-48 as sections apply to work. Not all Sections need be assigned a breakout price as determined by the Engineer.
- C. Identify each line item with number and title as listed in Table of Contents.
- D. Provide dollar values for each line item for labor, overhead, profit, material, and equipment components for each category of work if requested by the Engineer.
- E. List quantities of materials specified under unit price allowances.
- F. The Schedule of Values, after approval by the Engineer, shall be the basis for the Contractor's Application for Payment.
- G. The first Application for Payment will not be reviewed prior to an approved breakdown.

1.04 PREPARATION OF SCHEDULE OF VALUES

- A. Breakdown schedule of values based on bid items in proposals with further breakdown below each item. In addition to the above, provide a separate line item cost below each bid item, as applicable, for each of the following items which shall be supported by proof where requested by Engineer:
 - 1. Performance and payment bonds.
 - 2. Insurance.
 - 3. Mobilization and Demobilization (Amounts shall be equal in value).
 - 4. Temporary facilities and measures as specified in Section 015000.
 - 5. Preparation of the Project Construction Schedule, and updates, as specified in Section 013300.

6. Rubbish removal and daily cleaning up. (Provide a total dollar amount and a daily rate for each calendar day during the contract period.)
 7. All Cash Allowance items as contained in Section 012100.
 8. Surveyor used for layout.
 9. A total dollar amount for furnishing all the Operations and Maintenance Manuals specified throughout the specifications.
 10. Record Drawing retainage amount specified in Section 017839.
 11. Final cleaning.
- B. Show total costs including overhead and profit.
- C. Provide additional details and data to substantiate the cost breakdown as requested by the Engineer.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 012973

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes:
 - 1. Requests for Interpretation or for information
 - 2. Coordination between contractors, if applicable
 - 3. Administration of subcontracts
 - 4. Coordination of work with other Contractors, utility companies, and the Owner/Engineer
 - 5. Communication and coordination requirements
 - 6. Qualifications of Contractor's job site superintendent
- B. Site staffing requirements for the Contractor's superintendent are also specified herein, the costs for which shall be included in the Contract price.

1.02 REQUEST FOR INTERPRETATION OR INFORMATION

- A. The Contractor shall use the Request for Interpretation/Information Form included within this Section when the Contractor feels that additional information is needed to perform the work of the Contract.
- B. The Engineer will respond to requests utilizing the form provided herein.
- C. The Engineer's verbal response(s) to the Contractor's formal requests, if provided, shall not constitute an official response and if acted upon by the Contractor are done so at the Contractor's own risk and liability and shall not be subject to claims for additional compensation.
- D. A signed facsimile of the form will be accepted. The original of the form must be signed and provided to the project manager.
- E. The Engineer will respond in writing to the request as soon as possible.

1.03 COORDINATION BETWEEN CONTRACTORS

- A. During the progress of the Work, other Contractors may be engaged in performing other work or may be awarded other contracts for other work on this Project. Each Contractor shall coordinate all the work to be done with the work of each Contractor(s) through the Owner.
- B. Each Contractor shall fully cooperate with each other Contractor(s) and carefully fit its own work to that provided under other contracts as shown or specified in the Contract Documents and as may be coordinated by the Owner and as may be coordinated by the Owner/Architect
- C. Each Contractor shall not commit or permit any act that will interfere with the timely performance of work by any other Contractor.
- D. The Contractor shall conduct his/her own operations, and to cooperate with such other parties, so as to cause as little interference as possible with the work by others.
- E. The Contractor agrees to make no claim against the Owner/Engineer for additional payment due to delays or other conditions created by the operation of others.
- F. If there is a difference of opinion as to the respective project rights of each Contractor doing the work, within the limits of or adjacent to the Project, the Owner/Engineer shall decide as to the respective rights of the various parties involved in order to secure completion of the work in a satisfactory manner. The Owner/Engineer's decision shall be final and binding on each Contractor.

- G. If any portion of the work of the Contractor, or any of his/her subcontractors, depends upon the proper execution of the work by others, the Contractor shall promptly give written notice to the Engineer of all purported defects in the installed work as renders it unsuitable for proper execution and completion of his own work. The Contractor shall further notify the Engineer of all supposed delays, in the performance of his/her work, as will affect the timely performance of his own work or the project.
- H. The Contractor's lack of notice shall constitute an acceptance by him/her that the work of others is fit and proper for the reception of the Contractor's own work, except as to defects developing in the work that could not have been reasonably foreseen.
- I. The Contractor's lack of notice shall also constitute an acceptance by him/her and an acknowledgement of the timely performance of work by other Contractors or the Owner and that no claims for additional compensation may result.
- J. If the Owner/Engineer determines that the Contractor is failing to coordinate his own work with the work of others, then the Owner shall have the right to enforce the provisions of the Contract as related to non-performance.
- K. The Owner/Engineer shall not be liable for any damages suffered by this Contractor by reason of any other Contractor's failure to comply with the directions so issued by the Owner/Engineer, or by reason of another Contractor's default in performance; it being understood that the Owner does not guarantee the continued efficiency or work production of any Contractor and by execution of the Contract, the Contractor fully understood the potential coordination problems associated with projects involving multiple prime construction contracts.
- L. The Contractor's attention is specifically directed to the fact that he may not have exclusive occupancy of the work area within the limits of the Contract. Each Contractor shall afford the Owner, other Contractors, and utilities reasonable opportunity for the storage of their materials and equipment, and the execution of their work, and shall connect and coordinate his work with theirs as required by the Contract Documents.

1.04 SUBCONTRACTOR ADMINISTRATION AND COORDINATION

- A. Terms and conditions of the Contract shall be binding upon each subcontractor.
- B. Furnish each subcontractor and major equipment vendor at least one (1) copy of the Plans and Technical Specifications.
- C. Provide at least one (1) copy of each approved shop drawing to each subcontractor whose work may depend upon the contents of the shop drawing submittal. The Owner reserves the right to stop all work, without claims for delay, until such time as appropriate subcontractors are furnished with appropriate shop drawings.
- D. Each Contractor shall sequence and schedule the work of subcontractors. Coordinate construction and administration activities of subcontractors. The Engineer and Owner will not accept telephone calls, facsimiles or office visits from any subcontractors on the project. Subcontractor and vendor questions and clarifications shall be directed to the Engineer by the Contractor.
- E. The Contractor's on-site project superintendent shall inspect all the work of all of his/her subcontractors, as it is being constructed. The Contractor's subcontractor shall not be permitted to do any work on the site without the Contractor's job site superintendent also being there to inspect the work as it is being performed.

1.05 UTILITY COORDINATION

- A. Comply with the requirements of 16 NYCRR Part 753 - Protection of Underground Facilities. Submit a letter stating the case number.
- B. Comply with the utility coordination requirements contained in the General Conditions.

1.06 PUBLIC/PRIVATE UTILITIES

- A. Notify all public and private utilities in accordance with Article 20, Section 322-a of the New York State General Business Law for location and markout of existing utilities in the vicinity of the work.
- B. Repair all utilities damaged during the Work to the standards and approval of the respective utility at no cost to the Owner.

1.07 SPECIFIC COORDINATION REQUIREMENTS

- A. The Contractor shall sequence and schedule work so as not to interfere with the work by others and to afford each Contractor the time to complete their contractual obligations with the Owner. Coordinate the work of this Contract with the work by others. Coordination includes, but is not limited to, the following:
 - 1. Schedule work with all trades throughout the project to prevent interference.
 - 2. Accomplish work in coordination with the other Contractors in a manner that will allow each Contractor adequate time (at the proper stage of construction as determined by the Owner/Engineer) to perform and complete the work of their contract.
 - 3. The Contractor shall annotate on each of his own shop drawings and submittals, information that is relevant to the work of others or where potential conflicts in the installed work may occur. The Contractor shall "bubble" in green ink the area of potential conflict so as to alert the reviewer.
 - 4. Each prime Contractor shall provide the Engineer with a list of shop drawings that they may require to properly coordinate the work. If a list is not provided to the Engineer within fifteen (15) calendar days from the date of the Notice to Proceed, then it shall be taken that shop drawings of other prime Contractors are not required. Each prime Contractor shall be responsible for providing the list within the time specified.
 - 5. In case of conflicts due to improper coordination by any Contractor, the Owner/Engineer's resolution will be final. No compensation will be awarded for extra work required to resolve conflicts or to coordinate the work of all contracts.
 - 6. Coordinate space requirements, supports, and installation of mechanical, electrical and plumbing work which may be indicated diagrammatically on the Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practicable. Place runs parallel with building lines. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and to facilitate repairs.
 - 7. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of all fixtures and outlets with finish elements and work by all other trades.
- B. Shop Drawings and Submittals Coordination Procedure:
 - 1. The Engineer will forward copies of relevant shop drawings to all prime Contractors, whose work may be subject to that of others, as solely determined by the Engineer.
 - 2. The Contractor shall then, within five (5) calendar days of receipt, review said shop drawings provided by the Engineer for the purposes of resolving field and fabrication problems and as a way to coordinate the work.
 - 3. Immediately notify the Engineer should a purported conflict in the work be discovered so that the Engineer can investigate and take appropriate action.

4. If a shop drawing was so provided by the Engineer and a conflict in the work was not brought to the attention of the Engineer, then the conflict shall be immediately corrected by the Contractor submitting the shop drawing.
- C. Each Contractor shall also coordinate the work by complying with the following:
1. Construction Schedule: Each Contractor shall provide a construction schedule as specified in Section 013216 - Construction Schedules.
 2. Weekly Schedule: By 3:00 PM of each Friday during the construction period, each Contractor shall fax or email a typed memo addressed to the Engineer/Owner's resident field engineer/inspector and designated office project manager summarizing the work for the following week. The memo shall also be faxed or emailed to each Prime Contractor's home office and the Owner. The memo shall briefly itemize the planned activities for the coming week. The memo shall also include a summary of expected material/equipment deliveries, concrete pours, utility tie-ins, excavated material removals and other heavy construction traffic that may impact the work activities for the coming week.
 3. Email Account: Each Contractor shall maintain an email account that shall be used to improve communication. An email shall not constitute a formal advisement regarding the terms and conditions of the contract. Email shall only be considered an informal way of notifying relevant parties of project related activities.
 4. Email List: Each Contractor, within five (5) calendar days from the Notice To Proceed, shall provide a list of email addresses for each major equipment supplier and local representative, if such exists. A contact person shall be provided for each email address.
 5. Work Plan: All Contractors shall within five (5) calendar days from the date of the Notice to Proceed, submit to the Engineer a type written work plan in bullet format of the sequence of construction activities from start to finish of construction. A facsimile will not be accepted. All work plans shall include a description of the different major phases of construction as pertaining to the individual construction contract. As a minimum each work plan shall include the tasks and subtasks specified in Section 013216 for the project schedule.
 6. Equipment and Startup Schedule: All Contractors shall also submit a preliminary equipment delivery schedule and a preliminary startup schedule for all equipment and systems being furnished under the Contract. This schedule shall be submitted within 30 calendar days from the date of the Notice To Proceed.
 - a. Include an early and late date for each item.
 - b. Indicate the time necessary to physically install and ready each item so that other work can be completed by other Prime Contractors.
 - c. The Engineer/Architect may waive this schedule if the Contractor has adequately shown the information on the construction schedule, in the opinion of the Engineer/Architect.
- D. Project Coordination Meetings: All Contractors shall participate in and attend the Project Coordination Meetings as specified below:
1. A minimum of (2) project coordination meetings will be held at the Engineer's or Owner's office as specified herein and in Section 013216.
 2. The meetings will be held when so called for by the Engineer.
 3. Each meeting may last up to eight (8) hours with one hour for lunch.
 4. The Engineer will prepare the final agreed version of the schedule and distribute it to all Contractors.
 5. The Engineer reserves the right not to hold these meetings if in his/her opinion they are not needed.
 6. All Prime Contractors shall be required to attend the meetings.
 7. The time associated with attendance at the meetings shall be included in the lump sum bid and be subject to a credit of \$150 per hour for each unused hour that the Contractor does not attend.

1.08 CONTRACTOR'S JOB SITE SUPERINTENDENT

- A. Each Contractor shall employ an on-site superintendent as specified herein below. He/She shall be a full-time employee of the Contractor.
- B. Each Contractor shall name the job site superintendent within five (5) days of the Notice To Proceed. A letter to the Engineer shall be provided.
- C. He/She shall have the authority to sequence and schedule the work, and to staff the project, so as not to interfere with the work by others and to complete the work daily within the time so required.
- D. Each Superintendent shall have a minimum of five (5) years of experience as a job site superintendent for projects of equal size and complexity.
- E. Contract superintendents shall be qualified and experienced person who shall act to schedule and sequence the work on a daily basis.
- F. Contract superintendents may be a foreman or crew supervisor.
- G. Each superintendent shall be qualified to perform the duties so required to successfully complete the work in accordance with the Contract Documents.
- H. All other construction superintendents shall be on the project site while work under his/her contract is being performed, either by direct forces or by subcontractors as stipulated above for subcontractor coordination.
- I. Each superintendent shall also visit the site daily when work is not being performed under their Contract for coordination purposes, through the Owner/Engineer. He/She shall remain on the site for a minimum of one (1) hour, if work is being performed by others. He shall telephone the Engineer/Architect's designated field representative to advise him/her that they are on the site to discuss matters related to coordination.
- J. Each superintendent shall speak English. If required by the Engineer, provide a resume for the proposed superintendent that shall be typed and shall list the qualifications of the superintendent. Prior to the Contractor assigning a superintendent to the project, he may wish to arrange an interview with the Engineer to determine the proposed superintendent's ability to properly coordinate the work through the Owner/Engineer. The Contractor shall employ a superintendent acceptable to the Owner.

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REQUEST FOR INTERPRETATION/INFORMATION (RFI)

OWNER'S NAME: Riverhead Water District

PROJECT NAME & CONTRACT DESIGNATION: Wellhead Treatment for Removal of Manganese
at Plant No. 5

CONSTRUCTION CONTRACT NO.: RDWD1906

Product, Item, or System:			
Request Date:		RFI No.:	
Specification Section:		Paragraph Ref:	
Contract Drawing Reference(s):			
Describe Request:			
Signed:	See Contractor's Attachments for Additional Description for Information		
Owner/Engineer Response:			
Engineer (Printed):	See Engineer's Attachments for Additional Information		
Engineer's Signature & Date		<i>Response Accepted By Contractor</i> <i>Contractor's Signature & Date</i>	
The Work shall be carried out in accordance with these supplemental instructions without change in Contract amount or Contract time for completion. Prior to proceeding with these instructions, indicate your acceptance of these instructions by signing where indicated and returning this form to the Engineer.			

END OF SECTION 013100

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the requirements for progress meetings.

1.02 PRE-CONSTRUCTION CONFERENCE

- A. Each Contractor is required to attend the pre-construction conference at a location, date, and time selected by the Owner.
- B. The owner, a partner, or a corporate officer representing each Contractor shall attend the conference. The job site superintendent and office project manager for each Contractor shall also attend.
- C. The Engineer will prepare an agenda for the conference.

1.03 PROGRESS MEETINGS

- A. Progress meetings will be held approximately once every two (2) weeks during the project. The Owner may elect to hold meetings more or less frequently.
- B. At least seven (7) calendar days advance notice will be given by the Engineer or the date for the upcoming meeting will be set during the progress meeting.
- C. Attendance at progress meetings shall be mandatory. An amount of \$1,000 shall be deducted from the Contract Amount for each announced meeting not attended by the Contractor.
- D. The owner, a partner, or a corporate officer representing the Contractor shall attend each announced progress meeting. The job site superintendent and office project manager for each Contractor shall also attend.
- E. Subcontractors shall attend when requested by the Owner or Engineer at no cost to the Owner.
- F. Meetings will be conducted by Engineer at a location selected by the Owner, normally at or adjacent to the project site.
- G. The minimum agenda will cover:
 - 1. Review minutes of previous meetings.
 - 2. Identify present problems and resolve them.
 - 3. Plan work progress during next work period.
 - 4. Review the status of off-site fabrication and delivery schedule.
 - 5. Review shop drawings and submittal schedules.
 - 6. Review change order status.
 - 7. Review status of construction progress schedule.
 - 8. Coordinate access requirements.
 - 9. Other business related to the work.

1.04 OTHER MEETINGS

- A. Attend special meetings which may be required or called for by Federal, State or Local authorities, utility companies, Owner, Engineer or any other firm, person or organization related to the project.

1.05 CONDUCTING MEETINGS

- A. General - This paragraph covers Owner and/or Engineer meetings with Contractor and/or his subcontractors. Neither Owner nor Engineer wishes to meet solely with a subcontractor and requests for such meetings will be discouraged. If a meeting is deemed necessary, every effort will be made to have Contractor attend. If, for some reason, circumstances do not allow such, the meeting may be held, minutes of the meeting will be sent to contractor and decisions on any major questions will be reserved until contractor has been consulted. Subcontractors may accompany contractor to meetings provided contractor notifies Engineer in advance.
- B. Chairman - When Engineer/Owner attend meetings, Engineer, or his duly authorized representative, will act as chairman. Should Owner-Contractor meetings be necessary, Owner will chair such meetings.
- C. Notices - Engineer or Owner will issue notices of meetings to all parties concerned and will note, thereof, who must attend and who may attend if they so desire. When a Contractor desires a formal meeting, make a request through Engineer. Except when Engineer determines that a prompt meeting is essential, all notices will be issued at least one week in advance of the meeting date.
- D. Agenda - All parties shall inform Engineer of items desired to be discussed and Engineer will notify all parties of all items to be considered. This is to allow each party to fully prepare for the meeting. This shall not be construed to mean that other items cannot be brought up at the meetings.
- E. Time Limits - It is the intent to hold productive and efficient meetings and to keep them as short as is reasonably possible. The Chairman will be the sole judge as to whether or not further discussion on any matter is warranted and all discussions shall cease when he so orders.
- F. Minutes - Minutes of meetings will be kept, written and distributed by the Chairman or his duly authorized representative. Minutes of all meetings will be available upon request to the Chairman.
- G. Conduct - It is the intent to conduct all meetings in an orderly manner, to reasonably discuss all items and to hear and observe the rights and opinions of all parties. The Chairman will allow each party to speak, however, he reserves the right to order any individual to leave the meeting at any time for any reason.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 013119

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for preparing construction schedules and for keeping them up to date.
- B. Prepare a Gantt Chart type schedule and keep it up to date as specified hereinafter.
- C. All schedules shall be submitted in accordance with the requirements contained herein in Section 013300.
- D. Refer to Section 013100 regarding the requirements for attendance at Project Coordination Meetings and additional requirements concerning the submission of other project coordination and sequencing information.

1.02 SCHEDULE PREPARATION MILESTONE DATES & REQUIREMENTS

- A. Each Contractor shall prepare Draft #1 Construction Schedule for presentation and discussion during Project Coordination Meeting No. 1.
 - 1. The Engineer will provide at least seven (7) calendar days written notice regarding the date of the first meeting.
 - 2. Draft #1 Construction Schedule shall be prepared as specified hereinafter.
 - a. The schedule shall show all the major and subordinate tasks necessary to complete the project in the specified time and interim milestones.
 - b. It shall allow adequate time for other Prime Contractors to complete their related work as best estimated by the Contractor. It being understood that the Contractor's allotted time for others to perform their work is non-binding and does not relieve the Contractor from completing all the work in the specified contract completion time in accordance with the Contract Documents. It also being understood that this is the Contractor's realistic best estimate of the time needed for others to complete their related work.
 - c. The schedule shall also show the dependencies and time allocated for each task.
- B. As a result of the first meeting, a better understanding of each Contractor's time requirements will have been achieved. Within five (5) working days of the date of *Project Coordination Meeting No. 1*, each Contractor shall prepare Draft #2 Construction Schedule and submit it to the Engineer and each other Prime Contractor for review. Each Contractor shall mail his/her schedule to all parties via Overnight Mail with a Return Receipt Requested.
 - 1. All Contractors shall deliver to the Engineer the electronic file of his/her Draft #2 Construction Schedule at the meeting. The Engineer will use the data files to prepare the Draft Combined Construction Schedule.
 - 2. The final schedule shall be implemented by all Prime Contractors on a daily basis. All tasks and subordinate tasks shall be completed on schedule.
 - 3. Each Contractor shall increase resources as needed to comply with the established milestone dates should the schedule start to lag.
 - 4. The Engineer's decision regarding the time allotted for a given task shall be final and each Contractor shall apply necessary resources to accomplish the work. Submission of a bid shall be intended to mean that the Contractor agrees that the determination is binding.

1.03 PRIME CONTRACTORS SCHEDULE TYPES

- A. Gantt Chart Type: The General Contractor shall prepare a Gantt Chart type schedule as specified hereinafter.

1.04 CONSTRUCTION SCHEDULE - GENERAL

- A. Coordinate the work and maintain the construction schedule. In the event actual progress begins to lag the schedule, promptly employ additional means and methods of construction to make up the lost time.
- B. Keep the construction schedule current and revise and resubmit as often as necessary to accurately reflect the conditions of the work, past progress and anticipated future progress.
- C. The construction schedule shall be completed, submitted, and deemed received by the Engineer prior to the first payment application.
- D. The schedule, when approved by the Engineer and the Owner, shall establish the dates for starting and completing work for the various portions of the Contract. It shall be the duty of the Contractor to conform to his/her own schedule and to perform the work within the time limits indicated. Failure to adhere to the approved schedule shall expose the Contractor to disputes, claims and additional costs incurred by others.
- E. Coordinate letting of subcontracts, material purchases, shop drawing submissions, delivery of materials, and sequence of operations, to conform to the schedule.
- F. Coordinate the construction schedule with the proposed schedules of the equipment suppliers and subcontractors.
- G. The schedule shall show the critical sequence items where new units must come online before existing facilities go offline, if applicable to the project. The schedule shall also show, in detail, the proposed sequence of the work and the estimated date of starting and completing each stage of the work in order to complete the project within the contract time.
- H. The schedule shall be plotted out in color and shall be 36-inch by 40-inch. It shall contain as many sheets as are necessary to show all rolled down tasks. Partially printed schedules will not be accepted. Each Contractor shall arrange to have it plotted on a color plotter suitable for the intended application.
- I. Prepare the schedule in a manner so that the actual progress of the work can be recorded and compared with the expected progress.

1.05 CONSTRUCTION SCHEDULE - GANTT CHART TYPE

- A. The schedule shall show, in detail, the proposed sequence of the work and the estimated date of starting and completing each stage of the work in order to complete the project within the contract time.
- B. Prepare the schedule in a manner so that the actual progress of the work can be recorded and compared with the expected progress.
- C. Coordinate the construction schedule with the proposed schedules of the equipment suppliers and subcontractors.
- D. The schedule shall be plotted out in color and shall be 36-inch by 40-inch. It shall contain as many sheets as are necessary to show all rolled down tasks. Partially printed schedules will not be accepted. Each Contractor shall arrange to have it plotted on a color plotter suitable for the intended application.
- E. The schedule shall show the following:
 - 1. Task links/task dependency in blue ink.

2. Work under the Contract in green ink.
3. Work by others in blue ink.
4. Milestone dates (zero duration) by a red diamond.
5. The end date for each task and subtask at the end of a bar.
6. The description of all major tasks within the bar. The bar shall be red.
7. Critical path.

1.06 REVISION OF PROJECT PROGRESS SCHEDULE

- A. Each Prime Contractor shall evaluate and provide updated construction schedules monthly in accordance with job requirements. Each update shall be submitted to the Engineer for information purposes and be provided by the last Friday of every month
- B. Each Contractor shall modify his construction schedule to accommodate coordination of the construction contracts by the Owner/Engineer without claims for additional compensation or delay.
- C. The Engineer will provide an electronic version of the Final Combined Construction Schedule for use in keeping the schedule up to date.
- D. From time to time, and at stages deemed appropriate by the Engineer, the Engineer may issue updated schedules to reflect the project's status. The percent complete for each task may be shown, as determined by the Engineer.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 013216

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Project record documents shall be prepared as specified herein.

1.02 QUALITY ASSURANCE

- A. The Contractor shall employ a land surveyor licensed in the State where the project is located. The surveyor shall be acceptable to the Engineer in terms of experience and qualifications.
 - 1. Submit evidence of the surveyor's errors and omissions (professional liability) insurance coverage in the form of an insurance certificate.
 - 2. The surveyor shall maintain a minimum coverage of \$1,000,000 for professional liability.
 - 3. The Owner, Engineer, and Contractor shall be named as insurance certificate holders.
 - 4. A thirty-day cancellation notice shall be provided.
 - 5. Physical work shall not be performed until the certificate is provided and approved by the Owner.
- B. All instruments used on the project shall be of professional quality and in first class condition.
 - 1. All instruments shall have been calibrated by a manufacturer's service station within the last twelve (12) months.
 - 2. Submit certificate of calibration or paid invoice showing that the unit has been calibrated, if so required by the Engineer.

1.03 SUBMITTALS FOR REVIEW

- A. Submit name, address, and telephone number of Surveyor before starting survey work.
- B. Surveyor's professional liability insurance certificate.
- C. On request, submit documentation verifying accuracy of survey work.
- D. Submit a copy of the site drawing signed by the land surveyor showing locations of other benchmarks set by the surveyor, baseline location and offset hubs. If requested, the Engineer will provide a reproducible drawing or a drawing in digital format for use by the surveyor.

1.04 EXAMINATION

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Engineer of any discrepancies discovered.

1.05 SURVEY REFERENCE POINTS

- A. The Contractor's surveyor shall locate and protect survey control and reference points located throughout the project site.
- B. Control datum for survey is that indicated on the Drawings or will be provided by the Engineer.
- C. The Contractor shall protect survey control points prior to starting any site work. Preserve permanent reference points during construction.
- D. Promptly report to the Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
 - 1. The surveyor shall replace dislocated survey control points based on original survey control when directed by the Engineer.

2. Make no changes without prior written notice to Engineer.
- E. The surveyor shall set control lath for rough and final grading purposes. Lath shall be placed at sufficient intervals to control grade or as directed by the Engineer.
- F. All new structures, pits, chambers, drainage pools, curbs, roads, swales, and other physical elements shall be located by survey control.
- G. Underground pipelines need not be located using survey control but shall be located using standard survey equipment operated by persons experienced in their operation.

1.06 SURVEY REQUIREMENTS

- A. The Engineer will provide one (1) benchmark.
- B. The Contractor shall, with his own forces, obtain working or construction lines or grades as needed subject to the check of the surveyor. The surveyor shall set offsets.
- C. Establish elevations, lines, offsets and levels. Locate and lay out by instrumentation and similar appropriate means:
 1. Site improvements including pavements, stakes for grading, curbs, fill and topsoil placement, utility locations, slopes and invert elevations.
 2. Grid or axis for structures.
 3. Building foundation, column locations, ground floor elevations, and equipment foundations.
- D. Provide tie distances on record drawings to all underground structures, valves, pipes, and utilities installed as work of this Contract.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 013223

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for making submissions for the project. Electronic submissions will be required unless expressly noted otherwise.
- B. Refer to Section 013216 - Construction Schedule for the requirements concerning the submission of construction schedules and for making updates thereto.

1.02 IDENTIFICATION OF SUBMITTALS

- A. Each and every submission shall be provided by the Contractor and shall be accompanied by a SUBMISSION TRANSMITTAL FORM. The Contractor shall use the specimen form made a part of this Section. *Submittals not containing the form will be returned to the Contractor un-reviewed.* The Engineer will not review project submissions until such time as the form is completed in its entirety. Identify each submittal and resubmittal using the form.
- B. Each individual submittal shall be identified with a 'submission log number' as specified here in this example: 033000.01-1
 - 1. The Section number for which the submittal applies, followed by a period, shall be indicated, "033000."
 - 2. The submittal within the Section shall be indicated by the next grouping "01". For instance and in this example, the concrete design mix may be submission "01", the waterstop catalog cut may be "02", and so on. Submittals shall be sequentially numbered within the Specification Section, i.e. 01, 02, etc.
 - 3. The number of times the submission was made shall be preceded by a dash and a numerical suffix as follows: "-1". In this example, the concrete design mix is being submitted for the first time. Use the number "1" for the first time it is being submitted.
 - 4. Subsequent submissions of the concrete design mix shall utilize the original number and a sequential numeric suffix, i.e. "2" for a resubmission, "3" for the second resubmission, and so on. Substitute the new number for the original "1".
- C. Where a layout drawing, containing different elements of the project, is being submitted and there is a question as to what the log number might be, then the Contractor shall contact the Engineer so that an agreed upon log number can be assigned.
- D. It is incumbent on the Contractor to initially assign the submission log number designation to each submission. Submissions not containing a log number, as specified above, will be returned to the Contractor un-reviewed by the Engineer.
- E. Every submittal shall also be accompanied by a Transmittal Letter (or "Speed Form") addressed to the Engineer's Project Manager as hereinafter defined.

1.03 COORDINATION OF SUBMITTALS

- A. Prior to submitting to the Engineer, fully coordinate all interrelated work. As a minimum, do the following:
 - 1. Determine and verify all field dimensions and conditions by field measuring existing conditions and the installed work of this Contract and work by others.
 - 2. Coordinate with all trades, subcontractors, vendors, system and equipment suppliers and manufacturers, public agencies, and utility companies and secure all necessary approvals, in writing.
- B. Make submittals in groups containing all associated items that in some way depend upon each other.

1. This also applies to color charts, as one color may not be able to be selected without the selection of other colors so as to form a color-coordinated group.
2. The Engineer may elect not to review partial or incomplete submissions, whereupon he will notify the Contractor of the additional submissions that are required before a review can be made.

1.04 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates of installation to provide time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery. The Engineer will review submittals in a manner as expedient as possible, and will generally send a written response to the Contractor within seven (7) calendar days of receipt of submittals.
- B. Submissions may be returned reviewed, unreviewed, rejected, returned conditioned upon submission of related items, or for other reasons set forth in the Contract Documents.
- C. Make submissions well in advance as the returning, rejecting or disapproval of submissions or other similar circumstances are possible and are deemed "avoidable delays". Costs for these delays or those attributed to Contractor's tardiness in making submittals shall be borne by the Contractor.
- D. **All** submittals requiring Engineer's review (except operations manuals) as required under the technical specifications of these documents shall be submitted within **FORTY FIVE (45)** consecutive calendar days after the date of the Notice to Proceed. An amount of **\$250** per calendar day shall be deducted from payment due the Contractor for **each** day that an outstanding submittal exists, said amount being the cost associated with the Engineer's review.
- E. Operation and maintenance manuals shall be submitted at least **FORTY FIVE (45)** consecutive calendar days prior to scheduled startup of the unit or system.
- F. If material or equipment is installed before it has been deemed to be in general compliance with the Contract Documents, as determined by the Engineer, the Contractor shall be liable for its removal and replacement at no extra charge and without an increase in contract time.

1.05 DESTINATION OF SUBMITTALS

- A. Each submission of documents shall be accompanied by a transmittal form containing the name of the project, the contract name, the Engineer's project manager, a submittal ID number, and a description of content for the submitted items.
- B. A copy of the TRANSMITTAL FORM shall also be provided to the Engineer's inspector at the job site.
- C. Electronic submittals shall be transmitted through the Newforma® Project Center website or by email, pending instruction by the Engineer. H2M architects + engineers is using a project information application called Newforma® Project Center. One of its components is Newforma Info Exchange, a web application that facilitates sending and sharing transmittals, and file sharing.
- D. As an external team member on this project the Contractor will be required to access the H2M architects + engineers/Newforma Info Exchange website for information related to the project, including file transfers, RFI, Submittals, Action Items, and project Calendar information. The Contractor will have access to this website using any internet-capable computer running Internet Explorer or Firefox. All data transmitted through the H2M architects + engineers/Newforma Info

Exchange website is encrypted and logged. Further instructions will be provided to the Contractor after the contract is awarded.

- E. Other submissions, such as material samples or other items as instructed by the Engineer, shall be sent to the Engineer's office as follows:

H2M architects + engineers

538 Broad Hollow Road - 4th Floor East

Melville, New York 11747

Attention: H2M Project Manager (Named at Pre-Construction Conference or in the Notice to Proceed)

1.06 CLARITY OF SUBMITTALS

- A. All printed materials shall be neat, clean, professionally drafted by hand or by computer, clear, legible, and of such quality that they can be easily reproduced by normal photocopying.
- B. All electronic submittals shall be produced with a minimum resolution of 300 dpi.
- C. Binders of information shall be separated into groups, subsystems, or similar equipment/function. Copies not conforming to this paragraph will be returned to the Contractor without the Engineer's review.

1.07 CONTRACTOR'S REPRESENTATION

- A. By making a submission, the Contractor represents that he has determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving equipment into an enclosed space, materials, catalog and model numbers and similar data and that he has checked and coordinated each submission with other work at or adjacent to the project site in accordance with the requirements contained in Section 013100 - Project Management and Coordination and the Contract Documents.
- B. Every SUBMISSION TRANSMITTAL FORM shall contain the Contractor's approval stamp and date showing that the submittal has been approved by the Contractor. The Engineer will not review submittals that have not yet been reviewed and approved by the Contractor.

1.08 ENGINEER/ARCHITECT'S REVIEW

- A. Engineer will review and comment on each submission conforming to the requirements of this Section.
 - 1. Engineer's review will be for conformance with the design concept of the project and will be confined to general arrangement and compliance with the Contract Documents only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, laying lengths, tolerances, interference's, for coordinating the work by others or subcontractors.
 - 2. The Engineer's review of a separate item, or portion of a system, does not represent a review of an assembly or system in which the item functions.
- B. The Engineer will mark submittals as follows:
 - 1. NO EXCEPTION TAKEN (A) - No corrections, no marks. The content of this submittal has been reviewed by the Engineer and been found to be in general compliance with the Contract Documents. No further submission of this submittal is required and the information contained in the submittal may be built into the work in accordance with the Contract Documents.
 - 2. MAKE CORRECTIONS NOTED (B) - Minor amount of corrections. The content of this submittal has been reviewed by the Engineer and has been found in general to be in compliance with the Contract Documents. The notations made on the submittal by the

Engineer shall be incorporated into the work in accordance with the terms and conditions of the Contract Documents. No further submission of this submittal is required.

3. AMEND AND RESUBMIT (C) - The content of this submittal has been reviewed by the Engineer and this review has determined that additional data and/or modification to the submitted data or other changes are required to bring the work represented in this submittal into compliance with the Contract Documents. This submittal shall be reviewed and revised in accordance with the Engineer's comments and resubmitted to the Engineer for review. The information contained on the resubmittal shall not be incorporated into the work until the submittal is returned to the Contractor marked "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED".
 4. REJECTED (D) - The content of this submittal has been reviewed by the Engineer and has been determined not to be in accordance with the requirements contained in the Contract Document and requires too many corrections or other justifiable reason. The submittal shall be corrected and resubmitted or a submittal of an alternate shall be provided. No items are to be fabricated under this mark.
 5. SUBMIT SPECIFIED ITEM (E) - The content of this submittal has been reviewed by the Engineer and this review has indicated that the work displayed in the submittal is not in compliance with the Contract Documents. The Contractor shall submit another submittal for this portion of the work, which complies with the Contract Documents.
 6. RECEIVED (R) - This submittal is accepted on the project and filed for record purposes only, in accordance with the terms and conditions of the Contract Documents. Documents marked "RECEIVED" will not be returned.
- C. No payment will be made on any item for which a submission is required if such submission:
1. has not been made,
 2. has been made but was not stamped "No Exceptions Taken" by Engineer,
 3. has been made and stamped "Make Corrections Noted", but contractor has not complied with Engineer's notes marked on the submittal,
 4. has been made and stamped "No Exceptions Taken", but item provided does not conform to the shop drawing nor to the Contract Documents.
- D. Submittals not required by these specifications will not be recognized or processed.
- E. Provide an 8-inch by 10-inch space for the Engineer's review stamp.

1.09 RESUBMISSIONS

- A. Prepare new and additional submissions, make required corrections, and resubmit corrected copies until found in compliance with the Contract Documents.
- B. On, or with, re-submittals, clearly describe revisions and changes made, other than the corrections requested by Engineer, which did not appear on the previous submissions.

1.10 CONTRACTOR'S RESPONSIBILITIES

- A. Engineer's review of submittals shall not relieve the Contractor of his/her responsibility for any deviation from the requirements of the Contract Documents nor relieve the Contractor from responsibility for errors or omissions in the submittals.
- B. No portion of the work requiring a submission shall be commenced until the Engineer has found the submission in general compliance with the Contract Documents.
- C. The Contractor shall provide written notification of any specification or drawing deviation.

1.11 EXCESS COSTS FOR ENGINEERING/ARCHITECTURAL SERVICES

- A. The Owner will charge to the Contractor, and will deduct from the partial and final payments due the Contractor, all excess engineering and architectural expenses incurred by the Owner for extra services (work) conducted or undertaken by the Engineer as stipulated below:
 - 1. Services and other similar charges because of the Contractor's errors, omissions, or failures to conform to the requirements of the Contract Documents as related to administrative charges associated with non-compliance with the requirements for making project submissions.
 - 2. Services and other similar charges required to examine and evaluate any changes or alternates proposed by the Contractor and which may vary from the Contract Documents.
 - 3. Services and other similar charges as a result of the Contractor's proposed substitution of materials, equipment or products which require a redesign of any portion of the project, as contained in the Contract Documents at the time of bid.
 - 4. Services and other similar charges as a result of the Contractor's proposed substitution of products which require an engineering and/or architectural evaluation, beyond the time stipulated in Section 012500, to determine if the substituted product is equal to that specified.
 - 5. Services and other similar charges as a result of changes by the Contractor to dimensions, weights, sizes, voltages, phase, horsepower, materials of construction, and similar physical or operating characteristics of the product furnished which require redesign of the project in any way.
 - 6. Services and other similar charges for the review of resubmissions of shop drawings that have been marked as "No Exceptions Taken" or "Make Corrections Noted".
 - 7. Services and other similar charges for the review of shop drawings submitted more than two (2) times for the same product or portion of the work.

1.12 MISCELLANEOUS SUBMITTALS

- A. Provide a Submittal Schedule within seven (7) calendar days from the date of the Notice to Proceed. The Submittal Schedule shall list all submittals for the project referenced by draft log number. Provide the estimated date that the submittal will be transmitted to the Engineer for review.
- B. Within seven (7) calendar days from the date of the Pre-Construction Meeting, submit a Proposed Products List. This list shall be a complete listing of all products proposed for use, with name of manufacturer, service headquarters, trade name and model number of each product. Partial listings will not be accepted.
- C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.13 SUBCONTRACTOR LIST

- A. The Contractor shall submit, on AIA Form G705, within THIRTY (30) calendar days after the date of the Notice to Proceed, a list of all subcontractors, including the names of the major subcontractors that were submitted at the time of the bid.

1.14 MATERIAL SAFETY DATA SHEETS (MSDS)

- A. Comply with "Right to Know" requirements of Chapter 551 of Laws of New York, 1980, concerning notification of the use of toxic substances.
- B. Any product or substance used by the Contractor or its subcontractors which is listed in Subpart Z of OSHA Part 1910 Title 29 of the Code of Federal Regulations entitled "Toxic and Hazardous

Substances" shall be identified to the Owner/Engineer by the Contractor's submission of a standard Material Safety Data Sheet (MSDS) in accordance with "Right To Know" requirements.

- C. Products will not be permitted to be kept on site without a MSDS.

1.15 SHOP DRAWINGS

- A. Submit shop drawings for all fabricated work, for all manufactured items and for items specifically required by the specifications.
- B. Submit one (1) electronic copy of each standard drawing, catalog cut, or other material. All shop drawings or submittals that are not in the standard 8-1/2" x 11" format shall be submitted both electronically and in paper. Samples shall be delivered directly to the office of the Engineer. The Engineer will return an electronic copy of each submittal once reviewed.
- C. Subcontractors shall submit shop drawings directly to the Contractor for checking. Thoroughly check subcontractors' shop drawings for measurements, sizes of members, details, materials, and conformance with the Contract Documents.
 - 1. Return submittals which are found to be inaccurate or in error.
 - 2. Do not submit to the Engineer until all corrections have been made.
- D. Clearly show the relationship of the various parts of the project and where the information provided on the submission depends upon field measurements and existing conditions.
- E. The Contractor shall make all measurements, confirm existing conditions, and include them on the shop drawings before making a submission to the Engineer.
- F. Submissions for a single item, or group of related items shall be complete.
- G. When submitting manufacturers' catalogs, pamphlets or other data sheets, in lieu of prepared shop drawings, clearly mark the items being submitted for review.
- H. If the shop drawings contain any departures from the contract requirements, specifically describe them in the letter of transmittal.
 - 1. Where such departures require revisions to layouts, structural, architectural, electrical, HVAC or any other changes to the work as shown, Contractor shall, at his own expense, prepare and submit revised drawings accordingly.
 - 2. Make drawings the same size as the Contract Drawings and to the same scale.

1.16 SAMPLES

- A. Where required, or where requested by the Engineer, submit sample or test specimens of materials to be used or offered for use.
 - 1. Samples shall be representative, in all respects, of the material offered or intended, shall be supplied in such quantities and sizes as may be required for proper examination and tests, and shall be delivered to Engineer, prepaid, along with identification as to their sources and types of grades.
 - 2. Submit samples well in advance of anticipated use to permit the making of tests or examinations.
- B. Samples will be checked for conformance with the design and for compliance with the Contract Documents.
- C. Work shall be in accordance with the approved sample. The use of materials or equipment for which samples are requested or required to be submitted is not permitted until such time that the Engineer has completed his review.

1.17 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation. Provide manufacturer's instructions with shop drawings.

1.18 CERTIFICATIONS

- A. Submit certifications of compliance indicated in the Contract Documents.
- B. Certifications shall be complete and exact, they shall be properly authenticated by the written signature, in ink, of an owner, officer or duly authorized representative of the person, firm or organization issuing such certification and they shall guarantee that the materials or equipment are in complete conformance with the requirements of these specifications.

1.19 COLORS AND PATTERNS

- A. Unless the precise color and pattern are specified, whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts for Engineer's and Owner's review and selection.

1.20 MANUFACTURER'S SERVICE CENTER

- A. The product of a manufacturer who does not maintain an adequate nearby service center and a sufficient stock of spare parts are subject to rejection by Engineer solely on that basis.
- B. With each submission, submit information on manufacturer's facilities and give complete details of his service policies and capabilities, and a general idea of the stock of spare parts available. Submit this information in the form of a certification. Also include names, addresses and telephone numbers of at least three of the service center's present customers who are in the area of the project.

1.21 TEST RESULTS AND INSTALLATION

- A. Whenever field startup services are specified, the Contractor shall obtain from the manufacturer and submit to the Engineer Manufacturer Startup Reports (MSR's). The report shall detail the results of the field visit and all special conditions resulting from the startup.
- B. Whenever field or factory tests are required on materials, equipment and systems, such tests shall be performed and the test results submitted to Engineer in the form of a MSR.
- C. Do not deliver to the project or incorporate into the work any materials or equipment for which Engineer has not completed his review and found same to be in general conformance with the Contract Documents.
- D. Submit MSR's within thirty (30) calendar days after the date of the startup or factory test.

1.22 SPARE PARTS LIST

- A. Prepare a list of all spare parts specified to be provided in other Sections. Compile the total list for the purposes of reviewing actual spare parts delivered versus spare parts specified to be provided. The list shall reference the Section, model number, and quantity to be provided.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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CONTRACTOR'S COMPANY NAME
ADDRESS

SUBMISSION TRANSMITTAL FORM

CLIENT NAME: Riverhead Water District

PROJECT TITLE: Wellhead Treatment for Removal of Manganese at Plant No. 5

H2M PROJECT NO.: RDWD1906

Product, Item, or System Submitted:			
Submission Date:		Submission Log No.:	
Specification Section:		Paragraph Reference:	
Contract Drawing Reference(s):			
Manufacturer's Name:			
Manufacturer's Mailing Address:			
Manufacturer's Contact Information:	<i>Name</i>	() <i>Tel. no.</i>	<i>Email</i>
Supplier's Name:			
Supplier's Mailing Address:			
Supplier's Contact Information:	<i>Name</i>	() <i>Tel. no.</i>	<i>Email</i>
This item is a substitution for the specified item:	____ No		____ Yes
Contractor's Approval Stamp with Signature & Date	<u>Contractor's Brief Comments or Remarks</u> (attach separate letter as needed):		
	By making this submission, we represent that we have determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving the item into the enclosed space, materials, catalog and model numbers and similar data and that we have checked and coordinated this submission with other work at or adjacent to the installed location in accordance with the requirements contained in the Contract Documents.		

END OF SECTION 013300

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Codes
- B. Governing agencies
- C. Permits

1.02 CODES

- A. Comply with the requirements of the various codes referred to in these Specifications. Such codes shall be the date of the latest revision in effect at the time of receiving bids.
- B. If there is a conflict between local, state, and/or Federal regulatory requirements, seek a consultation with the State Department of Labor. Resolve conflicts to the satisfaction of the State Department of Labor prior to commencing work.
- C. Electrical Work: Conform to the requirements of the National Electrical Code (NEC) unless otherwise shown or specified. The Owner will be the sole judge of the interpretation of these rules and requirements.

1.03 GOVERNING AGENCIES

- A. All work shall conform to and be performed in strict accordance with all governing agencies such as, but not limited to:
 - 1. Occupational Safety and Health Act - OSHA
 - 2. State Department of Environmental Conservation
 - 3. State Building Code
 - 4. State Fire Code
 - 5. National Fire Protection Association - NFPA
 - 6. National Electrical Code
 - 7. State Plumbing Code
 - 8. New York State Energy Conservation Construction Code
 - 9. County Department of Health
 - 10. Town Codes, Rules, Laws and Ordinances
 - 11. Sewer District Sewer Use Code
 - 12. Local Water District
 - 13. Electric Utility
 - 14. Village Codes
 - 15. Suffolk County Department of Public Works.

1.04 PERMITS AND INSPECTIONS

- A. Representatives of the Owner shall have access to the work for inspection purposes. The Contractor shall provide facilities suitable to the Owner to facilitate inspections of the installed work.
- B. Obtain and pay for all permits, fees, licenses, certificates, inspections and other use charges required in connection with the work.
- C. Such permits include, but are not limited to:
 - 1. Dewatering Permit, if dewatering is required (All Contracts)
 - 2. Clearing and tree removal (Contract G)
 - 3. Transportation and disposal of construction debris (All Contracts)

4. Electrical Service (Contract E)
 5. Well Completion Report for Well Nos. 5-1 and 5-2(A) (Contract W)
 6. Electrical Inspector's Incorporated, Certificate for Electrical Installation or preapproved electrical inspection agency
 7. Suffolk County Department of Health
 - a. The Contractor shall submit to the Suffolk County Department of Health (or local AHJ) all necessary drawings and equipment specifications required for a complete Suffolk County Department of Health approved system.
 - b. The Contractor shall employ the services of a specialty Contractor to prepare all drawings and complete all applications. Approved Contractor shall be James Woerner, Inc., Farmingdale, New York, telephone (631) 454-9330.
 - c. The Contractor shall have a licensed New York State Professional Engineer stamp all drawings and complete all applications, and pay for all fees to obtain permits and approvals. The Contractor shall be reimbursed for cost of filing fees from allowance.
- D. Obtain a New York Board of Fire Underwriters inspection and certificate.
- E. The following permits and/or certifications will be obtained by the Owner from the appropriate permitting agencies:
1. Suffolk County Department of Health 348 – Public Water Supply Improvement.
 2. Suffolk County Department of Health 347 – Backflow Prevention Devices.
 3. Suffolk County Industrial Waste/Sewer Discharge Permit.

1.05 LISTINGS

- A. Equipment and materials for which Underwriters' Laboratories, Inc. (UL) provides product listing service, shall be listed and bear the listing mark. Alternately, ETL Testing Laboratories, Inc. Product Safety Testing Listing is acceptable if the listed product has been tested to the applicable UL Standard.

1.06 FIRE RESISTANT CONSTRUCTION MATERIALS AND ASSEMBLIES

- A. Conform to the fire rating classifications based upon the test methods and acceptance criteria in the Standard, Fire Tests of Building Construction and Materials for which Underwriters' Laboratories, Inc. (UL) provides listings.
- B. Materials and assemblies shall comply with the acceptance criteria, detailed description of the assembly, its performance in the fire test and other pertinent details such as specification of materials, Classification coverage, and alternate assembly details.
- C. Alternatively, fire resistance rating classifications by other issuing organizations listed in the Fire and Building Codes are acceptable.

1.07 COORDINATION WITH ELECTRIC UTILITY COMPANY

- A. Comply with the utility company requirements for the incoming electric service.
1. Pay the utility company's charges in connection with the installation of the incoming service.

1.08 COORDINATION WITH WATER UTILITY

- A. Comply with the water utility requirements for water and fire service connections. Obtain and pay for all necessary permits from the water utility. Obtain authority to connect to the existing water mains.
1. Make necessary connections to existing public water mains under supervision of the water utility representative.

- B. Pay the water utility's charges for the connections.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 014100

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements for monitoring the quality of the constructed project.
- B. Work of this Section also includes services of an independent testing laboratory for quality assurance testing.
- C. The services of the testing laboratory will be paid for out of the cash allowance included by the Contractor in the price as bid in accordance with the requirements contained herein and in Section 012100 - Allowances.

1.02 REFERENCES

- A. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- C. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.
- D. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.03 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or workmanship that is more precise.
- C. Perform work by persons qualified to produce workmanship of specified quality.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.04 MOCK-UP

- A. Tests will be performed under provisions identified in this Section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashing, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining work.

- D. Where a mock-up has been accepted by the Engineer and is specified to be removed, then the Contractor shall remove the mock-up and the clear area when directed to do so by the Engineer.

1.05 QUALITY ASSURANCE - TESTING LABORATORY

- A. In order to establish compliance with the Contract Documents, materials shall be tested, examined and evaluated before they are incorporated into the work. During and after installations, additional tests, examinations, and evaluations shall be made to determine continued compliance throughout the course of the work.
- B. Testing laboratory shall be a reputable, experienced firm that is capable of performing all of the required testing and authorized to operate in the state in which the project is located.
- C. Perform all sampling and testing in accordance with specified procedures and use the materials, instruments, apparatus, and equipment required by the codes, regulations and standards. Where specific testing requirements or procedures are not described, perform the testing in accordance with all pertinent codes and regulations and with recognized standards for testing.
- D. In the event that samples and test specimens are not properly taken, handled, stored or delivered or if other requirements of this Section are not complied with, Engineer reserves the right to delegate any or all of this work to others, or to take whatever action deemed necessary to ensure that sampling and testing are properly accomplished, for which all costs shall be borne by Contractor.
- E. Engineer reserves the right to disapprove the use of a specific testing laboratory, even after prior approval, if the laboratory fails to meet or comply with the requirements of this Section. If this should occur, immediately discharge the testing laboratory and retain the services of a different laboratory acceptable to Engineer.
- F. The testing laboratory shall meet the following criteria:
 - 1. Be capable of performing all of the required tests.
 - 2. Be regularly engaged in performing the types of services required.
 - 3. Have adequate facilities, materials, equipment, and personnel to perform the services.
 - 4. Have an adequately trained, experienced and qualified staff.
 - 5. Have at least one registered professional engineer licensed in the state in which the project is located who shall be capable of performing field tests, supervising laboratory testing and interpreting test results. The professional engineer shall be thoroughly knowledgeable in materials, soils, asphalt paving and concrete.
 - 6. Shall be able to be on the Project site within two hours after being notified.
 - 7. Comply with the requirements of ASTM C1077, ASTM D3740, ASTM D4561, ASTM E548 and ASTM E699.
 - 8. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.06 REFERENCE STANDARDS

- A. Conform to reference standards by date that the project was last bid.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.07 SUBMITTALS

- A. Within fifteen (15) calendar days from the date of the Notice to Proceed, submit documentation from three (3) testing laboratories that clearly indicates experience, location, qualifications of staff, and descriptions of any limitations or restrictions of the firm.
 - 1. Include a price schedule for standard tests and a billing rate schedule for technician classifications.
 - 2. Based upon this information, the Engineer will select one firm to be the primary testing laboratory and one firm to act as a standby.
- B. Certified copies of each test report shall be mailed directly to the Engineer. The Contractor shall arrange with the laboratory to secure copies.
- C. Each report shall be in writing and shall include the testing method used, the test results, the specified results, the exact location of where the test specimens were taken, the date taken, Project identification, Contractor's name and other pertinent information required for a complete and meaningful test report.
- D. Each report shall be signed and certified by a responsible officer of the testing laboratory.
- E. E-mail reports directly to Engineer within 24 hours after the sample is taken, except in those instances when tests cannot be immediately performed because of required curing, incubation periods, or lengthy testing procedures.
- F. The laboratory shall verbally communicate test results when requested by the Engineer. This does not eliminate nor replace the requirements for a written report.

1.08 SCHEDULING - LABORATORY SERVICES

- A. Except where otherwise specified, the Engineer will determine the number of samples to be taken, the date and time samples will be taken and tests made, the number and type of tests to be performed, who will collect the samples, how they will be handled and stored and when laboratory personnel are required on site.
- B. Engineer will notify Contractor of his/her decision to take samples and/or have tests made and provide him with the pertinent information. Contractor is responsible for notifying the testing laboratory and for having the testing performed, on schedule.
- C. In addition to the above, Contractor shall make his own arrangements for the sampling and testing of materials he proposes to incorporate into the work. This shall not be paid for out of the cash allowance.
- D. Notify Engineer at least 72 hours in advance of the times at which scheduled samples or tests will be conducted.
- E. If samples and/or tests cannot be taken or performed when required, delay the work until such time that they can be accomplished. Where possible, any work that has been installed but has not been sampled or tested as required, shall be tested by other means. Upon Engineer's request, uncover any work, which has been buried or covered, and perform special tests designated by Engineer. If the work cannot be tested by other means, Engineer may declare the work unacceptable. All costs associated with noncompliance and for special testing shall be borne by the Contractor and not be paid for out of the cash allowance.

- F. Should the testing laboratory be scheduled to take or collect samples or to perform tests, and finds that it is unable to do so as a result of delays in construction, inclement weather, or any other reason, reschedule the tasks for a date acceptable to Engineer. Costs associated with times testing laboratory is unable to perform scheduled services shall be borne by the Contractor and will not be paid for under the allowance.
- G. Plan all work and operations to allow for the taking and collection of samples and allow adequate time for the performance of tests. Delay the progress of questionable work until the receipt of the certified test reports.

1.09 TESTING REQUIREMENTS

- A. Dry Paint Thickness Measurement: Perform dry paint thickness using calibrated SSPC Type 2 fixed probe gages.
- B. Compaction Testing - Soil:
 - 1. Perform compaction testing in accordance with ASTM D2922, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth) or ASTM D1556 Density and Unit Weight of Soil In Place by the Sand Cone Method.
 - 2. Perform tests and analysis of fill material in accordance with ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. Rammer and 12-inch Drop.
- C. Compaction Testing - Asphaltic Concrete Pavement:
 - 1. Perform asphaltic concrete compaction testing in accordance with ASTM D2950 - Standard Test Method of Density of Bituminous Concrete in Place by Nuclear Methods.
 - 2. Calibrate nuclear density measurement equipment based on theoretical maximum specific gravity of asphaltic concrete pavement material.
 - 3. Perform test to determine theoretical maximum specific gravity in accordance with ASTM D2041 Theoretical Maximum Specific Gravity of Bituminous Pavement Mixtures. Perform test on mix at plant prior to delivery. Collect sample at plant in accordance with ASTM D979 - Sampling Bituminous Paving Mixtures and perform test in approved laboratory if plant does not have necessary equipment.
- D. Concrete Testing:
 - 1. Collect samples in accordance with ASTM C172, Practice for Sampling Freshly Mixed Concrete.
 - 2. Make test cylinders in accordance with ASTM C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. Test concrete cylinders in accordance with ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. Test slump and air entrainment.
- E. Asphalt Testing:
 - 1. Collect samples at point of delivery in accordance with ASTM D979, Standard Practice for Sampling Bituminous Paving Mixtures.
 - 2. Perform extraction test in accordance with ASTM D2172, Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
 - 3. Perform gradation test in accordance with ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.

1.10 TESTING SCHEDULE

- A. Dry Paint Thickness Measurement:
 - 1. Make five (5) separate spot measurements spaced evenly over 100 square feet of area.

2. For structures exceeding 1000 square feet of finished surface, three 100 square foot areas shall be randomly selected by the Engineer plus one 100 square foot area for each additional 1000 square feet of finished surface. This requirement shall be subject to change as required by the Engineer.
- B. Compaction Testing of Soil:
 1. Pipe Installation: As directed by the Engineer.
 2. Concrete flatwork: As directed by the Engineer.
 3. Pavement subgrade: As directed by the Engineer.
- C. Concrete Testing: Make six (6) concrete test cylinders for each 50 c.y. or fraction thereof.
 1. Test two (2) cylinders at 7 days.
 2. Test two (2) cylinders at 28 days.
 3. The remaining cylinders shall be tested at a time to be determined by the Engineer. This requirement shall be subject to change as required by the Engineer.
- D. Asphalt Testing: As directed by the Engineer.
- E. Compaction Testing of Pavement: As directed by the Engineer.

1.11 FIELD OBSERVATION OF CONTRACTOR'S WORK

- A. The Engineer will provide periodic observation of the Contractor's work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions. Verify that the existing substrate is capable of structural support or attachment of new Work being applied or attached. Examine and verify specific conditions described in individual specification sections. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance. Seal cracks or openings of substrate prior to applying next material or substance.
- B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 FIELD QUALITY CONTROL

- A. Allow representatives of the testing laboratory access to the work at all time. Provide all equipment, labor, materials, and facilities required by the laboratory to properly perform its functions. Cooperate with and assist laboratory personnel during the performance of their work.

- B. Test specimens and samples shall be taken by the person(s) designated in other Sections, or as directed by Engineer. Conduct field sampling and testing in the presence of Engineer. Provide all materials, equipment, facilities and labor for securing samples and test specimens and for performing all field-testing.

END OF SECTION 014500

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Moisture control.

1.02 RELATED SECTIONS

- A. Section 014100 - Regulatory Requirements
- B. Section 015719 - Temporary Environmental Controls

1.03 MOISTURE CONTROL

- A. The Contractor shall maintain a strict policy and protocol for the control of water infiltration and moisture build-up during the course of the project. The plans and specifications are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the Contractor is in the best position to verify that all construction is completed in a manner which will provide a watertight structure. The Contractor has the sole responsibility for ensuring the watertight integrity of the structure. The Contractor's contractual obligations include, but are not limited, to the following:
- B. Water Infiltration: If the Contractor observes water infiltration (unintended) into a completed building or an ongoing construction site, he must immediately report the condition to the Owner and Engineer, and shall immediately take steps to investigate the source of the water infiltration, identify the responsible party (person who performed work that resulted in water infiltration) and devise a procedure to promptly eliminate water infiltration into the building.
- C. Handling of Water-Damaged Building Materials and Construction:
 - 1. Contractor shall inspect all building materials delivered to the site for pre-existing water damage, as well as existing mold growth.
 - 2. If in-place construction becomes wet, notify the Owner and Engineer immediately. The Owner and Engineer will determine whether or not the work shall be removed and replaced, or if the type of material can be permitted to dry.
 - 3. Under no circumstances may new or additional construction be placed over, or otherwise enclose, wet building materials.
- D. Visible Mold/Mildew:
 - 1. If the Contractor observes any substance that appears to be mold or other fungal growth and/or an unidentified substance within a completed building or the ongoing construction site, he shall immediately suspend construction operations in the area, and report the condition to the Owner and Engineer.
 - 2. No person shall be allowed back into the affected area without permission of the Owner.

1.04 SUBMITTALS

- A. Contractor shall submit completed and notarized "Certification of Asbestos and Lead-Based Paint" form.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 014536

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section supplements the General Conditions.
- B. The Work of this Section includes temporary facilities, utilities, and controls to be furnished by the Contractors for this project as it is specified herein.
- C. This Section is made a part of all Construction Contracts associated with the project. It contains specific references to the particular Contractor supplying said product or service. If no reference is provided then the requirement applies to all Prime Construction Contractors.
- D. Temporary electric shall be provided by the Prime Electrical Contractor as specified in Section 015113 located in the Contract Documents for Contract E except as required herein.

1.02 CARE AND PLACEMENT

- A. All temporary and permanent facilities and controls and all other elements on the project site shall meet all standards of the Occupational Safety and Health Act of 1970 and subsequent revisions. Each Contractor shall comply with all requirements of the Act.
- B. Each Contractor shall take every precaution and shall provide such equipment and facilities as are necessary or required for the safety of its employees and persons at the site.
- C. In the event of damage to existing and/or temporary facilities then immediately make all repairs and replacements to an equal condition prior to the event.

1.03 QUALITY PERFORMANCE

- A. Comply with and perform all work in accordance with the requirements of local authorities and utility companies having jurisdiction, and all applicable codes, regulations and ordinances.
- B. Secure approvals from the appropriate jurisdictions and utility companies on all repairs, relocations, connections, disconnections and the Work.
- C. All barricades, warning signs, lights, temporary signals and other protective devices shall conform with "Manual on Uniform Traffic Control Devices for Streets and Highways", US Government Printing Office.

1.04 SUBMITTALS

- A. Each Contractor shall provide a list of contact numbers as follows:
 - 1. Contractor's superintendent and office project manager (home, beeper, cellular, office, fax, trailer, and email address).
 - 2. All subcontractors.
 - 3. All utility companies.
 - 4. Emergency services such as fire department, police, and ambulance.
 - 5. Contractor shall also submit the following:
 - a. Name and qualifications of person or persons who shall be available to render first aid.
 - b. Names, addresses and telephone numbers of personnel who can be telephoned and act on behalf of Contractor in the event of emergencies or other problems requiring prompt attention during winter shutdown, holidays, nights and other periods when the Contractor's superintendent may be absent from the project site.

- B. The General Contractor shall provide a sketch showing routing of temporary water service for construction purposes and for exfiltration tank testing. Provide cuts and plumber's certification for backflow device(s).

1.05 CONTRACTOR'S RESPONSIBILITY

- A. Each Contractor shall be responsible for the installation, performance, maintenance, and repair of all temporary facilities and controls specified herein this Section as originally provided.
- B. The Owner reserves the right to immediately correct a Contractor caused action, if in the opinion of the Owner, the situation may result in the immediate loss of life, property, and degradation of the environment. The costs for actions taken by the Owner shall be deducted from money due or to become due the Contractor. Amounts in excess shall be paid by the Contractor.
- C. If the Contractor caused situation is not deemed immediate, then the Contractor shall, within 24 hours of receipt of written and/or verbal notice, correct the defect or unsatisfactory condition.
- D. The Owner may repair, correct, replace, or install temporary facilities to correct the situation if the Contractor fails to perform within the allowed time. The costs to make the corrections shall be deducted from money due or to become due the Contractor. Amounts in excess shall be paid by the Contractor.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The Owner may use temporary power lines, pipes, roadways or other facilities that each Contractor furnishes, installs, and maintains (then removes at the completion of the work), during the period of construction.
- B. The location of all temporary power lines, roadways, and other necessary temporary facilities shall be subject to the approval of the Engineer, and these shall be located and operated so as not to interfere with the operation of the facilities.

2.02 WATER FOR CONSTRUCTION PURPOSES

- A. Each Contractor shall obtain water from the nearest potable water source as designated by the Owner.
- B. The Owner will pay for water usage for general construction activities such as dust control and for sanitary purposes, like hand washing.
- C. Each Contractor shall install his or her own backflow prevention device at the supply point where it is connected to the Owner's system.
 - 1. The water purveyor shall approve the device.
 - 2. The device shall be tested and certified as functioning properly.
 - 3. Post the certification in a location acceptable to the water purveyor.
- D. A water meter shall also be installed on any water service lines used to supply water for exfiltration testing.
- E. Each Contractor shall exercise measures to conserve water.

- F. Provide insulation and heat tracing to prevent freezing of temporary piping. Drain hoses at the end of each use.
- G. All Contractors, subcontractors, and personnel involved in the project shall be permitted to use water for construction purposes as provided under this paragraph.

2.03 SANITARY FACILITIES

- A. The General Contractor shall provide and maintain his or her own temporary toilet facilities and enclosures.
- B. These facilities shall be maintained in a strictly sanitary manner and be screened from the general public.
- C. All facilities shall be in accordance with the Occupational Safety and Health Act (OSHA) standards and all other applicable local codes.
- D. All applicable codes and regulations regarding the maintenance and method of waste disposal for these facilities will be strictly enforced. These facilities shall be of the portable type.
- E. The Owners sanitary facility will not be available for use by any contractor.
- F. Comply with the requirements also contained in Section 015719 - Environmental Protection.

2.04 HEAT

- A. Each Contractor shall provide and pay for heating devices and fuel as required to maintain adequate heat for specific construction operations; i.e. painting, application of coatings, etc. where so specified elsewhere in these specifications.
- B. The General Contractor shall heat buildings to properly apply paint in accordance with Section 099100 and 099123 requirements.
- C. Maintain minimum ambient temperature of 40 degrees F in areas where construction is in progress, unless otherwise indicated in specifications or as required by proposed working conditions and manufacturer's installation/application instructions.

2.05 VENTILATION

- A. Each Contractor shall ventilate enclosed areas to assist in the curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.
- B. The General Contractor shall ventilate buildings to safely apply paint in accordance with Section 099100 requirements.

2.06 BARRIERS AND PROTECTION

- A. Each Contractor shall provide railings, barricades, signs, fences, overhead protection, walkway covers and other protective devices to prevent unauthorized entry to construction areas, to allow for the Owner's / Public safe use of the site and to protect existing facilities and adjacent structures from damage from the work.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing buildings.
- C. Provide protection for plant life designated to remain.

- D. Protect vehicular traffic, stored materials, public utilities, site and structures from damage.
- E. Provide warning signs, detour signs and other traffic control devices to insure the safety of plant operators and to adequately direct traffic around the work. Illuminate barricades, obstructions, and warning signs from sunset to sunrise.

2.07 TEMPORARY FENCING

- A. Each Contractor is responsible for performance compliance with OSHA standards.
- B. Each Contractor shall provide temporary safety fence around all open excavations or other dangerous conditions on the construction site.
 - 1. All temporary safety fencing shall be designed and erected in compliance with OSHA standards, but in no case less stringent than these specifications for fencing.
 - 2. Fence is to be bright orange in color, a minimum of 4 feet high, and properly secured using 1" diameter steel pipe at 4'-0" on-center as support posts.
 - 3. Stake each support post to a depth of 18" and tamp securely into place.
 - 4. Each post shall be plumb.
 - 5. Secure fencing to posts using heavy-duty 12" long cable ties or tie wire.
 - 6. The fence and supports shall remain the property of the Contractor and be promptly removed at the appropriate time.
- C. The General Contractor shall install temporary safety fencing around the outside perimeter of each open tank that requires excavation and which is to be constructed under Contract G.
 - 1. Fencing shall be securely installed and maintained in accordance with OSHA regulations until the railing and grating has been installed.
 - 2. Fencing shall be installed on exterior tank walls where excavation is required.

2.08 TEMPORARY HANDRAILS AND SCAFFOLDS

- A. All temporary handrailing and scaffolds shall be designed and erected in compliance with OSHA standards. Each Contractor is responsible for performance compliance with OSHA standards.
- B. Handrails shall be securely installed and maintained in accordance with OSHA regulations until the permanent railing or grating has been permanently installed and approved by the Engineer.
- C. All scaffolding and platforms shall be erected in a safe and substantial manner complying with OSHA requirements.
- D. All temporary handrails and scaffolds shall be designed by a professional engineer licensed in the state where the project is being constructed.
 - 1. The design drawings and details shall be stamped by the licensed engineer and submitted for record purposes.
 - 2. The Contractor's design engineer shall visit the site to certify that the handrailing and/or scaffolds have been erected pursuant to the stamped design.
- E. The General Contractor shall protect all openings in building/structures of any type such as shafts, deck openings, and other building related chases.
- F. The General Contractor shall also install two (2) separate temporary handrailing installations at two (2) separate stages of the construction for all structures where OSHA requires handrailing is to be provided.
 - 1. OSHA approved wooden railing shall be installed at the point where the deck platform formwork is proceeding and before reinforcement steel is placed.

- a. Railing shall be installed using the bridge brackets used to construct the cantilevered platforms or other method as selected by the Contractor in compliance with OSHA.
 - b. Coordinate and advise the Prime Electrical Contractor of the date when the handrailing will be in place so that embedded conduit can be installed.
2. The second installation of railing shall be fabricated of steel structural members with aircraft cable and turnbuckles installed immediately after the deck platform is constructed and the formwork is removed.

2.09 EROSION CONTROL

- A. Each Contractor shall provide measures to keep the ground surface well drained, but avoid erosion of embankments, excavations, the project site, and adjacent areas.
- B. Each Contractor shall comply with all local codes, rules, and regulations concerning soil erosion.
 1. Use hay bales or silt fences to control erosion to the satisfaction of the Engineer and regulatory agencies. Use hay bales or silt fences to stop silt and sediment from reaching surface waters, parking lots and roads.
 2. Leave erosion control methods in place until ground cover is established or until date of substantial completion.
- C. Comply with the requirements also contained in Section 015719 - Environmental Protection.

2.10 DUST CONTROL

- A. Each Contractor shall provide measures to control dust resulting from the work.
- B. Control dust at locations and in such quantities and frequencies as required to prevent dust from becoming a nuisance to the surrounding area.
- C. In the event the Contractor does not adequately provide for dust control, or should insufficient quantities of dust control agents be placed and Contractor fails to place additional quantities within 4 hours after Engineer's direction, Owner will perform the required work by whatever means deemed expedient and all expenses incurred by Owner will be charged to and paid by Contractor.
- D. Take care in selecting and applying dust control agents so as not to make roadways or walkways slippery, muddy or hazardous. Dust control agents shall be acceptable to the Engineer.
- E. The General Contractor shall provide all roadways with dust control.

2.11 RUBBISH REMOVAL

- A. The General Contractor shall be responsible for overall rubbish removal.
- B. Burning of rubbish and trash will not be permitted.
- C. The General Contractor shall clean up trash as specified in Section 011400 - Work Restrictions or more often if the trash interferes with the work of others, presents a hazard or if directed by the Engineer.
- D. Dispose of rubbish and waste materials in accordance with state regulations and local ordinances.
- E. The General Contractor shall also place rubbish containers at locations selected by the Engineer.

1. Furnish adequately sized rubbish containers from the date of initial mobilization to the date of final payment.
 2. As a minimum, the Contractor shall furnish ten (10) 55-gallon general trash containers. Secure the top of each container to the container.
 3. Secure the container itself so that it does not get blown about the site.
- F. The General Contractor shall be responsible for maintaining the site free of trash.
- G. Each Contractor shall assist the General Contractor in maintaining the site free of trash and debris.
1. It shall be the sole responsibility of the General Contractor to prevent trash from being blown about the site.
 2. Provide a worker to police the site at least for 1 hour at the end of each day that work is being undertaken by the General Contractor.

2.12 SNOW REMOVAL

- A. The General Contractor shall be responsible for maintaining roads, walkways, sidewalks, and parking areas/lots free of snow. Provide snow plowing during and after each snow fall equal to or greater than 1.0 inch as reported by the local weather service.
- B. Any damage resulting from the Contractor's snow clearing operations shall be immediately repaired at no additional cost to the Owner.

2.13 ENCLOSURES

- A. Each Contractor shall provide and maintain temporary enclosures, sheds, or fenced-in areas to accommodate protection for products, material and equipment.
- B. Store equipment that cannot be exposed to outdoors in accordance with Section 016500 - Product Delivery, Storage and Handling.

2.14 SECURITY

- A. Each Contractor shall provide security and facilities to protect work from unauthorized entry, vandalism and theft.
- B. Coordinate with Owner's security program, if applicable.
- C. Each Contractor has full responsibility for the working area until final acceptance and payment.
- D. The General Contractor shall maintain the perimeter fence that pre-existed prior to the start of construction. A temporary perimeter fence shall be required at all times during the construction and until the new perimeter fence is installed, or until the project is accepted by the Owner.
- E. It shall be the General Contractor's responsibility to lock all gates to the site, and on the access road, at the end of each work day.
- F. All company vehicles shall be conspicuously identified, through sufficiently sized lettering on both the passenger and driver sides, with the company name, address and telephone number.
1. All employee owned vehicles shall have an 8-1/2 inch by 11 inch sign with the company name, address and telephone number placed on the dashboard on the driver side.
 2. Vehicles may be subject to search by the Owner or owner's representatives.
 3. Any vehicle that does not have the company name, address and telephone number will not be permitted on the Owners' property.

- G. Submit to the Owner a complete listing of all employees that will or might be performing work at the project site.
 - 1. Furthermore, provide sufficient information as may be required for the Owner to conduct background checks, in accordance with the Fair Credit Reporting Act.
 - 2. Background checks may be performed at the discretion of the Owner due to the sensitive nature of the work and the extensive, and sometimes unsupervised, access to Owner property and buildings.
 - 3. The Contractor shall be required, on request from the Owner, at any time prior to or during the work, to provide releases from its employees and officers to the Owner, H2M, and a background search firm, hired by either the Owner or H2M, to conduct background checks in accordance with the Fair Credit Reporting Act and applicable state law.

2.15 PARKING

- A. Do not allow heavy construction vehicle parking on existing pavement, if existing pavement is not scheduled for replacement or restoration.
- B. Provide and maintain access to fire hydrants, building entrances, process tanks, doors and the work in general.
- C. Each Contractor shall have his or her employees and subcontractors park in areas designated by the Owner/Engineer.
- D. Where trades work from their trucks, then coordinate the parking of trucks with other prime contractors.

2.16 DAMAGES

- A. Each Contractor, with the prior approval of the Owner/Engineer, shall promptly repair any damage, directly or indirectly caused by the Contractor's operations.
- B. All repairs shall be to the complete satisfaction of the Owner and equal in quality to that which pre-existed.

2.17 FIRST AID FACILITIES & EMERGENCY TELEPHONE NUMBERS

- A. Each Contractor shall provide and maintain adequately equipped first aid facilities in a location or at locations that are readily accessible to workmen, Engineer and visitors to the site.
- B. Provide at least one on-site employee who is properly trained in first aid and who shall be available to render first aid whenever construction is in progress.
- C. Provide a list of emergency telephone numbers as specified above.
- D. Post the list of emergency telephone numbers as directed by the Engineer.

2.18 POLLUTION CONTROL

- A. Do not permit pollutants, such as chemicals, fuels, lubricants, calcium chloride, sewage, water containing sediments and other deleterious, poisonous, toxic or oxygen demanding substances to enter or leach into streams, lakes, wetlands, other surface waters, into groundwater, or into the air.
- B. In waters used for public water supply or used for trout, salmon or other game or forage fish spawning or nursery, control measures must be adequate to assure that turbidity in the

receiving water will be increased not more than 10 standard turbidity units (s.t.u.) in the absence of other more restrictive locally established limitations, unless otherwise permitted by the State.

- C. In no case shall the classification for the surface water be violated, unless otherwise permitted by the State.
- D. In water used for other purposes, the turbidity shall not exceed State limits.

2.19 REMOVALS

- A. Remove all items provided under this Section except as otherwise specified.

PART 3 - EXECUTION

3.01 PROTECTION OF EXISTING UTILITIES AND PUBLIC WORKS

- A. Maintain and protect existing utilities and public works including, but not limited to, conduits, sewers, water mains, electric and telephone conductors or conduits, and gas mains encountered during the construction.
- B. In the event that it is not possible to cross over, under, around or otherwise avoid the existing utility, the owner of the utility shall be notified that the utility must be altered or moved.
- C. In the event that damage shall result to any service pipe for water or gas, or any private or public sewer or conduit, the Contractor shall immediately, and at its own expense, repair same to the satisfaction of the Engineer.
- D. Any contents from the pipes, sewers or conduits shall be immediately removed and disposed in accordance with applicable laws.

3.02 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities and materials, immediately following substantial completion and prior to release of retainage.
- B. Remove underground installations to a minimum depth of 2 feet.
- C. Regrade site to restore to existing slope and elevation, and restore the surface.
- D. Clean and repair damage caused by installation or use of temporary work.
- E. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.
- F. Remove temporary parking and access roads.
- G. Regrade area to existing slope and elevation and restore the surface to its existing condition.
- H. Final payment will not be processed until all removals have been completed to the satisfaction of the Owner/Engineer.

3.03 PROTECTION OF EXISTING PROPERTY

- A. Protect existing structures and finishes during performance of the work.
- B. Protect existing trees and plants during performance of the work.

- C. Do not deposit excavated materials or store materials around trees or plants or attach guy wires to trees.

END OF SECTION 015000

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Prime Electrical Contractor shall install temporary light and electricity for use by others.
- B. Temporary exit signs shall also be installed as work of this Section.
- C. Temporary electricity shall be installed within fifteen (15) calendar days from the date of the pre-construction conference to all areas of the site where new work is planned or where temporary electric facilities are shown on the Contract Drawings, except as specified herein below.
 - 1. Temporary electric shall be installed to the Engineer's trailer within two (2) days from the date that the trailer is on-site and is ready for power as notified by the Engineer.

1.02 TEMPORARY LIGHT AND ELECTRICITY

- A. The Prime Electrical Contractor shall make all necessary arrangements for temporary electric service at the site of the Work.
 - 1. Install all temporary light and power in accordance with the National Electrical Code.
- B. At the Contractor's option, a properly sized generator may be provided during this period with all costs associated with its operation and maintenance being paid for by the Contractor.
- C. Provide wiring and other equipment for temporary light and power in accordance with recognized industry standards.
 - 1. Wiring for temporary light and single-phase power shall, in general, consist of 3 wire, 120/240 volt with branch circuits of #12 conductors minimum.
 - 2. Provide branch circuits with weatherproof medium base type lamp holders for temporary lighting as required to maintain a minimum of 10 foot candles in the work areas of all buildings being constructed or renovated as work of this project.
 - 3. Provide branch circuits with fused ground type receptacle outlet for single-phase power.
 - 4. Provide lamps and fuses, including replacements.
 - 5. Provide new materials for temporary light and power, except that transformers need not be new if they are in satisfactory operating condition.
 - 6. Provide ground fault protection (such as portable plug-in type ground fault circuit interrupters) on single-phase 15 and 20 amp receptacle outlets.
 - 7. Provide receptacle outlets, portable cord connectors and attachment plugs with standard NEMA configurations.
- D. Upon completion of the project, remove all temporary electric light and power work and restore all affected finishes and connections.

1.03 TEMPORARY EXIT SIGNS

- A. Temporary exit signs shall be emergency illuminated type and be wired for operation during a power outage.
- B. Signs shall be installed in locations that require permanent signs where shown on the Drawings.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 015113

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Control of environmental pollution and damage that the Contractor must consider for air, water, and land resources in preparing a bid and while constructing the project. This Section includes management of site aesthetics, noise, solid and liquid waste and wastewater, and other pollutants that may be generated by the Contractor.
- B. Include all costs associated with environmental protection as specified herein and as specified in other Sections of these specifications in the total price bid.

1.02 DEFINITIONS

- A. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
 - 1. Adversely effect human health or welfare,
 - 2. Unfavorably alter ecological balances of importance to human life,
 - 3. Impact wetlands,
 - 4. Effect other species of importance to man, or;
 - 5. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- B. Definitions of Pollutants:
 - 1. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 - 2. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 - 3. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 - 4. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 - 5. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, organic chemicals, and inorganic wastes.
- C. Sanitary Wastes:
 - 1. Sewage: Domestic sanitary sewage and human and animal waste.
 - 2. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this Contract. Confine activities to areas defined by the Contract Documents.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

- C. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this Contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
- D. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
1. Box and protect from damage existing trees and shrubs to remain on the construction site.
 2. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 3. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
- E. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
1. Temporary Protection of Disturbed Areas: Construct diversion ditches and berms to retard and divert runoff from the construction site to protected wetlands areas as defined in the Clean Water Act and federal, state and local regulations.
 2. Erosion and Sedimentation Control Devices:
 - a. Construct or install all temporary and permanent erosion and sedimentation control features as shown or specified in the Contract Documents and as required by the Owner pursuant to direction of the regulatory authority.
 - b. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, hay bales, erosion control fencing, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
 3. Manage borrow areas on and off Owner property to minimize erosion and to prevent sediment from entering nearby property, watercourses and local streets.
 4. Manage and control spoil areas on and off Owner property to limit spoil to areas shown on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby property, watercourses or streets.
 5. Protect adjacent areas from degradation by temporary excavations and embankments.
- F. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment.
1. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule.
 2. Transport all solid waste off Owners' property and dispose of waste in compliance with Federal, State, and local requirements.
 3. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 4. Handle discarded materials other than those included in the solid waste category as directed by the Engineer.
- G. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this Contract.

- H. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
- I. Control movement of materials and equipment during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
- J. Monitor water areas affected by construction.
- K. Protection of Fish and Wildlife Resources:
 - 1. Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife.
 - 2. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.
- L. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources.
 - 1. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State and Federal emission and performance laws and standards.
 - 2. Maintain ambient air quality standards set by the Environmental Protection Agency and State, for those construction operations and activities specified.
- M. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
- N. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinkle, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
- O. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
- P. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- Q. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified in accordance with OSHA and local ordinances, whichever is more restrictive.
 - 1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 5:00 p.m. unless otherwise permitted by local ordinance or by the Engineer.
 - 2. Repetitive impact noise on the property shall not exceed the following dB limitations:
 - 3. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this Contract, consisting of, but not limited to, the following:
 - a. Use shields or other physical barriers to restrict noise transmission.
 - b. Provide soundproof housings or enclosures for noise-producing machinery.
 - c. Use efficient silencers on equipment air intakes.
 - d. Use and maintain efficient intake and exhaust mufflers on internal combustion engines.
 - e. Line hoppers and storage bins with sound deadening material.

- f. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.

END OF SECTION 015719

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes the general requirements for products that are to be furnished, installed, or otherwise incorporated into the project.

1.02 QUALITY ASSURANCE APPLIES TO ALL PRODUCTS

- A. In addition to the Contractor's warranties and guarantees on materials and equipment required under the General Conditions of the Contract and the Technical Specifications contained hereinafter, the Contractor shall also be responsible for all materials, equipment, and products that have or is planned to be incorporated into the work.
 - 1. The Contractor shall be responsible for the finished work and that it accurately and completely complies with these Contract Documents.
 - 2. The Contractor shall be responsible for work performed by subcontractors, equipment suppliers, and material vendors.
 - 3. The Contractor shall be satisfied as to the product's performance before it is ordered for installation. At the Contractor's option, he/she shall have tested each product to determine compliance with these specifications.
- B. The Engineer may check all or any portion of the work and the Contractor shall afford all necessary assistance to the Engineer in carrying out such checks.
 - 1. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.
 - 2. Such checking is a courtesy service being provided by the Owner and does not relieve the Contractor of his/her responsibilities under this Construction Contract.
- C. If witnessed shop tests or inspections are required at the point of manufacture, the Contractor shall keep the Engineer advised as to the progress of the work to allow inspection at the proper time and place. Provide at least two (2) weeks advance notice before scheduled shop tests.
- D. Should a dispute arise as to the quality of workmanship, equipment or material performance, then the final decision regarding acceptability with these Contract Documents shall be that of the Owner.
- E. At the request of the Engineer, the Contractor shall promptly provide the services of a competent representative of the manufacturer at the project site, fully equipped and prepared to answer questions, perform tests, make adjustments and to prove compliance with the Contract Documents free of all additional charges. Proof of compliance shall be the responsibility of the Contractor, and such special visits to the project site by the manufacturer shall not be eligible under any cash allowances or stipulated man-hours necessary to startup the system and/or train the Owner as may be specified in the Technical Specifications.

1.03 QUALITY ASSURANCE - EQUIPMENT

- A. Erect and install products under the supervision of a competent and experienced superintendent. The method of installation, including anchorage, clearances, and tolerances for rotating assemblies, methods of support for equipment and adjacent piping, shall be as recommended by the equipment manufacturer unless detailed on the Drawings or specified.
- B. All material furnished shall be new, and guaranteed free from defects in workmanship, installation, and design.
- C. Design and fabricate equipment in conformance with ANSI, ASTM, ASME, ASHRAE, IEEE, NEC and NEMA Standards.

1. Equipment shall withstand the stresses that may occur during fabrication, testing, transportation, installation and conditions of operation.
 2. Pumps shall conform to the requirements of the Hydraulic Institute.
 3. Equipment shall comply with the latest OSHA regulations and the ANSI Safety Standards.
- D. Equipment shall be products of manufacturers who produce evidence of their ability to promptly furnish any and all interchangeable replacement parts as may be needed at any time within the expected life of the equipment.
- E. Manufacturers shall also have readily available access to suitable and accurate testing facilities for performing the required shop tests.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Equipment shall have been in successful regular operation under comparable conditions for a period of at least five (5) years.
1. This time requirement does not apply when the manufacturer posts an Owner/Engineer acceptable Performance Bond or Letter of Credit for the duration of the time period that will guarantee replacement of the equipment in the event of failure.
 2. The bond shall be in a form that is acceptable to the Owner's legal council.
- B. The Owner reserves the right to reject any material or equipment manufacturer who, although he appears to be qualified and meets the technical requirements, does not provide satisfactory evidence indicating adequate and prompt post-installation repair and maintenance service, as required to suit the operational requirements of the Owner.
- C. Whenever it is required that the Contractor furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable on the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required.
- D. Perform work in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.
- E. Items of any one type of material or equipment shall be the product of a single manufacturer.
1. For ease of the Owner in maintaining and obtaining service for equipment and for obtaining spare parts from as few places as possible, to the maximum extent possible, use equipment of a single manufacturer.
 2. The Engineer reserves the right to reject any equipment from various manufacturers if suitable equipment can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.
- F. Substitute equipment shall not be fabricated nor installed until after written decision to accept request is received from the Engineer.

2.02 CONTROL PANELS, MCC'S AND SWITCHBOARDS

- A. All control panels, motor control centers, and switchboards shall be fabricated with pilot lights, selector switches, PLC, graphics display panels, elapsed time meters and other components that shall match.
1. This does not require that all components be one manufacturer, but does require that the like components be of the same manufacturer.

2. The Contractor shall coordinate the shop drawing submittals to indicate that all components have been selected on this basis.
 3. This requires the Contractor to advise each control panel supplier that product options are limited in this regard.
- B. Replacement of unlike products delivered to the job site shall be the responsibility of the Contractor.
- C. All costs associated with the replacement shall be borne by the Contractor.

2.03 NAMEPLATES

- A. Each unit of equipment shall have the manufacturer's name or trademark on a stainless steel nameplate securely affixed in a conspicuous place.
- B. The manufacturer's name or trademark may be cast integrally with stamp, or otherwise permanently marked upon the item of equipment.
- C. Such other information as the manufacturer may consider necessary for complete identification shall be shown on the nameplate.

2.04 FABRICATIONS

- A. Insofar as possible, shop prefabricate all items complete and ready for installation.
- B. Accurately fabricate all items to the details shown on the Drawings and on the shop drawings found in compliance with the Contract Documents.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to work under any Section, carefully inspect the work of all other prime trades and verify that all such work is in conformance with the Contract Documents and is complete to the point where the work under that Section may properly commence.
- B. Avoid the need to remove and replace work and to avoid unnecessary cutting and patching.
- C. Inspect all surfaces to be sure that they have been properly prepared before applying new work to such surfaces.
- D. Verify that all work can be installed in strict accordance with the drawings and the approved shop drawings. Immediately report discrepancies to Engineer.
- E. Do not proceed with the work under any Section until these conditions are obtained.

3.02 INSTALLATION

- A. Furnish and install materials and equipment in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise provided in the Contract Documents.
- B. All work shall be done in a workmanlike manner and set to proper lines and grades. The work shall be square, plumb and/or level as the case may be.

- C. Where performance criteria are specified, do all work necessary to attain the required end results.

3.03 FIELD QUALITY CONTROL

- A. Neither observations by Engineer nor inspections, tests or approvals by other persons shall relieve the Contractor from his obligations to perform the work in accordance with the requirements of the Contract Documents.
- B. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested or approved by some public body, the Contractor shall assume full responsibility therefore, pay all costs in connection therewith, and furnish the Engineer with the required certificates of inspection, testing or approval.
- C. The Owner reserves the right to independently perform laboratory tests on random samples of material or performance tests on equipment delivered to the site.
 - 1. These tests, if made, will be conducted in accordance with the appropriate referenced standards or specification requirements.
 - 2. The entire shipment represented by a given sample, samples or piece of equipment may be rejected on the basis of the failure of samples or pieces of equipment to meet specified test requirements.
 - 3. All rejected materials or equipment shall be removed from the site, whether stored or installed in the work, and the required replacements shall be made, all at no additional cost to Owner.

3.04 ADJUST AND CLEAN

- A. Upon the completion of installations, and as a condition of its acceptance, visually inspect all work, adjust all components for proper alignment and touch-up abrasions and scratches to make them completely invisible.
- B. Thoroughly examine all materials and equipment with protective or decorative finishes for defects and damage prior to being covered.
 - 1. In the case of buried items of work, restore protective surface covers so as to conform to the Contract Documents prior to being backfilled, buried or embedded, as the case may be.
 - 2. In the case of exposed items of work, for which a decorative finish is required, all scratches, discoloration's, unmatched colors, disfigurements and damages shall be repaired and touched-up so as to provide a neat, clean finish, and be uniform in color.

3.05 UNCOVERING WORK

- A. Unless otherwise specified or directed by Engineer, no work shall be covered until it has been observed, tested, photographed, measured, and authorized to be covered by Engineer.
- B. Tie distances to above ground physical structures as reference points to all underground utilities, conduits, pits, manholes, valves, and pipelines shall be obtained by the Contractor prior to covering the work. Immediately comply with the Engineer's direction to uncover the work if tie distances were not obtained.
- C. If any work has been covered with Engineer's consent and Engineer considers it necessary or advisable that covered work be observed or tested, the Contractor, at Engineer's request, shall uncover, expose or otherwise make available for observation, or testing as Engineer may

require, that portion of the work in question, furnishing all necessary labor, material and equipment.

1. If it is found that such work is defective, the Contractor shall bear all the expenses of such uncovering, exposure, observation, and testing of satisfactory reconstruction, including compensation for additional engineering services and an appropriate deductive change order shall be issued.
2. If, however, such work is not found to be defective, the Contractor shall be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, testing and reconstruction if he makes a claim therefore as provided in the General Conditions.

3.06 DEFECTIVE WORK

- A. The repair, removal, replacement and correction of defective work is a part of this Contract and shall be promptly performed in accordance with the requirements set forth in the General Conditions or other portions of the Contract Documents. All costs in connection with the correction of defective work shall be borne by the Contractor.
- B. Products that fail to maintain the performance or other salient requirements of the Contract Documents, shows undue wear, or other deleterious effects during the maintenance period, shall be considered defective.

END OF SECTION 016100

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Section includes the transportation, handling, storage and protection of products that are to be incorporated into the work.
- B. The procedures for turning equipment over to the Owner for installation by others is also included herein.

1.02 GENERAL

- A. Items shall be delivered as complete assemblies direct from the manufacturer with all internal wiring, piping, valving, and control devices intact except where partial disassembly is required by transportation regulations, protection of components, or where physical constraints may exist or be created for the setting of the item.
- B. Coordinate the disassembly and reassembly requirements with the manufacturer. Determine the need and extent of reassembly prior to bid.
 - 1. All labor, material and equipment costs associated with the disassembly and reassembly of the product shall be included in the Contract Price.
 - 2. Where reassembly of equipment is necessary, then the manufacturer shall provide reassembly instruction at the project site.
 - 3. A technician shall be present during the entire reassembly procedure and the manufacturer shall certify, in writing, that the unit was reassembled properly in accordance with instructions provided by the manufacturer and that all as-specified warranties remain in effect.
 - 4. The manufacturer's reassembly inspection time shall be in addition to the field service time specified and shall be included in the Contract Price. This time shall not be eligible for payment under any cash allowance item.
- C. In the case where equipment is to be installed by others, then the supplying contractor shall be responsible for its reassembly. If reassembly is necessary and the unit(s) are to be set inside an enclosure or building, reassemble the equipment inside said enclosure. The equipment once reassembled shall be turned over to the installing contractor as specified below.

1.03 PACKING

- A. Transport products in containers, crates, boxes or similar means such that the products are protected against damage that may occur during transportation.
- B. All parts shall be packaged separately or in container where parts of similar systems are grouped.
- C. Part numbers shall be indicated on the individual part. Use indelible ink to mark part numbers.
- D. All equipment shipments shall be included with a parts list showing a description (name) of the part and the manufacturer's part number.
 - 1. The parts list shall be shipped in a plastic zippered envelope with the words "Parts List" lettered on it in indelible ink.
 - 2. The parts list shall be placed inside the shipping container so that it is on the top of the contents.
- E. Equipment shall be shipped with storage, handling and installation instructions.

1. The Engineer reserves the right to withhold payment for equipment delivered to the site until such time as the storage, handling and installation instructions are supplied by the manufacturer.
 2. In the case where operation and maintenance manuals have been provided by the manufacturer, which includes the installation instructions, then the installation instructions shall also be included with the equipment shipment.
- F. All control panels shall be wood crated.
1. All sides of the control panel shall be covered with 3/4" plywood.
 2. The control panel number or name shall be printed on all sides of the crate in 1' high black lettering.
 3. The manufacturer's name, Contractor's name and project name shall also be printed on the front of the crate.
 4. All control panels and centers shall be packaged with three (3) copies of the approved wiring diagram inside the control panel enclosure in a separate plan holder attached to the inside door. The words "APPROVED FOR CONSTRUCTION" shall be indicated on each page of the wiring diagram.
- G. Delicate instruments and devices, reagents, chemicals, and glassware shall be shipped in packaging normally provided by the manufacturer.
- H. The Contractor shall require the manufacturer to be responsible for the proper packing of all products.

1.04 SHIPPING AND DELIVERY

- A. Product deliveries shall be accompanied with a bill of lading indicating the place of origination and the Contractor's purchase order number.
- B. Inspect shipments immediately upon delivery, to assure compliance with requirements of the Contract Documents and those products are undamaged.
- C. Promptly remove damaged material and unsuitable items from the job site.
- D. Provide equipment and personnel to handle products by methods to prevent soiling; disfigurement or damage.

1.05 STORAGE

- A. Store sensitive products and all spare parts in weather tight, climate controlled enclosures in an environment favorable to product.
- B. Store and protect products in accordance with the manufacturer's instructions.
- C. All other products that are to be installed underground or products such as pipe, valves, and fittings shall be stored outdoors but shall be blocked off the ground and covered with impervious sheet coverings.
- D. Store fabricated products above the ground on blocking or skids.
- E. Store loose granular materials in well-drained areas on solid surfaces to prevent mixing with foreign matter.
- F. Provide adequate ventilation to avoid condensation.

- G. In accordance with manufacturer's instructions protect bearings, couplings, shafts, rotating components, and assemblies. Protection of said equipment shall be continuous until the time the equipment is placed into permanent service.
- H. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- I. Do not store volatile liquids in any building on site.
- J. Storage of products shall be the responsibility of the supplying contractor. The installing contractor shall take all necessary precautions to protect the equipment being furnished by others.
- K. Store with seals and labels intact and legible.

1.06 EQUIPMENT INSTALLED BY OTHERS

- A. All products, except products noted on the Drawings or specified, shall be furnished and installed under this Contract.
 - 1. Only noted or specified products shall be furnished under this Contract for installation by others.
 - 2. If it is not noted on the Drawings or specified, then the product shall be furnished and installed under the Contract.
- B. The Contractor shall furnish these products to the Owner. These products shall be stored as specified above.
- C. The Owner will then advise the installing contractor that the product(s) are ready for installation.
 - 1. In the case where the product is stored in a proper enclosure, but not stored inside the building to be constructed under this project, then the installing contractor shall move the product into the building to a location adjacent to the final location shown on the Drawings.
 - 2. In all cases, the installing contractor shall be responsible for moving from storage, uncrating, anchoring, mounting and installing the product as required by the Contract Documents.
- D. The Contractor and installing contractor(s) shall be present at the time the equipment is turned over to the Owner. Immediately thereafter, the Owner will turn the product over to the installing contractor for installation.
- E. The Owner, Contractor, Engineer and the installing contractor shall inspect the condition of the product at this time.
 - 1. Any defects in the product will be noted and the Contractor will be advised to make all repairs immediately.
 - 2. The installing contractor shall still be required to install the product if the damage is deemed cosmetic by the Engineer.
 - 3. The manufacturer's installation instructions or wiring diagram shall be turned over to the installing contractor at this time by the Contractor.
 - 4. Any damage occurring to the product during moving, setting and mounting the unit(s) shall be the responsibility of the installing contractor.
 - 5. The Contractor is advised to take photographs to document the condition prior to it being turned over to the installing contractor.
 - 6. The installing contractor is advised to take photographs to document the condition prior to its acceptance.

- F. The supplied unit(s) remain the property of the Contractor until final acceptance of the work.
- G. Any damage caused to the unit(s) due to improper installation, workmanship, and non-compliance with the manufacturer's written installation instructions shall be the responsibility of the contractor who caused said damage. The burden of proof shall rest with the supplying Contractor.
- H. In the event the Contractor discovers misuse, abuse or improper installation of the unit(s) by the installing contractor, then he shall immediately notify the Engineer in writing. The Engineer will investigate the accusations and make a determination. The Engineer's determination shall be binding and agreed to by both parties.
- I. If the Engineer's determination substantiates the accusations of the Contractor, then the Contractor shall install the unit(s), the costs for which will be paid for as extra work. All costs associated with the extra work change order, including engineering and attorney fees of the Owner and Contractor will be deducted from money due the installing contractor.

1.07 PROTECTION OF WORK

- A. The Contractor shall protect the installed work. All costs for protection shall be borne by the Contractor. Provide coverings as necessary to protect installed products from damage, from traffic and subsequent construction operations. Remove when no longer needed.
- B. Cover and protect equipment from dust, moisture or physical damage. Protect finished floor surfaces prior to allowing equipment or materials to be moved over such surfaces. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.
- C. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify any extension in the Contract Time of Completion. In the event of the damage, promptly make replacement and repairs to the approval of the Engineer at no additional costs.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 016500

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Cleaning during the progress of the work
- B. Cleaning prior to final payment

1.02 SCHEDULING

- A. Sequence, schedule, and coordinate final cleaning work with the final cleaning work to be performed by other contractors.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning materials shall be appropriate to the surface and materials being cleaned.
- B. Provide pads to protect finished surfaces from cleaning materials.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

- A. Keep all buildings, enclosures, and confined areas where work is being performed under the Contract free from unattended combustible materials.
- B. Remove rust spots as they develop.

3.02 FINAL CLEANING

- A. Remove dust, dirt, grease, stains, paint drips and runs, plastic, labels, tape, glue, rope, and other foreign materials from visible interior and exterior surfaces.
- B. Do not move dust from spot to spot. Remove directly from the surface on which it lies by the most effective mean such as appropriately treated dusting cloths or vacuum tools. When doing high cleaning, do not allow dust to fall from high areas onto furniture and equipment below.
- C. Dismantle and remove all temporary structures, scaffolding, fencing, and equipment. Remove waste materials, rubbish, lumber, block, tools, machinery, and surplus materials.
- D. Perform the following prior to final payment:
 - 1. Broom clean all exterior concrete surfaces and vacuum clean all interior concrete surfaces.
 - 2. Dust and spot clean painted and vinyl covered walls.
 - 3. Clean and polish all unpainted metal on doors such as trim, hardware, kickplates and doorknobs.
 - 4. Vacuum clean acoustic ceilings.
 - 5. Repair, patch, and touch-up marred surfaces to specified finish and to match adjacent surfaces.
 - 6. Remove foreign material from brick.
 - 7. Replace all broken and scratched glass and mirrors.
 - 8. Replace all damaged insect screens.

9. Wash and clean interior and exterior window surfaces. All glass shall be clean and free of dirt, grime, streaks and excessive moisture. Wipe drippings and other marks from windowsills, sashes and woodwork. Do not use windowsills in lieu of ladders.
10. Polish bright metal by damp wiping and drying with a suitable cloth. If a polished appearance is not thereby produced, apply appropriate metal polish.
11. Clean and polish all stainless steel surfaces, including control panels supplied under this Contract.
12. Clean all paved roads, lots and drives which were paved as work under this Contract and all existing paved surfaces using a mechanical street cleaner.
13. Repair or repaint damaged pavement markings.
14. Vacuum and clean with a damp cloth light fixtures, including glass and plastic lenses, ceiling and wall mounted lights, cover panels, side panels, louvers, fixture frames and lamps.
15. Clean supply vents and exhaust grilles. Clean gutters and downspouts.
16. Remove all rust spots and stains from new and pre-existing concrete, painted surfaces, and all other surfaces.
17. Wash all existing floors that were in any way impacted by the construction operations.
18. Inspect interior and exterior surfaces, and all work areas, to verify that the entire work is clean and ready for use by the Owner. The project will not be considered substantially complete until all final cleaning has been performed.
19. Clean dirt that has accumulated between grating and grating angles/supports.
20. Vacuum the inside of all control panels provided under this Contract after the panel has been wired.
21. Pressure wash curbs, walks and concrete platforms on new and existing process tankage.
22. Thoroughly clean all pits, galleries, manholes, pipes, channels, tanks, wells and all structures entered upon.

END OF SECTION 017423

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the following:
 - 1. Starting systems
 - 2. Testing, adjusting, and balancing
 - 3. Updating of manufacturer's operations and maintenance manuals and wiring diagrams
- B. Work of this Section also includes stipulated man-hours that shall be provided by the **Prime Electrical Construction Contractor** for startup participation of equipment and systems.

1.02 STARTING SYSTEMS

- A. The Contractor shall coordinate, schedule, and sequence the start-up of various equipment and systems.
- B. Where the start-up of a system or piece of equipment is dependent upon the start-up of other system(s) or equipment, then the Contractor shall schedule and sequence the start-ups to coincide.
- C. Notify the Engineer at least 14 calendar days prior to the start-up of each item or system so that he can schedule the startup with the Owner, utilities, and other Prime Contractors.
- D. Where applicable, verify that each piece of equipment or system has been checked for proper:
 - 1. lubrication,
 - 2. drive rotation,
 - 3. belt tension,
 - 4. motor starter heater size,
 - 5. fuse size,
 - 6. water pressures,
 - 7. terminal connections,
 - 8. control sequence,
 - 9. for conditions which may cause damage or delay the start-up procedure.
- E. Verify that the equipment has been installed in accordance with the manufacturer's requirements.
- F. Complete all pre-startup checklists that may be required by the system vendor.
 - 1. In the event that start-up activities are delayed as a result of the Contractor's failure to properly check the completed installation and a manufacturer's representative is on the job site waiting for corrections to be made, then the Engineer may, at his/her sole discretion, postpone start-up until such time as the corrections have been made without any extra costs.
 - 2. The Owner may deduct from money due the Contractor the excess cost of engineering associated with having the Engineer present during the start-up.
 - 3. The deduction shall be equal to the Engineer's effective billing rate times the total number of hours delayed during the start-up activities.
- G. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- H. Verify that wiring and support components for equipment are complete and tested.
- I. Execute start-up under supervision of applicable Contractor's personnel in accordance with manufacturer's instructions.

J. The Contractor shall have the job site superintendent present during all start-up activities.

K. Provide manufacturer's authorized technician at the site when specified and in accordance with the requirements contained in Section 014500 - Quality Control.

L. Submit manufacturer's start-up reports (MSR's) in accordance with Section 013300.

1.03 STIPULATED STARTUP PARTICIPATION FOR PRIME ELECTRICAL CONSTRUCTION
CONTRACTOR

A. The **Electrical Construction Contractor** shall provide the services of the job site foreman or superintendent who shall participate in the startup of equipment or systems that were furnished by others so as to achieve proper and sustained service.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017500

PART 1 - GENERAL

1.01 SUMMARY

- A. Testing of piping.
- B. Pipe leakage testing shall comply with the conditions noted in the Schedule.

1.02 DEFINITIONS

- A. Leakage (or exfiltration) - The quantity of water to be supplied into the newly laid pipe, any valved section thereof, manhole, or other appurtenance, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
- B. Infiltration - The quantity of water that enters into any pipe, manhole, or other appurtenance when the static groundwater elevation is at the maximum elevation above the pipe or appurtenance as specified hereinafter.

1.03 QUALITY ASSURANCE

- A. Prior to Substantial Completion, pressure pipes and non-pressure pipes shall meet specific leakage requirements. These leakage requirements shall be satisfied by the basic materials alone. Where joint fillers and the like have been specified, primarily to protect jointing materials, and secondarily to provide a factor of safety, they shall not be applied until after leakage tests have been completed and have been accepted by Engineer.
- B. Engineer will witness tests. Tests not witnessed will be considered as not having been performed.
- C. Do not close or cover up work until it has been observed for proper and satisfactory construction and installation in compliance with the Contract Documents. Should incomplete or unacceptable work be covered, the Contractor shall, at his/her own expense, uncover all work so that it may be properly observed. After such observations, repair and replace the work that was found defective, unsatisfactory, and not in accordance with the Contract Documents. After such repair and replacement, bring all work to completeness and status as it was before it was closed and covered, all at the Contractor's own expense. Submit for review and approval proposed corrective action to correct failed systems.
- D. Successful completion of required tests shall be in no way interpreted as relieving the Contractor of responsibility for defects that become apparent subsequent to the time of testing. It shall be the sole right of the Engineer to determine whether defects exist. Retest all portions of the work deemed necessary by the Engineer prior to Substantial Completion.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Provide details and specifications on testing apparatus.
- C. Provide certified test results on forms approved by the Engineer.

1.05 SEQUENCING AND SCHEDULING

- A. Notify Engineer and governing agencies, if necessary, at least 48 hours in advance of a scheduled test so that the test may be witnessed.
- B. Test underground pipe after backfilling.

- C. At Engineer's discretion, additional sections of pipelines may be required to be tested as soon as pipe is laid and prior to backfilling when working conditions or the standard of workmanship have been altered.

PART 2 - PRODUCTS

2.01 TESTING APPARATUS

- A. Provide labor, plugs, measuring equipment, and other apparatus, complete, to perform testing.
- B. Provide clean water, air, nitrogen, and other materials as required to accomplish testing.
- C. Provide plugs and caps capable of withstanding test pressures.
- D. Provide temporary flanges, plugs, bulkheads, thrust blocks, weighing, bracing and other items necessary to prevent joints from separating, and to prevent injuries or damage.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Plug open ends, adequately block bends, tees, ends, and other fittings, and do whatever is necessary to brace piping system so that it will safely withstand the pressures developed under the tests and so that no damage or injury shall occur to the pipeline, people or property.
- B. Before tests are conducted, isolate, or remove any regulator, gauge, trap, or other apparatus or equipment that may be damaged by test pressures.

3.02 GENERAL

- A. Trapped Air: Trapped air may cause a false indication of the rate of leakage. Points of concern include ends of lines, stubs, house connections and high points in pipelines. No credit will be made for this condition and no adjustment will be made to the allowable leakage. When trapped air is suspected of causing a test failure, do whatever is necessary to evacuate the air and repeat tests until the actual leakage is equal to or less than allowable rate of leakage.
- B. Water Absorption: No credit will be given for absorption of water in pipe and manhole walls. If necessary, fill pipes and manholes with water well in advance of testing and allow them to soak in order to eliminate or minimize the effects of absorption.

3.03 TESTS FOR NON-PRESSURE PIPING

- A. General:
 - 1. Leakage shall be determined by exfiltration testing. The Engineer reserves the right to also require infiltration testing.
 - 2. Air testing is not permitted.
 - 3. Leakage testing shall include the main non-pressure pipe, house connections, and appurtenances on the section of pipeline being tested.
 - 4. Limit pipeline test sections to runs between adjacent structures. Manholes may be tested simultaneously with pipes.
 - 5. Adequately plug ends of house connections, stubs, and openings from which water may escape.
 - 6. Use clean water for exfiltration tests.
 - 7. Determine groundwater levels by installing piezometers, test holes or test pits at intervals not to exceed 1,000 feet.

B. Pipe Exfiltration Test:

1. The minimum water level required for testing is 4 feet above the crown of the upstream (highest) end of the pipe being tested or 2 feet above the maximum groundwater level along the test section, whichever is greater.
2. Install a watertight plug in the downstream end of the pipe.
3. Fill upstream manhole with water and conduct test for six (6) hours.
4. Upon satisfactorily completing the test, remove the downstream plug in the presence of Engineer. Do not touch nor remove anything until approved by Engineer.
5. Maximum allowable exfiltration is one hundred (100) gallons per inch diameter per mile per day.

3.04 TESTS FOR PRESSURE PIPES

- A. Leakage testing shall include the main exiting pipe, service connections, and other appurtenances on the section of pipeline being tested.
- B. Test pipes prior to applying insulation and before they are concealed or furred-in.
- C. Provide all necessary gauges. Gauges shall be standard pressure type with a minimum 6 inch diameter dial and a pressure range not in excess of 150% of the maximum required test pressure.
- D. Provide and maintain at the site a gauge stand with an approved laboratory calibrated test gauge. Periodically check test gauge used for testing against the test gauge, and whenever requested by Engineer.
- E. Where it is necessary for testing, tap pipes and insert approved plugs after testing is completed.
- F. Provide a hand or motor driven compressor to maintain the required test pressure constant throughout the duration of the test. If a water pump is used, pump water from a container with a known volume of water. If an air or inert gas pump is used, leakage shall be determined and calculated by the cycling of the pump.
- G. Provide test gauges at each end of the line being tested.
- H. Conduct leakage test in accordance with the requirements contained in the Schedule.

3.05 ALLOWABLE LEAKAGE

- A. The maximum allowable leakage for the various piping systems is presented in the schedule.
- B. It is the intent of this Contract to secure piping systems without leakage.
 1. Each section of pipe and within each structure shall not exceed the allowable leakage.
 2. It is also the intent to secure a piping system free from visible drips, streams and leaks. Therefore, even if a portion of the system meets the requirements for allowable leakage, visible leaks are not permitted and shall be repaired.
- C. Leakage tests will be considered satisfactorily passed when the rate of leakage is equal to or less than the stipulated allowances, there is no evidence of visible leaks, and there is no evidence of other system defects.

3.06 RETESTING

- A. Pipes, tanks and manholes not passing the tests shall have all defects corrected with methods approved by the Engineer to the inspection and satisfaction of Engineer, and shall be retested and re-corrected as often as is necessary until the test requirements have been met.
- B. It is the intent of this Contract to obtain work meeting test requirements on their own and solely through the use of the normal integral sealing components.
 - 1. Joint leaks shall not be stopped using concrete, caulking, mortar, or other patching materials.
 - 2. Leaking pipe joints shall be re-jointed and leaking manhole joints shall have joints reset, or replaced if necessary.
- C. Methods other than rejoining, resetting or replacing joint seals shall require the written approval of Engineer.

3.07 SCHEDULE

LEAKAGE TESTING REQUIREMENTS

SERVICE	FLUID	PRESSURE	DURATION (HRS.)	ALLOWABLE LEAKAGE (NOTE 1)		
				UNDERGROUND		EXPOSED
				INFIL.	EXFIL.	
NON-PRESSURE PIPING	WATER	4FT.	6	100	100	NONE
PRESSURE PIPING	WATER	(NOTE 2)	(NOTE 2)	0	0	0

SCHEDULE NOTES:

- 1. Maximum allowable leakage in gallons/day/inch diameter/mile of pipe, or gallons/day/inch diameter/mile for manholes. Where a percentage is shown, the loss shall not exceed the percentage of the starting test pressure.
- 2. Maintain 200 psi or two times operating pressure, whichever is greater, for 2 hours.

END OF SECTION 017550

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Submit the following documents to the Engineer before Substantial Completion:
 - 1. Project Record Documents as specified in Section 017839.
 - 2. Operations and Maintenance Manuals prepared in accordance with Section 017823 and be updated as a result of start-up activities.
 - 3. Manufacturer's Start-up Reports (MSR's) for all equipment and systems where manufacturer field time is specified.
 - a. Each MSR shall be signed by the field technician(s) who attended the start-up.
 - b. If the manufacturer is taking exception to the installation or if the warranty is voided, he shall provide a statement to that effect and provide reasons and justification to explain the company's position.
 - 4. One binder containing original counterparts of all warranties, guarantees, bonds, or affidavits as specified in the Technical Specification Sections. These documents shall contain the original signatures and be placed in a plastic sheet protector, one document per protector.
 - 5. Spare parts checklist itemizing all spare parts furnished under the Contract summarized by Section.
 - 6. Electrical Underwriter's Certificate where the prime construction contract includes electrical construction or where this Contract is for a Prime Electrical Construction Contract.
- B. Submit the following items to the Engineer with the final application for payment:
 - 1. Final Application for Payment prepared by the Engineer for Contractor's execution showing final amount of Contract including change orders.
 - 2. Maintenance Bond prepared in accordance with the Contract or General Conditions.
 - 3. Utility company signoffs and inspection approvals, if applicable.
 - 4. Federal, state, county, town and local signoffs and inspection approvals, where applicable.
- C. All documents shall be complete, signed, dated, and notarized (where applicable) and be subject to the Engineer's acknowledgment of receipt or approval.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017800

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for Operations and Maintenance Manuals required to be prepared by system suppliers and equipment manufacturers.
- B. The Contractor shall submit Operations and Maintenance Manuals for all equipment.
- C. Where the technical specifications call for the submission of manuals, said manuals shall be prepared in accordance with the requirements contained herein. It being understood that manuals shall be submitted for all equipment even if it is not specifically called out in the specifications.

1.02 MANUAL CONTENTS AND FORMAT

- A. All paper Operations and Maintenance Manuals shall be as specified hereinafter.
- B. The binder shall be 8 1/2" x 11", metal hinge, vinyl, large capacity by National or Equal. It shall show the name of the manufacturer or supplier and project name on the spine of the binder.
- C. A cover shall be provided showing the names of the Owner, Engineer, Contractor, and Manufacturer.
 - 1. It shall show the Contractor's order number and manufacturer's project number.
 - 2. The address of the manufacturer, service station telephone number, project title, contract number, and year shall also be shown.
- D. Provide tabbed color dividers for each separate product and system.
 - 1. The name of the product shall be typed on the tab.
 - 2. A separate tab shall also be provided for information such as troubleshooting instructions, spare parts list, etc.
- E. An index shall be provided in the back of the binder, with a separate tab, providing a quick way for the operator to find key and important topics contained in the manual.
- F. A separate listing for all charts, graphs, tables, figures and shop drawings shall be provided directly following the table of contents.
- G. Each manual shall contain one (1) copy of all shop drawings deemed in compliance with the Contract Documents by the Engineer submitted for the equipment or system for which the manual is prepared.
 - 1. Only these shop drawings shall be included in the manual.
 - 2. All shop drawings larger than 8 1/2" x 11" shall be folded and placed in a heavy duty, top loading plastic sheet protector with the title of the drawing showing; one (1) drawing per protector page.
- H. For systems being furnished with control panels, each manual shall contain a catalog cut for every electrical device installed inside the control panel or motor control center.
- I. Where manuals are prepared for treatment systems for water, a process chapter, written in plain language for the operators, shall be prepared by the manufacturer providing the following:
 - 1. A general discussion regarding the theory of the process.
 - 2. A specific discussion relating the theory to the project as designed and constructed. Provide capacities, sizes, loading rates, application criteria, design values, and design assumptions.
 - 3. Provide model numbers for equipment comprising the system.

4. Provide figures, tables, and graphs to assist the operator in understanding the operation of the treatment system.
 5. Where operator interfaces are provided, provide step-by-step instructions for changing a process control variable such as set points.
 - a. The instructions shall be numbered and written such as "press", "hold" "scroll", etc.
 - b. Each operator interface instruction sheet shall be laminated and placed in the binder.
 - c. Another laminated sheet shall be provided and placed inside the control panel.
- J. Each manual shall contain the following as a minimum:
1. Table of contents
 2. Final version of the warranty statement approved by the Engineer
 3. Nameplate data of each component, year of installation, contract number and specification number
 4. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s)
 5. Installation instructions
 6. Operation instructions including adjustments, the interrelation of components and the control sequence describing break-in, start-up, operation and shutdown
 7. Emergency operating instructions and capabilities
 8. Maintenance requirements include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair and reassembly instructions; and alignment, adjusting, balancing, and checking instructions
 9. Troubleshooting guide and corrective maintenance (repair) procedures for all electrical and mechanical equipment. These guides shall list the most frequent and common problems, together with the symptoms, possible causes of the trouble, and remedies
 10. Drawings (pictures or exploded views) which clearly depict and identify each part, suitable for assembly and disassembly of entire system and each component
 11. Wiring and control diagrams, if applicable
 12. Panelboard circuit directories including electrical service characteristics, if applicable
 13. Part list with current prices; ordering information; and recommended quantities of spare parts to be maintained in storage
 14. Charts of valve tag numbers, with location and function of each valve, keyed to the process and instrumentation diagram prepared as part of the Contract Documents
 15. Name, address, and telephone number of nearest parts supply house and nearest authorized repair service center.
 16. List of recommended spare parts and the recommended number of each per unit and per group of units.
- K. All electronic Operations and Maintenance Manuals shall be as specified hereinafter.
1. All files shall be in Adobe PDF format and submitted on compact discs.
 2. Files shall be organized by specification section and then by product.
 3. An electronic index and list of all charts, graphs, tables, figures, and shop drawings shall be included.
 4. All information provided in the paper Operations and Maintenance Manual shall be included in the electronic version.
- L. Submit one (1) copy of a preliminary draft manual at least fourteen (14) calendar days prior to the date set for start-up.
1. The Engineer will review the manual for content and compliance with these specifications.
 2. Written comments will be provided, but the manual will not be returned.
 3. The manual will be used at start-up, to record changes that should be made to the final manual.
 4. The manual will be retained on the site until such time as the final, updated manual is provided.

- M. Two (2) weeks after the date the unit was placed into service and the Owner has gained beneficial use, submit five (5) paper copies and two (2) electronic copies of the final updated Operations and Maintenance Manual. Refer to Section 017500 - Starting and Adjusting for requirements related to updating the manual(s).
- N. Where installation instructions are not included with the manual, they shall be shipped at least ten (10) days prior to the date the equipment is scheduled for installation.

1.03 RETAINAGE

- A. The Engineer will retain from payment due the Contractor, for failure to submit manuals as specified, an amount equal to 2% of the scheduled value for the equipment or system for which the manual applies. This Contract requirement only applies when a manual is specified to be provided in the Technical Specifications for a particular system or piece of equipment.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017823

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes:
 - 1. Maintenance of documents
 - 2. Recording of record information
 - 3. Submission of record documents
- B. Work of this section also includes the furnishing of underground pipeline documentation.

1.02 PLANS AND SPECIFICATIONS FURNISHED TO THE CONTRACTOR

- A. One (1) complete set of Contract Documents (plans, specifications and addenda) will be furnished to the Contractor in electronic portable document format (PDF).

1.03 MAINTENANCE OF DOCUMENTS

- A. The Contractor shall maintain at the site one (1) set of the following: drawings, specifications, addenda, change orders, approved shop drawings, test reports, operations and maintenance manuals, and shop drawing log.
- B. The Contractor shall make these documents available for use by the Owner, Engineer, regulatory agencies and other parties designated by the Owner.
- C. Provide a drawing rack for storage of plans.
- D. Maintain these documents in a clean, dry, legible condition throughout the entire contract period.

1.04 RECORDING OF RECORD INFORMATION

- A. Affix a stamp to each Contract Drawing and Shop Drawing reading as follows: "RECORD DOCUMENT" - "NAME OF PROJECT" - "CONTRACTOR NAME" in 2-inch high printed letters. The stamp shall be specifically prepared for this project.
- B. Keep the record documents current as the work progresses. Record information concurrent with construction progress.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Legibly mark the Contract Plans to record actual construction, including, but not limited to the following:
 - 1. All as-built work.
 - 2. All approved field changes and conditions.
 - 3. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 4. Location of underground conduits, boxes, devices. Wire sizes (AWG) and types installed. Number of active and spare wires in each conduit and conduit size (applicable where work involves electrical construction).
 - 5. Tied-down location of all underground process lines and buried valves.
- E. Shop Drawings: Maintain as record documents. Legibly mark-up to show changes made due to field conditions encountered during construction.

1.05 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. The General Plumbing Contractor shall on completion of major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction, site work and underground facilities installed as work of Contract P.
- C. The Contractor's surveyor site drawings shall also show the location of property line perimeter fence. The property line of the site shall be indicated on the plans.

1.06 SUBMITTAL OF RECORD DOCUMENTS

- A. The Contractor shall deliver to the Engineer three (3) full-size sets of drawings and one (1) PDF electronic copy detailing as-built chemical treatment installations, one (1) month prior to the date of startup of the plant site as outlined in the construction schedule. These shall be submitted to the Health Department by the Engineer for certification of installation and inspection. Drawings shall be submitted by the Contractor to the Engineer in accordance with the requirements of this Section.
- B. At Substantial Completion, the Contractor shall deliver one (1) preliminary record set of as-built documents to the Engineer with all changes conspicuously ballooned or otherwise emphasized.
- C. The work will not be considered substantially complete until such time as the preliminary record documents are delivered and acceptable to the Engineer. Mark this set "Preliminary Record Drawings".
- D. Prior to Final Completion, the Contractor shall conform the preliminary record drawings to the comments made by the Engineer. The Contractor shall provide one (1) set of full-scale paper as-built drawings and one (1) electronic copy in portable document format (PDF).
- E. As-built drawings shall be the same size as the Contract Drawings, with 1/2-inch margins space on three sides and a 2-inch margin on the left side for binding.
- F. Each drawing shall bear in the title box the words "FINAL RECORD DRAWINGS" and the name of the Contractor in heavy black lettering 1/2 inch high and be certified as complete and accurate.
- G. As a convenience, Engineer will make available to the Contractor electronic media of the Contract Drawings for the sole purpose of the Contractor preparing as-built drawings.
- H. Electronic media made available is without guarantee of compatibility with the Contractor's software or hardware.
 - 1. If the Contractor wishes to take advantage of this offer, the Contractor will be required to execute an indemnification and hold harmless agreement with the Engineer.
 - 2. Electronic media will be provided free of charge on disc in a zipped format.
 - 3. Electronic media shall be returned to the Engineer upon acceptance of the as-built drawings by the Owner.

1.07 RELATED DOCUMENTS

- A. Provide certificate of release of liens if requested by the Engineer.

1.08 UNDERGROUND PIPELINE DOCUMENTATION

- A. The installing Contractor shall document the location of all underground pipelines by taking digital photographs of the installed pipelines prior to backfilling. At least 3 digital photographs shall be taken of each pipe section before it has been backfilled.
- B. The Contractor shall provide each pipe installation crew with a digital camera capable of a 3 mega-pixel quality picture using Smart Media, Compact Flash Media, or Memory Stick cards as the media within the camera.
- C. At the end of each day that pipe has been installed, the crew foreman shall hand deliver to the Engineer the removable media.
 - 1. The Engineer will then download the photographs and delete the photographs from the media.
 - 2. The media will be returned to the crew foreman within two working days from the date it was delivered.
 - 3. The Contractor shall have at least three (3) 256 MB media cards available for this purpose to be used on a rotating basis.
- D. Installed work will not be eligible for payment until documentation is provided.
- E. In addition, the underground piping shall be marked with construction grade spray paint before the photos have been taken to indicate the pipelines in the pictures.
 - 1. The Contractor shall assign a separate paint color to each line to be shown in the picture.
 - 2. The paint color, once selected by the Contractor, shall be used for the entire run of piping.
 - 3. The marks shall be large and long enough to be visible in the picture. Where practical, spray paint the name of the contents that will be conveyed in the pipe, e.g. "POTABLE WATER", "BACKWASH EFFL."
 - 4. This requirement is necessary so that the pipe lines shown in the pictures can be easily named and referenced at a later date.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017839

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Section includes the requirements for delivering spare parts specified to be furnished under the provisions of the Contract Documents.

1.02 QUALITY ASSURANCE

- A. Spare parts shall be delivered as complete assemblies direct from the manufacturer such that the part is fully functional and ready to be installed.

1.03 DELIVERY, STORAGE AND HANDLING OF SPARE PARTS

- A. Comply with the requirements of Section 016500 for packing, delivery, storage and handling requirements for all parts delivered to the site of the work.
- B. All spare parts required to be furnished under a Section of the Specifications shall be packaged in one separate box, crate or container with the words "SPARE PARTS" lettered on all sides of the container.
- C. The equipment name or system name for which the spare parts are being provided shall also be lettered on the container.
- D. A separate packing list for the spare parts shall be included in the container.
- E. The Contractor shall store all spare parts indoors immediately upon delivery of the spare parts to the site. Spare parts will not be accepted by the Owner/Engineer if the spare parts have been stored outdoors for more than 8 hours upon delivery to the site.
- F. The storage location shall be secure.

1.04 TURN OVER OF SPARE PARTS

- A. Spare parts shall be turned over to the Owner/Engineer approximately two (2) weeks prior to the Engineer's preparation of the Final Punch List.
 - 1. Spare parts will not be accepted until this time.
 - 2. The Certificate of Substantial Completion will not be issued until all spare parts are delivered.
- B. The following procedure shall be followed:
 - 1. The Contractor shall provide a formal letter of transmittal listing the name or description of the part, part number, model number, manufacturer (or supplier), and system component name and the Section where it was specified to be provided.
 - 2. Two (2) counterparts of the letter shall be provided.
 - 3. The Contractor shall turn each part individually over to the Owner/Engineer.
 - 4. The Owner/Engineer will initial next to the part description on each counterpart of the transmittal letter.
 - 5. The initials represent that the part was received.
 - 6. One transmittal counterpart will be returned to the Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017843

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the requirements for demonstrating and training of installed systems, equipment, and products.
- B. Manufacturer field services and the credit for unused service time is also included herein.

1.02 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual specification sections require field services to be provided, said services shall be provided by qualified, authorized and factory trained representative(s) of the manufacturer (supplier).
- B. Field services shall generally consist of:
 - 1. installation supervision,
 - 2. verify terms of the manufacturer's warranty,
 - 3. equipment and system calibration,
 - 4. startup supervision,
 - 5. and operation and maintenance instructions to the Owner's employees.
- C. Such services do not include service time to correct a factory fault, correct problems resulting from a factory wiring or control logic error, or errors caused by poor or improper installation by the Contractor.
- D. Sale representatives are not acceptable.
- E. The time specified to be provided under the specification sections shall be exclusive of travel time to and from the facility or site. For the purposes of this Contract, one (1) day shall be defined as eight (8) hours exclusive of breaks or mealtime.
- F. The times specified to be provided by the manufacturer does not relieve the manufacturer from providing sufficient service time to place the equipment or systems into satisfactory operation and to obtain the specified performance. The manufacturer shall provide, as a minimum, the times specified in the Specification Sections.
- G. Where manufacturer services are specified for control panel or control center startup, the representative shall be experienced and trained to work on and field rewire such devices.
 - 1. Field representatives for control panel startup shall understand the control sequence specified and, in the case of programmable logic controllers, are able to make revisions to the factory program using handheld programming devices or laptop computers.
 - 2. The time spent by the representative to correct a PLC program shall not be included in the time specified for startup.
- H. Submit manufacturers' startup reports (MSR's) in accordance with the requirements contained in Section 013300 - Submittals.

1.03 SUBMITTALS

- A. The Contractor shall prepare a list of all manufacturer specified field time required by the technical specifications. Compile this summary listing and submit it to the Engineer for review in accordance with the requirements contained in Section 013300.
- B. Manufacturer's Startup Reports

1.04 QUALITY CONTROL

- A. The Contractor shall adhere to all instructions provided by the manufacturer's authorized representative.
- B. All verbal instructions necessary to satisfy performance of the equipment or the system shall be immediately provided by the Contractor. The manufacturer shall document all verbal orders in writing at a time suitable to the Contractor.
- C. All written instructions provided in operation, maintenance, and installation guides and manuals, provided by the manufacturer of such equipment and or system, shall be complied with by the Contractor.
- D. The Contractor shall comply with all manufacturer requirements such that written or implied warranties remain in full force during the time period so specified elsewhere in the technical specifications.
- E. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- F. Actions and/or non performance by the Contractor that may void manufacturer warranties shall not constitute a release of the specified warranty, and all warranty claims made by the Owner shall be paid for by the Contractor as if the manufacturer's warranty was still in effect.

1.05 SCHEDULING - FIELD SERVICES

- A. The Contractor shall arrange field service on dates acceptable to the Owner and Engineer.
- B. The service visits shall be scheduled at least 2 weeks in advance so that the Owner and Engineer can adequately staff the date.
- C. Operator training will not be allowed until such time as the Manufacturer's Operation and Maintenance Manuals have been supplied and approved by the Engineer.
 - 1. The field service technician shall review the contents of the manual with designated employees of the Owner.
 - 2. Field services will not be deemed provided until the MSR is provided.

1.06 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel prior to date of Substantial Completion.
- B. Utilize manufacturer's and vendor's Operation and Maintenance Manuals as basis for instruction. Review contents of the manual with the Owner's personnel in detail to explain all aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of the equipment or of the system.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- E. The Contractor shall arrange to have the manufacturer's Operation and Maintenance Manuals updated with information that has been added during start-up activities.

- F. The final manual shall contain the most recent information and reflect all operational and maintenance aspects of the final installed and functioning system or equipment component of the system.
- G. Any changes to control panel wiring diagrams or interconnection wiring schematics shall be made and new prints provided as an update to previously approved manuals.
- H. Manufacturer field time shall be as specified in individual Sections of the Technical Specifications.
- I. For control panels, explain the control sequence, timing structure, and safety precautions when working inside the panel, terminal wiring system, PLC program, if applicable, operator interface(s) and control logic.
- J. Explain PLC LED input and output numbering system, if applicable. If control relays are used, explain technique for their replacement.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017900

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

1.03 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition shall remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.05 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.
 - 6. Review procedures for turning over salvaged materials to the Owner and protected off-site storage of materials to be reused in the work of the project..

1.06 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting the public, pedestrian access and circulation areas and property , for

environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.

- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Inventory: Submit a list of items to be removed, salvaged and delivered to Owner prior to start of demolition.
- D. Removed, salvaged Photographs or Video: Submit before Work begins.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- F. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.08 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use and is included in this Division of the specifications . Examine report and / or the appropriate specification section to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 1. Maintain fire-protection facilities in service during selective demolition operations.
 2. Provide a Fire Watch or other method acceptable to the authority having jurisdiction should the existing fire protection facilities have to be shut down during the work.
 3. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to Architect.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs .
1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
- B. Existing Services/Systems to be removed, relocated, or abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Arrange to shut off indicated utilities with utility companies. Provide 5 days notice to the Architect prior to any utility shut-downs.
 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap, plug or reconnect remaining piping with same or compatible piping material.
 - b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug or reconnect remaining ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building. Maintain existing required widths of egress pathways throughout.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.04 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner or as indicated on Drawings.
 5. Protect items from damage during transport and storage.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 1 inch (19 mm) at junctures with construction to remain. Dislodge concrete from

reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.07 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.08 SELECTIVE DEMOLITION SCHEDULE

- A. Remove, store, relocate, salvage and protect the following materials and equipment:
 - 1. Existing Items to Be Removed: Items indicated on contract drawings and items listed in technical specifications sections.
 - 2. Existing Items to Be Removed, relocated and/or Salvaged: Items required to be removed, relocated salvaged and/or stored to complete the work as indicated or called for in these construction documents.
- B. Existing Items to Remain: to complete and conform to the work of the project shall be as indicated on the contract drawings and items listed in the technical specification sections..

END OF SECTION 024119

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Complete removal of designated building and construction items as indicated on the Contract Documents including but not limited to existing doors & frames, windows, interior finishes, and roofing systems.
- B. Identification of utilities.
- C. Disposal of materials. Salvaging of removed materials as indicated on drawings or schedule at the end of this Section.
- D. The extent of Selective Demolition Work is that Work necessary and required to facilitate the new construction indicated.
- E. Removal of Asbestos Containing Materials (ACM) is not included in this Section

1.02 RELATED SECTIONS

- A. Section 011100 – Summary of Work.
- B. Section 013100 – Project Management & Coordination.
- C. Section 013300 – Submittals
- D. Section 015000 – Temporary Facilities and Controls.
- E. Section 017800 – Closeout Submittals.

1.03 SUBMITTALS

- A. Section 013300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate demolition and removal sequence and location and construction of temporary work. Describe demolition removal procedures and schedule.

1.04 SUBMITTALS FOR CLOSEOUT

- A. Section 017800 – Closeout Submittals. Procedures for submittals.
- B. Waste manifests for all removed materials to an approved waste collection site.
- C. Project Record Documents: Accurately record actual locations of capped utilities, obstructions and unseen utilities.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code and OSHA requirements for demolition work, safety of existing structures and dust control.
- B. Obtain required permits from authorities having jurisdiction.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct egress width to any building or site exit.

- E. Do not disable or disrupt building fire or life safety systems without ten (10) days prior written notice to Architect/Engineer and the Owner.
- F. Do not turn off electric equipment without authorization from Owner.
- G. Conform to procedures applicable if hazardous or contaminated materials are discovered.

1.06 SCHEDULING

- A. Section 013300 - Submittals: Work schedule, describe demolition removal procedures and schedule.
- B. Schedule demolition to coincide with new construction.
- C. Coordinate removal of indicated to equipment connected to drainage, plumbing and electrical systems.

1.07 PROJECT CONDITIONS

- A. Indicated "Existing Construction" was obtained from existing drawings, field measurements or other information which may not reflect actual conditions. The Contractor shall verify all existing conditions and notify the Architect/Engineer of discrepancies before proceeding with the Work.
- B. Perform the removal, cutting, drilling, etc., of existing work with extreme care, and using small tools in order not to jeopardize the structural integrity of the building. Do not use jack-hammers or explosives.
- C. Conduct demolition to minimize interference with adjacent occupied spaces and site utilities.
- D. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.
- E. Provide all safety precautions necessary to protect life and property.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide appropriately sized dumpsters and rubbish containers for the proper and safe disposal of all debris.
- B. Provide any and all shoring and bracing which may be required for safe removal of items indicated and protection of existing structure.
- C. Materials which are damaged by the Contractor to the extent that they cannot be repaired shall be replaced by the Contractor with equal quality material at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide, erect and maintain temporary barriers at locations indicated, as required and/or as directed by OSHA guidelines.
- B. Protect existing materials and equipment, which are not to be demolished.

- C. Any finishes, equipment, structures or site features damaged as part of this work shall be replaced at no additional cost to the Owner.
- D. Prevent movement of structure; provide bracing and shoring.
- E. Provide appropriate temporary signage including signage for exit or building egress, construction work area, etc.
- F. Notify affected utility companies before starting work and comply with their requirements
- G. Mark location of horizontal and vertical utilities. There may be utilities running within the building wall cavities as well as under pavement and sidewalks.
- H. Erect and maintain weatherproof closures for exterior openings.

3.02 DEMOLITION

- A. Demolish in an orderly and careful manner. Protect existing supporting structural members, roof deck, finishes and equipment.
- B. Employ only skilled tradesmen to perform selective demolition. Cut work by methods least likely to damage work to the retained and adjoining work.
- C. Saw cut existing masonry walls for enlarging openings.
- D. Where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.
- E. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- F. Where selective demolition terminates at a surface or finish to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even, substrate transition.
- G. Remove demolished materials from site as work progresses except where specifically noted otherwise. Do not burn or bury materials on site.
- H. Upon completion of Work, leave areas in clean condition.
- I. Remove temporary work.

3.03 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent building areas or Owner's operations.
- B. Construct temporary work areas prior to any demolition work enclosing respective work from the public and Owner's staff.
- C. Cease operations immediately if structure appears to be in danger or hazardous materials are encountered. Notify Architect/Engineer. Do not resume operations until directed.
- D. Maintain protected egress and access to the Work at all times.
- E. Recycle all removed materials which can be recycled.

F. Provide manifests for all disposed materials.

END OF SECTION 024130

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Slabs-on-grade.
 - 3. Building frame members.
 - 4. Underslab vapor retarder.
 - 5. Insulation.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 ACTION SUBMITTALS

- A. The contractor shall comply with the requirements of Division 01 Specification of the Project Manual, Section 013300 - SUBMITTALS.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 2. Submit mix design mixtures for each type of concrete to be used on the Project at least 30 calendar days prior to the first scheduled concrete pour. The Contractor's testing laboratory shall develop concrete mix designs and test all materials and mixes for conformance with ACI 301 and these specifications. The costs associated with development of the design mix and testing of samples shall be included in the bid price.
 - 3. Submit the following:
 - a. Name, address, and telephone number of Contractor's laboratory.
 - b. Mix proportions.
 - c. Source of cement, type, brand, and certified copies of mill reports, including physical and chemical analysis.
 - d. Sources of fine aggregates and results of test made in accordance with ASTM C33/C33M and ASTM C40.
 - e. Source of coarse aggregates and results of tests made in accordance with ASTM C33/C33M.
 - f. Catalog cuts of all admixtures.
 - g. Furnish test results of slump, air entrainment and water-cement ratio for each mix design.
 - 4. For each mix proposed, make and cure four (4) standard 6 inch concrete test specimens to the laboratory in accordance with ASTM C192/C192M. Furnish compression test results made in accordance with ASTM C39/C39M. Break two (2) cylinders at seven (7) days and two (2) at 28 days.

5. If the concrete is intended to be pumped, design mix accordingly and submit certification that it has been tested for pumping.
 6. If adopted mix fails to produce concrete meeting the requirements for strength and placibility, the Architect may order additional cement or adjustments to mix proportions at no extra cost to the Owner.
- D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, spacing, locations, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement including steel bars and wire fabric.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer licensed in the state where the project is located; detailing fabrication, assembly, and support of formwork. Shop drawings shall bear the signature and seal of the same licensed Professional Engineer.
1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal
 2. Shop drawings shall indicate formwork dimensioning, materials and arrangement of joints and ties.
 3. Manufacturer's instructions: Indicate installation procedure and interface required with adjacent work
- F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
1. Location of construction joints is subject to approval of the Architect, if not shown on the drawings.
- G. Samples: For waterstops and vapor retarder.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, provided by manufacturers:
1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Curing compounds.
 6. Bonding agents.
 7. Adhesives and Vapor retarders.
 8. Semi rigid joint filler.
 9. Joint-filler strips.
 10. Repair materials.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.
- F. Minutes of preinstallation conference.
- G. Furnish transit-mix delivery slips to Owner's Representative.

1.06 QUALITY ASSURANCE

- A. Comply with Referenced Standards specified in Division 01 Section "References" in addition to ACI 301.
- B. Perform testing under the provisions of Division 01 Section "Quality Requirements" and the "FIELD QUALITY CONTROL" Article of Part 3 listed in this specification.
- C. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- E. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - 1. The contractor shall provide an adequately sized, insulated curing box to house concrete cylinders at the discretion of the Architect, for the 48-hour period between concrete pour and sample collection pick-up by the Testing Laboratory (ASTM C31/C31M). As directed by the Architect, the contractor shall cure additional cylinders in the same fashion as the in-place concrete.
 - 2. Curing box shall be located away from the main construction area and shall be blocked up off the ground.
 - 3. A log sheet shall be provided in a waterproof sheet protector to log in the placement and removal of the concrete test samples by the testing laboratory.
 - 4. Minimum information to be logged for each pour date shall include: date of pour, date of pick-up, weather conditions at the time of pour, testing
- F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer. To further insure consistency, coloration, finish and quality; all aggregates, cement, water and other ingredients shall each be secured from the same source for the duration of the project.
 - 1. The batching plant and raw materials may be subject to inspections and test performed by the Architect.
- G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."
- H. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete", Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
 - 3. ACI 304R - "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
- I. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- J. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
2. Review special inspection and testing and inspecting agency procedures for field quality control, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Store cement off the ground in a dry, weatherproof, adequately ventilated structure with provisions to prevent the absorption of water.
- C. Transport dry concrete batches from the central plant to the site in approved truck mixers conforming to the requirements of the Truck Mixer Manufacturer's Agitating Standards. Each truck shall contain a plate stating the capacity, drum speeds and be provided with a revolution counter.
- D. Packaged material shall be delivered and stored in the original packages until ready for use. Packages or materials showing evidence of water or other damage shall be rejected.
- E. Protect all materials from freezing.

1.08 COORDINATION

- A. Coordinate work under provisions of Division 01 Specification of this Project Manual.
- B. The Contractor shall provide at least five (5) working days advance notice prior to formwork closure to the Architect.
- C. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Notify Architect a minimum of three (3) working days prior to commencement concrete pours.

1.09 REGULATORY REQUIREMENTS

- A. Conform to ACI 304R and all applicable codes for placement of concrete and related work.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when the ambient temperature is below 40 deg. F. or when the concrete temperature exceeds 85 deg. F. Under certain circumstances, the Engineer may approve the placement of concrete under the above conditions, provided that the procedures of ACI 305R and ACI 306R are strictly adhered to.

- B. Do not place concrete when the conditions may adversely affect the placing, curing or finishing of concrete, or its strength.
- C. Comply with the requirements contained in Section 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Steel forms: Minimum 16 gage thick, stiffened to support weight of concrete with minimum deflection.
 - 3. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Douglas Fir Species, solid one side grade and sound
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum unless indicated otherwise on the drawings.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal. Patterns and sizes as shown on the drawings.
- E. Form-Release Agent: Commercially formulated, colorless, water based, non-toxic, V.O.C. compliant, environmentally safe material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete; manufactured by DAYTON SUPERIOR or equal. Agent shall not be detrimental to the environment.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. For Concrete Tanks: Furnish snap-ties with 1 inch plastic cone and waterseal washer.

2.02 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.
- B. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- C. Galvanized Reinforcing Bars: ASTM A615/A615M, Grade 60; ASTM A706/A706M, deformed bars; ASTM A767/A767M, Class II zinc coated after fabrication and bending.
- D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 ; ASTM A706/A706M, deformed bars, assembled with clips.

- E. Deformed-Steel Wire: ASTM A 496.
- F. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. Provide load bearing pad on bottom to prevent vapor barrier puncture.

2.04 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C150/C150M, Type IA, gray. Supplement with the following:
 - a. Fly Ash: ASTM C618, Class F or C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C989/C989M, Grade 100 or 120.
 - 2. Silica Fume: ASTM C1240, amorphous silica.
 - 3. Normal-Weight Aggregates: ASTM C33/C33M, No. 57 or 67 crushed stone coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - a. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 - 4. Lightweight Aggregate: ASTM C330/C330M, 3/4 inch, nominal maximum aggregate size.
 - 5. Water: ASTM C94/C94M, clean and not detrimental to concrete.

2.05 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C260/C260M.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.06 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E1745, Class C or polyethylene sheet, ASTM D4397 not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400

- b. Grace Construction Products, W. R. Grace & Co.; Florprufe 120
 - c. Insulation Solutions, Inc.; Viper VaporCheck 10.
 - d. Meadows, W. R., Inc.; Perminator 10 mil.
 - e. Reef Industries, Inc.; Griffolyn 10 mil Green.
 - f. Stego Industries, LLC; Stego Wrap 10 mil Class A.
 - g. Or approved equal.
- B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C33/C33M for fine aggregates.

2.07 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing No. 4 sieve.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dayton Superior Corporation; Emery Tuff Non-Slip
 - b. Lambert Corporation; EMAG-20
 - c. L&M Construction Chemicals, Inc.; Grip It
 - d. Metalcrete Industries; Metco Anti-Skid Aggregate

2.08 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 8 oz. /sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet weighing approximately 8 oz. / sq. yd. bonded to prevent separation during use.
- C. Membrane curing compound: Moisture Retention complying with ASTM C309. Products: EUCOCURE VOX by Euclid Chemical Company or equal.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
- 1. Products: Eucocure VOX as manufactured by Euclid Chemical Company or approved equal.

2.09 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, 1/2" asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: three-component, solvent-free, moisture tolerant, epoxy modified cementitious product.
- 1. Product: Arimatec 110 EpoCem as manufactured by Sika Corporation or specifically approved equal.
 - 2. Types I and II, non-load bearing Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

- D. Non-Shrink Grout: Premixed compound, free of chlorides, with non-metallic aggregate, cement water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi at 48 hours and 7000 psi at 28 days. Grout shall be suitable for contact with potable water. For equipment bases and pipe supports, use non-shrink grout by Master Builders, Embeco 636, Unisorb V-1 or equal.
- E. Reglets: Fabricate reglets of galvanized-steel sheet not less than 26 gauge material; in the longest lengths possible with alignment splines for joints; secure to formwork; Type CO as manufactured by Fry Reglet or approved equal. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inches (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- G. Extrudable Strip Waterstop: One part polyurethane, extrudable swelling waterstop to create a compression seal; SikaSwell S-2 as manufactured by Sika Corp. or specifically approved equal.
- H. Field Applied Waterstop Grout: Krystol Waterstop Grout, crystalline grout to be applied in accordance with the manufacturer's specifications at joints and penetrations. Manufacturer: Kryton International Inc. (800)267-8280 or approved equal.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C109/C109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent Portland cement minimum, with fly ash or Pozzolan not exceeding 25 percent.
 - 5. Silica Fume: 10 percent.
 - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 8. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: Pier, Mat and Spread Footings; foundation walls, slab on grade and slab on metal deck: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.50 for all concrete building elements.
 3. Slump Limits (Conventional Mix):
 - a. Slabs: 3 inches plus or minus one inch.
 - b. Piers, Foundation Walls and Footings: 4 inches plus or minus one inch.
 4. Slump Limits (Pump Mix):
 - a. Final slump (Slabs): 6 1/2 inches plus or minus one inch.
 - b. Final Slump (Foundation, walls and footings): 7 1/2 inches plus or minus one inch
 5. Air Content:
 - a. Piers, Mats and Spread Footings: 5.5 percent, plus or minus 1.0 percent. at the point of delivery.
 - b. Slabs: 3 percent, plus or minus 1.0 percent at point of delivery. Do not allow air content of trowel finished concrete floors to exceed 3 percent.
 6. Large Aggregates: 3/4" crushed stone; ASTM C33/C33M, No. 67.
 7. Use Admixtures only when approved by the Engineer.
 8. Mix Grout in accordance with the manufacturer's instructions and specifications.
- B. All concrete for the clear-well and backwash waste tank construction shall include Krystol Internal Membrane (KIM)® integral water repellent admixture as manufactured by Kryton or specifically approved equal. Admixture shall be added at a rate as recommended by the approved manufacturer.

2.13 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and measurements before proceeding with formwork. Ensure that dimensions agree with the plans.
- B. Inspect the formwork and reinforcing that it has been properly set and secured and that all items to be embedded, built-in or pass through concrete are at their proper locations and elevations.
- C. The General Construction Contractor shall verify that all other prime contractors have installed concrete inserts, sleeves, and embedded elements of the project, such as conduit, and their work has been totally completed and inspected by the Architect.
- D. Ensure that all points of contact with new grout are free from oil, grease and scale.

3.02 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
 - a. Hand trim sides and bottom of earth forms and remove loose soil to the satisfaction of the Architect.
 - b. Remove water from forms and excavations and divert water flow to avoid washing over, under or through freshly placed concrete.
- D. Construct forms tight enough to prevent loss of concrete mortar. Align form joints.
- E. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.
- F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to

prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

- I. Chamfer: Provide 3/4" inch chamfer on all exterior horizontal and vertical corners and edges of permanently exposed concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.
- N. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-metallic/ non-shrink grout.
- O. Prepare previously placed concrete by cleaning with steel brush and apply a Bonding Agent in accordance with the manufacturer's specifications and instructions.

3.03 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.
 - 4. Ensure that all inserts and embedded items are not disturbed during concrete placement.

3.04 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.05 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.06 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturers recommended tape.
- B. Granular Course: Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.07 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Use reinforcing splices at minimum of locations and only at locations of minimum stress. Review locations of splices with Architect. Splice locations shall be approved during shop drawing review phase. Rebar splice overlap shall be the minimum length as per ACI 318.
 - 1. Weld reinforcing bars according to AWS D1.4/D1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Take necessary measures to ensure that reinforcement is not disturbed during the placement of concrete.

3.08 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated or at 20' o.c. maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction / Control Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawn Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3/16"-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 - JOINT SEALANTS are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- F. Ensure joint fillers and devices are not disturbed during placement of concrete.
- G. Install all joint fillers and devices in accordance with the manufacturer's instructions and specifications for floor and wall finish.
- H. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.
- I. Install joint covers in one-piece length when adjacent construction activity is complete.
- J. Apply sealants in joint devices in accordance with the manufacturer's specifications and instructions.

3.09 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
 - 2. Place concrete with the aid of mechanical vibrators which are capable of transmitting to the concrete not less than 3,000 impulses per minute. Maintain at least three (3) vibrators in good working condition, ready for use when concrete placement begins in any one area.
 - 3. Do not interrupt successive placement. Do not permit cold joints to occur.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and ACI 305R and as follows:

1. Maintain concrete temperature below 95 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
3. Maintain records of concrete placement. Record date, locations, quantity, air temperature and test samples taken.
4. In areas with floor drains, maintain floor elevations at walls; pitch surfaces uniformly to the drains maintaining a 1% slope.
5. Cure floor surfaces in accordance with ACI 308R.
6. Apply curing compound in accordance with the manufacturer's specifications and instructions in two (2) coats with the second coat at right angles to the first.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch 6 mm in one direction.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F (F) 30; and of levelness, F (L) 20; with minimum local values of flatness, F (F) 24; and of levelness, F (L) 15; for suspended slabs.
 3. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. This surface shall be used for interior and exterior walking surfaces unless noted otherwise. Finish edges of exterior walkway flags with steel tooled radius edge.
 2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, equipment pads, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb. /100 sq. ft. of dampened slip-resistive over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
 2. After broadcasting and tamping, apply float finish.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. All exposed horizontal and vertical wall and slab corners shall have a 3/4" wide chamfered edge.
- D. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.

3. Minimum Compressive Strength: 4000 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12 inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Cast anchor-bolt inserts into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- E. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.
- F. Grout: Install grout in accordance with the manufacturer's specifications and instructions. Moisten concrete and grout surfaces and allow drying until damp. Remove all standing water. Pump or inject grout into tight spaces to ensure intimate contact with the existing grout. Cure grout with an appropriate membrane in accordance with the manufacturer's specifications and instructions.

3.13 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 and ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308R and ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
- F. Liquid sealer/hardener to be applied on exposed concrete cured with moisture retentive or absorptive covers. The following materials provide varying levels of protection, sealant and hardness. Review products for project appropriateness.
 - 1. Euclid: Euco Diamond Hard (Liquid Sealer and Hardener)
 - 2. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
 - 3. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)
 - 4. Midwest Floor Care: Structure Formula (Liquid Sealer and Hardener)
 - 5. Or approved equal.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least three month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Immediately remove all rust spots that have developed during the construction period as soon as directed by the Architect. Remove all rust spots that have formed by the use of temporary handrails.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and/or qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Contractor is responsible to notify the Owners representative at least 72 hours prior to the scheduled work that requires inspection / testing. The presence of the Inspector engaged by the Owner does not relieve the contractor of Quality Control Requirements.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Headed bolts and studs.

3. Steel reinforcement welding.
 4. Concrete placement, including conveying and depositing.
 5. Curing procedures and maintenance of curing temperature.
 6. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. Frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - b. One (1) additional test cylinder shall be taken during cold weather and be cured under the same conditions as the concrete it represents.
 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C173/C173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Compression Test Specimens: ASTM C31/C31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two Insert number sets of two standard cylinder specimens for each composite sample.
 7. Compressive-Strength Tests: ASTM C39/C39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28-day tests.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E1155 within 72 hours of finishing.

END OF SECTION 033000

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Granular surfaced fiberglass asphalt shingle roofing.
- B. Leak barrier and roof deck protection and all other items essential to the completeness of the roofing installation, though not specifically specified, shall be provided for a watertight installation meeting the manufacturer's warranty requirements.
- C. Metal flashings, ridge vent, starter shingles and all accessories essential to the completeness of the roofing installation.

1.02 RELATED SECTIONS

- A. Section 077123 - Gutters and Downspouts.

1.03 REFERENCES

- A. ASTM A653/A653M – Steel Sheet, Zinc Coated or Zinc-Iron Alloy Coated by the Hot-Dip Process.
- B. ANSI/ASTM B209 - Aluminum Alloy Sheet and Plate.
- C. ANSI/ASTM D226 - Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- D. ANSI/ASTM D3018 - Class A - Asphalt Shingles Surfaced with Mineral Granules.
- E. ASTM D3462 – Standard Specification for Asphalt Shingles made from Glass Felt and Surfaced with Mineral Granules.
- F. ASTM D3161 Type 1 – Wind Resistance of Asphalt Shingles.
- G. ASTM A361 - Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process for Roofing and Siding.
- H. ASTM D4586 – Asphalt Roof Cement, Asbestos-Free.
- I. ASTM B370 - Copper Sheet and Strip for Building Construction.
- J. ASTM D2218 – impact Resistance of Prepared Roof Covering materials.
- K. ASTM D7158 – Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/ Uplift Resistance Method).
- L. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance and Transmission of Materials Using Integrating Spheres.
- M. National Roofing Contractors Association - NRCA Steep Roofing Manual.
- N. Asphalt Roofing Manufacturers Association – ARMA.
- O. UL 580 - Tests for Wind Uplift Resistance of Roof Assemblies.
- P. UL 997 – Wind Resistance of Prepared Roof Covering Materials.

Q. UL 790 - Tests for Fire Resistance of Roof Covering Materials.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data indicating material characteristics, performance criteria, colors, and limitations including Energy Star acceptance.
- C. Shop Drawings: Indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- D. Samples: Submit two sample boards indicating the manufacturer's full line of available colors. Submit two full size sample shingles indicating size, texture, color and overall appearance.
- E. Manufacturer's Instructions: Indicate preparation required and installation procedures.
- F. Certificate of Compliance: Provide a Certificate of Compliance from an independent laboratory indicating that the asphalt fiberglass shingles made in normal production meet or exceed the following requirements:
 - 1. ASTM E 108/UL 790 Class A Fire Resistance
 - 2. ASTM D 3161/UL 997 Wind Resistance
 - 3. ASTM D 3462
- G. Manufacturer's written certification indicating roofing applicator qualifications comply with those necessary to obtain specified warranty.
- H. Sample warranty for review.

1.05 QUALITY ASSURANCE

- A. Roof system shall be an integrated system providing single source responsibility from the manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing the roofing system products specified in this section, with a minimum of 25 years' experience.
- C. Installer Qualifications: Certified and trained by the shingle manufacturer for steep slope installation, certified to install enhanced warranty projects, such as GAF Master Elite Roofing Contractor, CertainTeed Master Shingle Applicator Wizard or approved equal.
- D. Perform work in accordance with NRCA Steep Roofing Manual.
- E. A final inspection is to be conducted by a manufacturer's roofing inspector.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code(s) for UL 790 Class A fire resistance and ASCE 7, UL 997 and UL 580 wind uplift for shingle types specified.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Store products under the provisions of Section 016500, and in accordance with manufacturer's instructions.

- B. Store all products in manufacturers unopened, labeled packaging until they are ready for installation. Store products in a covered, ventilated area, at a temperature not more than 110 degrees Fahrenheit, do not store near stream pipes, radiators, or direct sunlight.
- C. Store bundles on a flat surface. Maximum stacking height shall not exceed manufacturer's recommendations. Store rolls on ends.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install eave edge protection and shingles when ambient temperatures are below 50°F (10°C).

1.09 PROTECTION

- A. It shall be the Contractor's responsibility to respond immediately to correction of roof leakage during construction. A four (4) hour time limit shall be given from the time of notification of emergency conditions. In the event of water penetration during rain or a storm, the Contractor shall provide for repair or protection of the building contents and interior. If the Contractor does not respond or cannot be contacted, the Owner will effect repairs or emergency action and the Contractor shall be back charged for all expenses and damages, if any.
- B. Protect the building and the contents of the building from all risks resulting from the work. Contractor shall be sufficiently prepared to expediently install a temporary membrane to protect areas of incomplete roofing in the event of rain.
- C. Contractor must take every precaution to prevent interior leakage, materials from falling into the interior, or other such occurrences.
- D. Do not load or permit any part of structure to be loaded with a weight that will endanger its safety or cause damage. Confine equipment, storage of materials and debris and the operations and movements of workmen within any limits as indicated or as directed by the Owner.

1.10 WARRANTY

- A. Provide to the Owner a complete system warranty from the manufacturer such as GAF WeatherStopper Golden Pledge Warranty, CertainTeed SureStart Plus 5-Star Warranty or approved equal. Contractor must be a GAF Certified Master Elite Contractor, CertainTeed Master Shingle Applicator Wizard or approved equal.
 - 1. Material defects: Warranty shall provide 100% non-prorated coverage for materials and labor for 30 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - ASPHALT SHINGLES

- A. GAF Materials Corporation, 1361 Alps Road, Wayne, NJ 07470.
- B. CertainTeed Corporation, P.O. Box 860, Valley Forge, PA 19482.
- C. Or approved equal.

2.02 MATERIALS

- A. GAF Timberline Ultra HD Lifetime High Definition Shingles, super heavyweight, granule surfaced, self-sealing asphalt shingle, reinforced with fiberglass Micro Weave core and Stain

Guard protection which prevents pronounced discoloration from blue-green algae through formulation/blends of granules. Architectural laminate styling provides a wood shake appearance with a 5" or 5-5/8" exposure and features GAF's patented High Definition color blends and enhanced shadow effect. Color and pattern as selected by Owner from manufacturer's full range of colors available.

- B. CertainTeed Landmark Premium Shingles, 300 pounds per square, composed of a fiberglass mat base with ceramic coated colored/UV resistant mineral service granules across entire face of the shingle tightly embedded in carefully refined, water resistant asphalt. The two pieces of the shingle are firmly laminated together in a tough asphaltic cement, and are self-sealing, algae-resistant construction. Architectural laminate styling provides a wood shake appearance with a 5" or 5-5/8" exposure and features CertainTeed's Max Def color blends and enhanced shadow effect. Color and pattern as selected by Owner from manufacturer's full range of colors available.
- C. Or approved equal.

2.03 ACCESSORIES

- A. Hip and Ridge Shingles: High profile self-sealing ridge cap shingle matching the color of selected roof shingle.
- B. Starter Strip: Pre-cut self-sealing starter shingle with factory applied adhesive, designed for premium roof shingles matching the color of selected roof shingle.
- C. Leak Barrier: Self-adhering, self-sealing, bituminous leak barrier surfaced with fine, skid-resistant granules. Install leak barrier at valleys and around dormers, sidewalls, firewalls, chimneys, plumbing vents, and skylights.
- D. Shingle Underlayment: Premium, water repellant, breather type roofing underlayment meeting ASTM D226 and D4869.
- E. Roofing Cement: Asphalt Plastic Roofing Cement meeting the requirements of ASTM D4586, Type I or Type II, asphalt type with mineral fiber components, free of toxic solvents, capable of setting within 24 hours at temperatures of 75 F (24 C) and 50% RH.
- F. Ridge Vent: Flexible rigid plastic ridge ventilator designed to allow the passage of hot air from attics, while resisting snow infiltration and for use in conjunction with eave/soffit ventilation products.
- G. Soffit Vents: As specified in Section 076300 – Sheet Metal Specialties.
- H. Nails: Standard round wire, zinc-coated steel or aluminum; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8 inch (9mm) to 7/16 inch (11mm) in diameter. Length must be sufficient to penetrate into solid wood at least 3/4 inch (19mm) or through plywood or oriented strand board by at least 1/8 inch (3.18mm).
- I. Metal Flashing: As specified in Section 076200 – Flashing and Trim. 20-inch (510 mm) width minimum; shop precoated with silicone coating of clear color, a non-corroding metal drip edge must be used at eaves and at rake edges.

2.04 FLASHING

- A. Form flashings to protect roofing materials from physical damage and shed water.
- B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.

- C. Hem exposed edges of flashings minimum 1/4 inch (6 mm) on underside.
- D. Apply bituminous paint on concealed surfaces of flashings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing site conditions under provisions of Section 013100.
- B. Verify that roof penetrations are in place and flashed to deck surface.
- C. Verify roof openings are correctly framed prior to installing work of this Section.
- D. Verify deck surfaces are clean, dry and smooth, free of moisture, ridges, warps or voids, and suitable for installation of roof system.
- E. Beginning of installation means installer accepts existing conditions and substrate.

3.02 PREPARATION

- A. Examine existing roof deck surface to receive new roof system for moisture damage, unevenness, irregularities and deflection that would affect quality and execution of work. If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify Architect/Engineer.
- B. Areas of existing roof deck that are damaged or deteriorated shall be inspected by Architect/Engineer and roofing manufacturer's representative. Repair areas as directed in accordance with manufacturer's instructions.
- C. Fill knot holes and surface cracks with latex filler at areas of bonded eave protection.
- D. Broom clean deck surfaces thoroughly.

3.03 INSTALLATION - UNDERLAYMENT

- A. Install flat and without wrinkles in accordance with manufacturer's instructions.
- B. Eaves:
 - 1. Install eave metal flashing tight with fascia boards; lap joints 2 inches (51mm) and seal with plastic cement or high-quality urethane sealant; nail at the top of the flange.
 - 2. On all roofs install leak barrier up the slope from eaves edge a full 36 inches (914mm) or to at least 24 inches (610 mm) beyond the interior "warm wall". Lap ends 6 inches (152mm) and bond.
- C. Hips and Ridges:
 - 1. Install leak barrier along entire lengths. If ridge vents are to be installed, position the leak barrier so that the ridge slots will not be covered.
- D. Roof Deck:
 - 1. Install underlayment over a clean dry deck; install sheets horizontally so water sheds.
 - 2. Install leak barrier at eaves, valleys, rakes, skylights, dormers and other vulnerable leak areas.

3. Lay underlayment over deck and overlap 12" at side laps and 12" at end laps. Fasten side and end laps 12" o.c. and middle of the roll 24" o.c. Completely cover all side laps, end laps and fasteners with tape.
 4. Lap underlayment over leak barrier in valley at least 6 inches.
 5. Apply tape over all fasteners at the center of the roll to prevent rain or snow from entering at the fasteners.
- E. Penetrations:
1. Vent pipes: Install a 24-inch square piece of leak barrier membrane lapping over roof deck underlayment; seal tightly to pipe.
 2. Vertical walls: Install leak barrier membrane extending at least 6 inches up the wall and 12 inches on to the roof surface. Lap the membrane over the roof deck underlayment.
 3. Skylights and roof hatches: Install leak barrier membrane from under the built-in counter flashing and 12 inches on to the roof surface lapping over roof deck underlayment.
 4. Chimneys: Install leak barrier membrane around entire chimney extending at least 6 inches up the wall and 12 inches on to the roof surface. Lap the membrane over the roof deck underlayment.
 5. Rake edges: Install metal edge flashing over leak barrier membrane and roof deck underlayment; set tight to rake boards; lap joints at least 6 inches and seal with plastic cement; secure with nails. On all roofs install leak barrier up the slope from eaves edge along rake a full 36 inches (914mm) or to at least 24 inches (610 mm) beyond the interior "warm wall".

3.04 INSTALLATION - METAL FLASHING

- A. Weather lap joints minimum 2 inches (50 mm) and seal weather tight with plastic cement.
- B. Secure in place with nails at 12 inches (300 mm) on center. Conceal fastenings.
- C. Flash and seal work projecting through or mounted on roofing with plastic cement, weather tight.
- D. Install flashing in cast reglet or cut in place reglet. Seal with single component butyl sealant as specified in Section 079200.
- E. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counter flashings.
- F. Install ridge vent per manufacturer's instructions.

3.05 INSTALLATION - ASPHALT SHINGLES

- A. Install shingles in accordance with manufacturer's instructions.
- B. Minimize breakage of shingles by avoiding dropping bundles on edge, by separating shingles carefully and by cutting and not breaking over ridge or bundles. Handle carefully in hot weather to avoid scuffing the surfacing or damaging the shingle edges.
- C. Placement and Nailing:
 1. Along rakes and eaves install starter strip containing sealant or cement to underlayment and each other in a 4" width of asphaltic roof cement. Secure with 6 nails.
 2. Nails must be driven flush with the shingle surface. Do not overdrive or under drive the nails.
 3. Each shingle shall be securely nailed with six (6) min. 1² long, large head galvanized roofing nails. Nailing points shall be one nail (1²) one inch, (8²) eight inch and (14²) fourteen inch from each end and 5-5/8² from bottom of shingle.

4. Consult the application instructions for proper shingle offset. Laterally offset shingles from the existing keyways to avoid waves or depressions caused by excessive dips in the roofing materials. Using the bottom of the tab, align subsequent courses.
 5. Project first course of shingles 3/4 inch (19 mm) beyond fascia boards.
 6. Extend shingles 1/2 inch (13 mm) beyond face of gable edge fascia boards.
 7. At ridges, install ridge cap shingles over vent material, maintaining 5-inch (127 mm) weather exposure. Do not drive nails home, leaving 3/4" (19 mm) slot open between ridge and roof shingles. Place ridge cap shingles to avoid exposed nails and in accordance with manufacturer's instructions.
- D. Penetrations: All penetrations are to be flashed according to manufacturer, ARMA and NCRA application instructions and construction details.
- E. Skylights and Roof Hatches: Skylights and roof hatches are to be installed with pre-fabricated metal flashings specifically designed for the application of the unit. Consult the manufacturer of the skylight or roof hatch for specific installation recommendations.
- F. Complete installation to provide weather tight service.

3.06 FIELD QUALITY CONTROL

- A. Avoid breaking shingles by separating carefully and avoiding dropping. Take extra precautions and handle carefully in hot or cold weather.
- B. Field inspection will be performed under provisions of Section 014500. Schedule required manufacturer inspections required for warranty.

3.07 PROTECTION

- A. Protect finished work under provisions of Section 015000. Provide temporary protective sheeting over uncovered deck surfaces at the end of the day.
- B. Do not permit traffic over finished roof surface.
- C. Replace any shingles damaged during the course of the work at no additional cost to the Owner.

END OF SECTION 073113

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Aluminum gutters, downspouts and accessories.

1.02 RELATED SECTIONS

- A. Section 073113 – Asphalt Shingles
- B. Section 076200 – Flashing and Trim.

1.03 REFERENCES

- A. ASTM B32 - Solder Metal.
- B. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.
- C. SMACNA - Architectural Sheet Metal Manual.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on prefabricated components.
- C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations and installation details.
- D. Samples: Submit two samples, 6 inches (150 mm) long, illustrating component design, finish, color and configuration.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code(s) for size and method of rain water discharge.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500.
- B. Stack preformed and prefinished material to prevent twisting, bending or abrasion, and to provide ventilation. Slope to drain.
- C. Prevent contact with materials during storage which may cause discoloration, staining or damage.

1.07 COORDINATION

- A. Coordinate work under provisions of Section 013100.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aluminum: ASTM B209, 3003 alloy, H14 temper; 0.032-inch-thick (ogee); mill finish interior, shop precoated Kynar 500 or Hylar 5000 finish, color white.

2.02 COMPONENTS

- A. Gutters: SMACNA style profile seamless, 6" ogee profile.
- B. Downspouts: SMACNA rectangular profile seamless 3"x4".

2.03 ACCESSORIES

- A. Anchorage Devices: Type recommended by fabricator.
- B. Gutter Supports: Hidden hangers at 30" o.c.
- C. Downspout Supports: Straps.
- D. End Caps, Elbows: Fabricate to gutter profile.
- E. Fasteners: Aluminum finish exposed fasteners same as flashing metal.
- F. Splash Blocks: Provide precast concrete splash blocks at the termination of each downspout at grade.
- G. Primer: Zinc chromate type.
- H. Protective Backing Paint: Bituminous.

2.04 FABRICATION

- A. Form gutters and downspouts of profiles and sizes indicated in accordance with approved shop drawings.
- B. Fabricate with required connection pieces.
- C. Form sections square, true and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.
- F. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

- A. Apply bituminous protective backing on surfaces in contact with dissimilar materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install gutters, downspouts and accessories in accordance with manufacturer's instructions and approved shop drawings.

B. Slope gutters 1/8 inch per foot minimum to leader locations.

C. Seal metal joints watertight.

D. All gutters to be fastened maximum 30 inches o.c.

END OF SECTION 077123

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Polyurethane joint sealants.
 - 3. Latex joint sealants.
 - 4. Preformed joint sealants.
 - 5. Acoustical joint sealants.

1.03 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use ASTM C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Samples for Verification: For each type of sealant submit a color sample board and one sample joint, 1/2" wide by 6" long including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.04 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

- D. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Warranties: Sample of special warranties.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project with a minimum of three-years experience in the installation of the work of this section.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.07 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 degrees F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.08 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full color range.

2.02 SILICONE JOINT SEALANTS

- A. Single-Component, Non-sag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use NT.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. Pecora Corporation; 301 NS
 - c. Sika Corporation, Construction Products Division; SikaSil-WS 290
 - d. Tremco Incorporated; Spectrem 1.
- B. Single-Component, Non-sag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use T.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; 311 NS.

- b. Tremco Incorporated; Spectrem 800.
- C. Single-Component, Pourable, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade P, Class 100/50, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 310 SL.
 - c. Tremco Incorporated; Spectrem 900 SL.
- D. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Tremco Incorporated; Tremsil 200.
 - b. Pecora Corporation; 898.
 - c. Or Approved Equal.

2.03 POLYURETHANE JOINT SEALANTS

- A. Single-Component, Non-sag, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
 - b. Tremco Incorporated; Dymonic 100.
 - c. Or approved Equal.
- B. Single-Component, Nonsag, Traffic-Grade, Polyurethane Joint Sealant: ASTM C920. Type S, Grade NS, Class 25, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Masterseal NP1.
 - b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - c. Tremco Incorporated; Vulkem 116, Dymonic FC.
- C. Single-Component, Pourable, Traffic-Grade, Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 25, for Use T.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; MasterSeal SL 1.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Sherwin-Williams Company, Loxon SL1 Self-Leveling.
 - d. Sika Corporation. Construction Products Division; Sikaflex - 1CSL.
 - e. Tremco Incorporated; Vulkem 45.
- D. Immersible Multicomponent, Nonsag, Traffic-Grade, Polyurethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, for Uses T and I.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; MasterSeal NP 2.
 - b. Pecora Corporation; Dynatred.
 - c. Tremco Incorporated; THC 901.

2.04 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. BASF Building Systems; Sonolac.
- b. Bostik, Inc.; Chem-Calk 600.
- c. Pecora Corporation; AC-20+.
- d. Tremco Incorporated; Tremflex 834.
- e. Sherwin Williams Company (SherMax Urethanized Elastomeric Sealant).

2.05 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from Polyurethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Tremco Incorporated; Spectrum SimpleSeal.
 - b. Tremco Incorporated; Illmod 600
 - c. Dayton Superior Specialty Chemicals; Polytite Standard.
 - d. Sandell Manufacturing Co., Inc.; Polyseal.

2.06 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. Sherwin-Williams Company, Sher-Max Urethanized Elastomeric Sealant
 - c. Tremco Incorporated; Tremflex 834, Acoustical/Curtain Wall Sealant
 - d. USG Corporation; SHEETROCK Acoustical Sealant.

2.07 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.08 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or

harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations and at perimeters of acoustical Panel edge channels of Acoustical Panel Ceiling systems. with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations.

3.04 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 1 test for each 500 feet of joint length thereafter or 1 test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of

product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.05 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.06 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.07 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in paver and pavement installations.
 - b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Tile control and expansion joints.
 2. Silicone Joint Sealant: Single component, non-sag, traffic grade, neutral curing.
 3. Polyurethane Joint Sealant: Single component, non-sag, traffic grade Single component, pourable, traffic grade.
 4. Preformed Joint Sealant: Preformed foam sealant.
 5. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
1. Joint Locations:
 - a. Joints in pedestrian plazas.
 2. Polyurethane Joint Sealant: Immersible, multicomponent, non-sag, traffic grade.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in dimension stone cladding.
 - d. Joints between metal panels.

- e. Joints between different materials listed above.
 - f. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - g. Control and expansion joints in ceilings and other overhead surfaces.
 - 2. Silicone Joint Sealant: Single component, non-sag, neutral curing, Class 100/50.
 - 3. Polyurethane Joint Sealant: Single component, non-sag, Class 100/50.
 - 4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
- 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - 2. Polyurethane Joint Sealant: Single component, non-sag, traffic grade.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces.
- 1. Joint Locations:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of walls and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 - 2. Joint Sealant: Latex Acrylic based.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal non-traffic surfaces.
- 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - 2. Joint Sealant: Mildew resistant, single component, non-sag, neutral curing, Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal non-traffic surfaces.
- 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Acoustical joint sealant.

3.08 SEALANT INSTALLATION LOG

- A. A tabular log of all sealant installations on the project shall be kept and submitted with the O & M manuals at the completion of the project.
- B. Tabular log shall have columns for:
 - 1. Sealant type
 - 2. Sealant installation location
 - 3. Temperature during installation
 - 4. Date of Installation
 - 5. Manufacturer
 - 6. Sealant color installed.

END OF SECTION 079200

PART 2 PRODUCTS

1.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 5. Substitutions: See Section 016000 - Product Requirements.

1.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 4. Door Edge Profile: Manufacturers standard for application indicated.
 5. Typical Door Face Sheets: Flush.
 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

1.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Door Core Material: Vertical steel stiffeners with fiberglass batts.
 3. Door Thermal Resistance: R-Value of R-6.
 4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
 5. Weatherstripping: Refer to Section 087100.

1.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 - 2. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
 - 3. Weatherstripping: Separate, see Section 087100.

1.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

PART 2 EXECUTION

2.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

2.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 087100.

2.03 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 081113

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hardware for all new doors.
- B. Accessories and miscellaneous trim.

1.02 RELATED SECTIONS

- A. Section 062000 – Finish Carpentry.
- B. Section 081500 – Fiberglass Reinforced Plastic Doors and Frames.

1.03 REFERENCES

- A. American National Standards Institute (ANSI);
 - 1. ANSI A156.3 - National Standard for Exit devices.
 - 2. ANSI A156.4 - National Standard for Door Controls - Closers.
 - 3. ANSI A156.6 - National Standard for Architectural Door Trim.
 - 4. ANSI A156.13 - National Standard for Mortise Locks & Latches.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Fire Doors and Windows.
 - 2. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
 - 3. NFPA 252 - Fire Tests of Door Assemblies.
- C. Underwriters Laboratories (UL):
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 305 - Panic Hardware.

1.04 GENERAL REQUIREMENTS

- A. Keying:
 - 1. General - Locks must incorporate a security system to ensure that keys are used during construction will not open doors after District occupancy. Coordinate permanent locks with District's standard keying.
 - 2. Construction Keys and Inserts - Permanent cylinders with construction inserts are to be assembled into and shipped with all exterior-door locksets. Construction keys are to be shipped with the door locks. Construction insert-extractor keys are to be shipped to the Owner via Registered Mail. Prior to substantial completion, the Contractor shall collect all construction keys and, in the presence of the Owner or Engineer, remove the construction inserts from the lock cylinders and give all construction keys and inserts to the Owner or Engineer.

1.05 SUBMITTALS

- A. Comply with the requirements contained in Section 013300.
- B. Product Data: Submit manufacturers' technical product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finishes. Hardware sets will not be considered for approval without technical product data.

- C. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
 - i. Coordination with access control system.
 2. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- D. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver, store and handle materials in accordance with the requirements of Section 016500.
- B. Packing and marking: Package each item of hardware and each lock set separately in individual containers, complete with necessary screws, keys, instructions, and installation template for spotting mortising tools. Mark each container, identifying installation location of each item. Keep knobs suitably covered during construction period.

1.07 QUALITY ASSURANCE

- A. Coordinate the work with other directly affected Sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
- B. Coordinate Owner's keying requirements during the course of the Work. Furnish the Owner with ten (10) keys. Key all door cylinders to match Owner's master cylinder.
- C. Perform work in accordance with the following requirements:
1. ANSI A117.1
 2. NFPA 101.
 3. NFPA 80.
 4. NFPA 252.
 5. UL 10B.
 6. UL 305.
- D. Regulatory Requirements:
1. Conform to applicable code for requirements applicable to doors and frames.

2. Conform to ANSI A117.1-2003 "Accessible and Useable Buildings and Facilities" for mounting heights and locations of accessories.
- E. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
- F. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware to similar projects for a period of not less than 10 years, and who employs an experienced Architectural Hardware Consultant (AHC) to prepare the hardware schedule submittal and who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements.

1.08 WARRANTY

- A. Provide manufacturer's standard minimum one-year warranty for all hardware.

1.09 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS (GENERAL)

- A. Bolts, screws and other fastenings required for the application of the finish hardware shall be of size and type to fit requirements and shall be of same material and finish as the exposed parts of the hardware that they fasten.
- B. Door hardware: Hand of lock shall be as required. If door hand is changed by proper bulletin or change order before hardware is delivered, furnish such hardware items at no additional expense to Owner.
- C. Strikes: Furnish curved lip strikes with dust box of sufficient length to protect trim on all locks or latches.
- D. Silencers: Use three at single doors, four at pairs of doors on interior frames.
- E. All locks, locksets, latch sets, and bolts shall conform to Federal Specification FF-H-106a/ANSI. All locks shall accept interchangeable, removable cores.
- F. Finishes: Refer to the individual hardware headings for finish designations.

2.02 DOOR HARDWARE

- A. Lockset: Corbin Russwin ML2000 Series mortise lock or approved equal with Lustra lever handle, LWA trim and Best removable core cylinders keyed to District's system. US26D finish, function as noted.
- B. Exit Device: Sargent 8813ETB for single door and Sargent 8904ETB for active leaf of pair of doors, or approved equal, US32D finish.
- C. Hinges - Exterior: Stainless steel 4-1/2" x 4-1/2" heavy weight ball bearing, non-rising stainless-steel pin, Model T4A3386 4.5 X 4.5 NRP, manufactured by McKinney or approved equal, stainless steel machine screws furnished by hinge manufacturer.

- D. Hinges - Interior: Stainless steel 4-1/2" x 4-1/2" standard weight ball bearing, non-rising stainless-steel pin, Model TA2714 4.5 X 4.5, manufactured by McKinney or approved equal, stainless steel machine screws furnished by hinge manufacturer.
- E. Closer - Exterior: Parallel arm application, extra duty hold open, UNI-7500H, 689 finish with SRI pretreatment coating, manufactured by Norton or approved equal.
- F. Closer – Interior Doors: Parallel arm application, extra duty hold open, UNI-7500H, 689 finish with SRI pretreatment coating, manufactured by Norton or approved equal, mount closer on less public side of door.
- G. Overhead Stop: Model 6-series-652 as manufactured by Rixson or approved equal.
- H. Flush Bolts: Inactive leaf of double doors, Model FB01M-26D UL Listed for Metal Doors, metal door extension, flush bolts as manufactured by McKinney or approved equal. Shim and wear plate shall be furnished by hardware manufacturer, top and bottom of door.
- I. Dustproof Strike: Model DPS3-26D as manufactured by McKinney or approved equal.
- J. Astragal: Steel doors use 12-gauge stainless steel, FRP doors use FRP, 2 inches wide, edges rounded, factory finish, supplied by door manufacturer.
- K. Exterior Saddle: Aluminum Model S483AV x opening width as manufactured by Reese or approved equal.
- L. Interior Saddle: Aluminum Model S405A x opening width as manufactured by Reese or approved equal.
- M. Wall Stop: Wall mount as indicated in hardware sets WS03, 626 finish manufactured by McKinney or approved equal.
- N. Weather-stripping: Model 373SS as manufactured by Reese or approved equal mounted with stainless steel self-tapping screws, min. 8" on center.
- O. Door Sweep: Model MCK18061CNB as manufactured by McKinney or approved equal, mounted with stainless steel self-tapping screws, min. 8" on center
- P. Provide matching strikes, screws and brackets for all hardware.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work and dimensions are as indicated.

3.02 INSTALLATION

- A. Where not specified under other sections to be performed by manufacturer or suppliers, machine, fit and drill metal doors.
- B. Prepare doors of various types to receive hardware, using templates and instructions provided with the hardware items for jobsite work.
- C. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as

specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by the Architect/Engineer.

1. Conform to requirements of ANSI A117.1-2003 "Accessible and Useable Buildings and Facilities"
- D. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface mounted items until finishes have been completed on the substrate.
- E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- G. Set thresholds for exterior doors in full bed of butyl rubber or polyisobutylene mastic sealant.

3.03 ADJUSTING

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.04 PROTECTION OF FINISHED WORK

- A. Do not permit adjacent work to damage hardware or finish.

3.05 HARDWARE SETS

- A. Coordinate the Hardware Schedule with the Door Schedule on the Contract Drawings, each set to have:

SET 1

6 ea.	Exterior Hinges
1 ea.	Lockset
1 ea.	Exit Device
1 ea.	Exterior Closer (active leaf)
1 ea.	Overhead Stop
2 ea.	Flush Bolts
1 ea.	Dustproof Strike
1 ea.	Astragal
1 ea.	Exterior Saddle

1 ea. Weather-stripping
2 ea. Door Sweep

END OF SECTION 087100

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Fixed louvers, frames and accessories.

1.03 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axis of the blades are vertical).
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.
- D. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements
- B. Windborne-debris-impact-resistance test reports.

1.06 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.07 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
 2. Wind Loads: Determine loads based on a uniform pressure of 30 lbf/sq. ft. (1436 Pa), acting inward or outward.
- C. Windborne-Debris-Impact Resistance: Louvers located within 30 feet (9.1 m) of grade shall pass enhanced-protection, large-missile testing requirements in ASTM E1996 for Wind Zone 3 when tested according to ASTM E1886. Test specimens shall be no smaller in width and length than louvers indicated for use on Project.
- D. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- E. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
- G. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.03 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant Louver:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Airolite Company, LLC (The)
 - b. Arrow United Industries; a division of Mestek, Inc
 - c. Construction Specialties, Inc
 - d. Greenheck Fan Corporation

- e. Nystrom, Inc.
- f. Ruskin Company; Tomkins PLC.
- 2. Louver Depth: 4 inches.
- 3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
- 4. Louver Performance Ratings:
 - a. Free Area: Not less than 7.0 sq. ft. for 48-inch wide by 48-inch high louver.
 - b. Air Performance: Not more than 0.10-inch wg static pressure drop at 800-fpm free-area intake velocity.
 - c. Wind-Driven Rain Performance: Not less than 95 percent effectiveness when subjected to a rainfall rate of 8 inches per hour and a wind speed of 50 mph at a core-area intake velocity of .
- 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.04 LOUVER SCREENS

- A. General: Provide screen as manufactured by the Louver manufacturer on the interior face of each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Provide and install Bird screening except where Insect screening is indicated.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
 - 3. Type: Rewirable frames with a driven spline or insert.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Stainless steel, 1/2-inch square mesh, 0.0637 inch wire.
 - 2. Insect Screening: Stainless steel, 18 by 18 mesh, 0.009-inch wire.

2.05 MATERIALS

- A. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T5, T-52, or T6.
- B. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- C. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.06 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated.
 - 2. Horizontal Mullions: Provide horizontal mullions at joints where indicated.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
 - 1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
 - 2. Exterior Corners: Prefabricated corner units with mitered and welded blades and with mullions at corners.
- G. Provide subsills made of same material as louvers or extended sills for recessed louvers.
- H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.07 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.
- C. Class I, Clear Anodic Finish: AA-M12C22A41 complying with AAMA 611.
 - 1. Mechanical Finish: Nonspecular as fabricated.
 - 2. Chemical Finish: Etched, medium matte.
 - 3. Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker.
- D. Class I, Color Anodic Finish: AA-M12C22A42/A44 complying with AAMA 611.
 - 1. Mechanical Finish: Nonspecular as fabricated.
 - 2. Chemical Finish: Etched, medium matte.
 - 3. Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker. Color to fall in standard range for color variation in anodic finishes.
 - 4. Color: Dark bronze

- E. Baked-Enamel Finish: AA-C12C42R1x.
 - 1. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.
 - 2. Chemical Finishes: Cleaned with inhibited chemicals and acid-chromate-fluoride-phosphate conversion coating.
 - 3. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss
 - 4. Color: As selected by the Architect from the manufacturer's full range of colors.
- F. Woodgrain Finish:
 - 1. Airowood Woodgrain Finish as manufactured by The Airolite Co.
 - 2. Finish shall comply with AAMA 2604.
 - 3. Wood Grain: AL301 Honey Knotty Pine

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.03 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 - JOINT SEALANTS for sealants applied during louver installation.

3.04 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. 2' x 2' extruded Polyvinyl Chloride (PVC) ceilings complete with suspension systems and related accessories, entire system to be 100% recyclable. Ceiling tile units, suspension system, grid system and wall moldings shall be furnished by a single manufacturer, for a complete ceiling system.
- B. It shall be the Contractor's responsibility to coordinate with all other trades and other contractors hired by the Owner including but not limited to the telephone company, mechanical and air balance personnel, electrical contractor, plumbing contractor and security system installer. Contractor shall remove and replace ceiling panels as required. It shall be the Contractor's responsibility to furnish a finished ceiling with no broken, scarred, marked, or soiled ceiling panels following the total completion of the project.

1.02 REFERENCES

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2020.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2019b.
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- G. Job conditions, preparatory work, and installation techniques shall be in accordance with Acoustical Materials Association Installation Recommendations.

1.03 PROJECT REQUIREMENTS

- A. Ceiling system shall be:
 - 1. 100% waterproof
 - 2. Washable
 - 3. Will never rust, sag, bow or bend due to humidity
 - 4. Mold, bacteria, fungi and mildew resistant
 - 5. Resistant to cleaning agents, acids and other chemicals
 - 6. Impact and damage resistant, non-shedding
 - 7. Insect resistant
 - 8. Free of lead, asbestos and fiberglass
 - 9. Will not rot, peel or flake
 - 10. Flame retardant
 - 11. USDA, FDA, CFIA and Health Department compliant
 - 12. UV-resistant
 - 13. 100% Recyclable
 - 14. Will not show scratches

- 15. No yellowing or color change in corrosive environments
- 16. Factory cut for installation for lay-in suspension grids

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on metal grid system, components, acoustic tile units and accessories.
- C. Samples: Submit two 6" x 6" samples of each ceiling type, illustrating material and finish of acoustic units.
- D. Submit to the Architect/Engineer for approval scaled shop drawings showing layout of suspension system and tile, incorporating light fixtures, grilles and other items mounted through or on acoustical ceiling.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements: Surface Burning Characteristics in Accordance with ASTM E 84 for Class A finish for both flame spread and smoke density.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered and stored under the provisions of Section 016500 - LINOLEUM FLOORING.
- B. All materials shall be delivered to the job in original unopened containers or bundles, labeled to allow easy identification.
- C. Follow manufacturer's instructions on storage of materials; do not store materials in damp or wet areas. Store panels flat on a flat, smooth surface.
- D. Prior to installation, store acoustical units for 24 hours minimum at same temperature and relative humidity as space where Work will be installed.

1.07 ENVIRONMENTAL CONDITIONS

- A. Section 013100 - PROJECT MANAGEMENT AND COORDINATION: Environmental conditions affecting products on site.
- B. Maintain uniform temperature of minimum 60 degrees F and maximum 80 degrees F and maximum humidity of 75 percent prior to, during, and after ceiling system installation.
- C. Sequence work to ensure ceiling system is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- D. Install acoustic units after interior wet work is dry.
- E. Rigidly secure ceiling system including integral mechanical and electrical components with maximum deflection of L/360.

1.08 WARRANTY

- A. Provide manufacturer's standard 25-year limited system warranty to withstand relative humidity without sag, mold/mildew, bacteria or rust.

1.09 EXTRA MATERIALS

- A. Section 017800 - CLOSEOUT SUBMITTALS.
- B. Provide minimum 10 percent of total acoustic unit area of each type of tile to Owner in unopened packages.

PART 2 - PRODUCTS

2.01 STANDARD OF QUALITY

- A. The following acoustic tile specification is based upon products as manufactured by New Ceiling Tiles, LLC, Spring, TX (800) 518-9835. Substitutions shall be considered during bidding as stipulated in section 012500 - PRODUCT SUBSTITUTION PROCEDURES.
- B. Provide PVC ceiling system including tile, grid suspension system and all accessories which shall be manufactured by one manufacturer.

2.02 PVC PANELS

- A. Type 24" x 24" PVC Genesis maintenance free ceiling tile.
- B. Owner shall choose from manufacturer's full line of styles and colors from the Smooth Pro, Printed Pro, Classic Pro & Stucco Pro, Stucco Teg and Contour Teg lines.
- C. Manufactured from extruded, white, virgin-grade, rigid, PVC vinyl with printed surface, 100% recyclable content.

2.03 SUSPENSION SYSTEM

- A. Type Genesis RP 15/16" PVC ceiling grid, Color: White
- B. Suspension system shall not be less in size and strength than required to support itself and shall be increased in size and strength as necessary to support the light fixtures, acoustical units and related items without deflecting more than 1/36" of the span when tested as a simple beam, ends free.
 - 1. Grid: intermediate duty, PVC exposed T; nominal 1 inch width; quick lock keyhole connections.
 - 2. Accessories: Stabilizer bars, hold down clips, and splices.
 - 3. Support System: Main runners, cross tees, edge moldings, spacer bars, variable placement tees, grid adapters, and components.
 - 4. Manufactured from extruded, white, virgin-grade, rigid PVC vinyl.

2.04 HANGERS

- A. Suspension wire attached to power actuated fasteners shall be 12 gauge galvanized pre-straightened wire to support a maximum of 16 sq. ft. of ceiling and 8 gauge galvanized pre-straightened wire to support a ceiling area exceeding 16 sq. ft. No hanger shall support more than 24 sq. ft. of ceiling.

- B. Types of power actuated fasteners shall be subject to the approval of the manufacturer for the type of ceiling installed.

2.05 ACCESSORIES

- A. Provide all accessories, as required or recommended by manufacturer for use/condition including, spacers, hold downs, and wall moldings.
- B. Sealant for Perimeter Moldings: Specified in Section 079000.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Section 013100 - PROJECT MANAGEMENT AND COORDINATION: Verification of existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 INSTALLATION - GRID

- A. Install ceiling system per manufacturer's instructions and to support ceiling and applied fixture loads. Provide hanger wire at all four corners of each light fixture.
- B. Install ceiling tile in accordance with tile layouts shown on Reflected Ceiling Plans and approved shop drawings.
- C. Contractor to coordinate work closely with electrical and mechanical trades to establish and maintain clearances with a minimum of conflict.
- D. Refer to Acoustical Materials Bulletin LXXII (1962) for installation and materials standards.
- E. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- F. Hanger spacing to fall not more than 4'-0" o.c., not more than 2' 0" from ends, and not more than 4'-0" o.c. between ends of main runners and as required to support other work resting in or on ceiling. All four corners of all light fixtures must be supported with hanger wire.
- G. Where conditions prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Do not eccentrically load system, or produce rotation of runners.
- J. Perimeter Molding:
 - 1. Install edge molding at intersection of ceiling and vertical surfaces into bed of acoustic sealant at walls.
 - 2. Use longest practical lengths.
 - 3. Form corners in accordance with manufacturer's installation instructions.

4. Provide at junction with other interruptions.
 5. To be same material and style as grid system.
 6. To be manufactured by the same manufacturer as grid system.
- K. Wall moldings shall be provided at the perimeter of all rooms and shall be securely fastened to walls or as indicated. Finish channel corner plates shall be used at all exterior corners.

3.03 INSTALLATION – PANEL UNITS

- A. Install panel units in accordance with manufacturer's instructions.
- B. Fit units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units one way. Fit border trim neatly against abutting surfaces.
- D. Install units after ceiling grid work is complete.
- E. Install units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting PVC Units:
1. Use utility knife and straight edge; score the finish side of the panel. Bend panel at the score mark and snap apart.
 2. To cut to fit irregular grid and perimeter edge trim, measure distance between T-bar centers, or between the T-bar center and closest edge of wall molding.
 3. Cut with a table or skill saw. Use hole saw to cut penetrations for conduits, recessed light fixtures and other components.
 4. To cut to fit irregular grid and perimeter edge trim.
- G. Reach over the installed panel and snap hold-down clips over grid members.

3.04 CLEANING

- A. Remove all debris from space above ceiling. Vacuum or brush grid and panels to remove dust.
- B. Clean grid and panels of all dirt, finger/hand prints, smudges, etc. with moist cloth and mild soap or other household cleaner. Avoid solvents or lacquer thinner. Spray detergent onto clean rag and wipe. Ceiling system can be power washed.
- C. Tile and trim shall be clean and without blemish at time of acceptance.
- D. At the completion of the finished ceiling work, remove all rubbish from the building, leaving floors broom clean. Excess material, scaffolding, tools and other equipment shall be removed from the building and job site.
- E. Protect ceiling system from subsequent construction activity.

3.05 CONSTRUCTION TOLERANCES

- A. Section 014500 - QUALITY CONTROL: Tolerances.
- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Local kinks or bends shall not be made in hanger wires as a means of leveling main runners. Wire hanger loops shall be tightly wrapped and sharply bent to prevent any vertical movement or rotation of the member within the loops.

D. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 095400

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Epoxy floor coating system.
- B. Surface preparation.

1.02 REFERENCES

- A. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser; 2019.
- B. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2005, with Editorial Revision (2012).

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; warranty, sizes, patterns, and colors available.
- B. Manufacturer's Installation Instruction: Indicate special procedures and perimeter conditions requiring special attention.
- C. Upon request, provide six-inch by six-inch square sample demonstrating floor and cove base final product.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface and suggested schedule for cleaning.

1.04 QUALITY ASSURANCE

- A. The Manufacturer shall have a minimum of 10 years' experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
- B. The Applicator shall have been approved by the flooring system manufacturer in all phases of surface preparation and application of the product specified.
- C. No requests for substitutions shall be considered that would change the generic type of the specified System.
- D. System shall comply with the requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
- E. System shall comply with the Indoor Air Quality requirements of California section 01350 as verified by a qualified independent testing laboratory.
 - 1. A pre-installation conference shall be held between Applicator, General Contractor, and the Owner to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping
- B. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

C. Storage and Protection

1. The Applicator shall be provided with a storage area for all components. The area shall be between 60 F and 90 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
2. Copies of Safety Data Sheets (SDS) for all components shall be kept on site for review by the Engineer or other personnel.
3. Waste Disposal
 - a. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.06 PROJECT CONDITIONS

A. Site Requirements

1. Application may proceed while air, material and substrate temperatures are between 60 F and 90 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
3. The Applicator shall ensure that adequate ventilation is available for the work area.

B. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.

1. Conditions of new concrete to be coated with epoxy material.
 - a. Concrete shall be moisture cured for a minimum of 7 days and have fully cured a minimum of twenty-eight days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
2. Concrete shall have a flat rubbed finish, float, or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
3. Sealers and curing agents should not be used.
4. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements

1. All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
 - a. "No Smoking" signs shall be posted at the entrances to the work area.
2. The Owner shall be responsible for the removal of foodstuffs from the work area.
3. Non-related personnel in the work area shall be kept to a minimum.

1.07 WARRANTY

A. Provide 5-year installer and materials warranty.

B. Warranty: Include coverage against flooring delamination from substrate and degradation of surface finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Dur-A-Quartz as manufactured by Dur-A-Flex.
- B. Ceramic Carpet #400 as manufactured by Sherwin Williams.
- C. Or approved equal.

2.02 MATERIALS

- A. Floor Coating: 100% solids seamless epoxy resin.
 - 1. Compressive Strength: ASTM C579 - 12,500 psi.
 - 2. Hardness: ASTM D2240 - 75 - 90; D.
 - 3. Thickness: 3/16-inch nominal thickness.
- B. Aggregate: Quartz, ASTM D451, manufactured by 3M Company or approved equal; color as selected by Architect/Engineer from manufacturer's full line.
- C. Top Coat: Dur-A-Flex Poly-Thane 2 or Sherwin Williams GP4638 Urethane Seal Coat.

2.03 ACCESSORIES

- A. Primers and Fillers: Waterproof; types recommended by flooring manufacturer.
- B. Expansion Joints/Joint Fillers: Types recommended by flooring manufacturer for specific application.

2.04 PRODUCT REQUIREMENTS

A. Primer	Dur-A-Glaze #4 WB
1. Percent Solids	56 %
2. VOC	2 g/L
3. Bond Strength to Concrete ASTM D4541	550 psi, substrates fails
4. Hardness, ASTM D3363	3H
5. Elongation, ASTM D2370	9 %
6. Flexibility (1/4: Cylindrical mandrel), ASTM D 1737	Pass
7. Impact Resistance, MIL D2794	>160
8. Abrasion Resistance ASTM D4060,	
a. CS17-wheel, 1,000g Load:	30 mg loss
B. Broadcast Coat and Grout Coat	Dur-A-Glaze #4
1. Percent Solids	100 %
2. VOC	0 g/L
3. Compressive Strength, ASTM D 695	16,000 psi
4. Tensile Strength, ASTM D 638	3,700 psi
5. Flexural Strength, ASTM D 790	4,700 psi
6. Abrasion Resistance, ASTM D 4060,	
a. C-10 Wheel, 1,000 gm load, 1,000 cycles	35 mg loss
7. Flame Spread/NFPA-101, ASTM E 84	Class A
8. Izod Impact ASTM D-256	0.50
9. Water Absorption ASTM D-570	0.04%
10. Pot life @ 70 F	20 minutes
C. Topcoat	Armor Top
1. Percent Solids	95.2 %
2. VOC	0 g/L
3. Tensile Strength, ASTM D 2370	7,000 psi
4. Adhesion, ASTM 4541	Substrate Failure
5. Hardness, ASTM D 3363	>4H
6. 600 Gloss ASTM D 523	Satin 50+/-10/Gloss 75+/-10
7. Abrasion Resistance, ASTM D4060,	Gloss Satin
a. CS 17 wheel (1,000 g load) 1,000 cycles	4 8 mg loss with grit

- 8. Pot Life, 70 F, 50% RH
- 9. Full Chemical Resistance

10 12 mg loss w/o grit
45 minutes
7 days

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
- B. Verify that surfaces are smooth and flat with maximum variation of ¼ inch in 10 feet and are ready to receive work.
- C. Verify concrete floors have cured a minimum of 28 days, are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.

3.02 PREPARATION

- A. General
 - 1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
 - 2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
 - a. Perform anhydrous calcium chloride test ASTM F 1869-98. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 3 lbs./1,000 sf/24 hrs.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
 - c. If the vapor emission exceeds 75 % relative humidity or 3 lbs./1,000 sf/24 hrs. then Dur-A-Flex, Inc Dur-A-Glaze MVP Primer moisture mitigation system must be installed prior to resinous flooring installation. Slab-on grade substrates without a vapor barrier may also require the moisture mitigation system.
 - 3. There shall be no visible moisture present on the surface at the time of application of the system. Compressed oil-free air and/or a light passing of a propane torch may be used to dry the substrate.
 - 4. Mechanical surface preparation
 - a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-4 as described by the International Concrete Repair Institute.
 - b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
 - c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
 - d. Cracks and joints (non-moving) greater than 1/8-inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
 - 5. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

3.03 INSTALLATION FLOORING

A. General

1. The system shall be applied in six distinct steps as listed below:
 - a. Substrate preparation
 - b. Priming
 - c. First broadcast coat application with first aggregate broadcast
 - d. Second broadcast coat with second aggregate broadcast
 - e. Grout coat application, sand floor (if required)
 - f. Topcoat application
2. Immediately prior to the application of any component of the system, the surface shall be dry, and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Primer

1. The primer shall consist of a liquid resin and hardener that is mixed at the ratio of 1 part resin to 4 parts hardener per the manufacturer's instructions.
2. The primer shall be applied by 1/8-inch notched squeegee and back rolled at the rate of 200-250 sf/gal to yield a dry film thickness of 4 mils.

C. Broadcast Coat

1. The broadcast coat shall be applied as a double broadcast system as specified by the Architect.
2. The broadcast coat shall be comprised of two components, a resin, and hardener as supplied by the Manufacturer and mixed in the ratio of 2 parts resin to 1 part hardener.
3. The resin shall be added to the hardener and thoroughly mixed by suitably approved mechanical means.
4. The broadcast coat shall be applied over horizontal surfaces using "v" notched squeegee and back rolled at the rate of 90-100 sf/gal.
5. Colored quartz aggregate shall be broadcast to excess into the wet material at the rate of 0.5 lbs./sf.
6. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
7. Apply a second coat of resin with a coverage rate of 50 sf/gal and broadcast aggregate to excess at the rate of 0.5 lbs./sf.
8. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

D. Grout Coat

1. The grout coat shall be comprised of a liquid resin and a liquid hardener that is mixed in the ratio of 1 part hardener to 2 parts resin and installed per the manufacturer's recommendations.
2. The grout coat shall be squeegee applied and back rolled with a coverage rate of 50 sf/gal.

E. Topcoat

1. The topcoat of Armor Top shall be roller applied at the rate of 500 sf/gal to yield a dry film thickness of 3 mils.
2. The topcoat shall be comprised of a liquid resin, hardener and grit that is mixed per the manufacturer's instructions.

- 3. The finish floor will have a nominal thickness of 3/16 inch.
- F. Form integral ¼ inch radius cove base 4 inches high with same materials as floor coating. Apply three finish coats minimum and spread aggregate uniformly.
- G. Install expansion joints and/or joint filler as per manufacturer's instructions.

3.04 FIELD QUALITY CONTROL

- A. Tests, Inspection
 - 1. The following tests shall be conducted by the Applicator:
 - a. Temperature
 - 1) Air, substrate temperatures and, if applicable, dew point.
 - 2. Coverage Rates
 - a. Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.05 PROTECTION OF FINISHED WORK

- A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
- B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.
- C. Protect finished work until work is complete and cured.
- D. Prohibit traffic on floor finish for 48 hours after installation, or as per manufacturer's instructions.
- E. Barricade area to protect flooring until fully cured.

END OF SECTION 096716

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Exterior coating.
- C. Piping, Valves and Fittings.

1.02 RELATED SECTIONS

- A. Section 013300 - Submittals
- B. Section 016100 - Basic Product Requirements
- C. Section 016500 - Product Delivery, Storage and Handling
- D. Section 221113 - Facility Piping
- E. Section 221000 - Gas Piping
- F. Section 402323 - Large Piping and Fittings
- G. Section 402324 - Valves and Valve Accessories

1.03 REFERENCES

- A. ANSI/NSF 61 - Drinking Water System Components - Health Effects
- B. AWWA - C115 - Standard for Flanged Pipe
- C. NACE No. 2/SSPC SP10 - Near-white Blast Cleaning.
- D. NACE No. 3/SSPC SP6 - Commercial Blast Cleaning.
- E. SSPC PA - 1 - Shop, Field, and Maintenance Painting of Steel
- F. SSPC PA 2 - Method for Measuring of Dry Paint Thickness with Magnetic Gages
- G. SSPC VOL 1 - Good Painting Practices - 2002 4th Edition latest edition
- H. SSPC VOL 2 - Systems and Specifications - 2005 Edition latest edition
- I. SSPC SP 3 - Power Tool Cleaning
- J. SSPC SP 2 - Hand Tool Cleaning
- K. SSPC VIS 1-89 - Visual Standard for Abrasive Blast Cleaned Steel.
- L. ASTM D4417-03 – Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
- M. ASTM E1216-99(2005) - Standard Practice for Sampling for Particulate Contamination by Tape Lift

- N. NACE SP0188-99 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide material data sheets (MDS) and material safety data sheets (MSDS), issued by the manufactures, for all materials and accessories that are to be used.
- C. Samples: Provide a color chart for paint color selection by the Owner and Engineer for approval prior to all aspects of painting.
- D. Manufacturer's instructions: Indicate surface preparation and paint application.
- E. Submit a detailed plan on the method(s) to be employed to protect adjacent equipment and surfaces including, but not limited to, the following:
 - 1. Method of surface preparation.
 - 2. Method of paint application.
 - 3. Quality Control Plan for all phases of construction operations.
- F. Submit detailed daily reports weekly, to include the following:
 - 1. The daily work location, date, start time and finish time, ambient conditions including wet bulb temperature, dry bulb temperature, and steel surface temperature, including hold point inspection observations.
 - 2. All surface preparation operations including location, date, start time and finish time.
 - 3. The date, start time and finish time for all painting operations, including location, wet bulb temperature, dry bulb temperature, and steel surface temperature, of the each coat applied.
 - 4. The name, type, batch numbers, manufacturer's name and amount of coatings used for each application.
- G. The Contractor shall submit to the Engineer letters from manufacturers certifying that the paint being supplied for this project conforms completely to specifications.

1.05 REGULATORY REQUIREMENTS

- A. All coatings shall comply with VOC regulations as promulgated by the Ozone Transport Commission, effective January 2005.

1.06 CERTIFICATES

- A. The Contractor shall submit to the Engineer, immediately upon completion of the job, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to properly coat all surfaces.
- B. Certification shall make reference to the square footage figures provided to the manufacturer by the Contractor.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to the site under provisions of Sections 016100 and 016500.

- B. All materials furnished by the Contractor shall be brought to the job site in the original sealed and labeled containers of the paint manufacturer and shall be subject to inspection by the Engineer.
- C. Every container of coatings materials shall have the batch number imprinted on the can, as well as the Federal Specification Number. Colors, where not specified, shall be as selected by the Engineer or Owner.
- D. Store all materials as recommended by the manufacturer. Any materials stored improperly shall be removed from the site immediately. Maintain storage location and temperature log at storage site available for inspection.
- E. The Contractor shall supply the Owner with two (2) one gallon paint kits of each of the exterior, intermediate and finished coats in each color.

1.08 WARRANTY

- A. Provide a 1-year labor and manufacturer's materials warranty for the coating systems.
- B. Warranties are to be submitted in writing to the Engineer prior to product delivery.
- C. Any defects, failures, breakdowns, or discrepancies of the paint or coatings, that reveal themselves within the 1-year warranty period after acceptance of work shall be promptly repaired at no additional cost to the Owner.
- D. Touch up procedures shall be issued by the engineer for areas of coating defects, breakdowns, or discrepancies to be repaired, only if the accumulative areas are less than five square feet, or if the engineer permits.
- E. Remove the entire coating in the area where failure occurs. Touch-up work will not be permitted. The surface is to be prepared as originally scheduled.

PART 2 - PRODUCTS

2.01 COATING REQUIREMENTS

- A. All coating systems submitted for use shall be new for the project described. Two component coating materials shall be mixed in accordance with the manufacturer's data sheet. No partial kits shall be permitted to be used.
- B. All coating systems submitted for use shall conform and meet the minimum requirements specified by the Engineer for:
 - 1. Adhesion - ASTM-D-3359 and 4541
 - a. Minimum 900 psi as measured with a Type 2 tester
 - 2. Hardness - ASTM-D-3363, 2583, and 2240
 - a. Exterior Finish Coating - No gouging or scratching with an 8H or less pencil
 - 3. Flexibility - ASTM-D-522 and FED-STD-6221
 - a. Exterior Finish Coating - No less than 34% elongation, average of three tests
 - b. Impact Resistance - ASTM-D-2754
 - c. Exterior Coating - No visible cracking or delamination of film after 34 inch pounds or less direct impact.
 - 4. Abrasion Resistance - ASTM-D 968 and 4060
 - a. No More than 100 mg loss after 1000 cycles

2.02 MANUFACTURERS

- A. TNEMEC COMPANY, INC
- B. SHERWIN WILLIAMS
- C. Coating substitutions shall be permitted only after receiving written approval from the Engineer prior to bid.

2.03 MATERIALS - CARBON STEEL AND BLACK IRON PIPING

- A. TNEMEC Paint System - Three full coats, one stripe coat.
 - 1. Tnemec Series 94H2O, Hydro-Zinc, 2.5 - 3.5 mils DFT
 - 2. Tnemec Series 27FC Typoxy Stripe Coat (Contrasting Color)
 - 3. Tnemec Series 27FC Typoxy, 3.0 - 5.0 mils DFT
 - 4. Tnemec Series 72 Low VOC Acrylic Urethane, 2.5 - 5.0 mils DFT
- B. SHERWIN-WILLIAMS Paint System - Three full coats, one stripe coat.
 - 1. Sherwin-Williams Corothane 1 Galvapak B65G11, 2.5 - 3.5 mils DFT
 - 2. Sherwin-Williams Macropoxy 646 Stripe Coat (Contrasting Color)
 - 3. Sherwin-Williams Macropoxy 646, 3.0 - 5.0 mils DFT
 - 4. Sherwin-Williams Acrolon 218HS, 2.5 - 5.0 mils DFT

2.04 MATERIALS - DUCTILE IRON PIPING

- A. TNEMEC Paint System - Two full coats, one stripe coat.
 - 1. Tnemec Series 27FC Typoxy, 4.0 - 6.0 mils DFT
 - 2. Tnemec Series 27FC Typoxy Stripe Coat (Contrasting Color)
 - 3. Tnemec Series 72 Low VOC Acrylic Urethane, 3.0 - 5.0 mils DFT
- B. SHERWIN-WILLIAMS Paint System - Two full coats, one stripe coat.
 - 1. Sherwin-Williams Macropoxy 646, 4.0 - 6.0 mils DFT
 - 2. Sherwin-Williams Macropoxy 646 Stripe Coat (Contrasting Color)
 - 3. Sherwin-Williams Acrolon 218HS, 3.0 - 5.0 mils DFT

2.05 MATERIALS - PVC & COPPER PIPING (CHEMICAL PROCESS)

- A. TNEMEC Paint System - Two full coats
 - 1. Tnemec Series 115 Uni-bond, 2.0 - 4.0 mils DFT
 - 2. Tnemec Series 1028 or 1029 Enduratone, 2.0 - 3.0 DFT
- B. SHERWIN-WILLIAMS Paint System - Two full coats
 - 1. Sherwin-Williams DTM Primer/Finish, 2.5 - 5.0 mils DFT
 - 2. Sherwin-Williams DTM Acrylic Semi-Gloss, 1.5 - 2.5 mils DFT

2.06 ACCESSORIES

- A. Seam Sealer/Caulk: Shall be as recommended by the coating manufacturer.

2.07 TESTING

- A. The Engineer shall have the right to take random samples of paint from the painter's bucket as it is being applied to the steel structure, tank or mechanical piping. These samples will be sent to the paint manufacturer for analysis to determine constituents and type of coating.

- B. No material of any kind shall be used until it has been inspected and accepted by the Engineer. All materials rejected shall be immediately removed from the work and not again offered for inspection.

2.08 ACCESSORY MATERIALS

- A. Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, cleaning solvents, and remove waste as required to perform the work to achieve the results specified herein. Materials not specifically indicated but required to achieve the finishes specified shall be of commercial quality and as recommended by the manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall verify existing ambient condition and substrate conditions prior to proceeding with any work and submit to Engineer/representative prior to requesting Engineer's/representative's verification.
- B. Contractor shall verify substrate is properly prepared, properly cleaned, and or properly coated in accordance with project specifications prior to proceeding with any additional work and prior to requesting Engineer's/representative's verification.
- C. Should the contractor request verification from Engineer/representative and work is not in conformance with requirements contractor shall pay \$500 per occurrence to cover the costs to the owner.

3.02 PREPARATION - GENERAL

- A. Surface Preparation Schedule:
 - 1. Carbon Steel: Shall be abrasive blast cleaned to SSPC SP-6 (commercial blast cleaning) to achieve an angular surface profile between 1.5 - 3 mils.
 - 2. Ductile Iron: All damaged primer and or connections shall be cleaned to SSPC SP-3 (Power Tool Cleaning)
 - 3. Galvanized Steel: Shall be cleaned in accordance with SSPC SP-1 (Solvent Cleaning) and may also require SSPC SP-7 (Brush off Blasting) as deemed necessary by the engineer or owner.
 - 4. Copper & PVC: Shall be cleaned in accordance with SSPC SP-1 (Solvent Cleaning) and SSPC SP-2 (Hand Tool Cleaning) to achieve a uniformly scarified surface.
- B. Cleaned surfaces, when viewed without magnification, shall be free of all visible paint oil, grease, dirt, mill scale, rust, oxides, corrosion products and other foreign matter as noted in Chapter 2, SSPC Painting Manual Volume 2.
- C. Pit filler shall be applied to all voids that are greater than $\frac{1}{4}$ of the original steel surface thickness.
- D. The pit filler shall be applied prior to the application of the first coat and in accordance with manufacturer's instructions. If the manufacturer's instructions differ from the project specifications, the more stringent will apply.
- E. All areas shall be cleaned prior to any coating application. All surfaces to be painted shall be dry.

- F. Weld projections or irregular portions of welds, or any steel defects that would interfere with the proper coating shall be ground smooth, as directed.

3.03 APPLICATION

- A. Apply coating in strict conformance with the manufacturer's instructions and requirements. If the manufacturer's instructions differ from the project specifications, the more stringent will apply.
- B. Before coating is applied to surfaces, steps shall be taken, either by circulation of dry air or by the application of heat, to dry the metal surfaces completely.
- C. No coatings shall be applied when the surface temperature is less than 5 degrees Fahrenheit (3 degrees Celsius) above the dew point.
- D. No coatings shall be applied when the relative humidity is above 85% or as recommended by manufacturer.
- E. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer. Do not apply exterior coatings when unfavorable weather conditions are forecast within 24 hours of application.
- F. No surfaces shall be coated that are not in compliance with SSPC surface preparation standards or any other part of the project specifications.
- G. All coatings shall be applied at the rate specified. Deficiencies in film thickness shall be corrected with the proper surface preparation and application of an additional coating or as directed by the Engineer. Coatings in excess of the specified range shall be corrected at the direction of the Engineer.
- H. All coating applications shall be inspected and approved by the Engineer prior to the application of any succeeding coats. All coats shall be applied to the dry film thickness specified.
- I. The minimum and maximum total dry film thickness shall be as indicated in this section. The Mil Gauge shall be calibrated in accordance with the National Institute of Standard and Technology. The Contractor shall have available on the job site a satisfactory magnetic type Mil Gauge for measuring film thickness.
- J. A brush applied stripe coat, of different color, shall be applied to all weld seams, edges, seams, or any non conforming surfaces deemed necessary by the Engineer. The stripe coat shall be applied after the first coat but prior to the second coat.
- K. The coating shall be applied as a continuous film of uniform thickness. Any holidays or areas missed in the application shall be recoated within the maximum re-coat time or be corrected with the proper surface preparation and cleaning prior to the application of the subsequent coating.
- L. All coatings that are specified shall only be acceptable in the number of coats specified in the contract documents.
- M. Color Coding of Process Piping shall be in accordance with Ten States Standards as follows:

Service	Color
Raw Water	Olive Green
Potable Water	Dark Blue

Lime	Light Green
Blowoff/Waste	Light Brown
Chlorine	Yellow
Drainage and Waste	Dark Gray
Orthophosphate	Light Green w/red band

3.04 CLEANING

- A. All surfaces shall be free of all dirt, oil, debris, or any other foreign matter prior to the application of any coating.
- B. The Contractor shall maintain his work area in a neat, orderly fashion. Accumulation of debris, muck, rust, scale, etc., shall be frequently (not to exceed 1 week) cleaned up and removed from the site. Thinners used to clean equipment shall be held in sealed containers and removed from the site to an approved disposal area by the Contractor. Provide certificates from the disposal site indicating that the material has been properly disposed of.
- C. Upon completion of the work, all excess material, rigging, empty containers, cables, tarps, etc., shall be removed from the site. Buildings and grounds shall be left in as good condition as when work was started.

3.05 FIELD QUALITY CONTROL

- A. The Engineer will inspect the painting as it is being performed.
- B. The Engineer reserves the right to accept each phase of the work before further work may be conducted, to halt all Work deemed to be improper or not in compliance with project specifications, and to require the contractor to promptly correct all improper practices or deficient work. Contractor shall notify the Engineer's/representative's 24 hours minimum prior to the following:
 - 1. Prior to the start of work
 - 2. Immediately following surface preparation
 - 3. Immediately prior to each coating or lining application
 - 4. Following the application of each coat
 - 5. Following the curing of the coating or lining
- C. The Engineer reserves the right to conduct any testing, both destructive and nondestructive, at any time for inspection or evaluation purposes.
- D. Any expenses incurred for corrective measures required as the result of improper practices and/or defective or deficient work shall be borne by the contractor and the extent of these corrective measures shall be at the discretion of the engineer.
- E. The contractor shall provide safe access to all areas, including but not limited to, equipment, containers and spaces for inspection at any time as deemed necessary by the engineer or his representative
- F. Sufficient lighting shall be provided to ensure proper safety conditions and permit inspection.
- G. All manholes and other tank openings shall remain open as necessary during cleaning, painting and curing operations.

END OF SECTION 099744

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation
- B. Interior and Exterior coatings
- C. Manganese Removal Vessels

1.02 RELATED SECTIONS

- A. Section 013300 - Submittals
- B. Section 016100 - Basic Product Requirements
- C. Section 016500 - Product Delivery, Storage and Handling
- D. Section 466121 - Manganese Removal System

1.03 REFERENCES

- A. ANSI/NSF 61 - Drinking Water System Components - Health Effects
- B. AWWA - C115 - Standard for Flanged Pipe
- C. NACE No. 2/SSPC SP10 - Near-white Blast Cleaning.
- D. NACE No. 3/SSPC SP6 - Commercial Blast Cleaning.
- E. SSPC PA - 1 - Shop, Field, and Maintenance Painting of Steel
- F. SSPC PA 2 - Method for Measuring of Dry Paint Thickness with Magnetic Gages
- G. SSPC VOL 1 - Good Painting Practices - 2002 4th Edition latest edition
- H. SSPC VOL 2 - Systems and Specifications - 2005 Edition latest edition
- I. SSPC SP 3 - Power Tool Cleaning
- J. SSPC SP 2 - Hand Tool Cleaning
- K. SSPC VIS 1-89 - Visual Standard for Abrasive Blast Cleaned Steel.
- L. ASTM D4417-03 - Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
- M. ASTM E1216-99(2005) - Standard Practice for Sampling for Particulate Contamination by Tape Lift
- N. NACE SP0188-99 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.

- B. Product Data: Provide material data sheets (MDS) and material safety data sheets (MSDS), issued by the manufactures, for all materials and accessories that are to be used.
- C. Samples: Provide a color chart for paint color selection by the Owner and Engineer for approval prior to all aspects of painting.
- D. Manufacturer's instructions: Indicate surface preparation and paint application.
- E. Submit a detailed plan on the method(s) to be employed to protect adjacent equipment and surfaces including, but not limited to, the following:
 - 1. Method of surface preparation.
 - 2. Method of paint application.
 - 3. Quality Control Plan for all phases of construction operations.
- F. Submit detailed daily reports weekly, to include the following:
 - 1. The daily work location, date, start time and finish time, ambient conditions including wet bulb temperature, dry bulb temperature, and steel surface temperature, including hold point inspection observations.
 - 2. All surface preparation operations including location, date, start time and finish time.
 - 3. The date, start time and finish time for all painting operations, including location, wet bulb temperature, dry bulb temperature, and steel surface temperature, of the each coat applied.
 - 4. The name, type, batch numbers, manufacturer's name and amount of coatings used for each application.
- G. The Contractor shall submit to the Engineer letters from manufacturers certifying that the paint being supplied for this project conforms completely to specifications.

1.05 REGULATORY REQUIREMENTS

- A. All coatings shall comply with VOC regulations as promulgated by the Ozone Transport Commission, effective January 2005.

1.06 CERTIFICATES

- A. The Contractor shall submit to the Engineer, immediately upon completion of the job, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to properly coat all surfaces.
- B. Certification shall make reference to the square footage figures provided to the manufacturer by the Contractor.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to the site under provisions of Sections 016100 and 016500.
- B. All materials furnished by the Contractor shall be brought to the job site in the original sealed and labeled containers of the paint manufacturer and shall be subject to inspection by the Engineer.
- C. Every container of coatings materials shall have the batch number imprinted on the can, as well as the Federal Specification Number. Colors, where not specified, shall be as selected by the Engineer or Owner.

- D. Store all materials as recommended by the manufacturer. Any materials stored improperly shall be removed from the site immediately. Maintain storage location and temperature log at storage site available for inspection.

1.08 WARRANTY

- A. Provide a 1-year labor and manufacturer's materials warranty for the coating systems.
- B. Warranties are to be submitted in writing to the Engineer prior to product delivery.
- C. Any defects, failures, breakdowns, or discrepancies of the paint or coatings, that reveal themselves within the 1-year warranty period after acceptance of work shall be promptly repaired at no additional cost to the Owner.
- D. Touch up procedures shall be issued by the engineer for areas of coating defects, breakdowns, or discrepancies to be repaired, only if the accumulative areas are less than five square feet, or if the engineer permits.
- E. Remove the entire coating in the area where failure occurs. Touch-up work will not be permitted. The surface is to be prepared as originally scheduled

PART 2 - PRODUCTS

2.01 COATING REQUIREMENTS

- A. All coating systems submitted for use shall be new for the project described. Two component coating materials shall be mixed in accordance with the manufacturers data sheet. No partial kits shall be permitted to be used.
- B. All coating systems submitted for use shall conform and meet the minimum requirements specified by the Engineer for:
 - 1. Adhesion - ASTM-D-3359 and 4541
 - a. Minimum 900 psi as measured with a Type 2 tester
 - 2. Hardness - ASTM-D-3363, 2583, and 2240
 - a. Exterior Finish Coating - No gouging or scratching with an 8H or less pencil
 - 3. Flexibility - ASTM-D-522 and FED-STD-6221
 - a. Exterior Finish Coating - No less than 34% elongation, average of three tests
 - b. Impact Resistance - ASTM-D-2754
 - c. Interior Coating – No visible cracking or delamination of film after 25 inch pounds or less direct impact.
 - d. Exterior Coating - No visible cracking or delamination of film after 34 inch pounds or less direct impact.
 - 4. Abrasion Resistance - ASTM-D 968 and 4060
 - a. No More than 100 mg loss after 1000 cycles

2.02 MANUFACTURERS

- A. TNEMEC COMPANY, INC
- B. SHERWIN-WILLIAMS
- C. Coating substitutions shall be permitted only after receiving written approval from the Engineer prior to bid.

2.03 MATERIALS - MANGANESE REMOVAL VESSELS - EXTERIOR

- A. TNEMEC Exterior Paint System - Three full coats, one stripe coat.
 - 1. TNEMEC Series 94H2O, Hydro-Zinc, 2.5 - 3.5 mils DFT.
 - 2. TNEMEC Series 27FC Typoxy Stripe Coat (Contrasting Color)
 - 3. TNEMEC Series 27FC Typoxy, 3.0 - 5.0 mils DFT
 - 4. TNEMEC Series 72 Low VOC Acrylic Urethane, 2.5 - 5.0 mils DFT
- B. SHERWIN-WILLIAMS Paint System - Three full coats, one stripe coat.
 - 1. Sherwin-Williams Corothane 1 Galvapak B65G11 or Zinc Clad IV (85), 2.5 - 3.5 mils DFT
 - 2. Sherwin-Williams Macropoxy 646 Stripe Coat (Contrasting Color)
 - 3. Sherwin-Williams Macropoxy 646, 3.0 - 5.0 mils DFT
 - 4. Sherwin-Williams Acrolon 218HS, 2.5 - 5.0 mils DFT

2.04 ACCESSORIES

- A. Seam Sealer/Caulk: Shall be as recommended by the coating manufacturer.

2.05 TESTING

- A. The Engineer shall have the right to take random samples of paint from the painter's bucket as it is being applied to the steel structure, tank or mechanical piping. These samples will be sent to the paint manufacturer for analysis to determine constituents and type of coating.
- B. No material of any kind shall be used until it has been inspected and accepted by the Engineer. All materials rejected shall be immediately removed from the work and not again offered for inspection.

2.06 ACCESSORY MATERIALS

- A. Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, cleaning solvents, and remove waste as required to perform the work to achieve the results specified herein. Materials not specifically indicated but required to achieve the finishes specified shall be of commercial quality and as recommended by the manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall verify existing ambient condition and substrate conditions prior to proceeding with any work and submit to Engineer's/representative's prior to requesting Engineer's/representative's verification.
- B. Contractor shall verify substrate is properly prepared, properly cleaned, and or properly coated in accordance with project specifications prior to proceeding with any additional work and prior to requesting Engineer's/representative's verification.
- C. Should the contractor request verification from Engineer's/representative's and work is not in conformance with requirements contractor shall pay \$500 per occurrence to cover the costs to the owner.

3.02 PREPARATION - GENERAL

- A. Surface Preparation Schedule:

1. Manganese Removal Vessels - Exterior: Shall be abrasive blast cleaned to SSPC SP-6 (commercial blast cleaning) to achieve an angular surface profile between 1.5 - 3 mils.
- B. Cleaned surfaces, when viewed without magnification, shall be free of all visible paint oil, grease, dirt, mill scale, rust, oxides, corrosion products and other foreign matter as noted in Chapter 2, SSPC Painting Manual Volume 2.
- C. Pit filler shall be applied to all voids that are greater than $\frac{1}{4}$ of the original steel surface thickness.
- D. The pit filler shall be applied prior to the application of the first coat and in accordance with manufacturer's instructions. If the manufacturer's instructions differ from the project specifications, the more stringent will apply.
- E. All areas shall be cleaned prior to any coating application. All surfaces to be painted shall be dry.
- F. Weld projections or irregular portions of welds, or any steel defects that would interfere with the proper coating shall be ground smooth, as directed.

3.03 APPLICATION

- A. Apply coating in strict conformance with the manufacturer's instructions and requirements. If the manufacturer's instructions differ from the project specifications, the more stringent will apply.
- B. Before coating is applied to surfaces, steps shall be taken, either by circulation of dry air or by the application of heat, to dry the metal surfaces completely.
- C. No coatings shall be applied when the surface temperature is less than 5 degrees Fahrenheit (3 degrees Celsius) above the dew point.
- D. No coatings shall be applied when the relative humidity is above 80% or as recommended by manufacturer.
- E. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer. Do not apply exterior coatings when unfavorable weather conditions are forecast within 24 hours of application.
- F. No surfaces shall be coated that are not in compliance with SSPC surface preparation standards or any other part of the project specifications.
- G. All coatings shall be applied at the rate specified. Deficiencies in film thickness shall be corrected with the proper surface preparation and application of an additional coating or as directed by the Engineer. Coatings in excess of the specified range shall be corrected at the direction of the Engineer.
- H. All coating applications shall be inspected and approved by the Engineer prior to the application of any succeeding coats. All coats shall be applied to the dry film thickness specified.
- I. The minimum and maximum total dry film thickness shall be as indicated in this section. The Mil Gauge shall be calibrated in accordance with the National Institute of Standard and Technology. The Contractor shall have available on the job site a satisfactory magnetic type Mil Gauge for measuring film thickness.

- J. A brush applied stripe coat, of different color, shall be applied to all weld seams, edges, seams, or any non conforming surfaces deemed necessary by the Engineer. The stripe coat shall be applied after the first coat but prior to the second coat.
- K. The coating shall be applied as a continuous film of uniform thickness. Any holidays or areas missed in the application shall be recoated within the maximum re-coat time or be corrected with the proper surface preparation and cleaning prior to the application of the subsequent coating.
- L. All coatings that are specified shall only be acceptable in the number of coats specified in the contract documents.
- M. All coatings shall be checked and verified with a High-Voltage Holiday detector by the Contractor. Testing shall be performed in accordance with NACE SPO188. All Holidays indicated shall be repaired. These areas shall be re-tested after the appropriate curing time. The coating system must pass the Holiday test of the existing coating thickness. The coating system must pass the Holiday test of the newly applied coating thickness.
- N. The Engineer may conduct a final high-voltage Holiday detection in accordance with NACE SPO188 after delivery to the site. The coating must pass the Holiday test regardless of the existing coating thickness. Any Holidays detected by the Engineer shall be repaired by the fabricator/supplier.

3.04 CLEANING

- A. All surfaces shall be free of all dirt, oil, debris, or any other foreign matter prior to the application of any coating.
- B. The Contractor shall maintain his work area in a neat, orderly fashion. Accumulation of debris, muck, rust, scale, etc., shall be frequently (not to exceed 1 week) cleaned up and removed from the site. Thinners used to clean equipment shall be held in sealed containers and removed from the site to an approved disposal area by the Contractor. Provide certificates from the disposal site indicating that the material has been properly disposed of.
- C. Upon completion of the work, all excess material, rigging, empty containers, cables, tarps, etc., shall be removed from the site. Buildings and grounds shall be left in as good condition as when work was started.

3.05 FIELD QUALITY CONTROL

- A. The Engineer will inspect the painting as it is being performed.
- B. The Engineer reserves the right to accept each phase of the work before further work may be conducted, to halt all Work deemed to be improper or not in compliance with project specifications, and to require the contractor to promptly correct all improper practices or deficient work. Contractor shall notify the Engineer's/representative's 24 hours minimum prior to the following:
 - 1. Prior to the start of work
 - 2. Immediately following surface preparation
 - 3. Immediately prior to each coating or lining application
 - 4. Following the application of each coat
 - 5. Following the curing of the coating or lining
- C. The Engineer reserves the right to conduct any testing, both destructive and nondestructive, at any time for inspection or evaluation purposes.

- D. Any expenses incurred for corrective measures required as the result of improper practices and/or defective or deficient work shall be borne by the contractor and the extent of these corrective measures shall be at the discretion of the engineer.
- E. The Contractor shall provide safe access to all areas, including but not limited to, equipment, containers and spaces for inspection at any time as deemed necessary by the Engineer or his representative
- F. Sufficient lighting shall be provided to ensure proper safety conditions and permit inspection.
- G. All manholes and other tank openings shall remain open as necessary during cleaning, painting and curing operations.

END OF SECTION 099745

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Right-to-know tank and chemical system signs.

1.02 REFERENCES

- A. NFPA 704.

1.03 RELATION SECTIONS

- A. Section 220553 - Identification for Mechanical Piping & Equipment

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Seton Name Plate Co., New Haven, CT.
- B. Approved Equal.

2.02 MANUFACTURED UNITS

- A. Right to Know Signage:
 1. Interior signage shall be fiberglass.
 2. Exterior signage shall be suitable for outdoor installation and UV protected.
 3. Size 15 by 15 inches for exterior signage; 10 by 7 inches for interior signage.
 4. Mounting holes through sign or self adhesive for direct mounting on tank.
 5. List chemical identity, NFPA hazard warning and personal protective items that shall be used.
 6. Provide right to know signs for each of the following:

<u>Chemical</u>	<u>NFPA Rating</u>	<u>Quantity</u>
Calcium Hypochlorite	2H, 0F, 0R, 0X	1
Calcium Hydroxide - Lime	3H, 0F, 0R, 0X	1

7. Provide 14-inch by 10-inch fiberglass sign at each storage tank; Quantity - 2:
 - a. Chemical being stored
 - b. Facility name
 - c. NYSDEC Chemical bulk Storage number
8. Provide NYS CBS & SCDH tank ID signs for all chemical bulk storage tanks. Signs shall contain information including Facility name, NYSDEC CBS #, NYSDEC & SCDH Tank ID#, Design Capacity and Working Capacity required by local and state regulations. Signs shall be installed directly on tanks indicating capacity of tank. Install at remote fill location (exterior) and on tank (interior).
9. Provide confined space warning on all man way hatches, at containment areas and at pipe trenches. Six (6) required.
10. Provide No Smoking sign at entrance to New Treatment Building and Well 5-1 Building.
11. Provide signs for recycle tank indicating capacities and use. Install on tanks (interior).
12. Provide interior identification signs for the following equipment:
 - a. NYSDEC Health tank identification
 - b. Design capacity
 - c. Working capacity

13. Provide 12-inch square fiberglass "No Smoking" sign within chemical storage areas;
Quantity - 2.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install identification signs on or immediately adjacent to tanks with stainless steel hardware and as directed by engineer/owner.
- B. Install exterior warning signs at each entrance.
- C. Use stainless steel hardware to mount signs on exterior walls. Engineer shall determine location of each sign adjacent to building entrance.

END OF SECTION 104300

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Safety equipment and supplies associated with use of calcium hypochlorite, lime, sequestering agent, and sodium hydroxide.

1.02 REFERENCES

- A. ANSI Z87.1.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. LAB SAFETY SUPPLY, JANESVILLE, WI.
- B. Or approved equal.

2.02 MATERIALS

- A. Face Shield:
 - 1. Ratchet Suspension System
 - 2. Polycarbonate Face Shield
 - 3. Compliance with ANSI Z87.1
 - 4. Order No. 6955
 - 5. Quantity: Two (2) per location
- B. Splash Goggles:
 - 1. Polycarbonate Lens
 - 2. Indirect Vent
 - 3. Fog Free
 - 4. Compliance with ANSI Z87.1
 - 5. Order No. 54876
 - 6. Quantity: Two (2)
- C. Rubber-coated Apron:
 - 1. Lightweight
 - 2. PVC-coated
 - 3. Cotton ties and loop neck
 - 4. Size: 35" x 45"
 - 5. Color: Yellow
 - 6. Order No. 1606
 - 7. Quantity: Two (2)
- D. Rubber Gloves:
 - 1. Unlined natural rubber gloves
 - 2. Length: 18-inches
 - 3. 0.05-inch gauge
 - 4. Size 10
 - 5. Order No. 6680

6. Quantity: Two (2) pair.
- E. HAZ-MAT Spill Kit:
1. PVC Carrying Bag.
 2. Polypropylene Socks
 3. Polypropylene Mats
 4. Disposable bag, gloves
 5. Order No. SPC Hazwik Chemical Spill Kit
 6. Quantity: Two (2)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install one set of complete equipment as indicated in 2.02 A-F at each of two (2) locations indicated by the Engineer/Owner. Provide stainless steel or FRP rack with hooks for hanging equipment. Install rack(s) in location(s) as directed by Engineer.

END OF SECTION 104310

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers, mounting clips and cabinets.
- B. Fire extinguisher identification decal.

1.02 RELATED SECTIONS

- A. Section 099100 – Painting.

1.03 REFERENCES

- A. ANSI/NFPA 10 - Portable Fire Extinguishers.
- B. UL 299 - Dry Chemical Fire Extinguishers.

1.04 SUBMITTALS

- A. Submit in accordance with Section 013300 - Submittals.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes:
 - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, materials, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
 - 2. Extinguisher type, operational features, color.
- C. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017800.
- B. Maintenance Data: For cabinets & extinguishers, include test, refill or recharge schedules and re-certification requirements.

1.06 QUALITY CONTROL

- A. Regulatory Requirements: Conform to NFPA 10 and local jurisdiction for requirements for extinguisher location and mounting.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.08 WARRANTY

- A. Warranty: Cabinets – provide manufacturer's standard one year warranty.
- B. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products that may be incorporated in the work include the following:
 - 1. Ansul, a Tyco international Company, Marinette, WI (715) 735-7411.
 - 2. J.L. Industries, Bloomington, MN (800) 554-6077.
 - 3. Larsen's Manufacturing Company, Minneapolis, MN (800) 527-7367.
 - 4. Potter-Roemer, Incorporated, Cerritos, CA (800) 366-3473.
 - 5. Or approved equal.

2.02 EXTINGUISHERS

- A. Extinguisher: Provide multipurpose dry chemical type, UL 299; UL-rated A: B: C. 10 pound nominal capacity in enameled steel container at locations noted on plans.
- B. Mounting Bracket: Provide surface mounted wall bracket mounting clips and all required accessories. Metal designed to prevent accidentally dislodging extinguisher, of size required for type and capacity of extinguisher specified. Bright chrome finish.
- C. Mount brackets so top of extinguisher is maximum 54" above finished floor and bottom is a minimum of 12" above finished floor.
- D. Identification: Decal complying with authorities having jurisdiction for style, size, spacing, and location.

2.03 CABINETS

- A. Construction:
 - 1. Fire Rating: Non-rated
 - 2. Material: 304 stainless steel with #4 finish
 - 3. Style: Vertical duo panel with frame
 - 4. Glazing: Clear acrylic sheet
 - 5. Trim: 4 inch rolled edge, one piece construction with corners mitered, welded, and ground smooth
 - 6. Door: Full ½" thick hollow metal heavy gauge door, one piece construction with corners mitered, welded, and ground smooth
 - 7. Door Hardware: Recessed door pull with friction latch and continuous matching hinge
 - 8. Lettering: Red vertical die cut lettering applied to door
 - 9. Mounting: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish
 - 10. Provide factory-drilled mounting holes

- B. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
- C. Fabrication: Provide manufacturer's standard box (one piece construction) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install extinguishers, brackets and cabinets in accordance with manufacturer's published instructions in locations required by authority having jurisdiction and where indicated by Architect/Engineer.
- B. Mount brackets and cabinets so top of extinguisher is maximum 54" above finished floor.
- C. Install extinguisher cabinets and brackets square, plumb and level, secured rigidly in place to structure.
- D. Place extinguisher on clips.
- E. Apply identification decal above fire extinguisher, size and location per local authority having jurisdiction.

END OF SECTION 104413

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufacturer-engineered, shop-fabricated structural steel building frame.
- B. Insulated Metal wall and roof panels including soffits, gutters and downspouts, and roof mounted equipment curbs.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between accessory components and wall system.
- B. Section 081113 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; 2016.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014, with Editorial Revision (2017).
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2020.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2019a.
- H. ASTM C991 - Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings; 2016.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2019b.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019.
- L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- M. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2018.
- N. MBMA (MBSM) - Metal Building Systems Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on profiles, component dimensions, fasteners.
- C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
- D. Samples: Submit two samples of precoated metal panels for each color selected, 4 x 4 in size illustrating color and texture of finish.
- E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.
- F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- G. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
 - 1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
 - 1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
 - 2. Comply with applicable code for submission of design calculations as required for acquiring permits.
- B. Perform work in accordance with AISC 360 and MBMA (MBSM).
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
 - 1. Accredited by IAS in accordance with IAS AC472.
- D. Erector Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.07 WARRANTY

- A. Provide five year manufacturer warranty for Metal Building.
 - 1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Buildings Systems:
 - 1. Ironbuilt Steel Buildings Corp: Basis of Design: www.ironbuiltbuildings.com: 2884 Industrial Blvd. Bethel Park, PA 15102 800-615-6032 Betty Moro, National Construction Services
 - 2. Metallic Building Company: www.metallic.com/#sle.
 - 3. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 ASSEMBLIES

- A. Single span rigid frame.
- B. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, and wind bracing.
- C. Secondary Framing: Purlins, and other items detailed.
- D. Wall System: Preformed metal panels of horizontal profile, with sub-girt framing/anchorage assembly, and accessory components.
- E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.
- F. Roof Slope: 4 inches in 12 inches (or per drawings).

2.03 PERFORMANCE REQUIREMENTS

- A. Installed Thermal Resistance of Wall System: R-value of 19 (RSI-value of 3.3459).
- B. Installed Thermal Resistance of Roof System: R-value of 30 (RSI-value of 5.2830).
- C. Design structural members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

2.04 MATERIALS - FRAMING

- A. Structural Steel Members: ASTM A36/A36M.
- B. Structural Tubing: ASTM A500/A500M, Grade B cold-formed.
- C. Anchor Bolts: ASTM A307, Grade A, with no preference for protective coatings.
- D. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.

2.05 MATERIALS - WALLS AND ROOF

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Designation SS (structural steel), Grade 55, with G60/Z180 coating.

- B. Insulation: ASTM C991, Type II; 6 inches (152 mm) thick or as required to achieve specified R-Value for walls and roof. Microlite L by Johns Mansville.
- C. Metal Building Type, Factory Applied, Vapor-Barrier Insulation Facings: Water vapor permeance no greater than 0.10 perm (5.7 ng/(Pa s sq m)) when tested in accordance with ASTM E96/E96M; flame spread index of 25 or less, and smoke developed index of 40 or less when tested in accordance with ASTM E84.
 - 1. Manufacturers:
 - a. Lamtec Corporation; WMP-50: www.lamtec.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- D. Joint Seal Gaskets: Manufacturer's standard type.
- E. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.
- F. Sealant: Manufacturer's standard type.
- G. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.06 COMPONENTS

- A. Doors and Frames: Specified in Section 081113.

2.07 STRUCTURAL FRAMING

- A. Primary Framing – Main Frames: Ironbuilt's standard structural primary framing systems shall be designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing. Standard configurations are as follows:
 - 1. Frame Types:
 - a. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
 - 2. Frame Configurations:
 - a. Single gable.
- B. Primary Framing – End-Walls: Manufacturer's standard end-wall interior columns, corner columns, and rafters shall be fabricated for field-bolted assembly, from structural-steel shapes or shop-welded, built-up steel plates.
- C. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, galvanized steel sheet, unless otherwise indicated, to comply with the following:
 - 1. Purlins and Girts
 - a. Profiles
 - 1) C-shaped sections formed with stiffening lips angled 90 degrees to flange and minimum 3½-inch-wide flanges.
 - 2) Z-shaped sections formed with stiffening lips angled 45 to 50 degrees to flange and with minimum 2½-inch-wide flanges.
 - b. Available material thicknesses: 0.0620 inches, 0.0720 inches, and 0.0920 inches.
 - c. Available Depths: 8 inches, 10 inches, 11½ inches, and 12 inches.

2. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0620-inch-, 0.0720-inch-, and/or 0.0920-inch-thick steel sheet to provide adequate backup for both roof and wall panels. The bottom flanges shall be 3½ inches wide, minimum. The web depth, top flange width, and flange and lip angles shall be dictated by the roof slope. The stiffening lips shall be parallel to the web.
 3. Lateral Bracing: 1- by 1-inch structural-steel angles, with a minimum thickness of 1/8 inch, to stiffen primary frame flanges.
 4. Base or Sill Angles: Minimum 3-by-2-by-0.0620-inch zinc-coated (galvanized) steel sheet.
 5. Purlin and Girt Connection Clips: Minimum 0.0620-inch-thick, zinc-coated (galvanized) steel sheet.
 6. Framing for Openings: C-shaped sections formed with stiffening lips angled 90 degrees to flange and minimum 3½-inch-wide flanges; fabricated from 0.0620-inch-, 0.0720-inch-, and/or 0.0920-inch-thick steel sheet, for framing head and jambs of door openings, and head, jambs, and sill of other openings.
 7. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- D. Bracing shall be one of the methods listed below, based on specified requirements, building geometry, and design loads.
1. Cable: ¼-inch-, 3/8-inch, and/or 1/2-inch diameter with eye-bolt end anchors.
 2. Rigid Portal Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 3. Fixed-Base Columns: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 4. Diaphragm Action of Panels: Diaphragm capacity values are available for the Ironbuilt Ribbed Panel (R-Panel) and Ironbuilt Architectural Panel (A-Panel), described herein. These are listed below:
 - a. 0.0190-inch (Ironbuilt A, 26-gage): pounds per foot.
 - b. 0.0190-inch (Ironbuilt R, 26-gage): pounds per foot.
 - c. 0.0236-inch (Ironbuilt R, 24-gage): pounds per foot.
- E. Bolts: Provide shop-painted bolts unless structural-framing components are in direct contact with roof and wall panels. Provide zinc-plated bolts when structural-framing components are in direct contact with roof and wall panels.

2.08 WALL AND ROOF PANELS

- A. Wall Panel: Ironbuilt Ribbed Panel (R-Panel), Reverse-Rolled
1. Profile: Lap-seam wall panels fabricated from metallic-coated steel sheets plain or prepainted with coil coating, factory formed to provide 36-inch coverage, with 1.25-inch-high recessed trapezoidal
 - a. major valleys at 12 inches o.c., and two (2) intermediate stiffening valleys symmetrically spaced between adjacent major ribs for full length of panel. Panels designed for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges.
 2. Materials
 - a. Available Finishes, Exposed
 - 1) TRINAR®/KYNAR 500®/Hylar 5000®: Fluoropolymer two-coat System over aluminum-zinc alloy-coated steel:
 - (a) General: Ironbuilt's standard two-coat, thermo-cured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a total minimum dry film thickness of 1 mil and 30 percent reflective gloss when tested according to ASTM D 523.

- (b) When field tested under normal range of weather conditions for a minimum of 20 years, the coating shall perform without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of five Hunter units.
 - (c) Colors: Select from Ironbuilt's standard color chart. Other colors are available as special orders.
 - b. Finish, concealed: Coil manufacturer's standard backer finish, consisting of the following products manufactured by Akzo Nobel Coatings, Inc.: Bonderite 1303 pretreatment, UV9R24235A primer, and PW4R28555 white polyester coat with a total minimum dry film thickness of 0.5 mil.
 - c. Available Yield Strengths: 80 ksi.
 - d. Available Metal Thicknesses: 0.0190-inch or 0.0236-inch.
- B. Standing-Seam Roof Panels: Manufacturer's standard panels complying with the following:
 - 1. Ironbuilt Vertical-Lok (CVL): Double-folded mechanically seamed vertical-rib roof panels fabricated from metallic-coated steel sheets plain or prepainted with coil coating, factory formed to provide 18-inch coverage; with 2-inch-high inverted-L vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between major ribs for full length of panel.
 - 2. Available Materials
 - a. Available Finishes, Exposed
 - 1) TRINAR®/KYNAR 500®/Hylar 5000®: Fluoropolymer two-coat System over aluminum-zinc alloy-coated steel:
 - (a) General: Ironbuilt's standard two-coat, thermo-cured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a total minimum
 - 3. Lateral Bracing: 1- by 1-inch structural-steel angles, with a minimum thickness of 1/8 inch, to to ASTM D 523.
 - a. When field tested under normal range of weather conditions for a minimum of 20 years, the coating shall perform without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of five Hunter units.
 - 1) Colors: Select from Ironbuilt's standard color chart. Other colors are available as special orders.
 - b. Finish, concealed: Coil manufacturer's standard backer finish, consisting of the following products manufactured by Akzo Nobel Coatings, Inc.: Bonderite 1303 pretreatment, UV9R24235A primer, and PW4R28555 white polyester coat with a total minimum dry film thickness of 0.5 mil.
 - c. Yield Strength: 50 ksi.
 - d. Metal Thicknesses: 0.0236-inch.
 - e. Clip System: Fixed or floating to accommodate thermal movement.

2.09 LINER AND SOFFIT PANELS: IRONBUILT RIBBED PANEL (R-PANEL)

- A. Profile: Lap-seam roof panels fabricated from metallic-coated steel sheets or prepainted with coil coating, factory formed to provide 36-inch coverage, with 1.25-inch-high raised trapezoidal major ribs at 12 inches o.c., and two (2) intermediate stiffening ribs symmetrically spaced between adjacent major ribs for full length of panel. Panels designed for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges.
 - 1. Available Materials
 - a. Available Finishes, Exposed
 - 1) Galvalume® Plus: Aluminum-zinc alloy-coated steel.

- 2) White Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.7 mil for topcoat.
- b. Finish, concealed: Coil manufacturer's standard backer finish, consisting of the following products manufactured by Akzo Nobel Coatings, Inc.: Bonderite 1303 pretreatment, UV9R24235A primer, and PW4R28555 white polyester coat with a total minimum dry film thickness of 0.5 mil.
- c. Yield Strength: 80 ksi.
- d. Metal Thicknesses: 0.0140-inch or 0.0190-inch.

2.10 ACCESSORIES

- A. Provide components required for complete panel assemblies including trim, copings, fasciae, sills, corner units, ridge closures, clips, flashings, gutters, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.
- B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of roof or wall sheets by means of plastic caps or factory-applied coating. Comply with the following:
 1. Fasteners for Roof and Wall Panels: Self-drilling/self-tapping, zinc-plated, hex-head carbon-steel screws, with a zinc-aluminum-alloy head and EPDM sealing washer.
 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 3. Blind Fasteners: Stainless-steel rivets for plain Galvalume® material, painted steel for Kynar®-coated material.
- C. Flashing and Trim: Form from 0.0190-inch-thick, aluminum-zinc alloy-coated steel sheet plain or prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent roof or wall panels.
 1. Opening Trim: Minimum 0.0190-inch-thick steel sheet. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- D. Gutters: Form from 0.0190-inch-thick, aluminum-zinc alloy-coated steel sheet, plain or prepainted with coil coating. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in 195- and/or 243-inch-long sections, sized according to SMACNA's Architectural Sheet Metal Manual. Furnish gutter supports spaced 24 inches o.c., fabricated from same metal as gutters. Finish gutters to match roof fascia and rake trim.
- E. Downspouts: Form from 0.0190-inch-thick, aluminum-zinc alloy-coated steel sheet, plain or prepainted with coil coating; in 3-inch by 4-inch or 4-inch by 5-inch 10-foot-long sections, complete with formed 75-degree elbows and offsets. Finish downspouts to match wall panels.
- F. Foam Closures: Closed-cell, laminated polyethylene; minimum 1-inch-thick, flexible closure strips; premolded to match roof and wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 1. Outside closure for ridge condition of R-Panel roofs with slopes greater than 1:12.
 2. Inside closure for eave condition of R-Panel roofs (optional).
 3. Inside closure for base condition of R-Panel walls (optional).
 4. Outside closure for gable (rake) condition of A-Panel, R-Panel, and Reverse-Rolled R-Panel walls (optional).
 5. Inside closure for eave condition of A-Panel, R-Panel, and Reverse-Rolled R-Panel walls (optional).

- G. Metal Closures: Provide closures at eave and ridge for the following applications:
 - 1. Outside closure for ridge condition of standing seam roof systems, fabricated from 0.0239-inch-thick steel.
 - 2. Inside closure for eave condition of standing seam roof systems, fabricated from 0.0478-inch-thick steel.
- H. Standing Seam Roof Clips: Configuration shall be fixed or floating, as required by substrate conditions and/or roof geometry.
- I. Standing Seam Roof Backing Plates: Fabricated from 0.0620-inch thick steel.
- J. Standing Seam Roof Thermal Spacer Blocks: Provide thermal spacer blocks; fabricated from extruded polystyrene, in the following thicknesses.
 - 1. 3/8-inch: for low clip system with 3-inch insulation.
 - 2. 3/8-inch: for high clip system with 6-inch insulation.
 - 3. 5/8-inch: for high clip system with 4-inch insulation.
 - 4. 1-inch: for high clip system with 3-inch insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.02 ERECTION - FRAMING

- A. Erect framing in accordance with AISC 360.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION - WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches (50 mm). Place side laps over bearing.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.

- G. Install sealant and gaskets, providing weather tight installation.

3.04 ERECTION - GUTTERS AND DOWNSPOUTS

- A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Slope gutters minimum 1/8 inch/ft (3 mm/m).
- C. Install splash pans under each downspout.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from level; 1/8 inch (3 mm) from plumb.
- B. Siding and Roofing: 1/8 inch (3 mm) from true position.

END OF SECTION 133419

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufacturer-engineered, factory-fabricated offices to be used as SCADA Room

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2020.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit product data sheets, including material descriptions, dimensions and profiles of components and finishes, and preparation instructions and recommendations.
- C. Shop Drawings: Submit plans, elevations, sections, construction details, and utility connections as necessary for this work.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's unopened packaging and store until ready for installation.
- B. Protect components and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep materials free from dirt and foreign matter.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for fabricated control booths that fail in materials or workmanship within warranty period as indicated .

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design - Allied Modular Building Systems:
- B. Other Acceptable Manufacturers:
 - 1. Porta-King Building Systems; ____: www.portaking.com/#sle.
- C. Substitutions: See Section 016000 - Product Requirements.

2.02 MANUFACTURED UNITS

- A. Type of Application: SCADA Room.
 - 1. Style of Office: As indicated on drawings.
 - 2. Platform: As indicated on drawings.

2.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide factory fabricated structures capable of withstanding the following loads and stresses without damage or failure.
 - 1. Loads: In compliance with local building codes.
- B. Electrical Components, Devices, and Accessories: Listed and labeled by UL (DIR) or testing agency acceptable to authorities having jurisdiction and installed in compliance with NFPA 70, and marked for intended application.

2.04 COMPONENTS

- A. Walls: Polystyrene Core Wall with hardboard sandwich panels and FRP facing on interior and exterior. Intermediate steel uprights in continuous floor track.
- B. Roof: 3W Steel Deck Roof
- C. Windows: Provide extruded aluminum sash frames with glazing as indicated.
 - 1. Aluminum Finish: Clear Anodized, Class I.
- D. Doors: Provide door type(s) as indicated on drawings.
 - 1. Swinging Door: 1-3/4 inch (44.45 mm) thick, insulated, with tubular frame fabricated from galvanized steel, with full-height of door glazed.
 - 2. Provide lock support, guide hardware or three butt hinges, hydraulic closer, and full perimeter weather-stripping.
 - 3. Deadlock: Mortise lever lock with removable cylinder capable of being master keyed.
- E. Ceiling: Acoustical ceiling panels and grid.
- F. Interior Lighting Fixtures: Provide three, ceiling mounted, light-emitting diode (LED) lighting fixture, 24 x 24 inch (____ m) long, with acrylic lens.
 - 1. Provide single-pole switch mounted adjacent to entry door to control light fixtures.
- G. Heating/Air Conditioning Unit: Provide wall-mounted, thermostatically controlled, 208/230 VAC, 1,500 watt electric heater with fan-forced operation; capacity not less than 5,000 BTU/hr (1,465 W), and air conditioner with cooling capacity not less than 13,500 BTU/hr (3,956 W) and enclosed within enameled steel cabinet.

2.05 MATERIALS

- A. Walls - Polystyrene Core Wall with hardboard sandwich panels and FRP facing on interior and exterior. Intermediate steel uprights in continuous floor track.
- B. Vinyl Clad Steel Door with vision lite
- C. 2 x 2 Manufacturer standard Fissured Commercial Acoustic Grid Ceiling - White
- D. 3W Steel Deck Roof
- E. 4-in Gray Vinyl Wall Base
- F. Glazing: 1/4" Safety Glass
 - 1. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 - a. Laminated Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 test requirements for Category II.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install room in accordance with manufacturer's written instructions.
- B. Set room plumb and aligned, baseplates level and true to plane with full bearing on concrete substrate, and securely fasten to concrete base with indicated anchorage. See Section 033000.
- C. Install connection to electrical, mechanical, and communication systems. See Sections

3.02 ADJUSTING

- A. Adjust doors, operable windows, and hardware to operate smoothly and properly without binding, and verify that locks engage accurately and securely without forcing or binding.
- B. Touch-up, repair or replace damaged products or exposed finishes prior to Date of Substantial Completion.

END OF SECTION 133423.16

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical requirements specifically applicable to Division 22 Sections, in addition to the General Requirements.
- B. Furnish all tools, machinery, equipment, scaffolding, appurtenances and appliances necessary for the satisfactory handling and execution of the work.
- C. Keep the premises free from accumulations of waste material and rubbish caused by machines, material, employees or work. Place waste and rubbish in neat piles or in containers outside of the building as directed. Cooperate with all the other trades appurtenant to this work. At the completion of his work, remove all tools, scaffolding and surplus material.

1.02 REFERENCES

- A. ASME American Society of Mechanical Engineers
- B. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers.
- C. AGA American Gas Association.
- D. ANSI American National Standards Institute.
- E. ARI American Refrigeration Institute.
- F. ASTM American Society for Testing and Materials.
- G. AWWA American Water Works Association.
- H. MSS Manufacturer's Standardization Society of the Valve and Fitting Industry.
- I. NEMA National Electrical Manufacturers' Association.
- J. NFPA National Fire Protection Association.
- K. SMACNA Sheet Metal and Air Conditioning Contractors' National Association.
- L. UL Underwriters' Laboratories, Inc.

1.03 SUBMITTALS

- A. Approval by the Architect/Engineer of the layouts and shop drawings for any material, apparatus, devices and layouts shall not relieve Contractor from the responsibility of furnishing same of proper dimensions, size, quantity, quality and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Such approval shall not relieve Contractor from the responsibility for errors of any sort on the shop drawings. If the shop drawings deviate from the Contract Documents, the Contractor shall advise the Architect/Engineer of the deviations in writing accompanying the initial submission shop drawings, and including the reasons for the deviations.
- B. Submit under provisions of the General Requirements.
- C. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.

1.04 RECORD DRAWINGS

- A. Keep master set of prints on job site for recording deviations from the Drawings as specified in the General Requirements.

1.05 WARRANTY AND SERVICE

- A. Provide manufacturer warranties.
- B. Provide warranty services for all installed equipment.

1.06 REGULATORY REQUIREMENTS

- A. Applicable Building Code, including Mechanical and Plumbing Codes.
- B. Obtain permit and request inspections from Authority Having Jurisdiction.
- C. Equipment shall bear the U.L or National Board label.

1.07 PROJECT/SITE CONDITIONS

- A. Mechanical layouts indicated on the Drawings are diagrammatic. Coordinate mechanical work with other trades prior to installation. Install work in locations shown on the Drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections.
- C. Cause as little interference or interruption of existing utilities and services as possible. Schedule work which will cause interference or interruption in advance with Owner and Architect/Engineer, Authorities Having Jurisdiction, and all affected trades.
- D. Determine sizes and verify locations of existing utilities on or near site.
- E. Visit site and be informed of conditions under which work must be performed.
- F. Install equipment in accordance with manufacturer's recommendations.

1.08 INTENT OF SPECIFICATIONS AND DRAWINGS

- A. It is the intent of the Specifications and the Drawings to describe the nature and extent of the work to be performed and the character of the material to be used to include all material, equipment, apparatus and devices, even if not specifically described in the specifications or shown on the Drawings, which can be reasonably inferred to be necessary for the control and operation of the work installed and/or for which the necessity is established by any governmental and/or insurance rules and regulations in effect at the time of bid opening.
- B. The Drawings showing the layouts of piping, heating, ventilating and air conditioning work, apparatus, accessories and duct systems are diagrammatic, except where specifically located by dimensions. All apparatus shall be located and all pipes and ducts run in the manner and locations shown thereon as closely as conditions of construction of the building will permit. Deviations shall be made only with the consent of the Architect/Engineer and/or Owner and without additional charge.
- C. Accessibility: Install equipments and materials in order to provide the required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices

requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

- D. Rough-In: Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- E. Refer to the architectural drawings and those of other trades for items such as space conditions and locations of work under separate contracts.

1.09 DAMAGE TO OTHER WORK

- A. This Contractor shall be responsible for, and be required to make good at his own expense, any and all damage done to the Owner's property and/or to any work or material in place in the premises, which is caused by his work or workers.

1.10 COORDINATION WITH OTHER WORK

- A. Coordinate work with the other contractors in order to insure installation of equipment and materials without conflict.
- B. Scaled and figured dimension with respect to the items are approximate only, sizes of equipment have been taken from typical equipment items of the class indicated. Before proceeding with the work, carefully check all dimension and sizes and assume full responsibility for the fitting in of equipment and material to the building and to meet Architectural and Structural conditions.
- C. Wherever field conditions or the proper execution of the work required reasonable changes in piping, supports, breeching, ducts and equipment as shown on drawings, make all such changes as directed or approved without extra cost. This includes horizontal or vertical offsets of piping, breeching and ductwork necessary to avoid conflicts or to maintain ceiling heights.
- D. Should any discrepancy, conflict, error or omission appear, or should any doubt arise as to the true intent and meaning of the Drawings and Specifications, or should any portion of same be obscure or capable of more than one interpretation, the Contractor shall bring such items to the attention of the Architect/Engineer before performing this work, for the correction or explanation of same. In all cases the interpretation of the Architect/Engineer and/or Owner shall be considered final and work shall be done accordingly. The Architect/Engineer will decide whether, and in what amount, a change to the contract price is necessitated by such corrective work.

1.11 TESTS

- A. The Contractor shall be responsible for the work of other trades disturbed or damaged by tests, repair or replacement of work. Work so disturbed or damaged shall be restored to its original condition at no additional expense to the Owner.
- B. All equipment shall be tested in service and the Contractor shall demonstrate that it complies with the requirements of the Specification.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 220500

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pipe hangers for various installed pipe systems.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300

1.03 REFERENCES

- A. Underwriters Laboratories - UL Listing.
- B. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- C. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
- D. ASTM A653 - Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process
- E. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)
- F. MSS SP58 - Manufacturers Standardization Society: Pipe Hangers and Supports- Materials, Design, and Manufacture
- G. MSS SP69 - Manufacturers Standardization Society: Pipe Hangers and Supports- Selection and Application
- H. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.04 QUALITY ASSURANCE

- A. Hangers and supports used in fire protection piping systems shall be listed and labeled by Underwriters Laboratories.
- B. Steel pipe hangers and supports shall have the manufacturers name, part number, and applicable size stamped in the part itself for identification.
- C. Hangers and supports shall be designed and manufactured in conformance with MSS SP 58.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Anvil International (Grinnell)
- B. Cooper B-Line, Inc.
- C. Carpenter and Patterson
- D. Fee and Mason
- E. Hilti

- F. Elcen
- G. Piping Technology and Products, Inc.
- H. Or Approved Equal

2.02 MATERIALS

- A. Pipe Hangers & Supports:
 - 1. All pipe hangers and supports for stainless steel piping systems shall be of stainless steel construction.
 - 2. All pipe hangers and supports for copper tubing piping systems shall be of stainless steel construction. Provide dielectric/isolation wrapping or pipe insulation where dissimilar metals meet.
 - 3. All pipe hangers and supports for black iron piping systems shall be of stainless steel construction. Provide dielectric/isolation wrapping where dissimilar metals meet.
 - 4. All pipe hangers and supports for PVC piping systems shall be of galvanized steel construction, except where piping is used for chemical treatment.
 - 5. All pipe hangers and supports for chemical lines including calcium hypochlorite and lime shall be of stainless steel construction.
 - 6. All pipe hangers and supports for chemical lines including brine solution and regenerate piping shall be of stainless steel construction.
 - 7. All pipe hangers and supports for Rigid galvanized piping systems shall be of galvanized steel construction.
- B. Trapeze Hangers: Where three or more non-chemical lines of pipe run parallel, support them with galvanized trapeze hangers, Grinnell Figure 46. Trapeze to be supported by a minimum of two galvanized rods with Figure 60 washer plates. For top loading only.
- C. Concrete Inserts: Anvil International Figure 282, MSS SP-58 (Type 18), galvanized, universal concrete inserts, adequately sized and correctly positioned to support full load operating systems.
- D. C-Clamps: Anvil International Figure 86, MSS SP-58 (Type 23) galvanized with set screw and lock nut. Use these for attaching hangers to steel beams. Welding hanger rods to steel members is not permitted. Provide retaining clip for C-Clamps.
- E. Malleable Beam Clamps: Anvil International Figure 218, MSS SP-58 (Type 30), galvanized. Use these for attaching hangers to bar joists. Provide retaining clip for all beam clamps.
- F. Clevis Hanger (4" diameter Piping or Less): Anvil International Figure 67, MSS SP-58 (Type 5), galvanized. Use these for attaching hangers to bar joists, column or wall.
- G. Clevis Hanger (4" diameter or Greater D.I. Piping): Anvil International Figure 590, MSS SP-58 (Type 1), galvanized.
- H. Pipe saddle support: Pipe saddle with U-bolt and threaded pipe adjuster. Cooper B-Line Figure 318A, MSS SP-69 (Type 37), stainless steel. Pipe stand: Cooper B-Line Figure 316T, stainless steel.
- I. All hangers and supports shall be UL Listed. Cooper B-Line Figure 318A & 316T,
- J. Provide threaded rod in accordance with manufacturer instruction.

2.03 FINISHES

- A. Indoor Finishes
 - 1. Hangers and clamps for support of bare copper piping shall be coated with copper colored epoxy paint, B-Line Dura-Copper®. Additional PVC coating of the epoxy painted hanger shall be used where necessary.
 - 2. Hangers for other than bare copper pipe shall be zinc plated in accordance with ASTM B633 OR shall have an electro-deposited epoxy finish.
 - 3. Strut channels shall be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90 OR have an electro-deposited green epoxy finish.
- B. Outdoor and Corrosive Area Finishes (Chemical Room)
 - 1. Hangers and strut located outdoors shall be hot dip galvanized after fabrication in accordance with ASTM A123. All hanger hardware shall be hot dip galvanized or stainless steel. Zinc plated hardware is not acceptable for outdoor or corrosive use.
 - 2. Hangers, strut, and clamps located in corrosive areas shall be type [304] [316] stainless steel with stainless steel hardware.
 - 3. Provide dielectric/isolation wrapping in systems of dissimilar metals.

PART 3 - EXECUTION

3.01 SCHEDULES - HANGER SPACING

- A. Copper Pipe
 - 1. Not more than 10'-0" o.c.
- B. Black Iron and Galvanized
 - 1. 1/4 to 1-1/4 inches - 5'-0" o.c.
 - 2. 2 to 2-1/2 inches - 8'-0" o.c.
 - 3. 3-inches and above - 10'-0" o.c.
- C. Ductile Iron Piping
 - 1. As shown on contract drawings
- D. PVC Pipe
 - 1. 1/2 to 1-inch - 4'-0" o.c.
 - 2. 1 1/4 to 8-inches - 5'-0" o.c.

3.02 INSTALLATION

- A. Support pipes on specified hangers so that equipment, pumps, and fittings do not bear weight of pipe.
- B. Do not use perforated metal, strap iron, or band iron.
- C. Do not make offsets in hangers.
- D. Maximum allowable spacing of pipe hangers for horizontal piping is listed above. Space hangers and brackets at close intervals where necessary to maintain levels, slopes, and drainage, or to prevent sagging.
- E. Place hangers within 12 inches of each horizontal elbow.
- F. Use hangers with 1-1/2 inch minimum vertical adjustment.

- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Allow for forces imposed by expansion joints, satisfy structural requirements and maintain proper clearances with respect to adjacent piping, equipment and structures. Hangers for insulated pipes shall be sized to accommodate insulation thickness.
- I. Support cast iron pipe under each section and at each hub.
- J. Keep the different types of hangers to a minimum and provide hangers that are neat, without complicated bolting and with the number of parts of each hanger and its anchor kept to a minimum.
- K. Make accurate weight balance calculations to determine the required supporting forces at each hanger or support location and the pipe weight load at each equipment connection.
- L. Pipe hangers shall be capable of supporting the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.
- M. All hangers and supports that are not galvanized shall be painted or shop primed.
- N. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape- B-Line Iso-pipe. Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.
- O. Support horizontal cast iron pipe adjacent to each hub.
- P. Install hangers to provide a minimum of 1/2 inch space between finished covering and adjacent work.
- Q. Place a hanger within 12 inches of each horizontal elbow.
- R. Support Provide neoprene protection where dissimilar metals come into contact.
- S. Maximum allowable spacing of pipe supports for vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.
- T. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified. Trapeze hangers shall be spaced according to the smallest pipe size, or install intermediate supports according to schedule in section 3.01B.
- U. Do not support piping from other pipes, ductwork or other equipment that is not building structure.
 - 1. Where horizontal piping movements are greater than 1/2 inch, or where the hanger rod angularity from the vertical is greater than four degrees from the cold to hot position of the pipe, the hanger pie and structural attachments shall be offset in such a manner that the rod is vertical in the hot position.
- V. In the part of the building which is steel-framed, attach hangers to the building structural steel beams. Where hangers do not correspond with the building structural steel beams, provide supplemental steel members continuously welded or bolted to the building structural steel beams.

- W. In the parts of the building which is a concrete structure, attach hangers to the concrete structure by installing anchors into the concrete.

END OF SECTION 220529

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Stencils
- B. Pipe markers
- C. Tags

1.02 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Submit list of wording, symbols, letter size and color coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures and installation.

PART 2 - PRODUCTS

2.01 STENCILS

- A. Manufacturers:
 - 1. SETON NAMEPLATE CO., New Haven, CT, Model SPS.
- B. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch (20-30 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 1/2 inch (15 mm) high letters.
 - 2. 1-1/2 to 2 inch (40-50 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 3/4 inch (20 mm) high letters.
 - 3. 2-1/2 to 6 inch (65-150 mm) Outside Diameter of Insulation or Pipe: 12 inch (300 mm) long color field, 1-1/4 inch (30 mm) high letters.
 - 4. 8 to 16 inch (200-250 mm) Outside Diameter of Insulation or Pipe: 24 inch (600 mm) long color field, 2-1/2 inch (65 mm) high letters.
 - 5. Equipment: 2-1/2 inch (65 mm) high letters.
- C. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.02 PIPE MARKERS

- A. Manufacturers:
 - 1. SETON NAMEPLATE CO., New Haven, CT., Set Mark Pipe Markers.
 - 2. BUNTING, Pittsburgh, PA, Wrap-Mark.
- B. Color: Conform to ASME A13.1.

- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed. For the following piping systems:
1. Raw water - pre-treatment
 2. Raw Water - post- treatment
 3. Blow Off/Waste piping
 4. Backwash Waste
 5. Filter Effluent
 6. Water Service
 7. Calcium Hypochlorite
 8. Drain
 9. Air Relief
 10. Sampling/Fresh water.
 11. Blowoff water.
 12. Domestic water.
 13. Recycle Water Piping
 14. Sample Lines
 15. Pressure Sensing/Static Water Lines
 16. Pre-lubrication
 17. Hypochlorite injection lines
 18. Phosphate piping
 19. Lime Piping
 20. Lime injection lines
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mils (0.10 mm) thick, manufactured for direct burial service.

2.03 TAGS

- A. Manufacturers
1. SETON NAMEPLATE CO., New Haven, CT.
 2. Metal Tags: Brass with stamped letters.
 3. Tag Size Minimum: 1-1/2 inch diameter.
 4. Chart: Typewritten letter size.
- B. Signage: Factory fabricated, flexible, semi-rigid plastic; minimum information indicating PID identification, contents, volume, installation date and right to know information, for the following piping systems:
1. Lime Tank (1)
 2. Tablet Chlorinator (1)
 3. Bag Filter
 4. Resin Trap

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with paint manufacturers recommendations.

3.02 INSTALLATION

- A. Apply stencil painting in accordance with paint manufacturer's application instructions.
- B. Install plastic pipe markers in accordance with manufacturer's instructions at intervals of 8'-0" on center, or after any change in direction. Minimum of one marker per pipe section.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- E. Identify piping, concealed or exposed, with plastic pipe markers or stenciled painting. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Install tags with stainless steel/brass S hooks on corrosion resistant chain.
- G. Identify valves in main and branch piping with tags.

END OF SECTION 220553

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Black iron piping, valves and accessories
- B. Copper piping, valves and accessories
- C. Galvanized piping and accessories
- D. PVC piping, valves and accessories
- E. Reinforced flexible tubing and accessories
- F. Stainless steel piping, valves and accessories
- G. Caps
- H. Corporation stops
- I. Curb stops
- J. Pressure regulating valves
- K. Relief valves
- L. Solenoid valves
- M. Vacuum breakers

1.02 RELATION SECTIONS

- A. Section 220529 - Hangers and Supports for Piping
- B. Section 220553 - Identification for Mechanical Piping and Equipment
- C. Section 221119 - Plumbing Specialties
- D. Section 312333 - Trenching
- E. Section 331140 - Disinfection of Water Facilities

1.03 REFERENCES

- A. ASME B16.3 - Malleable Iron Threaded Fittings
- B. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- C. ASME B16.23 - Cast Copper Alloy Solder - Joint Drainage Fittings -DWV
- D. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
- E. ASME B31.3 - Process Piping
- F. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

- G. ASTM A120 - Pipe, steel, black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses
- H. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- I. ASTM A403 - Wrought Austenitic Stainless Steel Fittings
- J. ASTM B42 - Seamless Copper Pipe
- K. ASTM B88 - Seamless Copper Tube
- L. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications
- M. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- N. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
- O. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- P. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- Q. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
- R. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- S. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing
- T. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- U. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
- V. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot and Cold-Water Distribution Systems
- W. ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing
- X. AWWA C800 - Underground Service Line Valves and Fittings
- Y. AWWA C901 - Polyethylene Pressure Pipe and Tubing, 1/3" to 3", for Water Service

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, hydrants and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with the local water utility company requirements.

- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500.
- B. Deliver and store items in shipping containers with labeling in place.

1.07 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 017839.
- B. Accurately record actual locations of piping mains, valves, connections and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- D. Provide manufacturer's standard warranty for all applicable items under provisions of Section 017800.

PART 2 - PRODUCTS

2.01 BLACK IRON PIPING, VALVES AND ACCESSORIES

- A. Standard weight, Schedule 40, threaded ends, conforming to ASTM A53. Fittings shall be malleable iron, screwed type conforming to ASME B16.3.
- B. Transitions from black iron to poly-tubing shall be made with barbed fittings and stainless clamps, or approved equal.
- C. Ball Valves: All 316 stainless steel body, ball and retainer, reinforced RPTFE stem, seat and retainer seal, 304 stainless steel lever with vinyl grip, rated for 125 psi minimum working pressure, threaded connections, Series 76F-100-A Apollo Valve as manufactured by CONBRACO INDUSTRIES, INC.
- D. Check Valves: All 316 stainless steel construction, including body, tail piece, guide and spring, glass filled RPTFE ball check, rated for 125 psi minimum working pressure, threaded connections, Series 62-100 Apollo Valve as manufactured by CONBRACO INDUSTRIES, INC.

2.02 COPPER PIPING, VALVES AND ACCESSORIES

- A. All exposed small copper piping shall be Type "K" hard drawn copper tubing. All underground piping shall be soft annealed Type "K" copper tubing with compression fittings.
- B. All brass valves and fittings installed on potable water supply piping shall be made of "low-lead" materials (UNS Copper Alloy C89833 or C89520) and have a maximum lead content of 0.25 percent by weight. All low lead brass fittings shall be stamped or embossed with a mark indicating that the product is manufactured from low-lead alloys.
- C. Check valves shall be swing check renewable BUNA-N disc, all bronze, STOCKHAM Figure B-319Y (threaded end) or Figure B-309Y (solder end) - 250 to 300 psi non-shock water.
- D. Ball valves for copper piping/tubing and galvanized piping shall be renewable reinforced Teflon seats, adjustable packing gland, non-blowout stem with run port opening. Ball valves shall be STOCKHAM Figure T or S-285 (threaded or soldered ends).

2.03 GALVANIZED PIPING AND ACCESSORIES

- A. Galvanized piping shall be standard weight, Schedule 40, seamless, with threaded ends, conforming to ASTM A120. Fittings shall be galvanized cast iron, threaded, conforming to ASME B16.12.

2.04 PVC PIPING, VALVES AND ACCESSORIES

- A. PVC piping for all interior and exterior applications shall be polyvinyl chloride, Class 1245-B, Schedule 80, and shall conform to ASTM Specifications D2267, D2241, D1784 and D1785. All PVC piping shall conform to NSF-61 and be approved for potable water applications. Pipe shall be as manufactured by A.M. BEYERS or CHARLOTTE PIPE COMPANY or approved equal. Fittings for PVC piping shall conform to ASTM D2467 and be slip type and shall be of the same schedule approved for use by the pipe manufacturer. Pipe shall bear the trademark of the manufacturer.
- B. Transitions from PVC to poly-tubing shall be made with barbed fittings and stainless clamps, or approved equal.
- C. Ball valves shall be double union/double block with PVC body, ball, insert and stainless steel rod and stem with Teflon seats, Tru-Bloc by NIBCO CHEMTROL, SPEARS or approved equal.
- D. Check valves shall be of the true union ball check type with a PVC body construction. The valves shall be rated at 150 psi. The valves shall be manufactured by HAYWARD CO., SPEARS or approved equal.
- E. Strainers shall be Y type, of size indicated, PVC body with 40 mesh cylindrical stainless steel screen and shall be as manufactured by HAYWARD CO. or approved equal.
- F. Pressure relief/backpressure valves shall be molded in-line valves with PVC body construction. Valves shall have a setting range from 5 to 100 psi and be compatible with chemicals in application. Valves shall be as manufactured by PLAST-O-MATIC VALVES, INC., WALLACE & TIERNAN, WALCHEM, or approved equal.
- G. Globe valves shall be of thermoplastic construction rated to 150 psi with EPDM seals and flanged connections. Valves shall be as manufactured by ASahi-AMERICA, NIBCO or approved equal.
- H. Unions shall be UL listed, Oring unions with Teflon gaskets by HAYWARD CO. or approved equal.
- I. Threads and dimensions: ANSI B1.1 and B18.2.
- J. All wetted parts of PVC piping, valves and accessories shall be compatible with treatment chemicals.
- K. Thread lubricant: Crane "Formula 425", or equal. (NOTE: Approved Teflon tape may be used).
- L. Gaskets: Full face, 1/8-inch thick neoprene rubber.
- M. Solvent welded joints for chemical piping shall be made using solvent cement that meets or exceeds ASTM F493, compatible with PVC pipe and fittings. Solvent cement shall be Low V.O.C., Heavy Duty Gray Industrial solvent cement by Oatey; Model EP42 or specifically approved equal.

- N. Pressure connections to pressure switches, recorders, and indicating gauges shall be equipped with a snubber.

2.05 REINFORCED FLEXIBLE TUBING

- A. PVC tubing with nylon inner braided reinforcing made from FDA approved materials, 65 Durometer, 175 psi working pressure for 1/2 to 1-1/2 inches ID. Install high pressure fittings with double stainless steel clamps for all connections to tubing.
- B. HDPE translucent tubing, compatible with chemical transported, minimum 190 psi working pressure at 70F for 1/2" to 3/4" O.D. Install high pressure PVC compression fittings all connections to tubing.

2.06 STAINLESS STEEL PIPING AND ACCESSORIES

- A. Standard weight, Schedule 40, two-ferrule type tube fitting connections, conforming to ASTM A269. All tubing, fittings, and valves shall be 316 stainless steel.

2.07 CAPS

- A. Vent caps
 - 1. Mushroom style, pipe size, galvanized cast iron construction with stainless steel no. 24 mesh screen as manufactured by PREFERRED UTILITIES MANUFACTURING CORP. or approved equal.

2.08 CORPORATION STOPS

- A. Manufacturers:
 - 1. MUELLER COMPANY, Model No. H-15000.
 - 2. FORD METER BOX COMPANY, Model No. FB600
- B. Ball valve type, water service bronze body with AWWA standard thread inlet and copper AWWA outlet, complete with straight coupling nuts.
- C. All connections greater than 1" shall utilize a threaded saddle with stainless steel bands.

2.09 CURB STOPS

- A. All metal parts shall be constructed of water service bronze. The curb stop shall have a combined tee and cap and an inverted tapered key with 1/4-inch hole drilled in cap for attaching a stationary rod. The valve shall open to the left (counterclockwise).
- B. All curb stops shall be by MUELLER COMPANY, No. H-15200, or specifically approved equal. Ball valve curb stop shall be by FORD METER BOX COMPANY, No. BH22-233, or specifically approved equal.
- C. All curb stops shall be provided with an extension service box.
- D. Extension service boxes with stationary rods to be by MUELLER COMPANY, No. H-10314 or approved equal. Cap shall be in accordance with the Owner's standard.

2.10 PRESSURE REGULATING VALVES

- A. Manufacturer:
 - 1. WATTS, Series 263A (3-way).

2. Approved equal.
- B. Valves shall be of brass construction with Buna-N disc/diaphragm, inlets/outlet size to match piping, maximum working pressure 300 psi, adjustable range 3 psi to 50 psi.
- C. Provide with pressure gauge and slotted adjusting screw.

2.11 RELIEF VALVES

- A. Air Release/Vacuum Valves
 1. Manufacturer:
 - a. CRISPIN, "AL" series
 - b. Approved equal
 2. Valve shall comply with ANSI/AWWA C512 Standards.
 3. The body and valve shall be constructed of cast iron conforming to ASTM A126, Class B.
 4. Spherical stainless steel float shall seal against a renewable Buna-N resilient seat.
- B. Pressure relief & Backpressure / Anti-siphon valves
 1. Manufacturer:
 - a. PLAST-O-MATIC VALVES, INC.
 - b. GRIFFCO, PRG2050P & BPV05OP
 - c. Approved equal
 2. Valves shall be molded in-line type with PVC body construction.
 3. Valves shall have a setting range from 5 to 120 psi and be compatible with chemicals in application. Size in accordance with the Plans.

2.12 SOLENOID VALVES

- A. Manufacturer:
 1. Red Hat II, Series 8210.
 2. Approved equal.
- B. Provide normally closed valves, 120 volt AC, 304 stainless steel body. The construction material of all wetted parts shall be compatible with the product contained.

2.13 VACUUM BREAKERS

- A. Vacuum breaker check valves shall be constructed of PVDF (Kynar), normally-closed, with self-sealing diaphragm. Connectors to match pipe and fittings. As manufactured by PLAST-O-MATIC VALVES, INC., Series VBM, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Clean inside of piping and tubing before installation. Keep installed piping clean and protect ends from foreign matter by capping or plugging.
- B. Install piping and tubing so that it does not interfere with opening of doors or apparatus, access to equipment or any portion of electrical equipment.
- C. Run piping and tubing in straight lines and square with building. Install rise plumb. Make offsets only where indicated and where necessary.
- D. Install pipes so that expansion and contraction will not cause undue stress or strain to pipes or equipment. Provide offsets and expansion joints as shown on drawings.

- E. Provide flanges and unions throughout the piping systems to make installation and removal of piping and equipment convenient. Make provisions for servicing and removal of equipment without dismantling piping.
- F. Support pipe in accordance with provisions of Section 220529.
- G. Install non-conducting dielectric connections wherever joining dissimilar metals.
- H. Install valves with stems upright or horizontal.
- I. Install water service lines in accordance with water utility standards.
- J. All copper piping shall be cut square, burrs removed and reamed after cutting. Fitting sockets and tube ends shall be thoroughly cleaned to a bright finish. All solder joints shall be fluxed and soldered using 95-5 tin and antimony solder and water soluble flux.
- K. All copper tubing connections shall be compression type.
- L. Joints between PVC and Black Iron/Galvanized Pipe (wherever necessary), shall be made with screwed fittings or screwed companion flanges.
- M. PVC piping and fittings connections to treatment equipment and at ends of runs shall have screw type joints. In all other locations, solvent welded slip type joints shall be used.
- N. Solvent welded joints shall be made using solvent cement that meets or exceeds ASTM F493, compatible with PVC pipe and fittings. Solvent cement shall be Heavy Duty Industrial orange solvent cement by Oatey, or specifically approved equal.
- O. Install PVC pipe in such a manner that it is not forced out of line by pipe supports, hangers or other supporting members. Pipe hangers shall be clevis or strap type.
- P. Threaded joints where specified shall be made using standard hand or machine pipe threading tools. Dies must be sharp and in good condition to assure a clean and smooth threading operation from start to finish. Threads shall be full cut and perfect. Protective pads of leather, rubber or felt shall be employed to prevent damage to pipe walls by chuck and/or vise jaws. A slightly tapered wood plug shall be tapped snugly into the pipe for the length of thread to prevent distortion of the pipe wall by the die.
- Q. Threaded pipe joints shall be made up using Teflon base compounds placed on the pipe threads. Do not place compound on threads of fittings. NO WICKING WILL BE PERMITTED.
- R. All fittings, except couplings, shall be supported and valves shall be braced to resist torque during valve manipulation.
- S. All piping shall be free of traps and graded to permit complete drainage.
- T. Connect reinforced flexible tubing to transition couplings with stainless steel clamps and/or compression fittings in accordance with tubing manufacturer's installation instructions.

3.02 SERVICE CONNECTIONS AND TAPPING

- A. Maintain a 10 foot (3 m) horizontal separation and an 18 inch (460 mm) vertical separation of water main from sewer piping.
- B. Thoroughly clean water main to be tapped to remove all dirt and scale.

- C. Tap main on the side toward the line to be connected to the tap.
- D. Equipment utilized for tapping shall be as recommended by the manufacturer of the corporation stop.
- E. Maintain a minimum of 4'-6" (1.4 m) cover over the copper service pipe.
- F. Install new copper service pipe in one continuous piece. Splicing will not be permitted.
- G. Install parallel lines in neat fashion maintaining a minimum of 8" wall to wall separation. Each service line shall penetrate foundation separate from all other utility penetrations. Record origin of all service lines penetrating foundation.
- H. Cuts made in copper service tubing for installation of valves or connection to the building shall be square, reamed and all burrs removed.
- I. Solder used for service line fittings shall be lead-free, with a maximum lead content of 0.2 percent.
- J. Install curb stop at locations specified and install curb box directly above the curb stop with the cover at or slightly above grade.
- K. Connect copper service piping to building service piping with compression fitting.

3.03 FIELD QUALITY CONTROL

- A. Flush piping prior to conducting pressure testing.
- B. Piping shall be pressure tested with air before piping is concealed. All joints shall be checked for leakage while under air pressure by swabbing, utilizing a soap and water solution, and leaks found shall be repaired and rechecked. Pressure of air during testing shall be at least 50 percent higher than normal working pressure. Piping shall be tested for pressure and leakage in accordance with Section 017550.
- C. Before piping and valves are concealed, recheck it for leaks.
- D. Rework or replace defective and leaking joints, and joints which are otherwise unsatisfactory. Peening, caulking and doping are not permitted.
- E. The Contractor shall furnish all labor, materials and equipment necessary to accomplish all testing and repairs.

3.04 VALVE ACCESS

- A. Locate shutoff and control valves for easy access and operation. Where valves are located in enclosed spaces provide and install access doors.

3.05 TESTING

- A. All small piping shall be tested for pressure and leakage, in accordance with AWWA Specification C600.

3.06 EXTRAS

- A. Provide District with three (3) 100-foot sections of poly-tubing (one for each chemical treatment system). Size appropriately, as indicated on the drawings.

END OF SECTION 221113

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pressure Gauges
- B. Interior Hose Bibs
- C. Non-Freeze Wall Hydrant
- D. Vent Caps
- E. Strainers
- F. Escutcheons
- G. Injection Quills
- H. Sight Flow Indicators

1.02 REFERENCES

- A. ASME A112.21.1 - Floor Drains
- B. ASEE 1019 - Wall hydrants, Frost Proof Automatic Draining Anti-Backflow Types
- C. ASME A112.26.1 - Water Hammer Arrestors
- D. ASSE 1011 - Hose Connection Vacuum Breakers
- E. PDI WH-201 - Water Hammer Arrestors
- F. ANSI Z124.6 - Plastic Sinks
- G. NSF 61 - Drinking Water System Components

1.03 SUBMITTALS FOR REVIEW

- A. Submit in accordance with Section 013300.
- B. Product Data: Provide component dimensions, weights, sizes, rough-in requirements, service sizes, and finishes.
- C. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions including assembly and support requirements.

1.04 DELIVERY, STORAGE, AND PROTECTION

- A. Transport, handle, store, and protect products in accordance with Section 016500.
- B. Accept specialties on site in original factory packaging. Inspect for damage.

1.05 WARRANTY

- A. Provide manufacturer's standard warranty for all applicable items under provisions of Section 017800.

PART 2 - PRODUCTS

2.01 PRESSURE GAUGES

- A. Pressure gauges shall be manufactured by ASHCROFT or approved equal, case type 1379, 4-1/2" diameter dial size, glycerin-filled, 316SS bourden tube and socket, with snubber and shut-off petcock valve. Pressure range as indicated on Plans.

2.02 INTERIOR HOSE BIBS

- A. Manufacturers: NIBCO or approved equal
- B. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with handwheel, vacuum breaker in conformance with ANSI/ASSE 1011.

2.03 NON-FREEZE WALL HYDRANT

- A. Wall Hydrant:
 - 1. Manufacturers:
 - a. ZURN Model Z-1310
 - b. ZURN Model Z-1321 Ecolotrol ceramic disc wall hydrant
 - c. Approved equal
 - 2. ANSI/ASSE 1019; non-freeze, anti-siphon, self-draining type with 3/4" hose connection, and integral backflow preventer.
 - 3. Exposed non-freeze, anti-siphon, automatic draining with copper casing, all bronze interior parts with 1/2 turn ceramic disc cartridge, 3/4" hose thread spout, stainless steel face, and operating key lock. Mounting height of 18 inches from center line of hydrant to finished grade or as indicated on Plans.
 - 4. Coordinate stem length in field.

2.04 VENT CAPS

- A. Vent caps shall mushroom type and conform to the requirements of NFPA No. 30, full pipe size galvanized cast iron construction as manufactured by PREFERRED UTILITIES MANUFACTURING CORP. or approved equal.
- B. Stainless steel security screens shall be installed where vent piping and air relief pipe penetrates an exterior wall.

2.05 STRAINERS

- A. Strainers shall be Y type, of size indicated, PVC body with 40 mesh cylindrical stainless steel screen and shall be as manufactured by HAYWARD CO. or approved equal. Provide strainers of Clear PVC construction where indicated on contract drawings.

2.06 ESCUTCHEONS

- A. Provide chrome plated escutcheons where un-insulated pipes penetrate walls of finished spaces.

2.07 INJECTION QUILLS

- A. Injection quill assembly to be manufactured by SAF-T-FLO, complete with retractable solution tube, corporation stop, adapters, safety chain, restrain hook, and bushings. Must be rated to 150 psi. Solution tube sizing to match line sizing.

1. Sequestering & Calcium Hypochlorite Injection: Brass corporation stop (S.S. where called for) and compression nuts, integral check valve with Viton seals, PVC solution tube with 45 degree bevel injection end. Solution tube length to be 1/2 diameter of pipe.
2. Calcium Hydroxide - Lime Injection: Black iron threaded piping and fittings, saddle for injection piping. Reinforced polyethylene tubing, and S.S. valves where called for.

2.08 SIGHT GLASS

- A. Manufacturer:
 1. JOHN C. ERNST CO., INC. Sight Flow Indicator Model 200.
 2. Approved equal.
- B. Double Window - Plain Type.
- C. Size: 10" diameter with 150 lb. ANSI flanged ends
- D. Construction: Carbon steel body, Neoprene seals, aluminum face plate, plated CS glass cover, and non-asbestos cushion.
- E. Pyrex annealed borosilicate glass, 4" visible glass diameter.
- F. Rated to 285 psig at 100 degrees F.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount sinks and faucets flush with mounting surfaces. Make all installations even and level. Caulk and/or seal all wall and floor penetrations. Use manufacturer provided/recommended mounting hardware.
- C. Extend cleanouts to finished floor or wall surface, or exterior grade. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- D. Install interior floor cleanouts at elevation to accommodate finished floor.
- E. Install exterior floor cleanouts in poured concrete pad at elevation to accommodate surrounding grade.
- F. Install insulation kits on exposed lavatory and drain pipe.

END OF SECTION 221119

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electric tempered water blending system.

1.02 RELATED SECTIONS

- A. Section 221113 - Facility Piping.
- B. Section 221119 - Plumbing Specialties.
- C. Section 224533 - Combination Emergency Fixture Units.

1.03 REFERENCES

- A. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.
- B. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data:
 - 1. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Provide electrical characteristics and connection requirements.
 - 3. Manufacturer's installation instructions.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017823.
- B. Include operation, maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.06 QUALITY ASSURANCE

- A. Ensure products and installation of specified products are in conformance with UL and National Sanitary Foundation (NSF) recommendations and requirements.

1.07 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

- A. Provide manufacturer's warranty for water heaters under provisions of Section 017800 and as indicated below.

PART 2 - PRODUCTS

2.01 ELECTRIC TEMPERED WATER BLENDING SYSTEM

- A. Manufacturers:
 - 1. Lawler tempering system
 - 2. Approved equal.
- B. Description: Tempered water blending system shall include 118 gallon water heater, heating element, accumulator, and 911E and 911E/F emergency mixing valves.
- C. Performance/Design Criteria:
 - 1. Mixing valve output temperature shall be factory set to 80°F with water influent temperature of 55°F.
 - 2. The system shall incorporate a device capable of flattening temperature spike through the system.
 - 3. A heat trap shall be provided to prevent heat migration to the cold side of mixing valves.
- D. Operation:
 - 1. Heating element shall be 120 V, 20 amp.
 - 2. System shall incorporate two (2) emergency mixing valves capable of controlling outlet temperature over a wide range of flows and employ a liquid-filled thermostatic motor and stainless steel sliding piston control device. The valves shall offer positive hot water shut-off in the event of cold water supply loss and full flow cold water bypass in the event of hot water supply loss or thermostatic failure.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install water heater in accordance with manufacturer's instructions.
- B. Coordinate with plumbing piping and electrical work as required to achieve operating systems.

END OF SECTION 224536

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This section describes the general requirements for all mechanical items and systems required by the Contract Documents.
- B. Comply with all Contract Requirements, General Conditions, Supplementary Conditions and Division 1 Sections applying to or affecting the Work of Division 23.
- C. Unless specifically dimensioned, the Work shown on the Drawings is in diagrammatic form only to show general arrangement.
- D. Include, in the Work, all accessories and appurtenances, necessary and integral, for the intended operation of any system, component or device, as such systems, components and devices are specified.
- E. If the pipe or duct size shown on the Drawings does not match the connection size of the equipment that it is connected to, provide the necessary transition pieces at the piece of equipment.
- F. Do not use or allow to be used asbestos or asbestos-containing materials on this project. Be rigorous in assuring that all materials, equipment, systems and components thereof do not contain asbestos. Any deviations from this requirement shall be remedied at the Contractor's expense without regard to prior submittal approvals.

1.02 RELATED DOCUMENTS

- A. The General Conditions and General Requirements Division 1 apply to the Work of this Section.

1.03 REFERENCE STANDARDS

- A. Compliance with the following codes and standards shall be required:
 - 1. Codes, Rules and Regulations of the State of New York
 - 2. USAS USA Standards Institute (Formerly ASA)
 - 3. AMCA Air Moving and Conditioning Association
 - 4. ADC Air Diffusion Council
 - 5. NEMA National Electrical Manufacturers Association
 - 6. FM Factory Mutual
 - 7. NFPA National Fire Protection Association
 - 8. ASTM American Society for Testing Materials
 - 9. UL Underwriters Laboratories, Inc.
 - 10. NEC National Electrical Code
 - 11. ASME American Society of Mechanical Engineers
 - 12. ANSI American National Standards Institute
 - 13. OSHA Occupational Safety and Health Act
 - 14. BSA Board of Standards and Appeals
 - 15. MEA Materials and Equipment Acceptance
 - 16. DEC New York State Department of Environmental Conservation - 6 NYCRR Part 613 Handling and Storage of Petroleum
 - 17. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers.
 - 18. AWWA American Water Works Association
 - 19. MSS Manufacturer's Standardization Society of the Valve and Fitting Industry
 - 20. ARI American Refrigeration Institute

21.	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
22.	TEMA	Tubular Exchanger Manufacturers Association
23.	F.S. or FED	Spec. Federal Specification
24.	ASA	Acoustical Society of America
25.	NACE	National Association of Corrosion Engineers
26.	ASSE	American Society of Sanitary Engineers
27.	International Building Code	
28.	International Fire Code	
29.	International Existing Building Code	
30.	International Fuel Gas Code	
31.	International Plumbing Code	
32.	International Energy Conservation Code	
33.	International Mechanical Code	
34.	New York State Industrial Code Rules	
35.	IRI	Industrial Risk Insurers
36.	AGA	American Gas Association
37.	AABC	American Air Balance Council
38.	NEBB	National Environmental Balancing Bureau
39.	AWS	American Welding Society

1.04 DEFINITIONS

- A. "Provide" means furnish and install, complete the specified material, equipment or other items and perform all required labor to make a finished installation.
- B. "Furnish and install" has the same meaning as given above for "Provide."
- C. Refer to General Conditions for other definitions.

1.05 ABBREVIATIONS

- A. Reference by abbreviation may be made in the Specifications and the Drawings in accordance with the following list:
 - 1. HVAC Heating, Ventilating and Air Conditioning
 - 2. CM Construction Manager
 - 3. AC Air Conditioning
 - 4. H & V Heating and Ventilating
 - 5. AWG American Wire Gauge
 - 6. BWG Birmingham Wire Gauge
 - 7. USS United States Standard
 - 8. B & S Brown & Sharpe
 - 9. OS & Y Outside Screw and Yoke
 - 10. IBBM Iron Body Brass Mounted
 - 11. WSP Working Steam Pressure
 - 12. PSIG Pounds per Square Inch Gauge
 - 13. PRV Pressure Reducing Valve
 - 14. GPM Gallons per Minute
 - 15. MBH Thousand BTU per hour
 - 16. BTU British Thermal Units
 - 17. WG Water Gage
 - 18. LB Pound (Also shown as: #)
 - 19. ASME American Society of Mechanical Engineers
 - 20. ASTM American Society for Testing Materials
 - 21. ABMA American Boiler Manufacturers Association
 - 22. ASA American Standards Associates

23. MER Mechanical Equipment Room
See Drawings for additional abbreviations

1.06 REVIEW OF CONTRACT DOCUMENTS AND SITE

- A. Give written notice with the submission of bid to the Architect/Engineer of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities having jurisdiction, and any necessary items of work omitted. In the absence of such written notice it is mutually agreed that the Contractor has included the cost of all required items in his proposal for a complete project.
- B. Contractors shall acknowledge that they have examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the Work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, utilities, roads and uncertainties of weather; the composition and condition of the ground; the characters quality and quantity of subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the Work; all federal, state, county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for successfully performing the Work.
- C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

1.07 MEASUREMENTS

- A. Base all measurements, both horizontal and vertical from established bench marks. Make all Work agree with these established lines and levels. Verify all measurements at site; and check the correctness of same as related to the Work.

1.08 LABOR AND MATERIALS

- A. Provide all materials and apparatus required for the Work of new and first-class quality. Furnish, deliver, arrange, erect, connect and finish all materials and equipment in every detail, so selected and arranged as to fit properly into the building spaces.
- B. Remove all materials delivered, or work erected, which does not comply with Drawings or Specifications, and replace with proper materials, or correct such work as directed, at no additional cost to the Owner.

1.09 COVERING OF WORK

- A. Do not cover up or hide from view any duct, piping, fitting, or other work of any kind before it has been examined or approved by the Architect/Engineer and/or other authority having jurisdiction over the same. Remove and correct immediately any unacceptable or imperfect work or unauthorized or disapproved materials discovered immediately after being disapproved.

1.10 PROTECTION

- A. Protect the Work and material of all trades from damage and replace all damaged material with new.

- B. Protect work and equipment until the Work is finally inspected, tested, and accepted; protect the Work against theft, injury or damage; and carefully store material and equipment received on site which is not immediately installed; close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.
- C. Preserve all public and private property, along and adjacent to the Work, and use every precaution necessary to prevent damage or injury thereto. Use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and do not remove them until directed.

1.11 CUTTING AND PATCHING

- A. Provide all cutting and rough patching required for the Work. Perform all finish patching.
- B. Furnish and locate all sleeves and inserts required before the floors and walls are built, pay the cost of cutting and patching required for pipes where sleeves and inserts were not installed in time, or where incorrectly located. Provide all drilling required for the installation of hangers.
- C. Punch or drill all holes cut through concrete slabs or arches from the underside. Do not cut structural members without the approval of the Architect/Engineer. Perform all cutting in a manner directed by the Architect/Engineer.
- D. Do not do any cutting that may impair strength of building construction. Do not drill any holes, except for small screws, in beams or other structural members without obtaining prior approval. All Work shall be done in a neat manner by mechanics skilled in their trades and as approved.

1.12 SUBMITTALS

- A. Submit for review, shop drawings for all materials and equipment furnished and installed under this Contract. Submissions shall include but not be limited to:
 - 1. Ductwork layout drawings, air devices and accessories
 - 2. Piping and equipment layout drawings.
 - 3. Piping materials, valves, hangers, supports and accessories
 - 4. Automatic temperature control equipment, diagrams and control sequences
 - 5. Equipment, fixtures, and appurtenances
 - 6. Insulation
- B. Reports
 - 1. Compliance with listings and approvals for equipment and for fire ratings.
 - 2. Acceptance certificates from inspecting agencies.
 - 3. Complete printed and illustrated operating instructions in report format.
 - 4. Manufacturer's performance tests of equipment.
 - 5. Field pipe and duct testing reports.
 - 6. Field operating test results for equipment.
 - 7. Manufacturer's reports on motorized equipment alignment and installation.
- C. Specific references to any article, device, product or material, fixture or item of equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and a standard of quality. All devices shall be of the make and type listed by Special Agencies, such as the Underwriters' Laboratories, and where required, approved by the Fire Department.

1.13 SPACE ALLOTMENTS AND SUBSTITUTIONS

- A. The space allotments and equipment layouts on the Drawings are based on the manufacturer's model indicated or scheduled as the "Basis of Design". Ensure that any equipment that is submitted other than the "Basis of Design" will fit in the space allotment and will provide the necessary maintenance clearances as recommended by the manufacturer. If maintenance clearances are not met, pay for any changes such that maintenance clearances will be met.
- B. Bear all costs associated with re-layout of the equipment, changes to piping/ductwork, and other changes as required if approved equipment other than the "Basis of Design" equipment is purchased. This shall also include any structural steel modifications and structural steel design changes. Submit, at no cost to the Owner, a steel design stamped by a structural engineer licensed in the state in which the Work is to be performed for structural modifications that must be made resulting from the use of equipment other than the "Basis of Design" or not specified.

1.14 PAINTING

- A. Prime paint all bare supplemental steel, supports and hangers required for the installation of Division 23 Work in accordance with "Painting" Specification Section. Touch up welds of galvanized surfaces with galvanizing primer.

1.15 MATERIAL SAFETY DATA SHEETS

- A. Submit material safety data sheets (MSDS) for all chemicals, hydraulic fluids, seal oils, lubricating oils, glycols and any other hazardous materials used in the performance of the Work, in accordance with the US Department of Labor, Occupational Safety and Health Administration (OSHA) hazard communication and right-to-know requirements stipulated in 29 CFR 1910.1200 (g).

1.16 MOTORS AND STARTERS

- A. Provide new NEMA Standard electric motors, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating. Provide motors with a service factor of at least 1.15.
- B. Install high efficiency electric motors for air handling units, and exhaust fans.
- C. Provide all motors for use with Variable Frequency Drives with "high efficiency inverter duty" insulation class "F" with class "B" temperature rise and that conform to or exceed the International Energy Conservation Code or the Federal EP Act of 1992 requirements for efficiency.
- D. Provide stainless steel nameplates, permanently attached to the motor, and having the following information as a minimum:
 - 1. Manufacturer
 - 2. Type
 - 3. Model
 - 4. Horsepower
 - 5. Service Factor
 - 6. RPM
 - 7. Voltage/Phase/Frequency
 - 8. Enclosure Type
 - 9. Frame Size
 - 10. Full-Load Current
 - 11. UL Label (where applicable)

12. Lead Connection Diagram
 13. Bearing Data
 14. Efficiency at Full Load.
- E. Provide motors whose sound power levels do not exceed that recommended in NEMA MG 1-12.49.
- F. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.
- G. Protect motor starters on equipment located outdoors in weatherproof NEMA 4X enclosures.
- H. Provide weatherproof NEMA 4X disconnect switches when located outdoors.
- I. Motor Characteristics:
1. 120V/1/60 Hz, 208V/1/60 Hz or 240V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
 2. 208V/3/60 Hz, 240V/3/60 Hz or 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.

1.17 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

- A. Install the Work in such a manner that noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within air handling equipment and air distribution and control media, do not to exceed sound pressure levels determined by the noise criteria curves published in the ASHRAE guide.
- B. Acoustical Tests
1. Owner may direct the Contractor to conduct sound tests for those areas he deems too noisy.
 2. If NC level exceeds the requirements of the Contract Documents due to improper installation or operation of mechanical systems, make changes or repairs to bring noise levels to within required levels.
 3. Retest until specified criteria have been met.

1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Instructions and Demonstration for Owner's Personnel
1. Provide operating and maintenance instruction to the Owner when project is completed and all HVAC equipment serving the building is ready to be turned over to the Owner.
 2. Turn over the HVAC equipment to the Owner only after the final testing and proper balancing of HVAC systems.
 3. Instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system.
 4. The above instruction requirements are in addition to that specified for specific equipment or systems. Conform to specified requirements if more stringent or longer instruction is specified for specific equipment or systems.

1.19 CODES, RULES, PERMITS & FEES

- A. Give all necessary notices, obtain all permits and pay all government sales taxes, fees, and other costs, in connection with the Work. Unless indicated otherwise, fees for all utility connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity will be paid directly to utility companies and/or agencies by the Owner. File all necessary plans,

prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for the Work and deliver same to the Owner's Representative before request for acceptance and final payment for the Work.

- B. Conform to the requirements of the NFPA, NEC, FM, UL and any other local or State codes which may govern.

1.20 RECORD DRAWINGS

- A. During the progress of the Work, make a record set of drawings of all changes by which the actual installation differs from the Drawings.
- B. Create all record drawings in AutoCAD version 2002 or later in .dwg format. Upon completion of the Work, submit to the Architect/Engineer for approval three complete sets of hard copies of the record drawings, of the same size as the Drawings for approval. Upon approval by the Architect/Engineer furnish the Owner a CD copy of the record drawings along with one hard copy for his records.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CLEANING AND ADJUSTING

- A. Cleaning
 - 1. Blow out, clean and flush each system of piping and equipment, to thoroughly clean the systems.
 - 2. Clean all materials and equipment; leave in condition ready to operate and ready to receive final finishes where required.
 - 3. Clean the operating equipment and systems to be dust free inside and out.
 - 4. Clean concealed and unoccupied areas such as plenums, pipe and duct spaces and equipment rooms to be free of rubbish and dust.
- B. Adjusting
 - 1. Adjust and align equipment interconnected with couplings or belts.
 - 2. Adjust valves of all types and operating equipment of all types to provide proper operation.
- C. Lubrication
 - 1. Lubricate equipment as recommended by the manufacturer, during temporary construction use.
 - 2. Provide complete lubrication just prior to acceptance.
- D. Permanent Equipment Operating During Construction
 - 1. Use only in same service as the permanent applications.
- E. Retouch or repaint equipment furnished with factory finish as required to provide same appearance as new.
- F. Tools
 - 1. Provide one set of specialized or non-standard maintenance tools and devices required for servicing the installed equipment.

3.02 ACCESSIBILITY

- A. Install valves, dampers and other items requiring access conveniently and accessibly located with reference to the finished building.

3.03 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof, even with the Owner's consent, is not an indication of acceptance of the Work on the part of the Owner, nor shall it be construed to obligate the Owner in any way to accept improper work or defective materials.

3.04 MODIFICATIONS OF EXISTING WORK

- A. Coordinate the Work with all other contractors and provide necessary dimensions for all openings. Provide all cuts and openings which are necessary for the Work for passage of piping and ductwork
- B. Upon completion, remove all temporary piping and equipment, shoring, scaffolds, etc., and leave all areas clean and free from material and debris resulting from the Work performed under this Section. Provide rough patching in areas required.

3.05 EQUIPMENT INSTALLATION

- A. Locate and set equipment anchor bolts, dowels and aligning devices for equipment requiring them.
- B. Level and shim the equipment; coordinate and oversee the grouting work.
- C. Perform field assembly, installation and alignment of equipment under direct supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.
- D. Alignment and Lubrication Certification for Motor Driven Apparatus
 - 1. After permanent installation has been made and connections have been completed, but before the equipment is continuously operated, have a qualified representative of the equipment manufacturer inspect the installation and report in writing on the manufacturer's letterhead on the following:
 - a. Whether shaft, bearing, seal, coupling, and belt drive alignment and doweling is within the manufacturer's required tolerances so that the equipment will remain aligned in the normal service intended by the Contract Documents and that no strain or distortion will occur in normal service.
 - b. That all parts of the apparatus are properly lubricated for operation.
 - c. That the installation is in accordance with manufacturer's instructions.
 - d. That suitable maintenance and operating instructions have been provided for the Owner's use.
 - e. Make any corrections to items that are required or recommended based on the manufacturer's inspection and have the equipment re-inspected.
- E. Machinery Guards
 - 1. Protect motor drives by guards furnished by the equipment manufacturer or in accordance with the Sheet Metal and Air Conditioning Contractors National Association's Low Pressure Duct Manual. Provide guards of all types approved as acceptable under OSHA Standards.
- F. Equipment Start-up

1. Require each equipment manufacturer to provide qualified personnel to inspect and approve equipment and installation and to supervise the start-up of the equipment and to supervise the operating tests of the equipment.
2. If a minimum number of hours for start-up and instruction are not stated with the equipment specifications, these shall be 2 full 8-hour working days as a minimum.
3. Advise Owner of start-up at least 72 hours in advance.

3.06 CLOSEOUT PROCEDURES

- A. General Operating and Maintenance Instructions: Arrange for each installer of operating equipment and other work that requires regular or continuing maintenance, to meet at the site with the Owner's personnel to provide necessary basic instructions in the proper operation and maintenance of the entire Work. Where installers are not expert in the required procedures, include instruction by the manufacturer's representatives.
- B. Where applicable, provide instruction and training, including application of special coatings systems, at manufacturer's recommendation.
- C. Provide a detailed review of the following items:
 1. Maintenance manuals
 2. Record documents and catalog cuts for each piece of equipment.
 3. Spare parts and materials
 4. Tools
 5. Lubricants
 6. Fuels
 7. Identification systems
 8. Control sequences
 9. Hazards
 10. Cleaning
- D. Warranties, bonds, maintenance agreements, and similar continuing commitments.
- E. Demonstrate the following procedures:
 1. Start-up
 2. Shut-down
 3. Emergency operations
 4. Noise and vibration adjustments
 5. Safety procedures
 6. Economy and efficiency adjustments
 7. Effective energy utilization.
- F. Prepare instruction periods to consist of approximately 50% classroom instruction and 50% "hands-on" instruction. Provide minimum instruction periods as follows:

Systems or Equipment	Training Time (Hours)
All Equipment	4 hrs.

Note: Consult individual equipment specification sections for additional training requirements.

END OF SECTION 230010

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The Work specified as part of this Section consists of the work required to achieve operational and coordinated Sequences of Operation as described. Work includes coordination of functions of controllers supplied as part of equipment packages, sizing of control valves, interconnection of systems, provision and installation of all accessory devices required for complete system operation including devices not provided as part of equipment, coordination of start up and testing and demonstration of the operation of Sequences of Operation to the Owner and his representatives.
- B. The control system operation of all equipment shall be subject to the operational modes, conditions and logic described in this Section and the controlled equipment manufacturer's recommendations.
- C. Training of the Owner's personnel in the operation, trouble shooting, adjustment and repair of all system controls.

1.02 RELATED SECTIONS AND WORK

- A. Division 26

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 GENERAL

- A. General
 - 1. Conform to the requirements of the Owner's standards for all electrical work and devices.

3.02 SEQUENCE OF OPERATION - ELECTRIC UNIT HEATER, (UH-1, UH-2, UH-3)

- A. General:
 - 1. The unit heater shall be provided with a remote, wall mounted digital thermostat, provided by Contract 'E'.
- B. Heating:
 - 1. The heating set point temperature shall be 60 degrees (adjustable). When the space temperature falls below the set point temperature, the unit heater shall turn on in order to maintain the set point temperature.

3.03 SEQUENCE OF OPERATION - EXHAUST FAN AND MOTORIZED LOUVER (EF-1, EF-2, L-1)

- A. General:
 - 1. The exhaust fan shall be provided with a Hand-Off-Auto switch and remote mounted thermostat by Contract 'E'.
 - a. Hand Mode: Exhaust fan shall operate and motorized louvers shall open.
 - b. Off Mode: Exhaust fan shall be off and motorized louvers shall be closed
 - c. Auto Mode: Exhaust fan shall run and motorized louvers shall open when space temperature rises above the set point of 85 degrees (adjustable)

END OF SECTION 230993

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide exhaust fans, as specified herein, of sizes and capacities scheduled and in locations shown on drawings.

1.02 REFERENCE CODES AND STANDARDS

- A. AMCA 99 - Standards Handbook
- B. AMCA 210 - Laboratory Methods of testing Fans for Rating
- C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans
- D. ASHRAE Handbook, HVAC Applications Volume "Sound and Vibration Control"
- E. UL listed and labeled.

1.03 SUBMITTALS

- A. Shop Drawings - Show fan layout, housing, materials, gauges, dimensions, weights and installation details
- B. Product data - Manufacturer's fan performance (data includes cfm, rpm, bhp, motor nameplate data, tip speed, outlet velocity and static pressure) and sound performance (data includes sound power level ratings by octave bands) as tested in accordance with AMCA Standards 210 and 300.
- C. Fan performance curves - Submit curves for all fans with system performance shown, and for plus or minus 10 percent and plus or minus 20 percent change in fan rpm. Curves shall include plotted rpm, horsepower, cfm, static pressure, and fan surge line and operating point.
- D. Certified AMCA Ratings - Submit ratings for air and sound performance.
- E. UL Listing - Submit listing if specified.

1.04 QUALITY ASSURANCE

- A. Factory balance each fan statically and dynamically, test run before shipment, and key fan wheel to fan shaft. Fans shall operate quietly and without pulsation or vibration. Conduct sound power level tests for each type fan at the factory in accordance with AMCA 300.
- B. Fans shall operate in the stable range of their performance curves.
- C. The fan external static pressures shown in the schedules are those required by the ductwork and apparatus, and do not include the internal and intake fan losses, inlet vanes or integral outlet dampers, inlet screens, outlet velocity heads or drive losses.
- D. Factory performance test each fan assembled in or as part of apparatus specified to be performance tested. Test shall display scheduled performance characteristics, using certified, calibrated testing instruments provided by the manufacturer of the apparatus.
- E. All fan performance ratings shall be based up on factory tests performed in accordance with AMCA 210. One fan of each type specified shall have actual factory performance tests performed prior to shipment. All fans shall be certified by AMCA and carry its seal.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation
- B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer's instructions. For long term storage follow manufacturer's Installation, Operations, and Maintenance Manual
- C. Handling: Handle and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer

1.06 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents
 - 1. The warranty of this equipment is to be free from defects in material and workmanship for a period of 1 Yr (Standard) from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at the Manufacturer's option when returned to Manufacturer, transportation prepaid
 - 2. Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station

PART 2 - PRODUCTS

2.01 DIRECT DRIVE SIDEWALL MOUNTED PROPELLER FANS (EF-1)

- A. General Description:
 - 1. Fan shall be model CBL as manufactured by American Coolair or approved equal.
 - 2. Fan arrangement shall be exhaust.
 - 3. Sidewall mounted applications.
 - 4. Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number.
- B. Wheel:
 - 1. Propeller shall be constructed of cast aluminum tapered airfoil blades and cast aluminum hubs.
 - 2. Securely attached to motor shaft with a standard square key, set screw and tapered bushing.
 - 3. Statically and dynamically balanced in accordance with AMCA Standard 204-05.
 - 4. The propeller and fan inlet shall be matched and shall have precise running tolerances for maximum performance and operating efficiency.
- C. Motors:
 - 1. Electronically Commutated Motor
 - a. Motor enclosure: Open drip proof.
 - b. Motor shall be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors.

- c. Motors shall be permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
 - d. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor.
 - e. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor.
 - f. Motor shall be a minimum of 85% efficient at all speeds.
- D. Drive Frame:
- 1. Frames and Panels shall be bolted construction.
 - 2. Drive frame assemblies and fan panels shall be galvanized steel or painted steel.
 - 3. Drive frame shall have formed channels and fan panels shall have pre-punched mounting holes, formed flanges and a deep formed one piece inlet venturi.
- E. Options/Accessories:
- 1. All options and accessories shall be as called for on the equipment schedules.

2.02 CENTRIFUGAL DOWNBLAST FANS (EF-2)

- A. Roof mounted exhaust fan shall be of the downblast direct drive type.
- B. The fan housing shall consist of the motor cover, shroud, cover cap and lower windband, and shall be constructed of heavy-gauge aluminum, Housing shall have a rigid internal support structure and leakproof design. The fan shroud shall be one-piece with a rolled bead for extra strength, which directs exhaust air downward. The low windband shall be one piece with formed edges for added strength and the curb cap shall include prepunched mounting holes to ensure correct attachment to the roof.
- C. The fan wheel shall be centrifugal, non overload, backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
- D. Motors shall be permanently lubricated and carefully matched to the fan loads. Motors shall be readily accessible for maintenance. Motors shall be mounted on the true vibration isolators, out of the airstream. each vibration isolator shall be sized to match the weight of each fan.
- E. A NEMA 3R disconnect switch shall be provided as standard. factory wiring shall be provided from the motor to the handy box.
- F. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.
- G. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification
- H. Fan shall be manufactured by Greenheck or approved equal
- 1. Exhaust Fan in Well No. 5-1 Building shall be Model G-090-VG, By Greenheck (1 total)
 - 2. Curb adapet and reducer shall be installed as required to facilitate installation of exhaust fans in locations shown on drawings.
 - 3. Ductwork to proposed exhaust fans shall be installed in accordance with manufacturer recommendations.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install fans, including all necessary structural supports and bracings as scheduled and located on the contract drawings in accordance with manufacturer's instructions and approved submittals.
- B. Connect duct to fans to allow for straight and smooth air flow.
- C. Provide flexible connections (minimum of 4") between fan and duct.
- D. Install fan level: +/- 5 degrees vertical. Final installation shall be free of all leaks from both fan and associated ductwork.

3.02 START-UP, TESTING, DEMONSTRATION

- A. Start-up fans after checkout to insure proper alignment and phased electrical connections.
- B. Test fans individually and as part of system.
- C. Insure fans are properly interlocked with supply fans and with control system.
- D. Demonstrate operation to Owner and instruct maintenance personnel in operation of equipment.

END OF SECTION 233416

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Electric Unit Heaters.

1.02 REFERENCES

- A. Electric unit heaters shall meet the requirements of the National Electric Code (NEC) and shall be UL listed.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300 - SUBMITTALS.
- B. Submit manufacturer's product data and installation instructions to Engineer.
- C. Submittal data shall include capacity and size of each heater and wiring instructions.

PART 2 - PRODUCTS

2.01 ELECTRIC UNIT HEATERS

- A. Electric unit heater shall be Model HVH as manufactured by Chloromax or approved equal. Heater shall be suitable for horizontal or vertical mount. Refer to the drawings for mounting type.
- B. Heater to be of the KW rating, voltage and phase specified in the schedule.
- C. Unit cabinet shall be 20 gauge die-formed furniture grade steel with integral adjustable louvers to provide control of discharge air. All metal surfaces of the case shall be phosphate coated to resist corrosion, and finished attractive two-tone power coated paint.
- D. The electric heating bank shall be metal sheath fintube heating elements with furnace brazed fins for improved heat transfer. Automatic reset thermal overload protection shall be wired for instantaneous de-energizing of built-in control of contactor holding coil in case of thermal overload.
- E. The motor shall be totally enclosed, continuous fan-duty sleeve bearing type equipped with built-in thermal overload protection. Each unit shall be equipped with combination motor support resiliently mounted at four points to absorb any motor vibration. Fans shall be aluminum, directly connected to fan motor, dynamically balanced and designed specifically for unit heater application.
- F. All units shall have built-in contactors and low voltage control circuit transformers to provide single-source power connection. Factory mounted disconnect switches shall be provided. A wiring diagram and grounding lug shall be included in each control compartment.
- G. Supports: Stainless steel hanger rods, double nuts, and ceiling/wall bracket.
- H. All options and accessories shall be as called for on the equipments schedules.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install unit in accordance with manufacturer's published installation instructions.

- B. Do not install horizontal unit heaters closer than 12 inches to combustible materials in any direction.

END OF SECTION 238239

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavation and backfill for electrical work.
- B. Demolition of existing electrical systems.
- C. Secondary power wiring and distribution system.
- D. Lighting.
- E. Wiring devices.
- F. Electrical control systems and interlock wiring.
- G. Wiring for built-in equipment.
- H. Motor Control Centers.
- I. Distribution panels and switches.
- J. Engine generator system and automatic transfer switch.
- K. Sound acoustical generator enclosure.
- L. Instrumentation and Controls.

1.02 RELATED WORK

- A. Foundations and pads required for equipment furnished under this division of specifications.
- B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.
- C. Flashing and sealing of conduits through outside walls.
- D. Cutting and patching for electrical work, except for errors and omissions under this Division.

1.03 QUALITY ASSURANCE

- A. It is understood that the rights and benefits given the Owner by the guarantees found in the technical specifications are in addition to and not in derogation of any rights or benefits found in the special and general provisions of the contract.
- B. Electrical equipment provided under this Division shall be turned over in operating condition. Instruction on further operation and maintenance shall be included in the operating and maintenance instructions.

1.04 REFERENCES

- A. Perform work in accordance with standards listed below. Where these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Engineer.
 - 1. NFPA-70: National Electrical Code
 - 2. NFPA-101: Life Safety Code
 - 3. New York State Energy Code

4. New York State Building Code
5. Applicable New York State Administrative Code
6. Applicable Town Ordinances.
7. Electric utility rules and regulations.
8. Telephone utility rules and regulations.

1.05 PERMITS AND FEES

- A. The Contractor shall obtain and pay for all permits, construction charges, fees, licenses, certificates, inspections and other use charges required in connection with the work.
- B. Such permits include, but are not limited to:
 1. Transportation and disposal of debris.
 2. Temporary Electrical Services and Permanent Electrical Service.
 3. Communication Service.
 4. Electrical Inspectors, Inc., or a pre-approved electrical inspection agency.
 5. Road opening permits.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. All materials and equipment used in carrying out these specifications shall have UL listing and label. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Engineer's approval.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Carefully examine specifications, drawings and project site to be thoroughly familiar with items which require electrical connections and coordination. Electrical drawings are diagrammatic and shall not be scaled for exact sizes.
- B. Notify other Contractors of any deviations or special conditions necessary for the installation of work. Interferences between work of various contractors to be resolved prior to installation. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to the Owner. Engineer to be mediating authority in all disputes arising on project.
- C. Equipment shall be installed in accordance with manufacturer's recommendation. Where conflicts occur between contract documents and these recommendations, a clarification shall be requested of the Engineer for decision before preceding with such work.
- D. Insofar as it is possible to determine in advance, advise masonry tradesmen to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required to be done is at this Contractor's expense.
- E. FIRE ALARM – For any facilities that utilize an existing fire alarm system, the contractor shall coordinate with the owner and fire alarm monitoring company prior to removing or disabling any devices. It shall be the contractor's responsibility to provide fire watch as per the latest addition of the Fire Code of New York State. The contractor shall provide fire watch for all areas of a

facility while occupied and unoccupied when any device or part of the fire alarm system is de-activated or put into "test mode".

3.02 CUTTING AND PATCHING

- A. Repair or replace routine damage caused by cutting in performance of work under this Division.
- B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.
- C. Holes cut through floor slabs to be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs to be properly sealed, fire proofed and waterproofed.
- D. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.03 TESTS

- A. On completion of work, installation shall be completely operational and entirely free from ground, short circuits, and open circuits. Perform a thorough operational test in presence of the Engineer. Balance all circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.
- B. Furnish Engineer with a copy of such tests including identification of each circuit and readings recorded, also the main service ground resistance test as described in Section 260526 of these specifications. Test information to include ampere readings of all panels and major circuit breakers, isolation resistance reading of motors and transformers.

3.04 IDENTIFICATION OF EQUIPMENT

- A. Properly identify the following:
 - 1. Motor Control Centers including all individual devices.
 - 2. Distribution panels.
 - 3. Disconnect switches.
 - 4. Transfer switches.
 - 5. Individually mounted circuit breakers.
 - 6. Relays.
 - 7. Pilot lights and control switches.
 - 8. Service entrance equipment and main circuit breaker.
- B. Use permanently attached black phenolic plates with 1/4-inch white engraved lettering on the face of each, attached with two sheet metal screws.
- C. Panelboard identification plates shall indicate panel by name.

3.05 INSTALLATION

- A. The Contractor shall carefully move and replace existing equipment, appliances and all related items, as required to conduct proposed work.
- B. Install and conduct all work per applicable NEC, State and local codes.

END OF SECTION 260000

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.
- B. Removal of all existing control equipment in MCC's and instrumentation panels.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable code for demolition work, safety of structure and dust control.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct egress width to exits.
- E. Do not turn off electric equipment without authorization from Owner.
- F. Conform to procedures applicable when discovering hazardous or contaminated materials.
- G. Obtain a utilities mark-out of all buried underground utilities for telephone, electric, gas, sewer and water, including all customer owned utilities.

1.04 SCHEDULING

- A. Schedule Work to coincide with new construction.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify field circuiting arrangements at all Buildings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on visual field observation. Report discrepancies to the Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing condition.

3.02 PREPARATION

- A. Coordinate utility service outages with Utility Company.

- B. Provide power, wiring and connections to maintain all existing power, control and telemetry systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction, as indicated on drawings.
- B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
- D. Repair adjacent construction and finishes damaged during demolition and extension work.
- E. Provide caps and filler plates/plugs for all openings in equipment and enclosures after removal of conduits.
- F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- G. Remove demolished materials from site as work progresses.
- H. Completely remove and dispose of all electrical power, control, and telemetry feeds including conduits, conductors, boxes and supports not scheduled to remain after new construction is tested and operational.
- I. Where existing devices and equipment are called to be removed, Contractor shall maintain circuit continuity to all existing devices and equipment remaining on that circuit. Contractor shall provide all required conduit, conductors and boxes as required.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Remove temporary work.

END OF SECTION 260010

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wires and cables.
- B. In general, the wires and cables included under this Section shall include, but not be limited to, the following:
 - 1. 600V power and control cable
 - 2. Instrumentation wires
 - 3. Communication cables
- C. All conductors to be continuous from origin to panel or equipment termination without splices.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.
- B. NECA Standard of Installations.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.

1.04 QUALITY ASSURANCE

- A. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the General Conditions.
- B. Contractor shall submit the following information pertaining to the manufacturer(s):
 - 1. Complete literature, performance, and technical data describing the proposed equipment and listing of items made by the manufacturer.
 - 2. Location of closest service office from which this equipment shall be serviced.
 - 3. Location of closest parts inventory for item installation.

1.05 COORDINATION

- A. Coordination:
 - 1. Coordinate wire and cable required with the equipment being furnished by others for the satisfactory operation of the equipment or system.
 - 2. Review installation procedures under other sections and contracts and coordinate them with the work specified herein.
 - 3. Notify other prime contractors in advance of the installation of the work included to provide them with sufficient time for installation and coordination of interrelated items that are included in their contracts and that must be installed in conjunction with the work included in this Section.

1.06 PROJECT CONDITIONS

- A. Verify that embedded conduit, in masonry and concrete, is installed as shown on the Drawings prior to the work being enclosed by others.
- B. The Contractor shall be present at all concrete pours made by the General Contractor.

- C. Conductor sizes are based on copper at 75°C.
- D. Wire and cable routing shown on Drawings is approximate unless dimensioned or specifically called for such as where conduit is to be embedded in concrete or masonry. Route wire and cable as required to meet project conditions and shall be routed above ceilings, directly under joists, in pipe trenches, where available, and in masonry. Where exposed conduit is permitted, it shall be run to maximize wall space.
- E. Field verify destination location to determine cable routing.
- F. Where wire and cable routing is not shown for proposed destination, determine exact routing and lengths required. Routing shall be reviewed with the Engineer.

PART 2 - PRODUCTS

2.01 CONDUCTORS

- A. Install products in accordance with manufacturer's recommendations.
- B. Single copper conductors with 600-volt insulation.
- C. Minimum size of feeder conductors and grounds shall be No. 12 AWG.
- D. Insulation: No. 12 AWG and No. 10 AWG, provide ANSI/NFPA 70, Type THWN-2 for interior circuits, type XHHW-2 for exterior circuits.
- E. Use solid conductor for feeder and branch circuits, 10 AWG and smaller.
- F. All conductors shall include complete set of manufacturer's markings for insulation and conductor size.
- G. Manufacturers shall be ANACONDA, TRIANGLE, ROME, or approved equal.
- H. Provide white colored neutral conductors; provide black, color coded phase conductors; provide green colored ground conductors.

2.02 300 VOLT INSTRUMENTATION SIGNAL CABLE - FOR INDOOR USE

- A. Indoor Application:
 - 1. The 300-volt instrumentation signal cable for indoor use shall consist of single or multiple twisted pairs or triads of coated, stranded copper conductors with polyvinyl chloride (PVC) insulation and nylon jacket. Each individual pair or triad of wires shall have an aluminum/polyester tape shield with a tinned copper drain wire. For multiple pair or triad cables, an overall aluminum/polyester tape shield with a tinned copper drain wire shall enclose the individual wire assemblies. The overall jacket shall be PVC. Cables shall have a 105°C rating.
 - 2. The conductors shall be annealed, tin-coated copper with Class B stranding per ASTM B8. Minimum size conductor shall be AWG No. 16.
 - 3. The insulation shall be PVC. The insulation thickness shall be 15 mils.
 - 4. Individual Conductor Insulation: The jacket over each individual wire shall be nylon and shall have a thickness of 4 mils.
 - 5. The shield for each individual pair or triad shall be an aluminum/polyester tape. The shield shall be 1.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be a maximum of two

sizes smaller than the conductors. All individual shields shall be completely isolated from each other.

6. The overall shield for multiple pair or triad cables shall be an aluminum/polyester tape. The shield shall be 2.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be the same size as the conductors.
7. The overall jacket shall be PVC and shall meet the requirements of UL 13.
8. The jacket thickness shall be as follows:

Wire Size	No. of Pairs	No. of Triads	Jacket Thickness
16 AWG	1	-	35 Mils
16 AWG	2,4	-	50 Mils
16 AWG	8,10,12	-	60 Mils
16 AWG	-	1	35 Mils
16 AWG	-	2,4	50 Mils
16 AWG	-	8	60 Mils
16 AWG	-	12	70 Mils

9. Manufacturers and their products shall be equal to:
 - a. Cablec APVIC
 - b. Okonite A Type P-OS and Type SP-OS
 - c. Or approved equal

B. Outdoor Use in Conduits:

1. The 300-volt instrumentation signal cable for outdoor use in conduits shall consist of single or multiple twisted pairs or triads of coated, stranded copper conductors with polyvinyl chloride (PVC) insulation and nylon jacket. Each individual pair or triad of wires shall have an aluminum/polyester tape shield with a tinned copper drain wire. For multiple pair or triad cables, an overall aluminum/polyester tape shield with a tinned copper drain wire shall enclose the individual wire assemblies. The overall jacket shall be chlorinated polyethylene (CPE). Cables shall have a 105°C rating.
2. The conductors shall be annealed, tin-coated copper with Class B stranding per ASTM B8. Minimum size conductor shall be AWG No. 16.
3. The insulation shall be PVC. The insulation thickness shall be 15 mils.
4. The jacket over each individual wire shall be nylon and shall have a thickness of 4 mils.
5. The shield for each individual pair or triad shall be an aluminum/polyester tape. The shield shall be 1.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be a maximum of two sizes smaller than the conductors. All individual shields shall be completely isolated from each other.
6. The overall shield for multiple pair or triad cables shall be an aluminum/polyester tape. The shield shall be 2.35 mils thick and shall be overlapped to provide 100% coverage. The shield shall also contain a 7-strand tinned copper drain wire which shall be the same size as the conductors.
7. The overall jacket shall be CPE and shall meet the requirements of UL 13.
8. The jacket thickness shall be as follows:

Wire Size	No. of Pairs	No. of Triads	Jacket Thickness
16 AWG	1	-	35 Mils
16 AWG	2,4	-	50 Mils
16 AWG	8,10,12	-	60 Mils
16 AWG	-	1	35 Mils
16 AWG	-	2,4	50 Mils
16 AWG	-	8	60 Mils

Wire Size	No. of Pairs	No. of Triads	Jacket Thickness
16 AWG	-	12	70 Mils

9. Manufacturers and their products shall be as follows:
 - a. Cablec APZIC
 - b. Okonite AOkobon Type P-OS and Type SP-OS
 - c. Or approved equal

2.03 4-PAIR CATEGORY 6 UNSHIELDED TWISTED PAIR CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Belden Corporation, Carmel, IN (800) 246-2673.
 2. Avaya, Basking Ridge, NJ (800) 344-02232.
 3. Berk-Tek, Incorporated, New Holland, PA (800) 237-5835.
 4. CommScope, Hickory, NC (800) 982-1708.
 5. Draka Comteq, Franklin, MA (888) 541-7100.
 6. General Cable, Highland Heights, KY (800) 424-5666.
 7. Mohawk/CDT Leominster, MA (978) 537 9961.
 8. NORDX/CDT, Worcester, MA (800) 331-0779.
 9. Superior Essex, Atlanta, GA. (800) 685-4887.
 10. Tyco Electronics, Harrisburg, PA (800) 522-6752.
- B. Conductors: 4 twisted pair - 24 AWG, solid copper w/ RJ-45 connector ends
 1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
 2. Complies with individual characteristics established in ANSI/TIA/EIA-568-B, and all addendums for Category 6 cable performance specification.
 3. Overall Nominal Diameter: .365 x .165 in.
 4. Nominal Impedance: 100 ohms plus or minus 15 percent.
 5. Certified capable of performing to minimum 350 MHz.
- C. Mechanical Characteristics
 1. Operating temperature: -20°C to +80°C
 2. Bulk cable weight: 29 lbs./1000 ft.
 3. Maximum recommended pulling tension: 45 lbs.
 4. Minimum bend radius: 1 in.
- D. Flame test: UL1666 Riser
- E. Electrical Characteristics:
 1. Nom. Mutual Capacitance @ 1 KHz 15.0 pF/ft
 2. Maximum Capacitance Unbalance (pF/100 m) 49.2 pF/100 m
 3. Nominal Velocity of Propagation 70 %
 4. Maximum Delay (ns/100 m) 510 @ 100MHz ns/100 m
 5. Maximum Delay Skew (ns/100m) 25 ns/100 m
 6. Maximum Conductor DC Resistance @ 20 Deg. C 9 Ohms/100 m
 7. Maximum DCR Unbalance @ 20 Deg. C 3 %
 8. Max. Operating Voltage - UL 300 V RMS

2.04 MECHANICAL CONNECTORS

- A. Conductor tapping connectors shall be BURNDY Servit split bolt, Series KS and KS3, or approved equal.

- B. Split bolt connectors shall use BURNDY Type SC Servit cover on indoor applications.
- C. Terminal lugs shall be BURNDY Universal Terminal Series. Terminal lugs shall be sized for proper ampacity and proper number of conductor holes. Each conductor shall occupy only one hole on a terminal lug.
- D. Conductor tapping connectors for multiple conductors shall be BURNDY Series V-Tap with V-Tap covers, and V-Blok mounting platforms.

2.05 BELOW GRADE EXTERIOR SPLICES

- A. Manufacturer: 3M or approved equal
- B. Model: 72-N series for inline splices
- C. Model: 90-B1 for WYE splices
- D. Splices shall be weatherproof, made with epoxy resin UL listed for direct burial.
- E. For use with all exterior pull boxes and hand holes where splices are made.
- F. Provide all connectors and crimp couplings as required.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Make terminations in accordance with cable manufacturers instructions for the particular type of wire and cable.
 - 2. Splices are not allowed in the underground duct and manhole systems. If splices are required, the Contractor shall obtain approval in writing from the Engineer prior to splicing.
 - 3. All splices shall be in made in terminal boxes.
- B. Wire and Cable Sizes: The sizes of wire and cable shall be as shown on the Contract Drawings, or if not shown, as approved by the Engineer. Minimum size wire shall be No. 12 AWG for all power, lighting and receptacle circuits. Wires for control circuits shall be No. 14 AWG minimum. Wire for instrumentation circuits shall not be smaller than No. 16 AWG. If due to field routing the voltage drop exceeds 2.5%, the size of conductors shall be increased such that 2.5% is the maximum voltage drop incurred.
- C. Number of Wires: The number of wires indicated on the Contract Drawings for the various control, indications, and metering circuits were determined for general schemes of control and for particular indication and metering systems. Coordinate wiring schemes with equipment schematics.
- D. Wiring Identification: All wiring shall have a unique wire number and be labeled at both ends. Wire numbers shall correspond with the equipment terminal wire numbers. Where no wire numbers are indicated, the Contractor shall assign wire numbers. Wire numbers shall not be duplicated.
- E. Cable Identification Tags: The Contractor shall furnish all labor and materials and affix in a permanent way to each cable in manholes, cable compartments and vaults, junction boxes, pull boxes and points of termination, a laminated plastic tag, bearing clearly printed, the cable number indicated on the Contract Drawings or some other approved identification number or

symbol. All cables shall be temporarily tagged with its full ID number immediately after it has been pulled.

- F. Wiring Supplies: Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Engineer shall be used. Friction tape shall be in accordance with ASTM D69.
- G. Training of Cable: Furnish all labor and material required to train cables around cable vaults within buildings and in manholes in any outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole cables shall be arc and fireproofed.
- H. Connections at Control Panels, Limit Switches and Similar Devices:
- Where stranded wires are terminated at panels, and/or devices connections shall be made by solderless lug, crimp type ferrule or solder dipped.
 - Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make 7-strand, No. 12 AWG, wire terminations impractical, the Contractor shall terminate external circuits in an adjacent junction box of proper size and shall install No. 14 AWG stranded wires to the junction box in a conduit.
- I. Pulling Temperature: Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40°F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55 degrees F and pulling shall be completed during the work day for which the cable is removed from the protected storage.
- J. Color Coding:
- Conductor jacket shall be color coded as follows:

AC POWER

480V/277 Volt 3 phase	208Y/120 Volt 3 phase (PSEGLI)	208Y/120 Volt 3 phase (NEC)	240/120 Volt 3 phase (PSEGLI)	240/120 Volt 3 phase (NEC)
Phase A Brown	Phase A Blue	Phase A Black	Phase A Blue	Phase A Black
Phase B Orange	Phase B Black	Phase B Red	Phase B Black	Phase B Orange (HiLeg)
Phase C Yellow	Phase C Red	Phase C Blue	Phase C Orange	Phase C Blue
Neutral White	Neutral White	Neutral White	Neutral White	Neutral White
Ground Green	Ground Green	Ground Green	Ground Green	Ground Green

- Control (Per ICEA Method 1, K-2):

WIRE NUMBER	COLOR
1	Black
2	Red
3	Blue

WIRE NUMBER	COLOR
4	Orange
5	Yellow
6	Brown
7	Red With Black
8	Blue With Black
9	Orange With Black
10	Yellow With Black
11	Brown With Black
12	Black With Red
13	Blue With Red
14	Orange With Red
15	Yellow With Red
16	Brown With Red
17	Black With Blue
18	Red With Blue
19	Orange With Blue

3. DC Power
 - a. Positive Lead - RED
 - b. Negative Lead - BLACK
 4. Instrumentation Signal
 - a. Pairs - Black and White
 - b. Triads - Black, Red and White
 5. Equipment Ground - GREEN
- K. Instrumentation Cable Installation:
1. Where instrumentation cables are installed in panels, etc., arrange wiring to provide maximum clearance between cables and other conductors. Instrumentation cables shall not be installed in same bundle with conductors of other circuits.
 2. Grounding of cable shield shall be accomplished at one point only, unless otherwise required by instrumentation systems manufacturer.
 3. Special instrument cable shall be as specified or recommended by the vendor of the equipment or instruments requiring such wiring. Installation, storage, terminations, etc., shall be per manufacturer's recommendations.

3.02 IDENTIFICATION

- A. Identify wire and cable under provisions of Section 260553.
- B. Identify each conductor with its circuit number.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Field Testing:
 1. Wires and cables shall be tested before being connected to motors, devices or terminal blocks.

2. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner.
 3. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.
- E. Continuity Tests: All cables, wires and shields shall be tested for continuity. Testing for continuity shall be by test light or buzzer.
- F. Insulation-Resistance Tests:
1. 600V power and control cables and wires shall be tested for their insulation-resistance values. Test shall utilize a megohmmeter with applied voltage to be 1000VDC for one (1) minute. Insulation-resistance test shall be performed on each conductor with all other conductors grounded. The resistance value shall be 20 megohms or greater.
 2. 300V instrumentation signal cable shall be tested from conductor to conductor, conductor to ground, and conductor to shield using a digital volt-ohm meter. The resistance value shall be 10 megohms or greater.

END OF SECTION 260519

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 COMPONENTS

- A. Ground clamps: OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG", or equal by STEEL CITY or APPLETON.
- B. Raceways, conductors, outlet boxes, pull and junction boxes to be furnished in accordance with applicable sections of these specifications.
- C. Rod Electrode: Copper, 3/4-inch diameter, 10 feet long.
- D. Wire: Copper, sized to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.
 - 2. Effectively bond all grounding conductors to grounding rod electrodes, equipment enclosures and ground busses.
 - 3. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.
 - 4. Install service entrance building ground as per NEC and LIPA requirements.
 - 5. Service entrance shall be bonded to street side of first flange or coupling of incoming main water line with heavy duty ground clamp. Bonding conductor to be sized in accordance with NFPA 70.
 - 6. Building steel shall be bonded to ground bus on main service with a conductor the same size as in B.1 below.
 - 7. Install new service grounds and grounding systems for new service as per LIPA and NEC requirements.
 - 8. Generators shall have a dedicated grounding system for a separately derived system for switching neutrals.

B. Feeder/Branch Circuits:

1. All circuits shall have a separate green grounding conductor in conduit sized in accordance with NFPA 70. Minimum size of conductor shall be No. 12 AWG.
2. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit to have a jumper wire sized to ampacity of branch breaker and to be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

C. Transformers:

1. Transformers shall be grounded and grounding conductors and conduits sized in accordance with NFPA 70.

3.02 TEST

- A. Test ground on main service. Ground system resistance shall be no greater than 10 ohms using test equipment similar to a "Biddle" test. Test data to be submitted to the Engineer for approval and such approved test data to become a part of the Record Documents.

END OF SECTION 260526

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. System of supporting devices and hangers for support or bracing for conduit, electrical equipment, safety switches, fixtures, panelboards, outlet boxes, junction boxes and cabinets.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 EQUIPMENT REQUIREMENTS

- A. Provide appropriate corrosion-resistant supporting devices and hangers for electrical equipment, as manufactured by ERICO PRODUCTS, INC., CADDY FASTENERS, STEEL CITY, MINERALLAC or equivalent.
 - 1. "Z" purlin clips.
 - 2. Conduit clips.
 - 3. Beam clamps (universal and vertical flange).
 - 4. Beam clamps (set screw type).
 - 5. Combination push-in conduit clips.
 - 6. Combination conduit hanger clamps.
 - 7. Flexible conduit clips.
 - 8. Special combination conduit clips.
 - 9. One hole steel straps.
 - 10. Conduit hangers.
- B. Provide materials, sizes and types of anchors, fasteners and supports to carry the loads of equipment, wire in conduit and conduit.

2.02 CHANNEL SUPPORT SYSTEM

- A. Channel systems and supports shall be manufactured by KINDORF/THOMAS & BETTS, or approved equal.
- B. Channels shall be 1-1/2" x 1-1/2".
- C. Channels and all associated accessories and bolts shall be hot dipped galvanized.
- D. Channels shall have 9/16" bolt holes on 1-1/2" centers.
- E. Provide end caps for all channels.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Secure conduits to within 3 feet of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed 10 feet in accordance with currently effective edition of the National Electric Code.
- B. In seismic zones, support conduits 1 inch and smaller at 6 foot intervals.
- C. Install clamps secured to structure for feeder and other conduits routed against structure. Use drop rods and hangers to support conduits run apart from the structure.
- D. Provide and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, etc.
- E. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. Prepainted or galvanized support material is not required to be painted or repainted.
- F. Do not use chains, perforated iron, baling wire or tie wire for supporting conduit runs. Use of clips to support conduit to top of t-bar ceiling grid will not be permit-ted.
- G. Obtain permission from Engineer before drilling or cutting structural members.
- H. Install surface mounted cabinets and panelboards with a minimum of four anchors.
- I. Do not fasten supports to pipes, ducts, mechanical equipment and conduit.
- J. Install products in accordance with manufacturer's instructions.

END OF SECTION 260529

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Conduit system with associated couplings, connectors and fittings. Conduits to be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.
 - 1. Conduit Use - Rigid Galvanized Conduit:
 - a. All exterior circuits above and below ground.
 - 2. Conduit Use - PVC Sch. 80
 - a. Secondary service power feeds from PSE&G transformer.
 - b. All interior circuits above and below ground.
 - 3. Conduit Use - Metal Clad (MC) Cable:
 - a. All 15 and 20 amp branch circuits concealed in walls or ceilings.
 - 4. Conduit Use - Flexible Liquid-tight Metal Conduit:
 - a. Connecting motors, generators and other equipment subject to vibration, maximum length - 3 feet.
 - b. Passing through building expansion joints.
 - 5. J-Hooks
 - a. For use above finished ceilings for telephone, PA, CAT 6 data and fire alarm cable only.
- B. Device Boxes: Provide each fixture switch, receptacle and other wiring device with a box of appropriate size and depth for its particular location use unless indicated otherwise.
- C. Pull boxes, junction boxes and wire troughs

1.02 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI/NFPA 70 - National Electric Code.
- C. NECA Standard of Installation.
- D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- E. NEMA TC 3 - PVC Fittings for use with Rigid PVC conduit and tubing.
- F. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- G. ANSI/NEMA OS1 - Sheet-steel outlet boxes, device boxes, covers and box supports.
- H. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Working Drawings:
 - 1. Prior to equipment submission, submit a list of proposed manufacturers with the products they produce proposed for the contract.
 - 2. Manufacturer's catalog cuts for the conduit, boxes, fittings and supports proposed for use.
 - 3. Construction details of conduit racks and other conduit support systems with seismic restraint details and calculations signed by a licensed Engineer.

4. Scaled working drawings showing proposed routing of all conduits, inclusive of conduits routed above grade on exterior support structures, embedded in structural concrete and conduits directly buried in earth. Drawings shall show locations of pull and junction boxes and all penetrations in walls and floor slabs.

1.04 REGULATORY REQUIREMENTS

- A. Furnish products listed and classified by Underwriters Laboratories, Inc.
- B. Conform to requirements of ANSI/NFPA 70.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 017839.
- B. Accurately record actual routing of all conduits.

1.06 FIELD SAMPLES

- A. Provide under provisions of Section 014500.
- B. Provide field sample of conduit two each at 2 feet in length.
- C. Provide field sample of expansion/deflection fitting, two each.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with manufacturers' recommendations.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing abovegrade. Provide appropriate covering.

1.08 PROJECT CONDITIONS

- A. Verify all conduit routings by field measurements.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system. Provide all required sweeps, boxes and fittings.

PART 2 - PRODUCTS

2.01 RIGID GALVANIZED CONDUIT

- A. Rigid conduit shall be hot dipped, galvanized, or electro-galvanized steel by Wheatland, Triangle, Republic or approved equal.
- B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

- C. ERICKSON couplings, Series 676 or approved equal, shall be used where neither length of conduit can be rotated.
- D. Conduit connectors shall be threaded type. Set screw and compression type connections ARE NOT acceptable.
- E. Sealing fitting locknuts shall be Series 142SL.
- F. Steel or malleable iron insulated bullet hub, Series 370-379, complete with sealing "O" ring. DO NOT use "die cast" material.
- G. Entrance ells shall be Series 1491 or approved equal.
- H. Combination coupling shall be Series 531 for connecting rigid galvanized conduit to electrical metallic tubing.

2.02 PVC CONDUIT

- A. PVC conduit shall be manufactured by WHEATLAND, TRIANGLE REPUBLIC or approved equal.
- B. Description: NEMA TC 2; Schedule 80 PVC.
- C. Fittings and Conduit Bodies: NEMA TC3.

2.03 METAL CLAD CABLE (MC)

- A. Metal clad cable shall be manufactured by BICCGENERAL or approved equal.
- B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal.
- C. Conductors shall be types THHN and THWN. Ground wire shall be sized as per NEC with green THHN/THWN insulation. All conductors shall be cabled and wrapped in polyester tape. All conductors shall be rated for 600 VAC.
- D. Armor material shall be Aluminum Interlocked Armor.

2.04 DUCT SEAL

- A. RectorSeal or approved equal.
- B. Model #: 81881

2.05 J-HOOKS

- A. TO BE USED ABOVE FINISHED CEILING ONLY. FOR TELEPHONE, PA, CAT 6 DATA AND FIRE ALARM CABLE ONLY. ALL EXPOSED TELEPHONE, PA, CAT 6 DATA AND FIRE ALARM CABLE SHALL BE IN CONDUIT.
- B. Erico Caddy HP J. Hook Series or approved equal.
- C. Provide wire retainers for all.
- D. Provide mounting hardware and accessories as required.

- E. Spacing of J-Hooks and supports shall not exceed 5'-0" on center.

2.06 FLEXIBLE LIQUID-TIGHT METAL CONDUITS AND FITTINGS

- A. Liquid-tight flexible metal conduit shall be ANACONDA or approved equal.
- B. Description: Interlocked steel construction with PVC jacket.
- C. Provide flexible liquid-tight conduits and fittings as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO. or approved equal. Catalog numbers used below are those of the THOMAS & BETTS CORP., based on 3/4" size and are to be considered as standards by which equivalents are to be judged. All conduit shall be liquid-tight flexible type, UL type UA, or suitable for exposure to continuous or intermittent moisture.
- D. Flexible liquid-tight connectors shall be Series 5333 or approved equal.

2.07 OUTLET AND DEVICE BOXES

- A. Acceptable Manufacturers: Raco, General Electric or approved equal.
- B. Sheet Metal Outlet Boxes - All concealed boxes shall be NEMA OS1, galvanized steel:
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Provide 1/2" male fixture stubs where required.
- C. Concrete Ceiling Boxes: Concrete type.
- D. Cast Boxes: All exposed surface mounted boxes shall be NEMA FB1, Type FD, cast fer alloy. Provide gasketed cover by box manufacturer.

2.08 PULL BOXES

- A. All pull boxes used for this project shall be minimum LIPA B-3-6 or specifically approved equal for all customer installed power and control circuits.
- B. Provide H-20 Cast-Iron Traffic Load Cover. Cover shall have 3" high logo "Electric".

2.09 JUNCTION BOXES

- A. Acceptable Manufacturers: RACO, GENERAL ELECTRIC or approved equal.
- B. Sheet metal boxes: NEMA OS1, galvanized steel.
- C. Covers: Galvanized steel.

2.10 WIRE TROUGH

- A. Wireways shall be manufactured by Square D, Class 526, rain tight trough or approved equal.
- B. Wireway shall be completely enclosed with removable covers.
- C. Construction: 16 Gauge Galvanized Steel. 8-inch and 12-inch wire trough shall be 14-gauge galvanized steel.
- D. Finish: ANSI-49 epoxy paint applied by cathodic electro-deposition paint process over a corrosion resistant phosphate preparation.

- E. UL listed.

2.11 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT THREAD COMPOUND

- A. KOPR-SHIELD or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUITS

- A. Minimum size of conduits shall be 3/4-inch.
- B. Minimum conduit depth shall be 24" below grade, measured to the top of the conduit on exterior underground installations.
- C. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors and fittings.
- D. All threaded conduits and fittings shall have KOPR-SHIELD compound applied to all threads prior to assembly.
- E. Make bends or offsets with standard ells or field bends with an approved bender.
- F. Run concealed conduits in direct line with long sweep bends or offsets. Run exposed conduits parallel to and at right angles to building lines. Group multiple conduit runs in banks.
- G. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.
- H. Install conduit in accordance with NECA Standard of Installation.
- I. Cap ends of conduits to prevent entrance of water and other foreign material during construction.
- J. Complete all conduit systems before pulling conductors.
- K. Support conduits under provisions of Section 260529.
- L. Provide approved expansion joints or fittings and bonding jumpers where conduits in concrete pass through building expansion joints.
- M. Provide cable supports in conduits rising vertically in accordance with the National Electric Code, Article 300-19.
- N. Provide No. 12 AWG copper pull wires or nylon cord in all empty conduits. Steel wire not acceptable as pull wire.
- O. Install conduit to preserve fire resistance rating of partitions and other elements.
- P. Ground and bond conduit under provisions of Section 260526.
- Q. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.
- R. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in

a threaded hub, a steel, or malleable iron nylon insulated bullet hub, complete with recessed sealing "O" ring, shall be used, Series 370-379 . DO NOT use die cast material.

- S. In concrete slabs block up conduit from forms and securely fasten in place. All conduits in slabs shall be installed below concrete slab.
- T. Where conduits running overhead pass through building expansion joints, install flexible liquid tight conduit of same size with sufficient slack to allow conduits on either side of expansion joint to move a minimum of 3-inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.
- U. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.
- V. Arrange supports to prevent misalignment during wiring installation.
- W. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- X. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- Y. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- Z. Do not attach conduit to ceiling support wires.
- AA. Arrange conduit to maintain headroom and present neat appearance.
- AB. Route exposed conduit parallel and perpendicular to walls.
- AC. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- AD. Route conduit in and under slab from point-to-point.
- AE. Do not cross conduits in slab.
- AF. Maintain adequate clearance between conduit and piping.
- AG. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104°F (40°C).
- AH. Bring conduit to shoulder of fittings; fasten securely.
- AI. Use conduit hubs with sealing locknuts to fasten conduit in damp and wet locations.
- AJ. Install no more than equivalent of three 90-degree bends on interior locations between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch size.
- AK. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- AL. Do not use dissimilar strap or clamp supports. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.

- AM. Where fittings for liquid-tight flexible conduit are brought into an enclosure with a knockout, a gasket assembly, consisting of one piece "O" ring, with a Buna-R sealing material, Series 5200, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.
- AN. A copper ground wire sized in accordance with NEC shall be installed on the inside of the conduit as a jumper around flexible conduit to assure a continuity of ground.
- AO. Install a copper jumper across all flexible conduit including lighting fixtures, controls and other utilization equipment.
- AP. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.
- AQ. Allow sufficient slack conduit to reduce the effect of vibration.
- AR. Complete all conduit systems before pulling the conductors.
- AS. Support in accordance with requirements of National Electric Code.

3.02 INSTALLATION OF BOXES

- A. Install boxes concealed in finished walls.
- B. Locate boxes to prevent moisture from entering or accumulating within them.
- C. Support boxes independently of conduit, as required by the National Electric Code.
- D. Provide 4" x 1-1/2" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square ceiling outlet boxes.
- E. Where required to hang a specific fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.
- F. Provide 2-1/2" x 3-3/4" one gang masonry boxes for switches and receptacles installed concealed in concrete block walls. For increased cubic capacity, provide 3-1/2" x 3-3/4" one gang masonry boxes. Where more than two conduits enter the box from one direction, provide 4" square boxes with square cut device covers not less than 1" deep specifically designed for this purpose. Use round edge plaster rings only if the block walls are to be plastered. Use sectional or gang-type outlet boxes only in drywall construction.
- G. Provide 4-11/16" square outlet boxes with square cut device corners for block walls or round edge plaster rings for plastered walls for telephone outlets. Single gang device boxes are not acceptable.
- H. Provide fittings with threaded hubs for screw connections and with the proper type covers for switches and receptacles served by exposed conduit. Use pressed steel outlet only for ceiling fixture outlets.
- I. Provide condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.
- J. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed, in accordance with the National Electric Code.
- K. Effectively close unused openings in boxes with metal plugs or plates.

- L. Set boxes so that front edges are flush with finished surfaces.
- M. Support boxes from structural members with approved braces.
- N. Install blank device plates on outlet boxes left for future use.
- O. Provide bushings in holes through which cords or conductors pass.
- P. Install boxes so that the covers will be accessible at all times.
- Q. Electrical boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearance between such boxes and the gypsum board shall be completely filled with joint compound or approved fire-resistive compound. The wall shall be built around outlet boxes larger than 16 square inches so as not to interfere with the wall rating.

3.03 INSTALLATION OF PULL BOXES, JUNCTION BOXES AND WIRE TROUGHS

- A. Provide junction boxes as shown on Drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-inch square and 2-1/8-inches deep. Provide screw covers for junction boxes.
- B. Install boxes in conduit runs wherever necessary to avoid long runs or too many bends. Do not exceed 100-foot runs without pull boxes. Install pull boxes at all 90-degree bends.
- C. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered adequate support.
- D. Install boxes with covers in accessible locations. Size boxes in accordance with the National Electric Code.
- E. Do not install pull boxes or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box.
- F. Coordinate installation of exterior pull boxes with General contractor to establish elevations of finished grades and pavements. All castings shall have chimney adjustment of + 6".

3.04 CONDUIT LOCATIONS

- A. Surface mounted conduit will only be allowed on finished block walls or on plaster walls, where conduit cannot be run concealed. All horizontal runs shall be installed above finished ceilings, where drop ceilings are located. Surface mount horizontal runs shall only be allowed where drop ceilings are not located.
- B. All conduit shall be primed and painted to match adjacent wall color.
- C. J-Hooks are only permitted to be used above finished ceilings for telephone, PA, CAT 6 data and fire alarm cable.
- D. Contractor shall not route conduits over pump motors, roof hatches and trolley beams which would prevent removal of pump motors.

END OF SECTION 260533

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide catalog data for nameplates, labels and markers.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Underwriters Laboratories, Inc. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.
- B. Locations:
 - 1. Motor Control Centers.
 - 2. Distribution panelboards.
 - 3. All control switches and pilot light devices.
 - 4. Transfer Switches.
 - 5. Generator Enclosure.
- C. Letter Size:
 - 1. Use 1/4 inch (6 mm) letters for identifying all control pilot lights.
- D. Labels: Embossed adhesive tape, with 3/16" (5mm) white letters on black background. Use for identifying existing equipment, distribution panels, switchboards, disconnect switches, and individual electrical devices.

2.02 WIRE MARKERS

- A. Manufacturers:
 - 1. 3M ELECTRICAL SPECIALTY DIV., Product Scotch Code.
 - 2. THOMAS & BETTS CORP., Product E-Z Code.

3. Substitutions shall be permitted only after receiving written approval from the Engineer.
- B. Description: Epoxy film tape type wire markers.
- C. Locations: Each conductor at panelboards, auxiliary gutters, pull boxes, outlet and junction boxes, circuit breakers and each load connection.
- D. Legend:
 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
 2. Control Circuits: Control wire number indicated on interconnection diagrams on drawings.

2.03 CONDUIT MARKERS

- A. Manufacturers:
 1. THOMAS & BETTS CORP.
 2. Substitutions shall be permitted only after receiving written approval from the Engineer.
- B. Description: Self-sticking vinyl; black letters on orange background.
- C. Location: Furnish markers for each conduit longer than 6 feet (1.8 m).
- D. Spacing: 20 feet (6 m) on center.

2.04 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 1. THOMAS & BETTS CORP., Model NAF-0700.
 2. Substitutions shall be permitted only after receiving written approval from the Engineer.
- B. Description: 6 inch (150 mm) wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws, rivets or adhesive.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Apply conduit markers at 20 foot (6 m) intervals.
- E. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches (75 mm) below finished grade.

3.03 ELECTRICAL EQUIPMENT IDENTIFICATION

- A. The Contractor shall identify all existing circuits in existing distribution panels, switchboards and disconnect switches to remain.

- B. Label all circuits identifying the load served including all individual circuit breakers.
- C. Label all new circuit breakers and switches used for new feeder and branch circuits.
- D. Contractor shall furnish a minimum of 5 custom engrave three-layer laminated plastic labels with up to 20 words per label as directed by the engineer/owner in addition to the required labels for all pilot devices, switches, controls and timers.

END OF SECTION 260553

SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY H2M

PART 1 - GENERAL

1.01 SCOPE

- A. The contractor shall furnish short-circuit and protective device coordination studies for the entire site incorporating all existing and new information as required to reflect the conditions of the final system.
- B. The contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in the current version of NFPA 70E - Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.
- C. The scope of the studies shall include new distribution equipment supplied under this contract, in addition to existing equipment. Contractor is responsible to field verify all existing equipment information and configurations.

1.02 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. IEEE 141 - Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
 - 2. IEEE 242 -Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
 - 3. IEEE 399 - Recommended Practice for Industrial and Commercial Power System Analysis
 - 4. IEEE 241 -Recommended Practice for Electric Power Systems in Commercial Buildings
 - 5. IEEE 1015 - Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
 - 6. IEEE 1584 -Guide for Performing Arc-Flash Hazard Calculations
- B. American National Standards Institute (ANSI):
 - 1. ANSI C57.12.00- Standard General Requirements for Liquid-Immersed Distribution, Power, and .Regulating Transformers
 - 2. ANSI C37.13- Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
 - 3. ANSI C37.010- Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
 - 4. ANSI C 37.41- Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
- C. The National Fire Protection Association (NFPA)
 - 1. NFPA 70 -National Electrical Code, latest edition
 - 2. NFPA 70E- Standard for Electrical Safety in the Workplace

1.03 SUBMITTALS FOR REVIEW/APPROVAL

- A. The studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.

SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY H2M

1.04 SUBMITTALS FOR CONSTRUCTION

- A. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. Electronic PDF copies of the report shall be provided.
- B. The report shall include the following sections:
 - 1. Executive Summary including Introduction, Scope of Work and Results/Recommendations.
 - 2. Short-Circuit Methodology Analysis Results and Recommendations
 - 3. Short-Circuit Device Evaluation Table
 - 4. Protective Device Coordination Methodology Analysis Results and Recommendations
 - 5. Protective Device Settings Table
 - 6. Time-Current Coordination Graphs and Recommendations
 - 7. Arc Flash Hazard Methodology Analysis Results and Recommendations including the details of the incident energy and flash protection boundary calculations, along with Arc Flash boundary distances, working distances, Incident Energy levels and Personal Protection Equipment levels.
 - 8. Arc Flash Labeling section showing types of labels to be provided. Section will contain descriptive information as well as typical label images.
 - 9. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

1.05 QUALIFICATIONS

- A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.
- B. The Registered Professional Electrical Engineer shall be an employee of the equipment manufacturer or an approved engineering firm.
- C. The Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies.
- D. The approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual arc flash hazard analyses it has performed in the past year.
- E. The engineering firm shall have a minimum of twenty-five (25) years of experience in performing power system studies.

1.06 COMPUTER ANALYSIS SOFTWARE

- A. The studies shall be performed using SKM PowerTools or EasyPower for Windows software program.

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PART 2 - PRODUCT

2.01 STUDIES

- A. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E -Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D. This study shall also include short-circuit and protective device coordination studies.

2.02 DATA

- A. Contractor shall furnish all data as required for the power system studies. The Engineer performing the short circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- B. Source combination may include present and future motors and generators.
- C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor. Contractor is responsible for confirmation of accuracy.
- D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.03 SHORT-CIRCUIT ANALYSIS

- A. Transformer design impedances shall be used when test impedances are not available.
- B. Provide the following:
 - 1. Calculation methods and assumptions
 - 2. Selected base per unit quantities
 - 3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis
 - 4. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
 - 5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.
 - 6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
- C. For solidly-grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the engineer performing the study.
- D. Protective Device Evaluation:
 - 1. Evaluate equipment and protective devices and compare to short circuit ratings
 - 2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short circuit stresses

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3. The Contractor shall notify Owner in writing, of any circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS

- A. Protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.
- B. Include on each TCC graph, a complete title with descriptive device names.
- C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
- D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- E. Plot the following characteristics on the TCC graphs, where applicable:
 1. Electric utility's overcurrent protective device
 2. Medium voltage equipment overcurrent relays
 3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
 4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
 5. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves
 6. Medium voltage conductor damage curves
 7. Ground fault protective devices, as applicable
 8. Pertinent motor starting characteristics and motor damage points, where applicable
 9. Pertinent generator short-circuit decrement curve and generator damage point
 10. The largest feeder circuit breaker in each motor control center and applicable panelboard.
- F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.
- G. Provide the following:
 1. A One-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.
 2. A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
 3. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.
 4. The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices, the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram
 5. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
 6. The Contractor shall notify Owner in writing of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

2.05 ARC FLASH HAZARD ANALYSIS

- A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2009, Annex D. The arc flash hazard analysis shall be performed in conjunction with the short-circuit analysis (Section 2.03) and the protective device time-current coordination analysis (Section 2.04)
- B. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.
- C. Circuits 240V or less fed by single transformer rated less than 125 kVA may be omitted from the computer model and will be assumed to have a hazard risk category 0 per NFPA 70E.
- D. Working distances shall be based on IEEE 1584. The calculated arc flash protection boundary shall be determined using those working distances.
- E. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations
- F. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location in a single table. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum. Conversely, the maximum calculation will assume a maximum contribution from the utility. Calculations shall take into consideration the parallel operation of synchronous generators, where applicable as well as any stand-by generator applications.
 - 1. The Arc-Flash Hazard Analysis shall be performed utilizing mutually agreed upon facility operational conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
- G. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors should be decremented as follows:
 - 1. Fault contribution from induction motors should not be considered beyond 5 cycles.
- H. For each piece of ANSI rated equipment with an enclosed main device, two calculations shall be made. A calculation shall be made for the main cubicle, sides, or rear; and shall be based on a device located upstream of the equipment to clear the arcing fault. A second calculation shall be made for the front cubicles and shall be based on the equipment's main device to clear the arcing fault. For all other non-ANSI rated equipment, only one calculation shall be required and it shall be based on a device located upstream of the equipment to clear the arcing fault.
- I. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.
- J. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

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- K. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. A maximum clearing time of 2 seconds will be used based on IEEE 1584-2002 section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.
- L. Provide the following:
 - 1. Results of the Arc-Flash Hazard Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment classes and AFIE (Arc Flash Incident Energy) levels.
 - 2. The Arc-Flash Hazard Analysis shall report incident energy values based on recommended device settings for equipment within the scope of the study.
 - 3. The Arc-Flash Hazard Analysis may include recommendations to reduce AFIE levels and enhance worker safety.

PART 3 - EXECUTION

3.01 FIELD ADJUSTMENT

- A. Contractor shall adjust relay and protective device settings according to the recommended settings table provided by the coordination study.
- B. Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.
- C. The Contractor shall notify Owner in writing of any required major equipment modifications.

3.02 ARC FLASH LABELS

- A. The Contractor shall provide a 4.0 in. x 4.0 in. Brady thermal transfer type label of high adhesion polyester for each work location analyzed.
- B. The labels shall be designed according to the following standards:
 - 1. UL969 - Standard for Marking and Labeling Systems
 - 2. ANSI Z535.4- Product Safety Signs and Labels
 - 3. NFPA 70 (National Electric Code)- Article 110.16
- C. The label shall include the following information:
 - 1. System Voltage
 - 2. Flash protection boundary
 - 3. Personal Protective Equipment category
 - 4. Arc Flash Incident energy value (cal/cm²)
 - 5. Limited, restricted, and prohibited Approach Boundaries
 - 6. Study report number and issue date
- D. Labels shall be printed by a thermal transfer type printer, with no field markings.
- E. Arc flash labels shall be provided for equipment as identified in the study and the respective equipment access areas per the following:
 - 1. Floor Standing Equipment - Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups containing sections with multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.

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2. Wall Mounted Equipment- Labels shall be provided on the front cover or a nearby adjacent surface, depending upon equipment configuration.
 3. General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of general electrical hazards associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to work.
- F. Labels shall be field installed by The Contractor. The technician providing the installation shall have completed an 8-Hour instructor led Electrical Safety Training Course with includes NFPA 70E material including the selection of personal protective equipment.

3.03 ARC FLASH TRAINING

- A. The vendor supplying the Arc Flash Hazard Analysis shall train the owner's qualified electrical personnel of the potential arc flash hazards, associated with working on energized equipment (minimum of 4 hours). The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) or equivalent. The trainer shall be an authorized OSHA Outreach instructor.
- B. The vendor supplying the Arc Flash Hazard Analysis shall offer instructor led and online NFPA 70E training classes.

END OF SECTION 260574

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surge protection device.

1.02 STANDARDS

- A. The specified suppressor shall be designed, manufactured, tested and installed in compliance with:
 - 1. American National Standards Institute and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.11, C62.41 and C62.45).
 - 2. Federal Information Processing Standards Publication 94 (FIP PUB 94).
 - 3. National Electrical Manufacturer Association (NEMA LS-1).
 - 4. National Fire Protection Association (NFPA 20, 70, 75 and 78).
 - 5. Underwriters Laboratories (UL 1449).
 - 6. CAN/C22.2 No. 8-M1986; CSA Electrical Certification Notice No. 516.
 - 7. The system individual units shall be UL listed under UL 1449 Standard for Transient Voltage Surge Suppressions (TVSS) and the surge ratings shall be permanently affixed to the TVSS.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. MCG ELECTRONICS, INC., Deer Park, New York.
- B. Approved equal.

2.02 MANUFACTURED UNITS

- A. Surge suppression shall be series Surge Free Model No. 200LS.

2.03 SYSTEM REQUIREMENTS

- A. The specified surge protective device shall provide effective high energy surge diversion for application ANSI/IEEE C62.41-1991 Location Category C3 environments. Testing per ANSI/IEEE C62.45-1992 using ANSI/IEEE C62.41 Category C3 waveforms and amplitudes. UL 1449 listing. The specified surge protective device shall provide:
 - 1. 200,000 transient amps, per phase of surge protection.
 - 2. Peak surge current ratings must be independently tested and verified.
 - 3. All mode protection, L-N, L-G, L-L, N-G.
 - 4. Integral disconnect with safety dead front.
 - 5. Each MOV protected from over-current, thermal overload and monitored individually.
 - 6. Self diagnostics with comprehensive LED bar graph on front panel showing the exact % level of protection available.
 - 7. Audible fault alarm with silence switch.
 - 8. Event counter, indication of time and date of last event (battery backup for time and date).
 - 9. Remote alarm relay contacts (surge protected), Form C.
 - 10. Micro-Z low impedance installation cable.
 - 11. Twenty year warranty on entire system.
 - 12. LIFETIME "NO NONSENSE" WARRANTY ON FIELD REPLACEABLE POWER MODULES AND FUSES.
- B. Environmental Requirements:

1. Magnetic Fields: Connection shall be made using low impedance Micro-Z cabling provided with the suppressor for maximum magnetic field cancellation. Unit shall be shunt-installed with no series connected elements.
2. Operating Temperature: Operating temperature range shall be -40° to +71° C (-40° to +160° F).
3. Storage Temperature: Storage temperature range shall be -40° to +85° C.
4. Relative Humidity: Operation shall be reliable in an environment with 0% to 95% non-condensing relative humidity.
5. Operating Altitude: The system shall be capable of operation up to an altitude of 13,000 feet above sea level.
6. Operating Voltage: Maximum continuous operating voltage shall be no less than 115% and no greater than 140% of the nominal rated line voltage.
7. Power Frequency: The power frequency range shall be 47 to 440 Hertz.

C. Electrical Requirements:

1. Unit Operating Voltage Requirements:

Voltage:	Description:	Joules (8/20us):	Vpeak L-N (20kV, 10kA):	Vpeak L-N (6kV, 3kA):
277/480 VAC	3phase, 4W + gnd, wye	40,320	1212V	1500V

2. Unit shall be installed in parallel with the protected equipment. No series connected protective elements shall be used.
3. The maximum surge current capacity per phase of the specified system, based on the standard IEEE 8/20 microsecond waveform, shall be at least: 1 Event at 400 kA. The surge life (8/20us) shall be at least 10,000 @ 15 kA occurrences. The transient suppression capability shall be bi-directional and suppress both positive and negative impulses.
4. The suppressor shall be capable of interrupting a 200 kA, short circuit current delivered from the AC power line. The interrupt capability must be confirmed and documented by a recognized independent testing laboratory.
5. The suppressor shall be designed so as to minimize the internal surge path impedance. Direct point-to-point internal wiring is inherently inductive and not acceptable. Connection to the power service shall be constructed for best performance.
6. Equipment shall be as manufactured by MCG Electronics, Inc.: Model: SF400XT-Family or engineering department approved equal with supporting test data.

D. Protection System Components:

1. Replaceable modules: The suppressor shall be constructed using field replaceable protection modules. The suppressor shall have individually fused and monitored 40mm Metal Oxide Varistors (MOV's), including neutral to ground protection mode. Each module will provide five times (5X) redundant protection, with three modules per each phase and five fuses per module. The status of each module shall be locally monitored with a green LED that becomes red in a fault condition. The transient peak rating of the fuse shall be coordinated with the Ipeak handling capability of the MOV so that the surge path capability is not limited by the series fusing. In addition, each MOV shall incorporate a thermal disconnect means to remove a shorted MOV safely from the protection system.
2. Self-Diagnostics: Red, green and yellow solid state LED indicators shall be provided on the hinged front cover to indicate protection status. An illuminated green LED indicates power is present at the protector on all phases, and an illuminated red LED shall indicate that one or more of the modules have reduced protection. An illuminated yellow LED shall indicate a suppression event. Both front panel and internal LEDs are required to provide power and fault indications in the event of even the loss of a single fuse or MOV. Relay operation shall be in a fail-safe operating mode (i.e., continuously energized so that power

- failure, reduced protection, or a break in the remote monitoring line will cause a fault indication at the remote monitor).
3. Remote Alarm Capability: Relay alarm contacts shall be provided for remote alarm monitoring capability of unit status. Form C normally open and normally closed contacts shall be provided with voltage and current limiting protection.
 4. Audible Alarm: The specified system shall be equipped with an audible alarm which shall be activated when any one or more of the modules has a reduced protection condition. A mute option shall be provided for the audible alarm.
 5. Advanced Diagnostic LED Display: A front panel, microprocessor controlled LED display, in the form of a bar graph, will indicate the protection status of each MOV on each phase including neutral to ground. A event counter will display number of suppressed transient events with a time and date stamp.
 6. Integral Disconnect: Unit shall be provided with dead front disconnect to remove power from protector for maintenance access. The disconnect should not be accessed from the front panel unless the unit meets the minimum clamp voltage requirements.
 7. NEMA 12 Enclosure: 14 gauge steel, with stainless steel hardware.

PART 3 - EXECUTION

3.01 INSTALLATION AND MAINTENANCE

- A. The unit shall be factory installed in the motor control center by the Motor Control Center manufacturer, in accordance with the manufacturer's printed instruction to maintain warranty. All local and national codes must be observed.
- B. Units shall be installed as close as possible to the load side lugs of the transfer switch to which it is connected using low impedance Micro-Z cabling.
- C. A 3-pole disconnect shall be provided to insure safety of maintenance personnel.

3.02 TWENTY YEAR WARRANTY

- A. Manufacturer to provide twenty (20) year warranty to cover repair or replacement with a new device. Manufacturer to provide no cost replacement of fused protection modules for the life of the suppressor.

END OF SECTION 261823

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Dry type transformers.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.
- B. NEMA ST20 - Dry Type Transformers for General Applications.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA and impedance ratings and characteristics, tap configurations, insulation system type and rated temperature rise.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Dry type transformers shall be manufactured by General Electric Type QL.
- B. Approved equal.

2.02 EQUIPMENT REQUIREMENTS

- A. Three-phase and Single-phase general purpose dry type transformers be self-cooled, with ratings (KVA) as indicated on the drawings.
- B. Shall meet or exceed DOE 2016 efficiency requirements.
- C. Copper windings.
- D. Sound levels not to exceed the following:
 - 1. 0-9 KVA: 40 db.
 - 2. 10-50 KVA: 45 db.
 - 3. 51-150 KVA: 50 db.
 - 4. 151-300 KVA: 55 db.
 - 5. 301-500 KVA: 60 db.
 - 6. 501-700 KVA: 62 db.
- E. Three-phase transformers rated above 15 KVA to be insulated with UL listed Class 220 rated materials; and have a maximum average full load temperature rise of 115 degrees C.

- F. Transformers to have voltage ratios as indicated on drawings. Transformers between 15 KVA and 300 KVA to be provided with six 2-1/2% full capacity taps, two above and four below primary rated voltage.
- G. Nameplate: Include transformer connection data.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install transformers in accordance with manufacturer's recommendations.
- B. Provide both primary and secondary protection as shown on drawings.
- C. Set transformer plumb and level.
- D. Provide grounding and bonding in accordance with provisions of Section 260526.
- E. Transformers shall be factory installed in the Motor Control Center by the manufacturer of Motor Control Center where indicated on drawings.

3.02 FIELD QUALITY CONTROL

- A. Check for damage and tight connections prior to energizing transformer.
- B. Measure primary and secondary voltage and make appropriate tap adjustments.

END OF SECTION 262200

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Distribution panelboards.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.
- B. NECA Standard of Installation.
- C. NEMA AB1 - Molded Case Circuit Breakers.
- D. NEMA PB1 - Panelboards.
- E. NEMA PB1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- F. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.
- G. NEMA KS1 - Enclosed Switches.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. New Panelboards
 - 1. Panelboards shall be manufactured by Siemens.
 - 2. Approved equal.

2.02 PANELBOARD REQUIREMENTS

- A. Provide panelboards of circuit breaker, dead-front safety type, UL labeled, and meeting all applicable requirements of the National Electrical Manufacturers Association.
- B. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors.
- C. Provide electrically isolated neutral bars.
- D. Provide separate ground bars complete with lugs or connectors on bar.
- E. Provide key operated door and door lock. Door shall prevent access to operate circuit breakers.
- F. Provide panelboards with sequence phased bus bars or distributed phase bussing for voltage and phase as indicated on drawings.
- G. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

- H. Provide typed circuit directory cards.
- I. Provide front filler plates for unused breaker knockouts.
- J. Refer to drawings for Ratings and Features.
- K. All bus bars, including ground bars shall be tin-plated copper.
- L. All circuit breakers shall be bolt-on type.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Ground separate ground bars to panel boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors under provisions of Section 260526.
- B. Install all circuits using a common neutral bus bay in accordance with the National Electric Code. Balance all circuits to achieve not greater than 7% unbalanced neutral current in panel feeders.
- C. Provide six circuit breaker handle lock-on devices for each lighting and miscellaneous power panelboard for installation by the contractor on circuits as directed by the Engineer to prevent unauthorized personnel from turning off circuits to controls, unit heaters, autodial alarm system, etc. Provide spare lock-on devices over to the Engineer.
- D. Install panelboards in accordance with NEMA PB 1.1.
- E. Install panelboards plumb.
- F. Height: 6 feet (2 m) to top of panel board.
- G. Provide typed circuit directory for each branch circuit panelboard. Handwritten circuit directory cards will not be accepted. Revise directory to reflect circuiting changes required to balance phase loads.
- H. Provide a typed circuit directory in accordance with NEC sections 110.22 and 408.4. Circuits shall be labeled with detailed information describing the switches function and equipment location.
- I. For all existing circuits terminated to a new panelboard, contractor shall trace out and update the circuit directory in accordance with NEC sections 110.22 and 408.4. Include all costs for this work in base bid.
- J. Revise directory to reflect circuiting changes required to balance phase loads.
- K. Provide engraved plastic nameplates under the provisions of Section 260553.
- L. Panelboards shall be factory installed in the motor control center by the manufacturer of Motor Control Center and surface mount where indicated on drawings.

3.02 FIELD QUALITY CONTROL

- A. Maintain proper phasing for multi-wire branch circuits.

- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION 262400

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Switches, receptacles, thermostats, device plates and other wiring devices as indicated on Drawings.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.
- B. NEMA WD1 - General Purpose Wiring Devices.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Provide manufacturer's catalog information showing dimensions, colors and configuration.

1.04 REGULATORY REQUIREMENTS

- A. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 SWITCHES

- A. Manufacturers: HUBBELL, BRYANT, GENERAL ELECTRIC.
- B. Single pole, 20 amp, 120/277 VAC, NEMA WD-1, heavy duty, UL20.
- C. Device Plate: Stainless steel.

2.02 RECEPTACLES

- A. Manufacturers: HUBBELL, BRYANT, GENERAL ELECTRIC.
- B. 20 amp, 125 VAC, NEMA WD-1, heavy duty.
- C. 20 amp, 125 VAC, NEMA WD-1, heavy duty, ground fault circuit interrupter.
- D. Duplex type.
- E. Device Plate: Stainless steel.

2.03 EMERGENCY KILL MUSHROOM SWITCH

- A. Acceptable Manufacturers: SQUARE D Model No.: 9001KR9P1RH1321 or approved equal.
- B. Operator: 2-POSITION MAINTAINED PULL-MAINTAINED PUSH ILLUMINATED FLASHING mushroom head pushbutton. Switch head shall only be flashing in the "pushed" position.
- C. Mushroom Head: 2-1/4-inch diameter head.
- D. Nameplate: Large 2.92-inch square, Red nameplate with engraved logo "Emergency Stop", unless noted otherwise on drawings.

- E. Enclosure: Heavy duty, one opening, sheet steel enclosure, NEMA 12.

2.04 LINE VOLTAGE THERMOSTAT

- A. Acceptable Manufacturers: HONEYWELL, Model No. T651A3018, or approved equal.
- B. Heating/Cooling Rated
- C. Ratings: 120 volts, 22 amps resistive SPDT switch.
- D. Temperature Range: +44° to + 86° F.

2.05 CHEMICAL RECEPTACLES AND PLUG ENDS

- A. Acceptable Manufacturers: HUBBEL or approved equal.
- B. 20A, 125 VAC, NEMA L5-20R, Safety-Shroud twist lock receptacle Model No. HBL2310SR, for Well No. 5-1 Pre Treatment Chlorine and 5-1 Post Treatment Lime Pumps.
- C. 30A, 125 VAC, NEMA L5-30R, Safety-Shroud twist lock receptacle Model No. HBL2610, for Well No. 5-1 Post Treatment Chlorine, 5-2 Chlorine, 5-1 Pre Treatment Lime, and 5-2 Lime Pump.

2.06 MANUAL MOTOR RATED THERMAL SWITCH

- A. Acceptable Manufacturers: SQUARE D, Class 2510, Type KG1A, Type KG2C (3-pole, 600V) or approved equal.
- B. Contractor shall coordinate voltage, phase and current rating with equipment.

2.07 CONTACTORS

- A. Manufacturers: Square D, Model No. LO1000V02.
- B. 4 pole, 30 amp, open type contactor.
- C. Electrically held coil, 120VAC.
- D. Quantity required: Two (2)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mounting:
 - 1. Mount all switches 46-inches above finished floor to center line of switch unless noted otherwise.
 - 2. Mount all receptacles 18-inches above finished floor to center line of receptacle unless noted otherwise.
 - 3. Install switches with OFF position down.
- B. Polarity: Properly wire all receptacles so that the hot wire, the neutral wire and the ground wire connect to the proper terminal on all receptacles.

- C. Grounding: Install all devices in boxes specified under Section 260533 and install a No. 12 green ground wire from device grounding terminal to the outlet box in accordance with the National Electric Code.
- D. Install device plates on switch, receptacle and blank outlets in full contact with wall surface.
- E. Provide new SO cord for all chemical pumps and install plug end to match receptacle.

3.02 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

END OF SECTION 262726

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Disconnect switches.
- B. Enclosed Circuit Breakers.

1.02 REFERENCES

- A. NEMA KS-1 - Enclosed Switches.
- B. ANSI/UL 198C - High Intensity Capacity Fuses, Current Limiting Types.
- C. ANSI/UL 198E - Class R Fuses.
- D. FS W-S 865 - Switch, Box (Enclosed), Surface Mounted.
- E. NEMA AB1 - Molded Case Circuit Breakers.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Include outlet drawings with dimensions and equipment ratings for voltage, capacity, horsepower and short circuit current ratings.

1.04 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES

- A. Disconnect switches shall be GENERAL ELECTRIC, heavy-duty Type TH or approved equal.
- B. 75°C conductor ratings.
- C. Ratings: 600VAC
- D. Quick-break, quick-make, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- E. Suitable for use as service entrance equipment.
- F. UL listed for Class R 200,000 RMS amps, symmetrical IC.
- G. Class R fusing kit.
- H. Enclosures: Refer to drawings.

2.02 MOLDED CASE CIRCUIT BREAKERS

- A. Install molded case circuit breakers for Main Circuit Breaker, Generator Circuit Breaker and Panel Circuit Breakers.
- B. Molded Case Circuit Breaker:
 - 1. Manufacturer: SIEMENS
 - a. 125 Amp, 3 Pole Type ED6.
 - b. 250 Amp, 3 Pole Type HFD6.
 - c. 400Amp, 3 Pole Type HJD6.
 - d. 600Amp, 3 Pole Type HLD6.
 - e. 800Amp, 3 Pole Type HMD6.
 - 2. AIC Rating: 65,000 amperes.
 - 3. Thermal magnetic with interchangeable trip
- C. Enclosure
 - 1. Manufacturer: SIEMENS
 - 2. Rating: NEMA 1 (for interior use) or NEMA 4X Stainless Steel (for exterior use).
 - 3. External Throw.
 - 4. Suitable for Service Entrance Equipment (where applicable).
- D. Main Protective Devices 1200A and Above shall be Siemens Type WL Insulated Case Breaker. The main breaker shall have a Dynamic Arc Flash Sentry. The main breaker shall have a dual protective setting capability with graphic waveform display, i.e. the Siemens WL breakers ETU776 trip unit or equal. The main breaker will allow the installer to set two different trip curves into one breaker. One curve will be set for standard operating mode and the second curve, with instantaneous protection shall be set for arc flash mode. The switchboard shall be outfitted with a 24 VDC power supply, CubicleBus digital input module, annunciator panel with flashing light and a UPS power supply. The arc flash mode shall be actuated by a keyed. The breakers with frames rated 1200 amps or higher shall be equipped with Dynamic Arc Flash Sentry to comply with NEC 2014 240.87.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Removed temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Provide switches/enclosed circuit breakers at locations as indicated on drawings.
- D. Refer to disconnect switch schedule on drawings for ampacity ratings, fuse sizes, number of poles and enclosure ratings.
- E. Install fuses in fusible devices.
- F. Install engraved nameplates on each switch and enclosed circuit breaker identifying the following:
 - 1. Switch designated.
 - 2. Load served.
 - 3. Power origination.
 - 4. Fuse size as indicated on drawings.

3.02 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit breaker trip ranges.

END OF SECTION 262816

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Motor starters.

1.02 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Include electrical ratings, dimensions, mounting, materials, running overcurrent protection, branch circuit overcurrent protection, wiring diagrams, starting characteristics, interlocking and accessories.
- C. Submit 5 copies of a summary list to the Engineer indicating and identifying each motor controller installed, including catalog numbers for the correct size of protective devices for the motor controllers.

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.
- B. NEMA No. ICS-1, General Standards for Industrial Control and Systems; No. ICS-2, Industrial Control Devices, Controllers and Assemblies; No. ICS-6, Enclosures for Industrial Control and Systems.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with NEMA ICS 2.3.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.06 EXTRA MATERIALS

- A. Ten (10) spare pilot light bulbs.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Solid State Reduced Voltage Starter (RVSS):
 - 1. WEG SSW-06.
 - 2. Specifically approved equal.
- B. Full Voltage Non-Reversing and Reversing (FVNR):
 - 1. SIEMENS, Class 14.
 - 2. Specifically approved equal.

2.02 MOTOR STARTERS

- A. Motor starters shall have the following features:
 - 1. Enclosed type as shown on the Drawings.

2. Circuit breakers within the motor controller enclosures shall have external operating handles with lock-open padlocking provisions and shall indicate the ON and OFF positions.
 3. Motor Control Circuits:
 - a. Shall operate at not more than 120 volts.
 - b. Shall be grounded except as follows:
 - 1) Where isolated control circuits as shown.
 - 2) Where manufacturers of equipment assemblies recommend that the control circuits be isolated.
 - c. Incorporate a separate, heavy duty, control transformer within each motor controller enclosure to provide the control voltage for each motor operating over 120 volts.
 - d. Incorporate overcurrent protection for control power transformers in accordance with NFPA 70.
 4. Overload Current Protective Devices:
 - a. SIEMENS, Solid State Model ESP100 overloads for all contactors including bypass contactors. Provide only SIEMENS thermal overloads on all output contactors for variable speed drives.
 - b. One for each pole.
 - c. Manual reset on the door of each motor controller enclosure to reset Motor from any condition which tripped motor, such as high pressure, overload or incomplete valve cycle.
 - d. Correctly sized for the associated motor's rated full load current.
 5. Provide three (3) N.C. and (3) N.O. auxiliary contacts, H-O-A, O-C-A, sequence selectors selector switches, pilot lights, and other devices and accessories as shown on the Drawings for each starter.
 6. Elapsed non-resettable time meters as indicated on the Drawings. As manufactured by Fourth Dimension, 2-1/2" diameter minimum.
 7. Ammeters and 4 position phase selector switch (3-1/2" Square minimum) as manufactured by SIMPSON.
 - a. Well No. 5-1 and 5-2: 0-200 amps.
 - b. Air Scourer: 0-50 amps.
 8. Provide current and potential transformers for all three phases for ammeters and voltmeters.
 9. Voltmeters and seven position selector switch (3 1/2" square minimum) as manufactured by SIMPSON.
 10. Enclosures:
 - a. Shall be the NEMA Type 1.
 - b. Where the types of motor controller enclosures are not indicated, they shall be the NEMA types which are the most suitable for the environmental conditions where the motor controllers are being installed.
 - c. Doors mechanically interlocked to prevent opening unless the breaker or switch within the enclosure is open.
 - d. Thoroughly clean and paint the enclosures at the factory with manufacturer's prime coat and standard finish.
 11. Pilot lights shall be press-to test 30.5 mm Heavy Duty Oiltight pushbuttons.
 12. Pushbuttons and selector switches shall be 30.5 mm Heavy Duty Oiltight.
- B. Motor controllers incorporated with equipment assemblies shall also be designed for the specific requirements of the assemblies.

2.03 SOLID STATE REDUCED VOLTAGE STARTER

- A. Solid state reduced voltage starter and accessories to be factory installed in the motor control center.

- B. The starter shall be rated for 200-575V +/- 10%, 50-60Hz +/- 10%. Control Voltage shall be rated for 100-240V +/- 10%.
- C. The starter shall provide the following standard "starting" modes:
 - 1. Linear Torque control for Start.
 - 2. Variable Torque control for Start.
 - 3. Pump Control.
 - 4. Current Limit Start.
 - 5. Voltage ramp Start.
 - 6. Voltage ramp Start with current limit Start.
 - 7. Full Voltage Start.
 - 8. Remote analog control.
 - 9. Soft Start with Selectable Torque Boost.
 - 10. Slow Speed time controlled.
 - 11. Slow Speed external controlled.
 - 12. Dual Ramp Start.
- D. The Controller shall provide the following standard "stopping" modes:
 - 1. Linear Torque control for Stop.
 - 2. Variable Torque control for Stop.
 - 3. Pump Control.
 - 4. Voltage ramp Stop.
 - 5. Coast to Stop.
 - 6. Remote analog control Stop.
 - 7. DC injection Braking.
 - 8. Slow Speed time controlled.
 - 9. Slow Speed external controlled.
 - 10. DC-Brake at slow speed.
 - 11. Dual Ramp Stop.
 - 12. Accurate position stop control.
 - 13. Bypass control (Sequence Stop).
- E. The starter shall provide the following additional features:
 - 1. Jogging forward and reverse.
 - 2. 4 parameters sets (externally selectable)
 - 3. Analog output (programmable and selectable - 0-1VDC or 4-20mA)
 - 4. Built-in Display (w/ optional Remote Display).
- F. The starter shall provide the following standard "Operation" interfaces:
 - 1. Integral Keyboard.
 - 2. Remote.
- G. The starter shall provide the following optional Operation interfaces:
 - 1. Serial communication RS 232/485 Modbus RTU.
 - 2. Profibus DP.
 - 3. DeviceNET.
 - 4. Interbus-S.
 - 5. Lonworks.
 - 6. FIP IO.
 - 7. Saflink.
 - 8. External Display for mounting on enclosure door.
- H. The starter shall provide the following Protection features. The protection shall be maintained when bypass contactor is supplied.

1. Motor Thermal Overload.
 2. Soft Start thermal over temperature.
 3. PTC input
 4. Motor Shaft Torque (Max) machine process protection.
 5. Motor Shaft Torque (Min) machine process protection.
 6. Phase Imbalance.
 7. Phase reversal.
 8. Over voltage.
 9. Under voltage.
 10. Locked Rotor.
 11. Excessive Starts per hour for application.
 12. Phase loss input/output.
 13. Motor output loss.
- I. The starter shall provide the following standard Monitoring functions. The monitoring functions shall be maintained when bypass contactor is supplied.
1. Three Phase Current (average).
 2. Three Phase Voltage (average).
 3. Current in L1, L2, L3.
 4. Voltage between L1-L2, L1-L3, L2-L3.
 5. Shaft Power in kW/HP (selectable).
 6. Motor thermal capacity.
 7. Power factor.
 8. Torque in Lbs./ft. or Nm (selectable).
- J. The starter shall provide the following standard Alarm functions. The alarm functions shall be monitored during bypass contactor operation.
1. Line failure.
 2. Phase imbalance.
 3. Over temperature-motor.
 4. Over temperature-Soft Starter.
 5. Shorted SCR.
 6. Open SCR.
 7. Locked Rotor.
 8. Motor Output loss.
 9. Overload - Shaft Torque.
 10. Underload - Shaft Torque.
 11. Phase imbalance.
 12. Over voltage.
 13. Under voltage.
 14. Excessive Starts.
 15. Phase reversal.
 16. Event list 15 latest alarms.
- K. The starter shall be of modular construction, consisting of a Control Module and Power Stack.
- L. All PCB's shall be compatible with the full range power stack.
- M. All phases should be controlled during start/stop.
- N. The power stack shall consist of six SCR's mounted on a heatsink assembly for ratings up to and including 1250 amps.
- O. The starter shall be DIN Rail mountable up to 145A.

- P. DIN Rail mountable units should be mountable without space at side.
- Q. Starters 180A and larger shall allow for convenient connection of bypass contactor without modification of standard assembly.
- R. Starter Control Module:
1. Mechanical features:
 - a. The control module assembly shall consist of a power supply, logic control circuitry, silicon controlled rectifier (SCR) firing circuitry. I/O circuitry, a digital programming keypad, dual LED Displays.
 - b. The PCB's shall be designed for integral mounting on the control module and shall be compatible with the full range of current ratings - 30 amps to 1250 amps.
 - c. The control modules shall be easily removed from the power stack, without the need to disassemble associated printed circuit board assemblies.
 - d. Control terminals shall be easily accessible and located on the front bottom of the device. The terminals shall be UL rated for 300 Volts, 15 amps maximum, and accept a maximum of two wires.
 - e. Digital parameter adjustment shall be provided through a built-in keypad. Analog potentiometer adjustments, DIP or rotary switches, or plug-in jumpers are not acceptable.
 - f. Dual built-in alphanumeric, LED displays shall be provided for controller set-up, diagnostics, status and monitoring. The Control Keypad and Display shall have the option for remote mounting.
 - g. The starter shall two green lights for running and start/stop.
 - h. A serial communication port shall be provided as standard. Communication protocol interface modules shall be built in option available for connection to Remote I/O, Devicenet, PROFIBUS, Interbus S, Lonworks, FIP IO and RS 232/485 Modbus RTU.
 - i. A minimum of three auxiliary contacts shall be provided for customer use. These shall be programmable as follows:
 - 1) One form C (SPDT): Fault (dedicated).
 - 2) Two single pole NO: Multifunction (programmable). Ratings: 8A at 250VAC, 2000VA Inrush, B300 NEMA.
 2. Electrical features:
 - a. The PCB shall provide digital microprocessor control and supervision of all controller operation, including SCR pulse firing control.
 - b. The PCB power supply shall be self-tuning to accept control power input from 100 to 240, 50/60 Hz.
 - c. The SCR firing circuitry shall incorporate a latch circuit for three-wire control.
 - d. Reverse operation of the motor shall be standard in the jog mode without the use of a reversing contactor.
 3. User Adjustments:
 - a. The two acceleration start ramps shall have individual adjustments from 1 to 60 seconds.
 - b. The two acceleration stop ramps shall have individual adjustments from 2 to 120 seconds.
 - c. The initial torque setting shall be adjustable from 0 to 200% of motor torque.
 - d. The end torque setting shall be adjustable from 50 to 200% of motor torque.
 - e. Current limit starting shall be adjustable from 150% to 500% of the motor's full load current.
 - f. A selectable Torque Boost feature shall be available to set a current level from 300-500% of the motor's full load current rating. The time period shall be adjustable from 0.1 to 2.0 seconds.
 - g. Locked rotor function shall be adjustable between 1 to 10 seconds.
 - h. Slow speed shall be adjustable up to 60 seconds or up to 100 external pulses.

4. Protection Diagnostics:
 - a. Motor protection shall be as follows:
 - 1) Meets applicable standards and codes as a motor thermal overload protection device.
 - 2) Shaft Power measurement without the use of external electro-mechanical sensors.
 - 3) Overload trip classes of 10, 20 and 30 shall be provided and user programmable.
 - 4) Electronic thermal memory shall be provided for enhanced motor protection.
 - 5) Shaft overload and underload protection shall be available through the controller.
 - 6) All protections shall remain in effect if bypass contactor is supplied.
 - b. When fault conditions are detected, the controller shall inhibit starting or shut down SCR pulse firing.
5. Pump Control:
 - a. The standard feature pump control shall be implemented to provide closed loop control of a motor to match the specific torque requirements of centrifugal pumps for both starting and stopping. This shall aid in eliminating the phenomena commonly reference to as "water hammer". Methods utilizing Soft Start with Soft Stop shall not be acceptable.
 - b. Closed loop control with linear ramps shall be achieved without using external sensors or feedback devices.
 - c. Pump stop shall be initiated without the need for a dedicated Pump Stop input.
 - d. The Pump Stop times shall be user adjustable from 0 to 120 seconds.
- S. Starters rated for 30A to 145A shall consist of three modules. The three modules shall be mounted on a single heatsink. The heatsink shall be isolated from the power modules and shall have grounding provisions. Power modules rated 30A to 145A shall be encapsulated and shall include two power-switching semi-conductors and control module interface cables. Power connections on units 30-145 amps shall be bus bar type to accommodate wide range of cabling.
- T. Back-to-back SCR pairs shall be the only power switching semiconductor means acceptable. Diode/SCR combinations shall not be acceptable. Semi conductor fuses shall be required.
- U. Starter shall be built for continuous operation without need for bypass contactors, either external or internal, for any reason other than when the starter is mounted in a non ventilated enclosure.
- V. SCRs shall have the following minimum repetitive peak inverse voltage ratings: 200 to 575V: 1600V.
- W. For starters rated 30A to 145A, transient protection with snubber circuit including RC-net and capacitors against electrical noise shall be standard.
- X. Starters rated 180A and larger will include heavy duty MOV surge absorbers and R-C snubbers as standard.
- Y. Starters shall deliver its rated current in ambient temperature ranging from 0°C to +40°C. The starter shall be able to operate up to 50°C. The ambient storage temperature shall be -25°C to +70°C.
- Z. The starter shall be operable in relative humidity of 5 to 95%, non-condensing.
- AA. The starter shall be suitable for operation up to altitudes of 3000 feet (1000 meters) without derating.
- AB. The starter shall perform without malfunction from showering arc tests of 500V to 1500V (NEMA ICS 2-230).

- AC. The starter shall perform without malfunction when subjected to 3000V surges at a rate of 100 bursts per second for 10 seconds (IEEE STD 472).

2.04 FULL VOLTAGE STARTERS

- A. All Full Voltage Starters shall be NEMA rated for the load it serves.
- B. Manufacturers: SIEMENS, Class 14.

2.05 MISCELLANEOUS CONTROLS AND EQUIPMENT

- A. Provide phase failure/phase reversal relays and voltage sensitive relays for undervoltage and overvoltage protection for all phases. Relays shall be SIEMENS, or approved equal. The Contacts for these relays shall be in series with all Motor Starter Control Circuits.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with NFPA 70 and as shown on the Drawings.
- B. All starters shall be factory installed in Motor Control center.

3.02 DESCRIPTION OF CONTROL, SOLID STATE STARTER/ISOLATION INPUT/OUTPUT/BYPASS CONTACTORS

- A. Refer to the Description of Controls specification for control requirements of all motor controllers. Contractor is responsible for coordinating with system integrator for proper operation of motor controllers and all associated equipment. Any discrepancies shall be brought to the attention of the Engineer immediately for final coordination.
- B. In the AUTOMATIC position the H-O-A selector switch will provide control power to the motor starter circuit through the isolation and output contactors and solid-state starter. Once motor is fully started via solid-state starter, the bypass contactor shall be energized and the motor shall run via this contactor.
- C. In the HAND position the H-O-A switch the motor shall start and run whether or not the automatic control "ON" contacts are energized. Motor shall be started and stopped as in "A" above.
- D. In the AUTOMATIC position of the bypass-automatic selector switch, the switch shall provide control power to the HAND-OFF-AUTOMATIC (H-O-A) selector switch and the motor shall be controlled as described in A & B above. In the bypass position the selector switch shall provide control power to the H-O-A selector switch to maintain either automatic or manual control with the addition of disabling both the isolation and output contactor and the solid-state starter from the running/starting sequence. In bypass position, the motor shall start and run via bypass contactor (full voltage starter).

END OF SECTION 262913

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Magnetic motor starters.

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NECA "Standard of Installation," published by National Electrical Contractors Association.
- C. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies.
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- E. NEMA KS 1 - Enclosed Switches.

1.03 SUBMITTALS

- A. Refer to drawing for starter sizes on schedules.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Test Reports: Indicate field test and inspection procedures and test results.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with NEMA ICS 2.3.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. SIEMENS, Class 17
- B. Substitutions: Under provisions of Section 012500

2.02 AUTOMATIC CONTROLLERS

- A. Combination Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
- B. Motor starters shall be NEMA rated.

- C. Coil operating voltage: Coordinate voltage required with equipment to be installed and associated contactor(s).
- D. Auxiliary contacts: NEMA N/O and N/C contacts rated up to 10 Amp. SIEMENS Model No. 49AAFO and 49AAFC.
- E. Overload Relay: NEMA ICS; melting alloy overload.
- F. Enclosure: As shown in contract drawings.
- G. Circuit Breaker Disconnect Switch with external lockable handle.

2.03 PRODUCT OPTIONS AND FEATURES

- A. Auxiliary Contacts: NEMA ICS 2, 1 each normally open/closed contacts.
- B. Motor running and overload indication lights. Pilot lights shall be heavy duty 30.5 mm oiltight press-to-test by SIEMENS or equal.
- C. Selector Switches: Hand-off-automatic selector switch shall be heavy duty 30.5 mm oiltight by SIEMENS or equal.
- D. Manual reset push button for overload.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install enclosed controllers size as indicated, on starter schedule, in accordance with manufacturer's instructions.
- B. Install enclosed controllers plumb in locations indicated on drawings. Provide supports in accordance with Section 260526.
- C. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- D. Provide engraved plastic nameplates for each starter.
- E. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor and voltage/phase rating.

END OF SECTION 262914

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Motor control centers.

1.02 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Include electrical ratings, dimensions, mounting, material, running overcurrent protection, branch circuit overcurrent protection, wiring diagrams and accessories.
- C. Provide detailed control drawings on 24" x 36" blueprints for all motor controls which shall include all interface wiring between motor controls and instrumentation drawings as described in Section 265012 - Description of Controls. Provide point to point wiring diagrams showing interface between motor controls and instrumentation drawings.
- D. Provide detailed scaled 1/2" = 1'-0" drawings of motor control center including instrumentation and control drawings on 24" x 36" blueprints for floor plans showing MCC layout, locations and clearances.
- E. Provide detailed scaled 3/4" = 1'-0" elevation drawings of motor control center including instrumentation and controls. Elevation drawings shall show all switches, pilot lights, timers, keypads, timers and meters including scaled locations of all knockouts and cutouts on exterior of enclosures for review and approved by Engineer.
- F. Provide detailed scaled 3/4" = 1'-0" elevation drawings of motor control center including instrumentation and controls for interior mounting of all equipment. Drawings shall show sealed locations of all drives, starters, contactors, relays, protective devices, circuit breakers, fuses, wiring, timers, terminal blocks and cable connection points.
- G. Provide catalog cuts for each device including pilot lights, switches, timers, breakers, fuses, meters, protective devices, etc.

1.03 REFERENCES

- A. National Electrical Manufacturers Association (NEMA) - No. ICS-1, General Standards for Industrial Control and Systems; No. ICS-2, Industrial Control Devices, Controllers and Assemblies; No. ICS-6, Enclosures for Industrial Control and Systems.
- B. ANSI/NFPA 70 - National Electrical Code.
- C. ASTM D 178 - Specification for Rubber Insulating Matting.
- D. Underwriters Laboratories, Inc. (UL) - No. 845, Motor Control Centers, Electric.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. SIEMENS: Tiastar.
- B. Specifically Approved Equal. Substitute manufacturers shall be responsible to fit MCC line-up as detailed on drawings to the exact dimensions detailed on the drawings. Motor Control Center manufacturer shall provide applicable U.L. labeling for all sections shown on drawings and for complete installation of all equipment specified to be packaged into the Motor Control

Center. All equipment specified to be installed in Motor Control Center shall be factory installed by Motor Control manufacturer. No exceptions.

2.02 MOTOR CONTROL CENTERS

- A. Motor control centers shall be in accordance with UL, NEMA, NEC and as shown on the Drawings.
- B. Motor control center shall be same manufacturer for motor controls and all instrumentation and control cubicles.
- C. Motor control center is based on SIEMENS system Tiastar dimensions. Contractor shall be responsible to meet dimension requirements if substitution is proposed.
- D. Motor control centers shall be complete, floor mounted, metal enclosed, grounded, indoor type. The motor control centers shall be NEMA Standard, Class 11, Type C except where other NEMA Standard classes and types are shown on the Drawings.
- E. Ratings shall be 65,000 AIC for all motor control centers.
- F. Shall conform to the arrangements and details of the Drawings and to the spaces designated for installation. All MCC door enclosures shall open 90° with all accessories mounted. All doors shall be hinged left hand side.
- G. All MCC doors shall be removable with a wiring plug harness for quick removal of doors with disconnecting wire terminations.
- H. Design the centers to withstand the mechanical stresses caused by rough handling during shipment in addition to the electrical and mechanical stresses which will occur during operation of the centers.
- I. Coordinate components of the centers and their arrangements electrically and mechanically. The components and the control wiring shall conform to the approved shop drawings as furnished for the various applicable electrical and mechanical sections of the specifications.
- J. Assemble, connect and wire the centers at the factory in accordance with the NEMA Standard class and type for each of the centers.
- K. Thoroughly clean, phosphatize and paint the metal surfaces at the factory with primer and baked enamel or lacquer finishes.
- L. Shall have the following features:
 - 1. Standard Vertical Sections:
 - a. Approximately 90 inches high, front and rear line-up, fabricated by a single manufacturer.
 - b. Rugged steel assemblies with bracing, reinforcing gussets and jig-welding to assure rectangular rigidity. The sections shall be completely metal-enclosed, including their bottoms.
 - c. Steel shall not be less than code gauge, leveled.
 - d. Bolts, nuts and washers shall be rustproof metal.
 - e. Spaces within the sections shall be suitable and adequate.
 - f. Mount the sections on adequate structural steel supports at the factory, front and rear, for the full length of each center. Install the centers so the supports will rest on top of the concrete floor surfaces except where concrete pads are indicated. Anchor the centers with bolts, not less than 1/2-inch diameter.

- g. Each present and future motor controller shall have an individual door with hinges and latches.
- h. End panels shall be screw-removable to facilitate future additions.
- i. Removable panels shall have screws which remain in the panels when the panels are removed. Screws shall be received by self-aligning, self-retaining nuts attached within the assemblies.
- j. Isolated vertical full height wiring troughs.
- 2. Bus Bars and Interconnections:
 - a. Shall be copper, rated as indicated on drawings. Minimum size shall be 800 amps for the Well No. 5-1 Building.
 - b. Shall be totally enclosed.
 - c. Bus bar joints and interconnection joints shall be plated, constant high-pressure type with high strength copper-silicon bolts and nuts.
 - d. Provide continuous bars through dead corner cubicles to adjoining cubicles.
 - e. Insulation:
 - 1) High strength polyester glass or equal.
 - 2) High track-resistance.
 - 3) High impulse and dielectric strength, especially at elevated temperatures, for withstanding the maximum short circuit currents.
 - 4) High flame-retardant, self-extinguishing.
 - 5) NEMA Standard for 65°C temperature rise shall apply.
 - f. Shall have horizontal main buses and vertical buses for connecting the motor controllers, circuit breakers and switches. All three phases and neutral bus bars shall be extended across the entire width of the motor control center.
 - g. Shall have an adequate ground bus which extends across the entire width of each center.
 - h. Bus bars shall be designed to extend to additional sections when so shown on the Drawings in addition to extending through dead corner cubicles.
 - i. Temperature rises shall not exceed the NEMA Standards.
- 3. Completely equipped spaces for future motor controllers, circuit breakers and switches.
- 4. Motor Controllers:
 - a. Stab-on type except for large ratings which require bolted connections.
 - b. Shall conform to the applicable requirements in Section 262913. Include built-in H-O-A selector switches and red and green pilot lights.
 - c. Products of a single manufacturer, SIEMENS, or approved equal.
 - d. Interchangeable for the same ratings in all of the motor control centers being installed for this contract.
 - e. Disconnecting contact devices:
 - 1) Silver plated copper, full-floating, self-aligning, self-coupling, designed for cleaning action during engaging and disengaging movements.
 - 2) Adequate flexibility between the stationary and movable components.
 - 3) Adequate pressure maintained on the contacts.
 - 4) Shall engage silver plated buses.
 - f. Doors mechanically interlocked to prevent their opening unless the disconnect is opened. Incorporate "defeater" mechanisms for inspection by qualified personnel.
 - g. External operating handles with lock-open pad-locking provisions and ON and OFF position indicators.
- 5. Identify each motor controller, circuit breaker and switch with a separate nameplate of laminated black phenolic resin with white core and engraved lettering not less than 3/16-inch high. Identify each motor by its number or other designation and indicate function fulfilled by the motor. Identify pilot light with ON and OFF designation.
- 6. Line Monitoring Devices:
 - a. The motor control center shall be equipped with a three phase monitoring relay to interlock each starter upon phase failure, phase loss or phase reversal. The phase monitor shall be manufactured by SIEMENS, Class 47.

- b. A separate line voltage monitor shall be included in the motor control center for each motor to interlock motor when either undervoltage, overvoltage phase loss or phase reversal occurs.
- M. Test the motor control centers at the factory to assure that the centers do not have any defects.
- N. Electrical Matting: Dielectric strength 30,000 volts, 2 feet wide, 1/4 inch thick corrugated ASTM D 178 Type 2, Class II.
- O. Provide Eagle Cycle-Flex Timers for all timers mounted on motor control center enclosures as indicated on drawings.
- P. All circuit breakers shall be rated 65,000 AIC. AIC based on stand alone ratings. Manufacturers rating using combined systems ratings to use lower AIC rated breakers is not acceptable.
- Q. Main Protective Device - Siemens WL Insulated Case Breaker, Fixed Mount Main (**For breaker 1200A and above**)
 - 1. Circuit breakers shall comply with the requirements of UL. Breakers shall be three-pole, 100% rated type or approved equal.
 - a. Circuit breaker element shall have spring charged/discharged indicators and circuit breaker open or closed and ready to close indicators all of which shall be visible to the operator with the compartment door closed.
 - b. Provide interlocks to prevent racking the circuit breaker unless the breaker is open.
 - 2. Ratings: Interrupting up to 100 kA at 480V without fuses. Short time current ratings for each circuit breaker shall be as indicated on the drawings or data tables. Circuit breakers shall be 600-volt class.
 - 3. Operating Mechanism: Mechanically and electrically trip-free, stored-energy operating mechanism with the following features:
 - a. Normal Closing Speed: independent of both control and operator.
 - 4. Each low voltage circuit breaker shall be equipped with self-powered, microprocessor-based trip-device to sense overload and short circuit conditions. The device shall measure true RMS current. The tripping system shall consist of high accuracy (<1%) Rogowski coil sensors on each phase, a release mechanism and the following features:
 - a. Field Installable and interchangeable front mounted trip units. Trip units can be upgraded for future expansion in functionality, such as communication.
 - b. Functions: Long time, short time and extended instantaneous protection function (EIP) shall be provided to allow the breaker to be applied at the withstand rating of the breaker with minus 0% tolerance so that there is no instantaneous override whatsoever. This feature shall furthermore allow the circuit breaker to be applied up to the full instantaneous rating of the breaker on systems where the available fault current exceeds the breakers withstand rating. Each shall have an adjustable pick-up setting. In addition, long time and short time bands shall each have adjustable time delay. Short time function shall include a switchable I²t ramp.
 - c. A software program shall be made available free of charge to support system coordination studies. The software will allow time current curves to be generated for the chosen settings.
 - d. Individual LED's shall indicate an overcurrent, short circuit or ground fault trip condition.
 - e. Time-current characteristics shall be field adjustable locally or optionally remotely via a bus system Ethernet.
 - f. Current Adjustability shall be accomplished by use of dial settings and rating plugs on trip units. The rating plug shall be front mounted and upgradeable. Upgrades to the rating plugs shall not require changes to the CT.
 - g. Pickup Points: 10 Long Time Settings.

- h. Field Installable Ground-fault protection with at least three time-delay bands and an adjustable current pickup and an I²t ramp. Arrange to provide protection for four-wire service.
 - i. Field Installable Communications and metering functions shall be provided per schedule.
 - j. A LCD display shall be available to simplify settings & viewing data locally.
 - k. The option to remotely switch protection settings shall be provided whenever a generator is part of the power distribution system.
 - l. Field installable configurable [analog], [digital] output relays shall be available to connect directly to the trip unit.
 - m. Waveform capture and display shall be accomplished on the trip units LCD display.
 - 5. Terminal Block Connections, shall be front mounted and utilize Screw Type Terminals.
 - 6. Control Switch: One for each electrically operated circuit breaker.
 - 7. Undervoltage Trip - field installable: Adjustable time-delay.
 - 8. Indicating Lights: To indicate circuit breaker is open or closed, for electrically operated circuit breakers.
 - 9. Accessories shall be front mounted.
 - 10. Portable lifting yoke for drawout circuit breakers.
 - 11. Field interchangeable accessories shall include CT's, trip units, racking mechanism and all internal & external accessories.
 - 12. The main breaker shall have a Dynamic Arc Flash Sentry. The main breaker shall have a dual protective setting capability with graphic waveform display, similar to the Siemens WL breakers ETU776 trip unit. The main breaker will allow the installer to set two different trip curves into one breaker. One curve will be set for standard operating mode and the second curve, with instantaneous protection shall be set for arc flash mode. The switchboard shall be outfitted with a 24 VDC power supply, CubicleBus digital input module, annunciator panel with flashing light and a UPS power supply. The arc flash mode shall be actuated by a keyed. The breakers with frames rated 1200 amps or higher shall be equipped with Dynamic Arc Flash Sentry to comply with NEC 2014 240.87.
- R. Pilot Lights shall be LED type with push-to-test capabilities. No incandescent pilot lights shall be permitted.
- S. Push buttons and selector switches shall be 30.5 mm heavy duty oiltight.

2.03 POWER MONITOR

- A. Manufacturer: ACCUENERGY
 - 1. Model No: ACUVIM II Series.
 - 2. 480 volt.
- B. Quantity: Two (2) required (Utility and Generator feeds), 480V, 3 phase 4w.
- C. Provide current and potential transformers for all three phases and neutral for digital ammeters/voltmeters.
- D. The power monitor shall incorporate a vacuum display and keypad to allow the user to read the following parameters:
 - 1. Voltage V1, V2, V3.
 - 2. Current I1, I2, I3, I_n, I_{avg}.
 - 3. Power P1, P2, P3, P_{sum}.
 - 4. Reactive Power Q1, Q2, Q3, Q_{sum}.
 - 5. Apparent Power S1, S2, S3, S_{sum}.
 - 6. Frequency.
 - 7. Power Factor.

8. Energy.
 9. Reactive Energy.
 10. Apparent Energy.
 11. Demand.
 12. Load Features.
 13. Four Quadrant Powers.
 14. Power Quality.
 15. Voltage Harmonics.
 16. Current Harmonics.
 17. Voltage Crest Factor.
 18. Current K Factor.
 19. Voltage Unbalance Factor.
 20. Current Unbalance Factor.
 21. Max/Min Statistics with Time Stamps.
- E. Power monitor shall have the following features:
1. Alarms
 2. I/O Option Module
 3. Anti-tampering Seal
 4. Data Logging (8mb)
 5. Automatic Frequency adaption.
 6. Power Quality Event Logging.
 7. Communication
 - a. Modbus RTU Protocol and DNP 3.0 via RS485
 - b. Ethernet (Modbus TCP, HTTP, SMTP, SNMP)
 - c. Profibus DP
 - d. BACnet IP, BACnet MS/TP
 - e. Dual RS485 Communication Ports
 8. 0.2% accuracy.
- F. Power monitors shall be factory installed on the Switchboard enclosure doors as indicated on drawings.
1. The power monitor shall be installed in ATS cabinet on the load side and shall monitor Utility power only.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with NEC and manufacturer's instructions, and as shown on the Drawings.
- B. Install electrical matting to extend 24 inches beyond end of motor control center. Cut matting clear of obstructions.
- C. Install clear lexan window to allow visual indication of surge protection status.

END OF SECTION 262915

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Automatic transfer switch.

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- C. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Submit product data for transfer switches showing overall dimensions, electrical connections, electrical ratings, environmental restrictions, voltage, short circuit ratings, enclosure details and all accessories.
- C. Submit manufacturer's installation instructions. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product.
- D. Submit manufacturer's operation and maintenance manual as part of shop drawing submittal.

1.04 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 017823.
- B. Include instructions for operating equipment.
- C. Include instructions for operating equipment under emergency conditions.
- D. Identify operating limits which may result in hazardous or unsafe conditions, whether switch is being operated automatically or manually.
- E. Document ratings of equipment and each major component.
- F. Include manufacturer's recommended routine preventative maintenance schedule.
- G. List any special tools, maintenance materials and recommended spare parts.

1.05 EXTRA SERVICES

- A. The supplier shall include as a part of the package a 5-year warranty and 5-year planned maintenance agreement at no additional cost to the Owner. The agreement shall include, as a minimum, one service call per year. The services must be performed by the authorized distributor of the equipment furnished and may not be subcontracted. The following services shall be performed once a year.
 - 1. Check switches for loose, bare or broken wiring (replace as needed).
 - 2. Test transfer switch operation, time delays and manual operators.
 - 3. Test transfer switch operations and plant exerciser.

- B. Manufacturer's Instructions: The manufacturer's instructions shall indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product.

1.06 REGULATORY REQUIREMENTS

- A. Conform to all applicable national, state, city or local codes for standby electrical systems.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Transfer switch shall be ONAN Model OTPC. Motor Control Centers and sizing restrictions were designed with ONAN Model OTPC.
- B. Transfer switch shall be supplied and warranted for five (5) years including 100% parts and labor, including a five-year planned maintenance agreement by the single system source supplier. No exceptions.
- C. Proposal for any substitute equipment shall provide complete submittal data, as specified to the Engineer for approval or disapproval. Physical dimensions of transfer switches are based on ONAN Model OTPC. Substitute equipment shall be field verified for adequate equipment spacing relative to other equipment to be installed in the same locations.
- D. It is intended that all products specified herein be of standard ratings, therefore, the ampere ratings, withstand and closing ratings, etc., shall be the manufacturer's next available larger size of rating until the specifications are exactly met.

2.02 AUTOMATIC TRANSFER

- A. Description: NEMA ICS 2; automatic transfer switches.
- B. The switches shall be mechanically held, electrically operated and shall be interlocked mechanically and electrically to insure that normal power and emergency power mixing is impossible. The automatic transfer switches shall be suitable for use with emergency sources.

2.03 AUTOMATIC TRANSFER SWITCH

- A. Sequence of Operation: Automatic switching shall occur from normal power to emergency power when there is a phase reversal or when any phase of the normal power drops between an adjustable voltage range of 75 to 98% voltage and to automatically restore the load to normal when all phases are between an adjustable voltage range of 75 to 98% normal voltage or phase rotation is corrected.
- B. Main switch contacts shall be high-pressure silver alloy in order to improve interrupting and withstand capabilities. Main contacts shall be rated for 600 volts AC minimum. Contact assemblies shall have arc chutes for positive arc extinguishment. Arc chutes shall have insulating covers to prevent interphase flashover.
- C. Transfer switches shall be equipped with transparent protective covers over all live parts of the switch. These covers are to serve as protection to operators or service personnel from contact with live parts, and from contact with arcing by-products if the switches operate with the door open. Barriers shall be transparent to allow for visual inspection for contact position and for damage.

- D. Automatic transfer switches utilizing components of molded case circuit breakers are not acceptable.
- E. All transfer switches and accessories shall be UL listed and labeled, tested per UL Standard 1008 and CSA approved.
- F. Solid state undervoltage sensors shall simultaneously monitor all phases of both sources. Pick-up and drop-out setting shall be adjustable between 75 and 98% of system voltage. Voltage sensors shall allow for adjustment to sense partial loss of voltage on any phase. Voltage sensors shall have field calibration of actual supply voltage to nominal system voltage. Switches that do not monitor all three phases of both normal and emergency sources will not be acceptable.
- G. Provide frequency sensing relay which will not permit transfer to emergency power until the generator set is operating at 60 Hz.
- H. Control wiring shall be terminated interlocking, plug-type connectors. Operating current for the transfer shall be obtained from the source to which the load is to be transferred.
- I. The controls shall include latching diagnostic indicators to pinpoint the last successful step in the sequence of control functions, and to indicate the present status of the control functions in real time, as follows:
 - 1. Source 1 OK.
 - 2. Start Generator Set.
 - 3. Source 2 OK.
 - 4. Transfer Timing.
 - 5. Transfer Complete.
 - 6. Retransfer Timing.
 - 7. Retransfer Complete.
 - 8. Timing for Stop.

2.04 RATINGS

- A. Ratings shall be as follows:
 - 1. Voltage: 277/480 volts, three phase, four wire, 60 Hz.
 - 2. Ampere: 800A
 - 3. Switched Poles: 4, (overlapping neutral not acceptable).
 - 4. Load Inrush Rating: Combination Load.
- B. All automatic transfer switches shall meet the following withstand ratings as a minimum. In order to protect the system under current or possible future conditions, whether protected by circuit breakers or current limiting fuses, the transfer switches must meet both of the following molded case circuit breaker and current limiting fuse withstand and closing ratings as a minimum. Ratings are stated in symmetrical RMS amperes for three phase faults.
 - 1. Transfer Amperage: 800
 - 2. WCR @ 480 Volts W/Molded Case C/B'S: 65,000
 - 3. WCR @ 480 Volts W/Current Limit Fuses: 200,000
- C. Transfer switches shall be continuously rated in ambient temperatures of -40 to +50 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet.

2.05 AUTOMATIC SEQUENCE OF OPERATION

- A. Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.

- B. Time Delay to Start Alternate Source Engine Generator: 0 to 15 seconds, adjustable.
- C. Engine Start: Automatic controls shall signal the engine-generator set to start upon a signal from normal source sensors, after time delay to start has terminated.
- D. Initiate Transfer Load to Alternate Source: Upon initiation by normal source monitor and permission by alternate source monitor.
- E. Time Delay Before Transfer to Alternate Power Source: 2 to 120 seconds, adjustable.
- F. Initiate Retransfer Load to Normal Source: Upon permission by normal source monitor.
- G. Time Delay Before Retransfer to Normal Power: 0 to 30 minutes, adjustable; bypass time delay in the event of the alternate source failing.
- H. Time Delay Before Engine Shut Down: 0 to 10 minutes, adjustable, of unloaded operation; factory set at 5 minutes.
- I. Engine Exerciser: An Exerciser shall, once a week, start the generator set, transfer building load to the generator sets and after a set period of time, transfer the building load back to normal power. It shall be readily accessible and easy to start. Exercisers shall be furnished with load/no load selector switches. Provide bypass exerciser controls if the normal source fails during the exercise period.

2.06 ENCLOSURE

- A. Enclosures: Transfer switch shall be provided as open type for installation in the motor control center by the motor control center manufacturer. All controls which will be located on cabinets shall be key operated. Manual operating handles and all control switches, (other than key-operated switches) shall be accessible to authorized personnel only by opening the key-locking cabinet doors. Transfer switches with manual operating handles and/or non key-operated control switches located on the outside of the cabinet do not meet this specification and are not acceptable.

2.07 ACCESSORIES

- A. Indicating Lights: Mounted in cover of MCC by MCC manufacturer to indicate the following. Source lights shall be 30.5 mm heavy duty oiltight press-to-test by SIEMENS.
 - 1. NORMAL SOURCE AVAILABLE.
 - 2. EMERGENCY SOURCE AVAILABLE.
 - 3. NORMAL SWITCH POSITION.
 - 4. EMERGENCY SWITCH POSITION.
 - 5. AC POWER FAILURE.
- B. Test Switches: Mounted in enclosure of MCC by MCC manufacture to simulate failure of normal source. Switches to be keyed operated. Provide TEST/NORMAL/RETRANSFER positions. Retransfer position to provide immediate Retransfer to normal, bypassing time delay. The test switch shall be capable of receiving a remote signal. The generator load shed control panel shall provide a signal to initiate transfer to emergency source based on facility load. After the facility load has reduced the PLC shall deenergize the start signal. The transfer switch shall retransfer to the normal source and go into engine cool down mode 0-10 minutes adjustable.
- C. Emergency Kill Switch Pushbutton (Maintained): When depressed shall shut down generator. This switch shall be in series with new exterior emergency kill switch.

- D. Transfer Switch Main Shaft Auxiliary Contacts: Two normally open; two normally closed. Wired to terminal block for easy access for indication of switch position. Rated at 10 Amps continuous and 250 VAC maximum.
- E. Transfer switches are to be equipped with permanently attached operating handles and quick-break, quick-make mechanisms suitable for normal operation under load. Loose manual operating handles that need to be field attached for operation will not be acceptable.
- F. All transfer switches shall be provided with a field adjustable time delay during the switching in both directions, during which time the load is isolated from both power sources, to allow load residual voltage to decay before closure to opposite source. The delay feature shall have an adjustable range of 0 to 7.5 seconds. Phase angle monitor/inphase type monitors are not acceptable.
- G. Provide a voltage monitoring relay and pneumatic time delay relay control circuit to energize a relay contact when power to the load terminals of the transfer switch is lost for a pre-selected time interval. The voltage phase monitor relay shall monitor 3-phase voltage, phase failure, phase reversal and voltage imbalance. The phase monitor shall have a normally closed contact in Series with a time delay relay. The pneumatic time delay relay shall have a 0-5 minute timer with automatic reset when power is restored to the coil. The normally open contact of the time delay relay shall be input to the PLC.
- H. Provide generator 20 light remote annunciator located inside the Treatment Building on the ATS Cubicle. Interface generator set controls with battery charger and fuel tank alarms for all status conditions. Provide all power, control wiring including conduits.
- I. Provide a Signal Module Option: Provides relay output contacts for sending information to the building monitoring and control system. Relay outputs include: source 1 connected/available, source 2 connected/available, not in auto, test/exercise active, failed to disconnect, failed to synchronize, failed to transfer/retransfer, and elevator control pre-transfer signal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation of transfer switches shall be by the Motor Control Center manufacturer. Motor Control Center manufacturer shall provide applicable U.L. labeling for installed system.

3.02 POWER OUTAGE

- A. After the transfer switch is installed, the Contractor shall be responsible to inspect the installation and field verify that the switch has been installed per manufacturer's recommendations. Owner's operating personnel shall be instructed on the use and service requirements of the transfer switch by the manufacturer. A minimum of two (2) hours manufacturers training is required.

3.03 DEMONSTRATION

- A. Demonstrate operation of transfer switch under provisions.

END OF SECTION 262916

PART 1 GENERAL

1.01 GENERAL

1.02 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ETL/UL LISTED to 1008 Standards
- C. UL 50 LISTED
- D. COORDINATION
 - 1. Coordinate layout and installation of Generator Docking Station, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels
- E. GUARANTEE/WARRANTY
 - 1. Manufacturer Warranty shall be provided for a minimum of 1 Year,
 - 2. The equipment installed under this contract shall be left in proper working order
 - 3. New materials and equipment shall be guaranteed against defects in composition, design or workmanship. Guarantee certificates shall be furnished.

PART 2 PRODUCTS

2.01 DOCKING STATION

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. TRYSTAR: Manual Transfer Switch Docking Station
 - 2. TYSTAR Model No: TMTS-3-08-5-W-LL-M
 - 3. Option: A, C, D, I, J, N

2.02 GENERAL REQUIREMENTS

- A. Enclosure
 - 1. NEMA 3R Rain-Tight Aluminum Enclosure
 - a. Pad-lockable front door shall include a hinged access plate at the bottom for entry of temporary cabling that prevents unauthorized tampering while in use.
 - b. NEMA 3R Integrity shall be maintained while temporary cabling is connected during use
 - c. Front and Side shall be accessible for maintenance
 - d. Top, Side, and Bottom shall be accessible for permanent cabling
 - 2. Powder coat
 - a. Paint after fabrication shall be Hammer tone Gray
- B. Phase, Neutral, and Ground Busbar
 - 1. Material: Silver-plated Copper
 - 2. Equipment Ground Bus: bonded to box.
 - 3. Isolated Ground Bus: insulated from box.
 - 4. Ground Bus: 50% of phase size.
 - 5. Neutral Bus: Neutral bus rated 100 percent of phase bus.
- C. Temporary generator and Load Bank connectors shall be Camlok style mounted on gland plate.
 - 1. Camlok shall be 16 Series model and color coded according to system voltage requirements.

2. Camlok connections shall be Bus Bar Style, Cabling or Double Set Screw is not acceptable
3. Camlok connection shall be protected against accidental contact while not in use
- D. Permanent Connection shall be factory installed broad range set-screw mechanical type, located behind a physical barrier
- E. Transfer Switch Configuration
 1. [TMTS] Docking Station shall have integrated Rotary Transfer Switch (MTS).
 - a. MTS shall have three positions – Utility/Permanent Line – OFF – Temporary Line
 - b. MTS shall be located behind pad lockable door to prevent any tampering by unauthorized personnel.
- F. Short Circuit & Withstand Rating
 1. Shall be minimum 42KAIC unless otherwise indicated on drawings
- G. Voltage & Amperage
 1. 800A, 277/480V
- H. Factory Installed Phase Rotation Monitor Device:
 1. Phase monitoring relay to be Siemens 3U4512-1AR20 or equal and factory installed
- I. [Optional Breaker Disconnects as Indicated on Project Drawings and Manufacturer Submittal Drawings:]
 1. Must be UL 489 Listed Breaker
 2. Breakers shall be removable for service and maintenance
- J. Additional accessories shall be included in submittal drawing as follows:
 1. A: Two Wire Auto Start
 2. C: Battery Charger Receptacle 20A GFCI 125V
 3. D: Block Heater Receptacle 30A L5-30 125V
 4. I: Stainless Steel Construction
 5. J: Extra Depth for Bottom Conduit Access
 6. N: Strip Heater & Thermostat

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive Generator Docking Station for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected

3.02 INSTALLATION

- A. Surface, Flush or Base Mounted: Determined by Application
 1. Install anchor bolts to elevations required for proper attachment to Generator Docking Station.

3.03 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
- B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

- C. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.04 FACTORY COMMISSIONING

- A. Upon completion of the installation, the docking station shall be commissioned by the Manufacturer's factory authorized technician. THIS SERVICE IS PROVIDED AT AN ADDITIONAL COST.
- B. SCOPE OF WORK SHALL INCLUDE:
 - 1. Review and verify the installation of all Trystar components and verify the correct electrical flow as depicted on the one-line drawings.
 - 2. (If Applicable) The Manufacturer's authorized technician will set the long time, short time, instantaneous and ground fault protection settings on the Generator Docking Station circuit breaker(s) in accordance with the engineers specifications or as provided as part of the coordination study.
 - 3. Factory training for on-site personnel to educate them on how to connect the GDS to a portable generator
 - 4. The Manufacturer's factory authorized technician shall, upon completion of the commissioning provide a written report to the electrical contractor and electrical engineer indicating the completion of the work.
 - 5. Any issue that is found during the start-up that is determined at that time to be a warranty issue will be covered by Manufacturer. Any issues that are specific to the scope for the electrical installing contractor are the sole responsibility of the installing contractor.
 - 6. Upon successful completion of the commissioning, Trystar will provide a complimentary 12-month warranty extension, above and beyond the 12-month manufacturer warranty.

3.05 FIELD QUALITY CONTROL

- A. Third Party Tests and Inspections to include the following:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Prepare test and inspection reports, including a certified report that identifies Generator Docking Station and that describes scanning results. Include notation

END OF SECTION 262918

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Variable frequency controller.

1.02 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Shop Drawings: Include front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.
- C. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- D. Test Reports: Indicate field test and inspection procedures and test results.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- F. Manufacturer's Field Reports: Indicate start-up inspection findings.
- G. Manufacturer's recommended spare parts list.

1.03 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and tested by Underwriters Laboratories, Inc. as suitable for purposes specified indicated.

1.04 EXTRA MATERIALS

- A. Provide two of each fuse size and type.
- B. Provide one complete set of spare logic boards for each system provided.

PART 2 - PRODUCT

2.01 MANUFACTURERS

- A. Yaskawa IQPump.
- B. Approved equal.

2.02 DESCRIPTION

- A. Provide enclosed variable frequency controllers suitable for operating the indicated loads. Conform to requirements of NEMA ICS 3.1.
- B. Minimum efficiency at full load: 98 percent.

2.03 ENVIRONMENT RATINGS

- A. Operating Ambient: 0 degrees C to 40 degrees C.
- B. Relative Humidity: 5 to 95% non-condensing, all power ratings.
- C. Altitude: 3,300 feet (1,000 meters) maximum without derating.
- D. Vibration: 0.006 inches (0.152 mm) displacement, 1G peak.
- E. Shock: 15G peak for 11ms duration (+-1.0 ms).

2.04 INPUT POWER RATINGS

- A. Voltage: 460V AC +-10%
- B. Frequency: 48 to 62 Hz
- C. Phase: 3-phase
- D. Motor Horsepower: Refer to drawings for H.P. sizes
- E. Line Transient Protection: Line transients up to 5,000 volts peak. 320 Joules phase-to-phase 380 Joules phase-to-ground.
- F. Logic Power Ride-Thru: 2 seconds or longer -- subject to the integrity of user supplied external circuits.
- G. Drive Characteristics: Drive shall use isolated gate bi-polar technology.
- H. Control Logic Noise Immunity: Showering arc transients from 350 to 2,000 volts peak.
- I. Voltage: **Drive Rating BOO3-B200**
0 to applied input voltage, 230V AC, maximum output voltage cannot exceed applied input voltage.
- J. Frequency Range: 0 to 250 Hz with local programmable minimum and maximum limits
- K. Frequency Resolution: **Digital**
Preset speeds (serial interface or pulse train input) to 0.005 Hz of set frequency within the minimum and maximum limits.
Analog
Equal divisions between minimum and maximum limits to the nearest 0.005 Hz as a function of signal type.

Local speed pot, 1003 divisions.
Remote speed pot, 633 divisions.
4 to 20 mA input (TB2, Terminals 4 and 6), 726 divisions.
- L. Frequency Regulation: Digital Frequency Source: 0.0013% of set frequency, 0 to 40°C temperature range.
- M. Volts-per-Hertz: Fully programmable - Minimum 1 to 14.3 V/Hz through local programming.
- N. Intermittent Overload Capability: Programmable MOPC from 50 to 150% of rated output current for up to 1 minute maximum.
- O. Carrier Frequency: Carrier frequency shall be adjustable up to 15 KHz. No exceptions.

2.05 DRIVE ACCESSORIES

- A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current. Display shall be flush mounted on VFD enclosure door.

- B. Elapsed Time Meter: Non-resettable 6 digit.
- C. Input Signal: - 20 mA DC.
- D. Disconnecting Means: Include integral circuit breaker on the line side of each controller.
- E. One (1) 0 to 30 mA D.C. ammeter to monitor 4-20 mA input signal from PID controller. (3-1/2" square minimum).
- F. Hand-Off-Automatic Selector Switch.
- G. Drive-Bypass Selector Switch
- H. Ten (10) turn speed control pot.
- I. Isolation contactor (NEMA Rated).
- J. Output/Bypass contactors (NEMA Rated).
- K. Start Delay Timer: Eagle Cycle-Flex.
- L. Auxiliary NO and NC contacts.
- M. Three (3) programmable preset speeds to be initiated through contact closure.
- N. Lightning/surge arrestor with individual line to line and individual line to ground protection. Clamping voltage levels shall be specifically sized for the applied system voltage.
- O. Provide solid state overload relay on load size of bypass contactor and thermal overload relay on load side of output contactor as manufactured by SIEMENS.
- P. Fast-acting fuses on load side of main circuit breaker sized in accordance with manufacturers recommendations.
- Q. Isolated 4-20 mA input for follower signal input.
- R. Smart Keypad: Key pad shall have 1K memory for downloading information to any drive. Removable flush mounted on enclosure door.
- S. 4-20 mA scaled output proportional to drive speed. Input to PLC.
- T. Drive shall have three inputs for preset speeds initiated by remote contacts.
- U. Drive shall have speed contacts to close when speed is reached and be input to the PLC.
- V. Drive shall have fault and not in Auto Contacts and shall be input to the PLC.

2.06 VARIABLE SPEED DRIVE SYSTEM

- A. The variable speed drive system shall include a diode bridge converter, filter network and a transistorized inverter section. Base driver signals used to control firing of the power transistors shall be designed with optically-coupled-isolators for optimum drive protection. The output must be sinusoidal wave, pulse width modulated, voltage wave form for reduced harmonic heating in the motor. The systems shall include all the necessary control circuits, synchronizing the equipment and protective devices as required by design. The drive unit shall be able to

withstand a phase-to-phase and a phase-to-ground short without damage to the drive unit. The systems protection as a minimum shall provide the following:

Current Limit:	115% of rated current
Overcurrent:	180% of rated output current IET (trip fault)
Shortcircuit:	Phase-to-phase (trip fault)
Overvoltage:	High D.C. bus voltage (trip fault)
Undervoltage:	20% below line voltage (trip fault)
Momentary Power Failure:	30 to 500 milliseconds
Burn-out:	D.C. bus fuse protection or 3 phase input fusing
Terminal Strip for Remote Alarms:	Fault contact (Form C)
Digital Indication Individual Fault Condition:	Overcurrent of a transistor. Output overcurrent or shortcircuit. Overcurrent while running. Thermal overload. Overvoltage of the D.C. bus due to regeneration. Overvoltage of the D.C. bus due to high line voltage. Overtemperature of the enclosure. Ground fault.
LED Indication:	D.C. bus capacitor charge
Stall Protection:	Prevents current limit activation during overload condition to prevent stall
Ground Fault:	Detects output shortcircuit due to a ground (trip fault)
Voltage Limit:	Prevents the overvoltage of the D.C. bus during deceleration
Accel & Decel Time:	Fully programmable.

The control shall contain system adjustments. The adjustments shall be by potentiometers. The potentiometer shall be accessible through the front portal door on the unit which prevents exposure to lethal voltage to the operator.

The system parameters shall be shown on the digital display meter before, during and after the adjustment. The digital display shall indicate the actual setting of the adjustment, not percentage of setting. The following adjustment shall be provided:

Acceleration:	0.1 to 60 seconds
Deceleration:	0.1 to 60 seconds
Upper Frequency Limit:	0 to 80 Hz
Lower Frequency Limit:	0 to 80 Hz
Auto Reference Bias:	0 to 80 Hz
Auto Reference Gain:	0 to 80 Hz

The unit shall be self-protecting to prevent any misadjustments by the operator. The upper limit cannot be set below the lower limit, and will signal the operator of this misadjustment.

2.07 DESIGN

- A. Employ microprocessor based inverter logic isolated from power circuits.
- B. Employ IGBT inverter system.
- C. Adjustable carrier frequency up to 15 KHz.
- D. Employ switching power supply operating off DC link.
- E. Design for ability to operate controller with motor disconnected from output.
- F. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
- G. In the event of sustained power loss, the control shall shut down safely without component failure. In the event of momentary power loss, the control shall shut down safely without component failure. Upon return to power the system shall automatically return to normal operation, being able to restart into a rotating motor, regaining positive speed control without power failure.

2.08 FABRICATION

- A. Wiring Terminations: Match conductor materials and sizes indicated.
- B. Enclosure: NEMA 250, Type 1.
- C. Finish: Manufacturer's standard enamel.

2.09 SOURCE QUALITY CONTROL

- A. Inspect and production-test each product specified in this section.
- B. Test shall include simulated operation.
- C. Notify engineer at least five (5) days prior to test. Owner or Engineer may witness test.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Controllers shall be factory installed in Motor Control Center by same manufacturer of Motor Control Center.
- B. Install controller in accordance with manufacturer's written instructions and NEMA ICS 3.1.
- C. Tighten accessible connections and mechanical fasteners after placing controller.
- D. Install fuses in fusible switches.
- E. Select and install overload heater elements in controllers to match installed motor characteristics.

- F. Provide engraved plastic nameplates under the provisions of Section 260553.
- G. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full, load amperes, code letter, service factor, and voltage/phase rating.

3.02 ADJUSTING

- A. Make final adjustments to installed drive to assure proper operation of system. Obtain performance requirements from installer of driven loads.

3.03 DEMONSTRATION

- A. Demonstrate operation of controllers in automatic and manual modes.
- B. Provide the services of the manufacturer's trained personnel to completely check the VFD system installations and adjust the drive for operation. An additional period shall be included for trained personnel at the time of acceptance and field tests. A minimum amount of six days and three trips shall be required for this work.
- C. Manufacturer's trained personnel, after initial field startup shall remove all logic PC boards for the pump program logic and install and adjust a spare set of PC boards. These boards shall remain in the drives and the initial boards shall be provided as spares.
- D. Service Contract - Provide a one-year service contract for the pump control system. Service contract shall include the services of a manufacturer trained engineer to provide preventive maintenance service and calibration of the equipment. At least four routine service trips shall be made as scheduled by Owner. In addition, whenever trouble occurs with the system, a serviceman shall come and repair/replace defective parts at no additional cost. All parts required for repair shall be included at no additional cost. This service contract shall take effect one year after acceptance of the equipment and after the one-year guarantee period has lapsed.

END OF SECTION 262923

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator set.
- B. Exhaust piping, fittings, silencer and insulation.
- C. Control panels.
- D. Battery and charger.
- E. Vibration isolation.

1.02 REFERENCES

- A. NEMA AB1 - Molded Case Circuit Breakers.
- B. NEMA MG1 - Motors and Generators.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. ANSI/NFPA 70 - National Electric Code.
- E. NFPA 110 - Emergency Standby Systems.
- F. NFPA 30 - Flammable and Combustible Liquids Code.
- G. NFPA 37 - Installation of Stationary Engines.
- H. NFPA 101 - Life Safety Code.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, electrical diagrams including schematic and interconnection diagrams.
- C. Product Data: Provide data showing dimensions, weights, ratings, interconnection points and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, radiator and derating schedules, operating performance, exhaust flow data, and cooling system data. Submit generator alternator output curves, duration curves and temperature data on the complete genset individual components.
- D. Test Reports: Indicate results of performance testing including 0.8 power factor test at 100 percent load.
- E. Prototype Test Reports: Submittals will not be received without submission of prototype test reports. No exceptions.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product. Provide typical system interconnection wiring diagrams.

- G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- H. Manufacturer's Field Reports: Submit under provisions of Section 017500. Indicate procedures and findings.

1.04 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017823.
- B. Operation Data: Include instructions for normal operation.
- C. Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with NFPA 110.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten years experience, and with an authorized distributor offering 24-hour parts and service availability within 50 miles of the project. The manufacturer shall fabricate the engines, generators and control panel. Automatic transfer switches and generator enclosures shall be supplied, warranted and serviced by a single system source supplier.
- B. Supplier: Authorized distributor of specified manufacturer with minimum six years documented experience with specified products and factory-trained service technicians. The supplier must be factory authorized to perform warranty service on the entire system, including but not limited to, the engines, generators, control panels and automatic transfer switches. The supplier must show proof of factory trained service technicians on all components.
- C. The complete engine generator system shall be standard of a single manufacturer. It shall be factory built, tested and shipped by this single manufacturer.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 and NFPA 110.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.08 EXTRA SERVICES

- A. The single source supplier shall provide as part of the package a 5-year warranty and 5-year planned maintenance agreement at no additional cost to the Owner. This warranty shall cover the generator system, transfer switches and generator enclosures. Agreement shall include, as a minimum, one service call per year. The services must be performed by the authorized distributor of the equipment furnished, and may not be subcontracted. The following services shall be performed once a year.
 - 1. Replace engine-lubricating oil and remove used oil from premises.
 - 2. Replace oil and fuel filters.
 - 3. Check oil/water separator. Remove water from premises.

4. Check coolant system for proper levels and condition. Replace coolant filters and add corrosion inhibitor as needed.
5. Check air filter.
6. Check and clean crankcase breathers.
7. Check turbocharger free-spin and end play.
8. Check and adjust belts as required.
9. Check engine for loose, bare or broken wiring. Replace as needed.
10. Fuel tanks and lines to be inspected for the purpose of determining if excessive sludge or rust is collecting.
11. Check entire equipment for fuel or water leaks.
12. Check condition of batteries and report any action necessary for recharging or replacing.
13. Start and run all engines, check temperatures and pressures.
14. Test engine safety shutdown systems.
15. Test all transfer switches operation and time delays.
16. Submit a report of this inspection to the Owner and advise of any further work required.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. ONAN CORPORATION, Minneapolis, Minnesota, or specifically approved equal.
- B. Proposal for any substitute equipment shall provide complete submittal data, as specified in Section 012500 - Substitution Procedures and specified herein, to the Engineer for approval or disapproval. The supplier must submit detailed sizing calculations for each generator to verify models are capable of picking up the entire loads with voltage dips as herein specified.
- C. Approval of Substitute Equipment: Design has been based on ONAN Model Generators. If substitute equipment is approved, the contractor shall be responsible for the charges of any necessary revisions to the plans and specifications, drawings, and project documentation; and charges related to equipment spacing, enclosure sizes, foundation sizes, mounts, electrical wiring, ventilation equipment, fuel, exhaust components, etc., as well as any engineering costs. If a brand name other than that specified is proposed for use, the supplier must provide a locally available generator system for the Owner and engineer to review and inspect, as well as witness testing to show compliance with the specifications. Also, the supplier must furnish a list of completed installations, including name, address and telephone number of at least five comparable installations which can prove the proposed products have operated satisfactorily for three years.
- D. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.02 SYSTEM REQUIREMENTS

- A. The engine generator shall start and provide continuous power to the loads with 100 percent block loading at the time of transfer.

2.03 DIESEL ENGINE GENERATOR SET

- A. Rating: The AC engine generator set, ONAN Model 450 DFEJ and shall be rated by the manufacturer for standby operation at 450 kW/563 kVA at 0.8 PF, 60 Hz, 1800 RPM for use at 277/480 volts, 3 phase, 4 wire. Ratings shall be at an elevation of 500 feet above sea level, and at 104 degrees F.
 1. Voltage regulation shall be +/- 0.5 percent of rated voltage for any constant load between no load and rated load.

2. Frequency regulation shall be isochronous under varying from no load to 100% rated load.
3. Random Voltage Variation: The cyclic variations in RMS voltage shall not exceed +/- 0.5% of rated speed for constant loads from no load to rated load, with constant ambient and operating temperature.
4. Random Frequency Variation: Speed variations for constant loads from no load to rated load shall not exceed plus or minus 0.25% of rated speed, with constant ambient and operating temperature.
5. Telephone Harmonic Distortion: The sum of AC voltage waveform harmonics, from no load to full linear load, shall not exceed 5% of rated voltage (L-N, L-L, L-L-L) and no single harmonic shall exceed 3% of rated voltage.
6. Telephone Influence Factor: TIF shall be less than 50 per NEMA MG1-22.43.
7. The diesel engine generator set shall be capable of picking up 100% of nameplate KW and power factor in one step with the engine generator set at operating temperature, in accordance with NFPA Standard 110, Paragraph 5-13.2.6.
8. The maximum allowable engine BMEP on the engine shall not exceed 318 psi at 100% rated load.
9. The engine generator shall start and provide power to the loads in the following step starting sequence with a maximum instantaneous voltage dip of 12% and a maximum frequency dip of 3%.

Step No.	Description	Load	Volts/ Phase	Motor Code	Load Type	Starting Method
1	Misc. Electric Load	10 kW	208/3		Misc. Load	Full Voltage
1	Misc. Lighting Load	10 kW	120/1		Misc. Load	Full Voltage
1	Lime Tank Mixer No. 1	1.6 kW	208/1		Motor Load	Full Voltage
1	Lime Tank Mixer No. 2	1.6 kW	208/1		Motor Load	Full Voltage
1	Cl2 Room Fan (Wall)	1.2 kW	120/1		Motor Load	Full Voltage
1	Hallway/Clw Room Fan for Heat	1.2 kW	120/1		Motor Load	Full Voltage
1	Lime Room Fan	1.7 kW	208/3		Motor Load	Full Voltage
1	Pump Room Ceiling Fan	1.7 kW	208/3		Motor Load	Full Voltage
1	Cl2 Room Fan	1.2 kW	120/1		Motor Load	Full Voltage
1	Sump Pump	1.2 kW	120/1		Electric Load	Full Voltage
1	SCADA Room Split	5 kW	208/3		Electric Load	Full Voltage
1	UH-1 (Pump Room)	5 kW	480/3		Electric Load	Full Voltage
1	UH-2 (Engine Room)	5 kW	480/3		Electric Load	Full Voltage
1	Chemical Room Heater	10 kW	208/1		Electric Load	Full Voltage
1	5-2 UH	10 kW	480/3		Electric Load	Full Voltage
1	5-2 Wall Fan	1.2 kW	120/1		Motor Load	Full Voltage

Step No.	Description	Load	Volts/Phase	Motor Code	Load Type	Starting Method
1	Treatment Building Misc. Load	10 kW	208/3		Misc. Load	Full Voltage
1	Treatment Building Misc. Lighting Load	10 kW	120/1		Misc. Load	Full Voltage
1	Emergency Shower Heater	2.4 kW	120/1		Electric Load	Full Voltage
1	Motorized Treatment Valves	3 kW	120/1		Electric Load	Full Voltage
1	New Exhaust Fan	1.6 kW	208/1		Motor Load	Full Voltage
1	EUH-1	7.5 kW	480/3		Electric Load	Full Voltage
1	Roof Fan (5-2 Building)	1.7 kW	208/3		Motor Load	Full Voltage
2	SCADA Rack	3 kW	208/3		Electric Load	Full Voltage
3	Block Heater	3 kW	208/1		Electric Load	Full Voltage
3	UH-3 (Lime Room)	5 kW	480/3		Electric Load	Full Voltage
3	UH-4 (Lime Room)	5 kW	480/3		Electric Load	Full Voltage
3	EUH-2	7.5 kW	480/3		Electric Load	Full Voltage
3	EUH-3	7.5 kW	480/3		Electric Load	Full Voltage
3	EUH-4	7.5 kW	480/3		Electric Load	Full Voltage
4	Air Scouring System	17.5 kW	480/3		Motor Load	Full Voltage
5	Well 5-1	130 kW	480/3		Motor Load	Full Voltage
6	Pre Treatment Lime Pump	1.2 kW	120/1		Motor Load	Full Voltage
6	Pre Treatment Chlorine Pump	1.2 kW	120/1		Motor Load	Full Voltage
7	Post Treatment Lime Pump	1.2 kW	120/1		Motor Load	Full Voltage
7	Post Treatment Chlorine Pump	1.2 kW	120/1		Motor Load	Full Voltage
7	Post Treatment PO4 Pump	1.2 kW	120/1		Motor Load	Full Voltage
8	Well 5-2	103 kW	480/3		Motor Load	Full Voltage
9	Well 5-2 PO4 Pump	1.2 kW	120/1		Motor Load	Full Voltage
9	Well 5-2 Lime Pump	1.2 kW	120/1			
9	Well 5-2 Chlorine Pump	1.2 kW	120/1		Motor Load	Full Voltage

Step No.	Description	Load	Volts/Phase	Motor Code	Load Type	Starting Method
10	Dust Collector Fan	1.8 kW	208/1		Motor Load	Full Voltage
11	Air Compressor	1.6 kW	208/1		Motor Load	Full Voltage

10. The generator shall at a minimum provide the following performance.

- B. The generator as a packaged unit (engine, alternator and controls) provide a minimum of 2,429 SKVA sustaining a minimum of 90% of rated no load voltage with the specified 2,429 SKVA load at near zero power factor applied to the generator.
- C. The following performance verifications shall be provided for substitute generators.
 - 1. Submit five copies of generator sizing program based upon the specified step/starting sequence and associated voltage/frequency dips and required starting KVA.
 - 2. As part of the substitution requirements the contractor shall enter all design step/starting sequence loads into the manufacturer's generator sizing program in the presence of the engineer to verify model proposed by substitute manufacturer meets the specified requirements for ambient temperature, site altitude, voltage dip, frequency dip, and starting KVA.
- D. The diesel fuel oil tank shall be rated at 2525 gallons and shall be placed in a rupture basin of 110% capacity for secondary containment, in accordance with Suffolk County Department of Health Services and Suffolk County Fire Marshal requirements. Minimum 12 gauge steel shall be used for tank body, and minimum 3/16" steel shall be used for rupture basin. Tank shall be U.L. 142 listed and labeled, have vent, emergency vent, lockable fill, electric gauge, and fuel level contacts. Rupture basin shall have contacts to indicate a leak in the fuel tank. Tank must be factory tested for leaks under pressure prior to shipment. Three (3) integral, pre-engineered cable entry area shall be provided in the fuel tank and rupture basin for power, controls and distribution panel. Design of this entry area shall ensure the integrity of the rupture basin and tank, and be coordinated with the generator set manufacturer for location under the cable connection area on the generator. Bottom of rupture basin shall be raised 1 3/4" minimum off concrete pad so bottom does not rest on concrete pad. Exterior of tank and rupture basin and base rails to be painted with coal tar epoxy primer and exterior epoxy paint to prevent corrosion. Four-point lifting provisions shall be provided at the enclosure base, with capacity suitable for rigging the entire assembly. Quality assurance procedures of the manufacturer shall include regular testing of the lift devices.

2.04 AC GENERATOR, REGULATOR AND EXCITER UNIT

- A. The AC generator, exciter and voltage regulator shall be designed and manufactured by the engine generator set manufacturer as a complete generator system.
- B. The AC generator shall be synchronous, four pole, revolving field, dripproof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan and directly connected to the engine with flexible drive discs. The armature shall have skewed laminations of insulated electrical grade steel, two-thirds pitch windings in order to minimize field heating and voltage harmonics. The rotors shall have amortisseur (damper windings) layer wound mechanically wedged winding construction. The rotors shall be dynamically balanced. The exciters shall be brushless, three phase, with full wave silicon diodes mounted on the rotating shaft and a surge suppressor connected in parallel with the field winding. Field discharge resistors shall not be acceptable. Systems using three wire solid state devices (such as SCRs or transistors) mounted on the rotor shaft shall not be acceptable.

- C. All insulation system components shall meet NEMA MG1 standard temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 80 degrees C to provide additional allowance for internal hot spots. The main generator and exciter insulation systems must be suitably impregnated for operation in severe environments for resistance to sand, salt and sea spray.
- D. Generator shall be a Permanent Magnet Generator (PMG). Permanent magnet generators shall provide excitation power to the automatic voltage regulator for immunity from voltage distortion caused by nonlinear SCR controlled loads on the generator. The PMG's shall sustain main field excitation power for optimum motor starting and to sustain short circuit current for selective operation and coordination of system overcurrent devices.

2.05 ENGINE GENERATOR SET CONTROLS

- A. The generator sets shall be provided with microprocessor-based control systems which are designed to provide automatic starting, monitoring, and control functions for the generator set. The control systems shall also be designed to allow local monitoring and control of the generator sets, and remote monitoring and control as described in this specification. The controls shall be mounted on the generator sets, and shall be vibration isolated and prototype tested to verify the durability of all components in the system under vibration conditions encountered. The controls shall be UL-508 labeled, CSA282-M1989 certified, and meet IEC-8528 part 4. All switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure doors shall be gasketed. There shall be no exposed points in the controls (with the door open) that operate in excess of 50 volts. The controls shall meet or exceed the requirements of Mil-Std 461C part 9, and IEC Std. 801.2, 801.3 and 801.5 for susceptibility, conducted and radiated electromagnetic emissions. The entire controls shall be tested and meet the requirements of IEEE587 for voltage surge resistance. The generator set mounted controls shall include the following features and functions:
 - 1. The generator control panel shall provide a network interface for the future Scada System. This network interface shall communicate all the generator status, control, display messages, troubleshooting and safety features as described below. Software shall be available for interfacing PLC Software with generator control panel communications. This interface and software development will be performed by another contract.
 - 2. Three position control switch labeled RUN/OFF/AUTO. In the RUN position the generator set shall automatically start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
 - 3. Red "mushroom-head" push-button EMERGENCY STOP switch. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
 - 4. Push-button RESET Switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
 - 5. Generator Set AC Output Metering: The generator set shall be provided with a metering set with the following features and functions:
 - a. 2.5-inch, 90 degree scale analog voltmeter, ammeter, frequency meter, and kilowatt (KW) meter. These meters shall be provided with a phase select switch and an indicating lamp for upper and lower scale on the meters. Ammeter and KW meter scales shall be color coded in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red.
 - b. Digital metering set, 0.5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three phase voltages (line to neutral or line to line) simultaneously.

6. Generator Set Alarm and Status Message Display: The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel:
 - a. Low Oil Pressure (alarm)
 - b. Low Oil Pressure (shutdown)
 - c. Oil Pressure Sender Failure (alarm)
 - d. Low Coolant Temperature (alarm)
 - e. High Coolant Temperature (alarm)
 - f. High Coolant Temperature (shutdown)
 - g. Engine Temperature Sender Failure (alarm)
 - h. Fail to Crank (shutdown)
 - i. Overcrank (shutdown)
 - j. Overspeed (shutdown)
 - k. Low DC Voltage (alarm)
 - l. Low Coolant Level (alarm or shutdown-selectable)
 - m. High DC Voltage (alarm)
 - n. Weak Battery (alarm)
 - o. Low Fuel-Daytank (alarm)
 - p. High AC Voltage (shutdown)
 - q. Low AC Voltage (shutdown)
 - r. Under Frequency (shutdown)
 - s. Over Current (warning)
 - t. Over Current (shutdown)
 - u. Short Circuit (shutdown)
 - v. Ground Fault (alarm)
 - w. Over Load (alarm)
 - x. Emergency Stop (shutdown)
 - 1) In addition, provisions shall be made for indication of two customer-specified or future alarm or shutdown conditions. These two alarm conditions shall be interfaced with leak detection/overflow alarm panel for overflow and leak detection. Labeling of the customer specified or future alarm or shutdown conditions shall be of the same type and quality as the above specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate the generator set is not able to automatically respond to a command to start from a remote location.
7. Engine Status Monitoring: The following information shall be available from a digital status panel on the generator set control:
 - a. Engine Oil Pressure (psi or kPa)
 - b. Engine Coolant Temperature for left and right block temperatures (degrees F or C; both)
 - c. Engine Oil Temperature (degrees F or C)
 - d. Engine Speed (rpm)
 - e. Number of Hours of Operation (hours)
 - f. Number of Start Attempts
 - g. Battery Voltage (DC volts)
8. Control Functions: The control system shall provide for the following functions:
 - a. The control system provided shall include a cycle cranking system, which allows for user selected crank time, reset time, and number of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.

- b. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
 - c. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and ramping function to control engine speed and limit exhaust smoke while the unit is starting. The governor control shall be suitable for use in paralleling applications without component changes.
 - d. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
 - e. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure condition.
9. Alternator Control Functions: The generator set control shall include the following alternator control functions:
- a. The generator set shall include an automatic voltage regulation system which is matched and prototype tested with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control build up of AC generator voltage to provide a linear rise and limit overshoot. The systems shall include a torque-matched characteristic, which shall reduce output voltage in proportion to frequency below a threshold of [58-59] HZ. The voltage regulator shall include adjustments for gain, damping and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alpha-numeric LED readout to indicate setting level.
 - b. The voltage regulation system shall include provisions for reactive load sharing and electronic voltage matching for paralleling applications. Motorized voltage adjust pot is not acceptable for voltage matching.
 - c. Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator.
 - d. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition when total load on the generator set exceeds the generator set rating for in excess of 5 seconds.
 - e. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
 - f. An AC over/under voltage monitoring system which responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.
 - g. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32VDC. During engine starting, the low voltage limit shall be disabled, and if DC voltage drops to less than 14.4 volts for more than two seconds a "weak battery" alarm shall be initiated.
 - h. The control system shall include a ground fault monitoring relay. The relay shall be adjustable from 100-1200 amps, and include adjustable time delay of 0-1.0 seconds. The relay shall be for indication only, and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set, and provide relay which will function correctly in system as installed.

10. Control Interfaces for Remote Monitoring: All control and interconnection points from the generator set to remote components shall be brought to a separate connection box. No field connections shall be made in the control enclosure or in the AC power output enclosure. Provide the following features in the control system:
 - a. Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any alarm or shutdown condition on the generator set.
 - b. One set of contacts rated 2A @ 30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.
 - c. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
 - d. A fused 20 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.
 - e. The control shall be provided with provisions for connection of remote monitoring equipment as described herein or shown on the drawings.

2.06 ENGINES

- A. The diesel engine shall be manufactured by Cummins Engine Company and designed specifically for generator set duty. The diesel engine shall be 4 cycle, diesel fueled, direct injection, 1800 RPM, with forged steel crankshaft and connecting rods. Minimum engines shall be 912 cubic inches. Engines shall have a minimum of 6 cylinders. The cylinder blocks shall be cast iron with replaceable wet liners and have four valves per cylinder. The engines shall be turbocharged and aftercooled.
- B. Two cycle engines will not be acceptable.
- C. Electronic governor systems shall provide automatic isochronous frequency regulation. The engine governing systems shall not utilize any exposed operating linkage.
- D. The engines shall be cooled by a unit-mounted closed loop radiator system including belt-driven pusher fan, coolant pump and thermostat temperature control. The cooling systems shall be rated for full rated load operation in 104 degrees F (50 degrees C) ambient condition. The cooling capability of the generator sets shall be demonstrated by prototype tests on a representative generator set model conducted by the generator set manufacturer; calculated data from the radiator manufacturer only is not sufficient. Radiators shall be provided with a duct adapter flange permitting the attachment of an air discharge duct to direct the radiator air outside according to the manufacturer's instructions.
- E. Rotating parts shall be guarded against accidental contact per OSHA requirements.
- F. The maximum radiator cooling air shall not exceed 25,000 scfm. The maximum alternator cooling air shall not exceed 2190 cfm for the genset. The maximum allowable static restriction shall not exceed 0.5 inches of water. The entire cooling air system is based on the above data. All costs incurred if an alternate manufacturer is purchased shall be the responsibility of the electrical contractor. These costs shall include costs to all other trades as well as any associated engineering fees.

2.07 ENGINE ACCESSORY EQUIPMENT

- A. The engine generator sets shall include the following accessories:
 1. Fuel-Pressure Gauge.
 2. Electric starters capable of three complete cranking attempts without overheating, before overcrank shutdown (75 seconds).

3. Positive displacement, mechanical, full pressure, lubrication oil pumps. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicators. Provide bypass oil filters.
4. Engine driven, mechanical, positive displacement fuel pumps. Fuel filters with replaceable spin-on canister elements. Replaceable heavy duty dry element air cleaners with restriction indicators and safety element. Flexible fire rated supply and return fuel lines.
5. Engine mounted battery charging alternators, 35 ampere and solid-state voltage regulators.
6. Fuel water separators.
7. Anti-condensation heater for alternator.

2.08 BASES

- A. The engine-generator set shall be mounted on a heavy duty steel base to maintain proper alignment between components. The engine-generator set shall incorporate battery trays with battery holddown clamps on the base rails. Provisions for stub up of electrical connections shall be within the footprint of the generator set base rails and within the basetanks as specified in the housing section of the specification. Vibration isolators, spring type, shall be provided to be mounted under the generator set base.

2.09 GENERATOR SETS CIRCUIT BREAKERS

- A. Generator main circuit breaker shall be solid state UL listed, molded case type, rated as listed below. Circuit breakers shall be mounted in a separate NEMA 1 enclosure and be shipped completely wired to the gensets. No exceptions. Enclosures shall include neutral blocks for field connection.
- B. Solid State circuit breakers shall be 100% rated: Refer to drawings for sizes.
- C. Circuit breaker (CB) shall be long time current and instantaneous pickup with solid state trip unit. CB shall have visible mechanical fault indicator and push button trip.
- D. Circuit breakers shall be rated at 65,000 AIC.
- E. Provide auxiliary contacts on breaker position.

2.10 EXHAUST SYSTEMS

- A. One exhaust silencer shall be provided for the generator set. The silencer shall be super critical grade. The silencer shall reduce total noise a minimum of 40 dBA at three feet.
- B. The exhaust silencer shall be HARCO super critical bottom inlet/side outlet Model 5214-SFH-8 shall be mounted inside the sound attenuated enclosure. Provide all fittings, reducers, couplings elbows and spool pieces.
- C. All exterior fittings, accessories and bolts shall be type 304 stainless steel. Provide heat resistant gaskets between all flanged connections to serve as dielectric protectors.
- D. The maximum gas flow shall not exceed 3,105 cfm. The exhaust gas temperature shall not exceed 865 degrees F. The maximum back pressure shall not exceed 41 inches of water. The design of the entire exhaust system is based on the above data. If a substitution of model specified is made, all costs incurred to redesign as well as costs to other trades to modify the layout shall be the complete responsibility of the electrical contractor.

- E. Provide stainless steel flexible exhaust connections for the engine as required for connection between the engine exhaust manifolds and exhaust lines in compliance with applicable codes and standards.
- F. Provide an exhaust system condensation trap with manual drain valve to trap and drain off exhaust condensation and to prevent condensation from entering the engine.
- G. Provide a suitable weather cap at the stack outlet with all necessary flanges and fittings for proper installation. The weather cap shall have the proper counter weights attached to prevent banging while generator is unloaded.
- H. Thermal jacket for interior exhaust lines and silencer by FIRWIN CORP. or engineered approved equal. Jacket thickness shall be sufficient to maintain a surface temperature of less than 200 degrees F.
- I. Exhaust mufflers shall be installed by enclosure manufacturer so their weight is not supported by the engines.

2.11 ACCESSORIES

- A. Vibration isolators: Spring type.
- B. Starting and control Batteries: Two (2) 24 volt starting batteries each genset, lead acid type, 24 volt DC (12 volt DC will not be accepted), sized to accommodate 45 seconds of cranking at an ambient of 0 degrees F without being recharged.
- C. Battery Chargers: One 10 amp voltage regulated battery charger shall be provided for each engine-generator set. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30 VDC for remote indication of :
 - 1. Loss of AC Power - red light.
 - 2. Low Battery Voltage - red light.
 - 3. High Battery Voltage - red light.
 - 4. Power ON - green light (no relay contact).
- D. Block Heaters: Thermostatically controlled jacket water heater shall be supplied for each genset with a minimum size shall be 4825 watts. Input voltage of heaters shall be 208 VAC 1 phase.
- E. Provide generator 20 light remote annunciator located inside the Treatment Building on the ATS Cubicle. Interface generator set controls with battery charger and fuel tank alarms for all status conditions. Provide all power, control wiring including conduits.

2.12 ENCLOSURE

- A. The generator set shall be provided with a factory-installed sound attenuated housing which allows the generator set to operate at full rated load in the ambient conditions previously specified. The enclosure shall reduce the sound level of the generator set while operating at full rate load to a maximum of 75 dBA at any location 7 meters from the generator set in a free field environment. Housing materials used shall be steel. Fiberglass and plastic are not acceptable. Acoustical materials used shall be oil and water resistant. No foam materials shall be used.
- B. The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment and a hinged rear see-through control door. Key-locking and padlockable door latches shall be provided for all doors. Door hinges shall be stainless steel.

- C. The enclosure shall be provided with an exhaust silencer which is mounted inside of the enclosure, and allows the generator set package to meet specified sound level requirements. Silencer exhaust pipe shall include a rain cap and rain shield.
- D. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturers standard color using a two step electrocoating paint process, or equal meeting the performance requirements specified below. Metal part surfaces shall be prepared, primed and painted. The painting process shall result in a coating which meets the following requirements:
 - 1. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.
 - 2. Gloss, per ASTM D523, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.
 - 3. Crosshatch adhesion, per ASTM D3359, 4B-5B.
 - 4. Impact resistance, per ASTM D2794, 120-160 inch pounds.
 - 5. Salt spray, per ASTM B117, 1000+ hours.
 - 6. Humidity, per ASTM D2247, 1000+ hours.
 - 7. Water Soak, per ASTM D2247, 1000+ hours.
- E. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts will not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work. The enclosure shall be built and tested by the engine generator manufacturer.

2.13 SOURCE QUALITY CONTROL

- A. To provide proven reliability of the system, three series of tests shall be performed: prototype model tests, production model tests and field tests. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and factory tested at 0.8 PF will not be acceptable.
- B. Generator Set Factory Production Tests and Evaluation: These tests and evaluations must have been performed on a prototype generator set representative of the Model specified. A summary of the generator set testing results shall be submitted for review. The manufacturer's standard series of components development tests on the generator system, engine and other major components shall also be performed and available for review, but shall not be acceptable as a substitute for prototype testing on the complete representative generator set prototype.
- C. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torisional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.
- D. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.
- E. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals

must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.

- F. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer's standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.
- G. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two minutes.
- H. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptance criteria.
- I. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (122°F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge, shall be verified by this test.
- J. Maximum Motor Starting KVA: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent of no load voltage with the specified load KVA at near zero power factor applied to the generator set.
- K. Transient Response, Steady State Speed Control and Voltage Regulation: Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency backwidth with steady state load, maximum voltage and frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.
- L. Witnessed Generator Set Factory Production Tests: On the equipment to be shipped, an 8-hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory certified test record of the production testing. Certified test record shall be sealed by a licensed professional engineer. The contractor and/or equipment supplier at their expense shall coordinate and provide all transportation and lodging for the Owner and an Owner's engineering representative to witness the above stated factory-test.

2.14 WARRANTY

- A. Provide a 5-year manufacturer's limited warranty, including 100% parts and labor, ONAN Option L031. The complete electrical power system, including but not limited to, generator set, controls, associated switches, enclosures, and accessories, as provided by the single source manufacturer, shall be warranted by the manufacturer against defects in materials and workmanship for a period of five (5) years from the date of system startup. Coverage shall include parts, labor, travel expenses, and labor to remove/reinstall the equipment, per ONAN's standard published limited warranty. Supplier must be factory authorized to perform warranty service on the entire system, including, but not limited to, the engine, the generator, the control panels, and the automatic transfer switches.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install engine generator and all appurtenances in accordance with manufacturer's recommendations.
- B. Enclosure manufacturer shall install all exhaust components as shown on the drawings and as required to comply with NFPA 37 and local codes and regulations. Components shall be sized to assure full load operation without excessive backpressure sized as per manufacturer's recommendations with actual site dimensions when installed as shown on the drawing. Make provisions as required for pipe expansion and contraction.
- C. Coordinate installation of anchor bolts with generator enclosure manufacturer.
- D. Installation shall comply with applicable State and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

3.02 FIELD QUALITY CONTROL

- A. Initial startup and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment.
- B. Test data shall be collected and recorded on the following: time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.
- C. Procedure: Generator manufacturer shall conduct a six (6) hour load bank test at 1.0 power factor for each generator set. Contractor shall provide load bank for testing generator set at 100% load. Contractor is not permitted to use load bank specified as part of the testing requirements. Load bank test shall test generator at full nameplate KW rating. Generator manufacturer's representative shall record test data, as described in (B) above. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.

END OF SECTION 263213

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Charger/rectifier unit.
- B. Inverter unit.
- C. Batteries.

1.02 REFERENCES

- A. IEEE 519 - Guide for Harmonic Control and Reactive Compensation of Static Power Converters.
- B. NEMA PE 1 - Uninterruptible Power Systems.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. NFPA 70 - National Electrical Code.

1.03 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.
- B. Operation Data: Description of operating procedures.
- C. Maintenance Data: Description of servicing procedures; list of major components; recommended remedial and preventive maintenance procedures; spare parts list.

1.04 WARRANTY

- A. Provide one (1) year warranty, including parts and factory service.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. APC American Power Conversion Corp. - Model BR1000G: 1000VA

2.02 UNINTERRUPTIBLE POWER SUPPLY

- A. Components:
 - 1. Batteries.
 - 2. Rectifier/charger to maintain battery charge and to provide input to inverter when utility power is available.
 - 3. Inverter to provide power to load during normal operation.
 - 4. Static switch to transfer load automatically and without disturbance between inverter and utility power.
 - 5. Manual switch to bypass static switch for maintenance.
 - 6. Monitors, sensors and control circuits.
 - 7. Design Standards: IEEE 519 and NEMA PE 1.

2.03 SYSTEM RATINGS AND OPERATING CHARACTERISTICS

- A. Performance Requirements.

- B. System Configuration shall be the non-redundant, line-interactive type. All power connections, in and out, AC and DC, shall enter from the bottom or rear of the UPS cabinet. Compression-type terminal blocks shall be standard connections.
- C. System Operation.
- D. During normal operation, utility power is delivered to the load through the tap-switching power conditioner, while DC is delivered to recharge the batteries through the bi-directional converter. At the same time, the bi-directional on-line converter provides the regulation of voltage to the UPS output. AC output provided to load should be galvanically isolated from input including neutral.
- E. In case of UPS failure, when any part of the converter system fails so as to adversely affect the quality of the UPS performance, 100% of the load shall be automatically be provided by the power conditioner through the power transformer.
- F. The manual bypass switch shall be a standard feature, selecting clean, regulated AC from the UPS output, or raw AC power from the UPS input terminal blocks.
- G. When the utility power suffers and outage, or when it is out of tolerance as described in Item J (below), the battery bank shall supply DC power without any switching required and thus maintain the UPS in action. During such operation, the load power shall remain within the limits set in Item K (below).
- H. Battery charging shall be automatic based upon battery state of charge. The charging current is limited to prevent damage to the batteries, which will be the specially sealed, maintenance-free type.
- I. Summary of Characteristics - The characteristics specified in this section are the minimal ones to be considered.
- J. Input to UPS:
 - 1. Nominal Voltage: 120 VAC + 20%, -30%, 1-phase, 3-wire, plus ground.
 - 2. Frequency: 60 Hz +3 Hz.
 - 3. Input Power Factor: Between .9 leading and .8 lagging at full loads and nominal input voltage.
 - 4. Input Current Distortion: Less than 5% at full load and nominal input voltage.
- K. Output to UPS:
 - 1. Voltage: 120 VAC, 1-phase, 3-wire, including ground.
 - 2. Voltage Regulation:
 - 3. +3% for all load conditions.
 - 4. Wave Form: Sine wave.
 - 5. Frequency: 60 Hz +0.1% Slew Rate: 1 Hz/sec, synchronized to input +0.5, +1.0, +2.0 or +3.0 Hz selectable.
 - 6. Harmonic Distortion: Maximum 5% RMS total harmonic distortion (THD) and maximum of any single harmonic of 3%.
 - 7. Audible Noise: 50 dBA at 1 meter.
 - 8. Efficiency: 95% AC to AC.
- L. Battery System:
 - 1. A sealed maintenance-free battery, full wired and enclosed in a matching cabinet shall be provided. Provide optional battery ½ pack for a total battery run time of 11 minutes at full load.

M. Equipment: Environment:

1. Temperature and Humidity: The UPS shall be capable of operating between +10°C and 40°C, with a relative humidity between 0 and 95%, non-condensing. The non-operating temperature range shall be between -20° and +60°C.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install inside instrumentation cubicle.

3.02 WARRANTY AND SERVICE REQUIREMENTS

- A. Manufacturer shall warrant the UPS to be free from defects in design, material and workmanship under normal use and service for a period of one (1) year from shipment.
- B. Manufacturer shall guarantee a maximum response time of 24 hours.

3.03 DEMONSTRATION

- A. Demonstrate proper operation of the uninterruptible power supply by simulating an outage.

3.04 INTERFACING WITH NEW CONTROL SYSTEMS

- A. Contractor shall provide power from the UPS receptacles to new UPS power terminal blocks located in the new and existing instrumentation and control cubicles. Label "UPS 120V control power".
- B. Contractor shall provide 120volt power feeds for the following electrical equipment.
 1. Programmable logic controller.
 2. Indicator recorders power supply.
 3. All communication equipment.

3.05 QUANTITY

- A. Quantity required: One (1). Install one at the new Treatment Building..

END OF SECTION 263353

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Communication Control System between Remote Plant Sites and Administration Building.

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

- A. Submit product data under provision of Section 013300.
- B. Submit installation instructions and operation and maintenance manuals after approval of shop drawing and prior to installation of equipment.
- C. Submit schematics and wiring diagrams for the new system and existing controls.
- D. Contractor shall submit shop drawings for the fiber optic/Ethernet network for engineer's approval.

PART 2 - PRODUCTS

2.01 COMMUNICATION SYSTEM INTEGRATION

- A. Contractor shall utilize existing broadband ethernet service at Plant No. 5 and at the Administration Building for communication of new CP with existing administration building including but not limited to incoming utility cabling and equipment, modem, and all associated accessories. Existing firewall VPN appliance shall be replaced with new as detailed in Contract Drawings and Specifications. Coordinate with Utility as required.
- B. Communication system shall be designed, tested and integrated by the single source instrumentation control system supplier.
- C. The contractor shall provide satisfactory evidence to the engineer that the instrumentation system supplier has demonstrable qualifications in performance of this kind of work with a minimum of five (5) years related experience to substantiate:
 - 1. That the instrumentation system supplier has been regularly engaged in providing similar services and equipment for a minimum of 5 years.
 - 2. That the instrumentation system supplier has provided installations of comparable scope and complexity, with references.
 - 3. That the instrumentation system supplier has a service center within 50 miles of the project location
 - 4. That the instrumentation supplier has an office within 50 miles of the project site complete with the following:
 - a. Spare parts including PLC's, power supplies, I/O cards and processors.
 - b. Office has a minimum of two (2) field technicians staffed full time at this office which provides 24-hour, 7 days a week service with a minimum response time of 2-hours.
 - c. Office has a minimum of two (2) PLC programmers staffed full time at this location.
 - d. Office has a minimum of two (2) electrical engineers staffed full time at this location experienced with SCADA systems, PLC's and knowledge of water supply system operations.
 - e. The District and District's engineer shall have the right to inspect office, spare part supply and meet and interview service technicians, PLC programmers and engineers as part of determining qualification of system integration.

- f. No shop drawing submittals shall be made, nor any equipment delivered or installed with respect to instrumentation or control prior to the contractor having obtained written approval of the instrumentation system supplier.
- g. The contractor shall bear full responsibility for the communication system. The contractor shall have the instrumentation system supplier:
 - 1) Design the communication system and monitoring system described in these specifications.
 - 2) Prepare shop drawings for submittal by the contractor to the engineer.
 - 3) Provide the necessary information or modifications to the shop drawings to obtain approval.
 - 4) Supervise the installation.
 - 5) Perform debugging, testing, maintenance and operation of all radio communications and dial-up back-up modem systems.
- h. The communications system supplier shall prepare for submission by the contractor, detailed point-to-point wiring diagrams. Engineering services shall be provided by the instrumentation system supplier during start-up and testing as required by other sections of the specification.
- i. The contractor shall require the instrumentation system supplier to verify all connections and operational features of all equipment controlled, directly or indirectly, by equipment furnished under this contract prior to submission of shop drawings, schematics shall show all remote connections and respective input/output terminals of all such equipment.
- j. The contractor shall have the instrumentation system supplier develop and provide details for installation of all field mounted communication equipment, transmitters, receivers, etc. per recommended practices of the equipment manufacturer and in a manner acceptable to the engineer. Such details shall include specific location, method of support and connection details, as a minimum.
- k. Qualified personnel of the communications system supplier shall be provided, as specified hereinafter, for the purpose of instructing the owner's personnel in the operation, maintenance and troubleshooting of all instrumentation systems and related equipment.
- l. It is the intent of this specification that all devices, insofar as practical shall be purchased from a single manufacturer to simplify maintenance and operation.

2.02 ETHERNET SWITCH

- A. Manufacturer: N-Tron Model 708TX or approved equal.
- B. Din Rail mount.
- C. Eight (8) 10/100 Base TX RJ-45 ports.
- D. ESD and surge protection diodes and all parts.

2.03 FIBER OPTIC ETHERNET SWITCH (FOES)

- A. Manufacturer shall be ADVANTECH Model EKI-7559SI/MI (8+2 SC Type Fiber Optic Managed Industrial Ethernet Switch with Wide Temperature).
- B. APPROVED EQUAL
- C. 8-port fiber optic to Ethernet converters shall have at a minimum the following parameters.
 - 1. Communications:
 - a. Standard: IEEE802.3, IEEE802.3u, IEEE802.3z, IEEE802.3x, IEEE802.3ad, IEEE802.1d, IEEE802.1w, IEEE802.1p, IEEE802.1Q, IEEE802.1x
 - b. LAN: 10/100Base-T(X), 100Base-FX

- c. Transmission Distance:
 - 1) Ethernet: Up to 100m
 - 2) Fiber (Multi-mode): up to 2 km (EKI-7559MI)
 - 3) Fiber (Single-mode): up to 30km (EKI-7559SI)
 - d. Transmission Speed: Up to 100 Mbps
 - 2. Interface:
 - a. Connectors:
 - 1) 8 x RJ-45 ports
 - 2) 2 x SC type fiber-optic connectors
 - b. LED Indicators:
 - 1) PWR, PWR1, PWR2, R.M., P-Fail. 10/100T(X): Link/Activity, Duplex/Collision
 - c. Console: RS-232 (RJ-45)
 - 3. Network Management:
 - a. Configuration:
 - 1) Web browser, Telnet, Serial console, TFTP, SNMPv1/v2c/v3, Port Speed/Duplex Configuration
 - b. Redundancy:
 - 1) Advantech X-Ring (Recovery time < 10ms at 30pcs full loading ring structure), Dual Homing, Couple Ring, 802.1w/D RSTP/STP
 - c. Security:
 - 1) IP Access security, port security, DHCP Server, Port and IP Binding, 802.1X Port Access Control
 - 4. Power:
 - a. Power Consumption: Max. 8.4W (EKI-7559MI/SI)
 - b. Power Input: 12-48 Vdc, redundant dual inputs
 - 5. Mechanism:
 - a. Mounting: DIN-rail, Wall
- D. Provide all required power supplies, RJ-45 and SC connectors, Cat 6 and Fiber Optic patch cords as required for a complete installation.

2.04 FIBER OPTIC PATCH PANELS

- A. Acceptable Manufacturers: Multilink, Corning or approved equal.
- B. Patch Panels shall be a high density wall mount fiber distribution unit designed to support patching and splicing in one unit. The unit shall have 9 adapter panel positions allowing for a wide variety of fiber termination connectors types and be equipped with a set of double lockable doors, maintaining separation and security for the Network and Distribution sides of the termination panels.
- C. Splice Capacity: 3 splice tray.
- D. Patch Capacity: 9 termination panel.
- E. Lockable network compartment door.
- F. Black color.
- G. Dimensions: 17" H x 21.2" W x 5.0" D.
- H. Material: 16 GA Powder Coated Steel.
- I. Provide terminations as required to terminate all fibers.

2.05 FIBER OPTIC CABLES

- A. Manufacturer: Belden Cable or approved equal
- B. Fiber Optic Cable:
- C. Heavy duty double jacketed cable, Loose Tube, Outdoor Rated
- D. Model No. M9B844 – To be used for all fiber optic cable runs.
- E. Fiber Type: 62.5 Micron Multimode
- F. Number of Fibers: 12
- G. Materials:
 - 1. Primary Coating Material: Acrylate
 - 2. Buffer Tube Filling Material: Synthetic Thixotropic Gel
 - 3. Buffer Tube Material: Polybutylene Terephthalate
- H. Type “SC” Connectors are to be provided installed and tested on all ends of fiber optic cable runs.
- I. All cables shall be tested and certified utilizing a Fluke Networks DTX Cable Analyzer with fiber modules.
- J. Results to be provided to engineer for final approval. Report in include results of: Loss (dB), Loss limit (dB), Loss Margin (dB) and reference (dBm) at both 850nm and 1300 nm for all fire strands.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install a communication network system including VPN appliances, network switches, wiring and accessories as shown on Contract Drawings. Interface with existing communication utility modem(s) and other equipment as required. Coordinate with communication utility as required.

3.02 FIBER OPTIC COMMUNICATIONS

- A. Install a communication network system including network switches, Fiber Optic Ethernet switches, Fiber Optic cable, ethernet cables, wiring and accessories.

3.03 MANUFACTURER'S FIELD SERVICE

- A. Provide operating instruction manuals which includes the following information:
 - 1. System specifications.
 - 2. Electrical power requirements.
 - 3. Application considerations.
 - 4. Assembly and installation procedures.
 - 5. Power up procedures.
 - 6. Troubleshooting procedures.
 - a. Provide two (2) eight (8) hour days of manufacturers operation and maintenance procedures for training District personnel. Training procedures shall include troubleshooting, adjustment, calibration and replacement procedures.

END OF SECTION 264010

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Communication system via broadband Ethernet service provider.
- B. SCADA system servers, workstations, and associated equipment.

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

- A. Submit product data under provision of Section 013300.
- B. Submit installation instructions and operation and maintenance manuals after approval of shop drawing and prior to installation of equipment.
- C. Submit schematics and wiring diagrams for the new system and existing controls.

PART 2 - PRODUCTS

2.01 COMMUNICATION SYSTEM INTEGRATION

- A. Communication system shall be designed, tested and integrated by the single source instrumentation control system supplier.
- B. The contractor shall provide satisfactory evidence to the engineer that the instrumentation system supplier has demonstrable qualifications in performance of this kind of work with a minimum of five (5) years related experience to substantiate:
 - 1. That the instrumentation system supplier has been regularly engaged in providing similar services and equipment for a minimum of 5 years.
 - 2. That the instrumentation system supplier has provided installations of comparable scope and complexity, with references.
 - 3. That the instrumentation system supplier has a service center within 50 miles of the project location
 - 4. That the instrumentation supplier has an office within 50 miles of the project site complete with the following:
 - a. Spare parts including PLC's, power supplies, I/O cards and processors.
 - b. Office has a minimum of two (2) field technicians staffed full time at this office which provides 24-hour, 7 days a week service with a minimum response time of 2-hours.
 - c. Office has a minimum of two (2) PLC programmers staffed full time at this location.
 - d. Office has a minimum of two (2) electrical engineers staffed full time at this location experienced with SCADA systems, PLC's and knowledge of water supply system operations.
 - e. The Water District and District's engineer shall have the right to inspect office, spare part supply and meet and interview service technicians, PLC programmers and engineers as part of determining qualification of system integration.
 - 5. No shop drawing submittals shall be made, nor any equipment delivered or installed with respect to instrumentation or control prior to the contractor having obtained written approval of the instrumentation system supplier.
 - 6. The contractor shall bear full responsibility for the telemetry system. The contractor shall have the instrumentation system supplier:
 - a. Design the communication system and monitoring system described in these specifications.

- b. Prepare shop drawings for submittal by the contractor to the engineer.
 - c. Provide the necessary information or modifications to the shop drawings to obtain approval.
 - d. Supervise the installation.
 - e. Perform debugging, testing, maintenance and operation of all communication systems.
7. The communications and modem system supplier shall prepare for submission by the contractor, detailed point-to-point wiring diagrams. Engineering services shall be provided by the instrumentation system supplier during start-up and testing as required by other sections of the specification.
8. The contractor shall require the instrumentation system supplier to verify all connections and operational features of all equipment controlled, directly or indirectly, by equipment furnished under this contract prior to submission of shop drawings, schematics shall show all remote connections and respective input/output terminals of all such equipment.
9. The contractor shall have the instrumentation system supplier develop and provide details for installation of all field mounted communication equipment, transmitters, receivers, etc. per recommended practices of the equipment manufacturer and in a manner acceptable to the engineer. Such details shall include specific location, method of support and connection details, as a minimum.
10. Qualified personnel of the communications system supplier shall provide training to the owner's personnel in the operation, maintenance and troubleshooting of all instrumentation systems and related equipment.
11. It is the intent of this specification that all devices, insofar as practical shall be purchased from a single manufacturer to simplify maintenance and operation.

2.02 EXISTING BROADBAND ETHERNET SERVICES

- A. Contractor shall coordinate with Cablevision as required to interface new SCADA equipment racks with existing broadband ethernet service at the Administration Building and Plant No. 5. Construction fees paid by Owner.

2.03 RACK MOUNTED UPS

- A. Manufacturer: APF Model SMT2200RM2U
- B. Quantity: Two (2).
 1. One (1) at Administration Building
 2. One (1) at Plant No. 5 Treatment Building
- C. Power Capacity: 1,980 W / 2,200 VA
- D. Battery Capacity: 5 minutes full load, 15 minutes at 1,000 W.
- E. Control Panel: LCD display with LED status indicators on battery alarm plus configurable delays.
- F. Surge Energy Rating: 480 Joules.
- G. UL 1778 rating.
- H. Warranty: Three (3) years electronics, two (2) years battery and \$150,000 lifetime EPP.

2.04 RACK MOUNTABLE VPN/FIREWALL

- A. Manufacturer: Sonicwall Model NSA 4650
- B. Quantity: Two (2).

1. One (1) - Administration Building.
2. One (1) - Plant No. 5 Treatment Building.

C. General

1. For use to create a secure tunnel between the Administration Building Primary SCADA Rack, Plant No. 5 Treatment Building Redundant SCADA Rack, and remote Plant sites.
2. The VPN/Firewall shall be a single hardware device capable of supporting the specified features below. The device shall be designed for protecting Ethernet networks from threats.
3. The VPN/Firewall shall perform stateful inspection of incoming data packets to verify communication meets the requirements configured within the firewall.
 - a. The firewall shall:
 - 1) Control network access for specific protocols and applications. The user shall be able to define custom network protocol identities
 - 2) Develop policy based firewall rules and routing
 - 3) Block data packets based on country of origin
 - b. VPN/Firewall networking shall include QoS functionality.
 - c. Remote access services shall include:
 - 1) SSL VPN server with the minimum requirements:
 - (a) Layer 3 tunneling
 - (b) AES-128, 192, and 256-bit encryption
 - (c) Windows (32 and 64-bit): Windows Vista, Windows 7, Windows 8, Windows 10
 - (d) X.509 v.3 Authentication standards
4. Firewall General:
 - a. Operating System: SonicOS 6.5.4
 - b. Interfaces:
 - 1) 2 x 10-GbE SFP+
 - 2) 4 x 2.5-GbE SFP
 - 3) 4 x 2.5-GbE
 - 4) 16 x 1-GbE
 - 5) 1 GbE Management
 - 6) 1 Console
 - c. Expansion: 1 Expansion Slot (Rear)
 - d. Built-in Storage (SSD): 32 GB
 - e. Management: CLI, SSH, Web UI, Capture Security Center, GMS, REST APIs
 - f. SSO users: 60,000
 - g. Maximum access points supported: 128
 - h. Logging: Analyzer, Local Log, Syslog
5. Physical Features
 - a. Modular 19" rack-mountable enclosure- no larger than 2U.
 - b. Enclosure: Metal Case
 - c. Fans: Dual, Removable
 - d. Power: 100-240VAC, 50/60Hz, redundant
 - e. Maximum Power Consumption: 93.6W
 - f. Operating temperature: 0 to 45 °C
 - g. Drives: 1HDD, 1 SD card minimum
6. VPN Features:
 - a. Site-to-site tunnels: 4,000
 - b. IPSec VPN Clients (max): 2,000 (4,000)
 - c. SSL VPN NetExtender clients (max): 2 (1,000)
 - d. Encryption/Authentication: DES, 3DES, AES (128, 192, 256-bit)/MD5, SHA-1, Suite B Cryptography
 - e. Key exchange: Diffe Hellman Groups 1, 2, 5, 14v

- f. Route-based VPN: RIP, OSPF, BGP
- 7. Networking Features:
 - a. IP Address Assignment: Static (DHCP, PPPoE, L2TP and PPTP client), Internal DHCP server, DHCP Relay
 - b. NAT Modes: 1:1, many:1, 1:many, flexible NAT (overlapping IPS), PAT, transparent mode
 - c. VLAN Interfaces: 400
 - d. Routing Protocols: BGP, OSPF, RIPv1/v2, static routes, policy-based routing
 - e. QoS: Bandwidth priority, max bandwidth, guaranteed bandwidth, DSCP marking, 802.1p
 - f. Authentication: LDAP (multiple domains), XAUTH/RADIUS, SSO, Novell, internal user database, Terminal Services, Citrix, Common Access Card (CAC)
 - g. VoIP: Full H323-v1-5, SIP
 - h. Standards: TCP/IP, ICMP, HTTP, HTTPS, IPSec, ISAKMP/IKE, SNMP, DHCP, PPPoE, L2TP, PPTP, RADIUS, IEEE 802.3
- 8. Firewall/VPN Performance:
 - a. Firewall throughput: 6 Gbps
 - b. IPS throughput: 2.3 Gbps
 - c. Anti-malware throughput: 2.45 Gbps
 - d. Threat Prevention throughput: 2.5 Gbps
 - e. Application inspection throughput: 3.0 Gbps
 - f. TLS/SSL decryption and inspection throughput (DPI SSL): 675 Mbps
 - g. VPN throughput: 3.0 Gbps
 - h. Maximum Connections (SPI): 3,000,000
 - i. Maximum Connections (DPI): 1,000,000
 - j. Default/Maximum Connections (DPI SSL): 175,000/145,000
 - k. New connections/sec: 40,000/sec
- 9. Software
 - a. Provide VPN client software as manufactured by Dell Sonicwall VPN clients for server rack.

2.05 MANAGED RACK MOUNTED ETHERNET SWITCH

- A. Manufacturer: Netgear Model FS728TP
- B. Quantity: Two (2).
 - 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. General
 - 1. Provide a managed Smart Ethernet switch for connection to the network.
 - 2. Physical Features
 - a. Minimum copper ports: 24 - 10/100 TX RJ45 ports
 - b. Gigabit Ports: 2
 - c. SFP Ports: 2 Combo
 - d. PoE Ports: 12
 - e. Buffer Size: 1MB
 - f. Operating temperature: 0 to 130 °F
 - g. Enclosure: Metal case, DIN-rail mountable
 - h. Rating: UL Class 1, Division 2 Groups A, B, C, and D
 - 3. Network Features
 - a. Auto sensing duplex and speed
 - b. LED link/activity status indication

2.06 19" FREESTANDING COMMUNICATIONS ENCLOSURE RACK

- A. Manufacturer: APC Model AR 3150 for Dell mounted equipment.
- B. Quantity: Two (2).
 - 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. General:
 - 1. The 19" network rack shall be enclosed on all four sides with door access in the front and rear and removable panels on each side. The contractor shall furnish and install any and all appurtenances required for a fully functional network rack. The network rack shall have a 42U capacity.
 - 2. Features/Performance:
 - a. Network rack shall be furnished with the following appurtenances:
 - 1) Roof fans and tray.
 - 2) Lock and key door switch.
 - 3) Mounting rail brush strip(s).
 - 4) Cable ring set(s).
 - 5) Cable management rings (s).
 - 6) Horizontal cable organizer.
 - 7) Provide all mounting hardware and shelving as required.
 - 8) Caster wheels.
 - b. Contractor shall coordinate the location of all devices in the rack with the Owner/Engineer at the time of installation.
 - c. Furnish and install a power distribution unit (PDU) in the network rack, APC model AP9562. The PDU shall be fed from a dedicated 15A raw power feeder (not on UPS) and shall be provided for miscellaneous equipment for which UPS power is not required.
 - d. Furnish and install a protected uninterruptible power supply (UPS) power distribution unit (PDU) in the network rack. The PDU shall be fed from a dedicated 20A UPS power and shall be provided for all computer and networking equipment located in the server rack. This PDU shall be fed from the UPS mounted in the rack enclosure.

2.07 RACK MOUNTED NAS

- A. Manufacturer: Synology Model RackStation RS819
- B. Quantity: Two (2).
 - 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. Hardware:
 - 1. Quad Core CPU.
 - 2. RAM: 2 GB
 - 3. SATA Drives:
 - a. Type: 4x3.5" or 2.5" SATA
 - b. Capacity: 32 TB
 - 4. Hot Swappable Drive - Yes
 - 5. External Ports:
 - a. 2 x USB 3.0 Port
 - b. 1 x eSATA Port
 - 6. LAN: 2 x Gigabit (RJ-45)
 - 7. System Fans: 3 (40 x 40 x 20mm)

8. AC Input Power Voltage: 100VAC to 240VAC
9. AC Input Power Frequency: 50/60Hz, single phase
10. Operating Temperature: 5 degrees C to 35 degrees C
11. Relative Humidity: 5% to 95% RH

D. General DSM:

1. Networking Protocol: SMB, AFP, NFS, FTP, WebDAV, CalDAV, iSCSI, Telnet, SSH, SNMP, VPN (PPTP, OpenVPN™, L2TP)
2. File System:
 - a. Internal: Btrfs, ext4
 - b. External: Btrfs, ext4, ext3, FAT, NTFS, HFS+, exFAT
3. Supported RAID Type: Synology Hybrid RAID (SHR), Basic, JBOD, RAID 0, RAID 1, RAID 5, RAID 6, RAID 10
4. Storage Management:
 - a. Maximum single volume size: 108TB
 - b. Maximum system snapshots: 4,096
 - c. Maximum internal volume: 64
5. File Sharing Capability:
 - a. Maximum local user account: 2,048
 - b. Maximum local group: 256
 - c. Maximum shared folder: 256
 - d. Maximum concurrent SMB/NFS/AFP/FTP connection: 200
6. Privilege:
 - a. Windows Access Control List (ACL), application privilege
7. Directory Service:
 - a. Windows® AD integration: Domain users login via SMB/NFS/AFP/FTP/File Station, LDAP integration
8. Security:
 - a. Firewall, encryption shared folder, SMB encryption, FTP over SSL/TLS, SFTP, rsync over SSH, login auto block, Let's Encrypt support, HTTPS (customizable cipher suite)
9. Supported Client:
 - a. Windows 7 onwards, Mac OS X® 10.11 onwards
10. Supported Browser:
 - a. Chrome®, Firefox®, Edge®, Internet Explorer® 10 onwards, Safari® 10 onwards; Safari (iOS 10 onwards), Chrome (Android™ 6.0 onwards) on tablets

2.08 RACK MOUNTED CONSOLE KVM

- A. Manufacturer: Tripp Lite Model B020-U08-19KTAA.
- B. Quantity: Two (2).
 1. One (1) at Administration Building
 2. One (1) at Plant No. 5 Treatment Building
- C. 19" LCD Screen.
- D. Video Resolution: 1280 x 1024
- E. Eight (8) Switchable Ports with on console push buttons.
- F. Flip up/Flip down design.
- G. Hot pluggable.
- H. Multi-level password security for four (4) years.

2.09 RACK MOUNTED FAULT TOLERANT SCADA SERVER

- A. Manufacturer: Dell Model PowerEdge R340
- B. Quantity: Two (2).
 - 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. Provide a resilient, fault-tolerant server with replicated and monitored lock-step hardware in the SCADA Rack. This Fault Tolerant Server shall provide 99.999% uptime. The manufacturer shall be capable of 24/7 monitoring of the health of the server components via the internet.
- D. Server configured for installation in rack environment occupying 1U of rack space.
- E. Capability to run a minimum of three virtual machines.
- F. Processor: Quad-Core Intel® Xeon® Processor, 1.8 GHZ or greater, minimum of 10 MB L2 cache on each chip die per customer replaceable unit (CRU).
- G. RAM: 64 GB, 4 x DDR4 DIMM slots, up to 2666MT/s, Supports registered ECC.
- H. Storage Controllers:
 - 1. Internal controllers: PERC H730P, H330, HBA330 (non-RAID)
 - 2. Software RAID: PERC S140
 - 3. External HBAs: 12Gbps SAS HBA (non-RAID)
 - 4. Boot Optimized Storage Subsystem: 2x M.2 240GB (RAID 1 or No RAID), 1x M.2 240GB (No RAID only)
- I. Drive Bays:
 - 1. Up to 8 x 2.5 hot-plug SATA, SAS (optional) or SSD
 - 2. Up to 4 x 3.5 hot-plug SATA, SAS (optional) or SSD
- J. Power Supplies: Dual 550W (Platinum) hot-plug redundant power supplies
- K. Embedded Management:
 - 1. iDRAC9 with Lifecycle Controller
 - 2. iDRAC Direct
 - 3. iDRAC RESTful API with Redfish
- L. Security:
 - 1. TPM 1.2/2.0
 - 2. Cryptographically signed firmware
 - 3. Silicon Root of Trust
 - 4. Secure Boot
 - 5. System Lockdown
 - 6. System Erase
- M. I/O & Ports:
 - 1. Networking Options:
 - a. 2 x 1GbE LOM Network Interface Controller (NIC) ports
 - 2. Front Ports:
 - a. 1x USB 2.0, 1 x iDRAC micro USB 2.0 management port
 - 3. Rear Ports:
 - a. 2 x USB 3.0, VGA, serial connector
 - 4. PCIe Gen 3.0 Slots:

- a. One x8 slot low-profile, half-length with x4 slot width
 - b. One x16 slot low-profile/full-height, half-length with x8 bandwidth
- N. Supported Operating Systems:
- 1. Certify XenServer
 - 2. Citrix® XenServer®
 - 3. Microsoft Windows Server® with Hyper-V
 - 4. Red Hat® Enterprise Linux
 - 5. Ubuntu Server
 - 6. SUSE® Linux Enterprise Server
 - 7. VMware® ESXi

2.10 WORKSTATION

- A. Manufacturer: Dell T3600
- B. Quantity: Two (2).
- 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. Workstations shall be set-up to run OIT development and client applications, PLC & OIT development software, and Reporting & Analysis software depending on their use as shown on the drawings.
- D. Tower workstation form factor:
- 1. 1 Intel Quad-Core processor, 3.0 GHz or greater, minimum of 8 MB L3 cache on chip die, 1333 MHz front side bus minimum.
 - 2. 16 GB of RAM, 1600 MHz speed minimum, 2 DIMMS maximum.
 - 3. Media Drives:
 - a. DVD ± Dual-layer Drive with both Read and Write Capability.
 - b. Expansion slots:
 - 1) Two Full Height PCI slots.
 - 2) One Full Height PCI Express slot.
 - c. Internal Disk:
 - 1) 300 GB of usable storage minimum, consisting of one 300 GB SATA, 10,000 RPM hard drive.
 - d. Video graphics capable of 1920 x 1200 pixels, 70 Hz refresh rate and 32-bit true color minimum. VGA, DVI, and HDMI outputs. 512MB of dedicated video RAM minimum. Card must be dual monitor capable.
 - e. I/O Ports & Devices:
 - 1) Minimum of four USB 2.0 ports
 - f. Interface Devices:
 - 1) Generic USB 104 key (Windows) keyboard, no hot keys onboard.
 - 2) Two button USB optical mouse with scroll wheel.
 - 3) Stand Mount Monitor: Dell Model U2720Q
 - (a) Resolution: 3840 x 2160
 - (b) Device Type: LED Backlight Technology
 - (c) Panel Type: IPS
 - (d) Brightness: 350 cd/m2
 - (e) Response Time:
 - (1) 5ms gray to gray in Fast mode
 - (2) 8ms gray to gray in Normal mode
 - (f) Input Connectors: DP 1.4, HDMI 2.0, USB Type-C
 - (g) Aspect Ratio: 16:9
 - (h) Display Position Adjustments: Tilt, Swivel, Pivot

- (i) Dimensions with stand (WxDxH): 24.07 in x 7.28 in x 20.68 in
- (j) Compliant Standards:
 - (1) ENERGY STAR Certified Monitor
 - (2) EPEAT registered where applicable
 - (3) RoHS Compliant
 - (4) TCO certified
 - (5) BFR/PVC Free (Halogen-free) (excluding external cables)
 - (6) Meets NFPA 99 leakage current requirements
 - (7) Arsenic-Free glass and Mercury-Free for the panel only
- g. Networking:
 - 1) Two network cards in addition to any on-board network interface.
 - 2) All network interfaces shall have the following features:
 - (a) Support for latest Microsoft operating system.
 - (b) Gigabit Ethernet port, copper connection accepting standard CAT-5 cables for Ethernet communications.
 - (c) IEEE 802.3ab support for gigabit networking standard.
 - (d) IEEE 802.Q VLAN support.
 - (e) Auto sensing 10/100/1000 Mbps.
 - (f) SNMP manageable.
- h. Power supplies shall operate from 120VAC.
- i. Operating System:
 - 1) Latest release of 64-bit Windows 7 Ultimate, currently Windows 7 Ultimate SP1.
- j. Backup Software:
 - 1) Backup software is required above the default Microsoft Windows Backup utility included with the operating system. The backup software shall have the following features:
 - (a) Support the Windows operating system installed on server.
 - (b) Perform full system backups including all open files, system state and open database files without the need to stop any services or applications running on the server.
 - (c) Full restore of server from bare metal state.
 - (d) Restore individual files from tape to original locations or to alternative locations on the server.
 - (e) Backup job scheduler capable of supporting multiple schedules for full, incremental and partial backup jobs.
 - (f) Backup software shall keep a log file of the status of all backup and restore activities.
 - (g) Log file shall easily export to a text file.
 - (h) Provide Acronis or Symantec back-up software or equal.
- k. Other Software:
 - 1) Microsoft Office Professional 2013 shall include the following programs at a minimum:
 - (a) Microsoft Excel.
 - (b) Microsoft Word.
 - (c) Microsoft Access.
 - (d) Microsoft PowerPoint.
 - (e) Virus scan and protection software either McAfee Virus Scan Enterprise or Symantec Norton AntiVirus Business Pack (Latest Edition).
 - (f) Additional software required by the software installation matrix at the end of this Section.

2.11 43" WALL MOUNT MONITOR

- A. Manufacturer: Dell Model U4320Q.

- B. Quantity: Two (2).
 - 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. Input Connectors:
 - 1. 1 x DP 1.4 (HDCP 2.2)
 - 2. 2 x HDMI 2.0
 - 3. 1 x USB Type-C (Alternate Mode with Display Port 1.4, USB, 3.1 Upstream Port, Power Delivery upto 90W)
 - 4. 1 x Analog 2.0 Audio Line out (3.5 mm Jack)
 - 5. 2 x USB A , USB 3.1 Gen 1 (5 Gbps)
 - 6. 1 x USB 3.1 with B.C charging Adaptability of 2 A (Max)
 - 7. 1 x USB Type-C Downstream(15W), USB 3.1 Gen 1 (5 Mbps)
- D. Resolution: 3840x2160 at 60 Hz.
- E. Aspect Ration: 16:9.
- F. Color: Support 1.06 billion colors.
- G. Backlight Technology: LED light bar system.
- H. Screen Coating: Antiglare with hard coating 3H, 2% haze.
- I. Provide wall mount brackets and hardware. Monitor shall have VESA mount.
- J. Provide all HDMI cables to connect one (1) PC workstation per monitor.

2.12 LAPTOP COMPUTER

- A. Manufacturer: Dell Precision 15 7000 Series (7510).
- B. Quantity: Two (2).
- C. Processor: Intel Core I7-6820HQ (Quad Core 2.7 GHz, 3.6 GHz Turbo, 8 MB 45 W, with Intel HD Graphics 530).
- D. Operating System: Windows 7 Professional.
- E. Memory: 16 GB (2x8 GB) 2133 MHz DDR4 SDRAM Non-ECC.
- F. Hard Drive: 1 TB, 2.5 inch 7200 RPM SATA hard drive.
- G. Graphics Card: NVidia Quadro M1000M with 2 GB GDDR5.
- H. Display: 15.6" FHD (1920x1080) anti-glare, backlit.
- I. Battery Life: 13 hours with 91 Whr battery.
- J. Warranty: 3 years.
- K. Ports: Four (4) USB with PowerShare, One (1) Thunderbolt.

2.13 COLOR PRINTER

- A. Manufacturer: Dell Color Cloud Multifunction Printer (H825cdw).
- B. Quantity: Two (2).
 - 1. One (1) at Administration Building
 - 2. One (1) at Plant No. 5 Treatment Building
- C. Function: Print, copy, scan, fax.
- D. Print Speed: Simplex 600x600, 30 PPM mono and 30 PPM color.
- E. Resolution:
 - 1. Default: 300 dpi x 300 dpi
 - 2. High Resolution: 600 dpi x 600 dpi
 - 3. User Interface: 4.3" color touch screen.
 - 4. Processor Speed: 525 MHz.
 - 5. Memory: 1 GB RAM.
 - 6. Connectivity: VSB 2.0, client port, USB 2.0 host port, ethernet port, NFC, wireless 802.11, WIFI direct, WPS 2.0, WPA 2.0 (personal and enterprise).

2.14 SCADA SOFTWARE

- A. Allen Bradley Factory Talk for all servers, workstations, and GUI's. Provide all licensed copies in the name of the Village.
- B. Alarm Software: WIN-911 Enterprise (latest version). Install on all servers and workstations. Provide all licensed copies in the name of the Village.
- C. Allen Bradley Factory Talk ViewPoint for two (2) smart phones and three (3) tablets. Install and configure Sonicwall app for two (2) smart phones and three (3) tablets. Provide all licensed copies in the name of the Village.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install one (1) new primary SCADA server rack at Administration building and interface all existing remote plant PLCs with new primary SCADA server rack. Provide all connectivity cabling and programming required.
- B. Install one (1) new redundant SCADA server rack at Plant No. 5 Treatment Building. Redundant SCADA rack shall be configured and interfaced with primary SCADA server rack such that in the event that the primary SCADA server rack is offline for any reason, the redundant SCADA server rack will handle all SCADA system operations.
- C. Install all rack mounted servers and equipment at the Administration Building and at Plant No. 5 Treatment Building. Provide all power and connectivity cabling.
- D. Install a communication network system including cable modems, network switches, VPN Appliances, network attached storage, UPS, surge protectors, wiring and accessories.
- E. All devices (Servers, PLCs, Modems, VPN, Ethernet and Switches) on both ends and in between shall be programmed and configured to communicate via the communication network.

- F. Install new printer cable at each location to connect printer to workstation, coordinate exact location in field. Provide all connectivity cabling.
- G. Install one (1) new work station at Administration Building and one (1) new workstation at Plant No. 5 Treatment Building including all connectivity cabling.
- H. Provide two (2) 20 amp 120 volt circuit backed up by generator/ATS for new server rack at each location.
- I. Install new 43" monitor at Administration Building and Plant No. 5 Treatment Building, provide wall bracket, HDMI cable and new receptacle circuit feeding workstation.

3.02 MANUFACTURER'S FIELD SERVICE

- A. Provide operating instruction manuals which includes the following information:
 - 1. System specifications.
 - 2. Electrical power requirements.
 - 3. Application considerations.
 - 4. Assembly and installation procedures.
 - 5. Power up procedures.
 - 6. Troubleshooting procedures.

END OF SECTION 264011

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Interior and exterior luminaires and accessories.
- B. Emergency lighting and units.

1.02 REFERENCES

- A. NEMA WD 6 - Wiring Devices - Dimensional Requirements.
- B. NFPA 70 - National Electric Code.
- C. NFPA 101 - Life Safety Code.
- D. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
- E. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, performance data and installation instructions.
- D. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.
- E. All foot candle calculations and photometrics must be provided with substitute products. Photometrics shall include a room by room analysis showing walls, room names and room numbers. Calculation points shall be 2 feet on center, measured at 30" above the floor. Maintained foot candle levels shall meet or exceed those listed in Section 2.03B of this specification. On each drawing, provide a table showing the Room Name, Room Number, Maximum Light Level, Minimum Light Level, Average Light Level, Min:Max Ratio and, IES File Model Number.
- F. All substitute LED light fixtures and LED retrofit lighting kits must be Design Lights Consortium (DLC) qualified.
- G. All substitute LED replacement lamps must be listed by Energy Star as Certified Light Bulbs.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.05 EXTRA PRODUCTS

- A. Section 017800 - Closeout Submittals.

- B. LED Fixtures: At completion of installation, deliver to Owner.
 - 1. Four (4) additional fixtures for each type specified listed on the light fixture schedule.

PART 2 - PRODUCTS

2.01 LIGHTING UNITS

- A. Refer to lighting fixture schedule on drawings for fixture manufacturer, catalog number, and fixture description.
- B. Provide electronic energy saving ballasts. Where dimming is shown on drawings, provide dimmable type ballasts.
- C. All fixtures equipped with emergency battery packs shall have test light and switch accessible and visible from the room floor.

2.02 LIGHTING FIXTURE NOTES

- A. MOUNTING: Electrical Contractor is responsible for reviewing all mounting arrangements prior to ordering any products. Electrical Contractor is responsible for ordering all of the proper fixtures, mounting hardware and miscellaneous fasteners to complete project. Fixtures to be secured to the structure from a minimum of two points, at opposing ends of the fixture when ceiling recessed or surface mounted. Four points shall be secured where necessary for the fixture to be parallel and tight to underside of ceiling. All recessed fixtures to fit tight to ceiling to eliminate all light leaks. Trim kits, when not secured internally to fixture, shall be secured to structure at a minimum of two points.
- B. MOUNTING: Prior to submitting and ordering any light fixture, Contractor is responsible for verifying adequate mounting clearances for all light fixtures that are to be recessed into a grid type ceiling. Where new ceilings are to be installed, contractor shall coordinate with ceiling installers for exact mounting heights and required mounting spaces.
- C. FINISHES: All exposed portions (permanent or adjustable) of fixtures to be finished by the manufacturer in a finish as specified.
- D. Fixtures shall come pre-assembled and complete with all sockets (incandescent to be spring supported), lamp ends, ballasts, transformers, fixture ends, trim rings, plates, and low density mounting kits (as required) for a complete installation.
- E. LAMPS: Sylvania, Phillips or General Electric, as selected by the Electrical Contractor. Note, all lamps for one project to be furnished by the same manufacturer unless otherwise specified. At the end of the project, the Electrical Contractor shall turn over to the Owner one lamp envelope from each type installed. The Contractor shall be responsible for replacing all lamps which burn out during construction and up to ninety (90) days after Owner occupancy of the building.
- F. VOLTAGE: As noted on the lighting fixture schedule. Contractor is responsible for field verifying available voltage(s) and ordering fixtures, ballasts, and transformers accordingly.
- G. ORDERING: It is solely the responsibility of the Contractor to order fixtures, lamps, mounting brackets and accessories so that the fixtures will be installed and operating upon Owner Occupancy opening. Contractor is responsible for all delays because of his/her lack of effort to order the products in a timely manner.

- H. SHIPPING: The light fixture manufacturer shall mark the fixture type as indicated on the contract drawings and/or shop drawings on the respective carton when shipping luminaries. The Contractor shall be responsible for checking each carton immediately upon receipt for verification that fixtures are undamaged and no contents are missing. All discrepancies must be reported to shipper and manufacturer immediately; otherwise the Contractor shall be responsible for items which are lacking or damaged.

2.03 WARRANTY

- A. All light fixtures shall have a 5-year manufacturer's warranty. Warranty shall begin on date of substantial completion.

2.04 SUBSTITUTIONS

- A. ADD STANDARD LIGHT LEVELS IF NEEDED.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install fixtures in accordance with manufacturer's instructions.
- B. Mount fixtures in locations as shown on drawings and as called for in schedule on electrical drawings. Determine type of ceiling to be installed in each space from drawings and schedules and furnish fixtures suitable for the exact type.
- C. Joints in fixture wiring shall be made using wire nuts, pre-insulated Scotch locks, or other approved mechanical means of connection.
- D. Adjustable type fixtures shall be adjusted by the Contractor to illuminate intended area to satisfaction of the Engineer.
- E. Surface fixtures in or on plastered or drywall ceilings shall be supported from pieces of support channel spanning across main support channels and shall not depend on ceilings for support.
- F. Coordinate fixture locations to clear diffusers, ductwork, piping, etc.
- G. Maintain integrity of enclosures on all enclosed and gasketed fixtures. Minimize number of enclosure penetrations and make such penetrations water and dust tight with appropriate gasketing and fittings.
- H. Fixtures are to fit tight against construction to eliminate light leaks.
- I. Recessed downlights are to be provided with adjustable mounting bars/frames for drywall or lay-in ceilings as required. Fixtures shall be securely fastened to the ceiling framing member by mechanical means such as bolts, screws, rivets, or listed clips identified for use with the type of ceiling framing members and fixtures.
- J. Support recessed fixtures 2 foot x 2 foot and larger using a minimum of four independent wire hangers, one on each corner, of same gauge as ceiling suspension system supported from building structure independent of ceiling framing. Install earthquake clips to secure recessed grid-suspended luminaries in place.
- K. Wall-mounted fixtures shall be mounted plumb with building lines and installed with proper box and cover hardware.

- L. Surface-mounted fixtures are to cover mounting hardware. Use a canopy that is no longer than the length and width of the fixture and at a height that is no higher than required to mount the fixture absolutely vertical. Fixtures shall be plumb and shall align with building lines and with each other. Support surface mounted luminaires on grid ceiling directly from building structure. Secure to prevent movement.
- M. Stem-mounted fixtures are to be mounted to be absolutely vertical or horizontal. Install suspended luminaires using pendants supported from swivel hangers or in accordance with details shown in drawings. Provide pendant length required to suspend luminaire at indicated height. Support stem-mounted fixtures directly from the building structure.
- N. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings, recessed luminaires must carry one-hour UL fire rating classification.
- O. Install all accessories specified with each fixture. Install recessed luminaires to permit removal from below.
- P. Bond products and metal accessories to branch circuit equipment grounding conductor.
- Q. At completion of installation and before turning over to owner, clean and remove all dirt and smudges from all lighting fixtures including lenses, louvers and reflectors.
- R. Relamp luminaires that have failed at completion of project.

END OF SECTION 265000

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Programmable logic controllers.
- B. Input/output hardware.
- C. Programmer/programming requirements.

1.02 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
- C. NEMA ICS 3 - Industrial Systems.
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Submit shop drawings indicating layout of completed assemblies, interconnecting cabling, dimensions, weights, external power requirements and a complete I/O list of control points.
- C. Submit wiring and schematics diagrams for the new PLC's and existing controls.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience, which maintains service facilities within 50 miles of project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. ALLEN BRADLEY Model CompactLogix with 5380 Controller.
- B. Approved equal.

2.02 PROGRAMMABLE LOGIC CONTROLLER HARDWARE CHARACTERISTICS

- A. The Programmable Controller shall have downward compatibility whereby all new module designs can be interchanged with all similar modules in an effort to reduce obsolescence.
- B. The Controller shall have the capability of addressing up to 960 local discrete points or 240 local analog points. The digital calculations is based upon 32 points per module * 30 local modules (maximum for CompactLogix). The analog calculations is based upon 8 channels per module * 30 local modules (maximum for CompactLogix).
- C. The 30 maximum local I/O modules can be installed in up to 3 local I/O banks. Each bank will be a seamless extension to the local bank but will be electrically isolated from the other banks.

- D. The Programmable controller shall have the ability to be updated electronically to interface with new modules.
- E. All hardware of the Programmable Controller shall operate at an ambient temperature of 0 to 60 degrees C (32 to 140 degrees F), with an ambient temperature rating for storage of -40 to +85 degrees C (-40 to +185 degrees F).
- F. The Programmable Controller hardware shall function continuously in the relative humidity range of 5% to 95% with no condensation.
- G. The Programmable Controller shall have the ability to communicate with multiple distributed I/O racks or devices configured with multiple I/O modules. CIP Networks that allow distributed I/O ControlNet, EtherNet/IP, and DeviceNet.
- H. Connections can be made to other remote CompactLogix inputs and outputs over Devicenet.
- I. Connections can be made to other remote Point inputs and outputs bridging through Devicenet, EtherNet/IP, or ControlNet.
- J. Connections can be made to remote Flex inputs and outputs over Devicenet, ControlNet or EtherNet/IP. Each Flex I/O input and output module shall be mechanically joined to form an assembly. These assemblies with their respective modules shall contain up to 256 (8 modules x 32pts/module) unique points.
- K. Connections can be made to remote ControlLogix inputs and outputs over Devicenet, ControlNet or EtherNet/IP. For remote ControlLogix I/O, each input and output module shall be mechanically joined in a Chassis to form a bank. These banks with their respective modules shall contain up to 512 (16 modules x 32pts/module, using a 17 slot chassis) unique points.
- L. Real Time Produced/Consumed Connections can made and data seamless exchanged between multiple CompactLogix Controllers or CompactLogix controllers and any other Logix based controller.
- M. The Programmable Controller shall use multiple independent, asynchronous scans. These concurrent scans shall be designated for processing of input and output information, program logic, and background processing of other processor functions. Input and output devices located in the same backplane (local I/O) as the CPU will be produced at the rate of configured RPI (Requested Packet Interval).
- N. It shall be possible to communicate with distributed I/O racks or other PLCs via fiber optic cable by inserting fiber optic converters into the links. The fiber link must support distances between converters up to 6500 cable feet on "RIO" or 12 KM on ControlNet. Redundant fiber optic cabling shall be an option.
- O. The Programmable Controller shall have the ability to support multiple data communications links by using ControlNet, DeviceNet, Ethernet, and DH-485 networks.
- P. The Programmable Controller shall have at least one dedicated serial port, which supports RS-232-C signals. It shall be accessible in control logic and provide support for DF1 Master, DF1 Point to point, DF1 Slave and DH-485 communication protocols. Alternatively, it must be usable for programming and data monitoring purposes. The serial port will also provide support for ASCII communications.

2.03 MEMORY CHARACTERISTICS

- A. The program storage medium shall be of a battery backed RAM.

- B. Memory shall contain battery back-up capable of retaining all stored program data through a power failure. A low battery condition must be detectable in ladder logic, but shall not automatically generate a major fault. A low battery condition will generate a minor fault and will be detectable in ladder logic and will be indicated on a diagnostic indicator mounted on the front of the controller.
- C. The controllers shall provide the capability to use CompactFlash as nonvolatile memory storage. The CompactFlash card shall be available from the supplier as an industrial rated device suitable for use in the same environment as the controller. The CompactFlash shall support a Windows file system allowing multiple files to be stored on the card. The user can manually trigger the controller to save or load from CompactFlash and also configure the controller to load from CompactFlash on power up or when an issue is detected with the data in RAM. Additionally when memory is restored a user selectable option to be restored in Run mode or Program mode shall be provided.
- D. The operator should be able to backup volatile memory, including data, and program logic onto a CompactFlash storage device. In addition, the controllers current firmware should also be stored on the CompactFlash card.
- E. All user memory in the processor not used for program storage shall be allocable from main memory for the purpose of data storage. The Programmable Controller system shall be capable of storing 3 data types:
 - 1. Predefined.
 - 2. User-defined.
 - 3. Module-defined
- F. If contacts or entire rungs are intentionally deleted from an existing logic program, the remaining program shall be automatically repositioned to fill this void. Whenever contacts or entire rungs are intentionally inserted into an existing program, the original program shall automatically be repositioned to accommodate the enlarged program. All rung comments shall maintain their original links.
- G. It shall be possible to program application logic more than once into memory.
- H. The number of times a normally open (N.O.) and/or normally closed (N.C.) contact of an internal output can be programmed shall be limited only by the memory capacity to store these instructions.
- I. The number of times a timer or counter can be programmed shall be limited only by the memory capacity to store these instructions.
- J. Control logic programs shall have immediate access to the subelements of control structures by address and subelement mnemonic, such as timer accumulator value, timer done bit, or PID Process Variable value.
- K. Data in the controller should be user defined and tag based and not restricted to any fixed data register format.

2.04 INPUT/OUTPUT (I/O)

- A. Refer to Appendix A - PLC Inputs/Outputs at the end of this section.

2.05 SPECIFIC FUNCTION CHARACTERISTICS

- A. Program timers shall be available in both on-delay and off-delay with a time base selection of 0.01 seconds, and timer range from 0.01 to 327.67 seconds. Additional time bases and longer timing intervals can also be supported.
- B. Counters shall be available in both count up and count down with a range of -32,768 to 32,767.
- C. Sequencers shall have a minimum capacity of 16 bits by 100 steps and be cascadable, time-driven or event-driven.
- D. Shift registers shall be available with a minimum of 16 bit groups and be cascadable, time-driven or event-driven.

2.06 POWER SOURCE

- A. The PLC's power supply shall accept AC power of 85-132 volts at 60 Hz. It shall be capable of withstanding a power loss for a minimum of 20 milliseconds while still remaining in operation.
- B. Input power requirements for AC input power shall not exceed 180 VA.
- C. On AC powered PLC system with DC inputs, 200 mA at 24 VDC should be available to the user to power external 24 volt drives.

2.07 PROGRAMMABLE LOGIC CONTROLLER (CPU) HARDWARE

- A. The CPU shall be a self-contained unit, and will provide control program execution and support remote or local programming. This device will also supply I/O scanning and inter-processor and peripheral communication functions.
- B. The user program and data shall be contained in battery backed memory. The operating system firmware shall be contained in non-volatile memory.
- C. The operating system firmware can be updated via a separate update tool to allow for easy field updates. CompactLogix controllers that support CompactFlash shall allow the operating system to be updated using a suitably configured CompactFlash card.
- D. The controller memory should be 1.5MB.
- E. The CPU within the system shall perform internal diagnostic checking and give visual indication to the user by illuminating a "green" (OK) indicator when no fault is detected and a "red" (OK) indicator (Blinking or Solid) when a fault is detected.
- F. The front panel on the Controller shall include color indicators showing the following status information:
 - 1. Program or Run mode of the controller.
 - 2. The fault status of the controller.
 - 3. I/O Status.
 - 4. RS-232 activity.
 - 5. Battery Status.
 - 6. Force LED.
- G. The front panel of the Controller shall include a mounted keyswitch. The key shall select the following Controller modes: RUN - No control logic edits possible, program always executing; PROGRAM - Programming allowed, program execution disabled; and REMOTE - Programming

terminal can make edits and change processor mode, including test mode, whereby the logic executes and inputs are monitored, but edits are not permanently active unless assembled

- H. The Controller shall include a holder and a connector for a lithium battery. The battery shall provide power backup for user programs and data when the main power supply is not available.
- I. The front panel of the Controller shall include at least one 9-pin D-shell serial RS232 port, which supports DF1, DH-485 (messaging only no programming) and ASCII protocols.
- J. All system modules, local and remote chassis shall be designed to provide for free airflow convection cooling. No internal fans or other means of cooling, except heat sinks, shall be required.
- K. The Controller shall include an integrated Real Time Clock (RTU). This clock value should be in a form of a predefined tag and should be accessible via logic or remotely.

2.08 POWER SUPPLIES

- A. The Programmable Controller shall operate in compliance with an electrical service of 85 to 132 VAC or 120 to 220 VAC, single phase, in the frequency range from 47 to 63 Hz, or 16-32 VDC or 19.2 to 32 VDC.
- B. The manufacturer shall be able to provide as standard equipment a system power supply capable of converting AC standard low voltage line power to the DC power required to operate the Programmable Controller system.
- C. A single main power supply shall have the capability of supplying power to the CPU and local input/output modules. Other power supplies shall provide power to remotely located racks.
- D. The power supply shall automatically shut down the Programmable Controller system whenever its output power is detected as exceeding 125% of its rated power.
- E. The power supply shall monitor the incoming line voltage for proper levels. When the power supply is wired to utilize AC input, the system shall function properly within the range of 85 to 265 VAC. When the power supply is wired to utilize DC input, the system shall function properly within the range of 19.2 to 32 VDC. In addition, the power supply shall provide surge protection, isolation, and outage carry-over up to 2 cycles of the AC line.
- F. Design features of the Programmable Controller power supply shall include a diagnostic indicator mounted in a position to be easily viewed by the user. This indicator shall provide the operator with the status of the DC power applied to the backplane. In addition, a means of disabling power to the CPU shall be possible from a power disconnect switch mounted in a position easily accessible by the operator.
- G. At the time of power-up, the power supply shall inhibit operation of the processor and I/O modules until the DC voltages of the backplane are within specifications.
- H. In addition to the electronic protection described above the power supply shall offer a failsafe fuse that is not accessible by the customer.
- I. Provide one (1) spare power supply to District.

2.09 PROGRAM STORAGE

- A. The program storage medium shall be of solid-state RAM (volatile) type.
- B. Memory capacity shall be sized to allow for future programming expansion of 30% minimum.

- C. Memory shall contain battery backup capable of retaining all stored program data through a continuous power outage of 12 months under worst case conditions. The capability shall exist to remove all batteries from the system without removing system power.

2.10 INPUT/OUTPUT - GENERAL

- A. During normal operation, a malfunction in any remote input/output channel shall affect the operation of only that channel and not the operation of the CPU or any other channel.
- B. Circuit components for both remote input and output shall be mounted on plug-in modules and keyed to prevent module insertion into the wrong slot.
- C. Isolation shall be used between all internal logic and external power circuits. This isolation shall meet the minimum specification of 1500 vrms.
- D. It shall be possible to replace any input or output module without disturbing field wiring.
- E. Each I/O module shall contain a visual indicator to display ON/OFF status of individual input or output points.
- F. Discrete output modules shall be provided with self-contained fuses for overload and short circuit protection of the module.
- G. All field wiring to I/O modules shall be through a heavy duty terminal strip. Pressure-type screw terminals shall be used to provide fast, secure wire connections. All input/output modules shall be color coded and titled with a distinctive label.

2.11 INPUT/OUTPUT MODULES

- A. The programmable controller shall utilize discrete input/output hardware consisting of the following as required of this project:
 - 1. Inputs (Isolated type):
 - a. AC/DC input for devices which operate at 120 VAC, 50/60 Hz or 120 VDC, 220 VAC, 50/60 Hz or 220 VDC.
 - b. Isolated AC input which provides isolation of 120 VAC or 120 VDC input signals.
 - 2. Outputs (Isolated type):
 - a. AC output for devices which operate at 120 VAC, 50/60 Hz.
 - b. Isolated AC output which provides six (6) isolated outputs capable of switching 120 VAC or 220 VAC power.
 - c. Contact output which provides four (4) normally open and four (4) normally closed reed relay outputs.
 - 3. Provide thirty two (32) spare input and sixteen (16) spare output I/O points as spare including all rack for each PLC furnished as part of this project.

2.12 ANALOG INPUT/OUTPUT MODULES

- A. Analog input which accepts analog signals and converts them to 3-digit BCD, 4-digit BCD or 14-bit binary values. Digital resolution shall be available in 1 part in 256, 1 part in 1,000 (BCD), or 1 part in 4,096 (binary). Analog inputs shall be available in single-ended and sourcing and differential and differential isolated versions. Analog inputs shall be available in the following ranges:
 - 1. Voltage range: +1 to +5 VDC.
 - 2. Current range: 4 to 20 mA.

- B. Analog output converts a 3-digit BCD number, a 4-digit BCD number, or a 12-bit binary number into an equivalent single-ended analog output signal. Output isolation shall be available. Analog outputs shall be available in the following ranges:
 - 1. Voltage range: +1 to +5 VDC.
 - 2. Current range: 4 to 20 mA.
- C. Provide eight (8) additional input and eight (8) additional output I/O points as spare including all racks for each PLC and remote I/O furnished as part of this project.

2.13 PLC SOFTWARE CHARACTERISTICS

- A. The PLC's memory shall consist of data table and program logic areas. The PLC shall examine the status of its inputs prior to every program scan and store the status in the "Input" data table area of its memory. The PLC shall update the "Output" data table area of its memory during every program scan, and then set the real world outputs accordingly. The updating of inputs, program logic and outputs should be repeated continuously while the PLC is in the run mode. The user application program shall be stored in the program logic area of memory as a ladder diagram. The status of a group of inputs and/or outputs controlling an output or outputs shall be called a ladder diagram rung. The program shall consist entirely of ladder diagram rungs to carry out the control plan. The time that the PLC requires to scan 4,096 typical program instructions shall be less than or equal to 500 ms (milliseconds).
- B. Provide registered copy of latest edition of programming software and final accepted source code to District for each CPU furnished as part of this project.
- C. Inputs/Outputs: Refer to Specification 265011 - Programmable Logic Controller Appendix A - PLC Inputs/Outputs.

2.14 PLC SURGE PROTECTION

- A. PLC surge protection shall be provided for PLC circuits.
- B. Manufacturer shall be MCG ELECTRONICS, INC., Model PLC-15A-60V.
- C. Surge protection shall be for both AC power and 4-20 mA loop data lines.
- D. Provide surge protection for each new PLC including remote I/O.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions on PLC.
- B. Install all analog and digital spare I/O. Label as spare.

3.02 PROGRAMMING

- A. The Contractor shall be responsible to develop, document, program and debug the control sequence and logic necessary to assure system operation as stipulated in the specifications and on the contract drawings. The ladder logic shall be directly programmed in the PLC's. This Contractor shall be responsible for complete programming and verification of performance to be consistent with the intended control operation.

3.03 MANUFACTURER'S FIELD SERVICE

- A. Provide operating instruction manuals with adequate information pertaining to the following:
 - 1. Source Code.
 - 2. System specifications.
 - 3. Electrical power requirements.
 - 4. Application considerations.
 - 5. Assembly and installation procedures.
 - 6. Power up procedures.
 - 7. Troubleshooting procedures.
 - 8. Programming procedures.
 - 9. Explanation of internal fault diagnostics.
 - 10. Shutdown procedures.
- B. Documentation: Provide two annotated copies of all working programs on CD as well as a printed program listing.
- C. Product Support Services: The Service Department of the Supplier shall have experienced representatives capable of providing telephone consultation, prompt on-site service and field replacement stock.

3.04 DEMONSTRATION

- A. Provide complete system demonstration and performance verification services.
- B. Demonstrate operation and programming of controllers. Provide as part of the start-up and demonstration service described in Section 265012, instruction for operating personnel, to be conducted at project site with manufacturer's representative.
- C. Customer Training Programs: Provide a customer training program designed to teach the owner's personnel in the understanding and application of the programmable controller. The training program shall include training manuals and "hands-on" programming experience on a programmable controller of the type provided under this contract.

END OF SECTION 265011

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Programmable logic controller software development.

1.02 SUBMITTALS

- A. Submit PLC and Relay Logic Control drawings in accordance with Section 013300.
- B. Provide registered annotated copy of PLC programming including final accepted program to District for each PLC furnished as part of this project.
- C. Provide submittal drawings for PLC/Communication cubicles for each plant.

PART 2 - PRODUCTS

2.01 CONTROL SYSTEM INTEGRATION

- A. Instrumentation control system shall be provided by a single source supplier which includes manufacturing of the control panels, PLC programming, complete telemetry system, and operator terminals.
- B. Instrumentation control system shall be integrated and manufactured by:
 - 1. Eagle Control Corp, Yaphank, NY
 - 2. Lexington Technologies, Farmingdale, NY
 - 3. Wire to Water Inc, Farmingdale, NY
 - 4. Approved Equal
- C. The contractor shall provide satisfactory evidence to the engineer that the instrumentation system supplier has demonstrable qualifications in performance of this kind of work with a minimum of ten (10) years related SCADA experience to substantiate:
 - 1. That the instrumentation system supplier has been regularly engaged in providing similar SCADA services and equipment for a minimum of ten (10) years.
 - 2. That the instrumentation system supplier has provided at least five (5) SCADA installations of comparable scope and complexity, with references.
 - 3. That the instrumentation system supplier has a service center within 50 miles of the project location.
 - 4. No shop drawing submittals shall be made, nor any equipment delivered or installed with respect to instrumentation or control prior to the contractor having obtained written approval of the instrumentation system supplier.
 - 5. That the instrumentation supplier has an office within 50 miles of the project site complete with the following:
 - a. Spare parts including cabling, PLC's, power supplies, I/O cards and processors.
 - b. Office has a minimum of two (2) field technicians staffed full time at this office which provides 24-hour, 7 days a week service with a maximum response time of 2-hours.
 - c. Office has a minimum of two (2) PLC programmers staffed full time at this location.
 - d. Office has a minimum of two (2) electrical engineers staffed full time at this location experienced with SCADA systems, PLC's and knowledge of water supply system operations.
 - e. The Water District and District's engineer shall have the right to inspect office, spare part supply and meet and interview service technicians, PLC programmers and engineers as part of determining qualification of system integrater.
- D. The contractor shall bear full responsibility for the instrumentation and controls. The contractor shall have the instrumentation system supplier:

1. Design the instrumentation system, communication system and monitoring system described in these specifications.
 2. Prepare shop drawings for submittal by the contractor to the engineer.
 3. Provide the necessary information or modifications to the shop drawings to obtain approval.
 4. Supervise the installation.
 5. Perform debugging, testing, maintenance and operation of all instrumentation and control systems.
- E. The instrumentation system supplier shall prepare for submission by the contractor, detailed point-to-point wiring diagrams. Point-to-point wiring diagrams shall be provided for all existing electrical equipment to be interfaced with. Submittals not including this will be rejected. Engineering services shall be provided by the instrumentation system supplier during start-up and testing as required by other sections of the specification.
- F. The contractor shall require the instrumentation system supplier to verify all connections and operational features of all equipment controlled, directly or indirectly, by equipment furnished under this contract prior to submission of shop drawings, schematics shall show all remote connections and respective terminal numbers of all such equipment.
- G. The contractor shall have the instrumentation system supplier develop and provide details for installation of all field mounted control devices, communication equipment, transmitters, receivers, etc. per recommended practices of the equipment manufacturer and in a manner acceptable to the engineer. Such details shall include specific location, method of support and connection details, as a minimum.
- H. Qualified personnel of the instrumentation system supplier shall be provided, as specified hereinafter, for the purpose of instructing the owner's personnel in the operation, maintenance and troubleshooting of all instrumentation systems and related equipment.
- I. It is the intent of this specification that all devices, insofar as practical shall be purchased from a single manufacturer to simplify maintenance and operation.

2.02 CONTROL SYSTEM

- A. Contractor will not be furnished any record drawings of existing conditions for execution of this project. Contractor shall provide all required field investigation by system integrator to develop existing conditions record drawings and verify existing controls are operational. Once Contractor begins installation, no claims shall be made for existing conditions not operational.
- B. Control system integrator shall provide all relays, timers, pilot lights, selector switches and contactors required for operation of control system. IEC Contactors shall be required for all motorized butterfly valves/solenoid valves. Where contacts are required to interface with existing systems including caustic and oil level control panels, caustic tank leak/overflow alarm panels, pH, nitrate and chlorine analyzers, generator control panels, security panels, automatic transfer switches, existing blowoff valves, existing chemical treatment panels, variable frequency drives and starters; contractor shall provide new control boards, relays, wiring and controls as required to provide the required contacts for inputs/outputs as specified in the PLC I/O section and as required for system control.
- C. Contractor shall provide all wiring required for operation of control system as specified.
- D. Contractor shall provide all relays and controls for interfacing with new and existing I/O points. Provide IEC contactors for control of all valves and solenoids.

- E. Drawings do not show all required wiring and conduits. Contractor shall refer to specifications Section 265011 (Compact Logix) for description of I/O for circuits required. Provide shielded twisted pairs for analog I/O and minimum 2c-#14AWG for each digital I/O.
- F. Contractor shall provide minimum of two (2) 120 volt, 20 amps circuit from existing distribution system for all controls, at each location. Provide additional circuits for blowoff valves.
- G. Digital I/O and 120 volt power shall be permitted in common conduit.
- H. Analog signals shall be in dedicated conduit.
- I. Telephone circuits and Ethernet cables shall be in dedicated conduit. Minimum size shall be 3/4".
- J. Contractor shall program new PLC's such that when Well is set to run based on tank level, on loss of communication (Tank Level Signal) pumps shall be interlocked not to run after a time delay set through the graphic user interface (GUI) if communication is not restored.
- K. Contractor is responsible for coordinating control systems with equipment manufacturers for proper operation of all equipment. Any discrepancies shall be brought to the attention of the Engineer immediately for final coordination.

PART 3 - EXECUTION

3.01 WELL PUMP CONTROL

- A. Install a new PLC system including, I/O, GUI interface unit and communication equipment as described in Specification Section 264010, 265011 (Compact Logix) and 265013.
- B. The I/O units will be connected to new and existing instrumentation controls and/or termination boxes. Contractor to provide required relays, wires, conduits and connectors, schematics and wiring diagrams.
- C. The PLC will be used to transmit status and information to the main SCADA Control system and to control all equipment and change settings. The PLC's shall be programmed to communicate with the main SCADA system and the local plant GUI.
- D. The locations of the PLC and communication panel are indicated on contract drawings.
- E. At Plant No. 5 the GUI plant and global overview and controls screens shall be the same as the screens for the plant in the SCADA system PC.
- F. Control of the Wells shall be as follows:
 - 1. If the Well 5-1 Lead/Well 5-2 Lead selector switch (soft selector switch in GUI/SCADA) is in the Well 5-1 Lead position, Well 5-1 shall start and stop based on the operator adjustable lead pump setpoints and Well 5-2 shall start and stop based on the operator adjustable lag pump setpoints.
 - 2. If the Well 5-1 Lead/Well 5-2 Lead selector switch (soft selector switch in GUI/SCADA) is in the Well 5-2 Lead position, Well 5-2 shall start and stop based on the operator adjustable lead pump setpoints and Well 5-1 shall start and stop based on the operator adjustable lag pump setpoints.
 - 3. If the Tank Level/System Pressure/Pressure Tracking selector switch (soft selector switch in GUI/SCADA) is in the Pressure Tracking position and the Well 5-2 H-O-A selector is in the Auto Position Well 5-2 shall start and stop based on local pressure setpoints, and shall vary speed via VFD control to maintain an operator adjustable system pressure setting.

Refer to section 3.02 of this specification for additional detail. When in Pressure Tracking, Well 5-1 shall be locked out and prevented from starting automatically, however it can still be started manually (hand position of Well 5-1 H-O-A selector switch).

4. If the Tank Level/System Pressure/Pressure Tracking selector switch (soft selector switch in GUI/SCADA) is in the System Pressure position and the Well H-O-A selectors are in the Auto Position the Wells shall start and stop based on the local pressure setpoints (Lead and Lag). These setpoints can be set through the SCADA system and the local GUI.
5. If the Tank Level/Local Pressure/Pressure Tracking selector switch (soft selector switch in GUI/SCADA) is in the Tank position and the Well H-O-A selectors are in the Auto Position the Wells shall start and stop based upon the selected tank level setpoints (Lead and Lag). These setpoints can be set through the SCADA system and the local GUI.
6. If the Well H-O-A selector switch is in the Off position the well will not start.
7. The well pumps shall be automatically started and stopped when in the Automatic position of the H-O-A when the setpoint is reached. The well pump shall be automatically started and stopped in the automatic position of the H-O-A switch by selecting the prestart or prestop mode at the main SCADA station or local GUI ignoring the normal "on" and "off" contacts from the PLC. Once prestarted the well(s) will continue to run until the PLC stops the well based on elevated tank storage level or pressure or until the pre-stop button at the Main SCADA Station or local GUI is selected. The PLC shall have an adjustable start and stop time delay adjustable through the SCADA system or local GUI to prevent momentary fluctuations in tank level or pressure from starting and stopping the well.
8. Well pumps have an automatic blowoff control timing circuit. The blowoff control sequence shall be as follows when the blowoff valve is in the automatic position as selected on the open-close-stop-automatic valve selector switch:
 - a. Upon signal to start from the PLC, the prelube solenoid valve shall be energized open and the controls shall energize a manually adjustable prelube timer. This timer is external of the PLC. After the prelube timer elapses the prelube timer shall energize the manually adjustable blowoff timer and blowoff safety timer at the same time.
 - b. The well pump shall pump to blowoff (waste) for the amount of time as manually adjusted on the blowoff timer.
 - c. After the blowoff timer elapses the blowoff valve shall be energized to close.
 - d. A blowoff safety timer time delay control sequence shall be incorporated to allow sufficient time to acknowledge the blowoff valve is closed via a limit switch. After the blowoff safety timer elapses and the blowoff valve is not closed as sensed by the blowoff valve "closed" limit switch, the well shall shut down and indicate "Incomplete Valve Cycle" and will have to be manually reset.
 - e. Upon signal to stop the well pump(s) via tank level or pressure or turning the H-O-A selector switch from Auto or hand to "Off" or by selecting the prestop function in the SCADA or local GUI the blowoff valve shall be energized to open and the blowoff valve safety timer energized. Once the blowoff valve is in the full open position as acknowledged by the limit switch, it shall stop the well pump. If after the blowoff safety timer elapses and the blowoff valve limit switch is not initiated as open the well shall shutdown and indicate "Incomplete Valve Cycle" and will have to be manually reset.
 - f. When the blowoff valve open-close-stop-automatic selector switch is moved to the open position the valve shall open and travel stop when in the open position. When the selector is in the closed position the valve shall close and travel stop when in the closed position. When the selector switch is in the stop position the valve motor shall stop.
9. The well pumps shall have a high and low pressure cutout safety circuit internal to the PLC. If a high pressure still exists after an operator adjustable (via GUI/SCADA) time delay elapses, the well pump shall shut down and must be manually reset. The low pressure cutout is for alarm notification only and shall not turn the pump off. A separate operator adjustable time delay shall be provided for high and low pressure cutout to allow for individual time delays.

10. The well pumps shall have a backspin timing control sequence external of the PLC. After the well has stopped, a manually adjustable backspin timer shall be energized. During the preset time adjustment, the well cannot be started until the backspin timer elapses.
 11. The well pump(s) shall operate in the same sequence in the "hand" position as in the automatic position, except that "hand" does not need an on signal from the PLC to start the well.
 12. Upon any alarm related to the specified well pump the well and chemicals controls shall shut down and be manually reset locally on the CP and alarm screen acknowledged through the GUI or SCADA system.
 13. The well pumps shall have a bypass tank level safety enable/disable selector switch (soft) internal to the PLC, per well. When enabled, a high tank level alarm shall not shut down the well. The status of this selector switch shall be displayed on the plant overview screen in a conspicuous manner.
 14. There shall be a Tank _/Tank _ selector switch (soft) internal to the PLC to allow the operator to select which Tank the start/stop of the lead and lag wells will be based on when the Tank Level/System Pressure/Pressure Tracking selector switch is in the Tank Level position.
- G. All well pump control for prelube, blowoff, blowoff safety, high pressure cutout, and low pressure alarm shall be internal to the PLC. Well pump control for backspin shall be external of the PLC. Backspin timer shall prevent well from starting external of PLC.
- H. All status of Plant No. 5-1 and Treatment Building points listed in Specification Section 265010 shall be graphically represented on the local GUI.
- I. All status of existing administration office Plant No. 5 PLC I/O points listed in Specification Section 265010 shall be maintained in order to operate as currently configured. Contractor shall modify programs as required to communicate appropriate information from new PLC '51CP' in Plant No. 5-1 building, SCADA rack and new PLC 'TBCP' in treatment building to existing PLC in administrator building, and to existing SCADA PC in administrator building. Refer to specification 265011 - Programmable Logic Controller Appendix A - PLC inputs/outputs for additional detail.

3.02 PROPORTIONAL INTEGRAL DERIVATIVE CONTROL (WELL 5 SYSTEM PRESSURE TRACKING CONTROL)

- A. The proportional integral derivative controllers shall include an analog proportional controller to provide a continuous current output signal (0-20 or 4-20mA) to regulate the speed of the VFD. At minimum output (0 to 4 mA), the control output shall be programmable to be fully "on" or "off" depending on type of element used. At maximum output (20mA), control output shall be programmable to be fully modulated from its original position.
- B. The controller shall provide an output to the variable frequency drive to regulate the pressure level to a desired system setpoint set through the GUI. The controller shall combine adjustable proportional gain and integral functions to allow the process to attain the desired setpoint value within the shortest amount of time and with a minimum of overshoot by comparing the instantaneous difference between actual level and desired level (setpoint) as well as the recent history of difference between actual and desired pressures.
- C. LOOP GAIN controls shall be provided to adjust the overall gain of the control loop. PROP GAIN control shall be provided to tune the controller to the process dynamics.
- D. One PID loop control systems is required.

3.03 BACKWASH INITIATION PROCEDURE FOR VESSEL X (APPLIES TO ALL VESSELS)

- A. Backwash initiation procedure shall commence when the PLC receives a signal to backwash from either of the following:
 - 1. Differential pressure set point (Priority Setpoint) for Manganese Removal Vessel No. 1 or No. 2. Set point for each individual vessel shall be adjusted through the OIT.
 - 2. Time of Day (Backwash during off peak time periods).
 - 3. Total Flow through the vessel, set through the OIT/SCADA. Include an Enable/Disable selector switch within the OIT/SCADA to allow Operator to Enable/Disable the "Total Flow" Backwash Initiation Procedure.
 - 4. Manual backwash call as selected at the control panel.
- B. Upon receipt of signal to backwash from A1 (above), Vessel X shall be added to the Priority Backwash Called list and put into Offline Mode. The PLC shall start the Valve Cycle timer and instruct all Vessel X valves to close simultaneously. If any Vessel X valve is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the pump(s) to stop and close all valves on all Manganese Removal Vessels.
- C. Upon receipt of signal to backwash A2, A3, or A4 (above), Vessel X shall be added to the Backwash Called list and shall remain in Filter or Rinse Mode (as applicable).
- D. The PLC shall indicate mode of backwash call on the Control Panel.
- E. The vessels shall be backwashed in the order of the Priority Backwash Called list, followed by the Backwash Called List (selectable by operator via OIT/SCADA).
- F. No more than one (1) vessel shall be backwashed at a time. If more than one (1) vessel is in Backwash Cell A, Backwash Cell B, or Offline Modes, the well shall be shut down until only one vessel is in Backwash Cell A, Backwash Cell B, or Offline Mode.
- G. The PLC shall recognize when each Vessel is in the following modes and shall display them on the control cubicle and on the OIT screen:
 - 1. Backwash Cell A
 - 2. Backwash Cell B
 - 3. Rinse
 - 4. Filter
 - 5. Offline
- H. If at any time the backwash process is disrupted via an incomplete valve cycle, the PLC shall recognize this and indicate a "Backwash Mode Failure" alarm.
- I. There will only be one common Backwash Timer for the filter vessels. The Backwash Timer shall be set through the OIT screen

3.04 BACKWASH PROCEDURE FOR MANGANESE REMOVAL VESSEL NO. 1

- A. Backwash Valve Transition Mode:
 - 1. When the PLC receives a signal to start the Backwash Process for Vessel No. 1 the PLC shall instruct Vessel No. 1 to go to Backwash Valve Transition Mode. Backwash Valve Transition Mode is a valve transition mode only to prepare the vessel for Backwash Mode. No more than one (1) vessel shall be backwashed at a time. On call to backwash, both vessels shall backwash sequentially. Both vessels shall backwash before any one vessel returns to system.

2. The PLC shall instruct Vessel No. 1 and 2 system Effluent/Backwash Inlet Valves (Valves 106 and 206) and Common Effluent Valve (Valve 301) to close, while simultaneously opening Vessel No. 1 and 2 Rinse Valves (Valves 105 and 205). The PLC shall start a valve safety timer adjustable through the OIT. If a valve(s) is not recognized to be in the correct position by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.
 3. Once the PLC confirms that all valves associated with the Backwash Valve Transition Mode have opened and closed as instructed, the Vessel shall run on Backwash Valve Transition Mode for an adjustable period set through the OIT.
- B. Isolation Mode:
1. After the Backwash Valve Transition Mode timer has elapsed, the PLC shall place Vessel No. 1 on Isolation Mode and instruct (Cell B and Cell A Inlet Valves (Valves 102 and 101) and Rinse Valve (Valve 105) to close. If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels. The Vessel shall be in Isolation Mode for a set time adjusted through the OIT.
- C. Backwash Mode:
1. After the Isolation Mode timer has elapsed, the PLC shall start the Cell B Backwash Mode and instruct Cell B Backwash Effluent Valve (Valve 104), System Effluent/Backwash Inlet Valve (Valve 106), Vessel No. 2 System Effluent/Backwash Inlet Valves (Valve 206) to open while simultaneously closing Vessel No. 2 Rinse Valves (Valve 205). If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.
 2. Once the PLC confirms that all valves associated with Cell B Backwash Mode have opened and closed as instructed, the PLC shall start a Backwash timer for Cell B set through the OIT. After the Cell B Backwash timer times out, the PLC shall start Cell A Backwash Mode. The PLC shall instruct Cell A Backwash Effluent Valve (Valve 103) to open and Cell B Backwash Effluent Valve (Valve 104) to close. If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels. Once the PLC confirms that all valves associated with Cell A Backwash Mode have opened and closed as instructed, the PLC shall start a Backwash Timer for Cell A set through the OIT.
- D. Rinse to Waste Mode:
1. After Cell A Backwash timer times out, the PLC shall set Vessel No. 1 on Isolation Mode and instruct Cell A Backwash Effluent Valve (Valve 103), System Effluent/Backwash Inlet Valve (Valve 106), Vessel No. 2 System Effluent/Backwash Inlet Valves (Valve 206) to close and simultaneously instruct Vessel No. 2 Rinse Valves (Valve 205) to open to transition the Vessels to Rinse to Waste Mode. If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.
 2. To transition to Rinse to Waste Mode, the PLC shall instruct Cell B and Cell A Inlet Valves (Valve 102 and Valve 101), and Rinse Valve (Valve 105) to open simultaneously. At the same time the PLC shall instruct Vessel 2 to go into isolation mode by closing Cell B and Cell A Inlet Valves (Valve 202 and Valve 201) and Vessel 2 Rinse Valve (Valve 205). If a valve(s) is not recognized to be open or closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels. Once the PLC confirms that all valves have opened as instructed, the Vessel shall run on Rinse to Waste Mode for an adjustable period set through the OIT.

3. After the Rinse to Waste Mode timer times out, the PLC shall either go to the next scheduled Vessel Backwash process or prepare the Vessel No. 1 for Filter to System Mode.
- E. Filter to System Mode:
1. If Vessel No. 1 is set to go to Filter to System Mode, the PLC shall allow the system to run in the Rinse to Waste Mode for an adjustable period set through the OIT. After the Rinse to Waste Mode timer times out, the PLC shall instruct the Rinse Valve (Valve 105), Vessel No. 2 Rinse Valves (Valve 205) to close while simultaneously opening the Vessel No. 1 System Effluent/Backwash Inlet Valve (106), Vessel No. 2 System Effluent/Backwash Inlet Valves (Valve 206), and Common Effluent Valve (Valve 301). If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.

3.05 BACKWASH PROCEDURE FOR MANGANESE REMOVAL VESSEL NO. 2

- A. Backwash Valve Transition Mode:
1. When the PLC receives a signal to start the Backwash Process for Vessel No. 2 the PLC shall instruct Vessel No. 2 to go to Backwash Valve Transition Mode. Backwash Valve Transition Mode is a valve transition mode only to prepare the vessel for Backwash Mode. No more than one (1) vessel shall be backwashed at a time. On call to backwash, both vessels shall backwash sequentially. Both vessels shall backwash before any one vessel returns to system mode.
 2. The PLC shall instruct Vessel No. 1 and 2 system Effluent/Backwash Inlet Valves (Valves 106 and 206) and Common Effluent Valve (Valve 301) to close, while simultaneously opening Vessel No. 1 and 2 Rinse Valves (Valves 105 and 205). The PLC shall start a valve safety timer adjustable through the OIT. If a valve(s) is not recognized to be in the correct position by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.
 3. Once the PLC confirms that all valves associated with the Backwash Valve Transition Mode have opened and closed as instructed, the Vessel shall run on Backwash Valve Transition Mode for an adjustable period set through the OIT.
- B. Isolation Mode
1. After the Backwash Valve Transition Mode timer has elapsed, the PLC shall place Vessel No. 2 on Isolation Mode and instruct Cell B and Cell A Inlet Valves (Valves 202 and 201) and Rinse Valve (Valve 205) to close. If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels. The Vessel shall be in Isolation Mode for a set time adjusted through the OIT.
- C. Backwash Mode:
1. After the Isolation Mode timer has elapsed, the PLC shall start the Cell B Backwash Mode and instruct Cell B Backwash Effluent Valve (Valve 204), System Effluent/Backwash Inlet Valve (Valve 206), Vessel No. 1 System Effluent/Backwash Inlet Valves (Valve 106) to open while simultaneously closing Vessel No. 1 Rinse Valves (Valve 105). If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.
 2. Once the PLC confirms that all valves associated with Cell B Backwash Mode have opened and closed as instructed, the PLC shall start a Backwash timer for Cell B set through the OIT. After the Cell B Backwash timer times out, the PLC shall start Cell A Backwash Mode. The PLC shall instruct Cell A Backwash Effluent Valve (Valve 203) to open and Cell B Backwash Effluent Valve (Valve 204) to close. If a valve(s) is not

recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels. Once the PLC confirms that all valves associated with Cell A Backwash Mode have opened and closed as instructed, the PLC shall start a Backwash Timer for Cell A set through the OIT.

D. Rinse to Waste Mode:

1. After Cell A Backwash timer times out, the PLC shall set Vessel No. 2 on Isolation Mode and instruct Cell A Backwash Effluent Valve (Valve 203), Vessel No. 2 System Effluent/Backwash Inlet Valve (Valve 206), Vessel No. 1 System Effluent/Backwash Inlet Valves (Valve 106) to close and simultaneously instruct Vessel No. 1 Rinse Valves (Valve 105) to open to transition the Vessels to Rinse to Waste Mode. If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.
2. To transition to Rinse to Waste Mode, the PLC shall instruct Cell B and Cell A Inlet Valves (Valve 202 and Valve 201), and Vessel No. 2 Rinse Valve (Valve 205) to open simultaneously. At the same time the PLC shall instruct Vessel 1 to go into isolation mode by closing Cell B and Cell A Inlet Valves (Valve 102 and Valve 101) and Vessel No. 1 Rinse Valve (Valve 105). If a valve(s) is not recognized to be open or closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels. Once the PLC confirms that all valves have opened as instructed, the Vessel shall run on Rinse to Waste Mode for an adjustable period set through the OIT.
3. While in Rinse to Waste Mode, a Well Hold-in signal shall maintain well run signal.
4. After the Rinse to Waste Mode timer times out, the PLC shall either go to the next scheduled Vessel Backwash process or prepare the Vessel No. 2 for Filter to System Mode.

E. Filter to System Mode:

1. If Vessel No. 2 is set to go to Filter to System Mode, the PLC shall allow the system to run in the Rinse to Waste Mode for an adjustable period set through the OIT. After the Rinse to Waste Mode timer times out, the PLC shall instruct the Vessel No. 2 Rinse Valve (Valve 205), Vessel No. 1 Rinse Valves (Valve 105) to close while simultaneously opening the Vessel No. 2 System Effluent/Backwash Inlet Valve (Valve 206), Vessel No. 1 System Effluent/Backwash Inlet Valves (Valve 106), and Common Effluent Valve (Valve 301). If a valve(s) is not recognized to be closed by the PLC at the end of the Valve Cycle time an "Incomplete Valve Cycle" alarm shall occur and the PLC shall instruct the Well to stop and close all valves on all Manganese Removal Vessels.

3.06 CHEMICAL ALARMS

- A. On high pH and chlorine levels the chemical treatment panels lock out the chemical pumps. These contacts shall also be input into the PLC and monitored and provide alarms. All alarms shall have an adjustable time delay set through the GUI and SCADA system. Alarms shall have enable/disable feature programmed in the SCADA system to send alarm (enable) or don't send the alarm (disable) only when the well is not running. When the well is running to system the enable and disable feature will not work and a high/low chlorine/pH alarm will always be sent. An enable/disable relay shall be installed for the autodialer to not send alarm when the well is not running.
- B. On low chlorine and pH alarm the PLC shall generate an alarm only when the well is running to system via an adjustable time delay set through the GUI or SCADA system and shut the well off.

3.07 ALARMS

- A. All alarms shall have independent time delay setpoints set through the GUI and SCADA system prior to being posted to the alarm summary screen. This will allow the District to choose which are immediate and which shall require longer delays.

3.08 AC POWER LOSS

- A. The PLC shall monitor the input power to the UPS via a power monitor relay. If the relay senses no power the PLC shall sequence the pump to stop and de-energize the start signal contact.
- B. Upon power restoration pumps shall restart if tank level or pressure is calling for a start.

3.09 LOSS OF COMMUNICATION

- A. Where remote wells are using tank levels from remote sites and communication is lost the PLC shall initiate a stop well time delay adjustable through the GUI and SCADA. After the time delay the well shall stop. This shall also not apply if the well is operating off of local pressure.
- B. The SCADA system and GUI shall have a control selector switch to enable or disable an automatic switchover to pressure control after adjustable time delay set through the SCADA system or GUI after a communication loss. If the automatic switchover to pressure control is enabled the well shall be prestarted even if the well "on" pressure setting is not calling for a start. The well shall stop on the pressure stop setpoint. Once stopped the well shall not start until the "on" setpoint is reached. If the automatic switchover selector switch is in the disable mode the well shall not switchover to pressure control and must wait for a communication restore to operate on tank level.

3.10 ALARM MONITORING

- A. The PLC at each plant shall provide an alarm to the SCADA system and the local GUI, based on any alarm condition. The trigger alarm can be caused by high pressure, low level, incomplete valve cycle, overload, communication loss, PLC failure, AC power loss, etc. The detail of the alarm condition will be reported on the individual plant alarm page. After acknowledging the alarm, the alarm condition shall detail the reason for the alarm and what the operator needs to do to clear the alarm and assist diagnosing the problem.
- B. Contractor shall program alarm setpoint screens for high/low pH, nitrate and chlorine, high/low pressures at each plant, and high/low tank levels for each tank. All valves and time delays shall be set through GUI and SCADA system by operator. Coordinate with District as required.
- C. The SCADA system upon receiving the information from a remote PLC will dial the number(s) set at the PC Dialing System. The PC will report the alarm message via pager with a pre-recorded text message for each individual alarm (i.e., Well No. 5-1 overload) and request acknowledge of the person via telephone (dialing in) to the PLC receiving the call. The Superintendent or delegate shall have access to the dialing system (password) to be able to edit the pager numbers and enable and disable pagers and the alarm messages.
- D. The PC Dialing System can be edited to select the alarms, time, message, and the person(s) to be called (see Section 265013 for more detail on the alarms messages and on the Editing Dialing Page).

3.11 DEMONSTRATION

- A. Demonstrate operation of control system.

- B. Demonstrate procedure for changing set points and timer settings.

3.12 STARTUP & DEMONSTRATION SERVICE

- A. The Contractor shall engage the control system supplier/integrator to provide startup for the control system. A factory-trained engineer that is thoroughly familiar with the equipment supplied and its specific application on this project shall perform the startup service. The same factory trained engineer shall provide a minimum of two (2) eight (8) hour days for demonstration of the new control system to the Owner's personnel. The demonstration shall include all the plant's PLC and GUI, system communication and the SCADA system. This service shall proceed once the system is completely debugged and up and running and written acceptance issued.

3.13 CONTROL MODIFICATIONS

- A. The Contractor shall provide the services of the control system integrator to provide an additional five (5) eight (8) hour days of field programming changes as requested by the engineer based on start-up and field testing for the whole new system. Contractor shall make all requested control changes and incorporate into PLC programs and include changes as part of final closeout documentation. Control software changes shall include PLC, GUI or PC. Change notice will be provided by the engineer for each plant and/or system (PLC/GUI or SCADA).
- B. Per unit prices shall be indicated in the proposal. The District reserves the right to direct the Contractor to make changes at any plant and to make changes to enhance the system once the District has had the system on-line and alternative control sequences are desired. The District shall increase the contract amount or decrease the contract amount by the actual number of hours used based upon the per unit cost per hour as indicated in the proposal.

END OF SECTION 265012

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Operator Terminals.

1.02 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
- C. NEMA ICS 3 - Industrial Systems.
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Submit shop drawings indicating layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements.
- C. Submit scaled drawings of graphic screen generations including systems overview, controls settings, reports and alarms for approval by Engineer prior to development.
- D. Submit a written description of the alarms dialing scheduling/editing, reports editing and printing, access code and security, and communication from Administration Building control room and the Plant No. 5 Treatment Building control room, for approval by Engineer prior to development.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. ALLEN BRADLEY Panelview Plus 7 Graphic Terminal

2.02 GRAPHIC USER INTERFACE (GUI)

- A. Operator Terminal shall have the following features:
 - 1. 15-inch Color Active Matrix, TFT 1024x768, 18-bit color graphics.
 - 2. Full Analog resistive Touch screen
 - 3. Connect directly to specified ALLEN BRADLEY PLC
 - 4. 512MB of Battery Backed Application Memory
 - 5. Panel mount design to fit into motor control center.
 - 6. NEMA 4x enclosure.
 - 7. Luminance of at least 300cd/m2
 - 8. Audio visual feedback each time a touch cell is depressed.
 - 9. Built-in diagnostics, including "PLC communications lost" and "battery test fail".
 - 10. Complete FactoryTalk and Windows CE Operating System to generate system graphics on the operator terminal. Provide one (1) copy of FactoryTalk software and Windows CE Operating System CD formats for each of the panelviews.
 - 11. Provide two (2) copies of Panelview screen development software to district.
 - 12. Provide cable to allow download/upload of panelview operator terminal to IBM PC computer.
 - 13. Provide cable to connect the operator terminal to the PLC at each site complete with connectors.

14. Provide access code security to be assigned to any screen.
15. Install GUI unit SCADA Control Panel (SCP) location as shown on plans.
16. Provide LED type pilot lights with push-to-test capabilities. No incandescent pilot lights shall be permitted. No incandescent bases shall be permitted.

PART 3 - EXECUTION

3.01 GUI FUNCTION

- A. The GUI terminal shall allow operator access to the operating system to view the system overview, view and acknowledge alarms, view and change the variable settings for the local plant only. Access code is required for changing setpoints, alarms acknowledge and resetting. The GUI shall provide an editing page to assign the password code to the superintendent and its delegates. Every employee shall be assigned his own access code.
- B. Tank levels and pressure set points, time delays and alarm settings can be changed on the screen. It is required that an access password and any change shall be recorded and automatically included in the GUI and vice-versa when any change in setting takes place.
- C. All setpoints changed will be recorded on the GUI including the date, time and the authorized person.
- D. All tank levels, well flows, and system pressures that are recorded via chart recorders shall also be recorded and trended on a dedicated GUI screen.
- E. SCREENS
 1. The Plant overview shall represent the process at the plant including information on all pumps, valves, pH, nitrate, and Chlorine levels, control schemes, and flow-pressure-level.
 - a. Within the process control pages representing the tank levels and pressure settings for the alarms and start/stop of the equipment at each location, the variables can be changed as per the process requirements. A separate Matrix control page shall be generated listing the on/off settings for tank/pressure on/off setpoints and what each pump is selected for (tank/pressure). The contractor shall use the capability of the GUI Software to create the graphics and information. The software shall provide state of the art tools to edit the settings and controls and shall represent the status of the equipment, pipes and valves by changing colors, text indicators next to the device and providing on line variable data.
 2. Trend screens indicating the individual and total pressures, levels and flows, run times shall be continuously available.
 3. A General alarm indicating individual alarms and records shall be provided as a separate screen. Upon an alarm the Alarm Screen button will flash indicating that an alarm has occurred.
 - a. Report pages and trend curves shall be provided for reference. The reports and trend curves shall be selectable at any time interval and can be printed by the operator. The GUI System shall have an edit report page to select the elements to be included in each report and to select if the report is going to be printed automatically (daily, weekly, monthly or yearly) or on request. The data shall be stored on an acceptable database management system (DBMS) software (i.e., MS Access) for easy and rapid access. The software shall allow the data to be presented in a custom format for printing on specialized forms for District use. The District shall provide the contractor with sample forms for this purpose.
 - b. Process Data:
 - 1) PLC Variables - The Operator Interface System (OIS) will read and write process variables in the PLC registers to control and monitor each plant.
 - 2) Data Files - The following files will be maintained:
 - (a) Alarm log, an ASCII file that records each configured alarm.

- (b) Alarm summary, a dBASE file that summarizes alarms.
 - (c) Alarm acknowledgement, a dBase file that summarizes who acknowledged each alarm.
 - (d) Report log, an RTF file that is written each time the report is run.
- 4. Graphic Pages:
 - a. The OIS and all the processes it monitors and controls will be presented to operators through screens (called graphics pages). Operators will navigate through graphics pages via touchscreen.
 - b. Menu Page - The menu page shall feature buttons to:
 - 1) Display the overview page for each plant representing the process and its variables.
 - 2) Matrix Page
 - 3) Display the control page for each plant with access to all control setpoints.
 - 4) Display the alarm pages.
 - 5) Display the network page.
 - 6) Display the reports page.
 - 7) Display the editing reports page.
 - 8) Graphic trends and summary.
 - c. Graphics pages shall be linked together in a display sequence, so that operators can move easily between pages without needing to redisplay the menu page.
 - d. Test Page - A test page shall be configured to test the communications and other processes during the configuration of the application.
 - e. Utility Page - The utility page will contain some tools which will allow maintenance of the system security database as well as some tools to access some high level programming functions during the system's development.
 - f. Alarm Pages - Equipment that often has fault conditions shall trigger alarms, for example, when tanks show low levels, and when the pump exceeds its operating pressure. Alarms shall be displayed on a separate alarm page and an alarm summary page will display a summary of all alarms. Operators will use commands on the alarm pages to handle alarms. Hardware alarms (faults within the Operator Interface System itself) will be reported on a hardware alarm page. All alarm pages will be displayed from buttons on the menu page.

3.02 REMOTE SCADA SYSTEM ACCESS

- A. Establish communication between Plant No. 5 VPN Device and Administration Building VPN Device to allow remote access.
- B. All status of new Plant No. 5 '51CP' & 'TBCP' PLC I/O points listed in Specification Section 265010 shall be graphically represented on the local GUI and SCADA.
- C. All status of existing administration office Plant No. 5 PLC I/O points listed in Specification Section 265010 shall be maintained in order to operate as currently configured. Contractor shall modify existing program as required to communicate appropriate information from new PLC in Plant No. 5 '51CP' & 'TBCP' to existing PLC in administration building, and to new SCADA Rack and Workstation PC in administration building. Refer to Specification 265011 - Programmable Logic Controller Appendix A - PLC Inputs/Output for additional detail.
- D. Configure VPN router to accept remote connections. Configure firewall to protect VPN from unauthorized access.
- E. Allow remote users to have control of the SCADA system based on their login and security level. All password protection to login and make changes to setpoints shall be required even when a users is using the remote login.

END OF SECTION 265013

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Format and contents of SCADA System User Manuals.

1.02 FORMAT

- A. Assemble three (3) SCADA system user manuals which shall include all Plant sites.
- B. Provide one (1) electronic copy of SCADA System User Manual.
- C. Each manual shall be prepared with the following information:
 - 1. Table of Contents;
 - 2. Provide a glossary of terms, i.e. PLC, incomplete valve cycle, etc.
 - 3. Written description of control.
 - 4. Description of all external timers and software timers and functions.
 - 5. List of all PLC inputs and outputs. Provide a written description for every input and output describing what each input is and what its purpose is in the PLC program. Describe each PLC output on what its function is.
 - 6. Provide a color screenshot of every SCADA screen including all setpoint screens and describe step by step on how to use and make changes to all screens.
 - 7. On alarm generation describe in detail why the alarm occurred.
 - 8. Repairs shall include sufficient detail to describe how to replace a PLC processor, I/O cards, power supplies, radio modems.
 - 9. Provide a step by step description for programming alarm notification telephone numbers and changes to those numbers.
 - 10. Provide a step by step description for acknowledging SCADA alarms.
 - 11. Provide a troubleshooting guide and corrective repair procedures for all electrical and mechanical equipment. Guides should list the most frequent and common problems, together with the symptoms, possible causes of the trouble, and remedies.
- D. Cover: Identify each binder with typed or printed title SCADA System User's Manual.
- E. Provide an index to allow the operator to research all control functions.
- F. Submit two copies of preliminary draft manuals to Engineer at least 10 days prior to delivery of equipment or component parts of equipment.
- G. Bind above items in heavy, 3-ring commercial quality notebook binders, complete with index and tabbed dividers. Submit complete volume to Engineer for approval at least three (3) weeks before request for final acceptance of project.
- H. Submit two (2) CD's to engineer of the complete volume. Index shall be interactive with the various sections.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 265014

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. SCADA system design build criteria.

1.02 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
- C. NEMA ICS 3 - Industrial Systems.
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Submit shop drawings indicating layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements.
- C. Submit scaled drawings of graphic screen generations including systems overview, controls settings, reports and alarms for approval by Engineer prior to development.
- D. Submit a written description of the alarms dialing scheduling/editing, reports editing and printing, access code and security, and communication for approval by Engineer prior to development.

PART 2 - PRODUCTS

2.01 ADMINISTRATION BUILDING SCADA SYSTEM

- A. Install one (1) SCADA system PC operator workstation complete with monitors, speakers, wireless keyboards and wireless mouse.
- B. Install rack mounted SCADA server Rack mounted server shall dial all SCADA alarms and store historical data/alarms and events.
- C. Install one (1) UPS for SCADA workstation.
- D. Provide VPN appliance for network security.
- E. Provide color laser printer.
- F. Provide cable modem communication.
- G. Install rack mounted network switch..
- H. SCADA system software by Allen-Bradley Factory Talk including VPN software. Provide four (4) registered copies, one (1) for SCADA server, one (1) for PC workstation, and one (1) for each of the two (2) laptops .
- I. Provide all power circuits, communication circuits and all conduit and wiring as required.

2.02 PLANT NO. 5 TREATMENT BUILDING SCADA SYSTEM

- A. Install one (1) SCADA system PC operator workstation complete with monitors, speakers, wireless keyboards and wireless mouse.
- B. Install rack mounted SCADA server Rack mounted server shall dial all SCADA alarms and store historical data/alarms and events.
- C. Install one (1) UPS for SCADA workstation.
- D. Provide VPN appliance for network security.
- E. Provide color laser printer.
- F. Provide cable modem communication.
- G. Install rack mounted network switch..
- H. SCADA system software by Allen-Bradley Factory Talk including VPN software. Provide two (2) registered copies, one (1) for SCADA server and one (1) for PC workstation.
- I. Provide all power circuits, communication circuits and all conduit and wiring as required.

2.03 REMOTE SCADA CONTROL PANELS

- A. Install new PLC's in new control panels '51CP' and 'TBCP'.
- B. Install new UPS's in new control panels '51CP' and 'TBCP' with surge protection.
- C. Provide VPN appliance and cable modem.
- D. Provide all power circuits, communication circuits and all conduit and wiring as required.

PART 3 - EXECUTION

3.01 SCADA WORKSTATION PC TERMINAL FUNCTION

- A. The description below shall be applied to all SCADA PC's and GUI's. The network storage devices shall be configured to store all SCADA information. The data shall be stored on all the SCADA servers and network storage devices as soon as the data is created for a completely redundant data storage system.
- B. The following is a minimum description of each screen required for the SCADA system:
 - 1. The District overview shall represent the process at each plant including information on all pumps, water storage tanks, pH, and Chlorine levels, flow-pressure-level.
 - 2. The process control pages representing the tank levels and for the alarms and start/stop of the equipment shall be displayed for each location. In these pages the variables can be changed as per the process requirements. A separate Matrix control page shall be generated listing the on/off settings for tank/pressure on/off setpoints and what each pump is selected for (tank/pressure). The contractor shall use the capability of the SCADA Software to enhance the graphics and information provided in the attached document. The software shall provide state of the art tools to edit the settings and controls and shall represent the status of the equipment, pipes and valves by changing colors, text indicators next to the device and providing on line variable data.

3. Trend screens indicating the individual and total pressures, levels and flows, pH, chlorine residuals, run times shall be continuously available.
4. A General alarm page linked to each plant individual alarms and records shall be provided as a separate screen. Upon an alarm the Alarm Screen button will flash indicating that an alarm has occurred.
5. Report pages and trend curves for reference. The reports and trend curves shall be selectable for each plant at any time interval and can be printed by the operator. The SCADA System shall have an edit report page to select the elements to be included in each report and to select if the report is going to be printed automatically (daily, weekly, monthly or yearly) or on request. The data shall be stored on an acceptable spreadsheet software (i.e., MS Access) for easy and rapid access. The software shall allow the data to be presented in a custom format for printing on specialized forms for District use. The District shall provide the contractor with sample forms for this purpose.
6. Process Control Hardware and Communication:
 - a. The Water District system will be controlled and monitored by the operator interface on the selected workstation computers. The workstation computers are connected to the SCADA Network.
7. Process Data:
 - a. PLC Variables - The Operator Interface System (OIS) will read and write process variables in the PLC registers to control and monitor each plant.
 - b. Data Files - The following files will be maintained:
 - 1) Alarm log, an ASCII file that records each configured alarm.
 - 2) Alarm summary, a dBASE file that summarizes alarms.
 - 3) Alarm acknowledgement, a dBase file that summarizes who acknowledged each alarm.
 - 4) Report log, an RTF file that is written each time the report is run.
8. Graphic Pages:
 - a. The OIS and all the processes it monitors and controls will be presented to operators through screens (called graphics pages). Operators will navigate through graphics pages by using the keyboard and mouse.
 - b. Menu Page - The menu page shall feature buttons to:
 - 1) Display the overview page for each plant representing the process and its variables.
 - 2) Matrix Page
 - 3) Display the control page for each plant with access to all control setpoints.
 - 4) Display the alarm pages.
 - 5) Display the network page.
 - 6) Display the reports page.
 - 7) Display the editing reports page.
 - 8) Graphic trends and summary.
 - c. Graphics pages shall be linked together in a display sequence, so that operators can move easily between pages without needing to redisplay the menu page.
 - d. Test Page - A test page shall be configured to test the communications and other processes during the configuration of the application.
 - e. Utility Page - The utility page will contain some tools which will allow maintenance of the system security database as well as some tools to access some high level programming functions during the system's development.
 - f. Alarm Pages - Equipment that often has fault conditions shall trigger alarms, for example, when tanks show low levels, and when the pump exceeds its operating pressure. Alarms shall be displayed on a separate alarm page and an alarm summary page will display a summary of all alarms. Operators will use commands on the alarm pages to handle alarms. Hardware alarms (faults within the Operator Interface System itself) will be reported on a hardware alarm page. All alarm pages will be displayed from buttons on the menu page.

- 1) Hardware Alarms - The hardware button will display all hardware alarms (faults within the OIS) on the hardware alarm page. These alarms will be handled directly from the program, needing no configuration. These alarms are included in the operating interface system of the SCADA program.
 - 2) Alarms - Configured alarms will be logged to an ASCII file and displayed on the default alarm page, displayed by selecting the alarm button on the menu page. To acknowledge an alarm, operators will select the alarm and click the left mouse button or press the enter key. To acknowledge all alarms, operators will select the "Alarm Ack" button. (Only authorized operators will have the privilege to acknowledge alarms.)
 - 3) An alarm changes color when it is acknowledged, but remains displayed on the alarm page at each plant location and on the SCADA Workstation PC at the main control rooms until it is reset. Each alarm is identified by its name, current state, the time it changed state and (for analog alarms) the current value of the analog variable. The authorized person to acknowledge the alarm shall be identified by the SCADA system.
 - 4) Alarm Summary - A summary of alarms will be logged to a dBASE file and displayed on the Alarm Summary page for each plant, displayed by selecting the "Alarm Summary" button on the menu page. Each alarm is summarized by its name, current state, the time it changed state and the time taken to return it to its normal state. The alarm summary will be displayed on request and printed. For the Alarm Dialing System a page with all the alarms in the system shall be available. The Superintendent or his delegates shall be able to edit the page by selecting the alarms, messages, and telephone numbers to be called as per the system requirements.
 - 5) Automatic Dialing Alarm - An automatic PC dialing alarm system shall be in place to be utilized when an alarm situation takes place. This shall allow the system to text message one of several on-call personnel smart phones and deliver a pre-programmed text message for each individual alarm (i.e., Plant No. 5 high pH) based upon the problem that has occurred. The PC shall receive an acknowledgement via operator calling into PC via telephone. If the first smart phone is not acknowledged a second smart phone shall be placed to a second person and so on until an acknowledgement is received. The user shall be able to program the messages. The alarm conditions and messages shall be for high/low pH and chlorine residual, high nitrates and high and low tank levels.
9. The contractor shall provide an editing alarm page with all the alarms in the system for the Water District representative to select the alarms (enable/disable) to be in the "Automatic PC Dialing Alarm System".
10. Report Pages - For the System, reports shall be printed in a regular schedule or on request.
- a. Regular Scheduled Reports - The regular reports will be printed at the end of the day every day, monthly and yearly. The following is a list of regular reports:
 - 1) Operating Hours:
 - (a) Report 1 - All Wells and Boosters in system.
 - (b) In these reports, the hours of operation of each Well pump, Booster pump in the system is recorded daily (every minute), monthly (every day) and yearly (every month).
 - (c) The system shall be able to reset the hours of operation when a pump is being replaced. An editing page shall be available for the superintendent or his delegates to reset the counter. The SCADA System shall maintain a database of the equipment operating hours for each plant in the system. Equipment Operating Hours trends shall be available on request; they can be daily trend, monthly trend and yearly trend.
 - 2) Flows:
 - (a) Report 2- All Wells in system.
 - (b) Report 3 - All Boosters in system.

- (c) In these reports, the flow of water pumped from each pump is recorded daily, monthly and yearly. The SCADA System shall maintain a database of the Flows for each plant in the system. Flows trends shall be available on request; they can be daily trend, monthly trend and yearly trend. The same report shall be developed for the booster pumps.
- 3) Alarms:
 - (a) Report 4 - Summary (Daily)
 - (b) Report 5 - All Plants (On Request)
 - (c) In these reports, the alarms for each location are recorded daily, monthly and yearly. The SCADA System shall maintain a database of the alarms in the system. Alarms trends shall be available on request; they can be daily trend, monthly trend and yearly trend.
 - (d) Any alarm in the system, when it occurred, shall be indicated on the workstation PC's at the main SCADA control room and at all GUI locations. The alarm shall be clearly identified (flashing message) at any screen on the PC and only on the GUI at which the alarm has occurred. e.g. "Well No. 5-1 - Incomplete Valve Cycle"
- 4) Tanks Level:
 - (a) Report 6 - All storage tanks in system.
 - (b) In these reports, the Water Tank Levels are recorded daily, monthly and yearly. The SCADA System shall maintain a database of the Tanks Level in the system. Tank Level trends shall be available on request; they can be daily trend, monthly trend and yearly trend.
- 5) Chlorine/pH Level:
 - (a) Report 7 - All Plants in System.
 - (b) In these reports, the chlorine and pH Levels and are recorded daily, monthly and yearly. The SCADA System shall maintain a database of the Levels. Trends shall be available on request; they can be daily trend, monthly trend and yearly trend.
- 6) High Pumpage Day of the Month:
 - (a) Report 9 - High pumpage day of the Month (Monthly).
 - (b) In these reports, the High Pumpage Day of the Month for all Plants recorded monthly and yearly. The SCADA System shall maintain a database of the High Pumpage Days in the system. The pumpage trends shall be available on request; they can be monthly trend and yearly trend.
- 7) Yearly Pumpage:
 - (a) Report 10 - Yearly Pumpage (Yearly).
 - (b) In this report, the yearly pumpage for all Plants is added and recorded yearly. The SCADA System shall maintain a database of the Yearly pumpage in the system. The pumpage trends shall be available on request. (Develop same report but separate for all booster pumps).
- 8) High-Low-Average pH and chlorine residuals:
 - (a) Report 12 - High-Low-Average pH and chlorine residuals.
 - (b) In this report the high-low and average pH and chlorine residuals shall be recorded daily, monthly and annually. This report shall only record high-low and average levels if the well is running into system. If well did not run into system for that day a "did not run" shall be the data entry. Each month this report shall provide a high-low daily level for each well and at the end of the month the average value of only the days the well was running into system.
- 9) Reports on request:
 - (a) The plants chemical treatment data and the trend or graph reports are on request. The chemical reports are templates that have to be completed from the keyboard by the operator and the trend reports have to be edited by the operator from editing page. The SCADA System shall have an editing page that will allow the operator to request a graph or trend for a particular

plant or pump for a selected period of time. For each plant data of chemicals being used in the system shall be input to the SCADA System via the workstation. Reports and trend for pH and Chlorine residual data (when possible) shall be available.

- (b) When the report requested is not available on the server hard drive the operator shall have the ability to access the network storage drive at either birch drive or the administration building using a dialogue box on the screen where the data for the report requested is available. All data will be in Microsoft Excel format and will be able to be modified by the District as required.
- 11. Operator Commands:
 - a. Operators will activate the commands from both keyboard function keys and command buttons drawn on the graphics pages.
 - b. Commands that will be needed from any page will be configured as system keyboard commands. Commands local to a page will be configured as page keyboard commands, activated either from function keys or from buttons drawn on the page. Operators will activate buttons by positioning the mouse pointer on the button and either clicking the mouse button or pressing the Enter key on the keyboard.
 - c. Commands will be configured on the production page to change process variables - to switch pumps and valves on/off or open/closed. The modified variables will be written back into the PLC registers, to control the devices by authorized password only.
 - 12. Security:
 - a. Process data will be secured against unauthorized use by the use of passwords and user privileges. Users will be classified as either operators or supervisors, with access to a subset of commands. The OIS will use passwords to ensure security in the application. The levels of security are as follows:
 - 1) Level One - The application will start up this level. Only the Password button can be executed.
 - 2) Level Two (Operator) - The operator will enter a password to reach Level Two, from which all plant monitoring, operations and alarm acknowledgement functions will be available.
 - 3) Level Three (Assistant Superintendent) - The Assistant Superintendent's password will be entered to attain this level, from which system commands will be available.
 - 4) Level Four (Superintendent) - The Superintendent's password will be entered to attain this level, from which system commands will be available.

3.02 SCADA SCREEN DISPLAY AND CONTROL FEATURES

A. Plant No. 2A

- 1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, pH, chlorine residual, alarms (all), and chemical safeties.
- 2. Control - Provide on/off setpoint control to select Well No. 2A to run on elevated tank or system pressure or pressure tracking. Provide control to prestart and prestop well. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
- 3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.

B. Plant No. 3A

- 1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, pH, chlorine residual, tank 8 and tank 9 level, alarms (all), and chemical safeties.

2. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, well flow, system pressure, pH, chlorine residual, tank 58 level, alarms (all), and chemical safeties.
 3. Control - Provide on/off setpoint control to select Well No. 3A to run on elevated tank or system pressure or pressure tracking. Provide control to prestart and prestop well. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
 4. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.
- C. Plant No. 4
1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, pH, chlorine residual, alarms (all), and chemical safeties.
 2. Control - Provide on/off setpoint control to select Well No. 4-1 to run on elevated tank or system pressure and to select Well No. 4-2 to run on elevated tank or system pressure or pressure tracking. Provide control to prestart and prestop wells. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
 3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.
- D. Plant No. 5
1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, iron removal system status, pH, chlorine residual, alarms (all), generator running, ATS position status, and chemical safeties.
 2. Control - Provide on/off setpoint control to select Well No. 5-1 to run on elevated tank or system pressure and to select Well No. 5-2 to run on elevated tank or system pressure or pressure tracking. Provide control to prestart and prestop wells. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
 3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.
- E. Plant No. 10
1. Display booster on/off, discharge valve open/closed, reverse valve open/closed, altitude control valve open/closed, altitude butterfly valve open/closed, low zone check valve open/closed, forward flow, reverse flow, high zone pressure, low zone pressure, tank 10 level, alarms (all).
 2. Control - Provide on/off setpoint control to select booster A and booster B to run on tank level or system pressure or pressure tracking. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
 3. Alarms - Provide setpoint control to set high and low pressure alarms and low flow alarm.
- F. Plant 11
1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, pH, chlorine residual, tank 8 and tank 9 level, alarms (all), and chemical safeties.
 2. Control - Provide on/off setpoint control to select Well No. 11-1 and Well No. 11-2 to run on tank level or system pressure. Provide control to prestart and prestop wells. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
 3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.

G. Plant 15

1. Display well on/off, booster on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, check valve open/closed, motorized butterfly valves open/closed, backspin status, well flow, well discharge pressure, plant effluent flow, system pressure, pH (well and booster), chlorine residual (well and booster), tank 15 level, alarms (all), well generator running, well ATS position status, booster generator running, booster ATS position status, and chemical safeties.
2. Control - Provide on/off setpoint control for Well Nos. 15-1, 15-2, and 15-3 to run on tank level in a lead/lag 1/lag 2 configuration. Provide on/off setpoint control for Booster Pumps A, B, C to run on tank level or system pressure in a lead/lag 1/lag 2 configuration. Provide control to prestart and prestop wells. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.

H. Plant 16

1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, pH, chlorine residual, pressure relief valve status, check valve status, alarms (all), generator running, ATS position status, and chemical safeties.
2. Control - Provide on/off setpoint control to select Well No. 16 to run on tank level or system pressure. Provide control to prestart and prestop wells. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.

I. Plant 17

1. Display well on/off, chemical pumps on/off, blowoff valve open/closed, discharge valve open/closed, backspin status, well flow, system pressure, pH, chlorine residual, alarms (all), and chemical safeties.
2. Control - Provide on/off setpoint control to select Well No. 17 to run on tank level or system pressure. Provide control to prestart and prestop wells. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
3. Alarms - Provide setpoint control to set high and low pH and chlorine residual alarms, high and low pressure alarms and low flow alarm.

J. Plant 18

1. Display booster on/off, discharge valve open/closed, check valve open/closed, suction pressure, discharge pressure, and alarms (all).
2. Control - Provide on/off setpoint control to select booster to run on tank level or system pressure or pressure tracking. Provide setpoint control for pressure start/stop delay setpoints, automatic switchover to pressure time delay and pressure enable/disable control.
3. Alarms - Provide setpoint control to set high and low pressure alarms and low flow alarm.

3.03 SCADA DISTRICT SCREENS - GUI FUNCTION

- A. The SCADA terminal shall allow operator access to the operating system to view the system overview, view and acknowledge alarms, view and change the variable settings for the local plant only. Access code is required for changing setpoints, alarms acknowledge and resetting. The SCADA System shall provide an editing page to assign the password code to the superintendent and its delegates. Every employee shall be assigned his own access code.

- B. Tank levels and pressure set points, time delays and alarm settings can be changed on the screen. It is required that an access password and any change shall be recorded and automatically included in the SCADA System and vice-versa when any change in setting takes place in another GUI or in the workstation PC the change will be automatically included in all elements of the SCADA System.
- C. All setpoints changed will be recorded on the SCADA system including the date, time and the authorized person.
- D. The information available at each SCADA terminal must be available at the SCADA System workstation PC's, plus the summary pages and reports. All the data, identification tags, symbols, graphics, time reference, alarms identification and pages, plant overview pages, variables identification and pages, access code and wording shall be the same throughout the SCADA System.

3.04 REMOTE SCADA SYSTEM ACCESS

- A. Provide new dedicated static IP address on new admin building cable modem and plant no. 5 cable modem to allow remote access into new SCADA network VPN. Coordinate with District IT personnel as required.
- B. Configure VPN router to accept remote connections. Configure firewall to protect VPN from unauthorized access.
- C. Allow remote users to have control of the SCADA system based on their login and security level. All password protection to login and make changes to setpoints shall be required even when a user is using the remote login.
- D. Provide, Install and fully configure three (6) copies of the VPN client software on to all of the District's servers/PCs/laptops as directed by the engineer. Install sixteen (10) copies of the VPN client software at the remote plant sites.

END OF SECTION 265015

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. High Water Level Sensors.

1.02 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Provide layout drawings, wiring diagrams, components list and operation and maintenance instructions.

PART 2 - PRODUCTS

2.01 HIGH WATER LEVEL SENSOR

- A. Sensor shall be as manufactured by GEMS SENSORS Model LS-270.
- B. Stem and Mounting: 304 Stainless steel.
- C. Float: Buna N
- D. Other Wetted parts: Beryllium Copper, Copper Nickel, Polycarb.
- E. Temperature: -40°F to +140°F (-40°C to +60°C).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install intrinsically safe relays in instrumentation and control cubicle.
- B. Install all control wires from water level sensors. Provide junction box for connection complete with protective bushings.
- C. Install high water level sensors 2" above floor.

END OF SECTION 265016

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary electric service for construction.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Shop Drawings: Indicate locations where temporary electric service will be located and routed.

1.04 REGULATORY REQUIREMENTS

- A. Obtain required permits from authorities.
- B. Notify affected utility companies before starting work and comply with their requirements.
- C. Do not close or obstruct egress width to exits.
- D. Do not turn off electric equipment without authorization from Owner and Engineer. Provide 72 hours advance notification.

PART 2 - PRODUCTS

2.01 TEMPORARY ELECTRIC SERVICE

- A. Temporary service shall be available during the entire contract period and during all phases of work, day and night for new Treatment Building and Well building..
- B. Temporary service shall be installed and maintained per NEC, OSHA, N.Y. State Uniform Building Code and Local Utility requirements.
- C. The temporary electrical service shall be sized correctly for all of the new and existing loads.
- D. All existing equipment shall be protected against damage caused by the installation, operation and removal of the temporary service. Any equipment or items damaged shall be replaced at no cost to the Owner.
- E. Provide temporary lighting for new Treatment Building and Well No. 5-1. Minimum foot candle for temporary lighting: 30 F.C., measured at floor surface. The Contractor shall set up light to minimize glare.
- F. Provide wiring, utility poles, metering equipment, distribution panel and other equipment for temporary light and power to Well No. 5-1 and 5-2. Contractor shall pay all fees required for temporary service and complete all required applications. Contractor shall pay all application and construction fees required for temporary service and complete all required applications. Contractor shall pay for all electrical consumption for temporary service.
- G. Provide Owner with three (3) keys to all distribution panels for temporary power for distribution to General Contractor and District Personnel.

- H. Wiring for temporary light, controls and power shall include a distribution panel for 4 wire, 120/240 volt, 200 AMP service. Feeders in building shall have branch circuits of #12 conductors minimum. Contractor shall pay all application and construction fees required for temporary service and complete all required applications
- I. Provide 20 amp branch circuits with fused ground type receptacle outlet for single phase power.
- J. Where distribution panels are provided for temporary power provide four (4) 20 amp circuits with #12 AWG SO cord pigtails with 20 amp plugs with strain relief. Provide one (1) 30 amp circuit with #10 AWG SO cord pigtail with 30 amp plug with strain relief.
- K. Provide lamps and fuses, including replacements required.
- L. Provide new materials for temporary light and power.
- M. Provide ground fault protection (such as portable plug-in type ground fault circuit interrupters) on single phase 20 amp receptacle outlets.
- N. Provide receptacle outlets, portable cord connectors and attachment plugs with standard NEMA configurations.
- O. Install all temporary light and power materials in accordance with National Electrical Code.
- P. Upon completion of the project, remove all temporary electric light and power work and restore all affected finishes, connections and sitework.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing system voltage characteristics and match to existing system voltage characteristics.
- B. Verify that the temporary service is sized to accommodate all loads.
- C. Determine locations and routings for temporary electric wires, cables and conduits with Engineer and Owner.

3.02 TEMPORARY POWER

- A. Temporary wiring and power shall be installed so as not to be a hazard and shall be protected from damage. Separate circuits shall be provided for light and power. Over-current protective devices and switches shall be provided. All equipment, tools, metal cabinets and boxes shall be grounded.
- B. Disable existing power only to make final connections or when new service is to be installed.
- C. Remove and dispose of all temporary power and control feeds after receiving written approval from Engineer. Restore all finishes to original specified conditions.

END OF SECTION 267174

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Remove and dispose of surface debris as required.
- B. Remove and dispose of paving, sidewalk, curbs, etc.
- C. Clear site or designated areas of the site of plant life and grass as required, and dispose of as required.
- D. Remove and dispose of trees and shrubs as required.
- E. Remove and dispose of stumps and root system of trees and shrubs as required.
- F. Removal and storage of topsoil.

1.02 RELATED SECTIONS

- A. Section 312213 - Rough Grading.
- B. Section 329119.13 - Topsoil Placement and Grading: Placement of stored topsoil.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable local code(s) for disposal of debris.
- B. Burning of materials on site is prohibited.
- C. Coordinate clearing work with utility companies.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify existing conditions.
- B. Identify existing plant life designated to be removed. Verify with Owner and Engineer prior to removal.
- C. Verify limits of clearing.

3.02 PROTECTION

- A. Locate, identify and protect utilities that are to remain from damage.
- B. Protect trees, plant growth and features designated to remain as final landscaping.
- C. Protect benchmarks and existing structures from damage or displacement. Any damage to existing structures is to be promptly repaired at no additional cost to the Owner.

3.03 APPLICATION

- A. Clear areas required for access to site and execution of work.
- B. Remove paving, curbs, debris and sidewalks as required.
- C. Remove trees and shrubs designated to be removed. Remove stumps, main root ball, surface rock and perishable debris.
- D. Clear undergrowth and dead wood without disturbing subsoil.
- E. Remove paving, debris, rock and extracted plant life from site and dispose of in accordance with State and local ordinances.
- F. Excavate topsoil from areas to be further excavated, re-landscaped or regraded. Do not excavate wet topsoil.
- G. Stockpile topsoil in area designated on site to a height not exceeding 8 feet. Protect from erosion. Remove excess topsoil not being reused from site. Do not remove any topsoil from the site prior to obtaining the approval of the Engineer.

END OF SECTION 311110

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Removal and storage of subsoil.
- B. Cutting, grading, filling and rough contouring the site prior to placement of topsoil, pavement, concrete curb and sidewalk or final grading.

1.02 RELATED SECTIONS

- A. Section 312323.13 - Backfilling
- B. Section 312333 - Trenching

1.03 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Sieve Analysis: Submit a sieve analysis of all types of fill material to be used.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of utilities remaining, by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Subsoil: Reused excavated material, graded, free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify site conditions.
- B. Verify that survey benchmark and intended elevations for the work are as indicated.

3.02 PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Identify known underground, aboveground and aerial utilities. Stake and flag locations.
- C. Coordinate the removal or relocation of utilities with the necessary utility companies.
- D. Protect above and below-grade utilities that are to remain.

- E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- F. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

3.03 APPLICATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped or re-graded. Do not excavate wet subsoil.
- B. Stockpile in area designated on site. Remove excess subsoil not being reused from site.
- C. Stockpile subsoil to a height not exceeding 8 feet. Cover to protect from erosion.
- D. When excavation through roots is necessary, perform work by hand and cut roots with sharp axe.
- E. Fill areas to contours and elevations with unfrozen subsoil material with allowances made for topsoil, aggregate base course or paving.
- F. Place and compact subsoil fill material in continuous layers not exceeding 6 inches compacted depth, compacted to 95 percent maximum dry density in accordance with ANSI/ASTM D1557.
- G. Maintain optimum moisture content of fill materials to attain required compaction density.
- H. Make grade changes gradual. Blend slope into level areas.
- I. Remove surplus fill materials from site.

3.04 TOLERANCES

- A. Maximum Variation From Top Surface of Sub-grade: 1 inch.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Perform tests and analysis of fill material in accordance with ANSI/ASTM D1557.
- C. Perform compaction tests at a rate of one for every 10 cubic yards of material placed.

END OF SECTION 312213

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavation for building foundations.
- B. Excavation for slabs-on-grade, paving and landscaping.
- C. Excavation for site structures.
- D. Site excavation.

1.02 RELATED SECTIONS

- A. Section 312213 - Rough Grading.
- B. Section 312323.13 - Backfill.

1.03 QUALITY ASSURANCE

- A. Do not excavate wet or frozen materials without written approval from the Engineer.
- B. Provide safety barricades around open excavations.

1.04 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the work are as indicated.

1.05 COORDINATION

- A. Coordinate work under provisions of Section 013100.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Identify known underground, above ground and aerial utilities. Stake and flag locations.
- C. Notify utility company to remove or relocate utilities, if required.
- D. Protect above and below grade utilities which are to remain.
- E. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- F. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.
- G. Notify the Engineer prior to commencement of excavation.

3.02 EXCAVATION

- A. Underpin adjacent structures that may be damaged by excavation work, including utilities and pipe chases.
- B. Excavate subsoil required to accommodate landscaping and construction operations to the limits as indicated on the plans.
- C. Machine slope banks to angle of repose or less, until shored.
- D. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- E. Hand trim excavation. Remove loose matter.
- F. Remove lumped subsoil, boulders, and rock.
- G. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- H. Correct unauthorized excavation at no extra cost to Owner in accordance with Section 312323.13.
- I. Stockpile excavated material in area designated on site and remove excess material not being reused from site.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Provide for visual inspection of bearing surfaces.

3.04 PROTECTION

- A. Protect work under provisions of Section 015000.
- B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION 312316

PART -1 GENERAL

1.01 SECTION INCLUDES

- A. Site structure backfilling to sub-grade elevations.
- B. Site filling and backfilling.
- C. Consolidation and compaction.
- D. Fill for over-excavation.
- E. Environmental testing.

1.02 RELATED SECTIONS

- A. Section 312316 - Excavation.
- B. Section 312213 - Rough Grading.

1.03 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18-inch Drop.
- B. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Material Source: Submit name of imported material suppliers.
- C. Provide a letter certifying that each type of imported fill material has been provided by a NYSDEC certified clean fill source or has been tested in accordance with NYSDEC Unrestricted Soil Use Guidelines as defined in Subpart 375-6 Remedial Program Soil Cleanup Objectives.
- D. Test Reports: Submit sieve analysis and test results from NYSDEC Unrestricted Soil Use Guidelines for each type of imported fill to be used.

1.05 PROJECT CLOSEOUT SUBMITTALS

- A. Submit under provisions of Section 017200.
- B. Provide documentation on the contractor's letterhead certifying that all fill material utilized for this project came from approved sources and met the requirements of the NYSDEC Unrestricted Program Soil Use Guidelines.

PART 2 - PRODUCTS

2.01 IMPORTED FILL SOURCE

- A. All imported fill materials shall be provided by a NYSDEC certified clean fill source or meet the requirements of NYSDEC Unrestricted Soil Use Guidelines as defined in Subpart 375-6: Remedial Program Soil Cleanup Objectives.
- B. Test samples of imported fill in accordance with the following table:

Recommended Number of Soil Samples for Imported Soil			
Contaminant	VOC's	SVOC's, Inorganics & PCB's/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with DER		

- C. Provide materials from the same source throughout the work. Change of source requires approval from the Engineer.

2.02 FILL MATERIALS

- A. Coarse Aggregate: Angular crushed or natural stone; washed, free of shale, clay, friable material, sand and debris; graded in accordance with ASTM D2487 Group Symbol GW or GP within the following limits

B.

Sieve Size	Percent Passing
1-1/2-inch	100%
1-inch	90-100%
1/2-inch	0-15%
No. 200	0-1%

- C. Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ASTM D2487 Group Symbol GC or GM, within the following limits:

1. Minimum Size: 1/4 inch.
2. Maximum Size: 5/8 inch.

- D. Sand: Natural river or bank sand; washed, free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ASTM D2487 Group Symbol SW or SP, within the following limits:

Sieve Size	Percent Passing
No. 4	100%
No. 14	10-100%
No. 50	5-90%

No. 100	4-30%
No. 200	0%

- E. Subsoil: Reused, excavated material, graded, free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants; no more than 15% passing the No. 200 sieve; no more than 30% retained on the $\frac{3}{4}$ " sieve.
- F. Drywell Collar Material: Clean sand and gravel containing less than 15% fine sand, silt and clay. Silt and clay fractions are not to exceed 5%. Native material may be reused if it meets this requirement.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate.
- B. Verify fill materials to be reused are acceptable.
- C. Verify items to be buried during backfilling process have been inspected prior to backfilling.

3.02 PREPARATION

- A. Compact subgrade to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.
- B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with sand or subsoil and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy materials.
- C. Place and compact fill material in 12 inch lifts (compacted thickness). Compact to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.
- D. Employ a placement method that does not disturb or damage structures or other items against which material is backfilled.
- E. Backfill against supported structures. Do not backfill against unsupported structures.
- F. Backfill simultaneously on each side of structure.
- G. Make grade changes gradual. Blend slope into level areas.
- H. Remove surplus backfill materials from site.
- I. Leave fill material stockpile areas completely free of excess fill materials.

3.04 TOLERANCES

- A. Maximum Variation From Top Surface of Backfilling Under Paved Areas: 1/4 inch.
- B. Maximum Variation From Top Surface of General Backfilling: 1 inch.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Perform field tests and analysis of fill material in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.
- D. Unless additional testing is required by the Engineer, compaction tests shall be taken at the following rates:
 - 1. Pavement Subgrade: One test per 5,000 square feet of subgrade immediately prior to placing subbase.

END OF SECTION 312323.13

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavate trenches for piping and utilities.
- B. Compacted bedding and backfill around and over piping and utilities to subgrade elevations.
- C. Backfilling and compaction.

1.02 RELATED SECTIONS

- A. Section 312213 - Rough Grading

1.03 REFERENCES

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18-inch Drop.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Test Reports: Submit a sieve analysis for backfill to be used.

1.05 QUALITY ASSURANCE

- A. Do not excavate wet or frozen materials without written approval from the Engineer.
- B. Do not backfill over or with wet or frozen materials.
- C. Provide safety barricades around open excavations.

1.06 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the work are as shown on plans.

1.07 COORDINATION

- A. Coordinate work under provisions of Section 013100.
- B. Coordinate trenching with installation of pipe or conduit.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Subsoil: Reused, excavated material, graded, free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing site conditions and substrate.

- B. Verify fill materials to be reused are acceptable.
- C. Verify items to be buried during backfilling process have been inspected prior to backfilling.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining which pass through work area.
- C. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- D. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic. Any item damaged by the contractor shall be promptly repaired at the contractor's expense.
- E. Protect above and below grade utilities which are to remain.
- F. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with subsoil fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATION

- A. Excavate subsoil required for piping.
- B. Cut trenches to the dimensions shown on the plans.
- C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- D. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- E. Remove lumped subsoil, boulders, and rock.
- F. For trenches made in solid rock, excavate to a depth of 1 foot below the proposed pipe invert.
- G. Correct unauthorized excavation at no cost to Owner in accordance with Section 312323.13.
- H. Stockpile excavated material in area designated on site and remove excess material not being used from site. Remove excavated material from site.

3.04 BACKFILLING

- A. Support pipe and conduit during placement and compaction of fill material.
- B. For trenches made in solid rock, place an additional 1 foot of fill material under pipe or conduit.
- C. Place fill material to the dimensions and limits as shown on the plans.
- D. Place and compact fill material in 12 inch lifts (compacted thickness) for depths greater than 2 feet and 6 inch lifts (compacted thickness) for depths less than 2 feet. Compact to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.
- E. Place fill material simultaneously on both sides of the pipe or conduit. Backfill to the dimensions and limits shown on the plans with reused subsoil.

- F. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- G. Place and compact material in continuous layers not exceeding 6 inches compacted depth.
- H. Employ a placement method that does not disturb or damage conduit or pipe.

3.05 TOLERANCES

- A. Maximum Variation From Top Surface of Backfilling Under Paved Areas: 1/4 inch.
- B. Maximum Variation From Top Surface of General Backfilling: 1 inch.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Perform field tests and analysis of fill material in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.
- D. Unless additional testing is required by the Engineer, compaction tests shall be taken at the springline of the pipe and after each lift at 100 foot intervals along the pipe run.

3.07 CLEANING

- A. Remove surplus backfill materials from site.
- B. Leave fill material stockpile areas completely free of excess fill materials.

3.08 PROTECTION

- A. Protect finished work under provisions of Section 015000.
- B. Recompect fills subjected to vehicular traffic.

END OF SECTION 312333

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wood and steel sheeting.
- B. Sheeting box.

1.02 RELATED SECTIONS

- A. Section 312323.13 - Backfilling.
- B. Section 312333 - Trenching.

1.03 REFERENCES

- A. Occupational Safety and Health Standards - Excavations; Final Rule (29 CFR Part 1926) - OSHA Standards.

1.04 QUALITY ASSURANCE

- A. Perform all work of this section in accordance with OSHA Standards and approved shop drawings.

1.05 COORDINATION

- A. Coordinate work under provisions of Section 013100.
- B. Coordinate work with all other sections requiring temporary sheeting and bracing.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood Sheeting: Hardwood species of size and dimensions capable of being driven to the required depths and capable of supporting excavation sides and soil pressures when braced; free from wormholes, wind shakes, loose knots, decayed or unsound portions or defects which would impair its strength or tightness; 2 inches (50 mm) thick minimum.
- B. Steel Sheeting: Corrugated "Z" shape cross-section; of size and dimensions capable of being driven to the required depths and capable of supporting excavation sides and soil pressures when braced; structurally sound; special shapes for corner construction and transition points.
- C. Sheeting Boxes: Steel, of size and dimensions capable of supporting excavation sides and soil pressures; structurally sound.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing substrate and site conditions.
- B. Verify elevations and grades are as indicated on the plans.
- C. Verify proposed locations of excavations are as indicated on the plans.

3.02 PREPARATION

- A. Excavate to a depth no greater than 4 feet (1.2 m) from existing grade.
- B. Assemble and drive the sheeting in accordance with approved shop drawings.

3.03 INSTALLATION - SHEETING

- A. Drive sheeting in place to thoroughly support both sides of the excavation using a sheeting hammer. Use a steam or pneumatic hammer for steel sheeting.
- B. Water jetting of sheeting will not be permitted. Do not loosen adjacent ground which might result in collapse.
- C. Install walls and braces or shores tight and in accordance with approved shop drawings.

3.04 INSTALLATION - SHEETING BOX

- A. Place box in trench utilizing a means which will not damage structural integrity of the box.
- B. Excavate ahead of the sheeting box only enough to advance the sheeting box and only immediately prior to moving the sheeting box.
- C. Backfill on both sides of the sheeting box as it is moved.

3.05 REMOVAL OF SHEETING

- A. Remove sheeting only as backfilling progresses.
- B. Carefully remove sheeting such that compacted backfill is not displaced. Add additional backfill to the areas vacated by the sheeting.
- C. All sheeting is to be removed from the site once its use is no longer required.

3.06 CLEANING

- A. Clean site of any debris from work of this section

END OF SECTION 315000

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Recycled concrete aggregate base course.

1.02 RELATED SECTIONS

- A. Section 312213 - Rough Grading.
- B. Section 312323.13 - Backfilling.
- C. Section 312333 - Trenching.

1.03 REFERENCES

- A. ANSI/ASTM C88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- B. ANSI/ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.
- C. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18-inch Drop.
- D. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Test Reports: Submit a sieve analysis for the aggregate base course used.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products to the site under provisions of Section 016500.
- B. Do not handle aggregate in any manner which will cause segregation of large or fine particles.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aggregate Base Course: At least 95% by weight, of angular, crushed, recycled concrete; free of organic matter and deleterious material; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2-inch	90-100%
1/4-inch	30-65%
No. 40	5-40%
No. 200	0-10%

- B. The material may contain up to 5% by weight of asphalt and/or brick.
- C. Material retained on the 1/2 inch sieve is coarse aggregate.

- D. Coarse aggregate shall not have more than 10 percent by weight of flat or elongated pieces. A flat or elongated piece is defined as being three times greater in the largest dimension as compared to its least dimension.
- E. The portion of the aggregate base course which passes the No. 40 screen shall have a plasticity index of one as tested in accordance with ASTM D4318.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate.
- B. Verify elevations of subgrade are as indicated on the plans.
- C. Verify that subgrade is properly compacted and ready to receive work of this section.
- D. Beginning work of this section means acceptance of existing conditions.

3.02 PREPARATION

- A. Fine grade and compact subgrade to 95 percent maximum dry density in accordance with ANSI/ASTM D1557.

3.03 AGGREGATE PLACEMENT

- A. Spread course aggregate over prepared subgrade to a total compacted thickness as indicated on the plans.
- B. Place aggregate in 3 inch layers and compact by roller.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Compact placed aggregate materials to achieve 95% maximum dry density in accordance with ANSI/ASTM D1557. Maintain optimum moisture content to attain required density.
- F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.
- H. New pavement must be placed on the properly compacted aggregate base course within 24 hours of final compaction. If aggregate base course is left open for more than 24 hours, re-compact and retest in accordance with ANSI/ASTM D1557.

3.04 TOLERANCES

- A. Maximum Variation From Flatness: 1/4 inch measured with 10 foot straight edge.
- B. Maximum Variation From Scheduled Compacted Thickness: 1/4 inch.
- C. Maximum Variation from True Elevation: 1/4 inch.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Perform compaction testing in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.
- D. Frequency of Tests: One test per 500 sq ft. immediately prior to paving.

END OF SECTION 321123.16

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Asphaltic concrete paving; wearing, binder or base course.

1.02 RELATED SECTIONS

- A. Section 321123 - Recycled Concrete Aggregate Base Course.

1.03 REFERENCES

- A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
- B. AI MS-8 - Asphalt Paving Manual.
- C. ASTM D242 - Mineral Filler for Bituminous Paving Mixtures.
- D. ASTM D546 - Test Method for Sieve Analysis of Mineral Filler for Road and Paving Materials.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Supplier: Submit name of asphalt supplier to be used on the project prior to placement of any asphalt on the project.
- C. Design Data: Submit asphalt mix design for each asphalt type to be used.
- D. Testing Firm: Submit name of testing firm to be performing tests on asphalt pavement.

1.05 QUALITY ASSURANCE

- A. Obtain materials from the same supplier throughout the duration of the project.
- B. Do not alter from mix design requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products to the site under provisions of Section 016500.
- B. Deliver asphalt in sealed, metal containers covered with suitable material to protect the asphalt from the elements.
- C. Lightly lubricate the inside surface of the container with a thin oil or soap solution before loading asphalt.
- D. All containers must be cleaned of all foreign materials prior to loading.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when base surface temperature is less than 40 degrees F, or if surface is wet or frozen.
- B. Do not place asphalt when precipitation is occurring.

PART 2 - PRODUCTS

2.01 2.01 - MATERIALS

- A. Asphalt Cement: AC-20; homogeneous, and shall not foam when heated to 347 degrees F.
- B. Fine Aggregate: Material passing the 1/8 inch sieve; natural sand of hard, strong, durable particles which are free from coatings or injurious amounts of clay, loam or other deleterious substances.
- C. Coarse Aggregate: Material retained on the 1/8 inch sieve; crushed stone or gravel; clean, durable, sharp angled fragments of rock of uniform quality.
- D. Mineral Filler: ASTM D242, finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter; 100 percent shall pass the No. 30 sieve; a minimum of 85 percent shall pass the No. 80 sieve; and a minimum of 65 percent shall pass the No. 200 sieve as measured in accordance with ASTM D546.

2.02 2.02 - EQUIPMENT

- A. Rollers: Minimum weight of 10 tons; equipped with lubricating devices for the roller wheels.
- B. Pavers: Equipped with a vibratory device.

2.03 2.03 - ACCESSORIES

- A. Tack Coat: Homogeneous, medium curing, liquid asphalt.
- B. Wheel Lubricant: Oil-water mixture containing maximum 10 percent lubricating oil.

2.04 2.04 - MIXES

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Base Course: NYSDOT Type 1; 4.0 to 6.0 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
2 inches	100
1 ½ inches	90-100
1 inch	78-95
½ inch	57-84
¼ inch	40-72
1/8 inch	26-57
No. 20	12-36
No. 40	8-25
No. 80	4-16
No. 200	2-8

- C. Binder Course: NYSDOT Type 3; 4.5 to 6.5 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing

1-1/2 inches	100
1 inch	95-100
1/2 inch	70-90
1/4 inch	48-74
1/8 inch	32-62
No. 20	15-39
No. 40	8-27
No. 80	4-16
No. 200	2-8

- D. Wearing Course: NYSDOT Type 6; 5.8 to 7.0 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
1 inch	100
1/2 inch	95-100
1/4 inch	65-85
1/8 inch	36-65
No. 20	15-39
No. 40	8-27
No. 80	4-16
No. 200	3-6

2.05 SOURCE QUALITY CONTROL

- A. Obtain asphalt materials from same source throughout the project.
- B. Provide asphalt in accordance with the approved mix design for each type of asphalt.
- C. Test samples in accordance with AI MS-2.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate.
- B. Verify that compacted subbase is dry and ready to receive work of this section.
- C. Verify gradients and elevations of base are correct.
- D. Verify that all castings are properly installed and are at the correct elevations.
- E. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Apply tack coat at uniform rate of 0.03 to 0.07 gal/sq. yd. to contact surfaces of castings, curbs, gutters and any asphalt or concrete material.
- B. Do not apply tack coat to wet or frozen surfaces.

- C. Coat top surfaces of castings with oil to prevent bond with asphalt pavement.

3.03 INSTALLATION

- A. Install work in accordance with AI MS-8.
- B. Maintain asphalt temperature between 250 and 325 degrees F during placement.
- C. Place asphalt within 24 hours of applying tack coat.
- D. Place asphalt to compacted thicknesses as identified on plans. If a multiple course pavement is to be used, place top course within 24 hours of placing bottom course. If more than 24 hours elapse, a tack coat will be required to be placed over the entire surface of the bottom course prior to any additional paving.
- E. Utilize the vibratory device on the paver at all times.
- F. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- G. Compact pavement to a minimum of 94% maximum density.
- H. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.
- I. Seal all joints between new pavement and existing pavement with asphalt cement.

3.04 TOLERANCES

- A. Maximum Variation From Flatness: 1/8 inch measured with 10 foot straight edge.
- B. Maximum Variation From Scheduled Compacted Thickness: 1/8 inch.
- C. Maximum Variation from True Elevation: 1/4 inch.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014500.
- B. Take samples and perform tests in accordance with AI MS-2.
- C. Test are to include percent compaction, gradation and asphalt content.
- D. Provide an asphalt thermometer for determining the asphalt temperature during paving operations.
- E. Frequency of Tests: One test for every 1,000 square feet of each pavement course.

3.06 PROTECTION

- A. Protect finished work under provisions of Section 015000.
- B. Immediately after placement, protect pavement from mechanical injury until project is accepted by the Owner.

END OF SECTION 321216

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Concrete sidewalks, handicap ramps, driveway aprons.
- B. Formwork.

1.02 RELATED SECTIONS

- A. Section 312213 - Rough Grading: Preparation of subgrade for sidewalk placement.

1.03 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- C. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- D. ASTM C33 - Concrete Aggregates.
- E. ASTM C94 - Ready Mix Concrete.
- F. ASTM C150 - Portland Cement
- G. ASTM C260 - Air-Entraining Admixtures for Concrete.
- H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- I. ASTM C494 - Chemical Admixtures for Concrete.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on joint filler, admixtures and curing compounds.
- C. Supplier: Submit name of concrete supplier prior to the placement of any concrete on the project.
- D. Design Data: Provide a design mix for each type of concrete to be used on the project.
- E. Certificates: Submit receipts of all concrete deliveries, indicating source, date, contractor, amount of concrete, concrete strength, truck number and time load was batched.
- F. Testing Firm: Submit name of testing firm to be performing tests on concrete.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 017839.
- B. Accurately record locations of each day's concrete pour.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain concrete only from approved suppliers and maintain the same source throughout the project.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products to the site under provisions of Section 016500.
- B. Deliver concrete in accordance with ASTM C94, Alternative No. 2.
- C. Place all concrete within 90 minutes of time load was batched.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or if surface is wet or frozen.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cement: ASTM C150, air entraining, Type 1A Portland, gray color.
- B. Aggregates: ASTM C33.
- C. Water: Potable and not detrimental to concrete.
- D. Reinforcement: ANSI/ASTM A185 plain welded steel wire fabric; in flat sheets; uncoated finish.

2.02 ACCESSORIES

- A. Forms: Douglas Fir plywood type; solid, sound, undamaged sheets.
- B. Joint Filler: ANSI/ASTM D1751; 1/2 inch thick.
- C. Air Entraining Admixture: ASTM C260.
- D. Chemical Admixture: ASTM C494, type as required.
- E. Curing Compound: ASTM C309, Type 1, Class A.
- F. Form Release Agent: Colorless material which will not stain concrete or absorb moisture.
- G. Detectable Warning Surface: SAFTI-TRAX Mats or equal.
- H. Joint Sealant: ASTM C920,,Type M, Grade P; SL-2 by Sonneborn or equal.

2.03 MIXES

- A. Concrete shall be mixed and prepared in accordance with the approved mix design and ASTM C94, Alternative No. 2.
- B. The mix shall be such that the concrete shall attain the following characteristics:

1. Compressive Strength (28 days): 4,000 psi.
 2. Slump: 2½ to 3½ inches.
 3. Air Entrainment: 6% ±1%.
- C. Use chemical admixtures only when approved by the Engineer. Use of admixtures will not relax placement requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate.
- B. Verify datum and all elevations are as indicated on the plans.
- C. Verify compacted granular subbase has been properly prepared and is ready to receive work of this section.
- D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Compact base to minimum 95 percent maximum dry density in accordance with ANSI/ASTM D1557.
- B. Moisten base to a minimum depth of 1/2 inch to minimize absorption of water from fresh concrete.
- C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.
- D. Place and secure forms to correct location, dimension and profile.
- E. Assemble formwork to permit easy stripping and dismantling without damaging concrete. Coat forms with form release agent.

3.03 INSTALLATION

- A. Place joint filler vertical in position in straight lines. Secure to formwork during concrete placement.
- B. Place reinforcement as indicated on the plans. Interrupt reinforcement at expansion joints.
- C. Place concrete in accordance with ACI 301.
- D. Ensure reinforcement and formed joints are not disturbed during concrete placement.
- E. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that joints occur.
- F. Vibrate concrete adjacent to forms.
- G. Place concrete to pattern indicated.
- H. Place expansion joints with joint filler at 20 foot intervals.
- I. Place scored contraction joints at 4 foot intervals.

- J. Place joint filler between paving components and building or other appurtenances and in expansion joints.
- K. Apply a light broom finish perpendicular to traffic.
- L. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing shall be performed under provisions of Section 014500.
- B. Take six concrete test cylinders for every 50 cu. yds. or fraction thereof of each class of concrete placed each day.
- C. Cure test cylinders on site under same conditions as concrete sidewalk.
- D. Take one slump test for each set of test cylinders taken.
- E. Concrete not meeting slump requirements will be rejected.
- F. Concrete represented by cylinders which do not meet required strength will be removed and replaced at no additional cost to the Owner.

3.05 PROTECTION

- A. Protect finished work under provisions of Section 015000.
- B. Immediately after placement, protect sidewalk from premature drying, excessive temperatures and mechanical injury.
- C. Protect sidewalk from damage until project is accepted by the Owner.

END OF SECTION 321313.33

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. PVC coated fence framework, fabric and accessories.
- B. Excavation for post bases; concrete foundation for posts and center drop for gates.
- C. Manual swing gates and related hardware.

1.02 RELATED SECTIONS

- A. Section 312316 - Excavation: Excavation for fence posts.

1.03 REFERENCES

- A. ANSI/ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ANSI/ASTM F567 - Installation of Chain Link Fence.
- C. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire.
- D. ASTM A392 - Zinc-Coated Steel Chain Link Fence Fabric.
- E. ASTM C150 - Portland Cement.
- F. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain Link Fence Fabric.
- G. ASTM F900 - Industrial and Commercial Swing Gates.
- H. ASTM F1043 - Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.

1.04 SYSTEM DESCRIPTION

- A. Fence Height: As indicated on plans.
- B. Line Post Spacing: As indicated on plans. If not indicated, intervals shall not exceed 10 feet.

1.05 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- C. Manufacturer's Installation Instructions: Indicate installation requirements and post foundation anchor bolt templates.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 017839.
- B. Accurately record actual locations of property perimeter posts relative to property lines and easements.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with ANSI/ASTM F567.
- B. Maintain one copy of document on site.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

1.09 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on the plans.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. ANCHOR FENCE, INC.
- B. AMERICAN FENCE CORPORATION.
- C. Substitutions shall be permitted only after receiving written approval from the Engineer.

2.02 MATERIALS

- A. Fence Framing: ASTM F1043; SS40 steel pipe, standard weight, one piece without joints.
- B. Fabric Wire: ASTM A392; Zinc-coated No. 9 steel core wire fabric with 2 inch squares, top and bottom selvage knuckle end closed.
- C. Gate Framing: ASTM F900; SS40 steel pipe, standard weight, one piece without joints.
- D. Barbed Wire: ASTM A121; Galvanized steel, 12 gage thick wire, 3 strands, 4 points at 5 inches on center.
- E. Concrete: ASTM C150, Type 1; minimum 4,000 psi strength at 28 days; 3 inch slump; 5 to 7 percent air entrainment.
- F. Tension Wire: 7 gauge thick steel, single strand.
- G. Tie Wire: Aluminum alloy steel wire.

2.03 ACCESSORIES

- A. Caps: Cast steel galvanized or malleable iron galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.
- C. Extension Arms: Cast steel galvanized to accommodate 3 strands of barbed wire, single arm, sloped to 45 degrees.
- D. Gate Hardware: Fork latch with gravity drop; center gate stop and drop rod; two 180 degree gate hinges per leaf and hardware for padlock.

- E. Diagonal Truss Rod with Turnbuckle: ASTM A153 galvanized steel.
- F. Grounding Rod: ANSI/ASTM A123 steel rod.
- G. Privacy Slats: High density polyethylene with ultraviolet inhibitors and locking slats.

2.04 FINISHES

- A. Framework: Galvanized to ANSI/ASTM A123; 1.8 oz/sq ft coating with a 10-15 mil supplemental PVC powder coating in accordance with ASTM F1043.
- B. Fabric and Tension Wire: Galvanized to ANSI/ASTM A123; 0.3 oz/sq ft coating with a 7-12 mil supplemental PVC coating in accordance with ASTM F668.
- C. Fittings and Accessories: Galvanized to 1.2 oz/sq ft coating with a 10-15 mil supplemental PVC powder coating in accordance with ASTM F1043.
- D. Color: Selected by Owner.

PART 3 - PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ANSI/ASTM F567 and manufacturer's instructions.
- B. Set all posts plumb in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- C. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.
- D. Install diagonal truss rod from the center of the gate or corner post to the bottom of the adjacent line post.
- E. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- F. Install brace rail on corner gate leaves.
- G. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- H. Position bottom of fabric 2 inches above finished grade.
- I. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- J. Attach fabric to end, corner and gate posts with tension bars and tension bar clips.
- K. Install bottom tension wire stretched taut between terminal posts.
- L. Do not swing gate from building wall; provide gate posts.
- M. Install gate with fabric and barbed wire overhang to match fence. Install 3 hinges per leaf, latch, catches and drop bolt.

- N. Install concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- O. Install 8 foot grounding rod to fence post.

3.02 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.
- C. Components shall not infringe adjacent property lines.

END OF SECTION 323113.13

PART 1 - GENERAL

SECTION INCLUDES

2.01 BOLLARDS.

2.02 FOOTINGS AND FOUNDATIONS.

A. REFERENCES

1. ASTM A36 - Structural Steel.
2. ASTM C33 - Concrete Aggregates.
3. ASTM C150 - Portland Cement.
4. ASTM C260 - Air-Entraining Admixtures for Concrete.
5. ASTM C330 - Lightweight Aggregates for Structural Concrete.

B. SUBMITTALS FOR REVIEW

1. Section 01330 - Submittals PART 2 - PRODUCTS

C. MATERIALS

1. A-36 structural steel tubing.

D. BOLLARDS

1. Formed Steel Tubes: 1/4" thick, 6" diameter galvanized steel, concrete filled.
2. PVC Bollard Cover: Manufactured by ULINE, Model H-3719Y. Color: Yellow.
3. Quantity: As indicated on plans.

PART 3 - EXECUTION

INSTALLATION

4.01 INSTALL UNITS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, WITHOUT DAMAGE. REPLACE OR REPAIR DAMAGED UNITS.

4.02 INSTALL UNITS IN ALIGNMENT WITH ADJACENT WORK.

4.03 INSTALL BOLLARDS IN FOOTINGS. BOLLARDS SHALL BE INSTALLED IN LOCATIONS AS PER LIPA REQUIREMENTS OR IN LOCATIONS AS DIRECTED BY ENGINEER.

4.04 INSTALL BOLLARD COVER. DRILL AND TAP STEEL BOLLARD TO ACCEPT TWO (2) GALVANIZED SCREWS TO ATTACH BOLLARD COVER AT 4" AFG.

END OF SECTION 323613

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Finish grade subsoil.
- B. Place, level and compact topsoil.

1.02 RELATED SECTIONS

- A. A. Section 329219 - Seeding.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products to the site under provisions of Section 016500.
- B. Deliver topsoil to the site in uncontaminated containers.
- C. Do not stockpile topsoil over a height of 8 feet.
- D. Cover stockpiled topsoil to protect from precipitation, erosion and contamination.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not place wet or frozen topsoil.
- B. Do not place topsoil on wet or frozen ground or when precipitation is occurring.

1.05 COORDINATION

- A. Coordinate work under provisions of Section 013100.
- B. Coordinate with all adjacent work and work within areas to receive topsoil.
- C. Coordinate the storage of topsoil under provisions of Section 311100 with the placement of topsoil in this section.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; friable loam; free of subsoil, clay or impurities, plants, weeds, roots, grass, stone and foreign matter; acidity range (pH) of 5.8 to 6.5; containing a minimum of 2.75 percent and a maximum of 25 percent organic matter. Topsoil may be reused from on-site if it meets these requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing substrate and conditions.
- B. Verify site conditions and note irregularities affecting work of this section.
- C. Beginning work of this section means acceptance of existing conditions.

3.02 PREPARATION

- A. Prepare subsoil in accordance with Section 312213.
- B. Eliminate uneven areas and low spots. Remove and dispose of debris, roots, branches and stones in excess of 1/2 inch in size. Remove and dispose of subsoil contaminated with petroleum products.
- C. Scarify subsoil to depth of 3 inches where topsoil is scheduled to be placed. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.03 INSTALLATION

- A. Place topsoil in areas where seeding, sodding or planting is scheduled or where shown on the plans.
- B. Place topsoil to the depths as indicated on the plans.
- C. Use topsoil in relatively dry state. Place during dry weather.
- D. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles and contours of subgrade.
- E. Remove and dispose stone, roots, grass, weeds, debris and foreign material while spreading.
- F. Manually spread topsoil around trees, plants and building to prevent damage.
- G. Lightly roll placed topsoil.
- H. Remove surplus subsoil and topsoil from site. Do not remove surplus topsoil from the site prior to obtaining approval of the Engineer.
- I. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.04 TOLERANCES

- A. Maximum Variation from Proposed Elevation: 1/2 inch.

3.05 PROTECTION

- A. Protect finished work under provisions of Section 016500.
- B. Protect landscaping and other features remaining as final work.
- C. Protect existing structures, fences, roads, sidewalks, paving and curbs. Any damage caused by the Contractor to any of these items shall be repaired promptly by the Contractor at no additional cost to the Owner.

END OF SECTION 329119.13

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Seeding.
- B. Mulch, fertilizer and other accessories.
- C. Maintenance.

1.02 RELATED SECTIONS

- A. Section 329119.13 - Topsoil Placement and Grading.

1.03 REFERENCES

- A. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.04 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel and Brome Grass.

1.05 SUBMITTALS

- A. Product Data: Provide data on seed mixtures, fertilizer and lime.
- B. Certificates: Provide certificates indicating that all fertilizer, pesticides and herbicides comply with all applicable regulatory agency requirements.

1.06 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.07 QUALITY ASSURANCE

- A. Seed: Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.08 REGULATORY REQUIREMENTS

- A. Comply with applicable regulatory agencies for fertilizer, pesticide and herbicide composition.
- B. All fertilizer, pesticides and herbicides to be used shall comply with all applicable regulatory agency requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500.
- B. Deliver grass seed mixture in original sealed containers. Seed in damaged packaging is not acceptable.

- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis and name of manufacturer.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not sow immediately following rain, during windy periods or if ground is frozen.
- B. Do not sow when the ambient temperature is expected to drop below 40 degrees F or rise above 90 degrees F during the time in which the seed will establish itself.
- C. Planting Season: April 1st through May 15th or September 1st through October 15th.

1.11 COORDINATION

- A. Coordinate with grading and placement of topsoil.
- B. Coordinate with installation of underground sprinkler system piping and watering heads.

1.12 WARRANTY

- A. Include coverage for one continuous growing season; reseed areas of dead or unhealthy grass at no additional cost to the Owner.

1.13 MAINTENANCE SERVICE

- A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition, as determined by at least two cuttings, or until the job is accepted by the Owner, whichever occurs last.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Seed: Dry, fresh, re-cleaned seed of the latest crops and of the following proportions:

1.	Minimum	Minimum %		
2.	Grass Type	Mixture	% Purity	Germination
3.	Kentucky Bluegrass	45	90	80
4.	Creeping Red Fescue	45	97	80
5.	Perennial Rye Grass	10	95	95

2.02 ACCESSORIES

- A. Mulching Material: Hemlock species wood cellulose fiber, dust form, free of growth or germination inhibiting ingredients.
- B. Fertilizer: FS O-F-241, Type I, Grade A; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions: Nitrogen 10 percent, phosphoric acid 6 percent, soluble potash 4 percent.
- C. Limestone: Ground dolomitic limestone containing a minimum of 90 percent calcium and magnesium carbonates. One hundred percent (100%) shall pass a No. 10 mesh screen and a minimum of 50 percent shall pass a No. 100 mesh screen.

- D. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 90 percent organic material measured by oven dry weight; pH range of 4 to 5 percent; moisture content of 30 percent; with moisture absorptive capacity of 450 to 500 percent.
- E. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.
- F. Stakes: Softwood lumber, chisel pointed.
- G. String: Inorganic fiber.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing substrate and site conditions.
- B. Verify that prepared soil base is ready to receive the work of this section.
- C. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Rake topsoil smooth.

3.03 APPLICATION

- A. Apply fertilizer at a rate of 21 lbs per 1,000 square feet.
- B. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- C. Mix thoroughly into upper 2 inches of topsoil and water lightly to aid the dissipation of fertilizer.
- D. Apply seed at a rate of 4 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.
- E. Do not seed areas in excess of that which can be mulched on same day.
- F. Roll seeded area with roller not exceeding 100 lbs per foot of width.
- G. Immediately following seeding and compacting, apply mulch at a rate of 92 lbs per 1,000 square feet. Maintain clear of shrubs and trees.
- H. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil. Discontinue watering if washing begins to occur.
- I. Identify seeded areas with stakes and string around area periphery. Set string height to 24 inches. Space stakes at 8 feet on center.
- J. Cover seeded slopes where grade is 30 percent or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- K. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.

- L. Secure outside edges and overlaps at 36 inch intervals with stakes.
- M. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- N. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 12 inches.

3.04 HYDROSEEDING

- A. Apply seeded slurry with a hydraulic seeder at a rate of 46 lbs per 1000 sq. ft. Apply in a uniform layer from 2 opposing directions to ensure complete soil coverage.
- B. Do not hydroseed area in excess of that which can be mulched on same day.
- C. Immediately following seeding, apply mulch to a thickness of 1/8 inches (3 mm). Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 by 100 mm).

3.05 MAINTENANCE

- A. Maintain grass until job is accepted by the Owner or until the grass exhibits a vigorous growing condition, as determined by at least 2 cuttings, whichever occurs last.
- B. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- C. Neatly trim edges and hand clip where necessary.
- D. Immediately remove clippings after mowing and trimming.
- E. Water to prevent grass and soil from drying out.
- F. Immediately reseed areas which show bare spots.

3.06 PROTECTION

- A. Protect seeded areas with warning signs during maintenance period.

END OF SECTION 329219

PART 1 - GENERAL

1.01 SUMMARY

- A. Well Inspection
 - 1. Well Video Inspection.
 - 2. Caliper Survey
 - 3. Plumbness/Alignment/Deviation Test
- B. Well Cleaning
 - 1. Wire Brushing
 - 2. Floating Material
 - 3. Air Lifting

1.02 REFERENCES

- A. ANSI/AWWA A100 - Water Wells.
- B. ANSI/AWWA A100 - Water Wells, Appendix D - Plumbness and Alignment - Procedure for Testing
- C. ANSI/AWWA C654 - Disinfection of Wells.
- D. ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
- E. AWS A2.0 - Standard Welding Symbols.
- F. AWS D1.1 - Structural Welding Code.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Well dimensions, bailing depth measurements, quantity and type of bailed material.
- C. Two DVD copies of each video inspection recording and written report of video inspection findings.
- D. Final pumping and water level measurements as described in contract drawings and specific capacity.
- E. As-built drawings, well configuration based on inspection and testing.

1.04 QUALITY ASSURANCE

- A. Well driller to be licensed by NYSDEC, minimum of 3 years' experience in well construction or rehabilitation.
- B. All work shall be performed in accordance with ANSI/AWWA A100.
- C. For any permanent welding, the welders shall be AWS certified.

PART 2 - PRODUCTS

2.01 TEMPORARY EQUIPMENT AND MATERIALS

- A. Pump and Motor: Capable of pumping the maximum quantity of water that the well will produce with shutdown time not to exceed one hour during that period. The pump shall be designed to facilitate backward surging.
- B. Flowmeter and Throttling Valve: Type and size capable of accurately measuring rates of flow over the entire range of testing.
- C. Discharge Piping: Sufficient size and length to conduct pumped water to an acceptable drainage course.
- D. Sound Attenuated Portable Generator: Sized appropriately to power the temporary pump for the duration of development and yield tests.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect pump station equipment from damage.

3.02 WELL INSPECTION

A. WELL VIDEO INSPECTION

1. Well Inspection Camera System:
 - a. Dual viewing color inspection camera.
 - b. Down view camera
 - c. 90 degree side view camera
 - d. 360-degree continuous variable speed rotation.
 - e. Minimum illumination of 0.5 lux @ f1.2
 - f. Resolution: 480i
 - g. Operator controlled focus and iris for both camera views
 - h. Camera control unit with 20" Screen
 - i. Audio voice-over recording
 - j. On-screen footage counter
 - k. Annotation capability
 - l. DVD recorder
2. The contractor shall introduce clear water into the well for a sufficient period and at sufficient quantity to produce clear viewing conditions during the inspection to the satisfaction of the Owner or the Owner's representative.
3. Lower camera into well and make video recording with axial view as the camera is being lowered to the bottom and horizontal, rotating view as camera is being raised to the top.
4. Stop the camera at critical areas including joints, changes in material or possible defects.
5. Provide the Engineer with two (2) DVD copies of the inspection video.
6. Should the inspection fail to produce a clear picture of the internal well conditions, additional water shall be introduced and additional inspections conducted until a clear video is obtained to the satisfaction of the Owner. All such remedial work and subsequent inspections shall be conducted at the Contractor's expense.

B. CALIPER SURVEY

1. The caliper equipment used to perform the survey shall have a minimum of three arms and be capable of measuring a borehole diameter up to 36 inches.

2. The horizontal scale for the caliper plot shall be four inches of borehole diameter per inch of plot. The vertical depth scale shall be as required.
3. The logging speed for the caliper shall be 40 feet per minute, unless otherwise approved

C. PLUMBNESS/ALIGNMENT/DEVIATION TEST

1. The contractor shall conduct alignment/deviation tests to determine the plumbness and straightness of the well casing.
2. The direction and deviation survey shall be performed with a gyroscopic-type tool or a similar approved tool.
3. Provide report of deviation and directional survey measurements and interpretation of well plumbness and alignment.
4. Unless otherwise directed, alignment/deviation testing shall be conducted in the presence of the owner's representative.

3.03 WELL CLEANING

- A. Wire brushing will be completed at the direction of the engineer. Tight fitting brushes shall be sized to casing and/or liner/screen. Continue until all scale and buildup is removed.
- B. Floating Material:
1. Remove floating material by bailing or other approved means.
 2. Floating material may be debris dropped in the well or residual oil product from previous oil lubricated well pumps.
 3. All oil contaminated water, absorbent pads, or pump equipment used or removed from well shall be deposited in clean barrels and not commingled with other debris. Barrels shall be properly labeled as "Non-Hazardous - Waste Oil" if required and properly disposed of. Report quantity and nature.
- C. Air Lifting:
1. Periodically remove solids from bottom of well and screen to prevent excessive buildup.
 2. Completely remove solids upon completion of each process that results in the deposition of significant material in the bottom of the well, i.e. wire brushing, high pressure jetting.
 3. Airlift equipment may consist of 4" or 3" drop pipe, dependent on the makeup of the debris to be removed.
 4. End of drop pipe shall be fashioned to minimize plugging and to break up accumulated material.
 5. Report depth encountered, quantity removed and nature of material.
 6. Provide means to settle solids and filter effluent to meet applicable discharge limits.
 7. Provide opportunity for Engineer to inspect removed material and provide, if necessary, a sieve analysis of gravel encountered.

3.04 CLEANING AND RESTORATION

- A. All doors, windows, roof hatches, etc. to be re-secured.
- B. All surfaces to be cleaned by washing, mopping or as necessary.
- C. Areas scratched or damaged to be repainted to match original condition.
- D. Original operational status of water plant to be restored.
- E. Grass areas disturbed to be reseeded.
- F. Mud, silt or debris discharged to leaching pits to be removed.

END OF SECTION 330111

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Domestic Water Service
- B. Valves and fittings.
- C. Curb valves

1.02 RELATED SECTIONS

- A. Section 312333 - Trenching.
- B. Section 331140 - Disinfection of Water Facilities

1.03 REFERENCES

- A. ASME 16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
- B. ASTM B88 - Seamless Copper Water Tube.
- C. AWWA C800 - Underground Service Line Valves and Fittings.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer: Company specializing in performing the work of this section.

1.06 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with New York State Plumbing Code, Suffolk County Department of Health Services and Water Utility requirements.
- B. Conform to applicable State of New York code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products in accordance with manufacturer's instructions to prevent soiling, disfigurement or damage.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

1.09 SCHEDULING

- A. Notify appropriate water utility as required prior to any work on water mains or interruption of service.

PART 2 - PRODUCTS**2.01 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING**

- A. Copper Tubing: ASTM B88, Type K.
 - 1. Fittings: ASME B16.26, cast bronze.
 - 2. Joints:
 - a. Flared or compression type
 - b. ANSI/AWS A5.8, BCUP silver braze

2.02 FLANGES, UNIONS AND COUPLINGS

- A. Pipe size 2 inches and under:
 - 1. Copper tube and pipe: 150 psig bronze unions with soldered joints. No lead solder will be permitted.
 - 2. Dielectric connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.03 CURB STOPS (PLUG VALVES AND EXTENSION SERVICE BOXES)

- A. Manufacturers:
 - 1. MUELLER COMPANY, Model No. H-15210 Curb Stop; Model No. H-10310 Extension Service Box.
 - 2. Other acceptable manufacturers offering equivalent products to be specifically approved.
- B. Curb stop to have water service bronze body with AWWA standard thread inlet and outlet; with combined tee and cap and an inverted tapered key with 1/4 inch hole drilled in cap for attaching a stationary rod; valve shall open to the left (counterclockwise).

- C. Extension service box MUELLER COMPANY No. H-10314 to have extra grade gray iron cover and base, steel extension pipe, complete with stationary inside stop rod MUELLER Company No. 82862, 33" length, and one-piece lid with two holes for removal with spanner wrench.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry and not over-excavated.
- B. Verify services connection size, water main size, location and inverts.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 BEDDING

- A. Excavate pipe trench in accordance with Section 312333 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Backfill around sides and to top of pipe with fill, tamp in place and compact to 95% of Standard Proctor Density in accordance with ASTM D698 and Section 312323.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Establish elevations of buried piping outside the building to ensure not less than 4.5 feet of cover.
- D. Install valves with stems upright, not horizontal or inverted.
- E. Service pipe shall be one continuous piece between the corporation stop and the curb stop.

3.05 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adaptors each side of valves in copper piped system. Sweat solder adaptors to pipe.
- C. Install gate valves for shutoff and to isolate equipment, part of systems, or vertical risers.

3.06 FIELD QUALITY CONTROL

- A. Test water piping in accordance with Plumbing Code and the water utility.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 331300.

END OF SECTION 331116.11

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of potable water piping, valves, pumping and treatment units.

1.02 REFERENCES

- A. ANSI/AWWA B300 - Standard for Hypochlorites
- B. ANSI/AWWA B301 - Standard for Liquid Chlorine
- C. ANSI/AWWA C651 - Standard for Disinfection of Water Mains
- D. ANSI/AWWA C652 - Standard for Disinfection of Water Storage Facilities
- E. ANSI/AWWA C653 - Standard for Disinfection of Water Treatment Plants

1.03 SUBMITTALS

- A. Submit proposed method for introducing disinfectant into the treatment unit. If media must be disinfected, obtain method for disinfecting from supplier.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Certificate: Certify that cleanliness of filter tanks, towers and clearwell meets or exceeds specified requirements.

1.04 PROJECT RECORD DOCUMENTS

- A. Prepare and submit a disinfection report containing the following:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test and injection locations.
 - 4. Initial and 24-hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- B. Prepare and submit complete water analysis results with the following information:
 - 1. Date issued, project name and testing laboratory name, address and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24-hour disinfectant residuals in ppm.
 - 6. Coliform bacteria and chemical test results.
 - 7. Certification that water conforms or fails to conform to New York State Drinking Water Standards.
 - 8. Laboratory Director's signature and authority.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ANSI/AWWA C651, ANSI/AWWA C652 and ANSI/AWWA C653.

1.06 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three (3) years experience.
- B. Testing Firm: Riverhead Water District approved laoratory, Pace Analytical Labs
- C. Testing Firm: Laboratory specializing in testing potable water systems, approved by the New York State Department of Health.

1.07 REGULATORY REQUIREMENTS

- A. Conform to Recommended Standards for Water Works and applicable codes or regulations for performing the work of this Section.
- B. Water quality to conform to New York State Drinking Water Standards after completion of disinfection.
- C. The Suffolk County Department of Health Services will be notified of the date of water quality testing to allow sampling by the Health Department. Provide Engineer three (3) days advanced notification of proposed sampling date.

PART 2 - MATERIALS

2.01 DISINFECTION CHEMICALS

- A. ANSI/AWWA B300, Hypochlorite
- B. ANSI/AWWA B301, Liquid Chlorine

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that all piping systems and treatment units have been cleaned, inspected and pressure tested.

3.02 EXECUTION

- A. Provide required equipment to perform the work of this Section. The Owner will provide the water required for the initial disinfection and filling of the piping, and valves, etc. The Contractor shall pay for the water required for any subsequent filling of these systems based on the Owner's retail water rate.
- B. Disinfect system in accordance with Section 4.1 or Section 4.3 of AWWA C651.
- C. The sampling schedule below has been produced in accordance with the New York State Department of Health, for the convenience of the Contractor. It is the responsibility of the Contractor to perform sampling in accordance with the most recently released Suffolk County Department of Health Services sampling requirements. Conflicts between the schedule below and the most recent sampling requirements should be brought to the attention of the Engineer immediately, and resolved prior to sampling.

Project Focus	Type of Work	MIC Sampling Time	POC Sampling Time	IOC Sampling Time	Notes	CONT
Well No. 5-1	Well Rehabilitation	0', 2', 5', 10', 30'	2'	30'	-	W
Manganese Removal Vessels	New Fe/Mn Removal Treatment	Raw: 0', 2', 5', 10', 30' Treated: 0', 2', 5', 10', 30'	2' Treated	30' Raw & Treated	Each Test, per Vessel. Test effluent Manganese at 0', 2', 5', 10', 30' for each vessel as well	P
Well 5-2(A)	Well Rehabilitation	0', 2', 5', 10', 30'	2'	30'	-	W
Site Piping	New Site Piping	0', 2', 5', 10', 30' 24 hrs and 48 hrs after flushing	-	-	Sample points as directed by the engineer	P

MIC =Microbiological

POC =Principal Organic Containmentment

IOC =Inorganic Contaminant

- D. Samples shall be obtained at tap locations:
1. Well Nos. 5-1 & 5-2(A) - well discharge
 2. Vessel 1 Effluent
 3. Vessel 2 Effluent
- E. Microbiological time series (0, 2, 5, 10, and 30 minute) tests will be required for Well Nos. 5-1 and 5-2(A), and the manganese removal vessels. Testing shall continue until two (2) consecutive sets, 24 hours apart, show negative results. Collect samples 24-hours after flushing disinfectant and refilling with potable water. Samples shall not be collected if chlorine residual is greater than 0.1 mg/L, or greater than distribution system residual, if chlorinated system water is used for testing.
- F. Manganese removal system water quality sampling procedures:
1. The contractor shall disinfect each vessel after all interior vessel work is complete, with the exception of media placement, and provide two (2) consecutive 24 hour micro-bacteriological tests on the effluent of each vessel and one (1) 96 hour Primary Organic Compounds analysis on the effluent of each vessel. All tests shall be performed prior to obtaining written authorization from the engineer to place media in the vessel.
 2. After loading of the media, the contractor shall provide one (1) micro-bacteriological time series test on the tank influent and effluent, one (1) 2 minute Primary Organic Compounds analysis on each vessel effluent, one (1) 30 minute Inorganic Compound analysis on each vessel influent and effluent, and one (1) additional time series test for iron and manganese on each vessel effluent. All tests shall be performed prior to obtaining written authorization from the engineer to place vessel into service.

- G. Collect samples 48 hours after flushing disinfectant and refilling with potable water. Samples shall not be collected if chlorine residual is greater than 0.1 mg/L, or greater than distribution system residual, if chlorinated system water is used for testing.
- H. Chemical tests shall include bacteriological, inorganic chemicals, volatile halogenated organics, non-volatile organics, heavy metals and any other tests required by the Suffolk County Department of Health Services.
- I. If water quality in system does not meet the bacteriological requirements of the Suffolk County Department of Health Services for potable water, the Contractor, at no additional cost to the owner, shall re-chlorinate or take other steps necessary to provide acceptable water quality. Samples shall be collected and analyzed after each attempt. All costs associated with subsequent sampling shall be borne directly by the Contractor.
- J. Neutralize residual chlorine to less than 1 mg/l with a suitable quantity of sodium bisulfite, sodium sulfide or sodium thiosulfate prior to disposal.
- K. For this project, a minimum of two (2) sets of bacteriological samples for plant/site distribution water main will be required. Take samples at the appropriate time intervals as required by the Suffolk County Department of Health Services. Verify sampling location with the Engineer.

3.03 QUALITY CONTROL

- A. Provide analysis and testing of treated water in towers and clearwell.
- B. Test samples in accordance with ANSI/AWWA C652 and C653 and the Suffolk County Department of Health Services.

END OF SECTION 331140

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Water Utility Pipe
- B. Special Castings; Mechanical Joint Fittings
- C. Buried Valves & Valve Boxes

1.02 RELATED SECTIONS

- A. Section 312333 - Trenching
- B. Section 312323.13 - Backfilling
- C. Section 331140 - Disinfection of Water Facilities

1.03 REFERENCES

- A. ANSI/AWWA C104 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- B. ANSI/AWWA C105 - Polyethylene Encasement for Ductile Iron Pipe Systems
- C. ANSI/AWWA C110 - Ductile Iron and Grey Iron Fittings.
- D. ANSI/AWWA C111- Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C150 - Thickness Design of Ductile Iron Pipes
- F. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast for Water Service.
- G. ANSI/AWWA C153 - Ductile-Iron Compact Fittings for Water Service.
- H. ANSI/AWWA C509 - Resilient Seated Gate Valves for Water Supply Service.
- I. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
- J. ANSI/AWWA C900 - pvc

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of water mains, valves, connections, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with the local water utility company requirements.
- B. The tone-out, mark-out, locating and verification of existing utilities on private property and within public Right-of-Ways are the responsibility of the contractor. All known utilities and facilities shall be verified by test holes or other means prior to commencing water main installation. No compensation will be paid to the contractor for lost time due to improper or inadequate utility investigation.
- C. The contractor shall conform to the standard traffic requirements of the New York State Manual of Uniform Traffic Control Devices for work in Public Roadways.
- D. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to ensure they are kept free from damage.
- B. Store piping and valves to ensure that their interiors are kept free of debris, organics or animals.
- C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.01 WATER UTILITY PIPING

- A. Cement-Lined Ductile Iron Pipe
 - 1. Approved Manufacturers:
 - a. US PIPE
 - b. McWANE DUCTILE
 - 2. Cement-Lined Ductile Iron Pipe meeting AWWA C150/C151 :
 - a. Special Class 52 for all pipe 14 inches and smaller.
 - 3. Interior lining shall be double-thick cement with a minimum thickness of 1/8" (125 mils) in accordance with AWWA C104.
 - 4. Exterior of pipe shall have an exterior bituminous coating measuring 1 mil in thickness and be marked with the manufacturer name, date of casting and pressure class.
- B. Pipe Accessories:
 - 1. Joints: ANSI/AWWA C111, vulcanized rubber gaskets for push-on pipe; mechanical joint with rods and retainer glands for fittings.
 - 2. Field lock gaskets by US Pipe Model 350 shall be utilized on the last push-on joint of all dead-end mains, where a bell falls within 10 feet of a mechanical joint connection or as indicated on the plans or as directed by the Engineer.
 - 3. Gaskets shall be free from porous areas, foreign materials and visible defects. No reclaimed rubber shall be used
 - 4. Lubricant for Joints: Nontoxic, NSF-61 certified, shall not support the growth of bacteria, and shall have no deteriorating effects on the gasket or pipe material.
 - 5. Wedges: Bronze, installed at each push-on joint. (CLDIP only)
 - 6. Electro-Magnetic Marking Tape: (PVC only)

2.02 SPECIAL CASTINGS

- A. Manufacturers:
 - 1. US PIPE

2. SIGMA CORP.
 3. TYLER UNION
 4. APPROVED EQUAL
- B. Material:
1. Fittings shall be in accordance with ANSI/AWWA C153 (compact).
 2. Fittings shall be ductile iron.
 3. Ductile iron fittings shall have a pressure rating of 350 psi.
 4. Fittings shall be cement lined.
- C. All fittings shall be manufactured domestically with the United States.
- D. Mechanical Joint fittings shall be used with "push-on" joint pipe with the joint conforming to AWWA Specifications.
- E. Rubber gaskets shall be used at each pipe connection. Rubber gaskets shall be vulcanized rubber that is free of porous areas, foreign materials and visible defects. No reclaimed rubber shall be used. The size, mold number, gasket manufacturer's mark, the letters "MJ" and the year of manufacture shall be molded in the rubber.
- F. Wedge type restraining glands shall be required at all mechanical joints.
1. Manufacturer:
 - a. EBAA IRON WORKS
 - b. FORD METER BOX CO.
 - c. SIGMA CORPORATION
 - d. TYLER UNION
 - e. US PIPE
 - f. Approved equal
 2. Wedge type restraining glands shall be secured to fittings using alloy steel T-head bolts and hex-head nuts.

2.03 BURIED VALVES

- A. Resilient Wedge Gate Valves (up to 12")
1. Acceptable Manufacturers:
 - a. MUELLER COMPANY; A-2362
 - b. CLOW VALVE COMPANY; Model 2639
 - c. KENNEDY VALVE CO.; Fig. 8571
 2. All vertical gate valves up to and including 12-inch diameter shall conform to AWWA Specification C509 or latest revision, and shall be specified as follows:
 - a. Select from below as required:
 - b. Material: Iron body, bronze mounted.
 - c. Pressure: 250 psi minimum working pressure.
 - d. Wedge: Cast iron wedge with urethane rubber coating (encapsulated). The rubber/metal bond shall be tested to meet ASTM D429.
 - e. Stem: Forged bronze, non-rising stem with two "O" ring seals.
 - f. Wrench Nut: Two-inch square (at base) wrench nut opening to the left or counterclockwise.
 - g. Mechanical Joint Ends: Mechanical joint ends complete with all joint accessories including rubber gaskets.
 - h. Painting: The body and bonnet shall be coated with a fusion coating both interior and exterior to meet AWWA Standard C550.
 - i. Markings: Markings shall be cast on the bonnet or body of each valve, and shall show the manufacturer's name or mark, the year the valve casting was made, the size of the valve, and the designation of working water pressure for 4 to 12-inch valves.

- j. Affidavit of Compliance: The Contractor shall have the manufacturer provide an affidavit directly to the Engineer that all valves supplied on this project comply with all applicable provisions of AWWA Specification C509, and that each valve was subjected to and passed the 500 psi hydrostatic test without leakage. No final payment for valves will be made until this Affidavit of Compliance is received by the Engineer.
- B. Valve Boxes
- 1. Manufacturer:
 - a. BINGHAM & TAYLOR
 - b. SIGMA CORPORATION
 - c. TYLER UNION
 - 2. Valve boxes shall be three piece, sliding type with 8" x 5-1/4" cast iron flanged bottom section, 9" x 6-1/8" ductile iron top section and 7" ductile iron drop lid with "WATER" cast on cover.

PART 3 - EXECUTION

3.01 INSTALLATION - PIPE

- A. Remove scale and dirt, on inside and outside, before assembly.
- B. Bevel plain ends of cut pipe at push-on joints.
- C. Excavate pipe trench in accordance with Section 312333 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- D. Place bedding material at trench bottom; level fill materials in one continuous layer not less than 6 inches compacted depth; compact to 95 percent maximum dry density.
- E. Maintain optimum moisture content of bedding material to attain required compaction density.
- F. The Contractor shall be responsible for verifying the location of the existing water mains and other utilities along the entire route of the project.
- G. The Contractor must have experienced personnel in his employ to perform the cut-ins and connections to the existing water mains and have available equipment necessary for cutting ductile iron, cast iron, asbestos cement and miscellaneous piping in the existing distribution system.
- H. Suitable facilities shall be available for proper dewatering, drainage and disposal of water removed from dewatered lines and excavations, without damage to adjacent properties. Exposed ends of the water main shall never be submerged either partially or fully.
- I. Maintain a 10 foot horizontal and 18 inch vertical separation of water main from all storm and sanitary sewer facilities. The Contractor shall install the water main with the minimum cover indicated in the Contract Documents. The Contractor shall verify the depth of any existing service laterals to the structures prior to crossing of same.
- J. Pipe trenches shall be of minimum width and allow six (6) inches on each side of the bell with sufficient width to allow straight alignment of pipe and provide sufficient room for joint-ing as required and to allow the backfill to be placed as specified.
- K. Only new full-lengths of pipe shall be delivered to and utilized on this project. Field cut pieces with bell ends shall be a minimum of 5 feet in length. Smaller pieces shall not be permitted for use and shall be removed from site.

- L. Pipe shall be laid with the bell end facing in the direction of laying. Where pipe is laid on a grade of 10% or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe up gradient.
- M. Install pipe to indicated elevation to within tolerance of 1/2 inch.
- N. Clean bell end of pipe prior to placing gasket. Apply lubricant to both gasket and plain end of pipe.
- O. Do not field cut pipe within 24 inches of bell or 8 inches of spigot end. Verify the pipe diameter of cut end.
- P. Route pipe in straight line where possible. Joint deflections are permitted as outlined in ANSI/AWWA C600.
- Q. Install and test ductile iron piping and fittings to ANSI/AWWA C600.
- R. For installation of CLDIP, at each joint, two serrated silicon bronze wedges shall be driven into the rubber gasket after the pipe is pushed into place. The wedges shall be installed on opposite sides of the joint on a horizontal plane. Both wedges shall be started in together and driven with a hammer with blows on alternate sides so as not to displace the spigot end to one side of the pipe.
- S. For installation of PVC main, install marking up.
- T. Establish elevations of buried piping to ensure not less than 4 feet of cover unless otherwise indicated on plans or specifically approved by Engineer or Owner in field.
- U. Trench widths shall not exceed the following authorized widths prior to cut-back:
 - 1. Less than 12-inches diameter mains: 30 inches
 - 2. 12-inch & 16-inch diameter mains: 36 inches
- V. Pavement removal shall be kept to a minimum and not exceed the preceding authorized widths. Sawing, drilling or chipping shall be used to ensure the breakage of pavement along straight lines. Final restoration limits shall include a 12-inch cut-back on all sides of the trench.
- W. Backfill trench in accordance with Section 312323. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 95 percent maximum dry density.
- X. The contractor shall restore, replace and/or reposition all decorative lawn ornaments, and miscellaneous items disturbed during water main installation including but not limited to the following: stones, brick driveway pavers, fences, signs, sprinklers, shrubs and trees.

3.02 DISINFECTION AND BACTERIA SAMPLING OF WATER UTILITIES

- A. Flush and disinfect system in accordance with Section 331140.

3.03 PRESSURE TESTING

- A. Perform hydrostatic pressure testing after disinfection, but prior to bacteria sampling.
- B. Expel all air from piping system, including pipe, valves and appurtenances. All new water mains shall be pressure tested to a minimum of 150 psi or 1.5 times line pressure, whichever is greater. The pressure test shall be held for a minimum of two hours with no leakage.

- C. Remove and replace any defective pipe, fittings, valves, and appurtenances. Repeat pressure test until satisfactory to Engineer.

3.04 INSTALLATION - SPECIAL CASTINGS

- A. Tighten glands in accordance with manufacturers direction.
- B. Ensure that fittings are free of dirt and debris prior to installation.
- C. Support fitting with solid blocking in areas of over excavation. Wood wedges, blocking and supports are prohibited.
- D. The contractor shall install a minimum of two ¾-inch steel tie rods on mechanical joint fittings. Additional tie-rods may be requested on vertical pipe or by Engineer in areas of high pressure.
- E. Steel tie rods shall be secured to fittings using ¾" steel eye-bolts, washers and nuts. The use of ductile iron "Duc-Lugs" is prohibited. Steel tie rods shall be secured to pipe using half-moon pipe clamps, restraints, washers and nuts.
- F. Bell ends of pipe shall not be installed within 5 feet of a mechanical joint assembly without being further restrained by locking gaskets and tie rods.
- G. Concrete blocking shall be applied on all pipe lines 4-inch in diameter and larger at all hydrants, tees, plugs, caps, and at bends deflecting 22-1/2 degrees or more. Blocking shall be placed between solid ground and the fitting to be anchored. The blocking shall be so placed that the pipe and fitting joints will be accessible for repair. Size of blocking and minimum bearing area shall be in accordance with the Bearing Area Table within this specification section.
- H. Form and place concrete for thrust blocks at each elbow or change of direction of pipe.

BEARING AREA TABLE

Pipe Size	Dead End of Tee	90 Degree Bend	45 Degree Bend	22½ Degree Bend
4 in	1 ft2	1 ft2	¾ ft2	½ ft2
6 in	2 ft2	3 ft2	2 ft2	1 ft2
8 in	4 ft2	5½ ft2	3 ft2	1½ ft2
10 in	6 ft2	8½ ft2	4½ ft2	2½ ft2
12 in	9 ft2	12 ft2	6½ ft2	3½ ft2
>16 in	15 ft2	22 ft2	12 ft2	6 ft2

- I. Concrete for Thrust Blocks: Portland Cement Concrete; 2,000 psi minimum strength at 28 days. Solid precast concrete blocking meeting the compressive strength requirement shall also be acceptable for use. When solid blocking is utilized, the contractor shall fill all annular spaces with cement or mortar. The use of wood wedges or blocking is not permitted.

3.05 INSTALLATION - VALVES

- A. Set valves on solid bearing.
- B. Contractor is responsible for ensuring that all valve boxes are plumb and centered over the operating nut until after final asphalt restoration is complete.
- C. Contractor shall adjust boxes prior to final restoration. The use of "Rite-Hite" type adapters is not permitted on new construction.

3.06 NOTIFICATIONS

- A. The Engineer and local water utility shall be notified at least 24 hours in advance and immediately prior to any of the following:
 - 1. Commencing work or starting again after more than a 72-hour shutdown.
 - 2. Admitting water to a new section.
 - 3. Flushing or blowing off water mains.
 - 4. Chlorination of water mains.
 - 5. Shutting down water mains or service to consumers. Consumers should also be informed at least 24 hours in advance and immediately prior to shutting down service.
 - 6. Disinfection and reconnection of house services.
 - 7. The permanent shutting down of existing water mains or house services.

3.07 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with Owner requirements.
- B. Leakage testing shall be in accordance with ANSI/AWWA C600.
- C. Compaction testing shall be in accordance with ANSI/ASTM D1557.
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

END OF SECTION 331411

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of potable water wells

1.02 REFERENCES

- A. ANSI/AWWA B300 - Standard for Hypochlorites.
- B. ANSI/AWWA B301 - Standard for Liquid Chlorine.
- C. ANSI/AWWA C654 - Standard for Disinfection of Wells.

1.03 SUBMITTALS

- A. Submit proposed method for introducing disinfectant into the well.

1.04 PROJECT RECORD DOCUMENTS

- A. Disinfection Report: Record:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test and injection locations.
 - 4. Initial and 24-hour disinfectant residuals (quantity in treated water) in ppm.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ANSI/AWWA C654.

1.06 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three (3) years experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to Recommended Standards for Water Works and applicable codes or regulations for performing the work of this Section.
- B. Water quality to conform to New York State drinking water standards after completion of disinfection.

PART 2 - MATERIALS

2.01 DISINFECTION CHEMICALS

- A. ANSI/AWWA B300, Hypochlorite.
- B. ANSI/AWWA B301, Liquid Chlorine.

PART 3 - DISINFECTION & TESTING

3.01 EXAMINATION

- A. Verify that well has been cleaned and inspected.

3.02 EXECUTION

- A. Provide required equipment to perform the work of this Section.
- B. Disinfect well in accordance with Sections 3, 4 and 5 of AWWA C654.
- C. Allow disinfectant 24 hour contact time with well during which well is undisturbed.
- D. Pump to waste to remove disinfectant to a level of less than 0.1 mg/l.
- E. Neutralize residual chlorine to less than 1 mg/l with a suitable quantity of sodium bisulfite, sodium sulfide or sodium thiosulfate prior to disposal.
- F. After disinfectant is removed, allow 24 hour contact time to pass before taking samples.
- G. Samples shall be collected in accordance with Section 331140.
- H. Samples shall not be collected if chlorine residual is greater than 0.1 mg/l.
- I. Water quality not consistent with that prior to performing of the work shall be cause for the contractor to pump the well to waste and resample.
- J. If water quality in well does not meet the requirements of the Nassau County Department of Health for potable water, the Contractor, at no additional cost to the Owner, shall rechlorinate or take other steps necessary to provide acceptable water quality. Samples shall be collected and analyzed after each attempt at no additional cost to the Owner.
- K. After submission of water quality sampling results, the Nassau County Department of Health will take a second set of samples. The Contractor is required to take additional samples at his own cost until two (2) consecutive 24-hour microbiological samples are tested negatively, one (1) by the Contractor and one (1) by the Health Department. Any bacterial growth found in the well within 30 days of the most recent sampling date shall be cause for the Contractor to rechlorinate and resample at no additional cost to the Owner.
- L. Results of all samples shall be submitted directly to the Engineer by the New York State Department of Health approved laboratory.
- M. All costs related to sampling, disinfection, resampling, and additional disinfection shall be included in the PROPOSAL.

END OF SECTION 332120

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Reduced pressure zone device (RPZ)

1.02 RELATED SECTIONS

- A. Section 221113 - Facility Piping

1.03 REFERENCES

- A. ANSI/ASSE 1013 - Reduced Pressure Principle Backflow Preventers
- B. ANSI/AWWA C511 - Reduced-Pressure Principle Backflow Prevention Assembly

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Within thirty (30) days of installation, the contractor shall employ a New York State certified backflow prevention tester to test each backflow device and submit results on New York State Department of Health Form DOH 1013.

1.05 QUALITY ASSURANCE

- A. All backflow prevention devices shall be approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research, Sixth Edition (or latest revision).
- B. All valves and fittings installed on a potable water supply line shall be made of "low-lead" materials and have a maximum lead content of 0.25 percent by weight. All low lead fittings shall be stamped or embossed with a mark indicating that the product is manufactured from low-lead alloys.
- C. All RPZ devices shall meet the requirements of ASSE Standard 1013 and AWWA Standard C511.

PART 2 - PRODUCTS

2.01 RPZ

- A. Manufacturer:
 - 1. FEBCO Model LF860, 1/2" through 2"
 - 2. or other USC Foundation for Cross-Connection Control and Hydraulic Research approved device
- B. The reduced pressure zone assembly shall consist of two independently operating, spring loaded check valves, one hydraulically dependent differential relief valve, two ball valves, four test cocks, and a strainer.
- C. The check valve and relief valve components shall be constructed so they may be serviced without removing the valve body from the line.
- D. The device shall include full ported, ball valve type, threaded inlet and outlet shut-off valves and test cocks by the same manufacturer as the RPZ device.

- E. The assembly shall be rated to 175 psi working pressure and water temperature range from 32 degrees F to 140 degrees F.
- F. RPZ Materials:
 - 1. Valve Body, Ball Valves, Test Cocks: Lead Free Cast Copper Silicon Alloy
 - 2. Elastomers: Silicone
 - 3. Springs: Stainless Steel

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall furnish and install each backflow prevention device in the location indicated on the contract drawings. The installation shall conform to all clearances as required by the County Department of Health.
- B. The Contractor shall install a drain funnel and drain line as indicated on the contract drawings. Installation shall conform to latest County Department of Health requirements.
- C. All piping and branches not protected by the backflow prevention device shall be stenciled or otherwise marked with "DO NOT TAP TO THIS LINE". Piping shall be marked with wrap around pipe markers at five foot intervals

END OF SECTION 400567

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Large interior piping systems.

1.02 RELATED SECTIONS

- A. Section 331140 - Disinfection of Water Facilities

1.03 REFERENCES

- A. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings
- B. ANSI/AWWA C104 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings
- C. ANSI/AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
- D. ANSI/AWWA - C115/A21.15 - American National Standard for Flanged Ductile Iron Pipe with Threaded Flanges
- E. ANSI/AWWA C150/A21.50 - American National Standard for Thickness Design of Ductile Iron Pipe
- F. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Appurtenances
- G. ANSI B18.2.1 - Square and Hex Bolts and Screws Inch Series Including Hex Cap Screws and Lag Screws
- H. ANSI B18.2.2 - Square and Hex Nuts (Inch Series)
- I. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Product Data: Provide data on pipe material, pipe fittings, and accessories. Provide manufacturer's catalog information.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

- A. ANSI/AWWA C151/A21.51; double thickness cement lining minimum 3/16" in accordance with ANSI/AWWA C104/A21.04, bituminous coating inside; and epoxy primer outside; flanged joint for exposed pipe, thickness Class 52 minimum for all pipe diameters.
 - 1. Fittings: ANSI/AWWA C110, Ductile iron, standard thickness.
 - 2. Flanged Joints: ANSI B16.1, Class 125 with full face, 1/8" thick rubber gaskets.
 - 3. Bolts: ANSI B18.2.1 and ASTM A307 Grade B.
 - 4. Nuts: ANSI B18.2.2 and ASTM A307 Grade B.
 - 5. Lubricant for Joints: Nontoxic; shall not support growth of bacteria; shall have no deteriorating effects on gasket or pipe material.
 - 6. Manufacturer: TYLER UNION, SIGMA, U.S. PIPE & FOUNDRY CO., GRIFFIN PIPE PRODUCTS or specifically approved equal.

- B. Flanged Adapters: Dresser Industries, Inc., Style 127 for plain end steel or cast iron pipe with all bolts, rings, gaskets and accessories.
- C. Restrained Flange Adapters: EBAA Iron Inc., Style 2100 Megaflange.
- D. Couplings: Dresser Industries, Inc., Style 38 for plain end steel or cast iron pipe with all bolts, rings, gaskets and accessories.
- E. Piping extending outside buildings shall be mechanical joint.

2.02 PIPE ACCESSORIES

- A. Joint Restrainers: Joint restrainers shall be Style 442 with tiebolts for flanged piping as manufactured by STAR NATIONAL PRODUCTS.
- B. Pipe Supports: Pipe supports shall be manufactured by MATERIAL RESOURCES:
 - 1. Pipe Saddle Support: Standon Model S92. Minimum Quantity: Two (2)/10'
 - 2. Pipe Flange Support: Standon Model S89. Minimum Quantity: Two (2)/10'

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Clean inside of pipe before installation. Keep installed piping clean and protect ends from foreign matter by capping or plugging.
- B. Install pipe so that it does not interfere with opening of doors or apparatus, access to equipment or any portion of electrical equipment. Group piping whenever practical at common elevations.
- C. Run pipes in straight lines and square with building. Install rise plumb. Make offsets only where indicated and where necessary.
- D. Install pipes so that expansion and contraction will not cause undue stress or strain to pipes or equipment. Provide loops, offsets and expansion joints as shown on drawings. If, in contractor's opinion, inadequate loops or offsets are shown, contact Engineer for instructions.
- E. Provide flanges and unions throughout the pipe systems to make installation and removal of piping and equipment convenient. Make provisions for servicing and removal of equipment without dismantling piping.
- F. Label piping after testing.
- G. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- H. Install valves with stems upright or horizontal, not inverted.
- I. Core drill through existing walls and floors to provide clearance around pipe to be installed and install link seals.
- J. Install ductile iron piping and fittings to ANSI/AWWA C600.
- K. Install flanged adapters and couplings in accordance with manufacturer's installation instructions. Drawings show minimum required adapters and couplings. Contractor shall install additional coupling and adapters as required for installation and disassembly of the piping systems.

- L. Install pipe saddle supports and pipe flange supports to brace piping systems in locations shown on contract plan or as directed by Engineer. Installation shall be in accordance with manufacturer's installation instructions.

3.02 PIPE JOINTING

- A. Preparing pipe ends: Cut pipe ends square with pipe cutters only. Do not use hacksaws or torch. Ream pipe ends, after cutting, to full diameter. Where pipe is to be threaded, die-cut right hand, pipe stand, clean cut full depth, taper threads. Make threaded joints so that they will be leak proof without caulking. Apply a thin coat of approved pipe lubricant to make threads only.
- B. Bracing joints: Provide braces and bridle rods as required to reinforce joints. Where large pipes underground are subject to shock because of sudden changes in liquid flow rate, provide concrete "kicker" blocks at joints, fittings and changes of pipe direction.
- C. Flanged ductile iron pipe joints: Clean face of flange of all sand, grease, grit or other foreign matter. Center gasket before assembling joints. After alignment has been completed insert bolts and hand tighten nuts. Keep gap between flanges approximately uniform while tightening. Tighten bolts to required torque in several steps, alternating from one side to the other.

3.03 RECHECKING AND REPAIRING

- A. Before piping is concealed, recheck it for leaks.
- B. Rework or replace defective and leaking joints, and joints which are otherwise unsatisfactory. Peening, caulking and doping are not permitted.

END OF SECTION 402323

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Butterfly Valves & Actuators
- B. Check Valves
- C. Hydraulic Control Valves
- D. Static Mixers
- E. Sight Glass

1.02 RELATED SECTIONS

- A. Section 099744 - Mechanical Piping Coating Systems
- B. Section 331140 - Disinfection of Water Facilities
- C. Section 402323 - Potable Water Process Piping

1.03 REFERENCES

- A. ASME/ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings
- B. ASME/ANSI B16.34 - 2004 Valves Flanged, Threaded and Welding End
- C. ASTM A126 - Grey Iron Castings for Valves, Flanges and Pipe Fittings
- D. ASTM A536 - Ductile Iron Castings
- E. AWWA C504 - Standard for Rubber Seated Butterfly Valves
- F. AWWA C508 - Swing Check Valves for Waterworks Service, 2 inches (50 mm) through 24 inches (600 mm) NPS
- G. AWWA C509 - Resilient Seated Gate Valves for Water Supply Service
- H. AWWA C540 - Power Actuating Devices for Valves and Slide Gates
- I. AWWA C542 - Electric Motor Actuators for Valves and Slide Gates
- J. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants
- K. AWWA C800 - Swing - Check Valves for Waterworks Service, 2 inches (50 mm) through 24 inches (600 mm) NPS
- L. ANSI/NSF Standard 61, Drinking Water System Components
- M. AWWA C530 - Pilot Operated Control Valves

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- C. Submit the following:
 - 1. Technical descriptive data for the valves showing model number, size, capacity, weight, materials, accessories and other similar information. Catalog cuts are acceptable if they contain the necessary information.
 - 2. Storage, handling and installation instructions for the valves.
 - 3. Warranty Certificate prepared in accordance with paragraph 1.03 herein.
- D. Operations and Maintenance Manuals prepared in accordance with the requirements contained in Section 017823 - Operating and Maintenance Data shall be provided.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit product data under provisions of Section 017839.
- B. Accurately record actual locations of valves, connections, and invert elevations.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with the local water utility company requirements.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. All brass valves and fittings installed on a potable water supply line shall be made of "low-lead" materials and have a maximum lead content of 0.25 percent by weight. All low lead brass fittings shall be stamped or embossed with a mark indicating that the product is manufactured from low-lead alloys.
- D. Consideration will only be given to suppliers who can demonstrate that their valve complies with these specifications having had successful and documented experience of the size, quality, performance and reliability to that specified, and who can successfully demonstrate this criteria to the Engineer.
- E. Each manufacturer shall have at least ten (10) years of experience in the design and manufacture of the specified valve.

1.07 WARRANTY

- A. Provide a Warranty Certificate typed on company letterhead and signed by an authorized officer of the manufacturer.
- B. The instrument manufacturer shall guarantee all components to be furnished under this section to be free from defects in design, materials and workmanship for a period of twenty-four (24) months commencing on the date the instrument was placed in permanent and consistent operation.
- C. During the guarantee period, if any part or equipment component is defective or fails to perform when operating at design conditions and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by the manufacturer; the manufacturer shall repair or exchange at the discretion of the Owner such defective part(s) free of any and all charges. The cost of labor and all other expenses resulting from the repair or replacement of the defective part(s) and from installation of part(s) furnished by this Warranty shall be borne solely by the manufacturer.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Sections 016100 and 016500.
- B. Deliver and store valves in shipping containers with labeling in place.

1.09 FIELD SERVICES

- A. Supply and credit to the Owner field services as specified in Section 014500 - Quality Control.
- B. Provide the following field services:
 - 1. One (1) day totaling eight (8) hours for the pressure relief - pressure sustaining valve manufacturer. During these visits, the representative shall check the installation, make all necessary adjustments, and otherwise place the specified valve into permanent operation as specified in Section 017500 - Starting and Adjusting. As part of startup activities, the representative shall check the terminal connections and the specific work of the Contractor. Before substantial completion, provide operation and maintenance instruction to the Owner. A complete review of the Operations and Maintenance Manual for the pressure relief - pressure sustaining valve shall be presented at this time.

1.10 SERVICE CONDITIONS

- A. All components of the control instruments shall be designed for continuous duty.
- B. Provisions shall be made for adjustments or replacements of all parts.

PART 2 - PRODUCTS

2.01 BUTTERFLY VALVES (FLANGED TYPE)

- A. Manufacturers:
 - 1. PRATT, Model 2FII
 - 2. Mueller, Lineseal III
 - 3. GA Industries, Series 800
 - 4. Approved equal.
- B. Flanged end butterfly valves shall be of the rubber-seated, tight closing type, with cast body and disc. Valves shall conform to the requirements specified in the governing Standard for Rubber-Seated Butterfly Valves, AWWA C504.
- C. Valve body shall be cast iron per ASTM A-126, Class B, with integrally cast hubs for shaft bearing housing, and 125 class flanged ends faced and drilled in accordance with ANSI B16.1, Standard for Cast Iron Flanges. Rated for 150 psig working pressure.
- D. Valve disc shall be symmetrical about the shaft axis with no external ribs, cast of alloy cast iron per Military Specification MIL 6-858a, Class I. Valve shaft shall be of a solid one-piece design of centerless ground 18-8 stainless steel or high strength steel (70,000 psi) completely isolated from line fluid.
- E. Taper pins, lock washers and nuts shall be 18-8 stainless steel. Valve seat shall be of molded natural rubber, recess mounted, bonded and mechanically secured to the valve body or disc. Sleeve type bearings of self-lubricating material shall be installed in the hubs of the valve body, designed for maximum load of 2,500 psi or one-fifth the compressive strength of the material, whichever is highest.

- F. A shaft seal shall be provided in the valve body hub where the shaft extends through same. The one-piece cast gland follower studs and nuts shall be bronze. Packing shall be self-adjusting split "V" type, or triple "O" ring.
- G. Manual Valve Operators
1. Manual operators shall be of the worm and gear type and shall be self-locking. The gear operators shall be permanently lubricated, totally enclosed, with adjustable stops for the open and closed position, and valve disc position indicator. The operator shall be designed so that a pull of not more than 80 pounds will produce an output torque sufficient to operate the valve under actual line pressures and velocities.
 2. Valves shall be equipped with hand wheels and position indicators.
 3. Provide manual valve operator wheel.
- H. Electric Valve Actuators
1. Manufacturers: AUMA motor operator, Model SQXX.2 Auma Matic for 3" valves and larger.
 2. Electric Valve Actuator operator shall conform to AWWA C504 and AWWA C540. Valve shall be electric motor actuated. The electric motor operator shall be designed to move the valve from fully open position to fully closed when electrical power is applied, and hold the valve in any intermediate position between full open and fully closed without creeping or fluttering. Valve, reducer, electric motor operator and accessories shall be furnished complete, ready for installation, from a single manufacturer. Electric motor enclosure shall meet NEMA 4 construction.
 3. Electrical control housing shall be heavy cast aluminum and fully gasketed to meet NEMA 4, watertight construction.
 4. Heavy duty motor shall operate from 120 VAC (nominal) single phase input source. Thermal cut-out switches shall be provided in case of motor overload. Internal heaters shall be provided to prevent damage from condensation within housing.
 5. Gears and gear shafts shall be alloy steel and heat treated for hardness. All shafts shall mount in friction reducing bearings. Gear box housing shall be grease filled and sealed. No lubrication shall be required for the life of the unit.
 6. Two (2) internal limit switches shall be preset at the factory and furnished for each extremity of valve disc travel. Adjustment of each limit switch within one-half degree of disc travel shall be possible. Two (2) additional external limit switches shall be furnished for signal or auxiliary control for both open and closed valve positions. Manual operation shall be available and shall be accomplished by means of a shaft, equipped with a flat wrench that extends through a sealed opening in the housing. A hand wheel for manual operation shall be supplied.
 7. For each motorized butterfly valve, provide automatic and local valve controls which will include an open-close-automatic remote selector switch and timer that will open the valve and then close the valve as directed. Two (2) indicator lights shall be provided to indicate the OPEN (green) and CLOSED (red) positions.
 8. Provide position indication by means of an indicator dial in full step at all items with valve travel during both powered and manual operation.
 9. Provide manual valve operator wheel.

2.02 CHECK VALVES

- A. Horizontal Swing Arm with limit switch
1. Manufacturers:
 - a. GOLDEN ANDERSON, Figure 350
 - b. CLOW, Model 206
 2. Quiet closing, outside lever and weight with adjustable air cushion chamber, ASTM A126 C1.B cast iron body and valve disc, stainless steel shaft, bronze seal and gate rings, watertight on closing, horizontal, resilient seat ring. AWWA C508, full flow area not less

than the area of a circle with a diameter equal to the nominal pipe size, flanged ends, Class 125, working pressure of 250 psi.

3. Valve shall be provided with a mounted plunger actuated limit switch.
4. SCADA compatible, Nema-4 heavy duty limit switch with DPDT contacts shall be provided.

2.03 HYDRAULIC CONTROL VALVES

- A. Pressure Relief - Pressure Sustaining Valves - Sustaining
 1. The pressure sustaining control valves shall be the CLA-VAL model 650-01, reduced port, hydraulically operated, pilot actuated automatic control valve, or approved equal. Approved alternate manufacturers include Watts and Ross. The control valve sizes shall be as indicated on the drawings.
 2. The valve shall be designed to maintain a predetermined minimum upstream pressure (setpoint), to sustain pressure downstream and permit flow to system.
 3. Pressure sustaining valves shall close quickly when upstream pressure drops below the predetermined setpoint, but open gradually to prevent surges, should the downstream pressure increase above the setpoint.
 4. Each main valve shall consist of three (3) components: ATSM A536 ductile iron body with seat; ATSM A536 ductile iron cover and bearings; and nylon reinforced Buna-N diaphragm and assembly including stainless steel stem, nut, and spring.
 5. Valves shall fail in the open position.
 6. Pilot and Accessories
 - a. Pilot tubes shall be copper with bronze fittings.
 - b. Pilot valve shall be ASTM B62 bronze.
 - c. Pressure Adjustment Range 20 to 200 psi.
 7. Each valve shall have the following attributes and accessories:
 - a. Globe style
 - b. Epoxy coated.
 - c. Stainless Steel trim
 - d. 150 lb. flanged connections
 - e. Isolation ball valves
 - f. Pressure gauge upstream and downstream: 4 1/2" glycerin-filled, 316SS bourden tube, Ashcroft, type 1379 or equal, two (2) required per valve.
 - g. Check feature

2.04 STATIC MIXERS

- A. Manufacturer:
 1. KOFLO Corporation, Series 512
 2. Approved equal.
- B. Size: 12-inch diameter, 60" length
- C. ANSI/AWWA C115 Class 53, cement-lined ductile iron body with 150 lb. flanged ends and high solids epoxy exterior coating.
- D. Mixing elements shall be manufactured of 316L stainless steel corrugated plates. The mixing elements will consist of intersecting plates and channels. Elements shall be capable of mixing low viscosity liquids for pH control and disinfection under turbulent flow operating conditions.
- E. The body shall include two (2) type 316 stainless steel injection fittings.
- F. The mixer body and plate materials shall be suitable for handling potable water at the rate of 2,200 gpm, a velocity ranging from 3 to 8 ft/s and 150 psi.

2.05 SIGHT MIXER

- A. Manufacturer:
 - 1. Receonics
- B. 2" NPT Sight Glass
- C. NSF61 certified

PART 3 - EXECUTION

3.01 GENERAL

- A. Install control valves and components in accordance with the written and/or verbal instructions provided by the manufacturer.
- B. All components shall be fully tested and verified for service by the manufacturer. Each manufacturer shall provide a MSR as specified in Section 017500 - Starting and Adjusting.

3.02 INSTALLATION

- A. All valves, valve accessories and static mixers shall be installed by workers thoroughly experienced in such work and all valve work shall be properly supported and aligned and present a neat and workmanlike appearance. All other required temporary or permanent supports for the valves shall be included in this contract to the approval of the Engineer.
- B. Secure all floor stands to support members using stainless steel hardware. Field touchup floor stands after installation.
- C. Plug valves shall be installed with the pressure side correctly placed.
- D. Set valves in a plumb or level position, as applicable.
- E. Install check valves for proper direction of flow. Adjust cushion chamber check valve to prevent water hammer at service conditions.
- F. Assemble flanged joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- G. All flanged valves shall be furnished and installed with a Style 128 flange adapter by Dresser Industries, Inc. or equal.
- H. Paint all installed valves and piping in accordance with Section 099744.
- I. Before each valve is installed, pipe lines should be flushed of all chips, scale, and foreign matter.
- J. Properly use dielectric fittings and gaskets with dissimilar metals to insure that galvanic and/or electrolytic action does not take place.
- K. Coordinate with Electrical Contractor for wiring of solenoid valves and transmitters.
- L. Limit switch shall be wired by Contract E.

3.03 INSPECTION, HANDLING AND STORAGE

- A. Inspection - All valves and accessories are subject to inspection by the Engineer at the point of delivery for manufacturer, direction of opening, freedom of operation, tightness of pressure-containing bolt, cleanliness of valve ports and especially seating surfaces, handling damage, cracks and any other damage.
- B. Valves found to be either defective or damaged shall be rejected and immediately removed from the job site.
- C. Handling - All valves shall be loaded and unloaded by lifting with hoists or skidding under control with ropes in order to avoid shock or damage. Under no circumstances shall valves and boxes be dropped.
- D. Storage - Valves, joint accessories and other appurtenances, if stored, shall be kept safe from damage. The interior of the valve and the joint accessories shall be kept free from dirt or foreign matter at all times.
- E. Perform operating tests on valves as per the manufacturers recommendations as required to determine they are in satisfactory operating condition and do not leak. All valves upon completion of the work shall be checked to determine they are in an open position, unless otherwise indicated.
 - 1. Electronic controller shall be installed and wired by Contractor E. Contract G shall provide manufacturer's representative to provide field start-up services for programming and calibrating the electronic control which shall receive a remote 4-20mA set point (desired flow) as an input to the electronic controller.

END OF SECTION 402324

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pressure Switches.
- B. Transmitters.
- C. Venturi Tubes.

1.02 REFERENCES

- A. NFPA 70 - National Electric Code.

1.03 SYSTEM DESCRIPTION

- A. Flow monitoring, water level monitoring and system control devices for potable water.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Provide catalog cuts indicating materials, ratings and descriptive data and accessories.
- C. Provide installation instructions and calibration data.

1.05 OWNERS INSTRUCTIONS

- A. Provide the services of a manufacturers trained representative on operation and maintenance of equipment

PART 2 - PRODUCTS

2.01 PRESSURE SWITCHES

- A. Manufacturers:
 - 1. Mercoid DA Series
- B. Bourdon Tube Material: Brass
- C. Stem Mounted
- D. Snubbers
- E. Adjustable Operating Range:
 - 1. 5-150 PSIG - Well No. 5-1 and 5-2
- F. Snap-action Switch - SPDT, 15A, 120V; one normally closed and one normally open.
- G. Set points shall be adjustable without removing switch cover or shutting down process.
- H. Switch shall have visible on/off indication
- I. Switch shall have calibrated dial and two pointers indicating set and reset points.

2.02 DIFFERENTIAL PRESSURE (FLOW) SWITCH

- A. Manufacturers:
 - 1. Meriam Instruments Series 1220.
- B. Bellows Material: Beryllium Copper.
- C. Rated Pressure: 500 psig.
- D. Electrical Switch: SPDT, 5A, 120V.
- E. Minimum Dead Band: 10% of full differential.
- F. Set Points: Visible and externally adjustable.
- G. Mounting: H mounting bracket for pipe saddle or wall mounting.
- H. Indicating Dial Size: 6 inches.
- I. Full Scale Displacement: 30 inches w.c. to 130 inches w.c. range.

2.03 ELECTRONIC FLOW TRANSMITTER

- A. Manufacturers:
 - 1. Foxboro, Model No. IDP10 Intelligent d/p cell transmitter for flow.
- B. Transmitter Housing: NEMA 4X.
- C. Pressure Cell Module: Type 316 stainless steel.
- D. Silicone Sensor Fill Fluid.
- E. Universal Wall/Pipe Mounting Bracket.
- F. Local Indicator: LCD display, integrally mounted.
- G. Lightning and Surge Protection.
- H. Accessories: 3 valve manifold, Type 316 Stainless Steel.
- I. Transmitter for use with venturi tube.
- J. Span Limits: 3.5 and 200 inches of water column.

2.04 VENTURI TUBE

- A. Manufacturers:
 - 1. Primary Flow Signal Model HVT-CI.
- B. Material: Cast Iron Pressure Vessel, pressure taps lined with stainless steel tubing, inlet cone throat and outlet cone fabricated from 304 Stainless Steel.
- C. Mounting: 150 ANSI flange.
- D. Pressure: 250 psig.

- E. Temperature: 250 degrees F maximum.
- F. Provide integral metal tag which indicates manufacturer's name, address, model number, serial number and throat diameter.
- G. Schedules:
 - 1. Manganese Removal Plant Effluent Flow: 12 inch line size, 6.0 inch throat size, with 100 inch of differential pressure at 2,086 GPM.
 - 2. Well No. 5-1 Discharge Flow: 10 inch line size, 4.8 inch throat size, with 100 inch of differential pressure at 1,328 GPM.
 - 3. Well No. 5-2 Discharge Flow: 10 inch line size, 4.8 inch throat size, with 100 inch of differential pressure at 1,328 GPM.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's installation instructions.
- B. Calibrate flow, level and pressure transmitters based on flow, level and pressure levels.
- C. Provide all taps, pressure sensing lines, valves and miscellaneous equipment as indicated on drawings.
- D. Mount pressure switches and transmitters in vertical position.
- E. Install copper Type K piping from pressure taps to switches and transmitters.
- F. Provide vent and drain valves in accordance with meter manufacturer's installation instructions.
- G. Calibrate booster flow for low and high flow using two (2) wide range transmitters.
- H. Contractor shall provide a portable clamp on flow meter and differential pressure gauge to calibrate new and existing flow transmitters.

3.02 FIELD QUALITY CONTROL

- A. Verify tubing installation is leak free.
- B. Demonstrate performance and operation of installed equipment.
- C. Calibrate all transmitters and pressure switches.

END OF SECTION 409000

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Chlorine residual monitoring components.
- B. pH monitoring components.
- C. Control relays to activate chemical feed equipment.
- D. Chemical treatment control panel modifications.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Provide catalog information, parts list and wiring diagram, and operation and maintenance instructions.

1.03 OWNERS INSTRUCTIONS

- A. Provide the services of a manufacturers trained engineer for one day to check each system installation, calibrate equipment and to instruct Owner on operation and maintenance.

1.04 EXTRA MATERIALS

- A. Manufacturer's recommended spare parts kits.

PART 2 - PRODUCTS

2.01 PH AND CHLORINE RESIDUAL MONITORING COMPONENTS

- A. Transmitter:
 - 1. Manufacturer:
 - a. Rosemount by Emerson Model FCL with Dual Channel Analyzer Transmitter model 56-03-24-32-HT. Free chlorine measuring system with continuous pH correction.
 - b. Approved equal.
 - 2. Transmitter Type:
 - a. Dual Channel
 - 3. Power:
 - a. 85-265 VAC Switching, 50/60 Hz with four Alarm Relays
 - 4. Liquid Analytical Measurement
 - a. Channel No. 1: Chlorine
 - b. Channel No. 2: pH
 - 5. Communication
 - a. HART Digital Communication
 - 6. Accessories:
 - a. Cable Gland Kit
 - b. 2 in. Stainless Steel Pipe Mounting kit
 - c. Stainless Steel Tag (Owner Specified Marking)
 - 7. Enclosure:
 - a. Material: Polycarbonate
 - b. Rating: Type 4X and IP65
 - c. Dimensions: 6.2 in. L x 6.2 in. W x 5.2 in. H
 - d. Conduit Opening: 1/2 in.

8. Display:
 - a. Features: Customizable, full color LCD, back-lit display
 - b. Resolution: 480 x 272 color TFT
 - c. Dimensions: 4.3 in. Diagonal
 9. Ambient Conditions:
 - a. Temperature: 14 to 131F
 - b. Temperature for Turbidity: 14 to 122F
 - c. Relative Humidity: 5 to 95% (non-condensing)
 10. Alarm Relays:
 - a. Four Form C SPDT configurable alarm relays for process measurement as alarms or faults with interval timer settings.
 11. Outputs:
 - a. Current Outputs: four actively powered (4-20mA or 0-20mA, scalable)
 - b. Max Load: 550 Ohms
- B. pH Sensor:
1. Manufacturer:
 - a. Rosemount Model 3900VP-02-10 pH/ORP Sensor.
 - b. Approved equal.
 2. Sensor Type: pH/ORP
 3. Measurement Range:
 - a. pH: 0 to 14
 - b. ORP: -1500 to +1500 mV
 4. Maximum Pressure: 100 psig at 212F
 5. Operating Temperature: 14 to 212F, automatic temperature compensation
 6. Process Connection:
 - a. Front Facing: 3/4-in. and 1-in. MNPT
 - b. Rear Facing: 1-in. MNPT
 7. Transmitter Compatibility:
 - a. Rosemount 56
 8. Cable:
 - a. Rosemount Model 24281-05 interconnecting cable, VP8 Variopol for 3900VP sensor, 4 ft.
 9. Measuring Code: General purpose low reistivity (GPLR) pH glass (0-14 pH)
 10. Calibration Certificates:
 - a. Loop Calibration Certificate (sensor and transmitter calibrated together, with test data).
 11. Materials of Construction:
 - a. Sensor Body: Ryton
 - b. O-ring: EPDM
 - c. pH Electrode: Glass
 - d. ORP Electrode: Glass, Platinum
 - e. Solution Ground: Stainless Steel
 - f. Reference Junction: PFTE (Teflon)
- C. Chlorine Sensor:
1. Manufacturer:
 - a. Rosemount Model 499ACL-01-54-VP Free Chlorine Sensor.
 - b. Approved equal.
 2. Sensor Type: Free Chlorine
 3. Measurement Range: 0 to 10 ppm (mg/L)
 4. Pressure: 0 to 65 psig
 5. Temperature: 32 to 122 F
 6. Process Connection: 1-in. MNPT

7. Transmitter Compatibility:
 - a. Rosemount 56
 - b. Rosemount 1056
 - c. Rosemount 1066-DO
 - d. Rosemount 5081-A
8. Cable:
 - a. Rosemount Model 23747-04 interconnecting cable, Variopol for 499ACL sensor, 4 ft.
9. Calibration and Conformance Certificate:
 - a. Loop Calibration Certificate (sensor and transmitter calibrated together, with test data).

2.02 MOUNTING

- A. The Chlorine analyzers shall be mounted on gray Formica mounting board, which shall be mounted to a stainless steel channel rack (refer to drawings for additional detail). Mounting board to be sized to allow ease of maintenance to all mounted equipment.

2.03 CHEMICAL TREATMENT SAFETY CONTROL

- A. Power Relays to energize treatment receptacle control contacts for each treatment pump, rated 1 H.P., 120/240 volts single phase with weld resistant contacts. Refer to drawings for required quantity.
- B. Each treatment pump receptacle shall be powered via a dedicated IEC Contactor Rated 1 HP, which will be energized via the treatment receptacle control contacts.
- C. Chemical Safeties for treatment shall be as shown on drawings.
- D. All components shall be installed in the MCC where shown on drawings.
- E. All press-to-test pilot lights shall be LED. Lights and switches shall be flush mounted on door with press-to-test lights.
- F. Monitor shall be factory wired to numbered terminal strips and tested prior to shipment.
- G. Labels to identify each indicator light and switches.
- H. The chemical safety panel shall have a four-position selector switch to permit "off", "normal", "weld" and "device" operation. When positioned "off", chemical feeders shall be prevented from operating. In the "normal" position, the closure of all safety/flow detection devices will allow chemical feeders to operate. When a safety/flow detection device activates, a pilot light shall indicate its operation. Similarly, when the chemical feed pump is energized, a pilot light shall indicate its operation. If a chemical feed pump becomes powered in the "normal" mode and any one or all of the safety devices are not closed, an alarm bell shall sound for an adjustable time period, all power to chemical feed pumps shall be interrupted, a pilot light shall indicate a failure, and an auxiliary relay contact shall close. Chemical safety panel shall require operator to manually depress a reset button to re-power chemical feeders and to reset alarms.
 1. The "weld" position shall allow testing of the power contactor's contacts for weld. During this test, individual push-buttons for each safety device are depressed. Should a power contactor contain a welded contact, pilot lights shall pinpoint the specific location. The procedure for electrically testing all pilot lights shall be performed by the weld test.
 2. The "device" position shall permit the operator to test the safety devices. By manually operating each device, the panel alarm bell shall double function as an audible continuity tester to indicate closed and open states. Visual verification shall be provided through panel pilot lights. All instructions for performing the above test procedures shall be silk screened on the panel face.

- I. All wiring shall be numbered, tagged, and terminated at 30 AMP heavy duty labeled terminal strips.
- J. All associated logic control and monitoring circuitry shall be configured utilizing control relays and timers of the octal base (or 11 pin base) plug in type. Each relay and timer shall be equipped with an LED or neon status indicator (visible with enclosure door open), and manual operators to facilitate testing and troubleshooting by Owner. Contact ratings shall be minimum 10 AMP, 24 volt.
- K. Install new controls to interface with well motor control circuits. Install relays and an adjustable 0 to 60 second time delay relay to provide a set of contacts that interface with the chemical treatment pump receptacles. The controls shall provide contacts that open/close based on the well pump to stop. This circuit shall de-energize the treatment safeties while the well pump is returning to blowoff before final shutdown. The adjustable time delay relay shall be mounted inside the enclosure.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install analyzers in location(s) indicated on drawings.
- B. Install all analyzer equipment as shown on drawings.
- C. Install all analyzer equipment on the mounting board as shown on drawings.
- D. Run power supply and interconnect cable in separate conduit.
- E. Run interconnect cable without splices from sensor junction box to analyzer.
- F. Install isolated 4-20 mA DC pH and chlorine residual process variable instrument circuits in dedicated conduits.

3.02 ADJUSTING

- A. Calibrate analyzer with installed probe using two point buffer method.
- B. Set low and high alarm set points as requested by Engineer.

3.03 DEMONSTRATION

- A. Demonstrate performance of system to operate monitoring systems and to operate chemical feed pump when alarm relay is energized.
- B. Demonstrate operation and maintenance of system to Owner.

END OF SECTION 409513

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. New water lubricated, deep well turbines, multi-stage pumping units and accessories for potable water.
- B. New uncoated column pipe and suction pipe.
- C. New discharge head and baseplate.
- D. Testing, adjusting, and balancing.
- E. Demonstration.

1.02 RELATED SECTIONS

- A. Section 099744 - Mechanical Piping Coating Systems
- B. Section 211100 - Small Piping, Valves and Miscellaneous Equipment
- C. Section 332120 - Disinfection of Wells
- D. Section 432268.01 - Vertical Hollow Shaft Electric Motor

1.03 REFERENCES

- A. ANSI B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- B. ANSI/NSF Standard 61 Drinking Water System Components
- C. ASTM A48 - Gray Iron Castings.
- D. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless.
- E. ASTM A108 - Steel Bars, Carbon, Cold Finished, Standard Quality.
- F. ASTM B42 - Seamless Copper Pipe, Standard Sizes.
- G. ASTM B584 - Copper Alloy Sand Castings for General Applications.
- H. AWWA E101 - Vertical Turbine Pumps - Line Shaft and Submersible Types.
- I. NEMA - National Electrical Manufacturers Association.

1.04 PERFORMANCE REQUIREMENTS

- A. The installed pumps shall be a high efficiency, multi-stage, water lubricated, deep well vertical lineshaft turbine pump with aboveground discharge for potable water with the following characteristics:

REQUIREMENT	WELL NO. 5-1
Capacity (GPM)	1,200
Total Dynamic Head (ft)	320
Minimum Pump Efficiency	83 percent
Full Load Speed (RPM)	1,770

Power (HP)	125
Min. Number of Stages	4
Discharge Head	10x10
Setting (ft)	65

REQUIREMENT	WELL NO. 5-2(A)
Capacity (GPM)	1,000
Total Dynamic Head (ft)	275
Minimum Pump Efficiency	83 percent
Full Load Speed (RPM)	1,770
Power (HP)	100
Min. Number of Stages	4
Discharge Head	10x10
Setting (ft)	50

- B. The pumping units shall be designed and furnished in accordance with the latest Hydraulic Institute and AWWA standards for lineshaft turbine pumps.
- C. Pump curves must not be excessively shallow at any point throughout the range of operating pressures.
- D. Manufacturer shall submit certified pump curves stamped by a registered Professional Engineer before shipping unit. The pump must meet a HI14.6-1U acceptance grade at the design point. If not, the pump will need to be reworked and retested at the manufacturer's expense.
- E. All pump equipment shall be supplied by a single manufacturer. A certified bill of materials shall be provided.
- F. All pump components and accessories in contact with water shall be in compliance with the "Lead in Drinking Water Act" effective January 4, 2014.

1.05 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Indicate technical information and dimensions for the pumps, including non-witnessed certified performance test pump curves.
- C. Certified bill of materials.
- D. Shop Drawings: Indicate mounting details, dimensions, configuration, and construction details and parts list.
- E. Certified Pump Curves: Indicate operating characteristics at design point as well as throughout the operating range of the pump.
- F. Manufacturer's Instructions: Indicate procedures and conditions required for proper installation.
- G. Written report on results of initial and final pump tests.
- H. Operation and maintenance data.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017823.
- B. Operation Data: Indicate procedures and methods required for proper operation of all equipment.
- C. Maintenance Data: Indicate maintenance schedule, type and frequency of lubrication, spare parts manual and local parts supplier.

1.07 WARRANTY

- A. Provide a minimum 1 year warranty on all parts, labor and equipment, effective the date of final payment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. GOULDS PUMPS INC.
- B. LAYNE CHRISTENSEN, CO.
- C. AMERICAN MARSH
- D. Or approved equal.

2.02 MATERIALS

- A. Pumping Unit (Vertical Turbine Pump): AWWA E101, high efficiency, multi-stage water lubricated, deep well turbine pump of the following materials and components:
 - 1. Bowl Assembly: ASTM A48, Class 30 (250 PSI), flanged, cast iron, high tensile strength; free from blowholes, sand holes and other faults; porcelain enamel coated water passages; fitted with diffuser vanes; replaceable bronze wear rings; rubber or bronze sand collar; bronze alloy C89835 sleeve bearings; bowl shaft and collets. Bowl exterior to be uncoated. Bowl assembly stages fastened with ASTM A276 type 316 stainless steel hardware.
 - 2. Impeller: ASTM A743, Type 304 stainless steel, fastened to the bowl shaft with ASTM A582 type 416 stainless steel taper collets; enclosed type with solid plates; statically and dynamically balanced; adjustable. Impellers shall be balanced to grade G6.3 of ISO 1940 as minimum. Impeller trim shall be typical of each individual impeller.
 - 3. Suction: The suction bowl shall be provided with a non-soluble grease packed bronze bearing. A bronze sand collar shall be provided to protect bearing from abrasives in water and shall have sufficient opening at bottom for easy removal of bearing.
 - 4. Impeller Shaft: ASTM A582 type 416 stainless steel, polished to better than 40 RMS surface finish, minimum 12% chromium content; diameter equal to that of line shaft; connected to line shaft with solid type 416 stainless steel coupling; supported by bearings above and below each impeller.
- B. Column Assembly - Water Lubricated: AWWA E101, discharge diameter pump column of the following materials and components:
 - 1. Line Shaft: ASTM A582 type 416 stainless steel; polished to better than 40 RMS surface finish, balanced; faced both ends, left hand threaded with a tendency to tighten during normal operation; maximum 10 foot lengths; ASTM A582 type 416 heavy duty stainless steel couplings, rubber line shaft bearings in bronze bearing retainers; water lubricated

during pump's operation; secured at each coupling or flange. Line shaft shall be rated for minimum of 150% of maximum rated torque/HP requirement. The lineshaft shall be provided with ASTM A743 type 304 stainless steel sleeve to act as a journal at each bearing location. The sleeve shall be placed on a full size shaft without undercutting and secured in position by a suitable adhesive.

2. Discharge Column Assembly: ASTM A53, Schedule 40, Grade B, steel pipe, threaded; maximum 10 foot lengths; screw coupled with 8 threads per inch with 3/16" taper per foot thread and faced parallel to butt against centering spider to form accurate shaft alignment. Uncoated.
 3. Bearing: Bearing shall be fluted rubber retained in the centering spider by a shoulder on each end of the bearing.
 4. Centering Spiders: ASTM B584 Alloy 1398 Silicon bronze
- C. Discharge Head Assembly - Water Lubricated:
1. Discharge Head: ASTM A48, Class 30 cast iron, high profile type to allow shaft coupled above stuffing box and provided for mounting the motor and support the column and bowl assemblies. Vertical suction to horizontal discharge, 125 ANSI drilling discharge flange.
 2. Stuffing Box: Provide cast iron stuffing box with a minimum of five (5) packing rings. The packing gland shall be a 316 stainless steel split type secured in place with 316 stainless steel hardware and with a rubber slinger installed on the shaft. The bearing shall be C89835 bronze.
 3. Headshaft: ASTM 582 type 416 stainless steel, polished to better than 40 RMS surface finish, minimum 12% chromium content; diameter equal to that of line shaft; connected to line shaft with solid type 416 stainless steel coupling;
 4. Discharge head shall be provided with 1/2" NPT fittings for rim drain and water lubrication connections.
 5. Discharge head shall be provided with (4) 1" NPT fittings for air and probe line penetrations.
 6. Provide removable discharge head opening guards to protect from inadvertent contact with rotating shaft.
 7. Baseplate: Provide ASTM A283 steel or ASTM A48, Class 30 cast iron base plate to mount discharge head.
- D. Suction Pipe
1. Suction Pipe: ASTM A53, Schedule 40, Grade B, steel pipe, 10 foot length.
 2. The suction pipe shall have a minimum inside diameter and weight equal to or larger than that of the discharge column pipe, unless otherwise noted.

2.03 ACCESSORIES

- A. Air Lines: Polyethylene, 1/4 inch outside diameter; complete with stainless steel wire for connection. Provide two air lines with properly sized compression fitting adapters to create a sanitary seal.
- B. Probe Line: Polyethylene, 5/8 inch inside diameter; complete with stainless steel wire for connection. Provide with properly sized compression fitting adapters to create a sanitary seal. Restrict lower opening to prevent portable level probe from passing through end but allows unrestricted water flow.
- C. Level Pressure Sensor Tube: Polyethylene, 1 inch inside diameter, 1-1/4" outside diameter; complete with stainless steel wire for connection. Provide properly sized compression fitting adapters to create a sanitary seal.
- D. Depth and Level Pressure Transmitter:
- E. Protective Coating: See Section 099744 (Head only).

- F. Bolts and Hardware: Stainless Steel; ASTM A582, Type 316.
- G. Altitude Gauge: One (1) 4½-inch diameter altitude gauge in feet, range 0 - 200 feet.
- H. Pressure Gauge: One (1) 4½-inch diameter liquid filled pressure gauge. Pressure gauge shall be 316 stainless steel Bourdon tube material with an operating range of 0-150 p.s.i. Case shall have flange for surface mounting and a snubber. Pressure gauge shall be manufactured by Ashcroft, Type 1379 or specifically approved equal for each well pump.
- I. Pre-lube Piping: See Section 221113.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing site conditions and work required to install pumps.
- B. Verify that the well and substrate are ready to receive well pump of this section.

3.02 REMOVALS

- A. Properly remove and dispose of existing well pump, column piping, discharge head and accessories from the well.

3.03 INSPECTION AND SERVICING OF PUMP STUFFING BOX AND DISCHARGE HEAD

- A. Servicing and inspection of pump stuffing box to include checking for free movement of stuffing box glands, cleaning and oiling of gland bolts, and inspection and repair of packing and seals, as required. The packing shall be removed and the shaft sleeve or shaft (if no sleeves were used) shall be examined for wear. If required by the Engineer, replace the stuffing box with new.
- B. The pump and driver alignment shall be checked and corrected as necessary. The vertical shaft movement of the pump shall be examined. Any vertical movement exceeding 150 percent of the original clearance shall be reported.
- C. All bearings shall be removed, cleaned and examined for defects. Bearing housings shall be carefully cleaned. Any defective bearings shall be replaced in accordance with the pump manufacturer's specifications. Immediately upon inspection and cleaning, bearings shall be coated with oil or grease. Oil-lubricated bearings shall be drained and filled with fresh oil. Grease-lubricated bearings shall be regreased. All grease and oil used shall comply with the pump manufacturer's specifications.
- D. The discharge head shall be sandblasted and repainted in accordance with Section 099744. The Owner shall select the color prior to painting.

3.04 INSTALLATION

- A. Prior to the installation of any pumping equipment, the equipment shall be thoroughly cleaned and disinfected.
- B. The Contractor shall utilize a minimum 2,000 psi pressure washer to thoroughly clean the interior and exterior of all pump equipment. Prevent any dirt, debris or other foreign matter from contaminating the washed equipment.

- C. Disinfect all pump equipment by applying a 200 ppm hypochlorite solution to all exterior and interior surfaces. After 20 minutes, rinse solution off of materials which are not compatible with hypochlorite to prevent corrosion.
- D. Install pumping unit in accordance with manufacturer's instructions and approved shop drawings.
- E. Position suction pipe, column assemblies and bowl assemblies in center of well casing and riser. Pump setting is to be as noted on plans.
- F. Securely mount pumping unit. Form approved sanitary well seal. Material used to form Sanitary Seal shall be NSF-61 approved.
- G. Install new/refurbished motor and new shafts and couplings in alignment with existing and/or new equipment.

3.05 TESTING

- A. Certified Factory Performance Test - It is the responsibility of the manufacturer to insure that production units are within acceptable tolerance from the manufacturer's rating tests. The pump shall be tested by the manufacturer under controlled conditions. Prior to shipment to the pump's installation location the manufacturer shall submit certified pump performance test results.
- B. Field Performance Test - it is the responsibility of the pump installer to conduct a field performance test to confirm the factory performance test results.
- C. After a minimum 12 hours of operation, conduct pump test for five different points along the pump curve (above and below) including the design point. Record and submit the following data for EACH point:
 - 1. Static water level.
 - 2. Flow in GPM.
 - 3. Discharge pressure.
 - 4. Drawdown.
 - 5. Voltage and amperage.
 - 6. Specific capacity.
 - 7. Power.
 - 8. Bowl Efficiency.
 - 9. Total Dynamic head.
 - 10. RPM.
 - 11. Motor vibrations.
- D. Provide all valves, gauges, piping, hoses, flow measuring devices and instruments required to conduct all tests. Owner's equipment shall not be used.

3.06 PROTECTION

- A. Protect all nearby equipment from damage during installations.
- B. Protect well pump and accessories from damage and contamination during installation and until project is accepted by the Owner.

3.07 ADJUSTING

- A. Adjust under provisions of Section 017500.

- B. Adjust operation of pump to ensure proper installation and operation consistent with the submitted pump curves.

3.08 DEMONSTRATION

- A. Demonstrate under provisions of Section 017500.
- B. Demonstrate operation and maintenance of pump to Owner's personnel.
- C. Performance not in substantial conformance (90%) with the certified pump curve will be grounds for rejection of the installation. Modifications and/or replacement shall be completed by the contractor at no additional cost to the owner.

3.09 PAINTING

- A. Includes discharge head and base plate.
- B. Abrasive blast all surfaces to be coated and where called for in the specifications.
- C. Apply new coatings as per Section 099744.
- D. Owner to determine paint color.
- E. Clean up all paint splatter, spills, chips, etc., to satisfaction of Engineer.

END OF SECTION 432155.01

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Premium efficiency vertical electric motors.
- B. Testing.

1.02 RELATED SECTIONS

- A. Section 432155.01 - Water Lubricated Vertical Turbine Well Pump

1.03 REFERENCES

- A. All equipment shall be fabricated, assembled and tested in accordance with the most current applicable standards as defined by the following institutions:
 - 1. Institute of Electrical and Electronic Engineers (IEEE).
 - 2. National Electrical Manufacturers' Association (NEMA).
 - 3. Anti-Friction Bearing Manufacturers' Association (AFBMA).
 - 4. American National Standards Institute (ANSI).
 - 5. National Electrical Code (NEC).
 - 6. Underwriter's Laboratories (UL).

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
 - 1. Preliminary Dimension Print and Frame Size.
 - 2. Approximate Motor Weight.
 - 3. Complete Motor Nameplate Information.
 - 4. Motor Performance Data, including the following:
 - a. Efficiencies at 100%, 75% and 50% of full load
 - b. Power factor at 100%, 75% and 50% of full load
 - c. Locked Rotor Current
 - d. Full Load Current
 - e. Starting Torque
 - f. Full Load Torque
 - g. Breakdown Torque
 - 5. Complete Description of Testing Facilities.
 - 6. Job site Storage Requirements.
 - 7. Certified Dimension Prints.
 - 8. Recommended Spare Parts List with current pricing.
 - 9. Shop Drawings: Indicate mounting details, plan layout of equipment, construction details, required clearances, power requirements, and wiring diagrams.
 - 10. Manufacturers Instructions: Indicate special procedures and conditions required for proper installation and maintenance.
 - 11. Required with motor upon shipment:
 - a. Operation and Maintenance Manuals
 - b. Connection Diagrams
 - c. Test Reports as Specified

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017823.

- B. Operation Data: Indicate procedures and methods required for proper operation of all equipment.
- C. Maintenance Data: Indicate maintenance schedule, type and frequency of lubrication, spare parts manual and local parts supplier.

1.06 COORDINATION

- A. Coordinate work under provisions of Section 013100.
- B. Coordinate work of this section with installation of new well pump, including all adjacent mechanical and electrical work.

1.07 WARRANTY

- A. Provide under provisions of Section 017800.
- B. Provide minimum 3 year warranty on all parts, labor and equipment, effective the date of final acceptance of the project.
- C. Provide 3 year guarantee that motor will meet or exceed specified requirements.

PART 2 - MATERIALS

2.01 VERTICAL HOLLOW SHAFT ELECTRIC MOTOR

- A. Conditions of Service
 - 1. Motor shall be suitable for operation under the following conditions of service unless otherwise specified:

WELL NO.	HORSE POWER	SPEED (RPM)
5-1	125	1,770
5-2(A)	100	1,770

- 2. Continuous operation on a three-phase 60 hertz system rated 460 volts.
 - 3. Motors shall have a service factor of 1.15.
 - 4. Motors shall be designed to operate at rated load in a maximum ambient temperature of 40° C at a maximum altitude of 300 feet.
 - 5. The location of the installation will be indoor unless otherwise specified.
- B. Design Requirements
 - 1. Motors shall be capable of withstanding all normal forces which may be imposed upon them during the course of normal operation, including starting and normal stops.
 - 2. Motors shall be suitable for across the line starting and shall be able to start and accelerate the connected load speed with 90% of rated voltage at the motor terminals.
 - 3. Motors shall be capable of continuous operation at full load and rated frequency with a voltage variation of +10%.
 - 4. Motors shall be capable of continuous operation at full load and rated voltage with a frequency variation of +5%.
 - 5. Motors shall be capable of continuous operation with a combined voltage and frequency variation of no greater than 10% with the frequency variation no greater than 5%.

6. Motor installation locations will be subject to dust, moisture and/or corrosive atmospheric conditions and shall have all parts given protective treatment such as Emerson's "CORRO-DUTY®" or equal.
- C. Enclosure
 1. Motors shall be furnished with a Weather Protected, Type I (WPI) guarded enclosure.
 2. Openings on enclosures shall be covered with metal guard screens having a mesh size no larger than 5/8" square.
 3. Enclosure shall be of cast iron construction in accordance with the manufacturer
 4. S standard design. Canopy caps shall be of plastic, aluminum, cast iron or sheet metal and shall be easily removable for maintenance purposes.
- D. Stator Construction
 1. Stator laminations shall be of fully processed steel. Each lamination surface shall be given necessary treatment so as to have core plate type C-5 insulation.
 2. Insulation system shall be Class F or better.
- E. Rotor Construction
 1. Rotors shall be of cast or fabricated aluminum in accordance with manufacturer's standard design practices.
- F. Bearings
 1. Bearing supplied shall be of type and size sufficient to satisfy thrust loading requirements for each motor in accordance with the manufacturer's standard design.
 2. Bearings shall be rated for an in-service L-10 life of 8,800 hours.
- G. Thrust bearings
 1. Thrust bearings shall be deep-groove ball, angular contact ball or spherical roller type. Bearings mounted back-to-back or in tandem are acceptable and may be furnished when required according to manufacturer's standard design.
 2. Motors shall be of high thrust design and shall be supplied with angular contact ball bearings whenever possible and in accordance with manufacturer's standard design.
 3. Where thrust requirements restrict the use of angular contact bearings, spherical roller bearings shall be furnished. Spherical roller bearings shall be spring loaded to keep the lower bearing race in contact and prevent bearing damage during starting and momentary upthrust conditions.
- H. Guide Bearings
 1. Guide bearings shall be deep-groove ball type.
 2. Guide bearings may be stacked when necessary according to manufacturer's standard design to accommodate specific upthrust conditions.
 3. Guide bearings or bearing assemblies shall be provided with sufficient means for preventing the leakage of lubricant or entrance of foreign matter along the shaft.
- I. Lubrication
 1. Grease lubricated bearings shall be furnished with provisions for in-service positive lubrication. A drain shall be provided to guard against over lubrication.
- J. Noise Level
 1. Sound pressure levels shall be measured according to NEMA MG1 / ANSI 12.51-2002 and shall not exceed 90 decibels as measured on the A-Weighted Scale at a distance of five (5) feet from any motor surface under no load, free field conditions.
- K. Nameplates
 1. Motor nameplates shall be of stainless steel and shall be securely fastened to the motor frame with pins of like material.

2. The following information shall be contained on the motor nameplate as a minimum:
 - a. Rated Horsepower
 - b. Full Load Speed
 - c. Frequency
 - d. NEMA KVA Code and Design (when applicable)
 - e. Rated Voltage
 - f. Manufacturer's Serial Number
 - g. Service Factor
 - h. Insulation Class
 - i. Maximum Ambient
 - j. Full Load Current at Nameplate Voltage
 - k. Frame Size Designation
- L. Terminal Boxes
 1. Terminal boxes shall be of aluminum, stamped steel, fabricated steel or cast iron construction to be compatible with the motor enclosure specified and when possible, shall be diagonally split and capable of rotation in 90° increments. Boxes not suitable for rotation shall be capable of top entry.
 2. The area in which the main terminal box is connected with the motor frame shall be fully gasketed in order to prevent entrance of foreign matter into the motor and to provide support for the stator leads where they pass through the motor frame.
 3. A properly sized grounding terminal shall be mounted in the main terminal box.
- M. Accessories
 1. Non-Reverse Ratchet
 - a. Motors shall be furnished with a non-reverse ratchet.
 2. Space Heaters
 - a. Motors shall be furnished with space heaters to provide sufficient wattage to maintain the internal temperature of the motor at a level approximately 10°C above the ambient temperature while the motor is not in operation.
 - b. Space heaters shall be of the silicone rubber strip type attached directly to the stator end turns. The leads shall be brought out to an auxiliary terminal box.
 - c. The space heaters shall be rated for operation on a single phase, 60 hertz, 120 volt system.

PART 3 - EXECUTION

3.01 TESTING

- A. Prior to shipment, one (1) motor of each horsepower and voltage rating shall be given a complete initial certified test in accordance with IEEE 112 method B and shall include the following items:
 1. Current Balance
 2. High Potential Test
 3. Winding Resistance
 4. Locked Rotor Current
 5. No Load Running Current
 6. Full Load Heat Run
 7. Full Load Percent Slip
 8. Efficiency at 100%, 75% and 50% Load
 9. Power Factor at 100%, 75% and 50% Load
- B. Noise test shall be performed in accordance with NEMA MG1 / ANSI S12.51-2002.
- C. Certified test reports shall be submitted to upon completion of all required tests.

1. After the motor has operated for a minimum of 12 hours under load, all motors shall be given a short commercial test in accordance with NEMA MG1-12.55.

D. VIBRATION TEST

1. After a minimum of 12 hours of motor operation under load, a vibration test shall be conducted.
2. Perform a vibration test on the installed motors.
3. Contractor to provide the equipment necessary to perform the test.
4. Instruments for vibration test must be approved by the Engineer.
5. Record displacement, velocity, and spike energy for each point as defined below.
6. Perform vibration test for each point in the pump test as outlined in Section 11209.

DESCRIPTION	MEAS. LOC.	DISPLACE. (MILS)	VELOCITY	SPIKE ENERGY
Top of Motor Bonnet - Horizontal		Y	Y	N
Upper Motor Bearing - Horizontal	90 & 180 degrees	Y	Y	Y
Lower Motor Bearing - Horizontal	90 & 180 degrees	Y	Y	Y
Discharge Head Coupling - Horizontal	90 degrees	Y	Y	N
Discharge Head Packing Gland - Horizontal		Y	Y	N
Discharge Head Base - Horizontal	90 & 180 degrees	Y	Y	N

Y - Required as part of vibration testing.

N - Not required as part of vibration testing.

90° - 90 degrees from discharge head discharge.

90 & 180° - 90 and 180 degrees from discharge head discharge.

7. Displacement readings greater than 2.0 mils or spike energy readings greater than 0.3 shall be cause for the Contractor to take measures to reduce the vibrations. This shall be done at no additional cost to the Owner.

3.02 INSTALLATION

- A. Prior to installation, verify motor horsepower, voltage and RPM.
- B. Furnish and install new motor. Adjust/modify pump column shaft after motor installation.
- C. Install motor in accordance with manufacturer's recommendations.
- D. Perform vibration test as outlined in this specification section.

3.03 ADJUSTING

- A. Adjust under provisions of Section 017500.

3.04 DEMONSTRATION

- A. Demonstrate operation and maintenance of motor to Owner's personnel.

3.05 PROTECTION

- A. Protect finished work.
- B. Protect motor and accessories from damage and contamination until project is accepted by the Owner.

END OF SECTION 432268.01

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Calcium hypochlorite tablet chlorinator.
- B. Calcium hypochlorite pump and accessories.

1.02 RELATED SECTIONS

- A. Section 220529 - Hangers and Support for Piping.
- B. Section 221113 - Facility Piping.

1.03 COORDINATION

- A. Coordinate work under provisions of Section 013100.
- B. Coordinate the inspection of the system by the manufacturer with the complete installation of the system.
- C. Coordinate with all other adjacent electrical and mechanical work.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Indicate information on solution tank, chemical feed pump, mixer, controls, including capacities, hypochlorite treatment unit, recirculation pump, secondary containment basin, capacities, performance, and accessories.
- C. Shop Drawings: Indicate plan layout of equipment, pertinent dimensions, mounting details, construction details, required clearances, power requirements and wiring diagrams.
- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions required for proper installation.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017823.
- B. Operation Data: Indicate proper operating instructions and procedures.
- C. Maintenance Data: Indicate types and methods of lubrication, cleaning, schedules, spare parts list and local parts supplier.

1.06 SPARE PARTS

- A. The following spare parts shall be provided for each chlorinator unit:
 - 1. One (1) calcium hypochlorite pump.
 - 2. One (1) set of diaphragms, poppets, and seals for each chemical metering pump and standard manufacturer's preventative maintenance kit for each pump supplied.
 - 3. One (1) complete length of 3/4" diameter discharge tubing.
 - 4. One (1) quart of pump lubricant, S.A.E. 40.

5. Four (4) 50 lb. pails of calcium hypochlorite briquettes, NSF Standard 60, 7 gram briquette size with anti-scale inhibitor. Provide hand scoop constructed of corrosion resistant material for transferring tablets to hopper.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products to the site under provisions of Section 016500.
- B. Do not remove manufacturer's packaging until product is ready to be installed.
- C. Do not store product directly on the ground.
- D. Store product on a firm, level surface.

1.08 WARRANTY

- A. Provide manufacturer's standard warranty.
- B. Warranty to include coverage for materials.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Contractor shall furnish and install two (2) new dry tablet chlorinators with new calcium hypochlorite pump in location indicated on the Plans.
- B. System must be supplied to achieve a chlorine solution strength of 0.8 to 0.99 percent at all times.

2.02 CALCIUM HYPOCHLORITE TABLET CHLORINATOR

- A. Manufacturers:
 1. Constant Chlor Plus, Model MC4-50 LITE as manufactured by Arch Chemicals, Inc. of Atlanta, GA. The chlorinator shall be factory pre-wired and piped and require only connecting to a reliable water supply, connecting to the dosing pump suction and plugging into an 115V outlet.
- B. Description:
 1. Equipment:
 - a. Calcium hypochlorite tablet chlorinator shall consist of a feed hopper; feed hopper cover, chemical support grid, a spray water system, solution storage tank and fully integrated control panel with PLC, to provide independent system operation and alarms.
 2. Chemical:
 - a. Chlorinator shall be designed to operate with Constant Chlor Plus TM briquettes. Briquettes shall be 66 percent calcium hypochlorite by weight with a size and form to prevent bridging and clogging of the hopper screen.
 - b. Briquettes shall contain a scale inhibitor, 0.5 percent by weight, to prevent excessive scaling of the wetted components.
 - c. Chemicals shall comply with: EPA No. 1258-1179, NSF Standard 60, and AWWA B300.
- C. Operation:
 1. Pressure Range: 40 to 150 psig
 2. Dry chemical Capacity: 62 lbs

3. Solution Tank Volume: 25 gallons
 4. Available Working Solution: 13 gallons
 5. Water Inlet Size: 1/2 inch FNPT
 6. Solution Outlet Size: 1/2 inch MNPT
 7. Solution Strength: <1.0 percent
 8. Operating Temperature: 40 degrees to 105 degrees F
 9. Electrical: 115V, 60Hz, 15A, 1Phase
- D. Controls and Alarms:
1. 4 Normally Open Contacts for Remote Interface. 1 Dry Contact for Remote Start of Dosing Pump.
 2. 24VDC Control Power.
 3. PLC with 14 inputs/10 outputs
 - a. 6 Inputs and 2 Outputs Available for Systems Integration 8 Buttons / Indicators:
 - 1) OFF/ON Indicator: Push-Button to turn the unit ON or OFF
 - 2) LID OPEN: Prevents the unit from operating if lid is open
 - 3) TANK LOW: Solution inside tank is low, alarm condition
 - 4) CIRCULATION PUMP: Circulation pump is interlocked with TANK LOW AND will not operate if TANK LOW alarm is activated. Lamp flashes if circulation pump pressure drops below 5 psi. Push- Button to turn ON or OFF
 - 5) DOSING PUMP: Chemical dosing pump is interlocked to the system. Will not pump if LOW CHLORINE SOLUTION alarm is activated. Remote or manual start capability. Push-Button to turn ON or OFF
 - 6) FILLING: Indicates that the solenoid is energized and the unit is making solution
 - 7) TANK FULL: The high float is engaged and the tank is full of concentrated solution
 - 8) E-STOP: Push-Button emergency stop for the unit. Turns off every function.
- E. Materials:
1. Hopper / Basket Assembly
 - a. Hopper / Basket Assembly shall be constructed of molded polyethylene and provide a minimum slope of 60 degrees to properly feed the briquettes to the hopper screen.
 - b. Hopper will be complete with a tightly sealed lid to retard condensation and casual water from binding the stored briquettes.
 - c. Hopper screen
 - 1) Hopper screen shall be made from polyethylene and shall be molded into the hopper / basket assembly.
 - 2) Hopper/ Screen shall be field replaceable and not require any tools for removal or installation.
 - d. Spray assembly
 - 1) Spray assembly shall be completely constructed of non-ferrous materials and shall be fitted with non clogging spray nozzles. Spray nozzles shall be designed to operate at 30-50 psi and shall provide spray patterns which completely covers the hopper grid area. Spray assembly shall be modified to produce a <1.0 percent solution.
 - e. Solution tank
 - 1) Solution tank shall be constructed of molded polyethylene.
 - 2) Solution tank will be fitted with factory installed connections for recirculation pump inlet and discharge, water inlet, chemical feed pump suction and return, off-gassing/spare and drain with shut-off valve.
 - f. Solution mixer
 - 1) A magnetically driven pump will be provided for recirculation mixing. The pump shall be sized to provide a minimum mixing capability to keep suspended solids in suspension in the calcium hypochlorite solution.
 - 2) An eductor will be used to provide additional mix solution in the tank.

- g. Inlet water assembly
 - 1) Inlet water assembly shall consist of an isolation valve, inlet Y-strainer with mesh screen, volumetric water meter (if required), pressure regulator, inlet water pressure gauge, pressure regulator, feeder inlet pressure gauge and a solenoid valve.
 - 2) Inlet assembly shall be 1/2" diameter piping (material as shown on drawings)
- h. Level controls and alarms
 - 1) A total of three level sensors shall be provided. These sensors include:
 - (a) A normally closed electronic low level control float.
 - (b) A normally closed electronic high level control float.
 - (c) A mechanical overflow float.
 - 2) The hopper shall include an option to provide a low level dry briquette alarm.
 - 3) The hopper lid shall include an "open lid" magnetic proximity switch and alarm.
 - 4) The solution tank shall include a low level alarm and a low level system shut off switch.

2.03 CALCIUM HYPOCHLORITE PUMP

- A. Manufacturers:
 - 1. Jesco, Memdax DX.
 - 2. Approved equal.
- B. Description:
 - 1. Motor driven, heavy duty, oscillatory displacement, diaphragm pump
 - 2. Contractor shall furnish and install calcium hypochlorite pumps in the locations indicated on the Plans. Provide three (2) spare pumps to the Owner.
- C. Operation:
 - 1. Pump motor shall be 230 Volt, 50Hz, 1/6 HP, 1360 RPM, one-phase induction, UL listed, International Protection Rating IP 55.
 - 2. Feed rate adjustment shall be manual stroke length control to allow capacity adjustment on a percent scale of 1400:1, with a maximum speed of 32 strokes per minute with a micrometer to indicate setting. Device to be fitted with locknut to prevent feed rate change after setting
- D. Materials:
 - 1. Materials of construction shall be compatible with up to 12 percent calcium hypochlorite solution.
 - 2. Clear PVC suction tubing, HDPE discharge tubing, foot valve with strainer, automatic air venting valve, and instruction book.
- E. Accessories:
 - 1. Pump shall be equipped with 10-foot length of cord with NEMA 460 volt, 20 amp, three phase twist-lock plug for matching receptacle.
 - 2. Provide standard manufacturers pump discharge anti-siphon valve.
 - 3. Filter housing, as manufactured by Pentair Water or approved equal, for filtering calcium hypochlorite solution on the discharge line. Filter shall be constructed of durable polypropylene or a clear FDA-compliant Styrene-Acrylonitrile (SAN). Filter shall be equipped with 3/4-inch NPT inlet and outlet ports and will also have two corresponding ball valves in order to remove filter for servicing.
 - 4. Flexible Suction and Discharge Line: provide clear, lightweight ozone resistant PVC tubing, 1/2 and 3/4 inch ID, reinforced with spiraled polyester yarn to reduce elongation under pressure. Certified NSF-61 and rated for working pressure of 250 psig at 70 degrees F and burst pressure of 1000 psig at 70 degrees F.

2.04 ACCESSORIES

- A. Spill Containment Pallet:
 - 1. Manufacturers: Eagle Manufacturing Company of Wellsburg, West Virginia, Model 1632, or approved equal
 - 2. Performance/design criteria: Pallet shall have a spill capacity of 30 gallons, sized to fit chlorinator and 3 pumps
 - 3. Materials: High density polyethylene with removable grating for spill inspection and cleaning

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and conditions are ready to accept work of this section as required by the manufacturer.
- B. Beginning of installation means installer accepts existing substrate and conditions.

3.02 INSTALLATION

- A. Remove existing chlorinator(s) from building and return to Owner's office. Care shall be employed so that no damage is done to existing unit(s).
- B. Mount and install treatment system and accessories in accordance with manufacturer's installation instructions and approved shop drawings.
- C. Pumps and piping runs shall be braced, properly supported, neat and orderly in appearance and parallel to walls and floors where possible.

3.03 MANUFACTURER'S FIELD SERVICE

- A. Provide manufacturer's field services under provisions of Section 017500.
- B. Manufacturer shall provide a trained service technician for one day per unit to verify proper installation, to start the system and to demonstrate operation of the unit to the Owner's designated representatives.
- C. Schedule demonstration with the Owner.

3.04 STARTUP

- A. Provide manufacturer's representative for calibration and 4 hour startup of chemical feed systems. Submit written report from manufacturer's representative covering inspection and startup of installed system.
- B. Prime suction and discharge line.
- C. Demonstrate system operation to Owner.

3.05 PROTECTION

- A. Protect finished work under provisions of Section 016500.
- B. Protect system and equipment from damage until project is accepted by the Owner.

END OF SECTION 444416

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Lime solution tank, mixer, shaft and impellers, and accessories.
- B. Lime slurry pump, piping, and accessories.
- C. Dust Collection and Exhaust System.

1.02 RELATED SECTIONS

- A. Section 220529 - Hangers and Supports for Piping.
- B. Section 221113 - Facility Piping.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Submit product data on all components and accessories as mentioned herein.
- C. Shop Drawings: Indicate plan layout of equipment, pertinent dimensions, mounting details, construction details, required clearances, power requirements and wiring diagrams.
- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions required for proper installation.

1.04 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 017823.
- B. Operation Data: Indicate proper operating instructions and procedures.
- C. Maintenance Data: Indicate types and methods of lubrication, cleaning, schedules, spare parts list and local parts supplier.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products to the site under provisions of Section 016500.
- B. Do not remove manufacturer's packaging until product is ready to be installed.
- C. Do not store product directly on the ground.
- D. Store product on a firm, level surface.

1.06 COORDINATION

- A. Coordinate work under provisions of Section 013100.
- B. Coordinate the inspection of the system by the manufacturer with the complete installation of the system.
- C. Coordinate with all other adjacent electrical and mechanical work.

1.07 WARRANTY

- A. Provide manufacturer's standard warranty under provisions of Section 017800.
- B. Warranty to include coverage for materials.

PART 2 - PRODUCTS

2.01 LIME SOLUTION TANK

- A. General Description: Solution tank shall be 5'-6" in diameter and 6'-0" feet high exclusive of dished or conical bottom. Nominal capacity 1,000 gallon tank wall shall be of one piece construction. Provide flat hinged tank cover for manually charging lime to tank and all required openings. Four (4) sturdy legs shall be welded to the tank bottom to support the tank above floor. Provide enough clearance for installation of drain piping and associated drain equipment.
- B. Manufacturer:
 - 1. Edwards Fiberglass, Inc., MO.
 - 2. Highland Tank, Stoystown, PA.
 - 3. Sims Steel, Lindenhurst, NY.
 - 4. Specifically approved equal.
- C. Materials:
 - 1. 1/4" (minimum) thick steel welded and rolled sections.
 - 2. Steel plates, angles and other structural shapes shall conform to ASTM A36.
 - 3. Bolts and nuts shall conform to ASTM A325.
 - 4. Steel pipe fittings shall conform to ASTM A501.
 - 5. Welds, Welding Metal:
 - a. Welding electrodes for manual shielded metal-arc welding shall conform to ASTM A233, E 60 or E 70 Series. Bare electrodes and granular flux used in the submerged-arc process shall conform to Section 1.17.3 or AISC Specifications for Structural Steel for Buildings, June 1, 1989.
 - b. Electrodes shall be suitable for the positions, material and other conditions of use as recommended by AWS or the manufacturer.
- D. Accessories:
 - 1. Three (3) full couplings (size as per drawings) for pump suction and return and one (1) 2" full coupling for water supply with air gap above tank top.
 - 2. One (1) 2" drain pipe connection from extreme bottom of tank with nipple and pipe drain.
 - 3. Eighteen inch (18") square charging door in cover with full length hinge and handle.
 - 4. Internal baffles at quarter points to enhance mixing of the lime solution.
 - 5. Link seals for sealing two pump connections.
- E. Fabrication:
 - 1. Fabricate steel and aluminum items according to approved shop drawings and to applicable portions of AISC Specifications. Conceal welds where possible; grind exposed welds smooth and flush.
- F. Shop Painting and Protective Coating:
 - 1. Conform to Steel Structures Painting Council Specification 15-68T, Type 1, including preparation of painting.
 - 2. Coat in accordance with Section 099744 - Mechanical Piping Coating Systems of solution tanks use only NSF and FDA approves coatings.
 - 3. Lime tank shall be painted white.

2.02 LIME SLURRY PUMP

- A. Install three (3) lime slurry pumps in the locations indicated on the Plans. Provide one (1) spare pump to the Owner.
- B. Lime slurry pump shall be manufactured by Jesco Model No. 1731-22-2816-2, or approved equal, designed to pump lime solution of 3 to 12 percent at the maximum rate of 53.5 gallons per hour against a maximum discharge pressure of 250 psi. Pump shall be hydraulically actuated with tubular diaphragm design, using pre-stressed diaphragm return. The pump shall be specifically designed to handle abrasive slurries.
- C. Pumping rate shall be adjustable by stroke length from 0 to 100 percent of maximum by manual crank and shall be continuously adjustable over a 10:1 range. Feed rate setting shall be adjustable to 0.25 percent of full scale.
- D. Head/check material shall be 316 stainless steel construction with polyurethane valve balls and ceramic or stainless steel seats. Valve body shall be PVC. Diaphragms shall be hypalon.
- E. Pump motor shall be standard NEMA foot mounted that is flexibly coupled to the gear reducer. Motor shall be mounted on a common base plate with the pump. Each pump shall be wired directly to its respective junction box for control source power.
- F. Motor shall be as manufactured by Baldor Reliance Industrial Motor Cat.No. L3504 or approved equal, 0.5 HP motor designed for operation at 115/230 volts, 1 phase, 60 Hz, inverter duty, TEFC enclosure. Pump shall be equipped with 10-foot length of cord with twist-lock plug for matching receptacle.
- G. 1-inch polyethylene tubing with nylon inner braided reinforcing made from FDA approved materials, 65 Durometer, 150 psi working pressure. Install high pressure fittings with stainless steel clamps for all connections to tubing.
- H. The following optional accessories offered by the manufacturer shall be standard equipment for this installation.
 - 1. Built-in hydraulic pressure relief valve and return piping.
 - 2. Backpressure valve for low discharge pressure.
 - 3. Automatic speed control by analog input signal.
 - 4. Automatic stroke length control.
 - 5. Food grade mineral oil.
 - 6. Hydraulic level detector.
 - 7. Jesco America Corporation Preventive Maintenance Kit.
 - 8. Single ball check valve with reversible seat on discharge of pump.
 - 9. Provide one (1) preventative maintenance kit for pump supplied.

2.03 TANK MIXER

- A. Gear Drive mechanical mixer with 316 stainless steel shaft and impellers.
- B. Provide minimum two (2) high efficiency 12.8" impellers suitable for mixing lime into solution. Provide stainless steel shaft and set bottom impeller 3-inches above tank bottom. Shaft shall be as sized to meet all dimensional and power constraints.
- C. Provide vibration dampening, as applicable.
- D. Mount: ball and socket type c-clamp, capable of angular adjustment.

- E. Motor: Gear drive, 20-280 RPM, 1/2 hp, 115V, single phase, TENV.
- F. Manufacturer: SPX Corporation, Lightning Brand, Model EV6P50M.

2.04 DUST COLLECTION AND EXHAUST SYSTEM

- A. General Description: Dust collection exhaust system to include in-line, centrifugal exhaust fan, extraction arm, ductwork, mounting accessories and all related appurtenances installed as per the contract drawings. The Contractor shall wall mount the exhaust fan and telescoping arm as per the manufacturers recommendations. Contractor shall core drill existing masonry wall and install exhaust duct outside with exhaust vent cover and screen.
- B. Manufacturers:
 - 1. Nederman Inc., Westland, MI
- C. Materials:
 - 1. Exhaust fan to be N-Series, model N-16 by Nederman. Fan shall be single phase, 0.75 HP, 208 V, 60Hz with a max airflow of 750 cfm.
 - 2. Extraction Arm shall be 10ft length by Nederman, with appropriate ducting and mounting accessories. Contractor to provide automatic spring loaded butterfly damper with extraction arm.
 - a. Structure: The internal articulating support structure shall be assembled from rectangular and square extruded aluminum tube stock. The profile section between the swivel and first arm section shall be 2" x 1.25" x 0.11" thick. The upper and lower arm profiles shall be 1.35" x 1.35" x 0.07" thick. To provide proper arm balance and promote ease of operation a support spring shall be utilized on the first arm section. The support spring shall be rolled from 0.15" diameter spring steel. The mounting swivel assembly shall be 0.125" thick hi-grade cast aluminum with 360° rotation. The swivel gasket shall be made of PVC. The swivel assembly shall incorporate an adjustable vertical friction joint with a range of motion of 180°. An adjustable center elbow joint shall have a vertical range of motion of 230°. The articulating fume arm shall have an effective reach of 7ft. The arm shall include a bolt on duct connection flange. The duct connection flange shall be constructed of 22 gauge stamped steel with a black powder coat finish. A rubber gasket shall be
 - b. Flexible Hose: The blue external flexible hose shall be made of a woven glass fabric with an internal and external PVC lamination. The hose shall be supported by a spirally wound steel wire helix. The hose shall be capable of withstanding a maximum operating temperature of 160° F. The flexible hose shall be 6.25" diameter.
 - c. Integral Hood: The articulating arm shall, as a standard component, incorporate a capture hood. The capture hood shall be constructed of 0.10" thick polycarbonate plastic with a 10.5" x 14" flanged O.D. The hood shall incorporate a handle to permit easy mobility. The polycarbonate hood shall incorporate a polyamide damper. The damper blade shall be 0.10" thick. The damper shall be lockable, by means of a ratchet mechanism, in three different positions; 100% open, 50% open and fully closed. The hood shall have a flat bottom, which will allow it to be placed directly on a flat surface. The hood shall incorporate a four-way friction joint allowing a range of motion of 180° + 220°.
 - d. Friction Joints: All articulating joints shall incorporate friction discs and be adjustable for tension. Friction discs shall be made of an asbestos free brake lining material. All friction joints shall utilize hardware incorporating nylon lock nuts.
 - e. Mounting Bracket: A wall-mounting bracket shall be included with each articulating arm. The wall bracket shall be formed from 1.25" diameter x 0.095" thick tubular steel. The wall bracket shall be predrilled to match the bolt pattern of the arm.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and conditions are ready to accept work of this section as required by the manufacturer.
- B. Beginning of installation means installer accepts existing substrate and conditions.

3.02 INSTALLATION

- A. Mount and install lime treatment system and accessories in accordance with manufacturer's installation instructions and approved shop drawings.

3.03 MANUFACTURER'S FIELD SERVICE

- A. Provide manufacturer's field services under provisions of Section 017500.
- B. Manufacturer shall provide a trained service technician for one day to verify proper installation, to start the system and to demonstrate operation of the feeder to the Owner's designated representatives.
- C. Schedule demonstration with the Owner.

3.04 PROTECTION

- A. Protect finished work under provisions of Section 015000.
- B. Protect system and equipment from damage until the project is accepted by the Owner.

3.05 SPARE PARTS

- A. The following spare parts shall be provided:
 - 1. One (1) lime slurry pump.
 - 2. One (1) standard manufacturer's preventative maintenance kit for each pump supplied.
 - 3. One (1) quart of pump lubricant.

END OF SECTION 444459.13

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section covers the requirements for supplying all labor, materials, equipment and services necessary to furnish and install a fully automatic manganese removal system as it is specified and shown on the Contract Drawings.
- B. The manganese removal system shall come complete, and without restricting the generality of the following, shall consist of the following equipment:
 - 1. Plant 5: Two (2), 10 ft. diameter by 20 ft. long, dual cell horizontal pressure filters.
- C. The Contractor shall furnish and install filter vessel internal parts, components, equipment, and media as may be detailed on the Drawings, specified herein or as may be required by the Filter System Manufacturer. It shall be the bidder's responsibility to ascertain the scope of the work associated with this Section of the technical specifications and submit a bid price accordingly.

1.02 RELATED SECTIONS

- A. Section 099745 - Vessel Coating System
- B. Section 331140 - Disinfection of Water Facilities

1.03 QUALITY ASSURANCE

- A. The manganese removal system at both sites shall be furnished by one single Supplier (Manufacturer). This requires the Supplier to be responsible for the development, design, fabrication, assembly, delivery to achieve a filter effluent water quality, as contained in paragraph 1.05 herein. This does not require that all system equipment and accessories be the products of one single manufacturer.
- B. Consideration will only be given to Suppliers who can demonstrate that their system complies with these Specifications. The Supplier shall have had successful and documented experience of the size, quality, performance and reliability to that specified, and who can successfully demonstrate these criteria to the Engineer.
- C. The system shall be, furnished, and installed to achieve the conditions of service specified in paragraph 1.05 herein.
- D. The Supplier shall have at least ten (10) years of experience in the design and manufacturing of iron removal systems. The iron removal system shall be manufactured by:
 - 1. Hungerford and Terry, Inc.
 - 2. Roberts Filter
 - 3. US Filter
 - 4. Tonka
 - 5. Specifically approved equal. Approved equal shall be submitted and approved by the Engineer in accordance with Section 012500.

1.04 DELIVERY, STORAGE AND HANDLING

- A. The system supplier and the Contractor shall comply with the requirements contained in Section 016500 - Product Delivery, Storage and Handling.

1.05 PERFORMANCE AND DESIGN REQUIREMENTS

- A. The manganese removal system at Plant 5 shall be designed, fabricated and constructed to meet the following requirements:
1. Influent manganese concentration (design) - 3.0 milligrams per liter (mg/l) - (see this section for actual representative water quality parameters)
 2. Design flow per vessel - 600 gallons per minute (gpm)
 3. Maximum flow per vessel - 1,200 gpm (one vessel offline)
 4. Number of filter vessels - 2 (10 ft. diameter x 20 ft.)
 5. Number of filter cells - 2 per filter vessel
 6. Facility design flow - 1,200 gpm
 7. Minimum filtration rate - 3.0 gpm per square foot (sf) (all vessels on line)
 8. Maximum filtration rate - 12.0 gpm per sf (one vessel off line)
 9. Maximum backwash rate - 2,400 gpm (12 gpm per sf) per cell for 10 minutes
 10. Maximum rinse rate - 860 gpm per vessel for 3 minutes
 11. Normal operating pressure - 75 pounds per square inch (psi)
 12. The system shall achieve effluent water quality requirements with one (1) filter vessel out-of-service and the remaining two (2) filters handling the facility design flow.
 13. The representative influent water quality is as follows:

Parameter	Well No. 5-1	Well No. 5-2(A)
pH	6.5 units	6.6 units
Calcium Hardness	39.2 mg/l	32.2 mg/l
Total Alkalinity	14.2 m/l	ND
Chloride	37.1 mg/l	23.8 mg/l
Total Dissolved Solids	ND	ND
Peak Iron Concentration	0.03 mg/l	ND
Manganese	0.32 mg/l	0.11 mg/l
Turbidity	< 1.0 mg/l	< 1.0 mg/l
Hydrogen Sulfide	Not Present	Not Present

14. The required filter effluent water quality shall be a maximum of 0.10 mg/l of iron and manganese at any time.

1.06 FIELD SERVICES

- A. The Supplier shall supply and credit to the Owner field services as specified in Section 014500 - Quality Control.
- B. The following field services shall be provided as a minimum in accordance with the requirements contained in Section 017500 - Starting and Adjusting:
1. Six (6) days totaling three (3) trips for the purpose of providing installation supervision to the Contractor. The Contractor shall be responsible for all costs associated with having the manufacturer present should the Contractor require more than six (6) days to install the media and vessel internals, if any.
 2. Six (6) days totaling three (3) trips once the system has been installed to check the completed installation, make all necessary adjustments, and otherwise place the system into permanent operation as specified in Section 017500 - Starting and Adjusting. During one of these trips, and before substantial completion, the manufacturer shall provide operation and maintenance instruction to the Owner. A complete review of the Operations and Maintenance Manual shall be presented at this time. The Contractor shall coordinate startup activities with the Prime Electrical Contractor. The Electrical Contractor's work shall be verified by the Supplier's representative. All terminal connections shall be verified.

3. Two (2) non-consecutive days, approximately three (3) and six (6) months after system startup to review the operation with the Owner and the Engineer and to make system adjustments as necessary.

1.07 SUBMITTALS

- A. Comply with the requirements contained in Section 013300 - Submittals. The following documents shall be submitted:
 1. Technical descriptive data for each equipment item in the system showing model number, size, capacity, weight, and similar type information. Catalog cuts are acceptable if they contain the necessary information.
 2. Complete filter sizing calculations showing loading rate, filter run time, backwash rate, rinse rate and chemical addition calculations.
 3. Catalog cuts and technical data for the exterior paint system.
 4. Anchor bolt location plan for the filter vessel saddle. Show the relationship and dimensions between the inboard filter saddle and the interior face of the building wall.
 5. Fabrication drawings for the filter and filter vessel saddle.
 6. Filter face piping drawing showing line, fitting and valve sizes, dimensional clearances, materials of construction, and methods of support. Provide a dimensional detail of the filter inlet and outlet flanged stub piece
 7. Filter media information and media installation, startup and operation instructions. Provide details for the installation of filter vessel internals, if they are to be field installed.
 8. Storage, handling and installation instructions.
 9. List of spare parts to be provided under this Contract.
 10. List of recommended spare parts.
 11. Manufacturer Start-up Report (MSR) in accordance with paragraph 3.01 herein.
- B. Operations and Maintenance Manual prepared in accordance with the requirements contained in Section 017820 - Operating and Maintenance Data. In addition to the Section 017820 requirements, provide a type written check list procedure for manually backwashing the filters.

1.08 SERVICE CONDITIONS

- A. All components of the system shall be designed for continuous duty.
- B. Provisions shall be made for lubrication, adjustments, or replacement of all parts. Corresponding parts of multiple units shall be interchangeable.

PART 2 - PRODUCTS

2.01 HORIZONTAL MULTICELL PRESSURE FILTERS

- A. Filter vessels shall be fabricated of carbon steel in accordance with ASME code procedures for unfired pressure vessels, stamped and shall be designed for a system operating pressure of 75 psig and hydrostatic test pressure of 100 psig at Plants 5.
- B. The filter vessels shall be 10'-0" in diameter with 20'-0" long side shells and 100 square feet of filter area per cell.
- C. Each multi-cell vessel shall be provided with dividing partitions designed to resist any pressure differential, which may be encountered in the operation of the treatment plant. The partitions shall divide the area above the under drain plate into two completely separated equal cells.
- D. The manganese removal system shall be furnished with an automatic air release system for each filter consisting of an automatic air-vacuum release valve with stainless steel ball float/check and an isolation ball valve located between the air-vacuum release valve and filter.

Air release manifold piping for balanced operation shall be furnished and installed as part of the air release system with provisions for manual flushing.

- E. Each filter shall include a three (3) inch diameter drain. The drain shall be located on the underside of the filter vessel on the same end as the filter face within the building. A lockable shut-off valve shall be provided on the drain.
- F. All flanged fittings shall be manufactured in accordance with ANSI/ASME B16.1 Class 125.
- G. Supports shall be welded cradle type support bases of the dimensions necessary to maintain centerline elevations shown on the Drawings. Each vessel cell shall include 10 feet diameter flow inlets and 10 feet diameter flow outlet. Inlets and outlet shall be flanged and shall be of a length to maintain the "REF." dimension shown on the Drawings.
- H. Access manholes shall be located to provide access to each cell above the media bed elevation mid length of the cell. Access manholes shall be 36 inches in diameter.
- I. Access manholes shall be circular with ASME 2:1 elliptical heads with spring assist and utilizing T-bolts closures for securing of the man way.
- J. Access manholes shall be provided with factory installed 1/2" diameter tap and plug, located at their centers. Threads shall be NPT, conforming to ANSI/ASME B1.20.1.
- K. The method of introduction of raw water to the filters or the collection of wash water from the units, shall be such that water is distributed to, or collected from, the entire filter bed in a uniform manner.
- L. The distribution and collection system of the filter shall be arranged to accommodate backwashing at the maximum rate detailed in Section 1.05.
- M. The arrangement of the collection systems shall provide for the proper backwashing of the filter beds without loss of filtering material. The distance from the surface of the bed to the wash water collector (freeboard) shall be not less than 50 percent of the depth of the filter bed.
- N. Couplings, support braces, and hardware used for construction of the internal components shall be stainless steel.

2.02 SUPPORTING BEDS

- A. A gravel support bed shall be incorporated in the bottom of each vessel, consisting of five (5) layers of graded gravel, with the largest size gravel loaded into the filter first and the succeeding smaller sizes placed on top. The gravel bed shall be graded as follows:

Layer & Min. Depth	Gravel Size
Top 2"	1/16" x 1/8" gravel
Next 2"	1/4" x 1/8" gravel
Next 2"	1/2" x 1/4" gravel
Next 2"	3/4" x 1/2" gravel
Bottom 4"	1-1/2" x 3/4" gravel

- B. The gravel shall be free from clay, loam, dirt, calcareous, or other foreign material and shall consist of round or angular particles being relatively free of flat or elongated particles. The gravel shall be washed and screened, and shipped in clearly marked 100-pound bags, palletized, and stretch wrapped. Gravel must meet the requirements of the AWWA B-100-96 specification.

- C. All gravel is to be field installed.

2.03 FILTER MEDIA

A. Filter Sand

1. Filter sand shall be GreenSandPlus™ by Inversand Company of Clayton, NJ or specifically approved equal. GreensandPlus™ shall be processed from a naturally occurring silica sand substrate to which a manganese dioxide coating is fusion bonded prior to shipment.
2. Each filter shall be equipped with enough filter sand to form an 24-inch bed depth.
3. The filter sand shall bear the WQA Gold Seal Certification for compliance with NSF/ANSI-61 and shall meet the following criteria:

Specific Gravity	Approx 2.4
Effective Size	0.30 - 0.35
Uniformity Coefficient	Less than 1.6
Screen Grading	18 x 60 mesh

- B. Filter sand shall meet all requirements of AWWA B100. The layer of sand shall be 24-inches deep (after washing) and consist of sand with an effective size between 0.30 and 0.35 mm and a uniformity coefficient less than 1.6.
- C. The total filter sand and anthracite bed depth shall total 36 inches.
- D. All filtration media shall be shipped in one (1) cubic foot bags, palletized, and stretch wrapped.
- E. The Filter media shall be accepted under Standard 61 of the National Sanitation Foundation. A NSF sheet on the filter media must be provided to indicate that the media is NSF 61 certified.
- F. Filter media shall be loaded into the filters after the graded gravel is installed. Filter sand shall be undercut and conditioned in accordance with the manufacturer's recommendations. Filter sand fines must be removed from the filter prior to loading anthracite.
- G. All filter sand is to be field installed.
- #### H. Anthracite
1. Each filter shall be equipped with enough specially graded anthracite coal to form an 12-inch bed depth. The anthracite is to meet the following criteria:

Specific Gravity	Approx 1.6
Effective Size	0.60 - 0.80 mm
Uniformity Coefficient	Less than 1.6

2. The anthracite shall be shipped in one (1) cubic foot bags, palletized, and stretch wrapped.
3. The anthracite shall be loaded into the filters after the filter sand has been installed.
4. All anthracite is to be field installed.

2.04 DIFFERENTIAL PRESSURE TRANSMITTER

A. Manufacturers:

1. INVENSYS FOXBORO, Model No. IDP10 Intelligent d/p cell transmitter for differential pressure.

B. Transmitter Housing: NEMA 4X.

- C. Pressure Cell Module: Type 316 stainless steel.
- D. Silicone Sensor Fill Fluid.
- E. Universal Wall/Pipe Mounting Bracket.
- F. Local Indicator: LCD display, integrally mounted.
- G. Lightning and Surge Protection.
- H. Accessories: 3 valve manifold, Type 316 Stainless Steel.
- I. Span Limits: 28 and 840 inches of water column.

PART 3 - EXECUTION

3.01 GENERAL

- A. All components of the iron removal system shall be installed in accordance with the written instructions provided by the system supplier.
- B. All components shall be fully tested and verified for service by the manufacturer. The manufacturer shall provide a MSR as specified in Section 017500 - Starting and Adjusting. An amount equal to 1.00 percent of the scheduled value for the work of this Section shall be retained until the report has been furnished.

3.02 FABRICATION

- A. Filter vessels shall be fabricated in accordance with approved shop drawings.
- B. All welds shall be ground smooth prior to coating operations beginning.

3.03 EXTERIOR COATING

- A. Perform coating of filter vessels in accordance with Section 099745.

3.04 INSTALLATION

- A. All equipment of this Section shall be installed by the Contractor unless noted on the Drawings.
- B. The Contractor shall pressure test all vessels to demonstrate to the Engineer that all vessels are leak free.
- C. Prior to loading of the media, the contractor shall disinfect each vessel after all interior vessel work is complete with the exception of media placement and provide two (2) consecutive 24 hour micro-bacteriological tests on the effluent of each vessel and one (1) 96 hour Primary Organic Compounds analysis on the effluent of each vessel. All tests shall be performed prior to obtaining written authorization from the engineer to place media in the vessel.
- D. After loading of the media, the contractor shall provide two (2) micro-bacteriological time series test on the tank influent and effluent, one (1) 2 minute Primary Organic Compounds analysis on each vessel effluent, one (1) 30 minute Inorganic Compound analysis on each vessel influent and effluent and one (1) additional time series test for iron and manganese on each vessel effluent. All tests shall be performed prior to obtaining written authorization from the engineer to place vessel into service.

- E. The Contractor shall perform water quality sampling on the vessels, prior to and after the media has been installed. Perform all sampling in accordance with Section 331140.
- F. The Contractor shall take measures to protect the exterior coating during transport, setting, and media placement. Damage to the exterior protective coating shall be repaired as directed by the engineer.
- G. Contractors placing media shall utilize personal protective equipment such as Tyvek suits and booties (or equal) to prevent the transport of foreign matter into the filter vessel.

END OF SECTION 466121

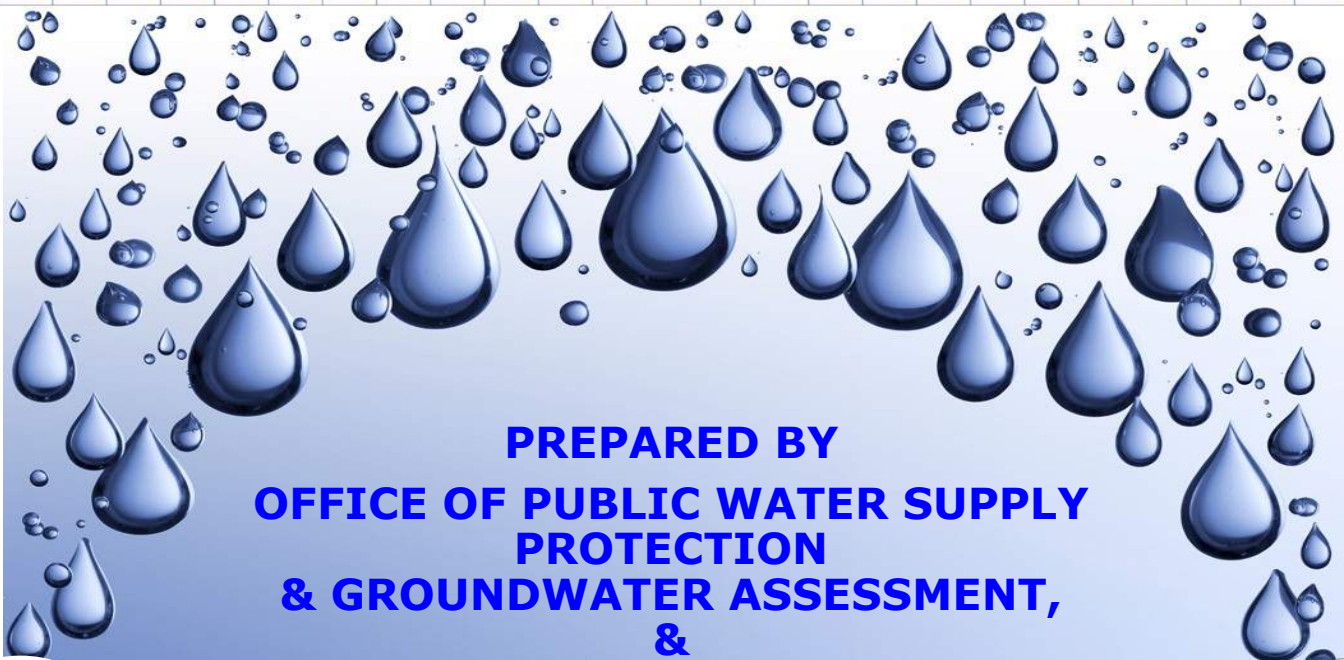


NASSAU COUNTY DEPARTMENT OF HEALTH

2021

Water Quality Monitoring Requirements

**For
Nassau County Public Water Systems**



**PREPARED BY
OFFICE OF PUBLIC WATER SUPPLY
PROTECTION
& GROUNDWATER ASSESSMENT,
&
OFFICE OF WATER SUPPLY ENGINEERING**



2018 NACCHO LOCAL HEALTH DEPARTMENT OF THE YEAR
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NASSAU COUNTY DEPARTMENT OF HEALTH WATER QUALITY MONITORING REQUIREMENTS FOR 2021

FOREWORD

- The purpose of this document is to present guidance to Nassau County public water suppliers in complying with Maximum Contaminant Levels (MCLs) and monitoring requirement schedules. All MCLs and Monitoring schedules conform to New York State Department of Health (NYSDOH) Sanitary Code, Subpart 5-1; Article VI of the Nassau County Public Health Ordinance, and Nassau County Department of Health Policies.
- On August 26, 2020, the NYSDOH adopted revisions to the NYSDOH Sanitary Code, Subpart 5-1 to established new MCL's of 1.0 ug/L for 1,4-Dioxane, of 10.0 ng/L for Perfluorooctanesulfonic acid (PFOS) and of 10.0 ng/L for Perfluorooctanoic acid (PFOA) which were based on the recommendations of the Drinking Water Quality Council. The NYSDOH also established new monitoring requirements for these contaminants. Therefore, the NCDOH has added a new Table 1-1A for the monitoring of these contaminants. All laboratory results must be submitted to the NCDOH and any wells with detections above an MCL must be reported to the Department immediately. Public water suppliers that have wells with contaminant levels above ½ the proposed MCL should consider potential treatment options and other actions needed to comply with the new requirements.
- The August 26th Sanitary Code revisions also provided water systems the option to apply to the State for a Deferral of MCL Violations for these contaminants for up to two years if they demonstrated that they were proactively monitoring and planning for installation of treatment prior to the implementation of the new regulations. All applications for Deferrals were due by October 25, 2020. Water systems granted waivers can apply for a one year extension if needed. Water systems operating under an MCL Deferral must operate their wells according to their Remediation Action Plan in such a way as to minimize public exposure to these contaminants.
- Following the establishment of the new MCL's, the NYSDOH also revised its policy for blending of wells as a treatment method for compliance with MCL's. The new policy allows for blending of wells for any contaminants other than microbiologicals. Blending has been used for some time as a method for treating wells for Nitrates and Perchlorates. NCDOH will review proposed plans for the blending of wells as a short-term method of treatment for 1,4-Dioxane, PFOA & PFOS. Water systems must also plan for a long-term permanent treatment for removing these contaminants. Currently, the Best Available Technology (BAT) for treating 1,4-Dioxane is the Advanced Oxidation Process (AOP) and the use of Granular Activated Carbon (GAC) for PFOA & PFOS. The short-term blending for other contaminants will be considered on a case by case basis.
- Please be reminded that the use of valid Safe Drinking Water Information System (SDWIS) sampling point IDs is inherent to maintaining compliance with your 2021 monitoring requirements. If you have made changes in treatment or are uncertain of the SDWIS sampling point ID associated with any of your wells, treatment plants, storage tanks or any other water supply infrastructure, please contact the Office of Public Water Supply Protection and Groundwater Assessment at (516) 227-9692.

NASSAU COUNTY DEPARTMENT OF HEALTH WATER QUALITY MONITORING REQUIREMENTS FOR 2021

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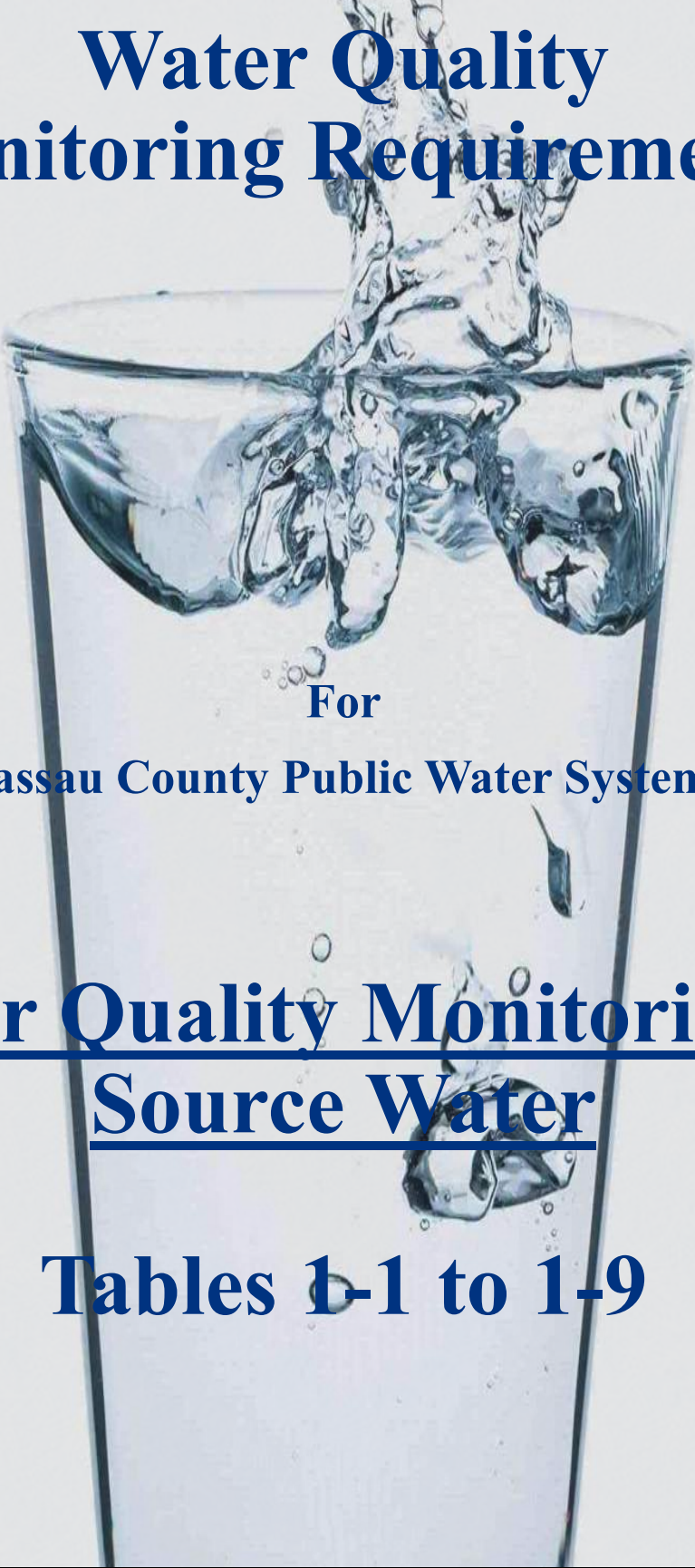
NASSAU COUNTY DEPARTMENT OF HEALTH WATER QUALITY MONITORING REQUIREMENTS FOR 2021

Monitoring Requirements

- **All routine monitoring must be performed for any well/treatment facility that ran into the system at any time during that monitoring period.**
- All routine monitoring for source water and treatment facilities must be completed **prior** to a planned removal of service. **In order to avoid monitoring violations, the Department strongly recommends that all routine monitoring samples are collected at the beginning of the monitoring period.**
- See Tables 4-1 – 4-5, “Contaminants & Maximum Contaminant Levels”, for contaminants to be monitored and the Maximum Contaminant Levels for each.
- A NYSDOH approved laboratory must perform all analyses and results sent to NCDOH.
- All sample analyses must be forwarded to NCDOH as soon as they are completed.
- SDWIS is used to verify that all monitoring requirements are met. In order to receive credit for taking the required samples for monitoring compliance, the SDWIS sampling point ID on the laboratory sheets and in SDWIS must match. Because each SDWIS sampling point ID is unique to each water supply system, it is important that the established SDWIS sampling point ID is used. These SDWIS sampling point IDs include all wells, treatment facilities, blending effluent and storage tanks.
- The number of samples required in the distribution system varies according to the population served by each water supplier.
- **Monitoring of by-products from new AOP treatment facilities will be directed on a case by case basis.**

Notification Requirements

- NCDOH must be notified within 24 hours of learning of the existence or the potential existence of a public health hazard as defined in NYSSC Section 5-1.1(bc) and as required by Section 5-1.77 (a) of the NYSSC.
- NCDOH must be notified within 48 hours of completion of analysis of any sample result that exceeds a Maximum Contaminant Level (MCL) in a well that is not treated, a treatment facility, blended effluent, a storage tank or distribution water as required by Section 5-1.77 (a) of the New York State Sanitary Code (NYSSC) and Article VI of the Nassau County Public Health Ordinance, Section 9 (c).
- NCDOH must be notified of **ALL** positive bacteriological sample results including wells, treatment facilities, storage tanks and distribution water. **This includes facilities not running to the system (out of service).**
- NCDOH must be notified any time the pH is found to be ≥ 9.0 or the chlorine residual is ≥ 2.0 mg/l leaving a treatment plant or in the distribution system.
- NCDOH must be notified any time Interconnections are being opened with a neighboring water supplier and the dates they were open must be included in the Monthly Operation Reports for that month.
- NCDOH must be notified when the delivery of water is interrupted to a minimum of 25 individuals or 15 service connections, or to a minimum of one percent of the total number of individuals served or service connections, whichever is larger for a period of four hours or more as required by Section 5-1.23(b) of the NYSSC.
- NCDOH must be notified **immediately** of any water main break that interrupts the delivery of water to a food service establishment, health care facility, or critical consumer.
- Please call 516-227-9692 during office hours or 516-742-6154 during non-office hours to report any analysis result that exceeds an MCL and any water main breaks or other water emergencies.

A clear glass filled with water, with a dynamic splash of water rising from the surface, creating a crown-like shape. The background is a light, textured blue.

Water Quality Monitoring Requirements

For

Nassau County Public Water Systems

Water Quality Monitoring of Source Water

Tables 1-1 to 1-9

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-1 Specific Organic Chemical (SOC):

SOC (Except 1,4-Dioxane, PFOA, PFOS)	MONITORING FREQUENCY ^a				
Water System Type	Initial Monitoring ^b	Continuing Monitoring With No Detections	Continuing Monitoring With Detections < 1/2 MCL ^e	Continuing Monitoring With Detections ≥ 1/2 MCL & < 80% ^f	Monitoring With Detections ≥ 80% MCL ^{g, h}
Community Water Systems Serving ≥ 500 Persons	1 Sample Quarterly Per Well for 4 Consecutive Quarters	1 Sample Every 18 Months Per Well ^c	1 Sample Quarterly Per Well	1 Sample Monthly Per Well	1 Sample Weekly Per Well
Community Water Systems Serving Fewer Than 500 Persons & Nontransient Noncommunity Systems	1 Sample Quarterly Per Well for 4 Consecutive Quarters	1 Sample Every 3 Years Per Well ^d	1 Sample Quarterly Per Well	1 Sample Monthly Per Well	1 Sample Weekly Per Well
Transient Noncommunity Water Systems	State Discretion ⁱ	1 Sample Every 3 Years Per Well ^d	1 Sample Quarterly Per Well	1 Sample Monthly Per Well	1 Sample Weekly Per Well

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-1 Specific Organic Chemical (SOC) CONTINUED:

- a) This table does not apply to first time detections. If a contaminant(s) has never been detected before or has not been detected for more than 1 year see First Time Detection Table 1-9 to determine if First Time Detection Monitoring is needed.
- b) Initial SOC monitoring for each well is 4 consecutive quarters. This includes all new wells and any well that has not completed initial monitoring. New wells are any well that is assigned a new N-Number by the DEC.
- c) Wells that have completed initial monitoring and have no SOC detections must be sampled every 18 months for Community Water Systems with populations greater or equal to ≥ 500 . The current 18 month monitoring period is from **July 1, 2020 through December 31, 2021. The next 18 month monitoring period will be January 1, 2022 through June 30, 2023.**
- d) Wells that have completed initial monitoring and have no SOC detections must be sampled every 3 years for Community Water Systems with populations less than < 500 and Noncommunity Water Systems. The current 3 year monitoring period is from **January 1, 2020 through December 31, 2022.**
- e) If a contaminant is detected that is less than $< 1/2$ the MCL, quarterly monitoring is required for the detected contaminant and must include all analytes contained in the approved analytical method for the detected contaminant (non-detected contaminants may remain on the current **routine** monitoring cycle). If all test results are non-detect for 4 consecutive quarters, the well may revert to routine monitoring (see c or d).
- f) If a contaminant is detected that is $\geq 1/2$ but less than 80% the MCL, monthly monitoring is required for the detected contaminant and must include all analytes contained in the approved analytical method for the detected contaminant. If all test results drop below $< 1/2$ the MCL for 3 consecutive months, the well may be tested on a quarterly basis (see e).
- g) Whenever a public supply well is tested and found to contain 80% of a SOC MCL, the Department strongly recommends that the well be removed from service and be subsequently re-tested to waste. The Department must also be immediately notified of these levels of contamination. If the well remains in service, it must be tested weekly and engineering plans submitted to this Department, as soon as possible for the installation of chemical removal treatment.
- h) Any well or treatment plant in which a test result exceeds the MCL must be immediately removed from service, **if practicable**, and collect the appropriate number of source and distribution resamples as directed by this Department to determine whether an MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps can be taken to assure the safety of the public's health. The water supplier must get approval from this Department prior to **implementing treatment**.
- i) State discretion shall mean when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.
- j) Please see Tables 2-2 – 2-7 for any routine SOC monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-1A 1,4-Dioxane, PFOA, PFOS (SOC):

1,4-Dioxane, PFOA, PFOS	MONITORING FREQUENCY ^a		
Water System Type	Initial Monitoring ^b	Continuing Monitoring With No Detections	Continuing Monitoring With Detections ^{e, f, g}
Community Water Systems Serving > 3,300 Persons	1 Sample Quarterly Per Well for 4 Consecutive Quarters (Initial Monitoring was required to begin for these systems in 2020)	1 Sample Every 18 Months Per Well ^c	1 Sample Quarterly Per Well
Community Water Systems Serving ≤ 3,300 Persons but ≥ 500 Persons	1 Sample Quarterly Per Well for 4 Consecutive Quarters (First sample must be collected by February 25, 2021)	1 Sample Every 18 Months Per well ^c	1 Sample Quarterly Per Well
Community Water Systems Serving Fewer Than 500 Persons & Nontransient Noncommunity Systems	1 Sample Quarterly Per Well for 4 Consecutive Quarters (First sample must be collected by February 25, 2021)	1 Sample Every 3 Years Per Well ^d	1 Sample Quarterly Per Well
Transient Noncommunity Water Systems	(One sample by February 25, 2021)	1 Sample Every 3 Years Per Well ^d	1 Sample Quarterly Per Well

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-1A 1,4-Dioxane, PFOA, PFOS (SOC) CONTINUED:

- a) This table does not apply to first time detections. If a contaminant(s) has never been detected before or has not been detected for more than 1 year see First Time Detection Table 1-9 to determine if First Time Detection Monitoring is needed.
- b) Initial 1,4-Dioxane, PFOA & PFOS monitoring for each well is 4 consecutive quarters. This includes all new wells and any well that has not completed initial monitoring. New wells are any well that is assigned a new N-Number by the DEC.
- c) Wells that have completed initial monitoring and have no 1,4-Dioxane, PFOA & PFOS detections must be sampled every 18 months for Community Water Systems with populations greater or equal to ≥ 500 . The current 18 month monitoring period is from **July 1, 2020 through December 31, 2021. The next 18 month monitoring period will be January 1, 2022 through June 30, 2023.**
- d) Wells that have completed initial monitoring and have no SOC detections must be sampled every 3 years for Community Water Systems with populations less than < 500 and Noncommunity Water Systems. The current 3 year monitoring period is from **January 1, 2020 through December 31, 2022.**
- e) If a contaminant is detected, quarterly monitoring is required for the detected contaminant and must include all analytes contained in the approved analytical method for the detected contaminant (non-detected contaminants may remain on the current routine monitoring cycle). If all test results are non-detect for 4 consecutive quarters, the well may revert to routine monitoring (see c or d).
- f) Whenever a public supply well is tested and found to contain 80% or greater of an MCL for 1,4-Dioxane, PFOA or PFOS for the first time, the Department strongly recommends that the well be removed from service and be subsequently re-tested to waste. The Department must also be immediately notified of these levels of contamination. Engineering plans must be submitted to this Department, as soon as possible for the installation of chemical removal treatment.
- g) Unless operating under an MCL Deferral issued by the NYSDOH, any well or treatment plant for which a test result exceeds the MCL must be immediately removed from service if practicable and the appropriate number of source and distribution resamples must be collected as directed by this Department to determine whether an MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps can be taken to assure the safety of the public's health. The water supplier must get approval from this Department prior to implementing treatment. Water systems operating under an MCL Deferral must operate their wells according to their Remediation Action Plan in such a way as to minimize public exposure to these contaminants.
- h) Additional plant effluent samples should also be collected for PFOA and PFOS where GAC treatment exists even if the treatment was not installed for removal of these contaminants.
- i) Please see Tables 2-2 – 2-7 for any routine 1,4-Dioxane, PFOA & PFOS monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-2 Principal Organic Contaminant (POC) & Unspecified Organic Contaminant (UOC)

POC ^j	MONITORING FREQUENCY ^a				
Water System Type	Initial Monitoring	Continuing Monitoring With No Detections	Continuing Monitoring With Detections < 1/2 MCL	Continuing Monitoring With Detections ≥ 1/2 & < 80% MCL ^f	Monitoring With Detections ≥ 80% MCL ^{g, h} (≥ 4.0 ug/l)
Community Water Systems Serving ≥ 500 Persons	1 Sample Quarterly Per Well ^b	1 Sample Quarterly Per Well ^b	1 Sample Quarterly Per Well ^b	1 Sample Monthly Per Well	1 Sample Weekly Per Well
Community Water Serving < 500 Persons & Nontransient Noncommunity Systems	1 Sample Quarterly Per Well for 4 Consecutive Quarters ^c	1 Sample Annually Per Well ^d	1 Sample Quarterly Per Well ^e	1 Sample Monthly Per Well	1 Sample Weekly Per Well
Transient Noncommunity Water Systems	State Discretion ⁱ	1 Sample Annually Per Well ^d	1 Sample Quarterly Per Well ^e	1 Sample Monthly Per Well	1 Sample Weekly Per Well
UOC ^j	MONITORING FREQUENCY ^a				
Water System Type	Initial Monitoring	Continuing Monitoring With No Detections	Continuing Monitoring With Detections < 1/2 MCL ^{b, e}	Continuing Monitoring With Detections ≥ 1/2 & < 80% MCL ^f	Monitoring With Detections ≥ 80% MCL ^{g, h} (> 4.0 ug/l)
Community & Noncommunity Water Systems	State Discretion ⁱ	State Discretion ⁱ	1 Sample Quarterly Per Well	1 Sample Monthly Per Well	1 Sample Weekly/Monthly Per Well

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-2 Principal Organic Contaminant (POC) & Unspecified Organic Contaminant (UOC) CONTINUED:

- a) This table does not apply to first time detections. If a contaminant(s) has never been detected before or has not been detected for more than 1 year see First Time Detection Table 1-9 to determine if First Time Detection Monitoring is needed.
- b) All wells in Community Water Systems with populations ≥ 500 must be monitored for POC's at a minimum of 1 sample per quarter.
- c) All Community Water Systems with populations ≥ 500 must perform initial monitoring on each well. Initial POC monitoring for each well is 4 consecutive quarters. This includes all new wells and any well that has not completed initial monitoring. New wells are any well that is assigned a new N-Number by the DEC.
- d) All Community Water Systems with populations < 500 and Noncommunity Water Systems must be monitored for POC's at a minimum of 1 sample per year **during peak pumpage**.
- e) All Community Water Systems with populations < 500 and Noncommunity Water Systems where a POC/UOC with a primary MCL value is detected that is less than 1/2 the MCL, quarterly monitoring is required. If all test results are non-detect for four consecutive quarters, the well may revert back to routine monitoring (see d).
- f) If test results equal or exceed 1/2 the MCL for any POC/UOC with a primary MCL value, the well shall continue to be tested monthly and notification of the result shall be given to the health department. All samples shall be analyzed as rapidly as possible. The well shall be placed into a last on and first off status if possible. If all test results drop below 1/2 the MCL for 3 consecutive months, the well may be tested on a quarterly basis.
- g) Whenever a public supply well or treatment plant is tested and found to contain 4.0 ug/l or greater of a POC with a MCL of 5.0 ug/l (or 80% of an Organic Contaminant MCL), the Department **strongly recommends** that the facility be voluntarily removed from service and be subsequently re-tested to waste. The Department must also be immediately notified of these levels of contamination. If the well remains in service, it must be tested weekly and engineering plans submitted to this Department, as soon as possible for the installation of chemical removal treatment.
- h) Any well or treatment plant in which a test result exceeds the MCL must be immediately removed from service **if practicable** and the appropriate number of source and distribution resamples **must be collected** as directed by this Department to determine whether a MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps can be taken **to protect the public health**. The water supplier must get approval from this Department prior to **implementing any treatment**.
- i) State discretion shall mean when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.
- j) In addition to the POCs listed in Table 4-2, any organic chemical compound belonging to the classes listed below has an MCL of 5.0 ug/l:
 - Halogenated alkane
 - Halogenated ether
 - Halobenzenes and substituted halobenzenes
 - Benzene and alkyl- or nitrogen-substituted benzenes
 - Substituted, unsaturated hydrocarbons
 - Halogenated non-aromatic cyclic hydrocarbons
- k) Please see Tables 2-2 – 2-7 for any routine POC/UOC monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-3 Nitrate & Nitrite:

NITRATE & NITRITE	MONITORING FREQUENCY ^a			
Water System Type	Continuing Monitoring With Detections < 5 mg/L ^b	Continuing Monitoring With Detections ≥5 & < 8 mg/L ^c	Continuing Monitoring With Detections ≥8 & < 9 mg/L ^d	Continuing Monitoring With Detections ≥ 9 mg/L ^{e, f}
Community & Noncommunity Water Systems	1 Sample Annually Per Well	1 Sample Quarterly Per Well	1 Sample Monthly Per Well	1 Sample Daily Per Well

- a) This table does not apply to first time detections. If a contaminant(s) has never been detected before or has not been detected for more than 1 year see First Time Detection Table 1-9 to determine if First Time Detection Monitoring is needed.
- b) 1 sample must be collected from each well annually (less than 5 mg/l for Nitrate, less than 0.5 mg/l for Nitrite).
- c) Nitrates and nitrites must be monitored quarterly if a test result on a well and/or GAC is greater than or equal to 50% of the MCL. If all test results are less than 50% of the MCL for 4 consecutive quarters, the well may be tested on an annual basis.
- d) Nitrates must be monitored monthly on wells and GACs if a test result is equal to or greater than 8.0 mg/l. If all test results drop below 8.0 mg/l for 3 consecutive months, the well may be tested on a quarterly basis.
- e) Whenever a public supply well, a treatment facility, or a blended sample is tested and found to contain greater than or equal to 9.0 mg/l of nitrate, the Department **strongly recommends** that the well be removed from service and be subsequently re-tested to waste. The Department must also be immediately notified of these levels of contamination. If the well remains in service, it must be tested daily and engineering plans submitted to this Department, as soon as possible for the installation of chemical removal treatment or blending, as well as nitrate monitors that will shut the well off before total nitrate/nitrite exceeds 10 mg/l. Daily sampling does not apply to wells with nitrate monitors.
- f) Any well or treatment plant in which a test result exceeds the MCL must be immediately removed from service and the appropriate number of source and distribution resamples must be collected as directed by this Department to determine whether an MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps (such as blending) can be taken to **protect the public** health. The water supplier must get approval from this Department prior to blending or **implementing treatment**.
- g) Please see Tables 2-2 – 2-7 for any routine Nitrate & Nitrite monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-4 Perchlorate:

PERCHLORATE	MONITORING FREQUENCY ^a		
Water System Type	Continuing Monitoring With Detections < 5 ug/l ^b	Continuing Monitoring With Results ≥ 5 & < 10 ug/l ^c	Continuing Monitoring With Results ≥ 10 ug/l ^{d, e}
Community & Noncommunity Water Systems	1 Sample Annually Per Well	1 Sample Quarterly Per Well	1 Sample Monthly Per Well

- a) This table does not apply to first time detections. If a contaminant(s) has never been detected before or has not been detected for more than 1 year see First Time Detection Table 1-9 to determine if First Time Detection Monitoring is needed.
- b) All wells must be sampled for perchlorate on an annual basis.
- c) If a well exceeds the Secondary Action Level of 5 ug/l, State notification is required and the well must be monitored quarterly and operated to reduce the discharge of perchlorate into the distribution system. If all test results drop below 5 ug/l for 4 consecutive quarters, the well may be tested on an annual basis.
- d) If monitoring test result(s) do not exceed the Primary Action Level of 18 ug/l but remain at or above 10 ug/l of perchlorate, the well shall be tested monthly on a routine basis. The well shall be placed into a last on and first off status if possible. If all test results drop below 10 ug/l of perchlorate for 3 consecutive months, the well may be tested on a quarterly basis.
- e) Any well or treatment plant in which a test result exceeds the Primary Action Level of 18 ug/l, the water supplier must immediately remove the facility from service **if practicable** and collect the appropriate number of source and distribution resamples as directed by this Department. The well must remain out of service until appropriate steps (such as blending) can be taken to **protect the public** health. The water supplier must get approval from this Department prior to blending or **implementing treatment**.
- f) Please see Tables 2-2 – 2-7 for any routine Perchlorate monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-5 Physical and Inorganic Constituents (IOC):

IOC ^{a, e}	MONITORING FREQUENCY		
Water System Type	Monitoring With IOCs < 1/2 MCL	Monitoring With IOCs ≥ 1/2 & < 80% MCL ^{b, c}	Monitoring With IOCs ≥ 80% MCL ^{d, e}
Community & Noncommunity Water Systems	1 Sample Annually Per Well	1 Sample Quarterly Per Well	1 Sample Weekly Per Well

- a) This table does not apply to first time detections. If a contaminant(s) has never been detected before or has not been detected for more than 1 year see First Time Detection Table 1-9 to determine if First Time Detection Monitoring is needed.
- b) Increased monitoring for IOCs with results $\geq 1/2$ of the MCL include the following contaminants: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Cyanide, Fluoride, Lead, Mercury, Selenium, Silver, Thallium, and Zinc.
- c) If monitoring test result(s) remain $\geq 1/2$ of the MCL, the well shall be tested quarterly on a routine basis. If all test results drop to $< 1/2$ of the MCL for 4 consecutive quarters, the well may be tested on an annual basis.
- d) Whenever a public supply well is tested and found to contain 80% of any IOC listed in b), the Department strongly recommends that the well be voluntarily removed from service and be subsequently re-tested to waste. The Department must also be immediately notified of these levels of contamination. If the well remains in service, it should be tested weekly and engineering plans submitted to this Department, as soon as possible for the installation of chemical removal treatment.
- e) Any well or treatment plant in which a test result exceeds the MCL or Action Level for the contaminants listed in b), must be immediately removed from service **if practicable** and the appropriate number of source and distribution resamples must be collected as directed by this Department to determine whether an MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps (such as blending or treating) can be taken to **protect the public** health. The water supplier must get approval from this Department prior to blending or **implementing treatment**.
- f) Please see Tables 2-2 – 2-7 for any routine IOC monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-6 Microbiological (MIC):

MICROBIOLOGICAL ^{a, b}	Routine Monitoring	Triggered Monitoring ^{c, d, e}
Community & Noncommunity Water Systems	1 Sample Quarterly Per Well	1 Sample Per Well Within 24 Hours Of Distribution Positive Bacteriological sample

- a) Any sample that tests positive for Total Coliform must immediately be analyzed for E. coli.
 - b) Any well, treatment system, or storage facility that tests positive for coliform bacteria must be immediately removed from service.
 - c) A Triggered Source Water Monitoring sample from the well(s) must be collected for each positive bacteriological sample detected from your routine monthly distribution sampling locations on your approved Sampling Site Plan. All Triggered Source Water Monitoring samples must be labeled as "Triggered".
 - d) Triggered Source Water Monitoring requires the sampling of all active wells that ran 24 hours prior to the date of the collection of a total coliform positive distribution sample. Triggered Source Water Monitoring also applies to any total coliform detection in the distribution system of a purchasing system or a system in which you have an open interconnection.
 - e) All active wells that must be sampled for Triggered Source Water Monitoring are those wells on your approved Triggered Source Water Monitoring sampling plan.
 - f) Please see Tables 2-2 – 2-7 for any routine microbiological monitoring requirements from water treatment facilities and storage tanks.
- Any well, treatment system, or storage facility that is removed from service due to positive coliform bacteria must have a satisfactory series of microbiological samples collected before obtaining Department approval to place it back into service (0',2',5',10',30' intervals are required for well and treatment systems and 2',30',60' intervals for water storage facilities).
 - Any well, treatment system or storage facility that tests positive for Total Coliform a second time or one that tests positive for **e.coli**, must then have a minimum of two (2) consecutive satisfactory sets of microbiological samples collected before obtaining Department approval to place it back into service. The second or final set of samples may be collected by the Department at the Department's discretion. Results of **ALL** samples must be provided to the Department before the final series is collected.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-7 Radionuclide- Gross Alpha, Combined Radium 226/228, & Uranium (RADs):

GROSS ALPHA, COMBINED RADIUM, & URANIUM ^{a, b}	MONITORING FREQUENCY ^{c, d, g}		
Water System Type	Initial Monitoring ^{c, d, e, f}	Continued Monitoring ≤ MCL ^{g, h}	Continued Monitoring > MCL ^{g, i}
Community Water Systems	1 Sample Quarterly Per Well for 4 Consecutive Quarters	1 Sample / 3 years Per Well	Sample quarterly until 4 consecutive quarterly sample results are ≤ MCL
Noncommunity Water Systems	1 Sample Quarterly Per Well for 4 Consecutive Quarters	1 Sample / 3 years Per Well	Sample quarterly until 4 consecutive quarterly sample results are ≤ MCL

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-7 Radionuclide- Gross Alpha, Combined Radium 226/228, & Uranium (RADs) CONTINUED:

- a) Gross alpha may be substituted for radium 226 and uranium when the measured gross alpha activity does not exceed 5 and 15 pCi/L respectively.
- b) Combined radium 226/228 requires that radium 226 (or substituted gross alpha) and radium 228 be collected at the same time.
- c) Initial gross alpha, combined radium 226/228, and uranium monitoring for each well is four (4) consecutive quarters. This includes new wells and any well that has not completed initial monitoring. New wells are any well that is assigned a new N-Number by the DEC.
- d) Initial gross alpha, combined radium 226/228, and uranium monitoring must be completed before going on the routine monitoring schedule.
- e) The final 2 quarters of initial monitoring for each well may be waived if the results of all the samples from the previous 2 quarters are below the detection limit of 3 pCi/L for gross alpha or 1 pCi/L for radiums 226 and 228. All requests to waive the final two quarters of monitoring must be submitted to this Department in writing (along with copies of the monitoring results) and be approved by NCDH prior to implementation.
- f) The waiver is based on the initial monitoring results for each contaminant and individual well. A waiver may only be granted if all sample results for each contaminant are below the detection limit.
- g) Routine monitoring frequency for gross alpha, combined radium 226/228, and uranium will be determined separately based on the average of the initial monitoring results for each contaminant. Thereafter, the sample schedule is based on routine sample results.
- h) 1 sample every 3 years at each well when monitoring results are less than or equal to the MCL (see Table 4-5). The monitoring period for 3 years is **January 1, 2020 - December 31, 2022**.
- i) 1 sample Quarterly at each well when monitoring results are above the MCL (see Table 4-5). An MCL violation is based on a running annual average of 4 consecutive quarters. A well can revert to a 3-year cycle once 4 consecutive quarters of monitoring are completed and all sample results are $\leq$ the MCL.
- j) **Any well or treatment plant in which a test result exceeds the MCL must be immediately removed from service if practicable and collect the appropriate number of source and distribution resamples as directed by this Department to determine whether a MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps can be taken to protect the public health.**
- k) Please see Tables 2-2 – 2-7 for any routine RADs monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-8 Radionuclide - Gross Beta & Photons (RADs):

GROSS BETA & PHOTONS	MONITORING FREQUENCY		
Water System Type	Monitoring For "Non-Vulnerable" Well ^a	Monitoring For "Vulnerable" Wells ^b	
Community & Noncommunity Water Systems	1 Sample / 5 years Per Well	Initial Monitoring With Detections > 50 pCi/L ^{c, d, e}	Continuing Monitoring after 1 year ≤ 50 pCi/L ^f
		Sample monthly until 1 year's consecutive sample results are ≤ 50 pCi/L	1 sample / 3 years Per Well

- a) Monitoring is 1 sample every 5 years at each well when monitoring results are less than the screening level of 50 pCi/L. The monitoring period for 5 years is **January 1, 2019 - December 31, 2023**.
- b) A well is considered "vulnerable" or "contaminated" if the gross beta particle activity results are above the screening level of 50 pCi/L.
- c) Initial monitoring for a well that is considered "vulnerable" or "contaminated" is subject to monthly gross beta monitoring and quarterly tritium and strontium 90 monitoring. Routine monitoring for gross beta, tritium, and strontium 90 begins the quarter after the well is deemed "vulnerable" or "contaminated".
- d) Monthly monitoring for gross beta shall be based on monthly samples or a composite of 3 monthly samples per quarter for 4 consecutive quarters.
- e) Quarterly monitoring for tritium and strontium 90 shall be based on quarterly samples or a composite of 4 quarterly samples annually.
- f) If the gross beta activity at a well that is considered "vulnerable" or "contaminated" has a running annual average ≤ 50 pCi/L the sampling may be reduced to 1 sample every 3 years.
- g) **Any well or treatment plant in which a test result exceeds the MCL must be immediately removed from service if practicable and collect the appropriate number of source and distribution resamples as directed by this Department to determine whether a MCL violation has occurred (See Table 5-1). The well must remain out of service until appropriate steps can be taken to protect the public health.**
- h) Please see Tables 2-2 – 2-7 for any routine RADs monitoring requirements from water treatment facilities and storage tanks.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-9 First Time Detections:

FIRST TIME DETECTION MONITORING REQUIREMENTS ^a				
CONTAMINANT ^b	STEP 1	STEP 2		STEP 3
	Initial Monitoring for First Time Detection	Continuing Monitoring After Initial Monitoring is Completed		Continued Monitoring
		Results < 1/2 MCL	Detections ≥ 1/2 MCL	
SOC	1 Sample Weekly for 4 weeks Per Well ^c	See Routine Monitoring ^d	1 Sample Monthly for 3 consecutive months Per Well ^e	Based on Result See Routine Monitoring Table ⁿ
POC & UOC	1 Sample Weekly for 4 weeks Per Well ^c	1 Sample Monthly for 3 Consecutive Months Per Well ^f	1 Sample Weekly for 4 weeks Per Well ^g	Based on Result See Routine Monitoring Table ⁿ
1,4-Dioxane, PFOA, PFOS	1 Resample Per Well if > the MCL	1 Sample Quarterly until 4 Consecutive Quarters are Non-Detect	1 Sample Quarterly until 4 Consecutive Quarters are Non-Detect	Based on Result See Routine Monitoring Table ⁿ
IOC- Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cyanide, Fluoride, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc	See Step 2	1 Resample Per Well ^h	1 Sample Weekly for 4 weeks Per Well ⁱ	Based on Source of Contaminant ^k
IOC- Copper, Lead	1 Series (0', 2', 5', 10', 30') Per Well ^j	Based on Source of Contaminant ^k	Based on Source of Contaminant ^k	Based on Source of Contaminant ^k
IOC- Nitrate & Nitrite	1 Resample Per Well ^l	Based on Result See Routine Monitoring Table ⁿ	Based on Result See Routine Monitoring Table ⁿ	Based on Result See Routine Monitoring Table ⁿ
Perchlorate	1 Sample Monthly for 3 consecutive months Per Well ^m	Based on Result See Routine Monitoring Table ⁿ	Based on Result See Routine Monitoring Table ⁿ	Based on Result See Routine Monitoring Table ⁿ

WATER QUALITY MONITORING REQUIREMENTS FOR 2021

WATER QUALITY MONITORING OF SOURCE WATER TABLES 1-1 – 1-9

Table 1-9 First Time Detections *CONTINUED*:

- a) First time detection monitoring for a contaminant is required according to Table 1-9 when a contaminant has been detected from a well that does **not** have treatment designed to remove the detected contaminant **and**:
 - i. The contaminant has never been before detected from the well,
 - ii. Or the contaminant has not been detected from the well in over 1 year for wells that monitor more frequently than annually,
 - iii. Or the contaminant was not detected in the last routine sample for wells that are monitoring annually or less frequently.
- b) Whenever a public supply well is tested and a first time detection is found to contain 80% of a MCL, the Department strongly recommends that the well be removed from service and be subsequently re-tested to waste. The Department must also be immediately notified of these levels of contamination. If the well remains in service, it must be tested weekly and engineering plans submitted to this Department, as soon as possible for the installation of chemical removal treatment.
- c) Whenever a well test result indicates a first time detection of an organic contaminant with a primary MCL value, 1 sample a week shall be collected for 4 consecutive weeks and analyzed for the detected contaminant(s).
- d) If all test results remain < 1/2 the MCL after the 4 consecutive weeks of monitoring the well may revert to routine monitoring (see Table 1-1).
- e) If any test result remains at or above 1/2 the MCL after the 4 consecutive weeks of monitoring, the well shall be tested monthly for 3 consecutive months.
- f) If all test results remain below one half 1/2 the MCL after the 4 consecutive weeks of monitoring the well shall be tested monthly for 3 consecutive months.
- g) If any test result remains at or above 1/2 the MCL after the 4 consecutive weeks of monitoring, 1 sample a week shall be collected for an additional 4 consecutive weeks (a total of 8 weeks since first detection) and notification of the result shall be provided to the health department. All 4 samples shall be analyzed as rapidly as possible. The well shall be placed into a last on and first off status if possible.
- h) Whenever a well test results indicate a first time detection below 1/2 the MCL of any IOC listed, 1 grab sample shall be collected.
- i) Whenever test results from the initial first time detection monitoring test result(s) equals or exceeds 1/2 the MCL for any IOC listed, 1 sample a week shall be collected for 4 consecutive weeks and notification of the result shall be given to the health department. All 4 samples shall be analyzed as rapidly as possible. The well shall be placed into a last on and first off status if possible.
- j) Whenever a well test results indicate a first time detection of lead or ≥ 400 ug/L of copper, a series (0', 2', 5', 10', 30') shall be collected.
- k) Monitoring frequency will be determined by this Department and will be based on source of the contaminant.
- l) Whenever a public supply well is tested and found a first time detection, 1 sample shall be collected.
- m) Whenever a well test results indicate a first time detection of Perchlorate, the well shall be tested monthly for 3 consecutive months.
- n) Monitoring frequency is based on the results of samples collected. The well may revert to routine monitoring (see appropriate Source Water Monitoring Tables 1-1 to 1-8).

A high-speed photograph of water being poured into a clear glass. The water is captured mid-splash, with droplets and ripples visible on the surface. The background is a light, textured blue.

Water Quality Monitoring Requirements

For

Nassau County Public Water Systems

Water Quality Monitoring of Existing, New and Modified Facilities

Tables 2-1 to 2-7

TABLE 2-1
NASSAU COUNTY DEPARTMENT OF HEALTH

Water Quality Monitoring of Existing, New and Modified WELLS							
STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY					NOTES
		MIC <i>Chlorine residual must be field measured & recorded in lab reports</i>	POC	IOC	SOC	RAD	
Routine Operation	Well Head	Refer to Tables 1-1 through 1-9					-----
New Construction	Well Head	0',2',5',10',30'	2' & 30'	2'	30'	30'	Engineering plan approval is required for well construction and rehabilitation work. While certain well improvements are exempt from plan review, sampling may still be required by this Department. Please contact the Bureau of Environmental Engineering at 516-227-9430 to discuss the entire scope of the planned work and determine if an engineering plan approval is required before the work is allowed to begin.
Rehabilitation Or Repair	Well Head	0',2',5',10',30'	2'	2'	N/A	N/A	1. The facility must be shut down overnight prior to sample collection. 2. Water must be directed to waste during the sampling period. 3. The water supplier is required to collect the first set of samples. If the results are satisfactory, NCDH will collect a second set of samples. NCDH requires 2 <i>consecutive</i> sets of satisfactory water quality results prior to the release of a new or renovated well.
Inspection When sanitary seal is opened	Well Head	0',2',5',10',30'	N/A	N/A	N/A	N/A	Water must be directed to waste during the sampling period.
Extended Shutdown Period of 90 or more days	Well Head	0',2',5',10',30'	N/A	2'	N/A	N/A	1. The facility must be shut down overnight prior to sample collection. 2. Water must be directed to waste during the sampling period. 3. Test results must be submitted to NCDH before the well is placed in service.

TABLE 2-2
NASSAU COUNTY DEPARTMENT OF HEALTH

Water Quality Monitoring of Existing, New and Modified PACKED TOWER AERATION SYSTEMS (PTAS)					
STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY			NOTES
		MIC <i>Chlorine residual must be field measured & recorded in lab reports</i>	POC	IOC	
Routine Operation	Raw	QUARTERLY From each well	MONTHLY if <u>treated</u> POC levels ≥ 50% MCL QUARTERLY if <u>treated</u> POC < 50% MCL	ANNUAL 30'	- The facility must be shut down overnight prior to MIC series sample collection. - Minimum run time before POC and IOC treated sample collection should be 30 minutes. - Raw and treated samples should be collected on the same day. - If vapor phase carbon (VPC) treatment of air emissions is provided, VPC influent and effluent air samples must be collected and tested quarterly. Simultaneous indoor air and outdoor air sample collection is also recommended.
	Treated	QUARTERLY Series: 0',2',5',10',30' From each clearwell <u>OR</u> from each tower, if a clearwell doesn't exist	WEEKLY If treated POC levels ≥ 50% MCL MONTHLY If treated POC levels <50% MCL	ANNUAL 30' (or after final stage of treatment)	
New Construction	Raw	0',2',5',10',30'	30'	2'	- The facility must be shut down overnight prior to sample collection. - Water must be directed to waste during the sampling period. - The water supplier is required to collect the first set of samples. If the results are satisfactory, NCDH will collect a second set of samples. NCDH requires 2 <i>consecutive</i> sets of satisfactory water quality results prior to the release of a new or renovated PTAS. - If vapor phase carbon (VPC) treatment of air emissions is provided, the water supplier is required to submit a Work Plan for NCDH review and approval. The Work Plan must propose the collection and testing of indoor air, ambient air, and internal VPC vessel air samples prior to PTAS operation; and collection and testing of indoor air, ambient air, and VPC vessel influent and effluent air samples while the PTAS is operating to waste. * Collect only if well(s) has been out of service for 90 or more days
	Treated	0',2',5',10',30' From each clearwell <u>OR</u> from each tower, if a clearwell doesn't exist	30'	30'	
Treatment Modification <u>OR</u> Packing Replacement	Raw	0',2',5',10',30' from each well	30'	2' *	
	Treated	0',2',5',10',30' From each clearwell <u>OR</u> from each tower, if a clearwell doesn't exist	30'	30'	
Inspection (When tower and/or clearwell is opened)	Treated	0',2',5',10',30' From each clearwell <u>OR</u> from each tower, if a clearwell doesn't exist	N/A	N/A	Water must be directed to waste during the sampling period.
Extended Shutdown Period of 90 or more days	Raw	0',2',5',10',30' from each well	N/A	2'	- The facility must be shut down overnight prior to sample collection. - Water must be directed to waste during the sampling period. - Test results must be submitted to NCDH before the PTAS is placed in service.
	Treated	0',2',5',10',30' From each clearwell <u>OR</u> from each tower, if a clearwell doesn't exist	30'	N/A	

TABLE 2-3
NASSAU COUNTY DEPARTMENT OF HEALTH

Water Quality Monitoring of Existing, New and Modified GRANULAR ACTIVATED CARBON (GAC) POC, SOC/PFOA/PFOS TREATMENT						
STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY				NOTES
		MIC Chlorine residual must be field measured & recorded in lab reports	POC	IOC NITRATE and/or PERCHLORATE	SOC/PFOA/PFOS	
Routine Operation	Raw	QUARTERLY From each well	MONTHLY if <u>treated</u> levels ≥ 50% MCL QUARTERLY if <u>treated</u> levels < 50% MCL	ANNUALLY (Raw and Treated for analysis of complete IOC listing) BUT + IF raw and/or treated nitrate = 5 to < 8 mg/l, collect a QUARTERLY raw and treated nitrate sample + IF raw and/or treated nitrate = 8 to < 9 mg/l, collect a MONTHLY raw & treated nitrate sample	MONTHLY if <u>treated</u> levels ≥ 50% MCL for design contaminants QUARTERLY if <u>treated</u> levels < 50% MCL	1. Refer to Tables 1-1 through 1-9 for additional raw water monitoring requirements. 2. The facility must be shut down overnight prior to MIC series sample collection. 3. Minimum run time before treated POC, IOC, SOC, PFOA, PFOS sample collection should be 30 minutes 4. Raw and treated samples should be collected on the same day.
	Treated	QUARTERLY 0'2'5'10'30' From each vessel OR combined effluent tap	WEEKLY If treated levels ≥ 50% MCL MONTHLY If treated levels <50% MCL	+ IF raw and/or treated nitrate ≥ 9 mg/l, remove well & treatment from service until approved for operation by NCDH. + IF raw perchlorate ≥ 5 ug/l, collect a QUARTERLY raw & treated perchlorate sample	WEEKLY If <u>treated</u> levels ≥ 50% MCL for design contaminants MONTHLY If <u>treated</u> levels < 50% MCL	
New Construction	Raw	0',2',5',10',30' From <u>each</u> well	30' From each well	30' From each well	30' from each well, only if treatment is designed for removal of SOC's/PFOA/PFOS	1. The facility must be shut down overnight prior to sample collection. 2. Water must be directed to waste during the sampling period. 3. The water supplier is required to collect the first set of samples. If the results are satisfactory, NCDH will collect a second set of samples. NCDH requires 2 consecutive sets of satisfactory water quality results prior to the release of a new or renovated water supply facility. * Collect only if well (s) has been out of service for 90 or more days.
	Treated	0',2',5',10',30' From <u>each</u> vessel	2' & 30' from each vessel	30' AND Arsenic Series: 0',2',5'10',30' from <u>each</u> vessel	30' from each vessel, only if treatment is designed for removal of SOC's/PFOA/PFOS	
Carbon Replacement	Raw	0',2',5',10',30' *	N/A	2' *	N/A	
	Treated	0',2',5',10',30' From <u>each</u> vessel	2' and 30' From each vessel	30' and Arsenic Series: 0',2',5'10',30' from <u>each</u> vessel	30' from each vessel, only if treatment is designed for removal of SOC's/PFOA/PFOS	
Shutdown Period of 7 or more days	Collect a 2' treated nitrate sample (If present in raw water) and a 2' treated perchlorate sample (If present in raw water) from each GAC vessel <u>or</u> blended effluent tap. Compare nitrate lab analysis result to on-line continuous nitrate analyzer for calibration purposes. Water must be directed to waste during the sampling period.					
Extended Shutdown Period of 90 or more days	Raw	0',2',5',10',30' From <u>each</u> well	N/A	2'	N/A	1. The facility should not be operated 24 hours prior to sample collection. 2. Water must be directed to waste during the sampling period. 3. Test results must be submitted to NCDH before GAC treatment is placed in service.
	Treated	0',2',5',10',30' From each vessel <u>OR</u> combined effluent tap	30'	2' nitrate sample (if present in raw water) 2' perchlorate sample (if present in raw water) from each GAC vessel <u>or</u> combined effluent tap	30' only if treatment is designed for removal of SOC's/PFOA/PFOS	

TABLE 2-4
NASSAU COUNTY DEPARTMENT OF HEALTH

Water Quality Monitoring of Existing, New and Modified
NITRATE TREATMENT/BLENDING AND/OR PERCHLORATE TREATMENT

STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY				NOTES
		MIC <i>Chlorine residual must be field measured & recorded in lab reports</i>	POC	IOC	NITRATE and/or PERCHLORATE	
Routine Operation	Raw	Refer to Tables 1-1 through 1-9			MONTHLY from all treated <u>OR</u> blended wells	1. Minimum run time before treated sample collection should be 30 minutes. 2. Raw and treated samples should be collected on the same day.
	Treated	QUARTERLY From each vessel <u>OR</u> combined effluent tap	N/A	ANNUAL 30' (Or after final stage of treatment)	MONTHLY From each vessel <u>OR</u> combined effluent tap	
New Construction	Raw	0',2',5',10',30' From each well	N/A	2'* and 30' From each well	30'	* Collect only if well(s) has been out of service for 90 or more days. 1. The facility must be shut down overnight prior to sample collection. 2. Water must be directed to waste during the sampling period. 3. The water supplier is required to collect the first set of samples. If the results are satisfactory, NCDH will collect a second set of samples. NCDH requires 2 consecutive sets of satisfactory water quality results prior to the release of a new or renovated water treatment facility.
	Treated	0',2',5',10',30' From each vessel	2'	30' from each vessel	30'	
Media Replacement	Raw	0',2',5',10',30' * From each well	N/A	2' *	30'	
	Treated	0',2',5',10',30' From each vessel	2'	30' from each vessel	30'	
Extended Shutdown Period of 90 or more days	Raw	0',2',5',10',30' From each well	N/A	2'	2'	1. The facility must be shut down overnight prior to sample collection. 2. Water must be directed to waste during the sampling period. 3. Test results must be submitted to NCDH before the treatment is placed in service.
	Treated	0',2',5',10',30' From each vessel <u>OR</u> combined effluent tap	N/A	N/A	2' from each vessel	

TABLE 2-5
NASSAU COUNTY DEPARTMENT OF HEALTH

Water Quality Monitoring of Existing, New and Modified IRON/MANGANESE (Fe/Mn) TREATMENT PLANTS						
STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY				NOTES
		MIC <i>Chlorine residual must be field measured & recorded in lab reports</i>	POC	IOC	IRON and/or MANGANESE	
Routine Operation	Raw	Refer to Tables 1-1 through 1-9			MONTHLY	- Minimum run time before treated sample collection should be 30 minutes. - Raw and treated samples should be collected on the same day.
	Treated	QUARTERLY From <u>each</u> vessel OR Combined effluent tap	N/A	ANNUAL	MONTHLY	
New Construction	Raw	0',2',5',10',30' From <u>each</u> well	N/A	2'* and 30'	N/A	* Collect only if well(s) has been out of service for 90 or more days. - The facility must be shut down overnight prior to sample collection. - Water must be directed to waste during the sampling period. - The water supplier is required to collect the first set of samples. If the results are satisfactory, NCDH will collect a second set of samples. NCDH requires 2 <i>consecutive</i> sets of satisfactory water quality results prior to the release of a new or renovated water treatment facility.
	Treated	0',2',5',10',30' From <u>each</u> vessel	2'	30' from <u>each</u> vessel AND 2' from <u>each</u> vessel for thallium analysis	0',2',5',10',30' from <u>each</u> vessel	
Filter Media Replacement	Raw	0',2',5',10',30' * From <u>each</u> well	N/A	2'* and 30'	N/A	
	Treated	0',2',5',10',30' From <u>each</u> vessel	2'	30' from <u>each</u> vessel AND 2' from <u>each</u> vessel for thallium analysis	0',2',5',10',30' from <u>each</u> vessel	
Inspection (Vessel is opened)	Treated	0',2',5',10',30' From each vessel	N/A	N/A	N/A	Water must be directed to waste during the sampling period.
Extended Shutdown Period of 90 or more days	Raw	0',2',5',10',30' From <u>each</u> well	N/A	2'	N/A	- The facility must be shut down overnight prior to sample collection. - Water must be directed to waste during the sampling period. - Test results must be submitted to NCDH before treatment is placed in service.
	Treated	0',2',5',10',30' From <u>each</u> vessel OR combined effluent tap	N/A	N/A	30' From <u>each</u> vessel OR combined effluent tap	

TABLE 2-6
NASSAU COUNTY DEPARTMENT OF HEALTH

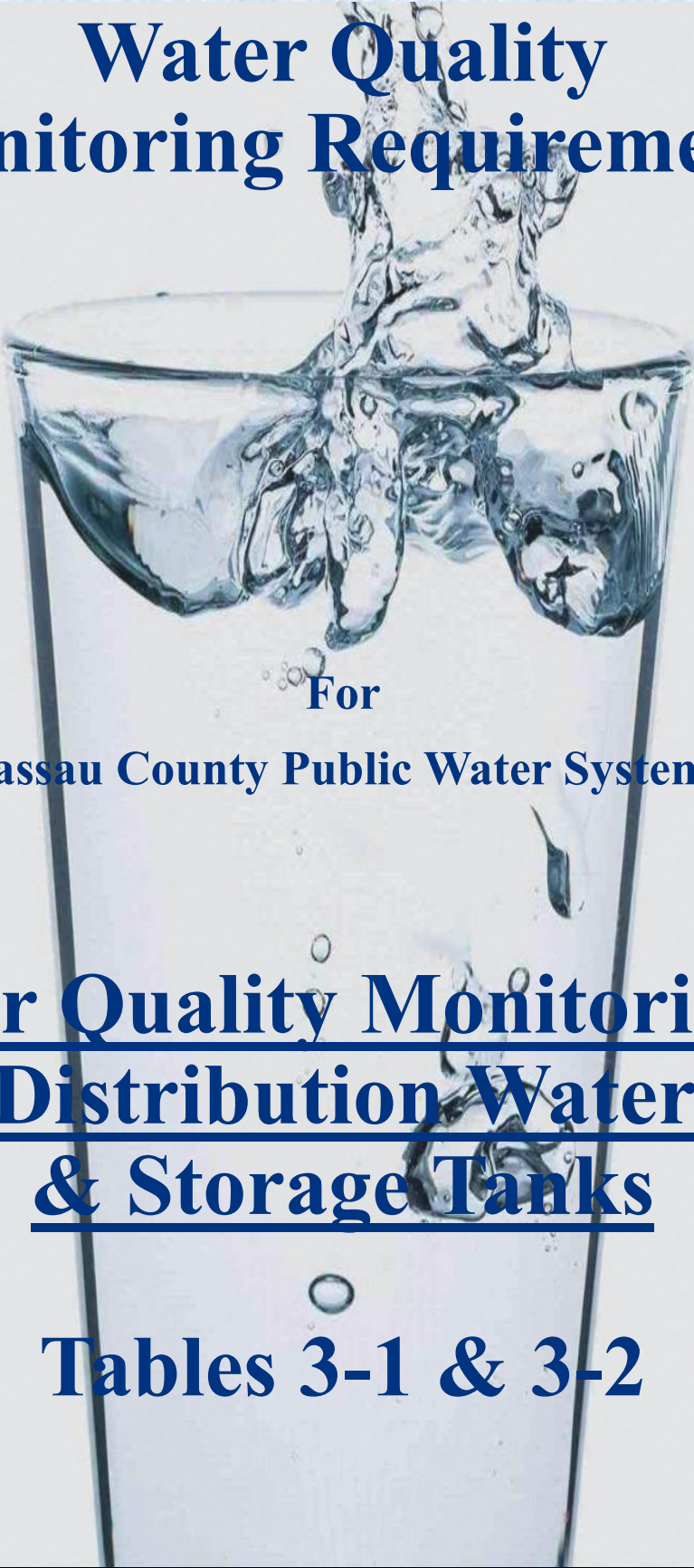
Water Quality Monitoring of Existing, New and Rehabilitated WATER STORAGE TANKS					
STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY			NOTES
		MIC <i>Chlorine residual must be field measured & recorded in lab reports</i>	POC	IOC	
Routine Operation	Tank sampling line or Booster Pump Tap	Quarterly	N/A	N/A	Tank does not have to be removed from service for sampling
New Construction	Tank sampling line or Booster Pump Tap	2', 30', 60'	30'	30'	1. The tank must be shut down overnight prior to sample collection. 2. The water supplier is required to collect the first set of samples. If the results are satisfactory, NCDH will collect a second set of samples. NCDH requires 2 <i>consecutive</i> sets of satisfactory water quality results prior to the release of a new or renovated water storage tank. 3. Sampling should be conducted while tank is draining to waste. 4. The operation of a new/rehabilitated tank releasing levels of paint components above 1 ppb will not be permitted on the basis that the detected contaminants are not present in the natural source water. Such tanks may be authorized by the Department for use to meet peak demand and emergency water demand conditions pending further reduction of contaminant levels.
Tank Rehabilitation	Tank sampling line or Booster Pump Tap	2', 30', 60'	30' Only if tank interior was painted	30' Only if tank interior was painted	
Tank Inspection (walk-in or by ROV)	Tank sampling line or Booster Pump Tap	2', 30', 60'	N/A	N/A	1. The tank must be shut down overnight prior to sample collection.
Extended Shutdown Period of 90 or more days	Tank sampling line or Booster Pump Tap	2', 30', 60'	30' Only if tank interior was painted	30' Only if tank interior was painted	2. Sampling should be conducted while tank is draining to waste. 3. Test results must be submitted to NCDH before tank is placed in service.

TABLE 2-7
NASSAU COUNTY DEPARTMENT OF HEALTH

Water Quality Monitoring of Existing, New and Modified ADVANCED OXIDATION PROCESS (AOP) HYDROGEN PEROXIDE TREATMENT SYSTEMS							
STATUS	SAMPLING LOCATION	TYPE OF ANALYSIS and MONITORING FREQUENCY					NOTES
		MIC	1,4-dioxane	Aldehydes POCs (including Acetone and TTHMs)	Carboxylic Acids, HAA9, Bromate, Chlorate, Chlorite, Hexavalent Chromium, Raw Water Scavenging Potential	IOCs	
Routine Operation	Raw Water	Quarterly	Weekly: 1 st Month Monthly thereafter	Monthly	Quarterly	Annually	OTHER MONITORING: 1. Hydrogen Peroxide should be monitored daily in the AOP & GAC effluent by the DPD/Peroxidase Colorimeter Test. 2. Operational Data ¹ or additional constituents as required by the Department at the time of Completed Works Approval. 3. Refer to Table 2-3 for additional GAC sampling requirements.
	AOP Effluent		Weekly: 1 st Month Monthly thereafter	Monthly	Quarterly	Annually	
	GAC Effluent - See Note 3 -	Quarterly 0',2',5',10',30' From each vessel or combined effluent tap	Weekly: 1 st Month Monthly thereafter	Monthly <u>See Note 3</u>	Quarterly	Annually <u>See Note 3</u>	
New Construction	Raw Water	0',2',5',10',30' from <u>each</u> well	30' from each well	30' from each well	30' from each well	2' from each well	1. Operational Data ¹ should be recorded at the time of sample collection. 2. The facility must be shut down overnight prior to sample collection. 3. Water must be directed to waste during the sampling period. 4. Refer to Table 2-3 for additional GAC sampling requirements.
	AOP Effluent		2' and 30'	30'	30'	30'	
	GAC Effluent - See Note 4 -	0',2',5',10',30' from <u>each</u> vessel	2' and 30' from each vessel or GAC Train	30' from each vessel or GAC Train	30' from each vessel or GAC Train	30' from each vessel or GAC Train <u>and</u> arsenic series from <u>each</u> vessel	
Treatment Modification OR Extended Shutdown Period of 90 or more days	Raw Water	0',2',5',10',30' from <u>each</u> well	30'	30'	30'	2'	1. Operational Data ¹ should be recorded at the time of sample collection. 2. The facility must be shut down overnight prior to sample collection. 3. Water must be directed to waste during the sampling period. 4. Refer to Table 2-3 for additional GAC sampling requirements.
	AOP Effluent		30'	30'	30'	30'	
	GAC Effluent - See Note 4 -	0',2',5',10',30' from each vessel	30' From each vessel or GAC Train	30' From each vessel or GAC Train	30' From each vessel or GAC Train	30' from each vessel or GAC Train <u>and</u> arsenic series from <u>each</u> vessel	

¹ Water flow rate (gpm), power (kWh), UVT (%), UV lamp intensity (mW/cm²), reactor temperature (°F), LRV for 1,4-dioxane and other POCs, total peroxide storage (gals), H₂O₂ pump speed (rpm)
 H₂O₂ injection rate (GPH), H₂O₂ readings (ppm) from reactor influent/effluent, GAC effluent, combined effluent using analyzers and field kits.

MONITORING TABLE 2-7. AOP. 2021

A high-speed photograph of water being poured into a clear glass. The water is captured mid-splash, with droplets and ripples visible. The background is a light, textured blue.

Water Quality Monitoring Requirements

For

Nassau County Public Water Systems

Water Quality Monitoring of Distribution Water & Storage Tanks

Tables 3-1 & 3-2

NASSAU COUNTY DEPARTMENT OF HEALTH
WATER QUALITY MONITORING REQUIREMENTS FOR 2021
WATER QUALITY MONITORING
DISTRIBUTION AND STORAGE TANKS MONITORING TABLE 3-1

WATER SYSTEMS	MIC (1)	CL2 (2)	TTHM & HAA5 (2)		TTHM & HAA5 (2)		POC (3)	NITRATE (4)	IOC ** (5)	ASBESTOS (6)
			Routine	Months	Reduced	Months				
All Water Storage Tanks	1 / Q	NR	NR		NR		NR	NR	NR	NR
Albertson Water District *	15 / M	15 / M	4 / Q	J,A,J,O	2 / A	Oct	1 / SA	1 / SA	1 / A	Waiver
Bayville, Village of *	8 / M	8 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Bethpage Water District *	40 / M	40 / M	4 / Q	F,M,A,N	2 / A	Aug	1 / SA	1 / SA	1 / A	Waiver
Carle Place Water District *	10 / M	10 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Cathedral Gardens Water District *	2 / M	2 / M	4 / Q	M,J,S,D	2 / A	Mar	1 / SA	1 / SA	1 / A	Waiver
East Williston, Village of *	3 / M	3 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Farmingdale, Village of *	10 / M	10 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	1 / A
Franklin Square Water District *	40 / M	40 / M	4 / Q	J,A,J,O	2 / A	July	1 / SA	1 / SA	1 / A	1 / A
Freeport, Village of *	50 / M	50 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	1 / A
Garden City, Village of *	40 / M	40 / M	4 / Q	M,J,S,D	2 / A	Sept	1 / SA	1 / SA	1 / A	1 / A
Garden City Park Water District *	20 / M	20 / M	4 / Q	J,A,J,O	2 / A	Oct	1 / SA	1 / SA	1 / A	Waiver
Glen Cove, City of *	32 / M	32 / M	4 / Q	J,A,J,O	2 / A	Oct	1 / SA	1 / SA	1 / A	Waiver
Glenwood Water District *	2 / M	2 / M	4 / Q	F,M,A,N	2 / A	Aug	1 / SA	1 / SA	1 / A	Waiver
Hempstead, Village of *	60 / M	60 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	1 / A
Hicksville Water District *	60 / M	60 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	Waiver
Jericho Water District *	60 / M	60 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	1 / A
Lido-Point Lookout T.O.H. Water Dept *	5 / M	5 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	1 / A
Locust Valley Water District *	8 / M	8 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Long Beach, City of *	40 / M	40 / M	4 / Q	J,A,J,O	2 / A	Oct	1 / SA	1 / SA	1 / A	1 / A
Manhasset-Lakeville Water District *	52 / M	52 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	1 / A
Massapequa Water District *	52 / M	52 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	1 / A
Mineola, Village of *	20 / M	20 / M	4 / Q	J,A,J,O	2 / A	July	1 / SA	1 / SA	1 / A	Waiver
New York American Water - Lynbrook	152 / M	152 / M	6 / Q	F,M,A,N	2 / Q	F,M,A,N	4 / SA	4 / SA	4 / A	1 / A
New York American Water - Merrick	120 / M	120 / M	6 / Q	M,J,S,D	2 / Q	M,J,S,D	4 / SA	4 / SA	4 / A	1 / A
New York American Water - Mill Neck *	2 / M	2 / M	2 / A	Sept	1 / A	Sept	1 / A	1 / A	1 / A	Waiver
New York American Water - Sea Cliff *	16 / M	16 / M	4 / Q	F,M,A,N	2 / A	Nov	1 / SA	1 / SA	1 / A	1 / A
Old Westbury, Village of *	8 / M	8 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Oyster Bay Water District *	10 / M	10 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Plainview Water District *	40 / M	40 / M	4 / Q	F,M,A,N	2 / A	Nov	1 / SA	1 / SA	1 / A	Waiver
Plandome, Village of *	2 / M	2 / M	4 / Q	M,J,S,D	2 / A	Dec	1 / SA	1 / SA	1 / A	Waiver
Port Washington Water District *	40 / M	40 / M	4 / Q	M,J,S,D	2 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Rockville Centre, Village of *	25 / M	25 / M	4 / Q	F,M,A,N	2 / A	May	1 / SA	1 / SA	1 / A	Waiver
Roslyn Water District *	20 / M	20 / M	4 / Q	M,J,S,D	2 / A	Dec	1 / SA	1 / SA	1 / A	Waiver
Sands Point, Village of *	4 / M	4 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
South Farmingdale Water District *	60 / M	60 / M	4 / Q	M,J,S,D	2 / A	Sept	2 / SA	2 / SA	2 / A	Waiver
Split Rock Water Supply *	2 / M	2 / M	2 / A	Sept	1 / A	Sept	1 / A	1 / A	1 / A	Waiver
Town of Hempstead Water Department *	100 / M	100 / M	6 / Q	M,J,S,D	2 / Q	M,J,S,D	3 / SA	3 / SA	3 / A	1 / A
Water Authority of Great Neck North *	32 / M	32 / M	4 / Q	M,J,S,D	2 / A	Dec	1 / SA	1 / SA	1 / A	1 / A
Water Authority of Western Nassau	100 / M	100 / M	6 / Q	M,J,S,D	2 / Q	M,J,S,D	3 / SA	3 / SA	3 / A	Waiver
West Hempstead Water District *	45 / M	45 / M	4 / Q	M,J,S,D	2 / A	June	1 / SA	1 / SA	1 / A	1 / A
Westbury Water District *	20 / M	20 / M	4 / Q	F,M,A,N	2 / A	Nov	1 / SA	1 / SA	1 / A	Waiver
Williston Park, Village of *	8 / M	8 / M	2 / A	Sept	1 / A	Sept	1 / SA	1 / SA	1 / A	Waiver
Beaver Dam Winter Sports Water Supply	1 / M	1 / M	Waiver	Waiver	Waiver	Waiver	1 / A	1 / A	1 / A	Waiver
Jones Beach State Park Water Supply	15 / 30 ⁺ / M	15 / 30 ⁺ / M	1 / A	July	1 / A	July	1 / A	1 / A	1 / A	Waiver
Seawanhaka Yacht Club Water Supply	1 / M	1 / M	1 / A	Sept	1 / A	Sept	1 / A	1 / A	1 / A	Waiver
Tobay Beach Water Supply	1 / 2 ⁺ / M	1 / 2 ⁺ / M	1 / A	July	1 / A	July	1 / A	1 / A	1 / A	Waiver

Please review the attached footnotes for details of the monitoring requirements

Months:

J,A,J,O- January, April, July, October

F,M,A,N- February, May, August, November

M,J,S,D- March, June, September, December

Frequency Codes:

A - Annually

M - Monthly

SA - Semi Annually

+ - During June - September

NR - Not Required

Q - Quarterly

* Indicates Water System is Approved for Reduced DBPR 2 Monitoring

** IOC's Including Perchlorate

WATER QUALITY MONITORING REQUIREMENTS FOR 2021
WATER QUALITY MONITORING OF
DISTRIBUTION AND STORAGE TANKS MONITORING TABLE 3-1 *CONTINUED*:

1) Microbiological:

- a) Any sample that tests positive for Total Coliform must immediately be analyzed for E. coli. **The Department must be notified immediately of all positive sample results from the distribution system and any neighboring water systems that have open interconnections must also be notified.**
- b) All routine microbiological samples taken from the distribution system must conform to the sampling site plan on file with and approved by this Department. To make a change to your sampling site plan, you must submit the proposed change in writing to this office and receive approval.
- c) Three repeat samples in the distribution system must be taken for each positive bacteriological sample detected in the distribution system. The repeat samples must be taken from the following locations: (1) The same sampling point location and tap as the original positive sample, (2) Within five service connections upstream of the original sample and (3) Within five service connections downstream of the original.
- d) When chlorine is used as a disinfectant, a chlorine residual must be taken and reported with each sample. If a detectable chlorine residual is not achieved, the sample should be analyzed for a heterotrophic plate count. "A heterotrophic plate count result equal to or less than 500 colonies per milliliter is considered to be equivalent to a measurable free chlorine residual".
- e) A summary of all monthly microbiological sampling performed in the distribution system must be submitted to this office within 10 days of the completion of the monitoring period.
- f) A "Triggered Source Water Monitoring" sample(s) must be taken for each positive bacteriological sample detected from your routine distribution sampling locations on your approved sampling site plan.
- g) Triggered Source Water Monitoring requires the sampling of all active wells that ran 24 hours prior to the date of the collection of a total coliform positive distribution sample. Triggered Source Water Monitoring also applies to any total coliform detection in the distribution system of a purchasing system or a system in which you have an open interconnection.
- h) All storage tank discharges must be monitored on a quarterly basis for bacteriological quality.
- i) Any well, treatment system, or storage facility that tests positive for coliform bacteria must be immediately taken out of service.

2) Total Trihalomethane (TTHM), Five Haloacetic Acids (HAA5), & Chlorine Residual (Cl₂):

- a) All water systems must collect samples in accordance with the Disinfection By-Product Rule Stage 2 (DBPR2). Sampling must be conducted for TTHM and HAA5 according to their new DBPR2 Sampling Site Plan on file and approved by this Department.
- b) To qualify for Reduced monitoring, systems must demonstrate TTHM and HAA5 locational annual averages of less than or equal to 0.04mg/L and less than or equal to 0.03mg/L, respectively or be collecting the same sampling locations and number under Stage 2 reduced monitoring as they were under Stage 1.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021
WATER QUALITY MONITORING OF
DISTRIBUTION AND STORAGE TANKS MONITORING TABLE 3-1 *CONTINUED*:

2) Total Trihalomethane (TTHM), Five Haloacetic Acid (HAA5), & Chlorine Residual (Cl₂) (*Continued*):

- c) Water systems that have qualified for Reduced monitoring must collect samples according to the Department's Reduced Monitoring letter, from the locations of highest TTHM and HAA5 potential, during the month(s) stated in the letter.
- d) To make a change to your sampling site plan, you must submit the proposed change in writing to this office and receive approval.
- e) Any water system that chlorinates at any time during the monitoring period (temporary disinfection) must collect TTHM and HAA5 samples.
- f) When chlorine is used as a disinfectant, a chlorine residual must be taken and reported with each microbiological distribution sample.
- g) A summary of all chlorine residuals, TTHMs and HAA5s sampling performed in the distribution system must be submitted to this office within 10 days of the completion of each quarter in which monitoring occurred.
- h) If the annual averages for TTHMs and HAA5s for water systems on Reduced **quarterly** monitoring are greater than or equal to 0.04mg/L and greater than or equal to 0.030mg/L, respectively, you must increase to Routine monitoring.
- i) If the annual averages for TTHMs and HAA5s for water systems on Reduced **annual** monitoring are greater than or equal to 0.06mg/L and greater than or equal to 0.045mg/L, respectively, you must increase to Routine monitoring.
- j) Water systems that do not collect samples according to the approved DBPR2 monitoring plan may be in violation of the monitoring requirements of Section 5-1.52 of the New York State Sanitary Code.

3) Principal Organic Contaminant (POC) & Unspecified Organic Contaminant (UOC)

- a) Whenever a distribution system sample is collected, and it is tested and found to contain 50% of an organic contaminant (POC, UOC, and/or SOC) MCL, the Department must be notified, and the water supplier must conduct an investigation to determine the source of contamination.
- b) Semi Annual monitoring period means a sample(s) collected from January through June and a sample(s) collected from July through December.
- c) Samples must be collected from a location on your bacteriological Sampling Site Plan closest to a well(s) most impacted by POC contamination.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021
WATER QUALITY MONITORING OF
DISTRIBUTION AND STORAGE TANKS MONITORING TABLE 3-1 *CONTINUED*:

4) Nitrate (NO₃) & Nitrite (NO₂):

- a) Whenever a distribution system sample is collected, and it is tested and found to contain ≥ 8.0 mg/l of nitrate, the Department must be notified, and the water supplier must conduct an investigation to determine the source of contamination.
- b) Semi Annual monitoring period means a sample(s) collected from January through June and a sample(s) collected from July through December.
- c) Sample must be collected from a location on your bacteriological Sampling Site Plan closest to a well(s) with highest NO₃/ NO₂ contamination.

5) Physical and Inorganic Constituents (IOC):

- a) Whenever a distribution system sample is collected and it is tested and found to contain $\geq 80\%$ of Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Cyanide, Fluoride, Lead, Mercury, Nickel, Selenium, and/or Thallium MCL, the Department must be notified and the water supplier must conduct an investigation to determine the source of contamination.
- b) Sample must be collected from a location on your bacteriological Sampling Site Plan.

6) Asbestos:

- a) A water system with asbestos levels less than the MCL must collect an annual sample for asbestos every nine (9) years.
- b) If a system is not vulnerable to asbestos contamination, either at its source or due to corrosion of asbestos cement pipe, it is **NOT** required to monitor if granted a waiver by the Department. The waiver must be renewed by the Department every nine (9) years. Current approved waivers have been issued for the period of January 1, 2021 to December 31, 2028. The basis for a waiver must include the following:
 - 1. Lack of potential asbestos contamination of the water source,
 - 2. No use of asbestos cement pipe for finished water distribution and noncorrosive nature of the water.
- c) A system must collect an asbestos sample if vulnerable to asbestos contamination due to source water and corrosion of asbestos cement pipe or solely to corrosion of asbestos cement pipe.
- d) Collect one sample at a tap served by asbestos cement pipe and under conditions where asbestos contamination is most likely to occur.
- e) A system which exceeds the MCL for asbestos shall monitor quarterly beginning in the next quarter after the violation occurred.

WATER QUALITY MONITORING REQUIREMENTS FOR 2021
WATER QUALITY MONITORING
LEAD AND COPPER MONITORING TABLE 3-2

Water Supply	System Type	Sample Plan	Samples Reduced (a)	Reduced	Last Sampled	Next Due (b)	Certification Due (c, d, e)
Plandome (Village)	S	20	10	YES	September- 2018	June 1-September 30, 2021	October 10, 2021
Port Washington Water District	M	60	30	YES	September- 2018	June 1-September 30, 2021	October 10, 2021
Rockville Centre (Village)	M	60	30	YES	September- 2018	June 1-September 30, 2021	October 10, 2021
South Farmingdale Water District	M	60	30	YES	September- 2018	June 1-September 30, 2021	October 10, 2021
Split Rock Water System	S	5	5	YES	September- 2018	June 1-September 30, 2021	October 10, 2021
Water Authority of Western Nassau	L	100	50 (f)	YES	September- 2018	June 1-September 30, 2021	October 10, 2021
Jones Beach State Park	S	10	5	YES	September- 2018	June 1-September 30, 2021	October 10, 2021

Table 3-2 Footnotes

a) First draw samples shall be collected from the same sampling sites each monitoring period. If a water supplier cannot gain entry to a previously used site after making reasonable efforts, the supplier may collect the sample from another sampling site in its sampling pool as long as the new sampling site meets the same targeting criteria and is within reasonable proximity of the original sampling site.

b) Each resident collecting samples must be provided with the *Homeowner Tap Sample Collection Procedures*. The bottom portion must be completed, signed by the resident and then returned to be retained with the sample results.

c) Using the applicable NYSDOH approved *Consumer Notice of Tap Water Results Template* all participants must be provided with copies of their sample results within 30 days of receipt, as well as the following: the MCL Goal and Action Level for lead and definitions of these terms, an explanation of the health effects of lead, the sources of lead, steps that consumers can take to reduce exposure to lead in drinking water, whether to have their child tested for lead, and water system, NYSDOH and EPA contact information.

d) In the event of a 90th percentile action level exceedance, public notification is required within 60 days after the end of the monitoring period with language that has been approved by the Department. (See Table 5-1 for 90th percentile calculations and determining Action Level exceedances).

e) The lead and copper monitoring results report must be submitted to the Department no later than **October 10, 2021**. **A sample of the notice provided to the participants, the Lead Consumer Notice Certification Form, the laboratory reports and a representative signed copy of the Homeowner Tap Sample Collection Procedures must be included with the report.**

f) All water systems that are sampling for lead and copper semi-annually and all large water systems over 50,000 in population that are collecting lead and copper monitoring must also collect parameter samples from distribution sites. The number of sites and types of parameters will depend on population size and on the corrosion control treatment chemicals that are being used.

*** All water systems that are sampling for lead and copper semi-annually and **all large water systems over 50,000 in population**, must collect water quality parameter samples at each entry point bi-weekly. The types of parameters collected will depend on the corrosion control treatment chemicals that are being used. ***

A clear glass filled with water, with a dynamic splash of water rising from the center. The background is a light blue gradient.

Water Quality Monitoring Requirements

For

Nassau County Public Water Systems

Water Quality Monitoring Contaminants & Maximum Contaminant Levels

Tables 4-1 to 4-5

TABLE 4-1
NASSAU COUNTY DEPARTMENT OF HEALTH
GROUNDWATER SOURCES - PUBLIC WATER SYSTEMS
WATER QUALITY MONITORING REQUIREMENTS FOR 2021
Contaminants & Maximum Contaminant Levels (MCLs)

[illegible]

TABLE 4-2
NASSAU COUNTY DEPARTMENT OF HEALTH
GROUNDWATER SOURCES - PUBLIC WATER SYSTEMS
WATER QUALITY MONITORING REQUIREMENTS FOR 2021
Contaminants & Maximum Contaminant Levels

Analysis Category	Constituents/ Contaminants	Maximum Contaminant Level (mg/l)	Analysis Category	Constituents/ Contaminants	Maximum Contaminant Level (mg/l)
POC's ^(a) Principal Organic Contaminants	Benzene	0.005	POC's ^(a) (continued) Principal Organic Contaminants	p-Isopropyltoluene	0.005
	Bromobenzene	0.005		Methylene Chloride	0.005
	Bromochloromethane	0.005		Methyl Tert. Butyl Ether (MTBE)	0.010
	Bromomethane	0.005		n-Propylbenzene	0.005
	N-Butylbenzene	0.005		Styrene	0.005
	Sec-Butylbenzene	0.005		1,1,1,2-Tetrachloroethane	0.005
	Tert-Butylbenzene	0.005		1,1,2,2-Tetrachloroethane	0.005
	Carbon Tetrachloride	0.005		Tetrachloroethene	0.005
	Chlorobenzene	0.005		Toluene	0.005
	Chlorodifluoromethane	0.005		1,2,3-Trichlorobenzene	0.005
	Chloroethane	0.005		1,2,4-Trichlorobenzene	0.005
	Chloromethane	0.005		1,1,1-Trichloroethane	0.005
	2-Chlorotoluene	0.005		1,1,2-Trichloroethane	0.005
	4-Chlorotoluene	0.005		Trichloroethene	0.005
	Dibromomethane	0.005		Trichlorofluoromethane	0.005
	1,2-Dichlorobenzene	0.005		1,2,3-Trichloropropane	0.005
	1,3-Dichlorobenzene	0.005		1,1,2-Trichloro 1,2,2- trifluoroethane	0.005
	1,4-Dichlorobenzene	0.005		1,2,4-Trimethylbenzene	0.005
	Dichlorodifluoromethane	0.005		1,3,5-Trimethylbenzene	0.005
	1,1-Dichloroethane	0.005		m-Xylene	0.005
	1,2-Dichloroethane	0.005		o-Xylene	0.005
	1,1-Dichloroethene	0.005		p-Xylene	0.005
	cis-1,2-Dichloroethene	0.005		Vinyl Chloride	0.002
	trans-1,2-Dichloroethene	0.005		Bromoform	*
	1,2-Dichloropropane	0.005		Bromodichloromethane	*
	1,3-Dichloropropane	0.005		Chloroform	*
	2,2-Dichloropropane	0.005		Chlorodibromomethane	*
	1,1-Dichloropropene	0.005	UOC	Unspecified Organic Contaminant	0.050
	cis-1,3-Dichloropropene	0.005			
	trans-1,3-Dichloropropene	0.005	-	Total POC's and UOC's	0.100
	Ethylbenzene	0.005			
	Hexachlorobutadinene	0.005			
	Isopropylbenzene	0.005			

a) All POC's listed must be tested for during routine monitoring.

* No Individual MCL level - MCL is a Locational Running Annual Average (LRAA) for Total trihalomethanes of 0.08 mg/l (See Table 4-4)

TABLE 4-3
NASSAU COUNTY DEPARTMENT OF HEALTH
GROUNDWATER SOURCES - PUBLIC WATER SYSTEMS
WATER QUALITY MONITORING REQUIREMENTS FOR 2021

Contaminants & Maximum Contaminant Levels

Analysis Category	Constituents/ Contaminants	Maximum Contaminant Level (mg/l)	Analysis Category	Constituents/ Contaminants	Maximum Contaminant Level (mg/l)
<u>IOC' s</u> Physical And Inorganic Constituents (mg/l)	Alkalinity, Total	-	Physical And Inorganic Constituents (mg/l)	Nickel	-
	Ammonia as N	-		Nitrate as N	10.0 (D)
	Antimony	0.006		Nitrite as N	1.0 (D)
	Arsenic	0.010		Odor	3 units
	Barium	2.0		pH	< 7.5 - 8.5 < (e)
	Beryllium	0.004		Selenium	0.05
	Cadmium	0.005		Silver	0.1
	Calcium Hardness	-		Sodium	(f)
	Chloride	250		Sulfate	250
	Chromium	0.10		Temperature (°F or °C)	-
	Color	15 units		Thallium	0.002
	Copper	1.3 (a)		Turbidity	5 units
	Cyanide, Free	0.2		Zinc	5.0
	Dissolved Solids, Total	-	Inorganic Contaminant	Perchlorate: Primary Action Level Secondary Action Level	0.018 0.005
	Foaming Agents	-			
	Fluoride	2.2	Inorganic Contaminant	Asbestos:	7.0 million fibers/liter (MFL)(> 10 microns)
	Hardness, Total	-			
	Iron	0.3 (b)			
	Langelier Index	(c)			
	Lead	0.015 (a)			
	Manganese	0.3 (b)			
	Mercury	0.002			

Table 4-3 Footnotes

a) USEPA Action Level

b) MCL may be exceeded with treatment approved by NCDH for sequestering. The combined concentration of iron and manganese should not exceed 0.5 mg/l for wells without treatment.

c) The NCDH recommends that the Langelier Saturation Index should be as close to zero as possible.

d) The total Nitrate and Nitrite MCL is 10.0 mg/l (as nitrogen).

e) NCDH guideline

f) The NYSDOH recommends that the sodium level not exceed 20 mg/l for severely restricted sodium diets and 270 mg/l for moderately restricted sodium diets.

TABLE 4-4
NASSAU COUNTY DEPARTMENT OF HEALTH
GROUNDWATER SOURCES - PUBLIC WATER SYSTEMS
WATER QUALITY MONITORING REQUIREMENTS FOR 2021
Contaminants & Maximum Contaminant Levels

Analysis Category	Constituents/ Contaminants	Maximum Contaminant Level (mg/l)	Analysis Category	Constituents/ Contaminants	Maximum Contaminant Level (mg/l)
Microbiological MIC.	Total Coliform	None Detected	TTHM's	Total Trihalomethanes (b)	0.080 (b)
	Escherichia Coliform (a)	None Detected	HAA5	Haloacetic Acids (c)	0.060 (c)
			CL2	Chlorine Residual (d)	4.0 (d)

Table 4-4 Footnotes

- a) The Escherichia Coliform (E. Coli) analysis is only required in a sample where the Total Coliform is positive.
- b) Total Trihalomethanes means the sum of Bromoform, Bromodichloromethane, Chloroform and Chlorodibromomethane. Level is a Locational Running Annual Average.
- c) 5 Haloacetic Acids means the sum of Monochloroacetic acid, Dichloroacetic acid, Trichloroacetic acid, Bromoacetic acid, and Dibromoacetic acid. Level is a Locational Running Annual Average.
- d) Part of the DBPR2. Level is a Running Annual Average Maximum Disinfection Residual.

TABLE 4-5
NASSAU COUNTY DEPARTMENT OF HEALTH
GROUNDWATER SOURCES - PUBLIC WATER SYSTEMS
WATER QUALITY MONITORING REQUIREMENTS FOR 2021
Contaminants & Maximum Contaminant Levels

Analysis Category	Contaminant	Maximum Contaminant Level	Detection Level
<u>RAD' s</u> Radionuclides	Gross Alpha	15 pCi/L	3 pCi/L
	Combined Radium 226/228 (b)	5 pCi/L	Radium 226 (a) 1 pCi/L Radium 228 1 pCi/L
	Uranium (a)	30 ug/L	1 ug/L
<u>RAD' s</u> Radionuclides	Gross Beta/Photons	4 mrem/year	Gross Beta 4 pCi/L Cs-134 10 pCi/L Sr-89 10 pCi/L Sr-90 2 pCi/L I-131 1 pCi/L H-3 1000 pCi/L Other nuclides & photon/gamma emitters: 1/10th of the rule

Table 4-5 Footnotes

a) Gross Alpha particle activity measurement may be substituted for:

*Radium-226 if Gross Alpha is $\leq$ 5pCi/L

*Uranium if Gross Alpha is $\leq$ 15pCi/L

b) If the gross alpha particle activity result is less than it's detection limit ($<$ 5pCi/L) and a system chooses to use gross alpha in lieu of a radium 226 measurement, then the gross alpha result can be used as the substitute for radium 226 in determining a combined radium 226/228 result. Radium 226 (or substituted Gross Alpha) and Radium 228 must be collected together.

When Using Gross Alpha As A Substitution For Radium 226 & Uranium

- 1) If the reported Gross Alpha result is less than ($<$) 3 pCi/L, substitute one half (1/2) the reported Gross Alpha result for the Ra-226 and/or Uranium value.
- 2) If the reported Gross Alpha result is greater than or equal to ($\geq$) 3 pCi/L, use the reported Gross Alpha result for the Ra-226 and/or Uranium value.
- 3) If the reported Gross Alpha result is reported as a negative value (-), use zero (0) reported Gross Alpha result for the Ra-226 and/or Uranium value.

Substitution of Reported Results for Determining Compliance/Monitoring Frequency

- 1) **Gross Alpha** - If the reported Gross Alpha result is less than ($<$) 3 pCi/L, use zero (0) as a result for the Gross Alpha value.
- 2) **Ra-226** - If the reported Ra-226 result is less than ($<$) 1 pCi/L, use zero (0) as a result for the Ra-226 value.
- 3) **Ra-228** - If the reported Ra-228 result is less than ($<$) 1 pCi/L, use zero (0) as a result for the Ra-228 value.
- 4) **Uranium** - If the reported Uranium result is less than ($<$) 1 ug/L, use zero (0) as a result for the Uranium value.

A clear glass filled with water, with a dynamic splash of water rising from the center. The splash is captured mid-air, with many droplets and bubbles visible. The background is a light, textured blue.

Water Quality Monitoring Requirements

For

Nassau County Public Water Systems

Water Quality Monitoring Maximum Contaminant Level Violation Determination

Table 5-1

TABLE 5-1
NASSAU COUNTY DEPARTMENT OF HEALTH
WATER QUALITY MONITORING REQUIREMENTS FOR 2021
GROUNDWATER SOURCES - PUBLIC WATER SYSTEMS
MAXIMUM CONTAMINANT LEVEL (MCL) VIOLATION AND
ACTION LEVEL (AL) EXCEEDANCE DETERMINATION

IF A RESULT OF A MONITORING SAMPLE ANALYSIS EXCEEDS A CONTAMINANT MCL/AL, THE WATER SYSTEM SHALL COLLECT RESAMPLES TO DETERMINE IF A MCL VIOLATION EXISTS ACCORDING TO THE FOLLOWING TABLE:			
CONTAMINANTS	RESAMPLES REQUIRED	WITHIN (TIME) of INITIAL SAMPLE	MCL VIOLATION EXISTS WHEN:
ANTIMONY, ARSENIC, BARIUM, BERYLLIUM, CADMIUM, CHROMIUM, CYANIDE, IRON (a), MANGANESE (a), MERCURY, SELENIUM, SILVER, THALLIUM, FLUORIDE, CHLORIDE, SULFATE, ZINC, COLOR, ODOR	ONE	2 WEEKS	THE AVERAGE OF THE TWO RESULTS EXCEEDS THE MCL. (FOR WELLS OR TREATMENT PLANTS, THIS ONLY APPLIES IF THE FACILITY HAS BEEN LEFT IN SERVICE.)
NITRATE, NITRITE	ONE (b)	24 HOURS	THE AVERAGE OF THE TWO RESULTS EXCEEDS THE MCL. (FOR WELLS OR TREATMENT PLANTS, THIS ONLY APPLIES IF THE FACILITY HAS BEEN LEFT IN SERVICE.)
POC's, SOC's 1,4-DIOXANE, PFOA, PFOS ** UNSPECIFIED ORGANIC CONTAMINANTS	ONE TO THREE	30 DAYS	AT LEAST ONE OF THE CONFIRMING SAMPLES FROM THE SAME SAMPLING POINT IS POSITIVE AND THE AVERAGE OF THE INITIAL SAMPLE AND ALL CONFIRMING SAMPLES EXCEEDS THE MCL. (FOR WELLS OR TREATMENT PLANTS, THIS ONLY APPLIES IF THE FACILITY HAS BEEN LEFT IN SERVICE.)
TOTAL COLIFORM	THREE (c) + TRIGGERED MONITORING	24 HOURS	IN SYSTEMS COLLECTING LESS THAN 40 SAMPLES PER MONTH - TWO OR MORE SAMPLES ARE POSITIVE FOR TOTAL COLIFORM.(d)(e)
			IN SYSTEMS COLLECTING 40 OR MORE SAMPLES PER MONTH - MORE THAN 5.0 PERCENT OF SAMPLES ARE POSITIVE FOR TOTAL COLIFORM.(d)(e)
ESCHERICHIA COLIFORM (E. COLI)	THREE (c) + TRIGGERED MONITORING	24 HOURS	A TOTAL COLIFORM POSITIVE SAMPLE IS POSITIVE FOR E. COLI AND A REPEAT TOTAL COLIFORM SAMPLE IS POSITIVE OR, A TOTAL COLIFORM POSITIVE SAMPLE IS NEGATIVE FOR E. COLI, BUT A REPEAT TOTAL COLIFORM SAMPLE IS POSITIVE FOR E. COLI. (e)
TOTAL TRIHALOMETHANES, FIVE HALOACETIC ACIDS, & CHLORINE	NA	NA	IF A LOCATIONAL RUNNING ANNUAL AVERAGE EXCEEDS THE MCL.
RADIONUCLIDES (Gross Alpha, Radium 226, Radium 228, Uranium Gross Beta, & Photon Radioactivity)	NA	NA	IF A RUNNING ANNUAL AVERAGE OF FOUR QUARTERLY SAMPLES EXCEEDS THE MCL.
ASBESTOS	ONE	2 WEEKS	THE AVERAGE OF THE TWO RESULTS EXCEEDS THE MCL.
LEAD AND COPPER	RECOMMEND RESAMPLE TIMED SERIES	NA	ACTION LEVEL EXCEEDANCE EXISTS WHEN THE 90TH PERCENTILE CALCULATION OF SAMPLES COLLECTED DURING THE MONITORING PERIOD EXCEEDS 15 ug/L FOR LEAD OR 1300 ug/L FOR COPPER.(f)

WATER QUALITY MONITORING REQUIREMENTS FOR 2021
TABLE 5-1 MAXIMUM CONTAMINANT LEVEL (MCL) VIOLATION AND
ACTION LEVEL (AL) EXCEEDANCE DETERMINATION FOOTNOTES:

Calculated results (e.g. averages) are rounded to the same number of significant figures as the MCL for the contaminant in question.

- a) For wells without Iron/Manganese removal; for such removal plants that exceed MCL after removal but do not use further approved sequestering treatment; for wells using polyphosphate sequestering treatment the combined concentration of Iron & Manganese shall not exceed 1.0 mg/L; and for wells using sodium silicate sequestering treatment the combined concentration of Iron & Manganese shall not exceed 1.5 mg/L
- b) Systems unable to collect an additional sample within 24 hours must issue a Tier 1 notification and must collect the additional sample within two weeks of receiving the initial sample results.
- c) Bacteriological repeat samples must be collected on the same day. Bacteriological repeat samples must be taken from: the same sampling site as the original coliform positive sample, one repeat sample within five service connections upstream of the original and one repeat sample within five service connections downstream of the original. If one or more repeat samples is total coliform positive, another set of repeat samples must be collected for each positive sample. This process must be repeated until total coliform are not detected in one complete set or it is determined that the MCL has been exceeded. Triggered Source Water Monitoring grab samples must be collected from each well that was in service within 24 hours of the positive bacteriological sample.
- d) No longer considered an MCL Violation. A Level 1 Assessment must be performed and submitted to the Department within 30 days.
- e) A Level 2 Assessment must be performed and submitted to the Department within 30 days of a confirmed E. coli positive sample. A Level 2 Assessment must also be performed and submitted to the Department with 30 days if more than one Revised Total Coliform Rule Assessment has been required within a twelve month period.
- f) The 90th percentile sample number is determined by multiplying the total number of samples by 0.9. In the event that the 90th percentile sample is not a whole number (ie:10.8), the **rounding** method is to be used in calculating the 90th percentile sample value.

**** Water systems will not be in violation if they have applied and received a Deferral from the State.**



Program Requirements and Bid Packet for Contracts Funded with New York State Financial Assistance Only

Recipient to Identify Contract Type:

☐ **Construction**

☐ **Non-Construction**

Effective October 1, 2020

New York State Environmental Facilities Corporation
625 Broadway, Albany, NY 12207-2997
P: (518) 402-6924 F: (518) 402-7456
www.efc.ny.gov

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PART 1: HOW TO USE THIS DOCUMENT

The New York State Environmental Facilities Corporation (“EFC”) implements various State financial assistance programs, including but not limited to the Engineering Planning Grant program, Water Infrastructure Improvement Act (“WIIA”) Grant program as well as the Intermunicipal Grant (“IMG”) program.

This document contains (1) a brief description of State program requirements for Contracts and Subcontracts funded by State financial assistance, (2) required language for such Contracts and Subcontracts to satisfy State financial assistance program requirements, including required forms, and (3) guidance materials to assist entities in complying with these requirements.

PROGRAM REQUIREMENTS

The following requirements apply to projects funded with State financial assistance only:

- Participation of Minority- and Women-Owned Business Enterprises (“MWBE”) and Equal Employment Opportunities (“EEO”) pursuant to New York State Executive Law, Article 15-A and New York Code of Rules and Regulations, Title 5 (5 NYCRR) Parts 140-145 (Regulations of the Commissioner of Economic Development);
- Participation of Service-Disabled Veteran-Owned Business Enterprises (“SDVOB”) pursuant to New York State Executive Law, Article 17-B and 9 NYCRR Part 252;
- Applicable State and/or local prevailing wage requirements; and,
- Requirements regarding suspension and debarment pursuant to State Labor Law § 220-b and State Executive Law § 316.

EFC or its authorized representatives, and other governmental entities as applicable, reserve the right to conduct occasional site inspections to monitor compliance with State financial assistance program requirements.

This document is not intended to be inclusive of all applicable legal requirements and there may be other legal requirements that need to be included in a particular Contract or Subcontract that are not set forth here. Accordingly, EFC recommends that Recipients, Contractors, Subcontractors, and any other involved entities consult their legal counsel for advice on compliance with all applicable laws, including but not limited to local laws. This document is not intended to be legal advice.

Refer to the EFC website at www.efc.ny.gov for the latest version of the bid packet to ensure that the most recent forms and contract language are being used.

REQUIRED CONTRACT LANGUAGE

Part 2 of this document is the Required Contract Language. All of the language in Part 2 must be inserted in to all Contracts and Subcontracts funded in whole or in part with State financial assistance, in order for State financial assistance Recipients, Contractors, and Subcontractors to comply with the above-listed State financial assistance program requirements.

GUIDANCE MATERIALS

Part 3 of this document sets forth Guidance Materials intended to assist State financial assistance Recipients, Contractors, and Subcontractors in complying with the foregoing State financial assistance program requirements, as applicable.

The Guidance Materials are for informational purposes only and are not intended to be used as contractual language. Please do not incorporate the Guidance Materials into any Contracts or Subcontracts.

COMMONLY USED TERMS

The following commonly used terms are defined herein as follows:

“Contract” means an agreement between a Recipient and a Contractor.

“Contractor” means all bidders, prime contractors, Service Providers, and consultants as hereinafter defined, unless specifically referred to otherwise.

“Service Provider” means any individual or business enterprise that provides one or more of the following: legal, engineering, financial advisory, technical, or other professional services, supplies, commodities, equipment, materials, or travel.

“Subcontract” means an agreement between a Contractor and a Subcontractor.

“Subcontractor” means any individual or business enterprise that has an agreement, purchase order, or any other contractual arrangement with a Contractor.

“Recipient” means the party, other than EFC, to a financial assistance agreement or a project finance agreement with EFC through which funds for the payment of amounts due thereunder are being paid in whole or in part.

“State” means the State of New York.

PART 2: REQUIRED CONTRACT LANGUAGE

Recipient to Identify Contract Type:

☐ Construction

☐ Non-Construction

SECTION 1 REQUIREMENTS AND PROCEDURES FOR BUSINESS PARTICIPATION OPPORTUNITIES FOR NEW YORK STATE CERTIFIED MINORITY- AND WOMEN-OWNED BUSINESS ENTERPRISES AND EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITY GROUP MEMBERS AND WOMEN

For purposes of this section:

“Non-Construction” shall mean Contracts for labor, services (including, but not limited to, legal, financial, and other professional services), supplies, equipment, materials, or any combination of the foregoing.

The Minority- and Women- Owned Business Enterprises (“MWBE”) and Equal Employment Opportunities requirements of this section apply to the Contracts or Subcontracts meeting the thresholds under New York State Executive Law Article 15-A as follows:

- (a) Non-Construction Contracts greater than \$25,000;
- (b) Non-Construction Contracts, that are initially under \$25,000 but subsequent change orders or contract amendments increase the Contract value to above \$25,000;
- (c) Construction Contracts greater than \$100,000; and,
- (d) Construction Contracts that are initially under \$100,000 but subsequent change orders or contract amendments increase the Contract value to above \$100,000.

I. General Provisions

- A. Contractors and Subcontractors are required to comply with New York State Executive Law Article 15-A and 5 NYCRR Parts 140-145 (“MWBE Regulations”) for all State contracts as defined therein, with a value (1) in excess of \$25,000 for labor, services (including, but not limited to, legal, financial, and other professional services), supplies, equipment, materials, or any combination of the foregoing, or (2) in excess of \$100,000 for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon.
- B. Failure to comply with all of the requirements herein may result in a finding by the Recipient that the Contractor is non-responsive, non-responsible, and/or has breached the Contract, leading to the withholding of funds or such other actions, liquidated damages pursuant to subsection III(F) of this section, or enforcement proceedings as allowed by the Contract.
- C. If any terms or provisions herein conflict with Executive Law Article 15-A or the MWBE Regulations, such law and regulations shall supersede these requirements.

- D. Upon request from the Recipient's Minority Business Officer ("MBO") and/or EFC, Contractor will provide complete responses to inquiries and all MWBE and EEO records available within a reasonable time. For purposes of this section, MBO means the duly authorized representative of the State financial assistance Recipient for MWBE and EEO purposes.

II. Equal Employment Opportunities (EEO)

- A. Each Contractor and Subcontractor performing work on the Contract shall undertake or continue existing EEO programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status. For these purposes, EEO shall apply in the areas of recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.
- B. Contractor represents that it has submitted an EEO policy statement to Recipient prior to the execution of this Contract.
- C. Contractor represents that it's EEO policy statement includes the following language:
1. The contractor will not discriminate on the basis of race, creed, color, national origin, sex, age, disability, or marital status against any employee or applicant for employment, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination and will make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on Contracts relating to State financial assistance projects.
 2. The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the Contract relating to this State financial assistance project, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.
 3. The Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status, and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.
- D. The Contractor will include the provisions of Subdivisions II(A), II(C), and II(E) in every Subcontract in such a manner that the requirements of these subdivisions will be binding upon each Subcontractor as to work in connection with the Contract.
- E. The Contractor shall comply with the provisions of the Human Rights Law (Executive Law Article 15), and all other State and Federal statutory and constitutional non-discrimination provisions. The Contractor and Subcontractors shall not discriminate against any employee or applicant for employment because of race, creed (religion), color, sex, national origin, sexual orientation, military status, age, disability, predisposing genetic characteristic, marital status or domestic violence victim status, and shall also follow the requirements of the Human Rights Law with regard to non-discrimination on the basis of prior criminal conviction and prior arrest.
- F. Required EEO Forms
1. EEO Staffing Plan
Non-Construction Contracts and Subcontracts only
To ensure compliance with this section, the Contractor represents that it has submitted prior to execution of this Contract an EEO Staffing Plan to the Recipient's MBO to document the composition of the proposed workforce to be utilized in the performance of the Contract by the specified categories listed, including ethnic background, gender, and federal occupational categories.

2. EEO Workforce Employment Utilization Report ("Workforce Report")

- a. The Contractor shall submit a Workforce Report, and shall require each of its Subcontractors to submit a Workforce Report to the Recipient, in such format as shall be required by EFC during the term of the Contract. For construction Contracts, Workforce Reports must be submitted on a monthly basis; for non-construction Contracts, Workforce Reports must be submitted on a quarterly basis.
- b. Separate forms shall be completed by Contractor and any Subcontractor.
- c. In limited instances, the Contractor may not be able to separate out the workforce utilized in the performance of the Contract from the Contractor's and/or Subcontractor's total workforce. When a separation can be made, the Contractor shall submit the Workforce Report and indicate that the information provided related to the actual workforce utilized on the Contract. When the workforce to be utilized on the Contract cannot be separated out from the Contractor's and/or Subcontractor's total workforce, the Contractor shall submit the Workforce Report and indicate that the information provided is the Contractor's total workforce during the subject time frame, not limited to work specifically under the Contract.

III. Business Participation Opportunities for MWBEs

A. Contract Goals

1. For purposes of this Contract, EFC establishes the following goals for New York State certified MWBE participation ("MWBE Combined Goals") based on the current availability of qualified MBEs and WBEs.

Program	MWBE Combined Goal*
NYS financial assistance only	30%
Engineering Planning Grant	30%

*May be any combination of MBE and/or WBE participation

2. For purposes of providing meaningful participation by MWBEs on the Contract and achieving the MWBE Contract Goals established in Section III-A hereof, the Contractor should reference the directory of New York State Certified MWBEs found at the following internet address: <https://ny.newnycontracts.com>.
3. The Contractor understands that only sums paid to MWBEs for the performance of a commercially useful function, as that term is defined in 5 NYCRR § 140.1, may be applied towards achievement of applicable MWBE participation goals.
 - a. For construction and construction-related services Contracts or Subcontracts, the portion of the Contract or Subcontract with an MWBE serving as a supplier, and so designated in ESD's Directory, that shall be deemed to represent the commercially useful function performed by the MWBE shall be 60% of the total value of the Contract or Subcontract. The portion of a Contract or Subcontract with an MWBE serving as a broker, as denoted by NAICS code 425120, that shall be deemed to represent the commercially useful function performed by the MWBE shall be the monetary value for fees, or the markup percentage, charged by the MWBE.
 - b. For non-construction Contracts or Subcontracts, the portion of a Contract or Subcontract with an MWBE serving as a broker that shall be deemed to represent the commercially useful function performed by the MWBE shall be 25% of the total value of the contract
4. Where MWBE Contract Goals have been established herein, pursuant to 5 NYCRR § 142.8, the Contractor must document "good faith efforts" to provide meaningful participation by MWBEs as Subcontractors or suppliers in the performance of the Contract.
5. In accordance with Section 316-a of Article 15-A and 5 NYCRR § 142.13, the Contractor acknowledges that if it is found to have willfully and intentionally failed to comply with the MWBE participation goals set forth in the Contract, such a finding constitutes a breach of

Contract and the Contractor shall be liable to the Recipient for liquidated or other appropriate damages, as set forth herein.

B. MWBE Utilization Plan

1. The Contractor represents and warrants that Contractor has submitted an MWBE Utilization Plan to the Recipient prior to the execution of this Contract.
2. The Contractor agrees to use such MWBE Utilization Plan for the performance of MWBEs on the Contract pursuant to the prescribed MWBE goals set forth in Section III-A of this section.
3. The Contractor further agrees that a failure to submit and/or use such MWBE Utilization Plan shall constitute a material breach of the terms of the Contract. Upon the occurrence of such a material breach, the Recipient shall be entitled to any remedy provided herein, including but not limited to, a finding that the Contractor is not responsive.
4. Contractor must report any changes to the Utilization Plan after Contract award and during the term of the Contract to the Recipient's MBO. Contractor shall indicate the changes to the MBO in the next Monthly MWBE-SDVOB Contractor Compliance Report after the changes occurred. At EFC's discretion, an updated MWBE Utilization Plan form and good faith effort documentation may be required to be submitted. When a Utilization Plan is revised due to execution of a change order, the change order should be submitted to the MBO with the Monthly MWBE-SDVOB Contractor Compliance Report or revised Utilization Plan.
5. The Contractor shall submit copies of all fully executed Subcontracts, agreements, and purchase orders that are referred to in the MWBE Utilization Plan to the MBO within 30 days of their execution.

C. Requests for Waiver

1. If the Contractor, after making good faith efforts, is unable to comply with MWBE goals, the Contractor may submit a Request for Waiver to the Recipient documenting good faith efforts by the Contractor to meet such goals. If the documentation included with the waiver request is complete, the Recipient shall forward the request to EFC for evaluation, and EFC will issue a written notice of acceptance or denial within twenty (20) days of receipt.
2. If the Recipient, upon review of the MWBE Utilization Plan and updated Quarterly MWBE Contractor Compliance Reports determines that the Contractor is failing or refusing to comply with the MWBE Contract Goals and no waiver has been issued in regards to such non-compliance, the Recipient may issue a notice of deficiency to the Contractor. The Contractor must respond to the notice of deficiency within seven (7) business days of receipt. Such response may include a request for partial or total waiver of MWBE Contract Goals.

D. Monthly MWBE Contractor Compliance Report ("Monthly MWBE-SDVOB Report")

The Contractor agrees to submit a report to the Recipient by the third business day following the end of each month over the term of this Contract documenting the payments made and the progress towards achievement of the MWBE goals of the Contract. The Monthly MWBE-SDVOB Report must be supplemented with proof of payment by the Contractor to its Subcontractors (e.g., copies of both sides of a cancelled check) and proof that Subcontractors have been paid within 30 days of receipt of payment from the Recipient. The final Monthly MWBE-SDVOB Report must reflect all Utilization Plan revisions and change orders.

E. Liquidated Damages - MWBE Participation

In accordance with Section 316-a of Article 15-A and 5 NYCRR §142.13, if it has been determined by the Recipient or EFC that the Contractor has willfully and intentionally failed to comply with the MWBE participation goals, the Contractor shall be obligated to pay to Recipient liquidated damages or other appropriate damages, as specified herein and as determined by the Recipient or EFC.

Liquidated damages shall be calculated as an amount not to exceed the difference between:

1. All sums identified for payment to MWBEs had the Contractor achieved the approved MWBE participation goals; and,
2. All sums actually paid to MWBEs for work performed or materials supplied under this Contract.

The Recipient and EFC reserve the right to impose a lesser amount of liquidated damages than the amount calculated above based on the circumstances surrounding the Contractor's non-compliance.

In the event a determination has been made by the Recipient or EFC which requires the payment of damages identified herein and such identified sums have not been withheld, Contractor shall pay such damages to the Recipient within sixty (60) days after they are assessed unless prior to the expiration of such sixtieth day, the Contractor has filed a complaint with the Empire State Development Corporation – Division of Minority and Women's Business Development ("ESD") pursuant to Subdivision 8 of Section 313 of the Executive Law in which event the damages shall be payable if the Director of ESD renders a decision in favor of the Recipient.

SECTION 2 PARTICIPATION OPPORTUNITIES FOR NEW YORK STATE CERTIFIED SERVICE-DISABLED VETERAN-OWNED BUSINESSES

For purposes of this section:

"Non-Construction" shall mean Contracts for labor, services (including, but not limited to, legal, financial, and other professional services), supplies, equipment, materials, or any combination of the foregoing.

The requirements of this section apply to Contracts or Subcontracts meeting the thresholds under New York State Executive Law, Article 17-B as follows:

- (a) Non-Construction Contracts greater than \$25,000;
- (b) Non-Construction Contracts, that are initially under \$25,000 but subsequent change orders or contract amendments increase the Contract value to above \$25,000;
- (c) Construction Contracts greater than \$100,000; and,
- (d) Construction Contracts that are initially under \$100,000 but subsequent change orders or contract amendments increase the Contract value to above \$100,000.

I. General Provisions

Contractors and Subcontractors are required to comply with New York State Executive Law Article 17-B and 9 NYCRR Part 252 for all State contracts as defined therein, with a value (1) in excess of \$25,000 for labor, services (including, but not limited to, legal, legal, financial, and other professional services), supplies, equipment, materials, or any combination of the foregoing, or (2) in excess of \$100,000 for the acquisition, construction, demolition, replacement, major repair or renovation or real property and improvements thereon.

II. Contract Goals

- A. EFC hereby establishes an overall goal of 6% for SDVOB participation, based on the current availability of qualified SDVOBs. For purposes of providing meaningful participation by SDVOBs, the Contractor should reference the directory of New York State Certified SDVOBs found at: <https://online.ogs.ny.gov/SDVOB/search>.
- B. Pursuant to 9 NYCRR § 252.2(n), Contractor must document "good faith efforts" to provide meaningful participation by SDVOBs as subcontractors or suppliers in the performance of the Contract.

III. SDVOB Utilization Plan

- A. In accordance with 9 NYCRR § 252.2(i), Contractor represents and warrants that it has submitted a completed SDVOB Utilization Plan to Recipient prior to the execution of this Contract.
- B. Contractor certifies that it will follow the submitted SDVOB Utilization Plan for the performance of SDVOBs on the Contract pursuant to the prescribed SDVOB contract goal set forth above.
- C. Contractor further agrees that a failure to use SDVOBs as agreed in the Utilization Plan shall constitute a material breach of the terms of the Contract. Upon the occurrence of such a material breach, the Recipient shall be entitled to any remedy provided herein, including but not limited to, a finding of Contractor non-responsibility.
- D. Contractor must report any changes to the Utilization Plan after Contract award and during the term of the Contract to the Recipient's MBO. Contractor shall indicate the changes to the MBO in the next Monthly MWBE-SDVOB Contractor Compliance Report after the changes occurred. At EFC's discretion, an updated SDVOB Utilization Plan form and good faith effort documentation may be required to be submitted. When a Utilization Plan is revised due to execution of a change order, the change order should be submitted to the MBO with the revised Utilization Plan.
- E. The Contractor shall submit copies of all fully executed subcontracts, agreements, and purchase orders that are referred to in the SDVOB Utilization Plan to the MBO within 30 days of their execution.

IV. Request for Waiver

- A. If Contractor, after making good faith efforts, is unable to comply with the SDVOB Contract goal, Contractor may submit a request for a partial or total waiver to the Recipient, documenting good faith efforts by Contractor to meet such goal. If the documentation included with the waiver request is complete, the Recipient shall forward the request to EFC for evaluation, and EFC will issue a written notice of acceptance or denial within twenty (20) days of receipt.
- B. Contractor shall attempt to utilize, in good faith, the SDVOBs identified within its SDVOB Utilization Plan, during the performance of the Contract. Requests for a partial or total waiver of established goal requirements made subsequent to Contract award may be made at any time during the term of the Contract to the Recipient, but must be made no later than prior to the submission of a request for final payment on the Contract.
If the Recipient, upon review of the SDVOB Utilization Plan and Monthly SDVOB Contractor Compliance Report determines that Contractor is failing or refusing to comply with the SDVOB Contract goal and no waiver has been issued in regards to such non-compliance, the Recipient may issue a notice of deficiency to Contractor. Contractor must respond to the notice of deficiency within seven business days of receipt. Such response may include a request for partial or total waiver of SDVOB Contract goals.

V. Monthly SDVOB Contractor Compliance Report ("Monthly MWBE-SDVOB Report")

In accordance with 9 NYCRR § 252.2(q), Contractor is required to report monthly SDVOB contractor compliance to the Recipient during the term of the Contract for the preceding month's activity, documenting progress made towards achieving the Contract SDVOB goals. The Contractor agrees to submit a report on to the Recipient by the third business day following the end of each month over the term of this Contract. The Monthly MWBE-SDVOB Report must be supplemented with proof of payment by the Contractor to its Subcontractors (e.g., copies of both sides of a cancelled check). The final Monthly MWBE-SDVOB Report must reflect all Utilization Plan revisions and change orders.

VI. Breach of Contract and Damages

In accordance with 9 NYCRR § 252.2(s), any Contractor found to have willfully and intentionally failed to comply with the SDVOB participation goals set forth in the Contract, shall be found to have breached the contract and Contractor shall pay damages as set forth therein.

SECTION 3 REQUIREMENTS REGARDING SUSPENSION AND DEBARMENT

The requirements of this section apply to all Contracts and Subcontracts.

The Contractor and any Subcontractors have not been deemed ineligible to submit a bid on or be awarded a public contract or subcontract pursuant to Article 8 of the State Labor Law, specifically Labor Law § 220-b. In addition, neither the Contractor nor any Subcontractors have contracted with, or will contract with, any party that has been deemed ineligible to submit a bid on or be awarded a public contract or subcontract under Labor Law § 220-b.

In addition, the Contractor and any Subcontractors have not been deemed ineligible to submit a bid and have not contracted with and will not contract with any party that has been deemed ineligible to submit a bid under Executive Law § 316.

PART 3: GUIDANCE MATERIALS

APPLICABILITY OF PROGRAM REQUIREMENTS

This table contains a breakdown of the applicable program requirements based on contract type and its value. For further details pertaining to each requirement, refer to the section identified in the heading. The relevant section number is the same in both Part 2 and Part 3 of this document.

Type of Contract	MWBE Section 1	SDVOB Section 2	EEO Section 1	Suspension & Debarment Section 3
Construction				
All				X
If greater than:				
\$100,000	X	X	X	X
Non-Construction				
All				X
If greater than:				
\$25,000	X	X	X	X

SECTION 1 GUIDANCE FOR THE REQUIREMENTS AND PROCEDURES FOR BUSINESS PARTICIPATION OPPORTUNITIES FOR NEW YORK STATE CERTIFIED MINORITY- AND WOMEN-OWNED BUSINESS ENTERPRISES AND EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITY GROUP MEMBERS AND WOMEN

I. Summary of EEO and MWBE Forms

A. Forms to be Submitted Prior to Contract Execution

1. EEO Policy Statement

To be submitted by the Contractor to the Recipient's Minority Business Officer ("MBO") prior to Contract execution. The "MBO" refers to the duly authorized representative of the State financial assistance Recipient for MWBE and EEO purposes. This form is attached hereto as Attachment 1. See Required Contract Language, Section 1(II).

2. EEO Staffing Plan

Non-Construction Contracts and Subcontracts only

To be submitted by the Contractor to the MBO prior to Contract execution. This form is attached hereto as Attachment 2. See required Contract Language, Section 1(II).

3. MWBE Utilization Plan

To be submitted by the Contractor to the MBO after the bid opening, but in no case more than ten (10) business days after the Contractor receives notice from the Recipient that the Contractor has submitted a low bid. For Contracts that are not bid, it is to be submitted prior to the Contract execution date. This form is attached hereto as Attachment 3. See Required Contract Language, Section 1(III)(B).

B. Forms to be Submitted During the Term of the Contract

1. EEO Workforce Employment Utilization Report ("Workforce Report")

To be submitted by the Contractor to the MBO on a monthly (construction Contracts) or quarterly (non-construction Contracts) basis during the term of the Contract. Instructions are attached hereto as Attachment 2. The actual Excel fillable form for Contractors and Subcontractors to complete will be e-mailed to MBOs by EFC at the start of the Contract term. See Required Contract Language, Section 1(II)(F).

2. Request for Partial or Total Waiver

If applicable, to be submitted by the Contractor to the MBO at any time during the term of the Contract, but not later than prior to the submission of a request for final payment on the Contract. This form is attached hereto as Attachment 4. See Required Contract Language, Section 1(III)(C).

3. Monthly MWBE-SDVOB Contractor Compliance Report ("Monthly MWBE-SDVOB Report")

To be submitted by the Contractor to the MBO by the third business day following the end of each month over the term of the Contract. This form is attached hereto as Attachment 5. See Required Contract Language, Section 1(III)(D).

II. Business Participation Opportunities for MWBEs

A. Contract Goals

The goals provided herein (Required Contract Language, Section 1(III)(A)) are effective as of October 1, 2020. MWBE participation goals for a contract will be based on the goals in place at the time of the execution date of each respective contract, unless otherwise specified.

Please contact EFC if you have any questions about the applicable MWBE participation goals for your contract.

B. Good Faith Efforts

The Contractor must make good faith efforts to develop an adequate MWBE Utilization Plan and must continue such good faith efforts to meet applicable MWBE participation goals. The Contractor shall maintain documentation of good faith efforts to solicit participation of MWBE firms for SRF-funded projects. If a Contractor is unable to meet contract MWBE participation goals, and submits a Request for Waiver, documentation of such good faith efforts must accompany the request. See Required Contract Language, Section 1(III)(C).

Contractor should also continue good faith efforts to seek opportunities for MWBE participation during the life of the contract even if proposed goals have been achieved.

When MWBE and SDVOB goals both apply to a contract, good faith efforts should be done simultaneously so that both types of certified firms have an equal opportunity to participate on the contract.

Examples of documentation of good faith efforts are set forth below:

- Information on the scope of work related to the contract, such as a copy of the schedule of values from the bid submission, and specific steps taken to reasonably structure the scope of work to break out tasks or equipment needs for the purpose of providing opportunities for subcontracting with, or obtaining supplies or services from, MBEs or WBEs.
- Printed screenshots of the directory of Certified Minority- and Women- Owned Business Enterprises ("MWBE directory") on ESD's website for certified MWBEs that provide the services or equipment necessary for the contract. Contact the MBO for assistance in performing a proper search including identifying a sufficient number of solicitations to show that good faith effort was made.
- Copies of timely solicitations and documentation (e.g., faxes and emails) that the Contractor offered relevant plans, specifications, or other related materials to MBE and WBE firms on ESD's MWBE directory to participate in the work, with the responses.
- A log prepared by the Contractor in a sortable spreadsheet documenting the Contractor's solicitation of MBEs and WBEs for participation as Subcontractors or suppliers pursuant to a contract. The log should consist of the list of MBE and WBE firms solicited, their contact information, the type of work they were solicited to perform (or equipment to provide), how the solicitation was made (fax, phone, email) and the contact information, the contacts name and the outcome. If a bid was received, the bid price should also be included in the log. See a sample log format below:

Date	M/WBE Type	Company	Scope of work	Contact Name	Phone/ Email	Solicitation Format	MWBE Response	Negotiation Required?	Selected? If not, Explain

If no response was received to an initial solicitation, at least one follow-up solicitation should be made in a different format than the first, e.g. fax followed by phone call. Any winning bids received from non-MWBE firms for the same areas MWBEs were solicited should also be tracked on the log.

- Copies of any advertisements of sufficient duration to effectively seek participation of certified MBE and WBEs timely published in appropriate general circulation, trade and MWBE oriented publications, together with listing and dates of publication of

such advertisements. EFC recommends the use of the NYS Contract Reporter that is free to all Contractors - <https://www.nyscr.ny.gov> .

- Documents demonstrating that insufficient MBEs or WBEs are reasonably available to perform the work.
- A written demonstration that the Contractor offered to make up any inability to meet the project MWBE participation goals in other Contracts and/or agreements performed by the Contractor on another SRF funded project.
- The date of pre-bid, pre-award, or other meetings scheduled by the Recipient, if any, and the contact information of any MBEs and WBEs who attended and are capable of performing work on the project.
- Any other information or documentation that demonstrates the Contractor conducted good faith efforts to provide opportunities for MWBE participation in their work. For instance, Prime Contractors and MBOs should develop a list of MWBE firms that have expressed interest in working on SRF-funded projects.

EFC reserves the right to request additional information and/or documentation to support the adequacy of the MWBE Utilization Plan and/or waiver request.

C. Review of the MWBE Utilization Plan

The MBO will evaluate a completed MWBE Utilization Plan. If the MBO finds the Utilization Plan sufficient, it will be forwarded to EFC for review. If the MBO finds the Utilization Plan insufficient, the MBO will work with the Contractor to address deficiencies before submitting to EFC for review. A written notice of acceptance or deficiency will be issued by EFC within 20 business days of receipt of the Utilization Plan. Upon receipt of a notice of deficiency from either the MBO or EFC, the Contractor shall respond with a written remedy to such notice within seven (7) business days of receipt.

D. Eligibility for MWBE Participation Credit

1. To receive MWBE participation credit, Contractors or Subcontractors performing work that have been identified in an approved MWBE Utilization Plan must be certified as an MBE or WBE by ESD.
 - a. A Contractor, who is a certified MBE or WBE, will be credited for up to 100% of the category of their certification. However, good faith efforts to seek participation in the other category are also required.
2. Prime Contractors may also include second or lower tier Subcontractors (Subcontractors hired by Subcontractors) on their MWBE Utilization Plan.
3. Credit for MWBE participation shall be granted only for MWBE firms performing a commercially useful business function according to custom and practice in the industry. An MWBE does not perform a commercially useful function if its role adds no substantive value and is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of participation.
 - a. "Commercially useful functions" normally include:
 - i. Providing technical assistance to a purchaser prior to a purchase, during installation, and after the supplies or equipment are placed in service;
 - ii. Manufacturing or being the first tier below the manufacturer of supplies or equipment;
 - iii. Providing functions other than merely accepting and referring requests for supplies or equipment to another party for direct shipment to a Contractor; or,
 - iv. Being responsible for ordering, negotiating price, and determining quality and quantity of materials and supplies.

- b. For construction Contracts or Subcontracts, the following rules apply when calculating MWBE utilization:
 - i. The portion of a Contract or Subcontract with an MWBE serving as a manufacturer that shall be deemed to represent the commercially useful function performed by the MWBE shall be 100% of the total value of the Contract or Subcontract.
 - ii. the portion of a Contract or Subcontract with an MWBE serving as a supplier (as denoted by a NAICS code beginning with 423 or 424, or a NIGP code that does not begin with the number 9), and so designated in ESD's Directory, that shall be deemed to represent the commercially useful function performed by the MWBE shall be 60% of the total value of the Contract or Subcontract.
 - iii. the portion of a Contract or Subcontract with an MWBE serving as a broker (as denoted by NAICS code 425120) that shall be deemed to represent the commercially useful function performed by the MWBE shall be the monetary value for fees, or the markup percentage, charged by the MWBE.
- c. For non-construction Contracts or Subcontracts, the following rules apply when calculating MWBE utilization:
 - i. the portion of a Contract or Subcontract with an MWBE serving as a broker that shall be deemed to represent the commercially useful function performed by the MWBE shall be 25% of the total value of the contract. Any firms that are listed as brokers or manufacturers' representatives (NAICS code 425120) and not specifically as suppliers fall in this category.
- d. No credit will be granted for MWBEs that do not perform a commercially useful function.

E. Requests for Waiver

1. If the Contractor's application of good faith efforts does not result in the utilization of MWBE firms to achieve the aforementioned goals or a specialty equipment/service waiver is requested, the Contractor may request a full or partial waiver of MWBE participation goals by completing a Request for Waiver form, attaching appropriate documentation of good faith efforts, and submitting same to the MBO. See also Required Contract Language, Section 1(III)(C). Even if an MWBE waiver is granted, EEO information must still be submitted.
2. The MBO and EFC will review each waiver request based on the good faith effort criteria presented above and the documentation submitted with the waiver request. EFC will not issue any automatic waivers from MWBE responsibilities.
3. Specialty Equipment/Service Exclusion: A specialty equipment/service exclusion may be granted in cases where:
 - a. equipment is made by only one non-MWBE manufacturer,
 - b. the technical specifications call for equipment that is not available through an MWBE supplier;
 - c. the equipment is constructed on site by specially trained non-MWBE labor;
 - d. the service is not available through an MWBE (such as work done by National Grid);
 - e. the service is proprietary in nature (such as use of certain computer software necessary for control systems); or,
 - f. the service cannot be subcontracted (such as litigation services).

If the contract includes specialty equipment or services, and documentation is submitted demonstrating that there are no MWBE firms capable of completing this portion of the contract, the specialty amount of the contract may be deducted from the total contract amount to determine the MWBE Eligible Amount and the goals will be applied to the MWBE Eligible Amount. This determination is made at the discretion of the MBO and EFC.

Example:

$$\begin{array}{rcl} \$200,000 & - & \$50,000 \\ \text{(Contract)} & \text{(Specialty equipment/service)} & \\ \hline & & = \$150,000 \\ & & \text{(MWBE Eligible Amount)} \end{array}$$
 The MWBE goal is applied to the MWBE Eligible Amount.

A request for this specialty equipment/service deduction can be completed by filling out a Request for Waiver form and submitting it to the MBO. The request must include a copy of the page from the contract where the equipment/ service is described, an ESD search result for the manufacturer or manufacturer's representative, and documentation of the cost of each item. For construction Contracts, the schedule of values or bid tabulation sheet should also be submitted. Additional documentation may be requested by the MBO or EFC.

III. Subcontractor's Responsibilities

Subcontractors should:

1. Maintain their MWBE certifications and notify the Contractor and MBO of any change in their certification status.
2. Notify the Contractor of any MWBE Subcontractors they hire so they may be included on the Contractor's Utilization Plan.
3. Respond promptly to solicitation requests by completing and submitting bid information in a timely manner.
4. Maintain business records that should include, but not be limited to, Contracts/agreements, records of receipts, correspondence, purchase orders, and canceled checks.
5. Ensure that a required EEO Policy Statement and applicable MWBE requirements are included in each subcontract.
6. Notify the MBO and EFC when contract problems arise, such as non-payment for services or when the Subcontractor is not employed as described in the MWBE Utilization Plan.

IV. Protests/Complaints

Contractors or Subcontractors who have any concerns, issues, or complaints regarding the implementation of the SRF MWBE & EEO Program or wish to protest should do so in writing to the MBO and EFC. The MBO, in consultation with EFC, will review the circumstances described in the submission, investigate to develop additional information, if warranted, and determine whether action is required. If the Contractor or Subcontractor believes the issue has not been resolved to their satisfaction, they may appeal in writing to EFC for consideration.

V. Waste, Fraud and Abuse

Subcontractors, Contractors, or Recipients who know of or suspect any instances of waste, fraud, or abuse within the MWBE & EEO Program should notify the project MBO and EFC immediately. Additionally, suspected fraud activity should be reported to the USEPA – Office of Inspector General Hotline at (888) 546-8740, the New York State Office of Inspector General at (800) 367-4448, or the ESD Compliance Office at (212) 803-3266.

SECTION 2 **GUIDANCE FOR NEW YORK STATE CERTIFIED SERVICE-DISABLED VETERAN-OWNED BUSINESS ENTERPRISES (“SDVOB”) PARTICIPATION OPPORTUNITIES**

I. Summary of SDVOB Forms

A. Forms to be Submitted Prior to Contract Execution

1. SDVOB Utilization Plan

To be submitted by the Contractor to the MBO after the bid opening, but in no case more than ten (10) business days after the Contractor receives notice from the Recipient that the Contractor has submitted a low bid. For Contracts that are not bid, it is to be submitted prior to the Contract execution date. This form is attached hereto as Attachment 6. See Required Contract Language, Section 2(III).

B. Forms to be Submitted During the Term of the Contract

1. Request for Partial or Total Waiver

If applicable, to be submitted by the Contractor to the MBO at any time during the term of the Contract, but prior to the submission of a request for final payment on the Contract. This form is attached hereto as Attachment 7. See Required Contract Language, Section 2(IV).

2. Monthly SDVOB Contractor Compliance Report (“Monthly MWBE-SDVOB Report”)

To be submitted by the Contractor to the MBO by the third business day following the end of each month over the term of the Contract. This form is attached hereto as Attachment 5. See Required Contract Language, Section 2(V).

II. SDVOB Participation Opportunities

A. Contract Goals

The goals provided herein (Required Contract Language, Section 2(II)(A)) are effective as of October 1, 2020. The SDVOB participation goal for a contract will be based on the goal in place at the time of the execution date of each respective contract, unless otherwise specified. Following Contract execution, Contractor is encouraged to contact the Office of General Services’ Division of Service-Disabled Veterans’ Business Development at 518-474-2015 or <https://online.ogs.ny.gov/SDVOB/search> to discuss additional methods of maximizing participation by SDVOBs on the Contract.

B. Good Faith Efforts

The Contractor must make good faith efforts to develop an adequate SDVOB Utilization Plan and must continue such good faith efforts in order to meet applicable SDVOB participation goal. The Contractor shall maintain documentation of good faith efforts to solicit participation of SDVOB firms for State financial assistance projects. If a Contractor is unable to meet the contract SDVOB participation goal, and submits a Request for Waiver, documentation of such good faith efforts must accompany the request. See Required Contract Language, Section 2(II)(B).

When MWBE and SDVOB goals both apply to a contract, good faith efforts should be done simultaneously so that both types of certified firms have an equal opportunity to participate on the contract.

Contractor should also continue good faith efforts to seek opportunities for SDVOB participation during the life of the contract even if proposed goals have been achieved.

Examples of documentation of good faith efforts are set forth below:

- Information on the scope of work related to the contract, such as a copy of the schedule of values from the bid submission, and specific steps taken to reasonably structure the scope of work to break out tasks or equipment needs for the purpose of providing opportunities for subcontracting with, or obtaining supplies or services from SDVOBs.
- A list of vendors from the directory of Certified SDVOBs on OGS's website that provide the services or equipment necessary for the contract. Contact the MBO for assistance in performing a proper search including identifying a sufficient number of solicitations to show that good faith effort was made.
- Copies of timely solicitations and documentation (e.g., faxes and emails) that the Contractor offered relevant plans, specifications, or other related materials to SDVOB firms in OGS's Certified SDVOB directory to participate in the work, with the responses.
- A log prepared by the Contractor in a sortable spreadsheet documenting the Contractor's solicitation of SDVOBs for participation as Subcontractors or suppliers pursuant to a contract. The log should consist of the list of SDVOB firms solicited, their contact information, the type of work they were solicited to perform (or equipment to provide), how the solicitation was made (fax, phone, email) and the contact information, the contacts name and the outcome. If a bid was received, the bid price should also be included in the log. See a sample log format below:

Date	Company	Scope of work	Contact Name	Phone/ Email	Solicitation Format	SDVOB Response	Negotiation Required?	Selected? If not, Explain

If no response was received to an initial solicitation, at least one follow-up solicitation should be made in a different format than the first, e.g. fax followed by phone call. Any bids received from non-SDVOB firms for the same areas SDVOBs were solicited should also be tracked on the log.

- Copies of any advertisements of sufficient duration to effectively seek participation of certified SDVOBs timely published in appropriate general circulation, trade publications, together with listing and dates of publication of such advertisements. EFC recommends the use of the NYS Contract Reporter that is free to all Contractors - <https://www.nyscr.ny.gov/>. A log should be kept of the responses to the ads, similar to the log for SDVOB firm solicitation and should include the non-SDVOB firms that responded and the bid prices. Any negotiations should be documented in the log.
- Documents demonstrating that insufficient SDVOBs are reasonably available to perform the work.
- A written demonstration that the Contractor offered to make up any inability to meet the project SDVOB participation goal in other contracts and/or agreements performed by the Contractor on another State financial assistance project.
- The date of pre-bid, pre-award, or other meetings scheduled by the Recipient, if any, and the contact information of any SDVOBs who attended and are capable of performing work on the project.
- Any other information or documentation that demonstrates the Contractor conducted good faith efforts to provide opportunities for SDVOB participation in their work. For instance, Prime Contractors and MBOs should develop a list of SDVOB firms that have expressed interest in working on State financial assistance projects.

- EFC reserves the right to request additional information and/or documentation to support the adequacy of the SDVOB Utilization Plan.

C. Review of the SDVOB Utilization Plan

1. The MBO will evaluate a completed SDVOB Utilization Plan. If the MBO finds the Utilization Plan sufficient, it will be forwarded to EFC for review. If the MBO finds the Utilization Plan insufficient, the MBO will work with the Contractor to address deficiencies before submitting to EFC for review. A written notice of acceptance or deficiency will be issued by EFC within 20 business days of receipt of the Utilization Plan. Upon receipt of a notice of deficiency from either the MBO or EFC, the Contractor shall respond with a written remedy to such notice within seven (7) business days of receipt.

D. Eligibility for SDVOB Participation Credit

1. To receive SDVOB participation credit, Contractors or Subcontractors performing work that have been identified in an approved SDVOB Utilization Plan must be certified as an SDVOB by the Office of General Services' Division of Service-Disabled Veterans' Business Development.
2. Prime Contractors may also include second or lower tier Subcontractors (Subcontractors hired by Subcontractors) on their SDVOB Utilization Plan.
3. Credit for SDVOB participation shall be granted only for SDVOB firms performing a commercially useful business function according to custom and practice in the industry. An SDVOB does not perform a commercially useful function if its role adds no substantive value and is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of participation.
 - a. "Commercially useful functions" normally include:
 - v. Providing technical assistance to a purchaser prior to a purchase, during installation, and after the supplies or equipment are placed in service;
 - vi. Manufacturing or being the first tier below the manufacturer of supplies or equipment;
 - vii. Providing functions other than merely accepting and referring requests for supplies or equipment to another party for direct shipment to a Contractor; or,
 - viii. Being responsible for ordering, negotiating price, and determining quality and quantity of materials and supplies.
4. A Contractor or subcontractor who is certified as both an SDVOB and MWBE may receive participation credit under both programs for its work on a contract or subcontract.

E. Requests for Waiver

1. If the Contractor's application of good faith efforts does not result in the utilization of SDVOB firms to achieve the aforementioned goals or a specialty equipment/service waiver is requested, the Contractor may request a full or partial waiver of SDVOB participation goals by completing a Request for Waiver form, attaching appropriate documentation of good faith efforts, and submitting same to the MBO. See also Required Contract Language, Section 2(IV).
2. The MBO and EFC will review each waiver request based on the good faith effort criteria presented above and the documentation submitted with the waiver request. EFC will not issue any automatic waivers from SDVOB responsibilities.
3. In cases where EFC accepts a full or partial waiver of SDVOB participation goals, the waiver request will be posted to EFC's website.

4. Specialty Equipment/Service Exclusion: A specialty equipment/service exclusion may be granted in cases where:
 - a. equipment is made by only one non- SDVOB manufacturer,
 - b. the technical specifications call for equipment that is not available through an SDVOB supplier;
 - c. the equipment is constructed on site by specially trained non-SDVOB labor;
 - d. the service is not available through an SDVOB (such as work done by National Grid);
 - e. the service is proprietary in nature (such as use of certain computer software necessary for control systems); or,
 - f. the service cannot be subcontracted (such as litigation services).

If the contract includes specialty equipment or services, and documentation is submitted demonstrating that there are no SDVOB firms capable of completing this portion of the contract, the specialty amount of the contract may be deducted from the total contract amount to determine the SDVOB Eligible Amount and the goals will be applied to the SDVOB Eligible Amount. This determination is made at the discretion of the MBO and EFC.

Example:
$$\begin{array}{rcl} \$200,000 & - & \$50,000 \\ \text{(Contract)} & \text{(Specialty equipment/service)} & \\ \hline & & = \$150,000 \\ & & \text{(SDVOB Eligible Amount)} \end{array}$$

The SDVOB goal is applied to the SDVOB Eligible Amount.

A request for this specialty equipment/service deduction can be completed by filling out a Request for Waiver form and submitting it to the MBO. The request must include a copy of the page from the contract where the equipment/ service is described and the cost of each item. For construction contracts, the schedule of values or bid tabulation sheet should also be submitted. Additional documentation may be requested by the MBO or EFC.

III. Subcontractor's Responsibilities

Subcontractors should:

1. Maintain their SDVOB certification and notify the Contractor and MBO of any change in their certification status.
2. Notify the Contractor of any SDVOB Subcontractors they hire so they may be included on the Contractor's Utilization Plan.
3. Respond promptly to solicitation requests by completing and submitting bid information in a timely manner.
4. Maintain business records that should include, but not be limited to, contracts/agreements, records of receipts, correspondence, purchase orders, and canceled checks.
5. Notify the MBO and EFC when contract problems arise, such as non-payment for services or when the Subcontractor is not employed as described in the SDVOB Utilization Plan.

IV. Protests/Complaints

Contractors or Subcontractors who have any concerns, issues, or complaints regarding the implementation of any EFC State financial assistance SDVOB Program, or wish to protest should do so in writing to the MBO and EFC. The MBO, in consultation with EFC, will review the circumstances described in the submission, investigate to develop additional information, if warranted, and determine whether action is required. If the Contractor or Subcontractor believes the issue has not been resolved to their satisfaction, they may appeal in writing to EFC for consideration.

V. Waste, Fraud and Abuse

Subcontractors, Contractors, or Recipients who know of or suspect any instances of waste, fraud, or abuse within the SDVOB Program should notify the project MBO and EFC immediately. Additionally, suspected fraud activity should be reported to the New York State Office of Inspector General at (800) 367-4448.

SECTION 3 GUIDANCE FOR REQUIREMENTS REGARDING SUSPENSION AND DEBARMENT

A list of contractors and subcontractors deemed ineligible to submit a bid on or be awarded a public contract or subcontract, pursuant to Article 8 of the State Labor Law, is available on the New York State Department of Labor's website at <http://labor.ny.gov/workerprotection/publicwork/PDFs/debarred.pdf>

A list of contractors deemed ineligible to submit a bid is maintained by Empire State Development's Division of Minority and Women's Business Development.

SECTION 4 GUIDANCE FOR APPLICABLE LABOR STANDARDS

Contractors and Subcontractors working under a public works contract are subject to labor standards under State Labor Law, including but not limited to prevailing wage requirements, and may be subject to additional labor requirements under applicable local laws. When preparing the bid for an SRF project, the Contractor, and any Subcontractors, must use the higher of the applicable prevailing State or local wage rates paid to each trade.

SECTION 5 SUMMARY OF CONTRACTOR REQUIREMENTS FOR STATE FINANCIAL ASSISTANCE PROJECTS

Forms can be found as attachments to this document or online at www.efc.ny.gov

Forms should be submitted electronically via email or through EFC's [dropbox](#)

To be submitted with the bid:

- ☐ EEO Policy Statement

**Refer to Part 3
Guidance Section
Section 1**

To be submitted prior to or upon Contract award or execution:

- ☐ Executed Subcontracts, agreements, and purchase orders
- ☐ EEO Policy Statement (when the contract is not bid)
- ☐ MWBE Utilization Plan and/or Waiver Request
- ☐ SDVOB Utilization Plan and/or Waiver Request
- ☐ EEO Staffing Plan

Section 1
Section 1
Section 2
Section 1

Tasks for construction start:

- ☐ Ensure that all Subcontracts contain Part 2: Required Contract Language
- ☐ Pay the higher of applicable prevailing state or local wages including benefits

Section 3

Ongoing documentation & tasks:

- ☐ EEO Workforce Utilization Report to EFC
- ☐ Submit Monthly MWBE-SDVOB Reports to MBO
- ☐ Maintain proof of payments for MWBE Subcontractors
- ☐ Maintain proof of payments for SDVOB Subcontractors

Section 1
Section 1/2
Section 1
Section 2

Attachments (Required Forms)

Attachment 1 – EEO Policy Statement



New York State Environmental Facilities Corporation EQUAL EMPLOYMENT OPPORTUNITY POLICY STATEMENT NEW YORK STATE FINANCIAL ASSISTANCE PROGRAMS

I, _____, am the authorized representative of _____.

Name of Representative

Name of Contractor/Service Provider

I hereby certify that _____ will abide by the equal employment

Name of Contractor/Service Provider

opportunity (EEO) policy statement provisions outlined below.

- (i) The Contractor will not discriminate on the basis of race, creed, color, national origin, sex, age, disability, or marital status against any employee or applicant for employment, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination and will make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on Contracts relating to Water Grant projects.
- (ii) The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the Contract relating to this Water Grant project, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.
- (iii) The Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status, and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.
- (iv) The Contractor shall comply with the provisions of the Human Rights Law (Article 15 of the Executive Law), including those relating to non-discrimination on the basis of prior criminal conviction and prior arrest, and with all other State and federal statutory and constitutional non-discrimination provisions. The Contractor and Subcontractors shall not discriminate against any employee or applicant for employment because of race, creed (religion), color, sex, national origin, sexual orientation, military status, age, disability, predisposing genetic characteristic, marital status or domestic violence victim status.
- (v) The Contractor will include the provisions of subdivisions (i) through (iv) in every Subcontract in such a manner that the requirements of these subdivisions will be binding upon each Subcontractor as to work in connection with the Contract.

X

Contractor/Service Provider Representative

Attachment 2 – EEO Staffing Plan

**New York State Environmental Facilities Corporation
Equal Employment Opportunity (EEO) Staffing Plan**

Municipality:	County:	SRF Project No.:	Contract ID:
Service Provider Name:		Date:	

Report Includes – Please select one from the options below:

- ☐ Workforce utilized on this contract
- ☐ Contractor/subcontractor's total workforce

Reporting Entity – Please select one from the options below:

- ☐ Prime Service Provider
- ☐ Subcontractor

Job Categories	Hispanic/ Latino		Not Hispanic or Latino											
			Male						Female					
	Male	Female	White	Black/ African American	Native Hawaiian/ Other Pacific Islander	Asian	Native American/ Alaska Native	Two or More Races	White	Black/ African American	Native Hawaiian/ Other Pacific Islander	Asian	Native American/ Alaska Native	Two or More Races
Senior Level Officials/Managers														
Mid-Level Officials/Managers														
Professionals														
Technicians														
Sales Workers														
Administrative Support Workers														
Skilled Craftsmen														
Operatives Semi-Skilled														
Laborers & Helpers														
Service Workers														
TOTAL														
Journeypersons														
Apprentices														
Trainees														

Electronic Signature of Service Provider: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge.
Name (Please Type):

Date:

**New York State Environmental Facilities Corporation
Equal Employment Opportunity (EEO) Staffing Plan
INSTRUCTIONS**

All Service Providers (including legal, engineering, financial advisory or other professional services, and labor) and each subcontractor identified in the bid or proposal must complete an EEO Staffing Plan and submit it no later than the date of execution of the contract to the Recipient's Minority Business Officer (MBO). Where the work force to be utilized in the performance of the contract **can** be separated out from the contractor's or subcontractors' total work force, the contractor shall complete this form *only for the anticipated work force to be utilized on the contract*. Where the work force to be utilized in the performance of the contract **cannot** be separated out from the contractor's or subcontractors' total work force, the contractor shall complete this form for the contractor's or subcontractors' *total work force*.

RACE/ETHNIC IDENTIFICATION: Definitions of race and ethnicity for purposes of completion of this form are as follows:

- **Hispanic or Latino** - A person having origins in Cuba, Mexico, Puerto Rico, South or Central America.
- **White** - A person having origins of Europe, the Middle East, or North Africa.
- **Black or African-American** - A person having origins in any of the black racial groups of Africa.
- **Native Hawaiian or Other Pacific Islander** - A person having origins in any of the peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- **Asian** - A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent
- **American Indian or Alaska Native** – A person having origins in any of the original peoples of North, Central, and South America and who maintain tribal affiliation or community attachment.
- **Two or More Races** - All persons who identify with more than one of the above (Non-Hispanic or Latino) five races.

DESCRIPTION OF JOB CATEGORIES: The major job categories used in EEO Staffing Plan are as follows:

- **Senior Level Officials and Managers** - Individuals residing in the highest levels of organizations who plan, direct and formulate policies, set strategy and provide the overall direction of enterprises/organizations for the development and delivery of products or services.
- **Mid-Level Officials and Managers** - Individuals who receive directions from the Senior Level management and serve as managers, other than those who serve as Senior Level Officials and Managers, including those who oversee and direct the delivery of products, services or functions at group, regional or divisional levels of organizations.
- **Professionals** - Most jobs in this category require bachelor and graduate degrees, and/or professional certification. In some instances, comparable experience may establish a person's qualifications.
- **Technicians** - Jobs in this category include activities that require applied scientific skills, usually obtained by post-secondary education of varying lengths, depending on the particular occupation, recognizing that in some instances additional training, certification, or comparable experience is required.
- **Sales Workers** - These jobs include non-managerial activities that wholly and primarily involve direct sales.
- **Administrative Support Workers** - These jobs involve non-managerial tasks providing administrative and support assistance, primarily in office settings.
- **Skilled Craftsmen** – Includes higher skilled occupations in construction (building trades craft workers and their formal apprentices) and natural resource extraction workers. Examples of these types of positions include: boilermakers; brick and stone masons; carpenters; electricians; painters.
- **Operatives Semi-Skilled** - Most jobs in this category include intermediate skilled occupations and include workers who operate machines or factory-related processing equipment. Most of these occupations do not usually require more than several months of training. Examples include: textile machine workers.
- **Laborers & Helpers** - Jobs in this category include workers with more limited skills who require only brief training to perform tasks that require little or no independent judgment.
- **Service Workers** - Jobs in this category include food service, cleaning service, personal service, and protective service activities.

See the bid packet at www.efc.ny.gov/mwbe or your designated MBO for further guidance.

Attachment 3 – EEO Workforce Utilization Report

Instructions for Completing and Submitting the Equal Employment Opportunity Workforce Utilization Report State Financial Assistance Only

The Equal Employment Opportunity (“EEO”) Workforce Utilization Report (“Report”) is used by contractors and subcontractors to report the actual workforce utilized in the performance of the contract broken down by job title for a particular reporting period. When the workforce utilized in the performance of the contract can be separated out from the contractor’s and/or subcontractor’s total workforce, the contractor and/or subcontractor shall submit a Report of the workforce utilized on the contract. When the workforce to be utilized on the contract cannot be separated out from the contractor’s and/or subcontractor’s total workforce, information on the contractor’s and/or subcontractor’s total workforce shall be included in the Report.

Instructions for Completing the Report

1. **Reporting Entity.** Check off the appropriate box to indicate if the entity completing the Report is the contractor or a subcontractor.
2. **Federal Employer Identification Number (“FEIN”).** Enter the FEIN assigned by the Internal Revenue Service (“IRS”) to the contractor or subcontractor for which the Report has been prepared. If the contractor or subcontractor uses a social security number instead of a FEIN, leave this field blank. The contractors and subcontractors for recipients of a grant only (such as an Engineering Planning Grant (EPG), a Water Infrastructure Improvement Act (WIIA) grant, or an Intermunicipal Grant Program (IMG) grant) do not need to fill out this section of the Report.
3. **Name.** Enter the name of the contractor or subcontractor for which the Report has been prepared.
4. **Address.** Enter the address of the contractor or subcontractor for which the Report has been prepared.
5. **Contract Number.** Enter the number of contract that the Report applies to, if applicable.
6. **Reporting Period / Month.** Check off the box that corresponds to the applicable quarterly or monthly (not both) reporting period for this Report. The Report is to be submitted on a monthly basis for construction contracts, and a quarterly basis based on the calendar quarter for all other contracts, during the life of the contract.
7. **Workforce Identified in Report.** Check off the appropriate box to indicate if the workforce being reported is just for the contract or the contractor’s or subcontractor’s total workforce.
8. **Preparer’s Name, Preparer’s Title, Date.** Enter the name and title for the person completing the Report, enter the date upon which the Report was completed, and check the box accepting the name entered into the Report as the digital signature of the preparer.
9. **Occupation Classifications (SOC Major Group) and SOC Job Title.** First, enter the applicable Occupation Classification (SOC Major Group) so a dropdown menu appears under SOC Job Title. Choose the SOC Job Title that best describes the worker.
10. **EEO Job Title and SOC Job Code.** The EEO Job Title and the SOC Job Code will automatically populate in the spreadsheet based upon the Occupation Classifications (SOC Major Group) and SOC Job Title selected. Please do not modify the information populated in these fields.

11. **Race/Ethnic Identification.** Race/ethnic designations do not denote scientific definitions of anthropological origins. For the purposes of this Report, an employee must be included in the group to which he or she appears to belong, identifies with, or is regarded in the community as belonging. However, no person should be counted in more than one race/ethnic group. The race/ethnic categories for this Report are:

- o **WHITE** (not of Hispanic origin) all persons having origins in any of the original peoples of Europe, North Africa, or the Middle East.
- o **BLACK/AFRICAN AMERICAN** a person, not of Hispanic origin, who has origins in any of the black racial groups of the original peoples of Africa.
- o **HISPANIC/LATINO** a person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race.
- o **ASIAN, NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER** a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent or the Pacific Islands.
- o **NATIVE AMERICAN/ALASKAN NATIVE** a person having origins in any of the original peoples of North America, and who maintains cultural identification through tribal affiliation or community recognition.

12. **Number of Employees and Number of Hours.** Enter the number of employees and the total number of hours worked by such employees for each SOC Job Title under the columns corresponding to the gender and racial/ethnic groups with which the employees most closely identify.

13. **Total Gross Wages.** Enter the total gross wages paid to all employees for each SOC Job Title, each gender, and each racial/ethnic group. Contractors and subcontractors should report only gross wages for work on the contract paid to employees during the period covered by the Report. Gross wages are those reported by employers to employees on their wage statements. Gross wages are defined more specifically by 20 NYCRR § 2380.4 and typically include every form of compensation for employment paid by an employer to his, her, or its employees, whether paid directly or indirectly by the employer, including salaries, commissions, bonuses, tips, and the reasonable value of board, rent, housing, lodging, or similar advantage received. The contractors and subcontractors for recipients of a grant only (such as an EPG, a WIIA, or an IMG grant) do not need to fill out this section of the Report.

14. **For EFC Use Only.** This section is for EFC use only and does not need to be filled out by the contractor/subcontractor.

Instructions for Submitting the Report

The Report is to be submitted on a monthly basis for construction contracts, and a quarterly basis based on the calendar quarter for all other contracts, during the life of the contract.

EFC will provide a Report form in Excel format to the Recipient's Minority Business Officer ("MBO"). The Recipient's MBO is responsible for providing the Report form to all contractors. Each contractor is responsible for providing the Report form to all subcontractors.

Reports are to be submitted electronically in Excel format, using the Report form provided, within ten (10) days of the end of each month or quarter, whichever is applicable. For example, the January monthly Report for a construction contract is due by February 10th and the January – March quarterly Report for a non-construction contract is due by April 10th

Once the Report form has been completed, each contractor/subcontractor must submit the Report form to EFC and the Recipient's MBO. The Report form must be submitted to EFC according to the following instructions:

1. Go to www.efc.ny.gov/mwbe-eeo , click on EEO Forms and Guidance, Click on Report Submission.
2. Enter the requested information pursuant to the instructions on the page. Make sure to choose the correct applicable funding program (non-SRF Grant Only (e.g. EPG, WIIA, IMG)) and the correct reporting period (reporting quarter for non-construction OR reporting month for construction). Enter the reporting period of the data, not the date it's submitted.
3. Submit your Report(s) pursuant to the instructions on the page.
4. If you are a contractor, use the naming convention provided by EFC (in the "For EFC Use Only" section of the Report form) for naming the file for upload (i.e., Funding Program – Project Number– Contractor short name (up to fifteen characters) – MWBE ID). The funding program should be GO (non-SRF grant only). If you are a subcontractor, use the naming convention provided by EFC and replace the contractor's short name with the first fifteen characters of the subcontractor's name, omitting any spaces or special characters.

Questions

If you have questions about or require assistance completing or submitting the Report, please contact EFC at mwbe@efc.ny.gov or 518-402-6924.

Attachment 4 – MWBE Utilization Plan

**NYS Environmental Facilities Corporation
Minority- & Women- Owned Business Enterprise (MWBE) Utilization Plan**

Instructions for Contractors & Service Providers:

Contractors and Service Providers must complete Sections 2 and 3. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format to the Recipient's designated Minority Business Officer (MBO) no later than the date of contract execution.** Incomplete forms will be found deficient. If more than 10 subcontractors are used, additional pages for Section 3 can be found on EFC's website.

If the prime contract is being performed by the parties to a Joint Venture, Teaming Agreement, or Mentor-Protégé Agreement that includes a certified MWBE, please contact EFC for assistance.

MWBE firms must be certified by the NYS Empire State Development Corporation (ESD) in order to be counted towards satisfaction of MWBE participation goals. The utilization of certified MWBEs for non-commercially useful functions may not be counted towards utilization of certified MWBEs in the Utilization Plan. Please note whether a firm is serving as a broker or supplier on the contract. A broker is denoted by NAICS code 425120 and is designated as a broker in ESD's MWBE Directory. A supplier is denoted by a NAICS code beginning with 423 or 424, or a NIGP code that does not begin with the number 9, and is designated as a supplier in ESD's MWBE Directory. If a firm is serving as a broker, please additionally provide the percentage of the broker's commission on the contract.

See the Bid Packet at www.efc.ny.gov or consult your designated MBO for further guidance.

Instructions for Minority Business Officers (MBO):

The MBO must complete Section 1. The MBO may designate an Authorized Representative to complete and submit quarterly payment reports on its behalf, and, if so designated, the MBO's Authorized Representative must also complete Section 1. The Authorized Representative may only submit quarterly payment reports on behalf of the MBO and may not submit any other required forms or reports for the MBO. The MBO must complete Section 1 even if designating an Authorized Representative. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format via e-mail to your EFC MWBE Representative.**

The subject heading of the e-mail to the EFC MWBE Representative should follow the format "UP, Project Number, Contractor." EFC will review the Utilization Plan and notify the MBO via e-mail of its acceptance or denial.

**NYS Environmental Facilities Corporation
Minority- & Women- Owned Business Enterprise (MWBE) Utilization Plan**

SECTION 1: MUNICIPAL INFORMATION			
Recipient/Municipality:		County:	
Project No.:	GIGP/EPG No.:	Contract ID:	Registration No. (NYC only):
Minority Business Officer:		Email:	Phone #:
Address of MBO:			
Electronic Signature of MBO: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.			Date:
Complete if applicable:			
Authorized Representative:		Title:	
Authorized Rep. Company:		Email:	Phone #:
Electronic Signature of Authorized Rep.: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.			Date:

SECTION 2: PRIME CONTRACTOR / SERVICE PROVIDER INFORMATION				
Firm Name:			Contract Type: ☐ Construction ☐ Other Services	
Prime Firm is Certified as: ☐ MBE ☐ WBE ☐ N/A ☐ Other: Please repeat information in the Utilization Plan below (Section 3). If dual certified, you must select either MBE or WBE.				
Address:		Phone #:	Fed. Employer ID #:	
Description of Work:				
Award Date:	Start Date:	Completion Date:	MWBE GOAL Total	PROPOSED MWBE Participation
Total Contract Amount: \$ MWBE Eligible Contract Amount: \$ (MWBE Goals are applied to this amount and includes all change orders, amendments, & waivers)			MBE: % \$ WBE: % \$ Total: % \$	MBE: % \$ WBE: % \$ Total: % \$

**NYS Environmental Facilities Corporation
Minority- & Women- Owned Business Enterprise (MWBE) Utilization Plan**

SECTION 3: MWBE SUBCONTRACTOR INFORMATION				
This Submittal is:	☐ The First/Original Utilization Plan ☐ Revised Utilization Plan #:			
NYS Certified M/WBE Subcontractor Info		Contract Amount:		For EFC Use:
		MBE (\$)	WBE (\$)	
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				

**NYS Environmental Facilities Corporation
Minority- & Women- Owned Business Enterprise (MWBE) Utilization Plan**

SECTION 3: M/WBE SUBCONTRACTOR INFORMATION continued				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	Completion Date:			
Full Contract Amount: \$				
SIGNATURE				
Electronic Signature of Contractor: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and that all MWBE subcontractors will perform a commercially useful function. Name (Please Type):				Date:

Attachment 5 – MWBE Waiver Request Form

**New York State Environmental Facilities Corporation
Minority & Women Owned Business Enterprise (MWBE) Waiver Request Form**

Instructions for Contractors & Service Providers:

Contractors and Service Providers must complete Sections 2, 3, and 4. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format to the Recipient's designated Minority Business Officer (MBO).** Incomplete forms will be found deficient.

See the Bid Packet at www.efc.ny.gov or consult your designated MBO for further guidance.

Instructions for Minority Business Officers (MBO):

The MBO must complete Section 1. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format via e-mail to your EFC MWBE Representative.** The subject heading of the e-mail to the EFC MWBE Representative should follow the format "Waiver Request, Project Number, Contractor." EFC will review and notify the MBO via e-mail of its acceptance or denial.

If a partial MWBE waiver is requested, an MWBE Utilization Plan must also be submitted for the amount of proposed MWBE participation.

SECTION 1: MUNICIPAL INFORMATION				
Recipient/Municipality:			County:	
Project No.:	GIGP/EPG No.:	Contract ID:	Registration No. (NYC only):	
Minority Business Officer (MBO):		Email:	Phone #:	
Address of MBO:				
Signature of MBO: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.				Date:

SECTION 2: PRIME CONTRACTOR / SERVICE PROVIDER INFORMATION				
Firm Name:			Contract Type: ☐ Construction ☐ Other Services	
Prime Firm is Certified as: ☐ MBE ☐ WBE ☐ N/A ☐ Other:				
Address:		Phone #:	Fed. Employer ID #:	
Contact Information of Firm Representative Authorized to Discuss Waiver Request:				
Name:		Title:	Phone #:	E-mail:
Description of Work:			EFC MWBE GOAL Total	
Award Date:	Start Date:	Completion Date:	MBE: % \$	
Total Contract Amount: \$ MWBE Eligible Contract Amount: \$ (MWBE Goals are applied to this amount and includes all change orders, amendments, & waivers)			WBE: % \$	
			Total: % \$	

**New York State Environmental Facilities Corporation
Minority & Women Owned Business Enterprise (MWBE) Waiver Request Form**

SECTION 3: TYPE OF MWBE WAIVER REQUESTED

1. ☐ **Full Waiver** (No MWBE participation)
2. ☐ **Partial Waiver** (Less than the MWBE goals; indicate below the proposed MWBE participation)

PROPOSED MWBE Participation

MBE: % \$

WBE: % \$

Total: % \$

3. ☐ **Specialty Equipment/Services Exclusion** (Must be of SIGNIFICANT cost - list of equipment and cost must be attached in addition to the supporting documentation outlined below)

SECTION 4: SUPPORTING DOCUMENTATION

To be considered, the Request for Waiver Form must be accompanied by the documentation requested in items 1 – 9, as listed below. If a Specialty Equipment Exclusion is requested, it must be accompanied by the documentation requested in items 1 - 13. If a Specialty Services Exclusion is requested, it must be accompanied by the items requested in items 1 – 9 and item 14. Copies of the following information and all relevant supporting documentation must be submitted along with the request. Please contact EFC for assistance, including sample documentation.

1. A letter of explanation setting forth your basis for requesting a partial or total waiver and detailing the good faith efforts that were made.
2. Copies of advertisements in any general circulation, trade association, and minority- and women-oriented publications in which you solicited MWBEs for the purposes of complying with your participation goals, with the dates of publication.
3. Screenshots of search results (by business description or commodity code) from Empire State Development Corporation's (ESD) MWBE Directory of all certified MWBEs that were solicited for purposes of complying with your MWBE participation goals.
4. Copies of faxes, letters, or e-mails sent to MWBE firms to solicit participation and their responses.
5. A log of solicitation results, consisting of the list of MWBE firms solicited for the contract and the outcome of the solicitations. The log should be broken out into separate areas for each task that is solicited (e.g., trucking, materials, electricians) and clearly provide a rationale for firms included on the completed Utilization Plan as well as for those not chosen. The log should show: that each MWBE firm was contacted twice by two different methods (e.g., fax and phone); who was spoken to; what was said; and the final outcome of the solicitation.
6. A description of any contract documents, plans, or specifications made available to MWBEs for purposes of soliciting their bids and the date and manner in which these documents were made available. Specifically, include information on the scope of work in the contract and a breakout of tasks or equipment, such as

**New York State Environmental Facilities Corporation
Minority & Women Owned Business Enterprise (MWBE) Waiver Request Form**

a schedule of values for a construction contract or a proposal or excerpt from a professional services agreement.

7. Documentation of any negotiations between you, the Contractor, and the MWBEs undertaken for purposes of complying with your MWBE participation goals.
8. Any other information you deem relevant which may help us in evaluating your request for a waiver. Examples may include sign-in sheets from any pre-bid meetings where MWBE firms were invited, attendance at MWBE forums, etc.
9. EFC and the MBO reserve the right to request additional information and/or documentation.

Additional Documentation for Requests for Specialty Equipment Exclusions:

10. Copies of the appropriate pages of the technical specification related to the equipment showing the choices for manufacturers or other information that limits the choice of vendor.
11. Letter, e-mail or screenshot of website from the manufacturer listing their distributors in NYS and the locations.
12. Screenshots of ESD's MWBE Directory searches for the manufacturer and distributor showing that they are not found in the Directory.
13. An invoice or executed purchase order showing the value of the equipment.

Additional Documentation for Requests for Specialty Service Exclusions:

14. A letter of explanation containing information about the scope of work and why no MWBE firms could be subcontracted to provide that service.

Note: Unless a Total Waiver has been granted, Firms will be required to submit all reports and documents pursuant to the provisions set forth in the procurement and/or contract, as deemed appropriate by EFC, to determine MWBE compliance. In cases where EFC accepts a full or partial waiver of MWBE participation goals, the waiver request will be posted to EFC's website.

SIGNATURE

Electronic Signature of Contractor:

☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge.

Name: (Please Type):

Date:

Attachment 6 – Monthly MWBE-SDVOB Contractor Compliance Report

New York State Environmental Facilities Corporation
Monthly Minority- & Women- Owned Business Enterprise (MWBE) Contractor Compliance Report
("Monthly MWBE-SDVOB Report")

Instructions:

- Contractors are to complete the report in Word version and email to the Recipient's Minority Business Officer ("MBO") on a monthly basis.
- If you require additional pages, you may find them on EFC's website at www.efc.ny.gov.
- All** MWBE Subcontractors for this contract **MUST** be listed on the form regardless of whether they were paid this month.
- Please save Report as "*MReport – (Project No). – (Municipality) – (Firm Name) – (Date)*" and send the Word version of this document.
- Proofs of payment in the amounts shown below must be transmitted to the MBO with the report.

Municipality:		County:		Contract ID:		Month:	Year:	
Project No.:		GIGP/EPG No:		Registration No. (NYC only):				
Prime Contractor/Service Provider:				Award Date:		Start Date:		
Date all MWBE / SDVOB subs paid in full:								
Signature of Contractor: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief. Date:								
Last Month's Contract Amt: \$ Revised Contract Amt: \$ Change Order Amt: \$	MWBE Eligible Amt: \$ (Goals are applied to this amount and includes eligible change orders, amendments & waivers)		EFC MWBE Goals			Total Paid to Prime Total Paid this Month: \$ Total Paid to Date: \$		
			MBE: % MBE Amt: \$ WBE: % WBE Amt: \$ Total: % Total Amt: \$					
	SDVOB Eligible Amount \$		EFC SDVOB Goals					
			SDVOB 6 % SDVOB Amt: \$					
NYS Certified MWBE / SDVOB Contractor & Subcontractor		Please Specify Any Revisions this Month.		Subcontractor Total Amount		Payments this Month	Previous Payments	Total Payments Made to Date
				Original Revised				
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker ____% ☐ Supplier ☐ N/A		☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED						
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker ____% ☐ Supplier ☐ N/A		☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED						

New York State Environmental Facilities Corporation
Monthly Minority- & Women- Owned Business Enterprise (MWBE) Contractor Compliance Report
("Monthly MWBE-SDVOB Report")

NYS Certified M/WBE / SDVOB Contractor & Subcontractor	Please Specify Any Revisions this Month.	Subcontractor Contract Amount		Payments this Month	Previous Payments	Total Payments Made to Date
		Original	Revised			
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					

New York State Environmental Facilities Corporation
Monthly Minority- & Women- Owned Business Enterprise (MWBE) Contractor Compliance Report
("Monthly MWBE-SDVOB Report")

NYS Certified M/WBE / SDVOB Contractor & Subcontractor	Please Specify Any Revisions this Month.	Subcontractor Total Amount		Payments this Month	Previous Payments	Total Payments Made to Date
		Original	Revised			
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Choose all that apply:</u> ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: <u>MWBE Only - Select Only One:</u> ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					

New York State Environmental Facilities Corporation
Monthly Minority- & Women- Owned Business Enterprise (MWBE) Contractor Compliance Report
("Monthly MWBE-SDVOB Report")

NYS Certified M/WBE / SDVOB Contractor & Subcontractor	Please Specify Any Revisions this Month.	Subcontractor Total Amount		Payments this Month	Previous Payments	Total Payments Made to Date
		Original	Revised			
Name: Fed. Employer ID#: Choose all that apply: ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: MWBE Only - Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Choose all that apply: ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: MWBE Only - Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Choose all that apply: ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: MWBE Only - Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Choose all that apply: ☐ MBE ☐ WBE ☐ SDVOB ☐ DSDVBD Control #: MWBE Only - Select Only One: ☐ Broker __% ☐ Supplier ☐ N/A	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Additional Pages can be found at www.efc.ny.gov TOTAL						
Please explain any revisions and note the scope of work that new subcontractors will be providing. Please note that change orders over \$25K may require that good faith efforts be made to obtain additional participation:						

Attachment 7 – SDVOB Utilization Plan

**NYS Environmental Facilities Corporation
Service Disabled Veteran-Owned Business (SDVOB) Utilization Plan**

Instructions for Contractors & Service Providers:

Contractors and Service Providers must complete Sections 2 and 3. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format to the Recipient's designated Minority Business Officer (MBO) no later than the date of contract execution.** Incomplete forms will be found deficient. If more than 10 subcontractors are used, additional pages for Section 3 can be found on EFC's website.

If the prime contract is being performed by the parties to a Joint Venture, Teaming Agreement, or Mentor-Protégé Agreement that includes a certified SDVOB, please contact EFC for assistance.

The utilization of certified SDVOBs for non-commercially useful functions may not be counted towards utilization of certified SDVOBs in the Utilization Plan. SDVOB firms must be certified by NYS Office of General Services in order to be counted towards satisfaction of SDVOB participation goals.

See the Bid Packet at www.efc.ny.gov or consult your designated MBO for further guidance.

Instructions for Minority Business Officers (MBO):

The MBO must complete Section 1. The MBO may designate an Authorized Representative to complete and submit quarterly payment reports on its behalf, and, if so designated, the MBO's Authorized Representative must also complete Section 1. The Authorized Representative may only submit quarterly payment reports on behalf of the MBO and may not submit any other required forms or reports for the MBO. The MBO must complete Section 1 even if designating an Authorized Representative. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format via e-mail to your EFC MWBE-SDVOB Representative.**

The subject heading of the e-mail to the EFC MWBE-SDVOB Representative should follow the format "UP, Project Number, Contractor." EFC will review the Utilization Plan and notify the MBO via e-mail of its acceptance or denial.

Within 10 days of EFC's acceptance of a Utilization Plan, EFC will post the approved Utilization Plan on the EFC website.

**NYS Environmental Facilities Corporation
Service Disabled Veteran-Owned Business (SDVOB) Utilization Plan**

SECTION 1: MUNICIPAL INFORMATION				
Recipient/Municipality:			County:	
Project No.:	GIGP/EPG No.:	Contract ID:	Registration No. (NYC only):	
Minority Business Officer:		Email:	Phone #:	
Address of MBO:				
Electronic Signature of MBO: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.				Date:
Complete if applicable:				
Authorized Representative:		Title:		
Authorized Rep. Company:		Email:	Phone #:	
Electronic Signature of Authorized Rep.: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.				Date:

SECTION 2: PRIME CONTRACTOR / SERVICE PROVIDER INFORMATION				
Firm Name:			Contract Type: ☐ Construction ☐ Other Services	
Prime Firm is Certified as: ☐ SDVOB Please repeat information in the Utilization Plan below (Section 3).				
Address:		Phone #:	Fed. Employer ID #:	
Description of Work:				
Award Date:	Start Date:	Completion Date:	SDVOB GOAL Total	PROPOSED SDVOB Participation
Total Contract Amount: \$ SDVOB Eligible Contract Amount: \$ (Goals are applied to this amount and includes all change orders, amendments, & waivers)			Total: 6% \$	Total: % \$

**NYS Environmental Facilities Corporation
Service Disabled Veteran-Owned Business (SDVOB) Utilization Plan**

SECTION 3: SDVOB SUBCONTRACTOR INFORMATION

This Submittal is:	☐ The First/Original Utilization Plan ☐ Revised Utilization Plan #:		
NYS Certified SDVOB Subcontractor Info		Participation: SDVOB (\$)	For EFC Use:
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		

**NYS Environmental Facilities Corporation
Service Disabled Veteran-Owned Business (SDVOB) Utilization Plan**

SECTION 3: SDVOB SUBCONTRACTOR INFORMATION continued			
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		
Name:	Fed. Employer ID#:		
Address:	DSDVBD Control #:		
Scope of Work:	Phone #:		
Full Subcontract Amount: \$	Email:		
Start Date:	Completion Date:		

SIGNATURE	
Electronic Signature of Contractor: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and that all SDVOB subcontractors will perform a commercially useful function. Name (Please Type):	Date:

Attachment 8 – SDVOB Waiver Request Form

**NYS Environmental Facilities Corporation
Service Disabled Veteran Owned Business (SDVOB) Waiver Request Form**

Instructions for Contractors & Service Providers:

Contractors and Service Providers must complete Sections 2, 3, and 4. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format to the Recipient's designated Minority Business Officer (MBO).** Incomplete forms will be found deficient.

See the Bid Packet at www.efc.ny.gov or consult your designated MBO for further guidance.

Instructions for Minority Business Officers (MBO):

The MBO must complete Section 1. **Submit the completed, signed (electronic signature box checked and dated) form in Microsoft Word format via e-mail to your EFC MWBE-SDVOB Representative.** The subject heading of the e-mail to the EFC MWBE-SDVOB Representative should follow the format "Waiver Request, Project Number, Contractor." EFC will review and notify the MBO via e-mail of its acceptance or denial.

If a partial SDVOB waiver is requested, an SDVOB Utilization Plan must also be submitted for the amount of proposed SDVOB participation.

SECTION 1: MUNICIPAL INFORMATION

Recipient/Municipality:			County:		
Project No.:	GIGP/EPG No.:	Contract ID:	Registration No. (NYC only):		
Minority Business Officer (MBO):		Email:		Phone #:	
Address of MBO:					
Signature of MBO: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.					Date:

SECTION 2: PRIME CONTRACTOR / SERVICE PROVIDER INFORMATION

Firm Name:			Contract Type: ☐ Construction ☐ Other Services		
Address:		Phone #:		Fed. Employer ID #:	
Contact Information of Firm Representative Authorized to Discuss Waiver Request:					
Name:		Title:		Phone #:	
				E-mail:	
Description of Work:			EFC SDVOB GOAL Total		
Award Date:	Start Date:	Completion Date:		Total: 6 % \$	
Total Contract Amount: \$ SDVOB Eligible Contract Amount: \$ (SDVOB Goals are applied to this amount and includes all change orders, amendments, & waivers)					

SECTION 3: TYPE OF SDVOB WAIVER REQUESTED

**NYS Environmental Facilities Corporation
Service Disabled Veteran Owned Business (SDVOB) Waiver Request Form**

1. ☐ **Full Waiver** (No SDVOB participation)
2. ☐ **Partial Waiver** (Less than the SDVOB goal; indicate below the proposed SDVOB participation)

PROPOSED SDVOB Participation

Total: % \$

3. ☐ **Specialty Equipment/Services Exclusion** (Must be of SIGNIFICANT cost - list of equipment and cost must be attached in addition to the supporting documentation outlined below)

SECTION 4: SUPPORTING DOCUMENTATION

To be considered, the Request for Waiver Form must be accompanied by the documentation requested in items 1 – 9, as listed below. If a Specialty Equipment Exclusion is requested, it must be accompanied by the documentation requested in items 1 - 13. If a Specialty Services Exclusion is requested, it must be accompanied by the items requested in items 1 – 9 and item 14. Copies of the following information and all relevant supporting documentation must be submitted along with the request. Please contact EFC for assistance, including sample documentation.

1. A letter of explanation setting forth your basis for requesting a partial or total waiver and detailing the good faith efforts that were made.
2. Copies of advertisements in any general circulation, trade association, in which you solicited SDVOBs for the purposes of complying with your participation goal, with the dates of publication.
3. A list of firms found as a result of a search (by business description or commodity code) of OGS's SDVOB Directory and solicited for purposes of complying with your SDVOB participation goal.
4. Copies of faxes, letters, or e-mails sent to SDVOB firms to solicit participation and their responses.
5. A log of solicitation results, consisting of the list of SDVOB firms solicited for the contract and the outcome of the solicitations. The log should be broken out into separate areas for each task that is solicited (e.g., trucking, materials, electricians) and clearly provide a rationale for firms included on the completed Utilization Plan as well as for those not chosen. The log should show: that each SDVOB firm was contacted twice by two different methods (e.g., fax and phone); who was spoken to; what was said; and the final outcome of the solicitation.
6. A description of any contract documents, plans, or specifications made available to SDVOBs for purposes of soliciting their bids and the date and manner in which these documents were made available. Specifically, include information on the scope of work in the contract and a breakout of tasks or equipment, such as a schedule of values for a construction contract or a proposal or excerpt from a professional services agreement.
7. Documentation of any negotiations between you, the Contractor, and the SDVOBs undertaken for purposes of complying with your SDVOB participation goal.

**NYS Environmental Facilities Corporation
Service Disabled Veteran Owned Business (SDVOB) Waiver Request Form**

8. Any other information you deem relevant which may help us in evaluating your request for a waiver. Examples may include sign-in sheets from any pre-bid meetings where SDVOB firms were invited, attendance at SDVOB forums, etc.

9. EFC and the MBO reserve the right to request additional information and/or documentation.

Additional Documentation for Requests for Specialty Equipment Exclusion:

10. Copies of the appropriate pages of the technical specification related to the equipment showing the choices for manufacturers or other information that limits the choice of vendor.

11. Letter, e-mail or screenshot of website from the manufacturer listing their distributors in NYS and the locations.

12. The name and federal employee identification number of the manufacturer and distributor for EFC to search the SDVOB Directory.

13. An invoice or purchase order showing the value of the equipment.

Additional Documentation for Requests for Specialty Service Exclusion:

14. A letter of explanation containing information about the scope of work and why no SDVOB firms could be subcontracted to provide that service.

Note: Unless a Total Waiver has been granted, Firms will be required to submit all reports and documents pursuant to the provisions set forth in the procurement and/or contract, as deemed appropriate by EFC, to determine SDVOB compliance. In cases where EFC accepts a full or partial waiver of SDVOB participation goals, the waiver request will be posted to EFC's website.

SIGNATURE

Electronic Signature of Contractor:

☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge.

Name: (Please Type):

Date: