

Bidding Requirements, Contract Forms and Conditions of the Contract
ADDENDUM
Section 00900

ADDENDUM No. 2

Date October 14 , 2015

City of Austin

Project Name South Austin Regional Wastewater Treatment Plant Filter Improvements

C.I.P. No. 3333.015

This Addendum forms a part of Contract and clarifies, corrects or modifies original Bid Documents, dated September 14 , 2015 . Acknowledge receipt of this addendum in space provided on bid form. Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

1. Replace the Page 2 of 5 of the Table of Contents dated 08/21/15 with the attached, revised Page 2 of 5 of the Table of Contents dated 10/19/15.
2. Replace Section 00810, "Supplemental General Conditions", with the attached, revised Section 00810, "Supplemental General Conditions".
3. Remove Section 00830HH, "Wage Rates Highway Heavy".
4. Replace Page 9 of 9 of Section 01046, "Temporary Filtration and Bypass Pumping System" with the attached, revised Page 9 of 9 of Section 01046, "Temporary Filtration and Bypass Pumping System".
5. Replace Section 16120, "480 Volt Motor Control Centers", with the attached, revised Section 16120, "480 Volt Motor Control Centers."

B. Drawing Revisions: (NOT USED)

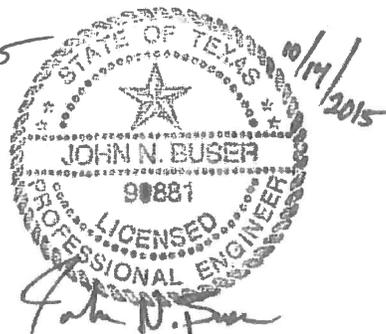
This addendum consists of 37 page(s)/sheet(s).

 [Signature] 10/14/2015

Approved by OWNER

 [Signature]

Approved by ENGINEER/ARCHITECT



END

Document Number	Title
00830	02/04/15 WAGE RATES AND PAYROLL REPORTING
00830BC	09/25/15 WAGE RATES BUILDING CONSTRUCTION
ADDENDA	
00900	02/23/10 ADDENDUM
SPECIFICATIONS	
DIVISION 1 - GENERAL REQUIREMENTS	
01010	04/22/13 SUMMARY OF WORK
01020	07/24/15 ALLOWANCES
01025	07/24/15 MEASUREMENT AND PAYMENT
01030	07/28/15 ALTERNATES
01040	09/30/15 PROJECT COORDINATION
01045	07/27/15 SEQUENCE OF CONSTRUCTION
01046	07/28/15 TEMPORARY FILTRATION AND BYPASS PUMPING SYSTEM
01050	10/19/15 GRADES LINES & LEVELS
01095	07/21/03 REFERENCE STANDARDS AND DEFINITIONS
01096	05/06/11 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)
01200	08/09/12 PROJECT MEETINGS
01300	04/22/13 SUBMITTALS
01310	07/28/15 PROGRESS SCHEDULES
01352	04/22/13 SUSTAINABLE CONSTRUCTION REQUIREMENTS
01353	08/09/12 CONSTRUCTION EQUIPMENT EMISSIONS REDUCTION PLAN
01380	08/09/12 CONSTRUCTION PHOTOGRAPHY & VIDEOS
01400	10/25/13 CONSTRUCTION MATERIALS TESTING
01445	01/19/09 MANUFACTURERS FIELD SERVICES
01500	08/09/12 TEMPORARY FACILITIES
01505	04/22/13 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
01550	08/09/12 PUBLIC SAFETY AND CONVENIENCE
01600	10/29/13 GENERAL EQUIPMENT REQUIREMENTS
01730	09/30/14 OPERATION AND MAINTENANCE DATA
01900	03/12/12 PROHIBITION OF ASBESTOS CONTAINING MATERIALS
01900A	06/05/06 STATEMENT OF NON-INCLUSION OF ASBESTOS CONTAINING MATERIAL (E/A PRIOR TO DESIGN)
01900B	06/05/06 STATEMENT OF NON-INCLUSION OF ASBESTOS CONTAINING MATERIAL (E/A AFTER DESIGN)

CITY STANDARD TECHNICAL SPECIFICATIONS**SERIES 100 – EARTHWORK**

102S	08/20/07	CLEARING AND GRUBBING
104S	09/26/12	REMOVING PORTLAND CEMENT CONCRETE
111S	09/26/12	EXCAVATION

SERIES 200 – SUBGRADE AND BASE CONSTRUCTION

201S	08/20/07	SUBGRADE PREPARATION
210S	02/24/10	FLEXIBLE BASE
220S	02/24/10	SPRINKLING FOR DUST CONTROL
236S	08/20/07	PROOF ROLLING

SERIES 300 – STREET SURFACE COURSES

360S	09/26/12	CONCRETE PAVEMENT
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SERIES 400 – CONCRETE STRUCTURES AND MISCELLANEOUS CONCRETE

Bidding Requirements, Contract Forms and Conditions of the Contract
SUPPLEMENTAL GENERAL CONDITIONS
Section 00810

The Supplemental General Conditions contained herein amend or supplement the General Conditions, Section 00700.

ARTICLE 1 - DEFINITIONS

Add the following definition:

"1.20 Engineer/Architect (E/A): Add the following:

Name: *Shelby Eckols, PE*
 AECOM Technical Services, Inc.
Address: *9400 Amberglen Blvd., Austin, TX 78729"*

Add the following definitions:

"1.51 Insurance Cost Form - Section 00425 of the Contract, submitted by CONTRACTOR with its Bid, used to notify OWNER of insurance costs not included in CONTRACTOR's Bid as a result of the OWNER providing insurance through ROCIP.

1.52 Payment Form - A form used by the ROCIP Administrator to notify the OWNER's Project Manager that all required insurance information and documentation has been received from CONTRACTOR.

1.53 OWNER's ROCIP Administrator - The insurance broker responsible for administering the OWNER's Rolling Owner Controlled Insurance Program (ROCIP).

1.54 Rolling Owner Controlled Insurance Program (ROCIP) - A specialized insurance program provided by OWNER for specifically identified Capital Improvements Program (CIP) projects."

Add the following definition:

"1.56 Allowance - Allowance is defined as "a not-to-be-exceeded amount", either individually or in the aggregate, which is established between the Owner and the Contractor as part of its Bid Proposal when the precise scope of a particular line item(s) has not been defined to a level which is adequate for the Contractor to provide a definitive line item pricing for that particular scope of Work. The use of any Allowances by the Contractor will be subject to the Owner's sole approval and it is the Owner's intent to minimize the use of Allowances to the fullest extent possible. For any Allowances which the Owner allows the Contractor to use, the following rules shall apply: (i) Allowances shall cover the cost to the Contractor of the Cost of Work; (ii) Contractor's overhead and profit associated with the stated Allowance shall be included in the Allowance; and (iii) upon completion of the portion of the Work subject to an Allowance, the Contract Amount for that portion of the Work will be adjusted based upon the approved actual cost of the Work, which will not exceed the approved aggregate amount of the Allowances."

Add the following definition:

"1.57 Mobilization Prompt Payment Program - The Owner's Mobilization Prompt Payment Program, will allow bimonthly payments during "critical mobilization stages" as specified in the Contract Documents by the Prime Contractor. The Mobilization Prompt Payment Program will only apply to projects with a construction cost of greater than \$2,000,000."

ARTICLE 2 - PRELIMINARY MATTERS

2.1 Delivery of Agreement, Bonds, Insurance, etc.: Add the following:

"2.1.1 CONTRACTOR shall complete enrollment in the Rolling Owner Controlled Insurance Program (ROCIP) within five (5) Working Days after written notification of award of Contract."

2.4 Before Starting Construction:

Add the following modification to the end of 2.4.2.1 for Mobilization Prompt Payment Program:

- .1 The Baseline Schedule and schedule submittals for Projects in the Mobilization Prompt Payment Program, must identify periods of "critical mobilization." The periods of critical mobilization will include the first two months of the Contract Time and additional periods identified by the Contractor and approved by Owner when peak Subcontractor mobilization will occur.

Delete 2.4.2.6 and replace with the following (changes to the original text are identified by underlining):

- "**.6** a preliminary schedule of values for all of the Work, subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. At a minimum, the schedule of values shall be broken out by trade and split between materials and labor. Prices will include an appropriate amount of overhead and profit applicable to each item of Work;"

ARTICLE 5 - BONDS AND INSURANCE

"5.3 Insurance:

5.3.1 CONTRACTOR Provided Insurance

CONTRACTOR shall provide insurance coverages described in paragraph(s) 5.3.1.1 and 5.3.1.2 (and 5.3.1.5 and 5.3.1.6, as required) for all Work required by the Contract through the end of the warranty period (with the exception of Builders' Risk, which is required only until the Work is accepted by OWNER). In addition, CONTRACTOR shall provide insurance coverages described in Paragraph(s) 5.3.1.3 and 5.3.1.4 from Substantial Completion of the Work (in accordance with Section 00700 General Conditions Paragraph 14.11) to the end of the warranty period.

Subcontractors performing Work which involves asbestos, hazardous material or pollution defined as asbestos or any other excluded contractor as described in 5.3.2.1 will not be enrolled in the Rolling Owner Controlled Insurance Program (ROCIP) and must provide insurance as specified in paragraphs 5.3.1.1 through 5.3.1.6.

In the event that the Rolling Owner Controlled Insurance Program (ROCIP) or the coverage it provides to the Project is terminated for any reason, whether prior to the start of Work or any time during the Work, upon thirty (30) days Written Notice from OWNER, CONTRACTOR shall purchase and maintain as minimum the insurance coverages described in Paragraphs 5.3.1.3 and 5.3.1.4, for all Work remaining under the Contract through the end of the warranty period. All insurance secured by CONTRACTOR, Subcontractors and Sub-subcontractors pursuant to OWNER's requirements under this provision shall be in accordance with Article 5 of the General Conditions and paragraph 5.3.1.1 of this section. If CONTRACTOR is required to provide insurance as described in paragraphs 5.3.1.3 and 5.3.1.4, OWNER shall reimburse CONTRACTOR for the reasonable cost of providing the insurance described therein based upon the "Total Cost of Insurance for Base Bid" (plus total of all "Total Cost of Insurance for Alternates" selected by OWNER) as stated by CONTRACTOR in Contract Section 00425 (Insurance Cost Form) pro rated to

take into account the Contract Time and Work remaining for performance of CONTRACTOR's obligations under the Contract.

5.3.1.1 General Requirements.

- .1 CONTRACTOR shall carry insurance in the types and amounts indicated below for the duration of the Contract, which shall include items owned by OWNER in the care, custody and control of CONTRACTOR prior to and during construction and warranty period.
- .2 CONTRACTOR must complete and forward the Certificate of Insurance, Section 00650, to OWNER before the Contract is executed as verification of coverage required below. CONTRACTOR shall not commence Work until the required insurance is obtained and until such insurance has been reviewed by OWNER. Approval of insurance by OWNER shall not relieve or decrease the liability of CONTRACTOR hereunder and shall not be construed to be a limitation of liability on the part of CONTRACTOR. CONTRACTOR must also complete and forward the Certificate of Insurance, Section 00650, to OWNER whenever a previously identified policy period has expired as verification of continuing coverage.
- .3 CONTRACTOR's insurance coverage is to be written by companies licensed to do business in the State of Texas at the time the policies are issued and shall be written by companies with A.M. Best ratings of B+VII or better, except for hazardous material insurance which shall be written by companies with A.M. Best ratings of A- or better.
- .4 All endorsements naming the OWNER as additional insured, waivers, and notices of cancellation endorsements as well as the Certificate of Insurance shall indicate: City of Austin, Contract Management Department, P.O. Box 1088, Austin, Texas 78767.
- .5 The "other" insurance clause shall not apply to the OWNER where the OWNER is an additional insured shown on any policy. It is intended that policies required in the Contract, covering both OWNER and CONTRACTOR, shall be considered primary coverage as applicable.
- .6 If insurance policies are not written for amounts specified below, CONTRACTOR shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of the primary coverage.
- .7 OWNER shall be entitled, upon request and without expense, to receive certified copies of policies and endorsements thereto and may make any reasonable requests for deletion or revision or modification of particular policy terms, conditions, limitations, or exclusions except where policy provisions are established by law or regulations binding upon either of the parties hereto or the underwriter on any such policies.
- .8 OWNER reserves the right to review the insurance requirements set forth during the effective period of this Contract and to make reasonable adjustments to insurance coverage, limits, and exclusions when deemed necessary and prudent by OWNER based upon changes in statutory law, court decisions, the claims history of the industry or financial condition of the insurance company as well as CONTRACTOR.
- .9 CONTRACTOR shall not cause any insurance to be canceled nor permit any insurance to lapse during the term of the Contract or as required in the Contract.

- .10 CONTRACTOR shall be responsible for premiums, deductibles and self-insured retentions, if any, stated in policies. All deductibles or self-insured retentions shall be disclosed on the Certificate of Insurance.
- .11 CONTRACTOR shall provide OWNER thirty (30) days written notice of erosion of the aggregate limits below occurrence limits for all applicable coverages indicated within the Contract.
- .12 If OWNER owned property is being transported or stored off-site by CONTRACTOR, then the appropriate property policy will be endorsed for transit and storage in an amount sufficient to protect OWNER's property.
- .13 The insurance coverages required under this contract are required minimums and are not intended to limit the responsibility or liability of CONTRACTOR.

5.3.1.2

Business Automobile Liability Insurance. Provide coverage for all owned, non-owned and hired vehicles. The policy shall contain the following endorsements in favor of OWNER:

- a) Waiver of Subrogation endorsement CA 0444;
- b) 30 day Notice of Cancellation endorsement CA 0244; and
- c) Additional Insured endorsement CA 2048.

Provide coverage in the following types and amounts:

- .2 A minimum combined single limit of \$<1,000,000 minimum> per occurrence for bodily injury and property damage.

5.3.1.3

Workers' Compensation And Employers' Liability Insurance. Coverage shall be consistent with statutory benefits outlined in the Texas Workers' Compensation Act (Section 401). CONTRACTOR shall assure compliance with this Statute by submitting two (2) copies of a standard certificate of coverage (e.g. ACCORD form) to Owner's Representative for every person providing services on the Project as acceptable proof of coverage. The Certificate of Insurance, Section 00650, must be presented as evidence of coverage for CONTRACTOR. CONTRACTOR's policy shall apply to the State of Texas and include these endorsements in favor of OWNER:

- a) Waiver of Subrogation, form WC 420304; and
- b) 30 day Notice of Cancellation, form WC 420601.

The minimum policy limits for Employers' Liability Insurance coverage shall be as follows:

- .1 \$100,000 bodily injury per accident, \$500,000 bodily injury by disease policy limit and \$100,000 bodily injury by disease each employee.

5.3.1.4

Commercial General Liability Insurance. The Policy shall contain the following provisions:

- a) Contractual liability coverage for liability assumed under the Contract and all contracts relative to this Project.
- b) Completed Operations/Products Liability for the duration of the warranty period.
- c) Explosion, Collapse and Underground (X, C & U) coverage.
- d) Independent Contractors coverage (Contractors/ Subcontractors work).
- e) Aggregate limits of insurance per project, endorsement CG 2503.

- f) OWNER listed as an additional insured, endorsement CG 2010 and CG 2037 or equivalent.
- g) 30 day notice of cancellation in favor of OWNER, endorsement CG 0205.
- h) Waiver of Transfer of Recovery Against Others in favor of OWNER, endorsement CG 2404.

Provide coverages A&B with minimum limits as follows:

- .2 A combined bodily injury and property damage limit of \$<1,000,000 minimum> per occurrence.

5.3.1.5 Builders' Risk Insurance. CONTRACTOR shall maintain Builders' Risk Insurance or Installation Insurance on an all risk physical loss form in the Contract Amount. Coverage shall continue until the Work is accepted by OWNER. OWNER shall be a loss payee on the policy. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

5.3.1.6 Hazardous Materials Insurance.

For Work which involves lead and asbestos or any hazardous materials or pollution defined as lead or asbestos, CONTRACTOR or Subcontractor responsible for the Work shall comply with the following insurance requirements in addition to those specified above:

- .1 Provide a lead and asbestos abatement endorsement to the Commercial General Liability policy with minimum bodily injury and property damage limits of \$1,000,000 per occurrence for coverages A&B and products/completed operations coverage with a separate aggregate of \$1,000,000. This policy shall not exclude lead, asbestos or any hazardous materials or pollution defined as lead or asbestos, and shall provide "occurrence" coverage without a sunset clause. The policy shall provide 30 day Notice of Cancellation and Waiver of Subrogation endorsements in favor of OWNER.
- .2 CONTRACTOR or Subcontractor responsible for transporting lead and asbestos or any hazardous materials defined as lead and asbestos shall provide pollution coverage. Federal law requires interstate or intrastate transporters of lead and asbestos to provide an MCS 90 endorsement with a \$5,000,000 limit when transporting lead and asbestos in bulk in conveyances of gross vehicle weight rating of 10,000 pounds or more. Interstate transporters of lead and asbestos in non-bulk in conveyances of gross vehicle weight rating of 10,000 pounds or more must provide an MCS 90 endorsement with a \$1,000,000 limit. The terms "conveyance" and "bulk" are defined by Title 49 CFR 171.8. All other transporters of lead and asbestos shall provide either an MCS 90 endorsement with minimum limits of \$1,000,000 or an endorsement to their Commercial General Liability Insurance policy which provides coverage for bodily injury and property damage arising out of the transportation of lead and asbestos. The endorsement shall, at a minimum, provide a \$1,000,000 limit of liability and cover events caused by the hazardous properties of airborne lead and asbestos arising from fire, wind, hail, lightning, overturn of conveyance, collision with other vehicles or objects, and loading and unloading of conveyances.
- .3 CONTRACTOR shall submit complete copies of the policy providing pollution liability coverage to OWNER.

5.3.1.7 Professional Liability Insurance. For Work which requires professional engineering or professional survey services to meet the requirements of the Contract, including but not limited to excavation safety systems, traffic control plans, and construction surveying, the CONTRACTOR or Subcontractors, responsible for performing the professional services shall provide Professional Liability Insurance with a minimum limit of \$500,000 per claim and in the aggregate to pay on behalf of the assured all sums which the assured shall become legally obligated to pay as damages by reason of any negligent act, error, or omission committed with respect to all professional services provided in due course of the Work of this Contract.

5.3.1.8 If City equipment is provided to the CONTRACTOR, the CONTRACTOR is required to provide all risk inland marine coverage including but not limited to fire, wind, hail, theft, vandalism and malicious mischief at 100% replacement cost for the value of that equipment. The value will be provided by the City. Coverage for transit shall be included. The City of Austin shall be named on the policy as Their Interest May Appear.

5.3.2 OWNER Controlled Insurance.

5.3.2.1 OWNER has procured, and will maintain at its own expense a Rolling Owner Controlled Insurance Program (ROCIP) with the following coverage for OWNER, CONTRACTOR, each Subcontractor and their respective Sub-subcontractors while engaged in Work under the Contract. It is not the intent of this ROCIP to cover architects, engineers (not including design/build subcontractors), consultants, vendors, suppliers (who do not perform or subcontract installation), material dealers, guard services, janitorial services, truckers. Moreover, this ROCIP will not provide coverage for:

- .1 Contractors and subcontractors whose main function is abating asbestos or removing hazardous materials and/or waste from the project site;
- .2 Others whose sole function is to transport, pickup, deliver or carry materials, supplies, tools, equipment, parts or other items to or from the project site;
- .3 Any employee(s) of the Contractor or an enrolled subcontractor of any tier that does not work and/or generate payroll at the Project Site

5.3.2.2 Workers' Compensation and Employers' Liability Insurance. All states including monopolistic.

- .1 Workers' Compensation - Statutory Benefits for Texas or state of hire as required by statute.
- .2 Employers' Liability. Limits of \$1,000,000 bodily injury each accident. \$1,000,000 bodily injury by disease, each employee. \$1,000,000 bodily injury by disease, policy limit.
- .3 Endorsements:
 - a) Employers' Liability Coverage Endorsement
 - b) Designated Workplaces Exclusion Endorsement
 - c) Voluntary Compensation and Employers Liability Coverage Endorsement
 - d) Policy Period Endorsement
 - e) Texas Waiver of Our Right to Recover From Others Endorsement
 - f) Federal Employers' Liability Act Coverage Endorsement

- g) Longshoremen's and Harbor Workers' Compensation Act
- h) Maritime Coverage Endorsement
- i) Sole Proprietors, Partners, Officers and Others Coverage Endorsement
- j) Sole Agent Consolidated Insurance Programs
- k) Unintentional Error And Omissions Endorsement
- l) Knowledge and Notice of Occurrence Endorsement
- m) Texas Health Care Network Endorsement
- n) Terrorism Risk Insurance Program Reauthorization Act Disclosure Endorsement
- o) Notice of Cancellation
- p) Texas Amendatory Endorsement - Notice of Cancellation
- q) Alternate Employer Endorsement
- r) Texas Deductible Endorsement
- s) Texas Amendatory Endorsement - Who Is An Insured
- t) State Specific Endorsements

5.3.2.3 Commercial General Liability Insurance.

- .1 Limits of Liability:
 - a) \$4,000,000 General Aggregate Limit
 - b) \$4,000,000 Products-Completed Operations Aggregate Limit
 - c) \$2,000,000 Personal and Advertising Injury
 - d) \$2,000,000 Each Occurrence
 - e) \$1,000,000 Damages to Premises Rented to You Limit (Any one premises. Subject to occurrence limit.)
 - f) \$10,000 Medical Expense Limit (Any one person. Subject to occurrence limit.)
 - g) Aggregate limits reinstate annually during the 5-year project period. For 10 Year Completed Operations Extension, the Products Completed Operations Aggregate will be shared with the latest annual policy period during which a policy issued by us was in effect.
- .2 Policy Form. Commercial General Liability Coverage Form CG 00 01 (12/07 Edition).
- .3 Forms:
 - a) Wrap-up Insurance Program - Amendment of Coverage
 - b) Products and Completed Operations Extension - Ten (10) Years - This is part of the Wrap-Up Insurance Program Amendment of Coverage Endorsement
 - c) Sole Agent / First Named Insured is the Sole Agent - This is part of the Wrap-Up Insurance Program Amendment of Coverage Endorsement
 - d) Designated Projects - This is part of the Wrap-Up Insurance Program Amendment of Coverage Endorsement

- e) Common Policy Conditions
- f) Texas Disclosure Form
- g) Early Notice of Cancellation Provided By Us
- h) Texas Changes - Cancellation And Nonrenewal Provisions For Casualty Lines And Commercial Package Policies
- i) Combined Limits of Insurance – Multiple Policies
- j) Blanket Additional Insured
- k) Notice of Occurrence, Offense or Injury
- l) Knowledge of Occurrence or Offense
- m) Nonowned Watercraft Amended
- n) Contractual Liability - Railroads
- o) Texas Changes – Employment Related Practices Exclusion
- p) Per Project and Per Location combined Aggregate Limits – With Optional Capped Limits Endorsement
- q) Unintentional Failure to Disclose
- r) Reasonable Force
- s) Bodily Injury Redefined
- t) Waiver of Transfer Rights of Recovery Against Others to Us
- u) Bodily Injury to Co-Employees Coverage – Supervisors, Managers and Good Samaritans
- v) Exclusion – Contractors – Professional Liability
- w) Professional Health Care Services by Employees or Volunteer Workers Coverage
- x) Texas - Total Pollution Exclusion
- y) Silica Exclusion Endorsement
- z) Recording and Distribution of Material or Information in Violation of Law Exclusion
- aa) Lead Exclusion
- bb) Mold And Mold Related Construction Defect Exclusion
- cc) Asbestos Exclusion Endorsement
- dd) Advertisement Redefined
- ee) Joint Defense Endorsement
- ff) Joint and Several Amendment
- gg) Nuclear Energy Liability Exclusion Endorsement (Broad Form)
- hh) Non-Cumulation of Liability (Same Occurrence)
- ii) Discrimination Exclusion
- jj) Composite Rate Endorsement
- kk) Deductible – Damages and Supplementary Payments (Damages Within The Deductible Erode The Policy Limit)

- ll) Personal and Advertising Injury – Occurrence Redefined
- mm) Personal and Advertising Injury – Definition of Publication
- nn) Cap On Losses From Certified Acts of Terrorism
- oo) Exclusion of Punitive Damages From Certified Acts of Terrorism
- pp) Other Terrorism Endorsements
- qq) All State Mandatory Endorsements

5.3.2.4 Umbrella/Excess Liability Insurance.

- .1 \$50,000,000 Each Occurrence
- .2 \$50,000,000 Products-Completed Operations Aggregate
- .3 \$50,000,000 Other Aggregate (Where Applicable)
- .4 Umbrella/Excess includes a Completed Operations Extension period of Ten (10) years.

5.3.2.5 General Provisions.

- .1 Coverage Availability. All insurance specified herein shall be maintained continuously until Substantial Completion of the Project except as provided in Section 5.3.1. All insurance shall provide for OWNER to take occupancy of the Work or any part thereof during the term of said insurance.
- .2 Insurance Policies and Certificates. The Broker and/or Insurers will issue Policies for Worker's Compensation and Binders for General Liability to CONTRACTOR, each Subcontractor and each Sub-subcontractor participating in the ROCIP.
- .3 CONTRACTOR, Subcontractor and Sub-subcontractors agree to comply with the requirements of the ROCIP including enrollment, record keeping, reporting, auditing, and claim requirements.
- .4 The first five thousand dollars (\$5,000) of any insurable general liability property damage loss will be the responsibility of and paid by the CONTRACTOR and deducted from the contract amount.
- .5 Contract Insurance Cost.
 - a) CONTRACTOR agrees not to duplicate or include any portion of their normal insurance cost, including Subcontractor insurance costs, in their Bid or in Change Orders (if any) for the coverages provided by OWNER under paragraphs 5.3.2.2 through 5.3.2.4.
 - b) CONTRACTOR stipulates that the insurance costs as defined in the Insurance Cost Form (Section 00425), submitted with the Bid and part of the Contract, is the amount that would have been included in the Bid if OWNER elected not to provide such coverage.
 - c) CONTRACTOR agrees to the audit conditions specified in the Insurance Cost Form (Section 00425).
 - d) In the event OWNER elects not to include CONTRACTOR's Work under the ROCIP coverages, the insurance amounts reported in the Insurance Cost Form (Section 00425) will be added to the Contract Amount on a pro rated basis.
 - e) CONTRACTOR shall agree to cooperate fully with OWNER's ROCIP Administrator and Project Manager in providing the necessary

insurance data and information as required in the Bid Documents and associated documents and submittals furnished and required by OWNER during the duration of the Project or until OWNER furnished coverages are terminated. Failure to provide insurance information or documents/submittals to the OWNER's ROCIP Administrator and OWNER's Representative within specified time periods, by CONTRACTOR, any Subcontractor or Sub-subcontractor will result in withholding of progress payments to CONTRACTOR by OWNER. The Green Form can be withheld due to failure to provide insurance information or documents within specified time periods.

.6 Governing Conditions. In the event of conflict between Insurance Policy Terms and Conditions and the coverage conditions specified herein, the insurance policies will govern.

.7 CONTRACTOR Furnished Insurance.

a) Automobile Liability Insurance. CONTRACTOR and all Subcontractors, Sub-subcontractors and vendors shall maintain Automobile Liability Insurance as specified in paragraphs 5.3.1.1 and 5.3.1.2, at their own expense. CONTRACTOR must submit Certificates of Insurance for all Subcontractors to OWNER prior to their commencing Work on the Project.

b) Vendors, Suppliers and Haulers Required Insurance

a. Workers' Compensation and Employers' Liability Insurance. Vendors, suppliers, haulers, and other non-ROCIP participants as outlined in 5.3.2.1 shall provide workers' compensation insurance as specified in paragraphs 5.3.1.1 and 5.3.1.3.

This coverage requirement does not apply to motor carriers who are required pursuant to Texas Civil Statutes, Article 6675c to register with the Texas Department of Transportation and to provide accidental insurance coverage pursuant to Texas Civil Statutes, Article 6675c.

This coverage requirement does not apply to sole proprietors, partners, and corporate officers who meet the requirements of the Texas Workers' Compensation Act (Act), Article 406.09(c) and who are explicitly excluded from coverage in accordance with the Act.

b. Automobile Liability Insurance. Vendors, suppliers, haulers and other non-ROCIP participants as outlined in 5.3.2.1 shall provide workers' compensation insurance as specified in paragraphs 5.3.1.1 and 5.3.1.2.

c. Commercial General Liability Insurance. Vendors, suppliers, haulers, and other non-ROCIP participants as outlined in 5.3.2.1 shall provide Commercial General Liability Insurance as specified in paragraphs 5.3.1.1 and 5.3.1.4.

c) Property Coverage

a. The General Contractor shall provide all risk property coverage including but not limited to fire, wind, hail, theft, vandalism and malicious mischief for all real and personal property placed in the General Contractors care, custody, and control. The policy shall include transit or cargo coverage. The limit of liability shall be a minimum of 100% of the value of the equipment. The City of Austin shall be a Loss Payee/Mortgagee on the policy as Their Interest May Appear."

- .8 Other Insurance.
- a) The ROCIP as outlined herein is intended to afford broad coverage and relatively high limits of liability, but it may not provide all the insurance needed or desired by CONTRACTOR, Subcontractors or Sub-subcontractors. Any insurance or limits of liability greater than those provided by the ROCIP or other coverages which CONTRACTOR, Subcontractors or Sub-subcontractors may be required by Law to carry or may need for its own protection, shall be at their own expense and the cost therefore may not be included in the Bid.
 - b) If CONTRACTOR chooses to have such policies endorsed to recognize the Project site during the construction period, coverage should be excess and/or Difference In Conditions (DIC) of the OWNER's ROCIP as determined by CONTRACTOR or Subcontractor. OWNER shall be endorsed as additional insured.
 - c) Any policy of insurance covering CONTRACTOR, any Subcontractor or any Sub-subcontractor for its owned and leased machinery, water craft, vehicles, tools, or equipment (used in connection with the Project) for physical loss or damage shall provide a Waiver of Subrogation Rights against OWNER, Project Manager, if applicable, CONTRACTOR, Subcontractor, or Sub-subcontractor that is insured under the ROCIP, including the employees, agents or assigns of any one of them.
- .9 Mutual Waiver of Property Damage and Right of Recovery. To the extent of coverage provided by the Builder's Risk Insurance, OWNER has waived its rights to recover physical damage or loss to its property against CONTRACTOR, Subcontractors and Sub-subcontractors. CONTRACTOR, Subcontractors and Sub-subcontractors shall also waive any and all rights each may have to recover physical damage or loss to the property of each against OWNER, its designees, E/A, and other contractors engaged in the Project. This waiver of the right of recovery for property damage shall be binding upon any property, automobile or equipment insured in respect to any subrogation rights which such insurer may possess by virtue of any payments of damage or loss. CONTRACTOR, Subcontractors and Sub-subcontractors agree as a condition of performing Work on the Project to execute such documents and coverage described herein and the waiver(s) of subrogation as described herein.
- .10 Certificates of Insurance. CONTRACTOR shall submit three (3) copies of the required Certificates of Insurance (Section 00650) for CONTRACTOR and all Subcontractors and Sub-subcontractors to OWNER prior to their commencing Work on the job site. CONTRACTOR and all Subcontractors and Sub-subcontractors shall provide the following information on the Certificate of Insurance:
- Workers' Compensation (off-site)
 - General Liability (off-site)
 - Umbrella/Excess Liability (off-site)
 - Automobile Liability - Primary (CONTRACTOR must provide hired/non-owned)

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.6 Permits, Fees: Add the following:

"OWNER will obtain and pay for the following permits, licenses and/or fees:

- .1 Site Development Permit.
- .2 Building Permit(s). OWNER's responsibility for obtaining and paying for the Building Permit(s) shall be limited to the following where applicable, and is included in Allowance Item No. 1: the required Electrical Service (Aid of Construction) Fee, Water and Wastewater Tap Fees, Water and Wastewater Capital Recovery Fees, and

Septic Permit Fee. The OWNER's responsibility for obtaining and paying for the Building Permit(s) excludes securing and paying for the following where applicable: Driveway Permit (Concrete) Fee, Electrical Permit, Mechanical Permit, Plumbing Permit, Water Engineering Inspection Fee, Temporary Use of Right-of Way Permit, the gas company's Gas Yard Line Contribution Fee, and any other permits/fees not listed above."

6.7 Laws and Regulations: Add the following:

"**6.7.4** This Work is subject to the Texas Pollution Discharge Elimination System (TPDES) permitting requirements for the installation and maintenance of temporary and permanent erosion and sediment controls and storm water pollution prevention measures throughout the construction period.

OWNER has prepared a Storm Water Pollution Prevention Plan (SWPPP). Reference Section 01096 for this SWPPP.

OWNER shall file the Owner's Notice of Intent to the Texas Commission on Environmental Quality (TCEQ). OWNER shall pay the TPDES storm water application fee.

CONTRACTOR's responsibilities are as follows:

- .1 Obtain a signed certification statement from all Subcontractors responsible for implementing the erosion / sedimentation controls and other best management practices that are part of the SWPPP. This statement shall indicate that the Subcontractor understands the permit requirements. The certified statement forms shall be attached to and become part of the SWPPP.
- .2 Fill out the TCEQ's "Construction Site Notice" form, which is Attachment 2 to the TPDES General Permit TXR150000 (form available from OWNER or on the Internet at <http://www.tceq.state.tx.us/assets/public/permitting/waterquality/attachments/stormwater/txr152d2.pdf> and post it near the main entrance of the Work, or at multiple postings if the Work is linear. Mail a copy of the completed Construction Site Notice form to the local Municipal Separate Storm Sewer Systems (MS4) representative:

TPDES Program Coordinator
City of Austin – WPD – ERM
P.O. Box 1088
Austin, TX 78767
- .3 Maintain all erosion/sedimentation controls and other protective measures identified in the SWPPP in effective operating condition.
- .4 Perform inspections every five (5) working days and after every ½ inch rainfall event, noting the following observations on an inspection form provided by OWNER:
 - Locations of discharges of sediment or other pollutants from the site.
 - Locations of storm water / erosion / sedimentation controls that are in need of maintenance.
 - Locations of storm water / erosion / sedimentation controls that are not performing, failing to operate, or are inadequate.
 - Locations where additional storm water / erosion / sedimentation controls are needed.

- .5 Maintain at Work site at all times a copy of the SWPPP (with all updates, as described below) and inspection reports.
- .6 Update the SWPPP as necessary to comply with TPDES permitting requirements, which includes noting changes in erosion / sedimentation controls and other best management practices that are part of the SWPPP and which may be necessary due to the results of inspection reports. Any SWPPP revisions or updates must be signed and certified by a Certified Professional in Erosion and Sedimentation Control (CPESC) or a Registered Professional Engineer. If the SWPPP includes engineering calculations, then SWPPP must be sealed and signed by a Registered Professional Engineer.
- .7 Upon completion of the Work, provide TPDES records to OWNER."

6.11 Safety and Protection: Add the following to paragraph 6.11.2:

"**6.11.2** CONTRACTOR shall comply with all provisions of the "Project Safety Manual" provided by OWNER as part of its insurance coverage program under the Rolling Owner Controlled Insurance Program (ROCIP). This program is in addition to CONTRACTOR's existing safety program, not in lieu of that program."

ARTICLE 11 - CHANGE OF CONTRACT AMOUNT

11.4 Determination of Value of Work: Add the following to paragraph 11.4.1.2:

"11.4.1.2 In the case of a Change Order determined by a mutually agreed lump sum or unit price properly itemized and supported by sufficient substantiating data, including documentation by subcontractors performing the work, to permit evaluation, the following method may be used:

COMPONENT ONE - The R.S. Means Co., Inc. 'Building Construction Cost Data' - latest edition - will be used as a basis for evaluating:

1a - the cost of labor (base rate, including fringe benefits),

1b - the cost of material and equipment to be incorporated in the Work, and

1c - the cost of tools, equipment and facilities necessary to accomplish the Work described in the change.

COMPONENT TWO - The costs of payroll taxes and insurance, Liability and Builder's Risk Insurance, shall be calculated as follows:

2a - Payroll taxes and Workers' Compensation Insurance <25% of payroll (Item 1a) (14.65% of 1a for ROCIP Projects)>

2b - Liability and Builder's Risk Insurance <2% of "total costs" (Items 1a, 1b, 1c, and 2a) (.034% of "total costs" for ROCIP Projects)>

COMPONENT THREE - Overhead and profit shall be calculated as follows:

3a - For Subcontractors and for those portions of the Work performed by CONTRACTOR'S own forces:

15% of the first \$10,000.00 of costs and 10% of the balance over \$10,000.00.

("costs" = Items 1a, 1b, and 1c, above, broken down into Contractor and Subcontractor costs).

3b - For the CONTRACTOR for that portion of the Work performed by Subcontractors:

10% of the first \$10,000.00 of the Subcontractor costs and 7.5% of the balance over \$10,000.00.

("costs" = Items 1a, 1b, and 1c, above, broken down into Subcontractor costs)

COMPONENT FOUR - Bonds

Performance and Payment Bond according to the following table ("TOTAL COST" = Items 1a, 1b, 1c, 2a, 2b, 3a and 3b,):

<u>DOLLAR VALUE OF CONTRACT</u>	<u>% OF TOTAL COST OF CHANGE ORDER ADDED FOR BOND EXPENSE</u>
100,000 or less	2.5
100,001 thru 500,000	1.5
500,001 thru 2,500,000	1.0
2,500,001 thru 5,000,000	0.75
5,000,001 thru 7,500,000	0.70
OVER 7,500,000	0.65

- The total costs for the change, whether additive or deductive, shall be the sum total of COMPONENTS ONE - FOUR.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.7 Warranty Period: Add the following:

"13.7.5 OWNER will utilize a "Warranty Item Form" (attached at the end of this Section) for the purpose of providing Written Notice of warranty defects to CONTRACTOR. CONTRACTOR shall date, sign, complete and return the form to OWNER when the defect is corrected, including such information on or attached to the form to describe the nature of the repairs or corrections that were made. If the defect cannot be corrected in seven (7) Calendar Days, CONTRACTOR shall provide a written explanation to the Owner's Representative describing the repairs needed and the time required to complete the repairs."

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 Application for Progress Payment: Delete 14.1.1 and replace with the following (changes to the original text are identified by underling):

"14.1.1 No more often than once a month, unless authorized as part of the Mobilization Prompt Payment Program, CONTRACTOR shall submit to Owner's Representative for review a completed and executed Application for Payment, in a form acceptable to OWNER, covering the Work completed as of the date of the Application and not previously paid and accompanied by such supporting documentation as required by the Contract Documents.

Add the following .1:

.1 - Mobilization Prompt Payment Program. During critical mobilization periods, as identified by the CONTRACTOR and as approved by OWNER in accordance with 00700 2.4.2.1 of this Contract, CONTRACTOR shall submit bi-monthly Applications for Payment. The additional Pay Applications will include any costs accrued during the periods of critical mobilization. The Program will allow the CONTRACTOR and Subcontractors to invoice for costs as they are accrued during periods of critical mobilization. The CONTRACTOR shall submit bimonthly invoices to the OWNER for such costs. The CONTRACTOR shall pay Subcontractors for costs within 10 days of receipt of payment from OWNER.

14.1 Application for Progress Payment: Delete 14.1.6.3 and replace with the following:

".3 Time Extension Request."

".4 Payroll Authorization and Certificates of Insurance. CONTRACTOR shall provide monthly payroll reports (including CONTRACTOR and all Subcontractors and Sub-subcontractors) to the ROCIP Insurance Administrator on forms provided by the ROCIP Administrator or on other mutually agreed upon forms. In addition, Contractor shall assure that current certificates of insurance are provided as necessary for CONTRACTOR and all Subcontractors and Sub-subcontractors. A Payment Form signed by the ROCIP Administrator shall be submitted with each Application for Payment. Failure to submit this form will result in withholding of payment. The ROCIP Insurance Administrator will generate the Payment Form upon receipt of the monthly payroll report and required certificates of insurance."

".5 Construction Progress Photos."

14.4 Decisions to Withhold Payment:

Reference 14.4.1; add the following:

".16 failure of CONTRACTOR to meet the ROCIP and/or Safety Program requirements.

.17 property damage losses that are the responsibility of the CONTRACTOR (reference section 00810, 5.3.2.5.4)"

14.7 Substantial Completion:

Add the following:

"**14.7.3** Substantial Completion of the work is defined as successful completion of the Performance Test in accordance with Specification Section 11399 "Disk Filter and Appurtenances" and includes all work identified in Specification Section 01045 "Sequence of Construction" as Phases I, II, and III and also as shown on the Phasing Drawings Nos. AP05-PH1, AP06-PH1, AP05-PH2, AP06-PH2, AP05-PH3, and AP06-PH3."

14.8 Partial Utilization: Delete 14.8.1 and replace with the following (changes to the original text are identified by underlining):

- “.1 OWNER at any time may request CONTRACTOR to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to Owner’s Representative that such part of the Work is substantially complete and request Owner’s Representative to issue a notice specifying what portion of the Work is substantially complete for the purpose of payment and what Work remains to be done on the portion being accepted. CONTRACTOR at any time may notify Owner’s Representative that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request Owner’s Representative to issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted. The provisions of paragraphs 14.7.1 and 14.7.2 will apply with respect to the notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted.”

14.10 Final Application for Payment: Add the following paragraph(s) to 14.10:

- “.10 Documentation required by the ROCIP.”
“.11 TPDES records in accordance with 6.7.4.”

14.11 Final Payment and Acceptance:

Add the following to paragraph 14.11.1:

“If the sole remaining, unfinished item of the Work is revegetation or other permanent erosion control, including, if applicable, tree mitigation, (collectively, the “revegetation”), the CONTRACTOR may execute a zero-cost “Revegetation Change Order” for such Work and post fiscal security acceptable to Owner to ensure completion of the revegetation.

The fiscal security will be a bond, letter of credit, or cash escrow in a form promulgated by OWNER and posted with OWNER’s Watershed Protection Department.

Upon receipt of the executed Revegetation Change Order and fiscal security, the Owner’s Representative will issue a conditional letter of final acceptance to the CONTRACTOR for the Work, excluding the revegetation, which establishes the Final Completion Date for that Work and initiates the one year warranty period.

This revegetation must be accomplished within 120 Calendar Days of the date of Final Completion of the balance of the Work or such other stipulated time for completion directed in the Change Order. When the revegetation has been established, OWNER will inspect for final acceptance of that portion of the Work and, as applicable, initiate the one year warranty period for that Work.

If the revegetation is not completed within the 120 Calendar Days or such other time set forth in the Change Order, the OWNER, at its option, may complete the Work using the posted fiscal security.”

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.3 Owner May Terminate with Cause: Add the following paragraph to 15.3.1:

- “.8 if CONTRACTOR fails to meet the ROCIP and/or Safety Program requirements;”

WARRANTY ITEM NO. _____

**(South Austin Regional WWTP
Filter Improvements)**

The General Conditions of the Contract require that Warranty Defects be corrected within 7 days after written notice is received.

TO: _____
contractor name address / telephone / fax / email

ATTENTION OF: _____

FROM: _____
project manager name / address / telephone / fax / email

PROJECT: _____
name / location / CIP ID number

END OF ONE YEAR WARRANTY: _____

SUBJECT: _____

- If checked, the damage requires immediate attention. The Contractor has been called.
- If checked, the Consultant has been asked to consult with the Contractor on the problem.

PLEASE CORRECT OR REPAIR THE FOLLOWING ITEM(S):

DATE OF REQUEST _____

SIGNATURE _____
Project Manager

XC:

- _____ Phone No. _____

RESPONSE FROM CONTRACTOR: DATE CORRECTION WAS MADE: _____

The Contractor must endeavor to correct the defect within 7 calendar days after written notice is given. If the defect cannot be corrected in that time, Contractor shall provide a written explanation to the Owner's Representative describing the repairs needed and the time required to complete the repairs.

Description of corrections made:

DATE OF REPLY _____ SIGNATURE _____

When the repair is complete, the contractor should return a copy to each of the following:

- _____ Phone No. _____

END

3.02 PREPARATIONS

A. Precautions

1. Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval for pipeline relocation from the City and the Engineer. All costs associated with relocating utilities shall be paid by the Contractor.
2. During all temporary filtration and bypass pumping operation, the Contractor shall protect the Junction Boxes, NPW/reuse influent pumps at JB 5, NPW/reuse pump station, main and all existing utilities from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to the existing system and utilities caused by human or mechanical failure.

3.03 INSTALLATION AND REMOVAL

- A. The Contractor shall make connections to existing JB 5, JB 6, NPW/Reuse pump station wet well, Junction Box D, and chlorination system. Contractor shall provide adequate pipe and all ancillary items.
- B. The Contractor shall exercise caution and comply with all applicable OSHA requirements when working inside manholes, junction boxes or wet wells, and when working in the presence of sewer gases, combustible gases, oxygen deficient atmospheres, and confined spaces.

3.04 - 3.10 (NOT USED)

3.11 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

END OF SECTION

ROCIP Project: Withhold insurance cost. Please refer to sections 00425 & 00810 for information.

SECTION 16120

480 VOLT MOTOR CONTROL CENTERS

PART 1 GENERAL

1.01 SUMMARY

- A. Scope of Work
 - 1. The Contractor shall furnish and install the motor control centers as specified herein and as shown on the PLANS.

1.02 RELATED WORK NOT INCLUDED

- A. The PLANS designate the type, number, size and rating of devices included in the Motor Control Centers (MCCs)
- B. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 QUALIFICATIONS

- A. The manufacturer of the MCCs shall also manufacture the majority of components and subsystems therein (i.e., circuit breakers, starters, controls relays, etc.)
- B. The MCCs shall be designed, constructed, and tested in accordance with the latest applicable requirements of NEMA, ANSI, UL, and NEC standards.
- C. MCCs shall be as manufactured by Square D Company, General Electric Company "G.E.", Allen-Bradley, or Cutler Hammer Corporation, or approved equal.

1.04 SUBMITTALS

- A. Submit shop drawings in accordance with the requirements of Section 01300 of the Contract Specifications. Include:
 - 1. Dimensioned/scaled top and bottom views, front elevations, and internal component/device layouts
 - 2. One-line diagrams and wiring diagrams,
 - 3. Catalog cut sheets. Include protective device coordination curves and current limiting circuit breaker/fuse peak current let through curves, where applicable.
 - 4. Key interlock scheme drawing and sequence of operations, where applicable.
 - 5. Submit VFD maximum heat loss
 - 6. As a minimum, the Contractor shall provide the recommended VFD type (Constant Torque, Variable Torque) to the MCC manufacturer in accordance with the pump/motor manufacturer's recommendations and requirements necessary for the pump/motor manufacturer to satisfy the driven equipment performance requirements. Submittals to reflect the recommended VFD type provided by the Contractor.

ROCIP Project: Withhold insurance cost. Please refer to sections 00425 & 00810 for information.

1.05 OPERATION AND MAINTENANCE MANUALS

- A. Furnish Operation and Maintenance Manuals in accordance with the requirements of Section 01730 of the Contract Specifications. Include:
1. Installation and operation manuals.
 2. Renewal parts bulletin.
 3. As built drawings, including approved shop drawings.
 4. Test data.
 5. Sealed and signed arc flash hazard analysis, harmonic study, motor starting, short circuit, and coordination study report. Report to include all final setpoints used.
- B. Submit report of results of arc-flash hazard analysis, short circuit analysis, coordination study, harmonic study, and motor starting studies described in Subsection 1.08, this Section of the Specifications, in accordance with the requirements of Section 01300 of the Contract Specifications. Submit preliminary analysis report(s) for review. Submit studies for permanent electrical services, staged/phased services, and temporary electrical services. Include the following data:
1. Executive Summary discussion narrative
 2. Short-Circuit Methodology Analysis Results and Recommendations, with discussion narrative and device evaluation/comparison tables as applicable
 3. Protective Device Coordination Methodology Analysis Results and Recommendations, with discussion narrative and device settings tables as applicable
 4. Time-Current Coordination Graphs and Recommendations
 5. Harmonic study results at each bus, as well as the additional locations as defined on the PLANS, and associated recommendations.
 6. Arc Flash Hazard Methodology Analysis Results and Recommendations with discussion narrative and tables as applicable. Include text of Arc Flash labels to be provided
 7. Motor starting methodology analysis results and recommendations. Submit composite graphs of voltage dip associated with motor starting measured at the primary of the process area service transformer, and motor control center bus (at minimum) for the sequential motor starting described hereinafter. Include composite graphs of motor and pump speed along with associated voltage dip. Provide commensurate graphs for each of the various reduced voltage auto-transformer tap settings and start-to-run transition time settings examined, and the final recommended setpoints. Include copies of motor and pump speed-torque characteristics and additional motor and pump information used in the study such as inertia, locked rotor current, etc
 8. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the 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. Use 11" x 17" sized paper, at minimum
 9. Studies input data such as X/R ratio, cable impedance, and other information, in tabular form.
- C. Additional information as required by subsection 1.12, this section of the Specifications.

ROCIP Project: Withhold insurance cost. Please refer to sections 00425 & 00810 for information.

1.06 STORAGE AND HANDLING

- A. Protection
1. The Contractor, and hence the MCC supplier, shall be responsible for safety of the MCC during storage, transporting and handling.
 2. At all times the MCC shall be housed inside a moisture free, non-porous, extra heavy duty plastic weatherproof housing.
 3. Interior and exterior of MCC shall be kept clean at all times.
 4. Energize the space heaters within the MCC and energize during storage and installation for humidity control.
- B. Additional project job site storage requirements: Upon delivery to the project site and prior to final installation, protect and store in accordance with the following:
1. Environmentally protected and stored in climate controlled (temperature, humidity, and non-corrosive class) environment at the job site. Size, furnish and install temporary gaseous air scrubbers, air conditioners, and additional environmental control equipment complete with branch circuiting conduit/wire as required to maintain in a controlled environment at the following conditions:
 - a. Ambient Dry Bulb Temperature:
 - 1) Minimum: 68 degrees Fahrenheit.
 - 2) Maximum: 85 degrees Fahrenheit.
 - b. Ambient Relative Humidity: Maximum: 50%.
 - c. Ambient Corrosion Level: International Society of Automation Class: G1
 2. Every effort shall be made to provide all necessary electrical power connections ready for immediate connection to equipment upon arrival of equipment on jobsite.
 3. Upon arrival of equipment onto job site, a maximum of ten (10) minutes shall be allowed for equipment to be left without to allow proper transition of power of equipment, especially any 120 VAC powered equipment, to ensure all air conditioning, heating, and gaseous air scrubbing equipment are fully operational with a maximum of a 10 minute down time during this transition of power.
 4. Furnish and install replacement air scrubber media, air filters, etc., as required for proper operation of the environmental control equipment.

1.07 TOOLS AND SPARE PARTS

- A. Furnish the following spare parts with the equipment for each MCC in conformance with the specifications:
1. One (1) – Set of fuses (minimum 3) for each type and size used.
 2. One (1) – Set of starter contacts for every three(3) like starters used (a minimum of 1 for each size used). If contacts are not replaceable a spare starter for each size used shall be supplied.
 3. Two (2) - Contactor coils for every NEMA size and type starter installed, a minimum of one coil per size.
 4. Two (2) - Spare control relays for each type used. Control relay shall be furnished complete with relay coils, Four (4) Normally Open (N.O.) contacts, Four (4) Normally Closed (N.C.) contacts, and shall be furnished with Relay Manufacturer's Transient Voltage Suppression Module.
 5. One (1) - Spare timing relay.
 6. Two (2) – Sets of overload heaters for each size and type used.
 7. One (1) Motor Management Relay / Motor Protection Relay, where Motor Management Relay / Motor Protection Relays are required by the PLANS
 8. One (1) Power Monitoring Unit (PMU)

ROCIP Project: Withhold insurance cost. Please refer to sections 00425 & 00810 for information.

9. Provide breaker test set for Solid-State-Trip units for each type used.
10. One (1) quart of touch-up paint.

1.08 SPECIAL MANUFACTURER SERVICES

- A. Prepare an arc-flash hazard analysis study, harmonic study, and a coordination study, complete with short circuit calculations and coordination curves reflecting calculated fault values and recommended and/or proposed fuse type/ratings, motor protective relay settings, equipment/device settings (as applicable) from the 4160V level at the existing Filter Power Center switchgears "5000A" and "5000B" (with close coordination with the Owner's upstream 12470V protective devices) through the 208/120V subsystem level equipment and devices at the Filter Building. As shown on the PLANS, the Filter Power Center switchgears "5000A" and "5000B" serve the Filter Building, the NPW/Water Reuse Pump Station, and the Dechlorination Facility. Thevenin equivalent system characteristics for the existing NPW/Water Reuse Pump Station, existing Dechlorination Facility, and the existing 12470V service to transformers "FBPC-XFMR-5000A" and "FBPC-XFMR-5000B" will be provided by the Owner after Bid Award to facilitate the Contractor's system study effort. Arc-flash hazard analysis study, harmonic study, and a coordination study, complete with short circuit calculations and coordination curves shall also be performed from the 480V level starting at "NPW-PDP-1" to the downstream equipment served by "NPW-PDP-1". Thevenin equivalent characteristics will be provided for the 480V distribution system upstream of "NPW-PDP-1" by the Owner after Bid Award to facilitate the Contractor's system study effort. Coordination with the Owner is required. Additional details concerning the implementation of the short circuit, coordination, arc flash, and harmonic studies such as main-tie-main circuit breaker states to be assumed, etc., will be provided after Bid Award. Information associated with existing loads to be included in the system studies such as motor speed-torque curves, pump speed-torque curves, pump inertia, etc., shall be provided by the Owner after Bid Award. Exception: existing protective device (circuit breaker, fuse, etc.) performance curves, cable damage curves, and other data commonly available via system analysis software packages will not be provided by the Owner.
- B. Prepare motor starting studies, complete with load calculations and voltage dip curves reflecting calculated load, voltage, motor and load speed-torque characteristics and values, tabulated voltage dip duration and magnitude from the 4160V level at the existing Filter Power Center switchgears "5000A" and "5000B" through the 208/120V subsystem level equipment and devices at the Filter Building, and recommended and/or proposed protective relay settings, reduced voltage auto-transformer starter tap settings, start to run transition time settings, equipment/device settings (as applicable), etc. for all proposed motor starters/distribution equipment on the project. In the studies, include the previously mentioned Thevenin equivalent system characteristics for the existing NPW/Water Reuse Pump Station, existing Dechlorination Facility, and the existing 12470V service to transformers "FBPC-XFMR-5000A" and "FBPC-XFMR-5000B" provided by the Owner. All studies shall be performed assuming each pump starts against a closed discharge valve. Assume that once the pump motor reduced voltage solid state starter transitions from the "start" (reduced voltage solid state reduced voltage setting) setting to the "run" (full voltage solid state voltage setting) setting, the pump discharge valve will open. Verify and coordinate the validity of these assumptions and the sequence of valve operation with the Owner after Bid Award and follow the recommendations of the Owner regarding the process system operation. Repeat all motor starting studies for each reduced voltage starter tap setting (50%, 65%, etc.) available for the reduced voltage starter, and also among each tap setting with a minimum of five different time limiting settings as applicable for each tap setting, to determine the optimal setpoints to successfully start the load while minimizing service

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voltage dip. Additionally, perform all motor starting studies assuming one main 4160V utility service is energized, the tie circuit breakers are closed, and the second 4160V utility service is de-energized. Perform the motor starting studies for the sequential progressive starting of the proposed pumping units. Repeat studies for each Filter Building 480V electrical service.

- C. The study should also include adjustments/ recommendations in the proposed/new protective relaying devices to better coordinate with the existing upstream protective devices in lieu of replacing any of the existing protective devices. The study shall also include any adjustments, recommendations, and requirements of the Owner and be fully coordinated with the Owner and the Owner's requirements. Coordinate with the Owner as required and submit documentation as required to meet the Owner's requirements at no additional cost to the Owner. The manufacturer's services should also include setting/re-adjusting and testing/calibration of the proposed protective devices and protective relaying, etc. (Referenced below).
- D. As shown on the PLANS, this project involves the staged/phased construction of the electrical service equipment associated with the Filter Building as well as multiple proposed temporary electrical services to facilitate the continuous operation of the Owner's process plant. To facilitate this staged/phased construction approach and the use of temporary electrical services, additional system studies will be required in order to develop protective device setpoints for the staged/phased electrical services and temporary electrical service equipment, etc., in order to fulfill the construction sequencing requirements of this project. The manufacturer shall review the construction sequencing requirements of the project, temporary electrical services of the project, and provide system studies as required to address the interim construction stages complete with associated interim protective device settings and temporary electrical services At No Additional Cost to the Owner.
- E. Perform the arc flash hazard analysis in conjunction with the short circuit and coordination analysis previously described herein and also in compliance with IEEE 1584 and NFPA 70E standards. The flash protection boundary and incident energy shall be calculated at all points in the distribution system (transformers, motor control centers, panelboards, etc.) where work could be performed on energized parts. The following additional requirements apply for the arc flash hazard analysis:
 - 1. Perform arc flash hazard studies assuming one main 4160V utility service is energized, the tie circuit breakers are closed, and the second 4160V main utility service is de-energized.
 - 2. Repeat studies for each electrical service.
 - 3. Calculations to address worst case (maximum) hazard analysis. Describe scenario employed in submittals.
 - 4. Perform analysis for one (1) additional configuration of main-tie-main switch/breaker positions that will be explained by the Owner during the pre-submittal conference.
- F. The arc flash hazard analysis effort shall also include:
 - 1. Reporting incident energy values based upon recommended protective device settings for all equipment,
 - 2. Reporting recommendations to reduce AFIE levels and enhance worker safety
 - 3. Furnish and install label(s) for all equipment included in the study indicating the following, at minimum:
 - a. System voltage
 - b. Shock and Flash protection boundaries

ROCIP Project: Withhold insurance cost. Please refer to sections 00425 & 00810 for information.

- c. Personal protective equipment requirements for each electrical task based upon hazard category (including flame resistant clothing requirements).
 - d. Arc flash incident energy value (cal/cm²)
 - e. Limited, restricted, and prohibited approach boundaries
 - f. Study report number and issue date
 - g. Additional information required by the applicable NFPA and IEEE standards.
 - h. Labels shall be manufacturer's standard labels with quantity and mounting location per manufacturer's standard.
- G. Perform a harmonic study in accordance with IEEE 519 from the 4160V level at the existing Filter Power Center switchgears "5000A" and "5000B" (with close coordination with the Owner's upstream 12470V protective devices) through the 208/120V subsystem level equipment and devices at the Filter Building. Additionally, a harmonic study in accordance with IEEE 519 also be performed from the 480V level starting at "NPW-PDP-1" to the downstream equipment served by "NPW-PDP-1". Including all necessary equipment (motor control center, switchboard, panelboard, transformer, feeders, loads, etc.) as required to demonstrate compliance with the harmonic performance requirements in the specific locations as shown on the PLANS. Refer to the PLANS. Include effort to adjust filter sizes (as applicable) and determine optimal VFD settings in accordance with the actual installed equipment.
- H. THE ARC-FLASH STUDIES, THE SHORT CIRCUIT CALCULATIONS AND ANALYSIS, THE COORDINATION STUDY, AND THE MOTOR STARTING STUDIES, AND HARMONIC STUDY SHALL BE PERFORMED:
1. UTILIZING SKM SOFTWARE, LATEST RELEASE – MICROSOFT WINDOWS VERSION. In addition to the hard copy submittal, an electronic copy of the FINAL VERSION of the short circuit analysis/calculations and the protective device setting curves (time-current curves) and summary setting tables, etc. shall be submitted on CD-ROM.
 2. By a State of Texas Licensed Professional Electrical Engineer. The final version of the studies shall be signed and sealed by a Professional Engineer who is licensed in the State of Texas as an electrical engineer.
- I. Furnish the services of a qualified, experienced, factory trained technical (non-sales type) representative to assist in the installation of the equipment. Include checking alignment of parts, wiring connections, operation of all parts (relays, starters, monitoring relays, etc.). Include time to correct and recheck any discrepancies which are discovered. Also include providing the OWNER with a report certifying that the equipment was installed, adjusted, properly tested, and set in accordance with the manufacturer's recommendations and is in satisfactory operating condition. Format and quantity of reports shall be per the requirements of Section 01300 of the Contract Specifications.

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- J. Manufacturer's technical representative is to set, adjust and test all protective relays, etc. in the presence of a representative of the Owner. The settings will be based on coordination and short circuit studies performed in compliance with Section 16120 of the Specifications "480 Volt Motor Control Centers", paragraph 1.08 "Special Manufacturer's Services". Provide the Owner with test report certified by the manufacturer. Include a record of all settings. Format and quantity of reports shall be per the requirements of Section 01300 of the Specifications. The Manufacturer shall furnish the protective device of the appropriate characteristics that shall be the most suitable for the proper protection and coordination of the system at No Additional Cost to the Owner.
- K. Any problems encountered with the operation of equipment, parts, components, etc. installed within the MCC line-up shall be repaired/remedied by the manufacturer's technical representative.
- L. VFD Harmonic Performance Requirements: Each VFD shall meet the following minimum harmonic performance requirements at the location identified on the PLANS:
 - 1. Compliance with latest version IEEE 519, with the location identified the PLANS serving as the IEEE 519 "point of common coupling".
 - 2. Should a harmonic filter (i.e., reactor, transformer, etc.) be required to meet the above harmonic performance requirements, the OWNER will select the characteristics of the harmonic filter that are most suitable for the system in providing compliance to the harmonic performance requirements. The Manufacturer shall furnish the harmonic filter of the appropriate characteristics that shall be the most suitable for the proposed operation of the system at No Additional Cost to the OWNER.

PART 2 PRODUCTS

2.01 GENERAL

- A. For additional construction notes and special requirements, refer to the PLANS. Also refer and adhere to the requirements of the PLANS.
- B. Motor Control Center shall not exceed the dimensions shown on the PLANS. Compartment/component arrangement shall be as shown on the elevation drawings. Provide for incoming feeder entering from below or above, and for outgoing circuits exiting from above and below, as shown on the PLANS.

2.02 CONSTRUCTION

- A. Structure
 - 1. Enclosures shall be NEMA Type 1, Gasketed. Enclosure shall be the totally enclosed, dead front, free standing type suitable for back-to-wall mounting.
 - 2. MCC shall consist of required number of vertical sections bolted together to form a rigid self supporting assembly. Each vertical section shall be nominally 90 inches high. Each vertical section shall be subdivided into compartments (units). Refer to the PLANS for additional dimensional requirements.
 - 3. The MCC shall contain a top horizontal wireway and a bottom horizontal wireway running the full width of the MCC. The bottom horizontal wireway shall be covered by hinged doors. Each vertical section shall include a top plate and a bottom plate; plates shall be removable.

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4. Each vertical section containing a plug-in unit shall also contain a vertical wireway that interconnects the top and bottom horizontal wireways. The vertical wireway shall be covered by a hinged door.
5. Each unit within each vertical section shall have a hinged door. Each unit shall have a padlockable disconnect operating handle. Include provisions for up to three padlocks. Handle shall be mechanically interlocked with the door to prevent personnel from opening the door when the unit disconnect is in the ON position. Provide handle-door interlock defeating (bypass) feature. Provide non-defeatable interlock to prevent the installation of a plug-in unit unless the unit disconnect is in the OFF position.
6. Unused unit spaces in each vertical section shall be covered by hinged blank doors and equipped to accept future units..
7. All combination starter and feeder units of plug-in construction shall utilize mechanical guides to insure positive alignment of the unit stabs to the section vertical bus. For each unit, shutters shall be provided to cover bus access openings when unit is removed. Unused structure openings shall have plugs or covers to prevent entry of foreign objects into the bus area.
8. Structure finish shall be primed and painted using the manufacturer's standard finishing process. Finish shall be applied at the manufacturing plant. Color shall be manufacturer's standard.
9. Provide each vertical section with a space heater wired to terminal blocks in the respective section. Size the space heater per manufacturer's standard.
10. Structure shall include field removable lifting means.
11. Where an incoming line section is required by the PLANS, the Incoming Line Section shall include lugs for the connection of the field wiring shown on the PLANS.

B. Buses

1. All buses shall be tin plated copper.
2. The main horizontal bus shall extend the entire length of the motor control center. Buses shall be fully rated and the rating shall be based on 65 degrees C maximum temperature rise in a 40 degree C ambient. The main bus shall be rated as shown on the drawings and/or data sheets. Provisions shall be provided to facilitate future extension of the buses.
3. The vertical bus in each section shall be rated for 300 ampere, at minimum.
4. The minimum RMS symmetrical short circuit current rating of the buses shall be as indicated on the one-line diagram drawings.
5. The power buses shall be isolated by barriers from starters, wire troughs, and other areas.
6. A continuous ground bus shall be furnished for the entire length of the MCC. The ground bus shall be rated for 50 percent of the main horizontal power (phase) bus rating, at minimum. Stack multiple ground bus bars as required to provide the required ground bus rating. Provide ground bolted connectors for the size and quantity of wire at each end of the bus as shown on the PLANS.

C. Wiring

1. Unless otherwise noted, the MCC shall be wired Class II, type B construction with terminal blocks for each cubicle.
2. All wiring shall be neatly bounded with tie-wraps and supported to wire ways supports.
3. Wiring shall be terminated to split-type terminal blocks.

D. Identification

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1. All component and control identification labels shall include the device name and number exactly as it appears on the PLANS. Refer to the PLANS.
2. All control wires shall be tagged and coded with an identification number. Tagging type and wire coding shall be per manufacturer's standard..
3. All terminal blocks shall be identified.
4. Properly label the devices mounted inside each section using manufacturer's standard laminated labels installed in accordance with the manufacturer's standard method.
5. Nameplates:
 - a. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - b. Color: White-Black-White
 - c. Lettering: Engraved through the face layer to the melamine middle layer. Nameplates located on the face of each section/compartment of each MCC shall be legible at a distance of six feet from the nameplate.
 - d. Accessories: Provide holes for mechanical fastening
 - e. Attachment Means: Secured with two Stainless Steel screws/bolts per manufacturer's standard; use of adhesives shall not be accepted.
6. Furnish and install nameplates for:
 - a. Each equipment/device/etc. installed/mounted on the face of the MCC.
 - b. Each exterior section/compartment of each MCC.
 - c. Overall entire lineup of MCC, i.e. a master nameplate. Master nameplate shall include the tag of the MCC as shown on the PLANS, at minimum, in addition to manufacturer's standard information for master nameplates.

2.03 BRANCH FEEDER CIRCUIT BREAKERS

- A. Provide thermal magnetic molded case circuit breakers with the following minimum requirements:
 1. U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than that of the main bus.
 2. Circuit breaker shall be three pole, 600 volt with a maximum continuous current carrying capacity shown on the PLANS.
 3. Breakers shall operate continuously when operating/running current is equal to 80% of the long time trip setting (or frame rating, as applicable) of the breakers.
 4. Breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick make, quick break action independent of the speed of the toggle handle operation. The design shall provide common tripping of all poles. Breakers shall be suitable for reverse feeding.
 5. Provide complete with rating plug and other accessories as required for proper operation of circuit breaker.
 6. Provide mechanical padlock attachment for each circuit breaker.
 7. Furnish lugs for feeders where required to facilitate field wiring termination, sizes shall be as required by the PLANS.
 8. All circuit breakers shall be unit mounted
- B. Provide where specifically shown on the PLANS:
 1. Current limiting circuit breaker.
 2. Electronic trip attachment. Trip unit shall be solid state type with field adjustable long time, short time, ground fault and pick up settings.

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3. Auxiliary contacts rated for 120 volts A.C. Contacts shall satisfy the requirements of the PLANS.

2.04 COMBINATION UNITS

- A. Each combination motor controller and feeder unit shall have the following characteristics:
 1. Molded case circuit breakers for branch circuit protection. Circuit breakers shall have the following characteristics:
 - a. U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than that of the main bus.
 - b. Three pole, 600 volt, type and maximum continuous current carrying capacity as shown on the PLANS.
 2. Starters shall have the following characteristics:
 - a. Starters shall be magnetic type, NEMA rated, with 120 volts A.C. operating coils. International type starters (IEC rated), will not be accepted, even if the starters were to show equivalent NEMA ratings.
 - b. Size and configuration (full voltage non-reversing, full voltage reversing, reduced voltage solid state, etc.) as shown on the PLANS.
 - c. Provide each starter coil with the manufacturer's standard transient voltage surge suppression module.
 - d. Provide auxiliary contacts as required by the PLANS. Contacts shall be rated for 120 volts A.C and shall satisfy the requirements of the PLANS. Provide each starter with one (1) normally open auxiliary contact wired to terminal blocks over the number of contacts required by the PLANS.
 3. Reduced Voltage Solid State Soft Starter (RVSS):
 - a. Each solid-state reduced-voltage starter assembly shall consist of an SCR-based power section, logic board, a main input isolation contactor, and a paralleling bypass contactor as shown on the PLANS. The minimum output current of the RVSS shall be as shown on the one-line drawings in the PLANS.
 - b. Each RVSS starter shall employ the use of Silicon Controlled Rectifier (SCR) technology. The RVSS starter shall have a micro-processor based SCR controller equipped with the manufacturer's standard features for protection, operation, and data acquisition of a RVSS starting system. The starter shall have configurable, field adjustable, motor acceleration time settings. Starters with deceleration functionality shall have the deceleration feature disabled. The operation of the controller shall also be coordinated with the operation of the motor protection and management relay specified hereinafter. Additionally, furnish the features as shown on the PLANS.
 - c. Each RVSS shall be UL listed according to Motor Control Center Equipment Specification UL 845 and shall be tested according to UL 508C.
 - d. The control logic drawings in the PLANS show the minimum requirements for the RVSS. Furnish additional controller contact inputs/outputs, interposing relays, selector switch contacts, fused power supplies, etc., as required to facilitate RVSS operation.
 - e. A paralleling bypass (run) contactor shall be supplied with each RVSS. The paralleling bypass contactor may be integral to the SCR based power section of the RVSS unit at the manufacturer's discretion. The paralleling bypass contactor shall be energized when the motor reaches full speed. The bypass contactor shall be rated to carry the motor full load current during steady state after full voltage has been applied to the

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motor by the soft starter. The RVSS integral protective features shall be active even when the shorting contactor is used to bypass the SCRs during steady state operation.

- f. Provide thermostatically controlled cooling fan for starter. Provide vertical section ambient High-High air temperature switch. Contacts shall be rated for 120 volts A.C and shall satisfy the requirements of the PLANS.
4. Provide Overload relays where required by the PLANS. Overload relays shall have the following characteristics:
- a. Standard class 20, ambient compensated,
 - b. Manually reset by push-button located on front of the compartment door.
 - c. Provide with auxiliary contact rated for 120 volts A.C. Contact shall satisfy the requirements of the PLANS.
 - d. The overload relay heaters will be selected by the Contractor after delivery of the MCC. Include all necessary delivery, packaging, and administrative costs associated with the delivery of overload heaters.
5. Variable Frequency Drive (VFD):
- a. Each Variable Frequency Drive (VFD) assembly shall consist of a main circuit breaker, VFD Controller and power section, and main output isolation contactor as shown on the PLANS. The minimum output current of the VFD shall be as shown on the one-line drawings in the PLANS.
 - b. Micro-processor based controller equipped with the manufacturer's standard features for protection, operation, and data acquisition of a VFD system. The operation of the controller shall also be coordinated with the operation of the motor protection and management relay specified hereinafter. Additionally, furnish the features as shown on the PLANS.
 - c. Electrically interlocked with the Main Output Contactor/Starter previously specified.
 - d. Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to variable voltage and frequency output. The manufacturer shall supply 18-Pulse design, at minimum.
 - e. UL 508C tested.
 - f. Incomplete sequence protection of each VFD main output contactor shall be provided with interlocking circuitry to fault the VFD should the contactor fail to close when commanded.
 - g. Provide with ratings as follows:

Ambient Temperature Range:	0 to 40 degrees Celsius
Input Voltage:	480 plus or minus 15 percent VAC
Input Voltage Frequency:	60 Hz plus or minus 2 percent
Displacement Power Factor:	Not less than 0.975 lagging under any speed or load condition
Efficiency at full load:	95 percent or greater
Minimum Continuous Output Current:	As shown on the PLANS
Overtorque Capacity for Constant Torque Operation:	150 percent for 1 minute
Overtorque Capacity for Variable Torque Operation:	110 percent for 1 minute

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- h. Furnish additional ventilation fans as required in accordance with LVVFD Manufacturer's recommendations to provide for proper VFD heat exchange.
 - i. The control logic drawings in the PLANS show the minimum requirements for the VFD. Furnish additional controller contact inputs/outputs, interposing relays, selector switch contacts, fused power supplies, etc., as required to facilitate VFD operation.
 - j. In addition to the VFD, size, furnish, and install a Harmonic Filter as specified hereinafter where required to meet the harmonic performance requirements of subsection 1.08.L, this Section of the Specifications.
6. Control Power Transformer. The transformer shall have the following characteristics:
- a. Adequately sized to serve all loads shown on the PLANS. Minimum size shall be as follows unless noted otherwise on the PLANS.:
 - 1) NEMA Size 4 and larger starters: 750 VA.
 - 2) All other starters, 200VA,
 - b. Connect as shown on the PLANS.
7. Provide one single pole fuse block with fuse for each motor space heater.
8. Where required by the PLANS, provide three phase power factor correction capacitor (PFCC) banks. Furnish and install additional requirements as follows:
- a. Manufacturer's standard overload protection for PFCC banks.
 - b. Each PFCC bank is dedicated to correct the power factor of a specific pumping unit. The kVAR size/rating shown on the PLANS is a minimum requirement for bidding purposes. The manufacturer shall properly select the kVAR size/rating of the capacitor bank based upon the actual motor load data to ensure an improved operating power factor of greater than or equal to 95 percent (lagging) when the associated distribution pump motor load is in full operating condition. The PFCC banks shall be 600 volt rated and Harmonic Duty rated PFCC banks, and suitable for use with RVSS starters.
 - c. Connect as shown on the PLANS.
 - d. Provide for auxiliary contacts as required by the PLANS. Contacts shall be rated for 120 volts A.C and shall satisfy the requirements of the PLANS.
9. Provide additional requirements as shown on the PLANS.

2.05 SURGE PROTECTIVE DEVICE (SPD)

- A. Provide Surge Protective Device system (SPD) were required by the PLANS. The SPD shall have the following characteristics:
- 1. SPD shall be tested with the ANSI/IEEE Category C high exposure waveform of 10 kA for 8 x 20 microseconds, at minimum.
 - 2. Integrated surge protective device recognized in accordance with UL 1449.
 - 3. Minimum surge current withstand shall be 160 kA per phase (80 kA per mode)
 - 4. Has a minimum pulse life of 5000 ANSI/IEEE Category C high transients without failure or degradation of clamping voltage by more than 10 percent.
 - 5. Provide with manufacturer's standard line side disconnect.
 - 6. Provide visual indication of SPD status
 - 7. Surge counter.
 - 8. Provide dry contact failure status output contact. Contact shall be rated for 120 volts A.C. and shall satisfy the requirements of the PLANS.
 - 9. 5 year warranty, at minimum.

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2.06 MOTOR PROTECTION AND MANAGEMENT RELAY "MPR/MMR"

- A. Where required by the PLANS, furnish and install Motor Protection and Management Relay (MPR/MMR) in the MCC. The Motor Protection and Management Relays shall be as manufactured by General Electric - MULTILIN Model 469 complete with the Ethernet communication capability and harsh environment UL 746C recognized conformal coating on all printed circuit assemblies as also shown on the PLANS, No Equal. Connect per manufacturer's recommendations and as shown on the PLANS. Protective relaying features will be enabled as determined during the performance of the studies performed per Subsection 1.08, "Special Manufacturer's Services", this Section of the Specifications.

2.07 INSTRUMENT TRANSFORMERS

- A. General
1. All instrument transformers specified shall be installed and connected at the factory.
- B. Instrument current transformers (C.T.'s):
1. Provide current transformers where required by the PLANS. Connect as shown on the PLANS.
 2. Current transformers shall be the window type and shall have an ANSI 60 Hz Metering Accuracy Class of 0.3 measured at burden of B0.1, at minimum.
 3. Install a shorting terminal block for each current transformer (C.T.). Rewire all terminals of each C.T. to its respective shorting terminal block. Shorting terminal blocks shall be as manufactured by "G.E.", or approved equal.
- C. Instrument Potential Transformers (P.T.'s):
1. Provide potential transformers where required by the PLANS. Connect as shown on the PLANS.
 2. Potential transformers shall have the following characteristics:
 - a. Primary voltage: 480 volts A.C.
 - b. Secondary voltage: 120 volts A.C.
 - c. Accuracy rating: 0.6 Y at burden of 1.2X
 - d. Thermal Burden: 150 VA at 30 degrees C ambient
 - e. Frequency: 60 Hz.
 3. Install with primary and secondary disconnect devices, grounding device, and accessories in conformance with IEEE and NEMA standards.
 4. Provide current limiting type primary fuses.

2.08 MISCELLANEOUS ACCESSORIES

- A. Pilot Lights:
1. Type: Transformer Type Light Emitting Diode (LED),
 2. Style: Push-to-test
 3. Lens Color: Furnish and install the colors as shown on the PLANS.
 4. Rating: NEMA 4/13, oil tight and water tight, Heavy Duty
 5. Size: NEMA Style full size 30-millimeter (30mm),
 6. Contacts: 10 ampere minimum at 120 volts A.C. Provide number of contacts to satisfy the requirements of the PLANS.
 7. Legend Plate: Furnish and install per manufacturer's standard with inscription as shown on the PLANS.
 8. Manufacturer: Allen Bradley Bulletin 800T, or approved equal.

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- B. Control relays shall have the following characteristics:
1. 600 volts, standard NEMA Size, AC Heavy-Duty industrial type with 120 volt AC coils.
 2. Minimum contact rating of 10A, continuous, at 120 volts AC.
 3. Furnish each relay with one additional Normally Open (N.O.) and one additional Normally Closed (N.C.) contacts over the number required by the PLANS.
 4. Provide each relay with Relay Manufacturer's Transient Suppression Module.
 5. Relays shall be "Allen Bradley Bulletin 700", Type-700P, or approved equal relays of the MCC manufacturer.
- C. Timing Relays shall have the following characteristics:
1. Solid state, multi-time, and multi-function type relay
 2. Both timing ranges and timing modes shall be field selectable. Each relay shall be capable of the following timing modes:
 - a. On Delay
 - b. Off Delay
 - c. One Shot
 - d. Repeat Cycle
 - e. Interval
 3. Minimum relay contact rating shall be 10 amps, continuous, at 120 VAC.
 4. Timing relays shall be Square D Class 9050 model No. JCK70 complete with Type NR61 Socket, or approved equal.
- D. MCC Space Heater Control Power Transformer for the MCC, where required by the PLANS, shall have the following characteristics:
1. Minimum size as shown on the PLANS. Adjust size as needed to serve the space heater loads.
 2. 120 volt AC grounded secondary
 3. Connect as shown on the PLANS.
 4. The space heater of each vertical section of the MCC shall be individually protected with a fuse mounted in the control power transformer compartment.
 5. The space heater circuitry shall be thermostatically controlled by centrally located thermostat(s). Provide the quantity of thermostats necessary to serve the load of the space heater circuitry.
- E. Provide control power transformer, fuses, power supplies, etc., and associated interconnect wiring as required to provide functional control power service to the circuit breaker trip circuitry for proper operation of circuitry, per manufacturer's standard.
- F. Provide key interlocks where required by the PLANS.
- G. Patch Panel: Where patch panel shown on the PLANS, furnish and install a dedicated patch panel for termination of the Ethernet data highway (serial communication) cabling for each Power Metering Unit (PMU) and Protective Relay. Patch panels shall be two-port, surface mounted, fully enclosed type, Category 6A, with RJ-45 connectors, as manufactured by "Panduit", Model Mini-Com #CBXJ2IW-A, with "Mini-Com TX6A" UTP Coupler Module Model CJK6X88TGBU and blank cover plates, or approved equal. Ethernet patch cords shall be furnished and installed between the patch panel and the respective protective relay/power monitoring unit per the requirements of Section 17600 "Distributed Control System".

2.09 HARMONIC FILTER

- A. General:

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1. Furnish and install Harmonic Filters as required to meet the specified harmonic performance requirements associated with Variable Frequency Drive application as described in subsection 1.08.L, this Section of the Specifications.
 2. Each Harmonic Filter shall be a passive series connected low pass filter consisting of an inductor capacitor network.
 3. The Harmonic Filter shall be suitable for use with specified type of Variable Frequency Drive.
 4. Each Harmonic Filter shall be mounted complete with all accessories inside of the enclosure hereinafter specified.
 5. Each Harmonic Filter shall be suitably sized for its respective motor.
 6. The type of Harmonic Filter specified below reflects the minimum Harmonic Filter features for bidding purposes. The selection of the final size and type of the Harmonic Filter shall be determined following Bid Award. The proposed size and type of the Harmonic Filter will be reviewed after Bid Award during the shop drawing submittal review process. The Owner shall select the size and type of the Harmonic Filter that will provide the best compliance with the specified harmonic performance requirements and the manufacturer shall furnish and install the Harmonic Filter accordingly at No Additional Cost To The OWNER.
- B. The harmonic filter shall meet the harmonic performance specification with a three percent phase voltage unbalance as defined in ANSI C-84.1-1995.
- C. The filter shall be listed per UL-508.
- D. Overload capability: 150 percent of full load current for one minute duration, with 10 percent reduction in nominal voltage for 1 minute duration
- E. All inductor windings and harmonic filter internal wiring shall be copper.
- F. Enclosure:
1. Where Harmonic Filters are shown on the PLANS to be mounted separately from the equipment:
 - a. Rating: NEMA-4X rated
 - b. Material: Type 316 Stainless Steel
 - c. Door: Hinged door with lockable door handle.
 2. Otherwise, mount Harmonic Filters inside the respective packaged system control panel.
- G. Manufacturer: MTE Corporation "Matrix AP Harmonic Filter", or approved equal.

PART 3 EXECUTION

3.01 FACTORY INSPECTION AND TEST

- A. Standard factory tests shall be performed on the equipment specified in this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards. The manufacturer shall provide certified copies of factory test reports prior to shipment of the equipment to the project site. Format and quantities of the test report shall be in accordance to Section 01300 and Section 01730 of the Contract Specifications.
- B. The Owner may elect to witness the factory tests as outlined above. The manufacturer shall provide at least three (3) week notice prior to the date the tests are to be performed.

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3.02 FIELD INSTALLATION (BY CONTRACTOR)

- A. Install per manufacturer's instructions and recommendations. Install all required safety labels.
- B. Perform manufacturer's field services as previously specified.
- C. Size, furnish and install the overload relay heaters based on actual motor nameplate current. Set overload relay settings at maximum values permitted by the NEC 430-32.
- D. Size, furnish and install the motor space heater fuses based on actual motor space heater load current.

3.03 FIELD TEST AND CHECKS

- A. Verify proper rotation of all motor loads
- B. Verify motor space heater circuits are operational..
- C. The following minimum test and checks shall be made before energizing the MCCs. These tests shall be performed by a Factory Trained Field Technician (non sales type):
 - 1. Thoroughly inspect the MCC.
 - 2. Test for proper phasing of power connections. Additionally, check phasing across the MCCs and connecting overhead bus duct/tie feeders (as applicable) using phasing sticks.
 - 3. Set, adjust, and test all protective relays based on the results of the coordination study, refer to sub-section 1.08, this Section of the Specifications.
 - 4. Megger terminals and buses for grounds, test per manufacturer's recommendations.
 - 5. Verify ratios of all CT's, and proper operation of all metering.
 - 6. Verify MCC enclosure space heater circuits are operational.
 - 7. Test key interlock system functionality
 - 8. Check tightness of accessible bolted bus joints using calibrated torque wrench per manufacturer's recommended torque values.
- D. Submit documentation of all tests outlined above.
- E. Submit manufacturer's certification report per sub-section 1.08, this Section of the Specifications.

3.04 EQUIPMENT PROTECTION AND RESTORATION

- A. Clean and vacuum all interior of the equipment.
- B. Touch-up and restore damaged surfaces to factory finish.
- C. Energize the space heaters within the MCC and energize during storage and installation for humidity control.

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3.05 TRAINING

- A. Provide training sessions for owner's representatives for Two (2) FULL normal workdays at the job-site location and/or at a location determined by the OWNER. If training is conducted in less than the time required by these specifications, the remaining time shall be utilized at the discretion of the OWNER.
- B. The training session shall be conducted by the MCC manufacturer's non-sales-type technical representative, who performed the field installation and start-up/setting/adjustment services.
- C. At minimum, the training session shall include:
 - 1. Operation and maintenance procedure for the equipment and all components installed within the MCCs.
 - 2. Factory contact persons phone numbers, persons names, ordering procedures and procedures to follow to obtain meaningful results from the factory.
 - 3. Potential of arc-flash hazards associated with working on energized equipment.

3.06 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

END OF SECTION