

**CITY OF MISSOULA**  
**MASTER ENERGY PERFORMANCE CONTRACT**  
**BETWEEN**  
**CITY OF MISSOULA**  
**AND**  
**MCKINSTRY ESSENTION, LLC**

# MASTER ENERGY PERFORMANCE CONTRACT

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**THIS MASTER ENERGY PERFORMANCE CONTRACT** (“Contract”) is entered into on date \_\_\_\_\_

by and between the City of Missoula, (hereinafter referred to as “Owner”), and McKinstry Essention, LLC, (hereinafter referred to as the “Contractor”). This Contract is entered into in accordance with Title 18, Montana Code Annotated (MCA), and the Administrative Rules of Montana (ARM), Title 2, chapter 5, for the purpose of installing utility cost saving equipment, as agreed to from time to time by the parties and described for each Phase and providing other services designed to save energy for the City of Missoula property and buildings, located in Missoula, Montana (hereinafter referred to as the “Project Site”).

## **RECITALS**

WHEREAS, Owner is a Montana municipality in Missoula, Montana and wishes to acquire equipment and services designed to reduce utilities use and associated utilities costs and related expenses at various sites in its Missoula buildings; and

WHEREAS, for the purposes of this Contract, the term “utilities” shall include, but not be limited to, the following: electricity (either purchased from 3<sup>rd</sup> parties or produced by Owner), natural gas, propane, steam, domestic water, ground water, treated or purified water (de-ionized water, reverse osmosis water, softened water and the like), compressed air, garbage collection, recycling operations and other such processes or services which Owner relies upon for the orderly functioning of its facilities; and

WHEREAS, Contractor has experience and technical management capabilities to identify and evaluate energy cost saving opportunities, and provide for engineering, packaging, procurement, installation, maintenance, and measurement of cost-effective utility saving measures, known as Facility Improvement Measures (“FIM’s”), through services provided and equipment installed and maintained at project sites similar in scope and scale to that of the Owner; and

WHEREAS, Contractor was selected pursuant to the Request for Qualifications (“RFQ”) after a determination that its qualifications are the most advantageous to the Owner, to perform a series of technical energy audits, and pursuant to the Energy Services Master Contract , dated \_\_\_\_\_, has delivered, or shall deliver to the Owner the Investment Grade Audit Report (“IGAR”) for each phase of work, which includes an assessment of the energy consumption characteristics of the Owner’s facilities, and the identification and evaluation of viable FIM’s, as well as estimates of expected energy and operational savings and associated project costs for each recommended FIM, including all capital and infrastructure improvement projects to be included in that phase of work. The Audit Report(s) contains a variety of Projects that Owner may choose to include in a Phase or Scope of Work to be performed under this Master Energy Performance Contract; and

WHEREAS, Owner has been authorized by the Missoula City Council to enter into a Master Energy Performance Contract , which will be the master agreement for engineering design, procurement, construction, installation, maintenance, cost and energy savings guarantees, and follow up monitoring and measurement for utility saving projects (hereinafter the “Master Contract”), and

WHEREAS, Owner will at various times during the term of this Master Contract select a Project or Projects from the Ph 1 IGAR (the “Work”) or future IGARs to be included as a Scope of Work to be implemented by Contractor in order to improve the energy efficiency of the Owner’s facilities. Should the Owner desire from time to time to move forward with additional phases of projects, the Owner and Contractor will execute contract amendments or modifications to include the intended Scope of Work, but the terms and conditions of this Master Contract will remain the same and also govern all additional phases. Each Phase of the Work may be separated into any number of groups or Projects of work for the purpose of efficiently scheduling the design and installation of the Work. The aggregate sum of all groups of Work within a Phase shall equal the total Scope of Work for that Phase. All Phases of Work, or Projects, which may be added by contract amendment or modification during the term of this Master Contract hereof shall be governed by the terms of this Master Contract, and the Parties understand and agree that there is no guarantee for any specific dollar value or number of Phase(s) to be performed under this Contract; and

WHEREAS, Owner is authorized under the laws and rules of the State of Montana to enter into this Contract for the purposes set forth herein.

NOW, THEREFORE, in consideration of the mutual promises and covenants contained herein, and intending to be legally bound hereby, Owner and Contractor hereto covenant and agree to be bound by the following, which shall include the Exhibits and Appendices are attached hereto (or will be, as provided in this Contract):

## **ARTICLE 1     DEFINITIONS; INVESTMENT GRADE AUDIT REPORT; ENERGY MANAGEMENT PLAN, AND CONTRACT ATTACHMENTS**

### **Section 1.1 Definitions**

All terms within this Contract are intended to be consistent with General Conditions if a definition is not specifically listed herein refer to General Conditions.

**Annual Services:** Those additional services relating to Equipment monitoring, maintenance, repair, servicing, and or other services for a Project, to be performed by the Contractor as required by the Owner from time to time, as laid out in the proposal.

**Certificate of Final Acceptance:** Issued by the Owner at the date when each Project and/or Phase construction and installation has been inspected and found to be completed and all commissioning and Owner training and demonstration has been completed and the Owner is in receipt of all documents and Certificates under the terms of this Contract and General Conditions.

**Contract:** This entire Contract is formed by the Contract Documents and includes all references and attached Amendments, General Conditions, Exhibits and Appendices.

**Contract Sum:** The Maximum Allowable Phase Cost as identified in the Investment Grade Audit Report for each Phase. The Maximum Allowable Phase Cost is the guaranteed cost for the Work. The Contract Sum is the sum of all materials, labor, Equipment, auditing, design, engineering, construction management services, subcontracted services, overhead, profit, Contractor contingency, Allowances, Contractor's Montana State Gross Receipts Tax, bonds, insurance, permits, Energy Performance Contractor fee, Measurement and Verification (M & V) Services, and Annual Services, related to each Project and Phase and agreed upon by the parties, all in accordance with and specified in proposal for each phase.

**CSM:** Cost Saving Measures.

**Energy and Cost Savings Guarantee:** The guarantee that is achieved as a result of the installation and operation of the Equipment and provision of Services provided for in this Contract, as specified for each Project in form of **Schedule A (Energy and Cost Savings Guarantee)**, **Schedule D (Phase Cost and Cash Flow Analysis)** in accordance with the savings calculation formulae, shown in **Schedule C (Savings Measurement and Verification Plan; Methodology to Adjust Baseline)**.

**ECM:** Energy Conservation Measure

**Equipment:** The goods specified to be installed for each Project as specified in the proposal for each phase.

**FIM:** Facility Improvement Measure.

**General Conditions:** Means those General Conditions of the Contract for Construction attached as Appendix A.

**Interim Period:** The period from contract execution to the Utility Savings Commencement Date.

**Investment Grade Audit Report (“IGAR”):** The study, for each phase of work, which includes detailed descriptions of the improvements (FIM’s) recommended for each Project or Phase, the estimated costs of the improvements, and the utility and operations and maintenance cost savings projected to result from the recommended improvements for each Project or Phase. The IGAR is also referred to as the “proposal” for each phase in this contract.

**Notice to Proceed:** The Notice issued by the Owner to the Contractor on execution of a Contract modification or amendment to include additional phases of work, to commence pre-design investigations and design Services for the Phase, and as defined in General Conditions.

**Phase:** An identified group of Projects or a single Project agreed to by the parties by written amendment to this Master Agreement, to be undertaken in one Scope of Work, as defined in the Exhibits.

**Project:** Each energy saving Project or group of Projects agreed to by the Parties from time to time under this Contract as defined by the Exhibits. Each Project shall consist of the total construction and installation of Equipment, and Services defined as the Work to be performed in a specified location within the Project Site(s) for that Phase, as defined in the proposal for each phase.

**Project Site(s):** The facilities of the City of Missoula in need of utility retrofits.

**Project Warranty Period:** Is the period of one (1) year from the date of the Substantial Completion for the particular cost-saving measure if operated and maintained in accordance with established procedures. Substantial Completion shall be defined as the stage in the progress of the Work where the Work is sufficiently complete in accordance with the Contract Documents so that Owner can utilize and take beneficial use of the Work for its intended use or purpose. Substantial Completion does not occur until the Equipment or system has been commissioned, accepted, and the “Substantial Completion” form fully executed. Substantial Completion is not final acceptance of the Work.

**Services:** Includes but is not limited to all professional services, including auditing, design, engineering, preparation of construction documents, drawings and specifications, and construction management services, ongoing monitoring, servicing and maintenance operations, and related direct Project fees and costs, as defined in the proposal for each phase and **Appendix A (General Conditions of the Contract for Construction)**.

**Utility and Cost Savings Guarantee:** The guarantee that is achieved as a result of the installation and operation of the Equipment and provision of Services provided for in this Contract, as specified in the proposal for each phase.

**Utility Savings Commencement Date:** The date determined for each Phase as its Utility Savings Commencement Date as defined in Section 2.4.

**Utility and Cost Savings Guarantee:** The guarantee that is achieved as a result of the installation and operation of the Equipment and provision of Services provided for in this Contract, as specified for each Project in the proposal for each phase.

## **Section 1.2 Investment Grade Audit Report**

1.2.1 Contractor has, or shall prepare the IGAR (also referred to as proposal) pursuant to the terms of the Energy Services Master Contract for the Project Site(s) for each Phase of Work. The audit shall include all conservation measures agreed upon by the parties.

1.2.2 This Master Contract, the General Conditions and the attached Exhibits and Appendices shall govern in the event of any inconsistencies between the Investment Grade Audit Report and this Master Contract.

1.2.3 It is acknowledged that additional IGAR’s or amendments to the Energy Services Master Contract may be required for further Phases of Work. Additional IGAR’s or amendments for additional Work may require a mutually agreed upon Contract amendment or modification in accordance with the Terms of this Contract.

## **Section 1.4 Contract Attachments**

A series of Exhibits and Appendices as set forth in Article 25 Contract Attachments, Exhibits, shall be assembled for each Phase of Work and upon execution by Contractor and Owner, shall be considered approved and accepted by the Owner and incorporated herein, and made part of this Contract.

## **ARTICLE 2 CONSIDERATION; SERVICES; ENERGY SAVINGS COMMENCEMENT DATE AND TERMS**

### **Section 2.1 Not Used**

### **Section 2.2 Consideration**

**2.2.1** Contractor agrees to perform the Work and provide the Services required under this Contract and other services as agreed by the parties for each Project and/or Phase.

**2.2.2** For each Phase, the Owner shall pay the Contractor up to the Maximum Allowable Phase Cost stated for each Phase as stated in the proposal for each phase and as defined in Article 9 - General Conditions. The process for Contractor payments for each Project is as described in General Conditions.

### **Section 2.3 Services**

**2.3.1** Contractor shall provide to the Owner all Work and Services identified in the proposal for each phase ("Scope of Work") and as described in General Conditions. All Work and Services shall be performed in accordance with General Conditions. Equipment to be installed and the quality of materials selected are subject to approval of Owner in the design review process as laid out in General Conditions.

**2.3.2** Contractor shall supervise and direct the Work and shall be responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work under this Contract, with the approval of the Owner in accordance with General Conditions.

**2.3.3** Contractor shall be responsible to pay for all fees, direct costs, labor, materials, equipment, tools, construction equipment and machinery, transportation and other facilities and services necessary for the proper execution and completion of the Work and Services.

**2.3.4** The Owner may require that the Contractor undertake additional Annual Services, which may include but not be limited to Equipment monitoring, servicing and maintenance operations, as set forth in the proposal for each phase. Compensation payments due to Contractor for on-going Annual Services under this Contract shall begin no earlier than 30 days after the Energy Savings Commencement Date for the Project.

### **Section 2.4 Utility Savings Guarantee Commencement Date**

**2.4.1** The Utility Savings Guarantee Commencement Date ("Utility Savings Commencement Date") for each Phase shall be the first day of the month after the month in which all schedules for that Phase are in final form and all Work and Services has been completed and accepted by the Owner in accordance with General Conditions,

and a Certificate of Final Acceptance has been issued for the Phase.

**2.4.2** The Certificate of Final Acceptance shall confirm that the Contractor has installed and commenced operating all of the Equipment specified in the proposal for each phase in accordance with General Conditions, and the Owner has inspected and accepted the Phase installation and operation.

**2.4.3** The Utility Savings Commencement Date for each Phase shall not occur, and the Owner shall not be required to accept the work under this Contract, unless and until all Equipment installation for the Phase is completed by Contractor in accordance with the terms of this Contract. The Owner shall inspect the Work and

Equipment for each Phase after notification by Contractor in accordance with General Conditions. The Owner reserves the right to reject the Equipment if installation fails to meet reasonable standards of workmanship, does not comply with applicable building codes and standards, or is otherwise not in compliance with this Contract. Contractor shall not be paid in full, including retainage, until after the final punch list is completed and Contractor has satisfied all claims for labor and materials and the Certificate of Final Acceptance has been issued, for each Phase, all in accordance with the General Conditions.

### **Section 2.5 Effective Date/Duration**

2.5.1 Contract Term. Contract shall take effect immediately upon its execution by all parties and terminate three (3) years from the Utility Savings Commencement Date, as defined in Section 2.4, unless terminated earlier in accordance with this Contract (MCA 18-4-313). If the Owner terminates the Contract prior to three (3) years after the Utility Savings Commencement Date, the length of contract shall include the full term of Measurement and Verification time period as set forth in the proposal for each phase.

2.5.2 The period from contract execution until the Utility Savings Commencement Date constitutes the "Interim Period". All utility savings achieved during the Interim Period are to be credited to the Owner at Reconciliation or Completion whichever is sooner.

## **ARTICLE 3 UTILITY AND COST SAVINGS GUARANTEE; ANNUAL RECONCILIATION; PAYMENTS TO CONTRACTOR; ENERGY USAGE RECORDS & REPORTING**

### **Section 3.1 Utility a Cost Savings Guarantee**

For each Project, Contractor shall formulate and, subject to the adjustments provided for in **Article 15 (Material Changes)**, guarantee the annual level of utility savings to be achieved as a result of the installation and operation of each Project's Equipment and provision of Services provided for in this Contract, in accordance with the methods of savings measurement and verification set forth in the proposal for each Phase. The Energy and Cost Savings Guarantee is set forth for the term of the Contract, as specified in the proposal for each phase.

### **Section 3.2 Annual Reconciliation**

3.2.1 For each one-year period of the Contract after the Utility Savings Commencement Date for each Phase, Contractor shall measure and/or calculate utility related cost savings, as specified in M & V Plan located in the proposal for each Project and Phase, and provide a report of the cost savings to the Owner within ninety (90) days after the end of the one-year period.

3.2.2 If utility savings achieved during a guarantee year are less than the guaranteed utility savings, as defined in the proposal for each phase, Contractor shall pay the Owner an amount equal to the deficiency for each Phase.

3.2.3 For each Phase, Contractor shall remit such payments to the Owner within 30 days after written notice by the Contractor to the Owner of the deficiency.

3.2.4 If the verified savings in any one year during the guarantee period exceed the Utility and Cost Savings Guarantee as set forth in the proposal for each phase the excess savings shall be retained the Owner. Excess savings may not be used to satisfy shortfalls of guaranteed savings in previous or future years of the Contract.

Excess utility savings from a Phase may be used to apply toward utility saving FIM's in an additional or future Phase of Work.

3.2.5 If guaranteed cost savings are not achieved during any year in the initial monitoring period, Contractor shall pay all costs for Measurement and Verification reports until guaranteed cost savings are achieved for all years in a term of consecutive years equal to the initial monitoring period.

### **Section 3.3 Not Used**

#### **Section 3.4 Utility Usage Records and Reporting**

3.4.1 Owner has furnished, and shall continue to furnish (or authorize its utility suppliers to furnish) during the Term of this Contract to Contractor or its designee, upon its request, all of its records and complete data concerning utility usage and related maintenance for the Project Site(s).

3.4.2 Upon request of Contractor, Owner shall provide Contractor, within 30 days after receipt by the Owner of Contractor's request, copies of all utility bills for the Project Site(s) for the period requested by Contractor. Upon receipt of the required information, Contractor shall calculate the savings in accordance with the agreed-upon calculation formulae in the proposal for each phase.

3.4.3 Annual Reporting Requirements; Within ninety (90) days after the end of each year during the guarantee period, as specified in the proposal of each phase, Contractor shall complete and submit to the Owner all data required to substantiate achieved energy and cost savings for a Phase.

### **Section 3.5 Not Used**

### **Section 3.6 Not Used**

#### **Section 3.7 Contractor Payments and Open Book**

3.7.1 Contractor payments and reimbursements shall be made in accordance with Article 9 of the General Conditions.

3.7.2 All allowable costs as laid out in Article 7 and Article 9 General Conditions to be verified by an "Open Book" method for the Term of Contract. All costs including fees under the terms of this Contract will be reported to and reconciled to the Owner at Annual Reconciliation and upon final completion of the Project. Contractor will maintain cost accounting records on Work performed in accordance with this Contract.

3.7.3 Contractor shall maintain records of all costs incurred relative to a Project and afford the Owner access to these records and preserve them in accordance with Article 13 - General Conditions.

3.7.4 Contractor guarantees that the aggregate cost of implementing all FIM's and performing the Work and the Services, will not exceed the Maximum Allowable Phase Cost, notwithstanding, any one of the individual estimated construction costs budgeted in the proposal may exceed the individual item budget. Furthermore, it is acknowledged that a deletion of a FIM from the Phase Scope of Work by contract modification does not necessarily translate to a proportionate cost reduction of the same amount identified for that FIM in the phase proposal. A contract modification under the terms of this Contract will be agreed by the parties for the cost saving.

## **ARTICLE 4 FISCAL FUNDING**

### **Section 4.1 Non-appropriation of Funds**

Notwithstanding the termination provisions in Article 14 - General Conditions, Owner is dependent upon appropriations made by City Council on an annual basis for its funding. If funds are not appropriated or otherwise made available by City Council to support continued performance of this Contract in subsequent fiscal periods, the Owner shall terminate this Contract. The Owner shall provide Contractor the date Owner termination shall take effect. The Owner shall not be liable to the Contractor for any payment that would have been payable had the Contract not been terminated under this provision. The Owner shall be liable to the Contractor only for Work completed plus overhead and profit, or pro-rated portion of that Work plus overhead and profit, in accordance with the General Conditions, owed to the Contractor up to the date the Owner termination takes effect. This is the Contractor's sole remedy.

### **Section 4.2 Non-substitution**

In the event of a termination of this Contract due to the non-appropriation of funds or in the event this Contract is terminated by Contractor due to a default by the Owner in accordance with Article 14 - General Conditions, the Owner agrees, to the extent permitted by state law, not to purchase, lease, rent, borrow, seek appropriations for, acquire or otherwise receive the benefits of any of the same and unique services performed by Contractor from another Energy Service Company or Contractor for a period of three-hundred sixty five (365) calendar days following such default by Owner, or termination of this Contract due to non-appropriations.

## **ARTICLE 5 NOT USED**

## **ARTICLE 6 NOT USED**

## **ARTICLE 7 NOT USED**

## **ARTICLE 8 CONSTRUCTION SCHEDULES AND EQUIPMENT INSTALLATION; AWARD OF SUBCONTRACTS; SYSTEMS STARTUP APPROVAL**

### **Section 8.1 Construction Schedule; Equipment Installation**

Construction and Equipment installation shall proceed in accordance with the construction schedule and/or key identified milestone dates approved by the Owner for each Project and Phase and included in the proposal for each phase. All construction work shall be subject to the terms and procedures laid out in General Conditions.

### **Section 8.2 Not Used**

### **Section 8.3 Systems Startup and Equipment Commissioning Approval**

8.3.1 Contractor shall conduct a thorough and systematic performance test of each element and the total system of the installed Equipment for each Project and Phase in accordance with the plan laid out in the proposal for each phase prior to issuance of an interim Certificate of Final Acceptance of a Project and Phase by the Owner.

8.3.2 Testing must be designed to determine whether the Equipment is functioning in accordance with both its published specifications and the Schedules to this Contract, and whether modified building systems, subsystems, and components are functioning properly. Contractor shall notify the Owner of the scheduled test(s) in accordance with General Conditions, and the Owner and/or its designees have the right to be present at any tests conducted by Contractor and/or manufacturers of the Equipment.

8.3.3 Contractor is responsible for correcting and/or adjusting any deficiencies in systems and Equipment operations observed during system commissioning procedures, as specified in the proposal for each phase. Contractor is also responsible for correcting and/or adjusting any deficiencies in Equipment operation observed during system testing procedures. Prior to the Owner issuance of an interim Final Certificate of Acceptance of the Project and Phase Work and Equipment installation, Contractor shall provide Owner with reasonable documentation that the Equipment installed is the Equipment specified in each FIM or Project proposal).

## **ARTICLE 9 NOT USED**

## **ARTICLE 10 STANDARDS OF COMFORT**

10.1.1 Contractor shall ensure continued operation and function of the Equipment and Project Site(s) during construction and installation operations, in a manner that provides acceptable standards of heating, cooling, ventilation, water supply, and lighting as agreed by the parties, and approved by the Owner and in accordance with each phase Scope of Work outlined in the proposal and General Conditions.

## **ARTICLE 11 NOT USED**

## **ARTICLE 12 TRAINING AND DEMONSTRATION**

For each Project and or Phase, as agreed with Owner, Contractor shall conduct the training program as generally described in the proposal for each phase. The training and demonstration specified for each Project must be completed prior to issuance of an interim Certificate of Final Acceptance for each Project and Phase, as appropriate. Contractor shall provide ongoing training and demonstration whenever needed concerning updated or altered Equipment, including upgraded software. Such training and demonstration shall be provided by Contractor at no charge to the Owner.

## **ARTICLE 13 ANNUAL SERVICES; EQUIPMENT SERVICE, MAINTENANCE AND REPAIR**

### **Section 13.1 Annual Services**

13.1.1 Contractor shall provide all service, repairs, and adjustments to the Equipment installed under this Contract pursuant to Articles 8 and 10 herein, the Owner shall incur no cost for Equipment service, repairs, and or adjustments, except as set forth in the proposal as Annual Services. If the Contractor demonstrates by notice to the Owner in writing, that the need for maintenance or repairs principally arises due to the negligence or willful misconduct of Owner or any or other designated agent of Owner, Contractor may charge Owner for the cost of the maintenance or repair if the cost is not covered by any Warranty or insurance.

13.1.2 Annual Services does not replace any Contractor obligations under the terms of this Contract in respect of Project Equipment Guarantees or Warranties, as laid out in General Conditions.

### **Section 13.2 Malfunctions and Emergencies**

13.2.1 As stated in General Conditions, the Owner shall use its best efforts to notify Contractor within 48 hours from the Owner's actual knowledge and occurrence of:

13.2.1.1 any malfunction in the operation of the Equipment or in any preexisting energy related equipment that might materially impact guaranteed energy savings;

13.2.1.2 any interruption or alteration to the energy supply to the Project Site(s);

13.2.1.3 any alteration or modification to any energy-related Equipment or its operation; or



13.2.1.4 any defect in Work undertaken by the Contractor, and/or

13.2.1.5 any other defects related to the Work as defined in General Conditions.

Any notifications under this Section 13.2.1 shall be made by the Owner to the Contractor during the "Project Warranty Period", and/or during the term of an Annual Services Agreement, and/or for the duration of this Contract, whichever is longer.

13.2.2 The Owner shall exercise due diligence in attempting to assess the existence of a malfunction, interruption, or alteration, but is not liable to pay costs incurred by Contractor, for failing to correctly identify such conditions as having a material impact upon the Utility and Cost Savings Guarantee. The Contractor shall respond to any reported malfunctions or defects as outlined in 13.2.1, or cause its designee(s) to respond, and shall promptly proceed with corrective measures, in accordance with General Conditions. Any telephone notification of such conditions by the Owner must be followed within three (3) business days by written notice to Contractor if Contractor fails to respond to phone notification from the Owner. If the Owner unreasonably delays in notifying Contractor of a malfunction, defect or emergency, and the malfunction, defect or emergency is not otherwise corrected or remedied, Owner is liable to Contractor for its loss, due to the delay, associated with the Utility and Cost Savings Guarantee under this Contract for the particular time period, if Contractor demonstrates a direct causal connection between the delay and the loss.

13.2.3 Contractor shall provide a written record of all Warranty defect work and any work performed as Annual Services under the terms of this Contract. This record must state the reason for the works or service, a description of the problem, and the corrective action performed.

### **Section 13.3 Actions by Owner**

Owner may not move, remove, modify, alter, or change the Equipment or any part of the Equipment without prior written approval of Contractor, except as defined in the Scope of Work outlined in the proposal for each phase. Owner may take reasonable steps to protect the Equipment if, due to an emergency, it is not possible or reasonable to notify Contractor before taking action. If there is an emergency, Owner shall take reasonable steps to protect the Equipment from damage or injury and shall follow any instructions for emergency action provided in advance by Contractor. Owner shall maintain the Project Site(s) in good repair and protect and preserve all portions that may affect operation or maintenance of the Equipment all in accordance with General Conditions.

## **ARTICLE 14 MODIFICATION, UPGRADE OR ALTERATION OF THE EQUIPMENT**

### **Section 14.1 Modification of Equipment**

During the Term of this Contract, Owner may not, without prior written consent of Contractor, install any accessory Equipment or device on any of the Equipment if the addition will change or impair the originally intended functions, value, or use of the Equipment, unless agreed in writing by both parties prior to modification taking place.

### **Section 14.2 Upgrade or Alteration of Equipment**

14.2.1 After completion and issuance of an interim Certificate of Final Acceptance of the Project, Contractor may, subject to Owner's prior written approval, which approval may not unreasonably be withheld, change the Equipment, revise any procedures for operation of the Equipment, or implement other energy saving actions in the Project, provided:

14.2.1.1 Contractor complies with the standards of comfort and services specified in proposal;

14.2.1.2 Modifications or additions to, or replacement of the Equipment, and any operational changes, or new procedures are necessary to enable Contractor to achieve the guaranteed energy and cost savings at the

Project Site(s) and;

14.2.1.3 Contractor bears any cost incurred relative to such modifications, additions, or replacement of the Equipment, or operational changes or new procedures.

14.2.2 All modifications, additions, or replacements of the Equipment, or revisions to operating or other procedures, must be described by Contractor in a supplemental Exhibits(s) provided to the Owner for approval, which may not be unreasonably withheld, and any replacement Equipment must, unless otherwise agreed, be new and have equal or better potential to reduce energy consumption at the Project Site(s) than the Equipment being replaced. Contractor may update any software to be used in connection with the Equipment, in accordance with the provisions of this Contract and in accordance with the General Conditions. All replacements of, and alterations or additions to, the Equipment become part of the Equipment described in the Scope of Work outlined in the proposal for each phase. and are to be commissioned in accordance with Article 8 herein, and training and demonstration to be provided in accordance with Article 12 herein.

## **ARTICLE 15 MATERIAL CHANGES**

### **Section 15.1 Material Change Defined**

15.1.1 A Material Change includes any change in, or to, the Project Site(s), whether structural, operational, or otherwise in nature that reasonably could be expected, in the judgment of Owner, to increase or decrease annual energy consumption, in accordance with Baseline Utility Consumption and Savings Measurement and Verification Plan as outlined in the proposal by at least 3%, after adjustments for climatic variations. Actions by Owner that may result in a Material Change include, but are not limited to, the following:

15.1.1.1 manner of use of the Project Site(s) by Owner;

15.1.1.2 hours of operation for the Project Site(s), or for any equipment or utility using systems operating at the Project Site(s);

15.1.1.3 Permanent changes in the comfort and service parameters;

15.1.1.4 occupancy of the Project Site(s);

15.1.1.5 types and quantities of equipment used at the Project Site(s);

15.1.1.6 modification, renovation or construction, or other changes to the structure, of/at the Project Site(s);

15.1.1.7 Owner's demonstrated failure to routinely maintain and repair the Equipment after Substantial Completion or as defined in the Scope of Work outlined in the proposal for each phase:

15.1.1.8 other conditions other than climate affecting utility use at the Project Site(s), including, but not limited to, replacement, addition, or removal of utility consuming devices, whether plug in or fixed assets;

15.1.1.9 casualty or condemnation of the Project Site(s) or Equipment;

15.1.1.10 changes in utility provider or utility rate classification, or

15.1.1.11 modifications, alterations, or overrides of the energy management system schedules or hours of operation, set back/start up, or holiday schedules.

### **Section 15.2 Reported Material Changes; Notice by Owner**

Owner shall use its best efforts to deliver to Contractor a written notice describing all actual or proposed Material Changes in the Project Site(s) or in the operations of the Project Site(s) at least thirty (30) calendar days before any

actual or proposed Material Change is implemented, or as soon as practicable after an emergency or other unplanned event. Notice to Contractor of Material Changes that result because of an emergency or other situation that precludes advance notice is sufficient if given by Owner within three (3) days after Owner knew or discovered that the event constituting the Material Change occurred.

### **Section 15.3 Other Adjustment**

15.3.1 Contractor and Owner shall investigate, identify, and as applicable correct any changes that prevent the Utility and Cost Savings Guarantee from being realized. Based on the investigation, Contractor and Owner shall determine what, if any, adjustments to the baseline are to be made in accordance with the Savings Measurement and Verification Plan and Baseline Utility Consumption. Any disputes between Owner and Contractor concerning any such adjustment shall be resolved in accordance with General Conditions.

15.3.2 If a change in the utility savings being realized, as identified by the Utility and Cost Savings Guarantee, cannot be accurately attributed to an identifiable cause or Material Change, projected utility savings, as identified in IGAR and Savings Measurement and Verification Plan for that Project or part thereof will be used to determine the actual savings until the cause of the change can be determined by Contractor. If at least two (2) years of historical energy savings data from the Project is available to use, this should be used as a basis for the energy savings being achieved prior to the Material Change.

15.3.3 If Owner elects not to use the projected utility savings or historical utility savings as identified in Section 15.3.2, then such claim or dispute shall be determined in accordance with Article 4.3 General Conditions.

### **Section 15.4 Owner's Responsibilities**

15.4.1 Methods of Operation by Owner. The parties agree that the guaranteed utility and cost savings may not be obtained unless certain procedures and methods of operation designed for utility conservation and as defined in the proposal, are implemented and followed by Owner on a regular and continuous basis.

15.4.2 Owner Maintenance Responsibilities Owner shall implement and follow the conservation procedures and methods of operation specified in the proposal) for each FIM or Project.

15.4.3 Inspection of Project Site(s) Contractor may inspect Project Site(s) once per month, with prior notice to Owner, to determine whether Owner is complying with the terms of this Contract and carrying out such routine maintenance and repair in accordance with the Manufacturers guidelines and Industry standards. Owner shall make the Project Site(s) available to Contractor during each monthly inspection and may witness each inspection and Contractor's notations on the checklist. Owner may complete its own checklist at the same time. Contractor may not interfere with Owner operations during any monthly inspection.

## **ARTICLE 16 PERFORMANCE BY CONTRACTOR**

16.1 Contractor shall perform all Work and Services under this Contract, in such a manner so as not to harm the structural integrity of the buildings or their operating systems, in accordance with the terms of this Contract, Exhibits, Appendices and General Conditions. Contractor shall repair and restore to its original condition any area of damage caused by the Contractor's performance of this Contract, and shall bear any costs associated with such repair. Contractor is responsible for the professional and technical accuracy of all Services performed, whether by Contractor or its Consultants or subcontractors throughout the term of this Contract.

## **ARTICLE 17 OWNERSHIP OF CERTAIN PROPRIETARY PROPERTY RIGHTS**

Owner does not, by virtue of this Contract, acquire any interest in any formulas, patterns, devices, secret inventions or processes, copyrights, patents, other intellectual or proprietary rights, or similar items of property used in

connection with the Equipment, except as provided for in the General Conditions. Contractor grants to Owner a perpetual, irrevocable royalty-free license for any and all software or other intellectual property rights necessary for Owner to continue to operate, maintain, and repair the Equipment in a manner that will yield guaranteed utility consumption reductions for the specified contract term. Contractor shall provide new versions of software or other enhancements if new versions or enhancements are necessary to achieve the guaranteed utility consumption reductions during the term of the contract, and as defined in the Contract.

**ARTICLE 18 NOT USED**

**ARTICLE 19 NOT USED**

**ARTICLE 20 ADDITIONAL DUTIES AND REPRESENTATIONS OF THE PARTIES**

20.1 Owner shall provide the Contractor, in a timely manner, with accurate and complete copies of all records relating to the performance of the Contract, including, but not limited to, records relating to utility usage and utility-related maintenance of Project Site(s) requested by Contractor that have not already been provided, in accordance with this Contract.

20.2 Except as provided in this subsection below, Owner represents that it has not entered into any lease or other contract regarding energy efficiency equipment, provision of energy management services similar to those provided in this Contract and impacting the same Equipment and Projects, for the Project Site(s), or servicing of energy related equipment located in the Project Site(s) as part of a Project. If Owner enters into any such lease or other contract, within ninety (90) days after execution, it shall provide Contractor with a copy of the lease or other contract. Owner has entered, or will soon be entering into a solar power purchase agreement for a facility to be constructed at the City's Waste Water Treatment Plant, which the Parties expressly agree does run afoul of this term.

20.3 Contractor represents that it is financially solvent, able to pay its debts as they mature, and has sufficient working capital to perform its duties under this Contract.

20.4 Before commencing performance of this Contract, under the terms of the General Conditions, Contractor shall provide Owner with written documentation that it is licensed to perform its duties under this Contract within the State of Montana and that all insurance and bonding requirements applicable to Contractor under this Contract have been met.

20.5 Upon request, Contractor shall make available to Owner all documents relating to its performance under this Contract, including all contracts and subcontracts.

20.6 All subcontractors used by Contractor in performing its duties under this Contract must be qualified, licensed, and bonded in the State of Montana to perform the subcontracted work, in accordance with the General Conditions.

20.7 All Equipment installed by Contractor under this Contract must meet, or exceed, the requirements specified in Section 8.3 herein and in the proposal for each phase.

20.8 All Equipment installed by Contractor under this Contract must be compatible with all other Project Site(s) mechanical and electrical systems, subsystems, and components with which the Equipment interacts.

**ARTICLE 21 MISCELLANEOUS DOCUMENTATION PROVISIONS**

21.1 Construction Performance and Payment Bonds, Labor and Material Payment Bonds. Contractor shall obtain bonding for each Phase in accordance with General Conditions. The bonding required under the terms of this Contract shall cover completion of the Work in accordance with the approved design, and shall not guarantee or warranty energy efficiency or performance guaranteed outlined in the proposal for each phase. Bonding shall not cover any obligation of the Contractor to ensure that the Work will result in any particular level of utility or cost savings.

21.2 The parties shall timely execute and deliver to each other all documents as required by this Contract and shall perform all further acts reasonably necessary to effectuate the provisions of this Contract.

21.3 Owner's responsibilities in respect of the performance of this Contract are outlined in Section 15.4 herein and General Conditions.

**ARTICLE 22 NOT USED**

**ARTICLE 23 SCOPE, AMENDMENT AND INTERPRETATION**

23.1 Contract. This Contract consists of the Master Contract, the General Conditions, and any attached Exhibits listed in Article 25. In the case of dispute or ambiguity about the minimum levels of performance required of Contractor, the order of precedence of document is defined in General Conditions.

23.2 Entire Contract. These documents contain the entire Contract of the parties. Any enlargement, alteration or modification requires a written amendment signed by both parties.

**ARTICLE 24 NOT USED**

**ARTICLE 25 CONTRACT ATTACHMENTS: EXHIBITS AND APPENDICES**

**25.1 Exhibits:**

EXHIBIT A - City of Missoula Non-Discrimination and Affirmative Action Policy

EXHIBIT B – Ph 1 Applicable Montana Prevailing Wage Rates

EXHIBIT C - City of Missoula Energy Performance Contract Proposal Project Forms – Ph 1 Pre-Construction Schedule

EXHIBIT D - City of Missoula Energy Performance Contract Proposal Project Forms – Aquatics Ph 1

EXHIBIT E - City of Missoula Energy Performance Contract Proposal Project Forms – City Shops Ph 1

EXHIBIT F - City of Missoula Energy Performance Contract Proposal Project Forms – Fire Ph 1

EXHIBIT G - City of Missoula Energy Performance Contract Proposal Project Forms – Missoula Art Museum Ph 1

EXHIBIT H - City of Missoula Energy Performance Contract Proposal Project Forms – Parking Ph 1

**25.2 Appendices:**

APPENDIX A - General Conditions of the Contract for Construction



## **EXHIBIT A: City of Missoula Non-Discrimination and Affirmative Action Policy**

**NON-DISCRIMINATION.** All hiring shall be on the basis of merit and qualification and there shall be no discrimination in employment on the basis race, ancestry, color, physical or mental disability, religion, national origin, sex, age, marital or familial status, creed, ex-offender status, physical condition, political belief, public assistance status or sexual orientation, gender identity or expression, except where these criteria are reasonable bona fide occupational qualifications.

**AFFIRMATIVE ACTION POLICY.** Contractors, subcontractors, sub grantees, and other firms doing business with the City of Missoula must be in compliance with the City of Missoula's Affirmative Action Plan, and Title 49 Montana Codes Annotated, entitled "Human Rights" or forfeit the right to continue such business dealings.

The City's Affirmative Action Policy Statement is:

The Mayor of the City of Missoula or the Mayor's designee may adopt an affirmative action plan to provide all persons equal opportunity for employment without regard to race, ancestry, color, physical or mental disability, religion, national origin, sex, age, marital or familial status, creed, ex-offender status, physical condition, political belief, public assistance status or sexual orientation, gender identity or expression, except where these criteria are reasonable bona fide occupational qualifications. In keeping with this commitment, we are assigning to all department heads and their staff the responsibility to actively facilitate equal employment opportunity for all present employees, applicants, and trainees. This responsibility shall include assurance that employment decisions are based on furthering the principle of equal employment opportunity by imposing only valid requirements for employment and assuring that all human resource actions are administered on the basis of job necessity.

Specific responsibility for developing, implementing, monitoring and reporting are assigned to the City Personnel staff under the supervision and direction of the Chief Administrative Officer and the Mayor.

It is the policy of the City of Missoula to eliminate any practice or procedure that discriminates illegally or has an adverse impact on an "affected" class. Equal opportunity shall be provided for all City employees during their terms of employment. All applicants for City employment shall be employed on the basis of their qualifications and abilities.

The City of Missoula, where practical, shall utilize minority owned enterprises and shall ensure that subcontractors and vendors comply with this policy. Failure of subcontractors and vendors to comply with this policy statement shall jeopardize initial, continued, or renewed funds.

Our commitment is intended to promote equal opportunity in all employment practices and provide a positive program of affirmative action for the City of Missoula, its employees, program participants, trainees and applicants.

MONTANA  
PREVAILING WAGE RATES FOR BUILDING CONSTRUCTION SERVICES 2021

**Effective: January 1, 2021**

**Steve Bullock, Governor**  
*State of Montana*

***Brenda Nordlund, Acting Commissioner***  
***Department of Labor & Industry***

To obtain copies of prevailing wage rate schedules, or for information relating to public works projects and payment of prevailing wage rates, visit ERD at [www.mtwagehourbopa.com](http://www.mtwagehourbopa.com) or contact:

Employment Relations Division  
Montana Department of Labor and Industry  
P. O. Box 201503  
Helena, MT 59620-1503  
Phone 406-444-6543

**The department welcomes questions, comments, and suggestions from the public. In addition, we'll do our best to provide information in an accessible format, upon request, in compliance with the Americans with Disabilities Act.**

**MONTANA PREVAILING WAGE REQUIREMENTS**

The Commissioner of the Department of Labor and Industry, in accordance with Sections 18-2-401 and 18-2-402 of the Montana Code Annotated (MCA), has determined the standard prevailing rate of wages for the occupations listed in this publication.

The wages specified herein control the prevailing rate of wages for the purposes of Section 18-2-401, et seq., MCA. It is required each employer pay (as a minimum) the rate of wages, including fringe benefits, travel allowance, zone pay and per diem applicable to the district in which the work is being performed as provided in the attached wage determinations.

All Montana Prevailing Wage Rates are available on the internet at [www.mtwagehourbopa.com](http://www.mtwagehourbopa.com) or by contacting the department at (406) 444-6543.

In addition, this publication provides general information concerning compliance with Montana's Prevailing Wage Law and the payment of prevailing wages. For detailed compliance information relating to public works contracts and payment of prevailing wage rates, please consult the regulations on the internet at [www.mtwagehourbopa.com](http://www.mtwagehourbopa.com) or contact the department at (406) 444-6543.

BRENDA NORDLUND  
Acting Commissioner  
Department of Labor and Industry  
State of Montana



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## **A. Date of Publication January 4, 2021**

## **B. Definition of Building Construction**

For the purposes of Prevailing Wage, the Commissioner of Labor and Industry has determined that building construction occupations are defined to be those performed by a person engaged in a recognized trade or craft, or any skilled, semi-skilled, or unskilled manual labor related to the construction, alteration, or repair of a public building or facility, and does not include engineering, superintendence, management, office or clerical work.

The Administrative Rules of Montana (ARM), 24.17.501(2) – 2(a), states *“Building construction projects generally are the constructions of sheltered enclosures with walk-in access for housing persons, machinery, equipment, or supplies. It includes all construction of such structures, incidental installation of utilities and equipment, both above and below grade level, as well as incidental grading, utilities and paving.”*

*Examples of building construction include, but are not limited to, alterations and additions to buildings, apartment buildings (5 stories and above), arenas (closed), auditoriums, automobile parking garages, banks and financial buildings, barracks, churches, city halls, civic centers, commercial buildings, court houses, detention facilities, dormitories, farm buildings, fire stations, hospitals, hotels, industrial buildings, institutional buildings, libraries, mausoleums, motels, museums, nursing and convalescent facilities, office buildings, out-patient clinics, passenger and freight terminal buildings, police stations, post offices, power plants, prefabricated buildings, remodeling buildings, renovating buildings, repairing buildings, restaurants, schools, service stations, shopping centers, stores, subway stations, theaters, warehouses, water and sewage treatment plants (buildings only), etc.”*

## **C. Definition of Public Works Contract**

Section 18-2-401(11)(a), MCA defines “public works contract” as *“...a contract for construction services let by the state, county, municipality, school district, or political subdivision or for nonconstruction services let by the state, county, municipality, or political subdivision in which the total cost of the contract is in excess of \$25,000...”*.

## **D. Prevailing Wage Schedule**

This publication covers only Building Construction occupations and rates. These rates will remain in effect until superseded by a more current publication. Current prevailing wage rate schedules for Heavy Construction, Highway Construction, and Nonconstruction Services occupations can be found on the internet at [www.mtwagehoubopa.com](http://www.mtwagehoubopa.com) or by contacting the department at (406) 444-6543.

## **E. Rates to Use for Projects**

ARM, 24.17.127(1)(c), states *“The wage rates applicable to a particular public works project are those in effect at the time the bid specifications are advertised.”*

## **F. Wage Rate Adjustments for Multiyear Contracts**

Section 18-2-417, MCA states:

*“(1) Any public works contract that by the terms of the original contract calls for more than 30 months to fully perform must include a provision to adjust, as provided in subsection (2), the standard prevailing rate of wages to be paid to the workers performing the contract.*

*(2) The standard prevailing rate of wages paid to workers under a contract subject to this section must be adjusted 12 months after the date of the award of the public works contract. The amount of the adjustment must be a 3% increase. The adjustment must be made and applied every 12 months for the term of the contract.*

*(3) Any increase in the standard rate of prevailing wages for workers under this section is the sole responsibility of the contractor and any subcontractors and not the contracting agency.”*

## G. Fringe Benefits

Section 18-2-412, MCA states:

“(1) To fulfill the obligation...a contractor or subcontractor may:

(a) pay the amount of fringe benefits and the basic hourly rate of pay that is part of the standard prevailing rate of wages directly to the worker or employee in cash;

(b) make an irrevocable contribution to a trustee or a third person pursuant to a fringe benefit fund, plan, or program that meets the requirements of the Employee Retirement Income Security Act of 1974 or that is a bona fide program approved by the U. S. department of labor; or

(c) make payments using any combination of methods set forth in subsections (1)(a) and (1)(b) so that the aggregate of payments and contributions is not less than the standard prevailing rate of wages, including fringe benefits and travel allowances, applicable to the district for the particular type of work being performed.

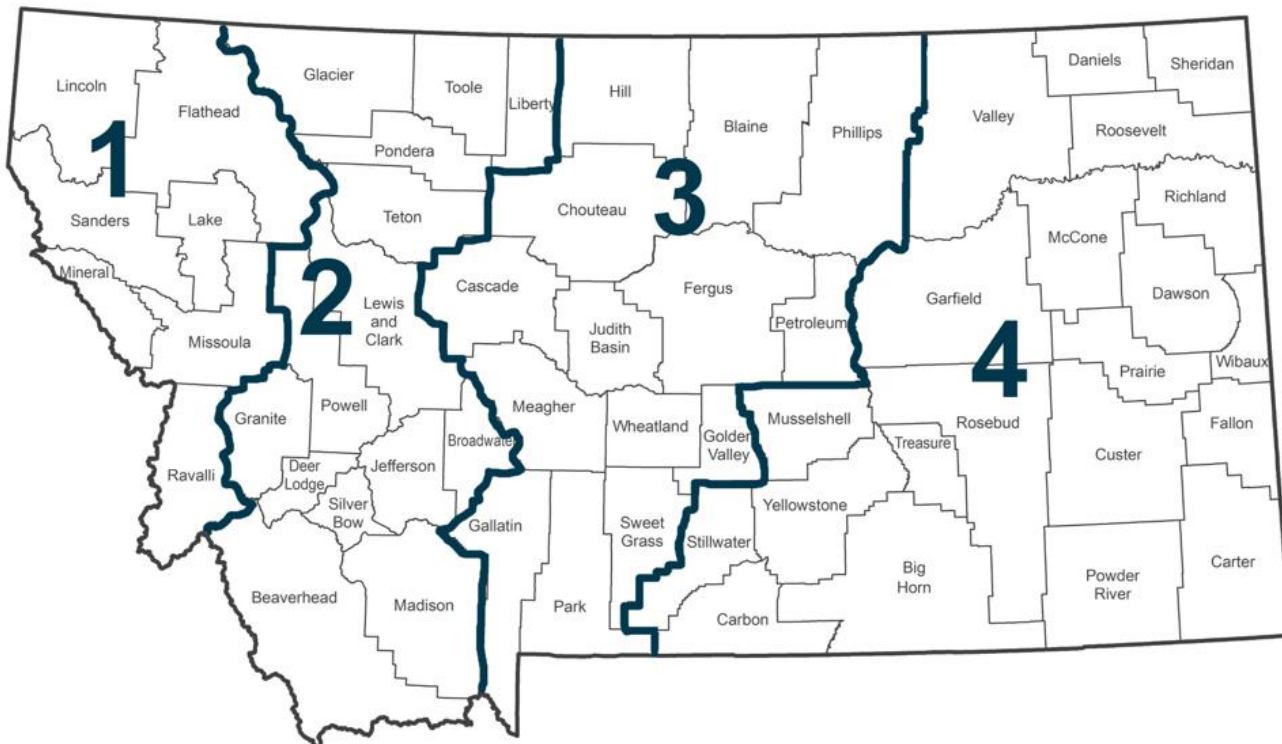
(2) The fringe benefit fund, plan, or program described in subsection (1)(b) must provide benefits to workers or employees for health care, pensions on retirement or death, life insurance, disability and sickness insurance, or bona fide programs that meet the requirements of the Employee Retirement Income Security Act of 1974 or that are approved by the U. S. department of labor.”

Fringe benefits are paid for all hours worked (straight time and overtime hours). However, fringe benefits are not to be considered a part of the hourly rate of pay for calculating overtime, unless there is a collectively bargained agreement in effect that specifies otherwise.

## H. Prevailing Wage Districts

Montana counties are aggregated into 4 districts for the purpose of prevailing wage. The prevailing wage districts are composed of the following counties:

### Montana Prevailing Wage Districts



## **I. Dispatch City**

ARM, 24.17.103(11), defines dispatch city as “...the courthouse in the city from the following list which is closest to the center of the job: Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, and Missoula.” A dispatch city shall be considered the point of origin only for jobs within the counties identified in that district (as shown below):

**District 1 – Kalispell and Missoula:** includes Flathead, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders;

**District 2 – Butte and Helena:** includes Beaverhead, Broadwater, Deer Lodge, Glacier, Granite, Jefferson, Lewis and Clark, Liberty, Madison, Pondera, Powell, Silver Bow, Teton, and Toole;

**District 3 – Bozeman and Great Falls:** includes Blaine, Cascade, Chouteau, Fergus, Gallatin, Golden Valley, Hill, Judith Basin, Meagher, Park, Petroleum, Phillips, Sweet Grass, and Wheatland;

**District 4 – Billings:** includes Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Treasure, Valley, Wibaux, and Yellowstone.

## **J. Zone Pay**

Zone pay is not travel pay. ARM, 24.17.103(24), defines zone pay as “...an amount added to the base pay; the combined sum then becomes the new base wage rate to be paid for all hours worked on the project. Zone pay must be determined by measuring the road miles one way over the shortest practical maintained route from the dispatch city to the center of the job.” See section I above for a list of dispatch cities.

## **K. Computing Travel Benefits**

ARM, 24.17.103(22), states “ ‘Travel pay,’ also referred to as ‘travel allowance,’ is and must be paid for travel both to and from the job site, except those with special provisions listed under the classification. The rate is determined by measuring the road miles one direction over the shortest practical maintained route from the dispatch city or the employee’s home, whichever is closer, to the center of the job.” See section I above for a list of dispatch cities.

## **L. Per Diem**

ARM, 24.17.103(18), states “ ‘Per diem’ typically covers costs associated with board and lodging expenses. Per diem is paid when an employee is required to work at a location outside the daily commuting distance and is required to stay at that location overnight or longer.”

## **M. Apprentices**

Wage rates for apprentices registered in approved federal or state apprenticeship programs are contained in those programs. Additionally, Section 18-2-416(2), MCA states “...The full amount of any applicable fringe benefits must be paid to the apprentice while the apprentice is working on the public works contract.” Apprentices not registered in approved federal or state apprenticeship programs will be paid the appropriate journey level prevailing wage rate when working on a public works contract.

## **N. Posting Notice of Prevailing Wages**

Section 18-2-406, MCA provides that contractors, subcontractors and employers who are “...performing work or providing construction services under public works contracts, as provided in this part, shall post in a prominent and accessible site on the project or staging area, not later than the first day of work and continuing for the entire duration of the project, a legible statement of all wages and fringe benefits to be paid to the employees.”

## **O. Employment Preference**

Sections 18-2-403 and 18-2-409, MCA requires contractors to give preference to the employment of bona fide Montana residents in the performance of work on public works contracts.

## **P. Projects of a Mixed Nature**

Section 18-2-408, MCA states:

*“(1) The contracting agency shall determine, based on the preponderance of labor hours to be worked, whether the public works construction services project is classified as a highway construction project, a heavy construction project, or a building construction project.*

*“(2) Once the project has been classified, employees in each trade classification who are working on that project must be paid at the rate for that project classification”*

## **Q. Occupations Definitions**

You can find definitions for these occupations on the following Bureau of Labor Statistics website:

[http://www.bls.gov/oes/current/oes\\_stru.htm](http://www.bls.gov/oes/current/oes_stru.htm)

## **R. Welder Rates**

Welders receive the rate prescribed for the craft performing an operation to which welding is incidental.

## **S. Foreman Rates**

Rates are no longer set for foremen. However, if a foreman performs journey level work, the foreman must be paid at least the journey level rate.

# WAGE RATES

## BOILERMAKERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$33.15	\$31.15
District 2	\$33.15	\$31.15
District 3	\$33.15	\$31.15
District 4	\$33.15	\$31.15

### Duties Include:

Construct, assemble, maintain, and repair stationary steam boilers, boiler house auxiliaries, process vessels, and pressure vessels.

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### Travel:

#### All Districts

0-120 mi. free zone  
>120 mi. federal mileage rate/mi.

### Special Provision:

Travel is paid only at the beginning and end of the job.

### Per Diem:

#### All Districts

0-70 mi. free zone  
>70-120 mi. \$65.00/day  
>120 mi. \$80.00/day

## BRICK, BLOCK, AND STONE MASONS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$30.55	\$15.75
District 2	\$30.55	\$15.75
District 3	\$30.55	\$15.75
District 4	\$30.55	\$15.75

### Duties Include:

Lays out, lays, cuts, installs, and finishes all brick, structural tile, refractory materials, precast units, concrete, cinder, glass, gypsum, terra cotta block, and all other natural and artificial masonry products to construct or repair walls, partitions, stacks, furnaces, or other structures.

Sets stone to build stone structures such as piers, walls, and abutments, and lays walks, curbstones, or special types of masonry for vats, tanks, and floors. May set, cut, and dress ornamental and structural stone in buildings.

This classification is tended by Tender to Masons Trades: Brick and Stonemason, Mortar Mixer, Hod Carrier

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### Travel:

#### All Districts

0-70 mi. free zone  
>70-90 mi. \$60.00/day  
>90 mi. \$80.00/day

## CARPENTERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$25.00	\$13.57
District 2	\$25.00	\$13.86
District 3	\$25.00	\$13.57
District 4	\$25.00	\$13.57

### Duties Include:

Install roll and batt insulation, and hardwood floors.

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### Zone Pay:

#### All Districts

0-30 mi. free zone  
>30-60 mi. base pay + \$4.00/hr.  
>60 mi. base pay + \$6.00/hr.

## CARPET INSTALLERS

**No Rate Established**

**Duties Include:**

Lay and install carpet from rolls or blocks on floors. Install padding and trim flooring materials.

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**Travel and Per Diem:**

**All Districts**

No travel or per diem established.

## CEMENT MASONS AND CONCRETE FINISHERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$25.61	\$10.40
District 2	\$24.74	\$10.40
District 3	\$25.31	\$10.40
District 4	\$25.36	\$10.40

**Duties Include:**

Smooth and finish surfaces of poured concrete, such as floors, walks, sidewalks, or curbs. Align forms for sidewalks, curbs, or gutters.

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**Zone Pay:**

**All Districts**

0-25 mi. free zone

>25-50 mi. base pay + \$2.50/hr.

>50 mi. base pay + \$3.00/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 1

	<b>Wage</b>	<b>Benefit</b>
District 1	\$27.91	\$13.67
District 2	\$27.91	\$13.67
District 3	\$27.91	\$13.67
District 4	\$27.91	\$13.67

**This group includes but is not limited to:**

Air Compressor; Auto Fine Grader; Belt Finishing; Boring Machine (Small); Cement Silo; Crane, A-Frame Truck Crane; Crusher Conveyor; DW-10, 15, and 20 Tractor Roller; Farm Tractor; Forklift; Form Grader; Front-End Loader, under 1 cu. yd; Oiler, Heavy Duty Drills; Herman Nelson Heater; Mucking Machine; Oiler, All Except Cranes/Shovels; Pumpman.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 2

	<b>Wage</b>	<b>Benefit</b>
District 1	\$26.69	\$12.18
District 2	\$28.70	\$13.67
District 3	\$28.70	\$13.67
District 4	\$28.70	\$13.67

**This group includes but is not limited to:**

Air Doctor; Backhoe\Excavator\Shovel, up to and incl. 3 cu. yds; Bit Grinder; Bituminous Paving Travel Plant; Boring Machine, Large; Broom, Self-Propelled; Concrete Travel Batch; Concrete Float & Spreader; Concrete Bucket Dispatcher; Concrete Finish Machine; Concrete Conveyor; Distributor; Dozer, Rubber-Tired, Push, & Side Boom; Elevating Grader\Gradall; Field Equipment Serviceman; Front-End Loader, 1 cu. yd up to and incl. 5 cu. yds; Grade Setter; Heavy Duty Drills, All Types; Hoist\Tugger, All; Hydralift Forklifts & Similar; Industrial Locomotive; Motor Patrol (except finish); Mountain Skidder; Oiler, Cranes\Shovels; Pavement Breaker, EMSCO; Power Saw, Self-Propelled; Pugmill; Pumpcrete\Grout Machine; Punch Truck; Roller, other than Asphalt; Roller, Sheepsfoot (Self-Propelled); Roller, 25 tons and over; Ross Carrier; Rotomill, under 6 ft; Trenching Machine; Washing /Screening Plant.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 3

	<b>Wage</b>	<b>Benefit</b>
District 1	\$29.45	\$13.67
District 2	\$29.45	\$13.67
District 3	\$29.45	\$13.67
District 4	\$29.45	\$13.67

**This group includes but is not limited to:**

Asphalt Paving Machine; Asphalt Screed; Backhoe\Excavator\Shovel, over 3 cu. yds; Cableway Highline; Concrete Batch Plant; Concrete Curing Machine; Concrete Pump; Cranes, Creter; Cranes, Electric Overhead; Cranes, 24 tons and under; Curb Machine\Slip Form Paver; Finish Dozer; Front-End Loader, over 5 cu. yds; Mechanic\Welder; Pioneer Dozer; Roller Asphalt (Breakdown & Finish); Rotomill, over 6 ft; Scraper, Single, Twin, or Pulling Belly-Dump; YO-YO Cat.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.



## CONSTRUCTION EQUIPMENT OPERATORS GROUP 4

	<b>Wage</b>	<b>Benefit</b>
District 1	\$30.45	\$13.67
District 2	\$30.45	\$13.67
District 3	\$30.45	\$13.67
District 4	\$30.45	\$13.67

**This group includes but is not limited to:**

Asphalt\Hot Plant Operator; Cranes, 25 tons up to and incl. 44 tons; Crusher Operator; Finish Motor Patrol; Finish Scraper.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 5

	<b>Wage</b>	<b>Benefit</b>
District 1	\$31.45	\$13.67
District 2	\$31.45	\$13.67
District 3	\$31.45	\$13.67
District 4	\$31.45	\$13.67

**This group includes but is not limited to:**

Cranes, 45 tons up to and incl. 74 tons.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 6

	<b>Wage</b>	<b>Benefit</b>
District 1	\$32.45	\$13.67
District 2	\$32.45	\$13.67
District 3	\$32.45	\$13.67
District 4	\$32.45	\$13.67

**This group includes but is not limited to:**

Cranes, 75 tons up to and incl. 149 tons; Cranes, Whirley (All).

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 7

	<b>Wage</b>	<b>Benefit</b>
District 1	\$33.45	\$13.67
District 2	\$33.45	\$13.67
District 3	\$33.45	\$13.67
District 4	\$33.45	\$13.67

**This group includes but is not limited to:**

Cranes, 150 tons up to and incl. 250 tons; Cranes, over 250 tons—add \$1.00 for every 100 tons over 250 tons; Crane, Tower (All); Crane Stiff-Leg or Derrick; Helicopter Hoist.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION LABORERS GROUP 1/FLAG PERSON FOR TRAFFIC CONTROL

	<b>Wage</b>	<b>Benefit</b>
District 1	\$22.10	\$11.27
District 2	\$22.10	\$11.27
District 3	\$22.10	\$11.27
District 4	\$22.10	\$11.27

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**Zone Pay:**

**All Districts**

0-15 mi. free zone

>15-30 mi. base pay + \$0.65/hr.

>30-50 mi. base pay + \$0.85/hr.

>50 mi. base pay + \$1.25/hr.

## CONSTRUCTION LABORERS GROUP 2

	<b>Wage</b>	<b>Benefit</b>
District 1	\$21.16	\$ 8.80
District 2	\$23.32	\$11.27
District 3	\$21.78	\$ 7.18
District 4	\$22.56	\$11.27

**This group includes but is not limited to:**

General Laborer; Asbestos Removal; Burning Bar; Bucket Man; Carpenter Tender; Caisson Worker; Cement Mason Tender; Cement Handler (dry); Chuck Tender; Choker Setter; Concrete Worker; Curb Machine-lay Down; Crusher and Batch Worker; Heater Tender; Fence Erector; Landscape Laborer; Landscaper; Lawn Sprinkler Installer; Pipe Wrapper; Pot Tender; Powderman Tender; Rail and Truck Loaders and Unloaders; Riprapper; Sign Erection; Guardrail and Jersey Rail; Spike Driver; Stake Jumper; Signalman; Tail Hoseman; Tool Checker and Houseman and Traffic Control Worker.

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**Zone Pay:**

**All Districts**

0-15 mi. free zone

>15-30 mi. base pay + \$0.65/hr.

>30-50 mi. base pay + \$0.85/hr.

>50 mi. base pay + \$1.25/hr.

### CONSTRUCTION LABORERS GROUP 3

	<b>Wage</b>	<b>Benefit</b>
District 1	\$23.10	\$11.27
District 2	\$23.10	\$11.27
District 3	\$23.10	\$11.27
District 4	\$23.10	\$11.27

**This group includes but is not limited to:**

Concrete Vibrator; Dumpman (Grademan); Equipment Handler; Geotextile and Liners; High-Pressure Nozzle; Jackhammer (Pavement Breaker) Non-Riding Rollers; Pipelayer; Posthole Digger (Power); Power Driven Wheelbarrow; Rigger; Sandblaster; Sod Cutter-Power and Tamper.

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**Zone Pay:**

**All Districts**

0-15 mi. free zone  
>15-30 mi. base pay + \$0.65/hr.  
>30-50 mi. base pay + \$0.85/hr.  
>50 mi. base pay + \$1.25/hr.

### CONSTRUCTION LABORERS GROUP 4

	<b>Wage</b>	<b>Benefit</b>
District 1	\$23.15	\$11.27
District 2	\$23.15	\$11.27
District 3	\$23.15	\$11.27
District 4	\$23.15	\$11.27

**This group includes but is not limited to:**

Hod Carrier\*\*\*; Water Well Laborer; Blaster; Wagon Driller; Asphalt Raker; Cutting Torch; Grade Setter; High-Scaler; Power Saws (Faller & Concrete) Powderman; Rock & Core Drill; Track or Truck Mounted Wagon Drill and Welder incl. Air Arc.

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**Zone Pay:**

**All Districts**

0-15 mi. free zone  
>15-30 mi. base pay + \$0.65/hr.  
>30-50 mi. base pay + \$0.85/hr.  
>50 mi. base pay + \$1.25/hr.

\*\*\*Hod Carriers will receive the same amount of travel and/or subsistence pay as bricklayers when requested to travel.

### DRYWALL APPLICATORS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$25.00	\$13.57
District 2	\$25.00	\$13.86
District 3	\$25.00	\$13.57
District 4	\$25.00	\$13.57

**Duties Include:**

Drywall and ceiling tile installation.

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**Zone Pay:**

**All Districts**

0-30 mi. free zone  
>30-60 mi. base pay + \$4.00/hr.  
>60 mi. base pay + \$6.00/hr.

## ELECTRICIANS: INCLUDING BUILDING AUTOMATION CONTROL

	<b>Wage</b>	<b>Benefit</b>
District 1	\$32.22	\$14.98
District 2	\$31.65	\$16.33
District 3	\$32.00	\$15.27
District 4	\$34.59	\$15.71

### **Duties Include:**

Electrical wiring; equipment and fixtures; street lights; electrical control systems. Installation and/or adjusting of building automation controls also during testing and balancing, commissioning and retro-commissioning.

### **Travel:**

#### **District 1**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-15 mi. free zone
- >15-45 mi. \$0.585/mi. in excess of the free zone.
- >45 mi. \$75.00/day

#### **District 2**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-10 mi. free zone
- >10-55 mi. federal mileage rate/mi.
- >55 mi. \$66.00/day

#### **District 3**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-08 mi. free zone
- >08-50 mi. federal mileage rate/mi. in excess of the free zone.
- >50 mi. \$66.00/day

#### **District 4**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-18 mi. free zone
- >18-60 mi. federal mileage rate/mi.
- >60 mi. \$75.00/day

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## ELEVATOR CONSTRUCTORS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$55.86	\$39.71
District 2	\$55.86	\$39.71
District 3	\$55.86	\$39.71
District 4	\$55.86	\$39.71

### **Travel:**

#### **All Districts**

0-15 mi. free zone

>15-25 mi. \$44.73/day

>25-35 mi. \$89.46/day

>35 mi. \$84.90/day or cost of receipts for hotel and meals, whichever is greater.

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## FLOOR LAYERS

### **No Rate Established**

#### **Duties Include:**

Apply blocks, strips, or sheets of shock-absorbing, sound-deadening, or decorative coverings to floors.

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## GLAZIERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$18.54	\$2.50
District 2	\$18.54	\$2.50
District 3	\$19.47	\$2.64
District 4	\$20.52	\$2.76

### **Travel and Per Diem:**

#### **All Districts**

No travel or per diem established.

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## HEATING AND AIR CONDITIONING

	<b>Wage</b>	<b>Benefit</b>
District 1	\$30.92	\$17.33
District 2	\$30.84	\$19.38
District 3	\$30.84	\$19.38
District 4	\$30.84	\$19.38

#### **Duties Include:**

Testing and balancing, commissioning and retro-commissioning of all air-handling equipment and duct work.

### **Travel:**

#### **All Districts**

0-50 mi. free zone

>50 mi.

- \$0.25/mi. in employer vehicle.
- \$0.65/mi. in employee vehicle.

### **Per Diem:**

#### **All Districts**

\$70/day

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## INSULATION WORKERS - MECHANICAL (HEAT AND FROST)

	<b>Wage</b>	<b>Benefit</b>
District 1	\$35.37	\$19.87
District 2	\$35.37	\$19.87
District 3	\$35.37	\$19.87
District 4	\$35.37	\$19.87

### **Duties Include:**

Insulate pipes, ductwork or other mechanical systems.

### **Travel:**

#### **All Districts**

0-30 mi. free zone

>30-40 mi. \$25.00/day

>40-50 mi. \$35.00/day

>50-60 mi. \$50.00/day

>60 mi. \$60.00/day plus

- \$0.56/mi. if transportation is not provided.
- \$0.20/mi. if in company vehicle.

>60 mi. \$95.00/day on jobs requiring an overnight stay plus

- \$0.56/mi. if transportation is not provided.
- \$0.20/mi. if in company vehicle.

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## IRONWORKERS - STRUCTURAL STEEL AND REBAR PLACERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$29.15	\$27.05
District 2	\$28.24	\$23.19
District 3	\$28.24	\$23.19
District 4	\$28.24	\$23.19

### **Duties Include:**

Structural steel erection; assemble prefabricated metal buildings; cut, bend, tie, and place rebar; energy producing windmill type towers; metal bleacher seating; handrail fabrication and ornamental steel.

### **Travel:**

#### **District 1**

0-45 mi. free zone

>45-60 mi. \$45.00/day

>60-100 mi. \$70.00/day

>100 mi. \$90.00/day

#### **Special Provision:**

When the employer provides transportation, travel will not be paid. However, when an employee is required to travel over 70 miles one way, the employee may elect to receive the travel pay in lieu of the transportation.

#### **Districts 2, 3 & 4**

0-45 mi. free zone

>45-85 mi. \$70.00/day

>85 mi. \$100.00/day

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## MILLWRIGHTS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$36.97	\$14.02
District 2	\$36.97	\$14.02
District 3	\$36.97	\$14.02
District 4	\$36.97	\$14.02

### **Zone Pay:**

#### **All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$4.00/hr.

>60 mi. base pay + \$6.00/hr.

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## PAINTERS: INCLUDING PAPERHANGERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$19.57	\$0.00
District 2	\$19.57	\$0.00
District 3	\$19.57	\$0.00
District 4	\$19.57	\$0.00

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### Travel and Per Diem:

#### All Districts

No travel or per diem established.

## PILE BUCKS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$32.00	\$13.57
District 2	\$32.00	\$13.86
District 3	\$32.00	\$13.57
District 4	\$32.00	\$13.57

### Duties Include:

All pile driving, bridge, wharf, building, and caisson work, on both land and water. General pile driving work includes all labor employed in the barking, shoeing, splicing, form building, heading, centering, placing, driving, staying, framing, fastening, demo, tooling of the cutter head, Lagging, automatic pile threading, pulling, and/or cutting off of all piling, to include all pile of any make and material as well as similar pre-cast structural shapes or units the setting of which is performed with a pile driver, derrick, crane, or similar power equipment. Fabrication, forming, handling, and setting of all such pre-cast, pre-stressed and post-stressed shapes that are an integral part of any heavy structure, rafting, boring, reeving, dogging, or booming of piles or other material. This includes the unloading of piling of all types together with the wailing and bracing included.

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### Zone Pay:

#### All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$4.00/hr.

>60 mi. base pay + \$6.00/hr.

## PLASTERERS

### No Rate Established

### Duties Include:

All materials beyond the substrate, such as a moisture barrier, any type of drainage installation between the moisture barrier and insulation or EPS board, the attachment of the EPS board, installation of fiberglass mesh embedded in the base coat, any water-resistant coat that is applied on top of the insulation to serve as a weather barrier, and the application of the finish coat.

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### Travel and Per Diem:

#### All Districts

No travel or per diem established.

## PLUMBERS, PIPEFITTERS, AND STEAMFITTERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$33.38	\$15.56
District 2	\$34.35	\$16.00
District 3	\$34.35	\$16.00
District 4	\$32.74	\$19.50

### **Duties Include:**

Assemble, install, alter, and repair pipe-lines or pipe systems that carry water, steam, air, other liquids or gases. Testing of piping systems, commissioning and retro-commissioning. Workers in this occupation may also install heating and cooling equipment and mechanical control systems.

### **Travel:**

#### **District 1**

0-30 mi. free zone  
>30-50 mi. \$30.00/day  
>50-75 mi. \$45.00/day  
>75 mi. \$85.00/day

#### **Special Provision**

If transportation is not provided, mileage at \$0.35/mi. with a separate free zone of 20 miles is added to the amounts above. However, if the employee is traveling more than 75 miles/day, only subsistence is required.

#### **Districts 2 & 3**

0-40 mi. free zone  
>40-80 mi. \$50.00/day  
>80 mi. \$100.00/day

#### **Special Provision:**

If employer provides transportation, travel pay will be ½ of the amounts listed above unless the employee stays overnight. If the employee chooses to stay overnight, the employee will receive the full amount of travel listed above even if the employer furnishes transportation.

#### **District 4**

0-70 free zone  
>70 mi.

- On jobs when employees do not work consecutive days: \$0.55/mi. if employer doesn't provide transportation. Not to exceed two trips.
- On jobs when employees work any number of consecutive days: \$105.00/day.

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## ROOFERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$25.61	\$12.49
District 2	\$25.61	\$12.49
District 3	\$21.60	\$ 7.66
District 4	\$22.72	\$ 5.67

### **Duties Include:**

Metal roofing. Excludes prefabricated metal buildings.

### **Travel:**

#### **District 1**

0-50 mi. free zone  
>50 mi. \$0.35/mi.

#### **District 2 and 3**

0-35 mi. free zone  
>35 mi. \$0.30/mi only when employer doesn't provide transportation.

#### **District 4**

0-25 mi. free zone  
>25 mi. \$0.30/mi only when employer doesn't provide transportation.

### **Per Diem:**

#### **District 1**

\$60.00/day

#### **District 2 and 3**

Employer pays for room + \$26.50/day.

#### **District 4**

Employer pays for room + \$25.00/day.

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## SHEET METAL WORKERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$30.84	\$19.38
District 2	\$30.84	\$19.38
District 3	\$30.84	\$19.38
District 4	\$30.84	\$19.38

### **Duties Include:**

Testing and balancing, commissioning and retro-commissioning of all air-handling equipment and duct work. Manufacture, fabrication, assembling, installation, dismantling, and alteration of all HVAC systems, air conveyer systems, and exhaust systems. All lagging over insulation and all duct lining.

### **Travel:**

#### **All Districts**

0-50 mi. free zone  
>50 mi.

- \$0.25/mi. in employer vehicle
- \$0.65/mi. in employee vehicle

### **Per Diem:**

#### **All Districts**

\$70.00/day

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## SOLAR PHOTOVOLTAIC INSTALLERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$32.22	\$14.98
District 2	\$31.65	\$16.33
District 3	\$32.00	\$15.27
District 4	\$34.59	\$15.71

### **Travel:** **District 1**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-15 mi. free zone
- >15-45 mi. \$0.585/mi. in excess of the free zone.
- >45 mi. \$75.00/day

### **District 2**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-10 mi. free zone
- >10-55 mi. federal mileage rate/mi.
- >55 mi. \$66.00/day

### **District 3**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-08 mi. free zone
- >08-50 mi. federal mileage rate/mi. in excess of the free zone.
- >50 mi. \$66.00/day

### **District 4**

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-18 mi. free zone
- >18-60 mi. federal mileage rate/mi.
- >60 mi. \$75.00/day

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## SPRINKLER FITTERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$34.35	\$23.00
District 2	\$34.35	\$23.00
District 3	\$34.35	\$23.00
District 4	\$34.35	\$23.00

### **Duties Include:**

Duties Include but not limited to any and all fire protection systems: Installation, dismantling, inspection, testing, maintenance, repairs, adjustments, and corrections of all fire protection and fire control systems, including both overhead and underground water mains, all piping, fire hydrants, standpipes, air lines, tanks, and pumps used in connection with sprinkler and alarm systems.

### **Travel**

#### **All Districts**

The following travel allowance is applicable when traveling in employee's vehicle.

0-60 mi. free zone  
>60-80 mi. \$19.00/day  
>80-100 mi. \$29.00/day  
>100 mi. \$105.00/day.

#### **Special Provision**

When traveling >100 miles, mileage at \$0.54/mi. + \$8.59 for every 15 miles traveled at beginning and end of job.

The following travel allowance is applicable when traveling in employer's vehicle.

0-100 mi. free zone  
>100 mi. \$105.00/day

#### **Special Provision**

When traveling >100 miles, \$8.59 for every 15 miles traveled, at beginning and end of job.

#### **Per Diem:**

##### **All Districts**

No per diem is applicable when traveling in employee's vehicle

The following per diem is applicable when traveling in employer's vehicle.

0-100 mi. free zone  
>100 mi. \$105.00/day

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## TAPERS

**No Rate Established**

### **Travel and Per Diem:**

#### **All Districts**

No travel or per diem established.

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## TELECOMMUNICATIONS EQUIPMENT INSTALLERS

	<b>Wage</b>	<b>Benefit</b>
District 1	\$22.11	\$ 3.48
District 2	\$24.33	\$10.85
District 3	\$24.42	\$ 9.22
District 4	\$22.76	\$..8.37

### **Duties Include:**

Install voice; sound; vision and data systems. This occupation includes burglar alarms, fire alarms, fiber optic systems, and video systems for security or entertainment.

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### **Travel:**

#### **All Districts**

The federal mileage rate/mi. in effect when travel occurs if using own vehicle.

### **Per Diem:**

#### **All Districts**

Employer pays for meals and lodging up to \$75.00/day. When jobsite is located in Big Sky, West Yellowstone, and Gardiner, lodging and meals will be provided by the employer for all actual and reasonable expenses incurred.

## TERRAZZO WORKERS AND FINISHERS

### **No Rate Established**

### **Duties Include:**

Finish work on hard tile, marble, and wood tile to floors, ceilings, and roof decks

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## TILE AND STONE SETTERS

### **No Rate Established**

### **Duties Include:**

Apply hard tile, stone, and comparable materials to walls, floors, ceilings, countertops, and roof decks.

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## TRUCK DRIVERS

Pilot Car Driver                      **No Rate Established**

Truck Driver                              **No Rate Established**

### **Truck drivers include but are not limited to:**

Combination Truck & Concrete Mixer; Distributor Driver; Dry Batch Trucks; Dump Trucks & Similar Equipment; Flat Trucks; Lowboys, Four-Wheel Trailers, Float Semitrailer; Powder Truck Driver (Bulk Unloader Type); Servicemen; Service Truck Drivers, Fuel Truck Drivers, Tiremen; Trucks with Power Equipment; Truck Mechanic; Water Tank Drivers, Petroleum Product Drivers..

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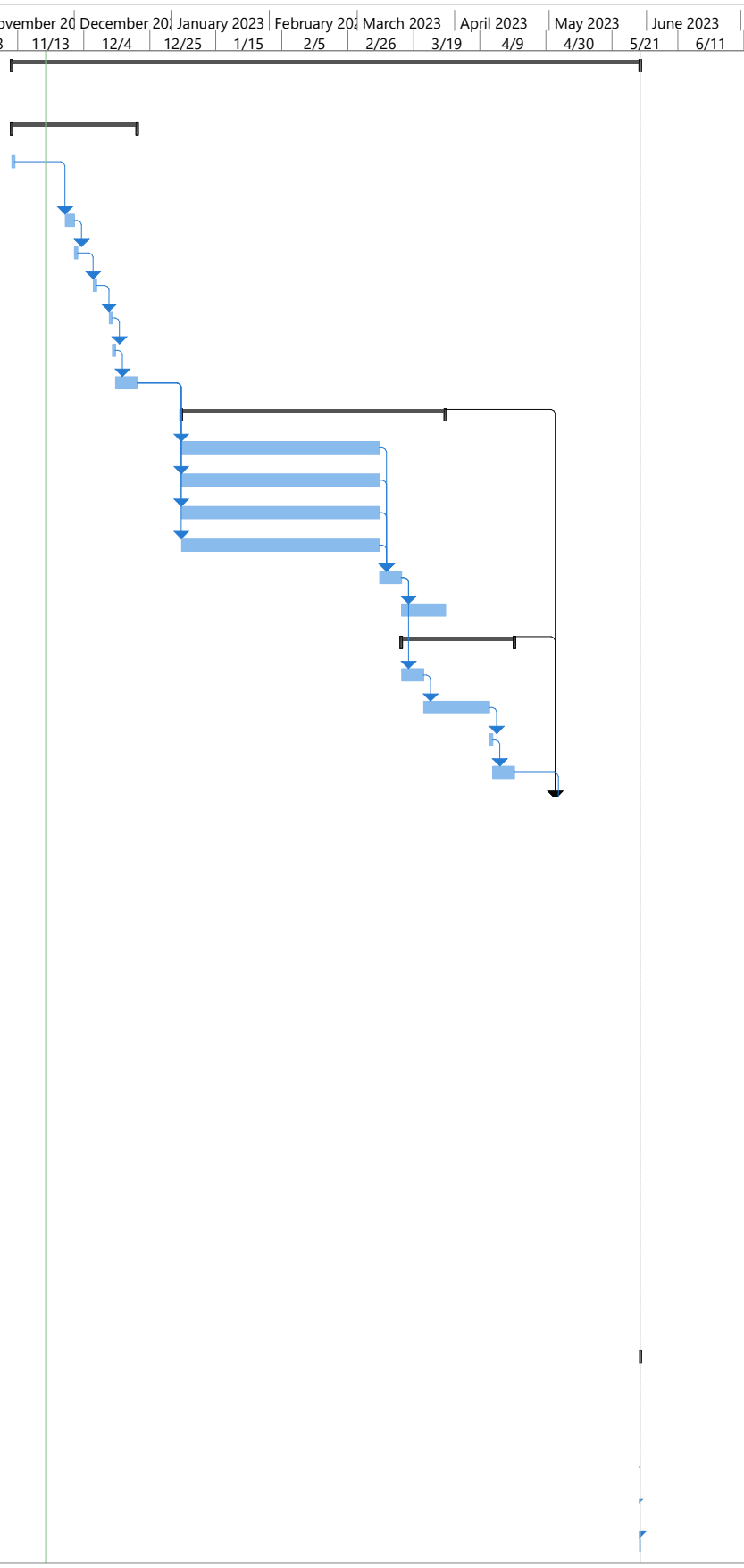
### **Zone Pay:**

#### **All Districts**

No zone pay established.

**EXHIBIT C - City of Missoula Energy Performance Contract Proposal Project Forms – Ph 1 Pre-Construction Schedule**

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	January 2022	February 2022	March 2022	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022	November 2022	December 2022	January 2023	February 2023	March 2023	April 2023	May 2023	June 2023								
1		<b>City of Missoula EPC: Ph 1 Implementation</b>	<b>142 days</b>	<b>Fri 11/11/22</b>	<b>Mon 5/29/23</b>		1/2	1/23	2/13	3/6	3/27	4/17	5/8	5/29	6/19	7/10	7/31	8/21	9/11	10/2	10/23	11/13	12/4	12/25	1/15	2/5	2/26	3/19	4/9	4/30	5/21	6/11
2		<b>Project Administration</b>	<b>28 days</b>	<b>Fri 11/11/22</b>	<b>Tue 12/20/22</b>																											
3		Submission of Contract and Exhibits	1 day	Fri 11/11/22	Fri 11/11/22																											
4		Final City Contract review	3 days	Mon 11/28/22	Wed 11/30/22	3																										
5		Refer to Council	1 day	Thu 12/1/22	Thu 12/1/22	4																										
6		Council Committee Review	1 day	Wed 12/7/22	Wed 12/7/22	5FS+3 days																										
7		City Council Meeting	1 day	Mon 12/12/22	Mon 12/12/22	6FS+2 days																										
8		City Contract approval	1 day	Tue 12/13/22	Tue 12/13/22	7																										
9		Contract execution	5 days	Wed 12/14/22	Tue 12/20/22	8																										
10		<b>Engineering &amp; Design</b>	<b>60 days</b>	<b>Wed 1/4/23</b>	<b>Tue 3/28/23</b>																											
11		Mechanical engineering	45 days	Wed 1/4/23	Tue 3/7/23	9FS+10 days																										
12		Electrical engineering	45 days	Wed 1/4/23	Tue 3/7/23	9FS+10 days																										
13		Lighting design	45 days	Wed 1/4/23	Tue 3/7/23	9FS+10 days																										
14		Consultant design	45 days	Wed 1/4/23	Tue 3/7/23	9FS+10 days																										
15		Submittals to City	5 days	Wed 3/8/23	Tue 3/14/23	11,12,13,14																										
16		Submittal approval	10 days	Wed 3/15/23	Tue 3/28/23	15																										
17		<b>Construction Buy-Out</b>	<b>26 days</b>	<b>Wed 3/15/23</b>	<b>Wed 4/19/23</b>																											
18		Preparation of RFP documents	5 days	Wed 3/15/23	Tue 3/21/23	15																										
19		Public RFP	15 days	Wed 3/22/23	Tue 4/11/23	18																										
20		RFP submissions	1 day	Wed 4/12/23	Wed 4/12/23	19																										
21		Subcontractor negotiations/select	5 days	Thu 4/13/23	Wed 4/19/23	20																										
22		<b>Implementation</b>	<b>7 days</b>	<b>Thu 5/4/23</b>	<b>Fri 5/12/23</b>	<b>10,17</b>																										
23	<p>Implementation schedule to be determined. Based on final design, equipment selections, subcontractors, vendors, material lead times, and other unknown market conditions, it is not possible to generate an accurate implementation schedule at time of contract. Contractor and Owner will define a mutually agreed upon implementation schedule once this data is available. This schedule is representative of a development schedule initiated immediately at the time of contract signing. Project specific timelines will be updated and/or created per scope of work added via Exhibit to this contract.</p>																															
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Project: 221108 Ph 1 Implemen  
Date: Tue 11/22/22

Task		Summary		Inactive Milestone		Duration-only		Start-only		External Milestone		Manual Progress
Split		Project Summary		Inactive Summary		Manual Summary Rollup		Finish-only		Deadline		
Milestone		Inactive Task		Manual Task		Manual Summary		External Tasks		Progress		

# EXHIBIT D- City of Missoula Energy Performance Contract Proposal Project Forms- Aquatics Ph 1



# Table 3.1 - Energy Savings Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Aquatics  
 Date: 11/3/2022

FIM ID	Facility Improvement Measures	FIM Type	Group	Facility	Guarantee Multiplier for Positive Numbers *	Guarantee Multiplier for Negative Numbers *	Electricity				Natural Gas		Water		Sewer		Total **
							kW	kW (\$)	kWh	kWh (\$)	Therm	Therm (\$)	kgal-W	kgal-W (\$)	kgal-S	kgal-S (\$)	All (\$)
49274	CURR 19.01 Water Conservation	19	Aquatics	Currents Aquatics	90%	110%	0.0	\$0	-7,192	-\$661	6	\$6	419	\$1,108	419	\$868	\$1,321
48222	CURR 01.02 Reduce Glycol Concentration	1	Aquatics	Currents Aquatics Center	90%	110%	0.0	\$0	0	\$0	2,364	\$2,305	0	\$0	0	\$0	\$2,305
48226	CURR 17.06 Sewer Deduct Meter	17	Aquatics	Currents Aquatics Center	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	3,252	\$6,739	\$6,739
48225	CURR 17.05 Water Filtration System Replacement	17	Aquatics	Currents Aquatics Center	90%	110%	0.0	\$0	28,367	\$2,607	0	\$0	1,464	\$3,875	1,464	\$3,034	\$9,517
50005	CURR 17.07 Chlorine Generation	17	Aquatics	Currents Aquatics Center	90%	110%	-2.2	-\$28	-7,192	-\$661	3,411	\$3,325	751	\$1,987	751	\$1,556	\$6,179
48221	CURR 01.01 Optimized Boiler Piping for Pool & DHW	1	Aquatics	Currents Aquatics Center	90%	110%	0.0	\$0	0	\$0	5,791	\$5,645	0	\$0	0	\$0	\$5,645
48219	CURR 13.01 Envelope Sealing, Caulking, etc.	13	Aquatics	Currents Aquatics Center	100%	100%	0.0	\$0	619	\$57	1,040	\$1,013	0	\$0	0	\$0	\$1,070
48220	CURR 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)	17	Aquatics	Currents Aquatics Center	90%	110%	0.0	\$0	67,247	\$6,181	0	\$0	0	\$0	0	\$0	\$6,181
48218	CURR 09.01 LED Lighting	9	Aquatics	Currents Aquatics Center	95%	105%	78.1	\$999	27,535	\$2,531	-50	-\$48	0	\$0	0	\$0	\$3,482
50018	SPL 17.07 Chlorine Generation	17	Aquatics	Splash Montana	90%	110%	-3.3	-\$42	-25,383	-\$2,333	9,686	\$9,442	2,115	\$5,599	2,115	\$4,383	\$17,048
49269	SPL 19.01 Water Conservation	19	Aquatics	Splash Montana	90%	110%	0.0	\$0	591	\$54	308	\$300	780	\$2,064	780	\$1,616	\$4,034
48206	SPL 09.01 LED Lighting	9	Aquatics	Splash Montana	95%	105%	30.6	\$391	7,892	\$725	-1	-\$1	0	\$0	0	\$0	\$1,116
48207	SPL 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)	17	Aquatics	Splash Montana	90%	110%	0.0	\$0	118,617	\$10,903	0	\$0	0	\$0	0	\$0	\$10,903
48280	SPL 13.01 Envelope Sealing, Caulking, etc.	13	Aquatics	Splash Montana	90%	110%	0.0	\$0	93	\$9	781	\$762	0	\$0	0	\$0	\$770
48211	SPL 17.04 Well for Pool Water	17	Aquatics	Splash Montana	90%	110%	-4.1	-\$52	-7,385	-\$679	0	\$0	4,993	\$13,217	4,993	\$10,346	\$22,832
							<b>99</b>	<b>\$ 1,267</b>	<b>203,810</b>	<b>\$ 18,734</b>	<b>23,336</b>	<b>\$ 22,748</b>	<b>10,521</b>	<b>\$ 27,850</b>	<b>13,773</b>	<b>\$ 28,541</b>	<b>\$ 99,140</b>

\* The savings shown in this table are less than the calculated savings unless a guarantee multiplier of 100% is shown.

\*\* The guarantee is based on Key Performance Indicators shown in Table 3.2. Refer to Section 3 of the ESP for the method of converting Key Performance Indicators to dollars during the M&V period.

\*\*\* The guarantee is based on the aggregate savings for all FIMs, not on individual FIM savings.

Confidential and Proprietary



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Aquatics  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
CURR 01.01 Optimized Boiler Piping for Pool & DHW	Currents Aquatics Center	A	1.	Boiler Efficiency	85%, boilers rarely run in condensing mode	92-95%, based on RWT	No task	Verify proper installation and operation of new equipment. Verify construction meets engineering design	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	pool heat load and DHW heating load remain the same
CURR 01.02 Reduce Glycol Concentration	Currents Aquatics Center	Non-Measured	1.	% Glycol in Heating System	50% glycol	40% glycol	Verify glycol concentration	Verify proper installation and operation of new equipment. Review and verify nameplate information for new equipment meets proposed KPI values. Verify additional items per detailed M&V plan.	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Annual boiler load remains constant, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
CURR 09.01 LED Lighting	Currents Aquatics Center	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
CURR 13.01 Envelope Sealing, Caulking, etc.	Currents Aquatics Center	Non-Measured	1.	Exterior and interior door weather stripping	No weather stripping on exterior doors	Weather stripping installed on 16 exterior doors and 11 interior doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
CURR 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)	Currents Aquatics Center	A	1.	Annual Occupied Operation	CSRP: 4,641 hr CSAP: 4,641 hr CSCP: 4,641 hr CPFP: 4,641 hr CPRP: 4,641 hr CFSP: 4,641 hr	CSRP: 4,641 hr CSAP: 4,641 hr CSCP: 4,641 hr CPFP: 4,641 hr CPRP: 4,641 hr CFSP: 4,641 hr	Pool hours of operation.	No task, assumed constant.	No task, assumed constant.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Occupied hours of operation stipulated.
			2.	Occupied Flow Rate	CSRP: 235 gpm CSAP: 235 gpm CSCP: 800 gpm CPFP: 560 gpm CPRP: 1,000 gpm CFSP: 1,500 gpm	CSRP: 235 gpm CSAP: 235 gpm CSCP: 800 gpm CPFP: 560 gpm CPRP: 1,000 gpm CFSP: 1,500 gpm	Collect equipment nameplate data, facility drawings, and equipment O&M manuals.	Review commissioning report to verify VFDs are operating as designed.	Collect VFD and pump control sequences and observe VFD operation as it transitions from occupied mode to unoccupied mode. Savings is verified if VFD reduces pump speed to desired flow rate as shown in control sequence.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Occupied hours of operation stipulated.
			3.	Unoccupied Flow Rate	CSRP: 235 gpm CSAP: 0 gpm CSCP: 0 gpm CPFP: 0 gpm CPRP: 1,000 gpm CFSP: 0 gpm	CSRP: 118 gpm CSAP: 0 gpm CSCP: 0 gpm CPFP: 0 gpm CPRP: 500 gpm CFSP: 0 gpm	No task, existing pumps are constant volume.	Review commissioning report to verify VFDs are operating as designed.	Collect VFD and pump control sequences and observe VFD operation as it transitions from occupied mode to unoccupied mode. Savings is verified if VFD reduces pump speed to desired flow rate as shown in control sequence.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Occupied hours of operation stipulated.
CURR 17.05 Water Filtration System Replacement	Currents Aquatics Center	A	1.	Filtration Method	Sand	Regenerative Media	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittals and confirm proper installation and operation of equipment.	Confirm proper operation of equipment.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	





# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Aquatics  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
			2.	Backwash Loss			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittals and confirm proper installation and operation of equipment.	Confirm proper operation of equipment.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Backwash Loss
			3.	Heating Efficiency			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittals and confirm proper installation and operation of equipment.	Confirm proper operation of equipment.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Heating Efficiency
CURR 17.06 Sewer Deduct Meter	Currents Aquatics Center	A	1.	Pool surface area	Spa SA: 210 sq. ft Pool SA: 4947 sq. ft.	Spa SA: 210 sq. ft Pool SA: 4947 sq. ft.	Site Audit	No Tasks	No tasks	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Pool and spa size
			2.	Pool and Spa Temperature	Spa temp: 101 F Pool Temp: 84 F	Spa temp: 101 F Pool Temp: 84 F	Site Audit	Verify water temperatures	Verify water temperatures	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Pool and spa temperature stipulated
			3.	Activity Level	activity level: see pool schedule	activity level: see pool schedule	No task	Verify pool schedules	Verify pool schedules	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Pool and spa activity matches schedule
CURR 17.07 Chlorine Generation	Currents Aquatics Center	Non-Measured	1.	Annual Chlorine Usage			Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant.	No Task, Assumed Constant.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Annual Chlorine Usage
			2.	Onsite Chlorine Generation			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittals, confirm installation, and test equipment onsite with building manger.	Review operation with building manager.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Onsite Chlorine Generation
CURR 19.10 Water Conservation	Currents Aquatics Center	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Kitchen equipment types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Kitchen Equipment	Validate kitchen equipment type and quantity by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
SPL 09.01 LED Lighting	Splash Montana	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Aquatics  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
SPL 13.01 Envelope Sealing, Caulking, etc.	Splash Montana	Non-Measured	1.	Exterior door weather stripping	No weather stripping on exterior doors	Weather stripping installed on 20 exterior doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
SPL 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)	Splash Montana	A	1.	Annual Occupied Operation	SP-1: 1,001 hr SFP: 394 hr SRP: 394 hr SLRFP: 394 hr SLRRP: 394 hr SFSP: 394 hr STSP: 394 hr SLRP-1: 394 hr SLRP-2: 394 hr	SP-1: 1,001 hr SFP: 394 hr SRP: 394 hr SLRFP: 394 hr SLRRP: 394 hr SFSP: 394 hr STSP: 394 hr SLRP-1: 394 hr SLRP-2: 394 hr	Pool hours of operation.	No task, assumed constant.	No task, assumed constant.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Occupied hours of operation stipulated.
			2.	Occupied Flow Rate	SP-1: 1,200 gpm SFP: 1,320 gpm SRP: 550 gpm SLRFP: 1,450 gpm SLRRP: 1,150 gpm SFSP: 1,500 gpm STSP: 1,350 gpm SLRP-1: 1,500 gpm SLRP-2: 1,500 gpm	SP-1: 1,200 gpm SFP: 1,320 gpm SRP: 550 gpm SLRFP: 1,450 gpm SLRRP: 1,150 gpm SFSP: 1,500 gpm STSP: 1,350 gpm SLRP-1: 1,500 gpm SLRP-2: 1,500 gpm	Collect equipment nameplate data, facility drawings, and equipment O&M manuals.	Review commissioning report to verify VFDs are operating as designed.	Collect VFD and pump control sequences and observe VFD operation as it transitions from occupied mode to unoccupied mode. Savings is verified if VFD reduces pump speed to desired flow rate as shown in control sequence.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Occupied hours of operation stipulated.
			3.	Unoccupied Flow Rate	SP-1: 1,200 gpm SFP: 0 gpm SRP: 550 gpm SLRFP: 0 gpm SLRRP: 1,150 gpm SFSP: 0 gpm STSP: 0 gpm SLRP-1: 0 gpm SLRP-2: 0 gpm	SP-1: 600 gpm SFP: 0 gpm SRP: 275 gpm SLRFP: 0 gpm SLRRP: 575 gpm SFSP: 0 gpm STSP: 0 gpm SLRP-1: 0 gpm SLRP-2: 0 gpm	No task, existing pumps are constant volume.	Review commissioning report to verify VFDs are operating as designed.	Collect VFD and pump control sequences and observe VFD operation as it transitions from occupied mode to unoccupied mode. Savings is verified if VFD reduces pump speed to desired flow rate as shown in control sequence.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Occupied hours of operation stipulated.
SPL 17.04 Well for Pool Water	Splash Montana	Non-Measured	1.	Annual Water Use			Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Annual Water Use
			2.	Annual Water from Well			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Verify well operation, connection, and flow.	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Annual Water from Well
SPL 17.07 Chlorine Generation	Splash Montana	Non-Measured	1.	Annual Chlorine Usage			Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant.	No Task, Assumed Constant.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Annual Chlorine Usage
			2.	Onsite Chlorine Generation			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittals, confirm installation, and test equipment onsite with building manger.	Review operation with building manager.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Onsite Chlorine Generation
SPL 19.01 Water Conservation	Splash Montana	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets

# Table 3.3 - Baseline Utility Rates



Project City of Missoula  
 Scenario Ph 1 Implementation - Aquatics  
 Date 11/2/2022

Facility	Utility	Provider	Rate Name	Rate	Unit
Currents Aquatics Center	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
Currents Aquatics Center	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
Currents Aquatics Center	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
Currents Aquatics Center	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
Currents Aquatics Center	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF
Splash Montana	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
Splash Montana	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
Splash Montana	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
Splash Montana	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
Splash Montana	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF

# Table 4.2 - Facility Improvement Measure (FIM) Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Aquatics  
 Date: November 8, 2022

FIM ID	FIM Type	Facility Improvement Measures	FIM Description	Facility	Group	Budget	Annual Utility Cost Savings	Annual Operational Savings **	Calculated SPB	Potential Incentives ***	Avoided Capital	Net Customer Cost (with Incentives)	SPB (with Incentives)
48221	01	CURR 01.01 Optimized Boiler Piping for Pool & DHW	Install a domestic hot water side loop so that one boiler can provide higher temperature water to produce DHW and the other boilers can reset down into the condensing operation band to improve efficiency of making HVAC and pool heating water.	Currents Aquatics Center	Aquatics	\$43,809	\$5,645	\$0	7.8	\$0	\$0	\$38,108	8.3
48222	01	CURR 01.02 Reduce Glycol Concentration	The system was observed to use 50% glycol which is considered high/conservative for this climate and application. Reducing system glycol percentage saves chemical cost, reduces pumping energy, and enhances heat transfer efficiency.	Currents Aquatics Center	Aquatics	\$17,756	\$2,305	\$0	7.7	\$0	\$0	\$15,446	8.2
48218	09	CURR 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	Currents Aquatics Center	Aquatics	\$101,413	\$3,482	\$1,297	27.3	\$3,217	\$0	\$84,969	27.5
48219	13	CURR 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	Currents Aquatics Center	Aquatics	\$17,249	\$1,070	\$0	16.1	\$0	\$0	\$14,754	16.9
48220	17	CURR 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)	Perform code study for pool and feature water turnover rates during occupied versus unoccupied operation modes. Add VFDs to pumps that do not have them and turn down speed as permitted by code.	Currents Aquatics Center	Aquatics	\$146,774	\$6,181	\$0	23.7	\$9,300	\$0	\$115,009	23.0
48226	17	CURR 17.06 Sewer Deduct Meter	Install a deduct meter to reduce sewer bills.	Currents Aquatics Center	Aquatics	\$49,130	\$6,739	\$0	7.3	\$0	\$0	\$42,737	8.5
50005	17	CURR 17.07 Chlorine Generation	Install a stand-alone, on-site chlorine generator to produce pH neutral equivalent chlorine to sanitize the pool system.	Currents Aquatics Center	Aquatics	\$172,015	\$6,179	\$4,987	23.8	\$0	\$0	\$147,128	25.5
49274	19	CURR 19.10 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, replace and/or retrofit existing kitchen equipment, install liquid pool cover, install on-site hypochlorite generation, and install on-site chemical cleaning infrastructure.	Currents Aquatics Center	Aquatics	\$25,784	\$1,321	\$134	19.0	\$0	\$0	\$22,054	22.5
48206	09	SPL 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	Splash Montana	Aquatics	\$18,175	\$1,116	\$231	15.3	\$887	\$0	\$14,917	15.0
48280	13	SPL 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	Splash Montana	Aquatics	\$12,978	\$770	\$0	16.9	\$0	\$0	\$11,100	17.7
48207	17	SPL 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)	Install VFDs on all process pumps to reduce flow via pump speed rather than balancing valves. Perform code study for pool and feature water turnover rates during occupied versus unoccupied operation modes. Add VFDs to pumps that do not have them and turn down speed as permitted by code.	Splash Montana	Aquatics	\$179,583	\$10,903	\$0	16.5	\$25,000	\$0	\$127,096	14.4
48211	17	SPL 17.04 Well for Pool Water	Drill a well to provide first-fill and make-up water to the water features, reducing City water and sewer costs.	Splash Montana	Aquatics	\$131,944	\$22,832	\$0	5.8	\$0	\$0	\$112,854	6.6
50018	17	SPL 17.07 Chlorine Generation	Install a stand-alone, on-site chlorine generator to produce pH neutral equivalent chlorine to sanitize the pool system.	Splash Montana	Aquatics	\$566,615	\$17,048	\$24,912	25.9	\$0	\$0	\$484,638	27.2
49269	19	SPL 19.04 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, retrofit existing ice machines, replace and/or retrofit existing kitchen equipment, and install on-site hypochlorite generation	Splash Montana	Aquatics	\$27,413	\$4,034	\$246	6.5	\$0	\$0	\$23,447	7.3
48225	17	CURR 17.05 Water Filtration System Replacement	The existing water filtration system utilizes equipment that is no longer supported by the manufacturer and requires large amounts of water for backwashing. Install a new filtration system - potentially "Neptune Defender".	Currents Aquatics Center	Aquatics	\$534,638	\$9,517	\$3,000	54.6	\$0	\$251,881	\$214,098	27.4
<b>TOTALS</b>						\$ 2,045,276	\$ 99,140	\$ 34,807	18.9	\$ 38,404	\$ 251,881	\$ 1,468,355	13.1

1. All savings are calculate at the base utility rates, refer to Table 3.3.
2. Per MCA, McKinstry guarantees units of energy saved, not dollars.
3. Savings guarantees are cumulative for the project rather than by individual FIM.
4. Rebates/incentives are only estimates and may change at the time of completion.
5. Avoided capital amounts are only estimates and are for illustrative purposes only.

# Aquatics FIMs

## 48206

# Detailed Scope of Work

**FIM ID # 48206**  
**SPL 09.01 LED Lighting**  
**Splash Montana**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

---

- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
433	Yes	SPLASH INT	TICKET OFFICE	WRAP-SM-4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
434	Yes	SPLASH INT	MAIN OFFICE	WRAP-PNDT-4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 2G WH SWITCH PLATE
435	Yes	SPLASH INT	GUARD ROOM	WRAP-PNDT-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
436	Yes	SPLASH INT	FIRST AID	WRAP-SM-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
437	Yes	SPLASH INT	CAFÉ	WRAP-PNDT-4FT	F T8 F32-32W-48" NLO- 3L	6	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH AND BLANK
438	Yes	SPLASH INT	CAFÉ	WRAP-SM-4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
439	Yes	SPLASH INT	CAFÉ	WRAP-SM-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
440	Yes	SPLASH INT	WOMEN'S LOCKER	VAPOR-4FT	F T8 F32-32W-48" NLO- 2L	10	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	10	Direct Wire LED Tube	
441	Yes	SPLASH INT	FAMILY LOCKER	VAPOR-4FT	F T8 F32-32W-48" NLO- 2L	8	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	8	Direct Wire LED Tube	
442	Yes	SPLASH INT	MEN'S LOCKER	VAPOR-4FT	F T8 F32-32W-48" NLO- 2L	8	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	8	Direct Wire LED Tube	
443	Yes	SPLASH INT	STORAGE	STRIP-PNDT-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
444	Yes	SPLASH INT	MECHANICAL/STORAGE	STRIP-SM-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
445	Yes	SPLASH INT	MECHANICAL	INDSTR-L-PNDT-4FT	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	
446	Yes	SPLASH INT	MECHANICAL	INDSTR-L-PNDT-4FT-BBU	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW-BBU		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast. W/ BBU	4	Direct Wire LED Tube	
447	Yes	SPLASH INT	MECHANICAL	INDSTR-L-PNDT-8FT	F T8 F32-32W-48" NLO- 4L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),4 lamp/fxtr	RET-4xLED4FT-DW-8' KIT		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (4), remove existing fluorescent ballast. Install strip kit to go from 2 8' lamps to 4 - 4' lamps.	4	Direct Wire LED Tube	
448	Yes	SPLASH INT	STORAGE	INDSTR-L-SM-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
449	Yes	SPLASH INT	STORAGE	INDSTR-L-SM-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
450	Yes	SPLASH EXT	ENTRY/EXIT	FLD-BLDG ATTACHED-YOKE-SLV	HAL SI PAR 30-LN 60W- 1L	2	Halogen Incandescent Screw-In PAR30-Long Neck-3.75 inch Diam. 60 Watt,1 lamp/fxtr	Lamp/1x11LEDSI/Par30		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par30, E26 medium base, 11 watts, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	
451	Yes	SPLASH EXT	EXTERIOR	FLD-BLDG ATTACHED-1/2" ROD-SLV	HAL SI PAR 38 90W- 2L	1	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 90 Watt,2 lamp/fxtr	Lamp/2x15.5LEDSI/Par38		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par38, E26 medium base, 15.5 watts, 4000k, 50,000 hrs, 120-277V.	1	LED Retrofit Lamp	
452	Yes	SPLASH EXT	EXTERIOR	CYLDR-10"	MH Med 70W- 1L	3	Metal Halide Medium Base (AKA: Standard, E26, Edison) 70 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x16_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 16 watts.	3	LED Retrofit Lamp	
453	Yes	SPLASH EXT	EXTERIOR	FLD-BLDG ATTACHED-1/2" ROD-SLV	HAL SI PAR 38 90W- 2L	2	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 90 Watt,2 lamp/fxtr	Lamp/2x15.5LEDSI/Par38		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par38, E26 medium base, 15.5 watts, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	
454	Yes	SPLASH EXT	EXTERIOR	FLD-BLDG ATTACHED-YOKE-SLV	HAL SI PAR 30-LN 60W- 1L	1	Halogen Incandescent Screw-In PAR30-Long Neck-3.75 inch Diam. 60 Watt,1 lamp/fxtr	Lamp/1x11LEDSI/Par30		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par30, E26 medium base, 11 watts, 4000k, 50,000 hrs, 120-277V.	1	LED Retrofit Lamp	
455	Yes	SPLASH EXT	EXTERIOR	CYLDR-10"	MH Med 70W- 1L	3	Metal Halide Medium Base (AKA: Standard, E26, Edison) 70 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x16_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 16 watts.	3	LED Retrofit Lamp	
456	Yes	SPLASH EXT	EXTERIOR	WP-LARGE FCO	LED-Fxtr-40W	3		N		N = No Retrofit	No Retrofit Proposed	3	N	
457	Yes	SPLASH EXT	EXTERIOR	POLE SPIDER	F T8 F32-32W-48" NLO- 3L	5	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	5	N	



# Aquatics FIMs

## 48207

# Detailed Scope of Work

**FIM ID # 48207**  
**SPL 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)**  
**Splash Montana**

## GENERAL

Install VFDs on all process pumps to reduce flow via pump speed rather than balancing valves. Perform code study for pool and feature water turnover rates during occupied versus unoccupied operation modes. Add VFDs to pumps that do not have them and turn down speed as permitted by code.

## SCOPE OF WORK INCLUDES

- A. "Provide" as written below shall mean furnish and install.
- B. Mechanical
  - 1. N/A
- C. Controls
  - 1. Furnish Variable Speed drives for pool pumps (Qty. of 7), Drives shall have integral lockable disconnect switch and By-Pass. VFD's are installed by the E.C.
  - 2. All programming shall be completed by the Temperature Controls Contractor with all logic residing in the VFD (No Building Automation System). Drives shall be programmed to run at reduced speed during unoccupied times.
  - 3. Replace motors where indicated on Sketches, motors shall be premium efficiency, inverter ready with integral shaft grounding ring.
  - 4. Provide Aegis shaft grounding ring on existing motors where shown on Sketches.
  - 5. Provide all programming necessary to operate the systems per the Design Intent set forth by McKinstry.
  - 6. Wiring exposed within rooms shall be run thru conduit.
  - 7. Reference drawings for additional requirements.
  - 8. Work with TAB Contractor and McKinstry Commissioning personnel to test systems.
  - 9. Provide Owner Training (2 hours) for this FIM.
- D. Electrical
  - 1. Contractor shall be responsible for equipment, materials, accessories, and other associated requirements called for in the following scope, and as indicated in the above supporting documents.
  - 2. General circuiting requirements
    - a. Contractor shall survey existing facility drawings and power distribution system to determine available space and capacity to support this scope of work. If existing space or capacity is insufficient to meet the requirements of the scope, Contractor shall immediately notify McKinstry.
    - b. For power circuits indicated as being removed, Contractor shall remove conductors back to the associated panel, and shall remove associated starters, disconnects, and other devices. Conduit shall be cut back to within 3" of room penetration.
    - c. For new power circuits, Contractor shall furnish and install overcurrent protection, conduit conductors, starter, disconnect, and related accessories as indicated on the drawings.
    - d. Where power circuits indicated as being removed meet the requirements for new power circuits, existing components may be reused where in compliance with current NEC.
    - e. Unless otherwise specified, similar loads may be combined on a common circuit as permitted by current NEC.
  - 3. Electrical panels and disconnects serving mechanical equipment shall comply with the service clearance requirements of the NEC. Furnish and install remote mounted panels and disconnects where required by the NEC.
  - 4. **General Scope:** Electrical work to support adding VFDs for Pool pumping equipment.

# Detailed Scope of Work

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- a. Replace combination starters/disconnects with Variable Speed Drives (furnished by T.C.C.) for pool circulation pumps. Extend conduit and conductors as required.
  - b. Reference electrical drawings for additional requirements.
- E. Commissioning
- 1. McKinstry Commissioning Engineer will fully commission the proposed systems.
- F. TAB
- 1. McKinstry to provide waterside TAB for setting the reduced pump speed.
- G. Engineering
- 1. McKinstry to provide design engineering for this FIM.
- H. Training
- 1. McKinstry to oversee Owner Training for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

- 1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
- 2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
- 3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
- 4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
- 5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
- 6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
- 7. This scope assumes the existing equipment is properly grounded.
- 8. This scope is based on re-using existing circuits and controls unless otherwise stated.
- 9. This scope does not include costing for providing any "seed" stock or extra materials.
- 10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
- 11. This scope does not include repairs to existing code issues unless explicitly described above.
- 12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.



ISSUES:	NO	DATE	DESCRIPTION
	1	10/1/2021	ISSUED FOR GMAX

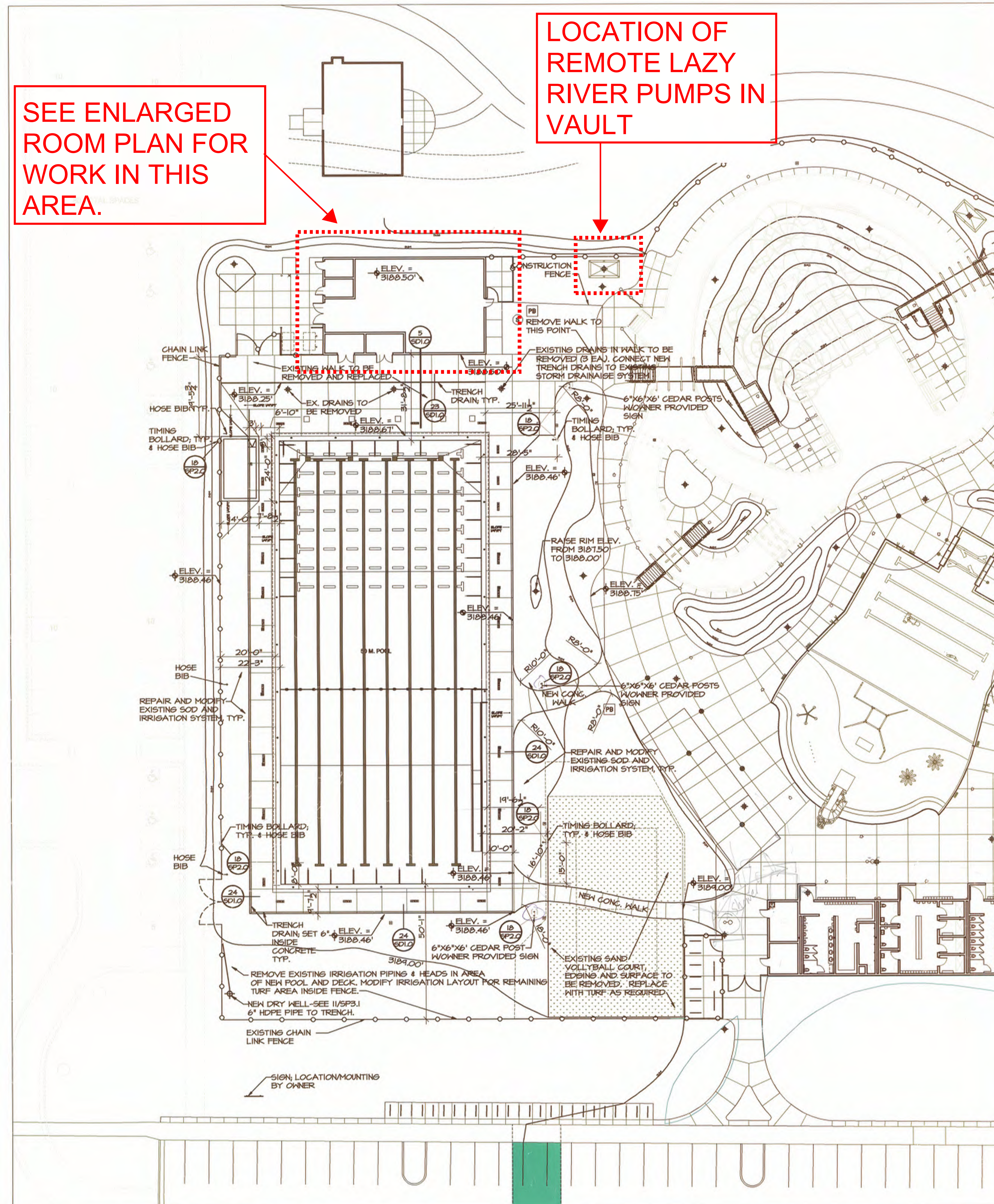
DESIGNED:	PF
DRAWN:	PF
CHECKED:	PF
JOB NO:	202094

SHEET TITLE:

**MECHANICAL  
SCHEDULES**

SHEET NUMBER:

**M1 OF 2**



19 SITE PLAN  
SD1.0 1"=20'-0"



PROJECT:

**CITY OF MISSOULA  
SPLASH WATERPARK**

FIM 48207 - 17.01

**VARIABLE SPEED  
PUMPING**

600 Cregg Ln.  
Missoula, MT 59801

CONSULTANTS:

REGISTRATION:

NO.	DATE	DESCRIPTION
1	10/1/2021	ISSUED FOR GMAX

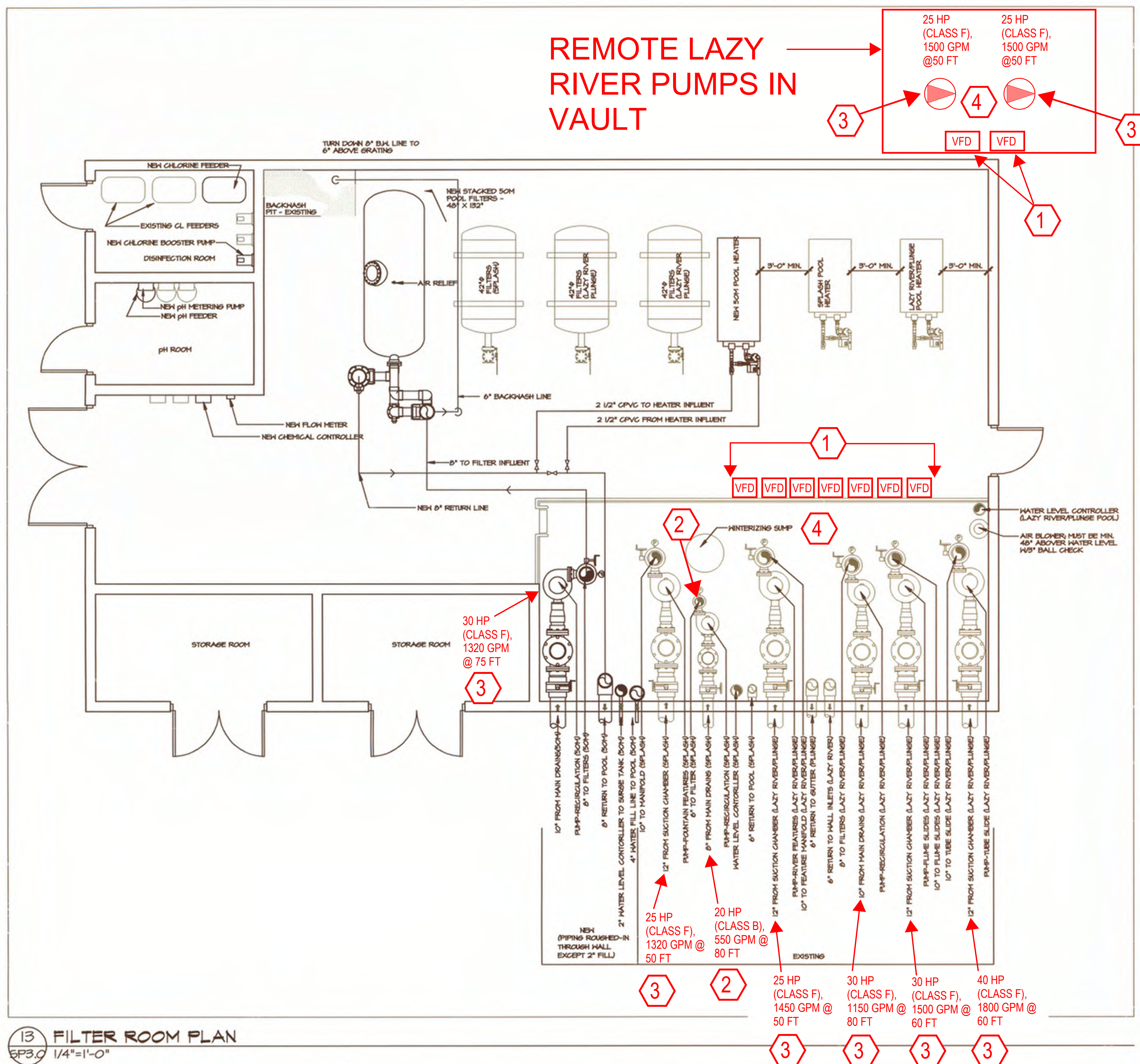
DESIGNED:	PF
DRAWN:	PF
CHECKED:	PF
JOB NO:	202094

SHEET TITLE:

**MECHANICAL  
RENOVATION  
PLAN**

SHEET NUMBER:

**REMOTE LAZY  
RIVER PUMPS IN  
VAULT**



13 FILTER ROOM PLAN  
5/3.0 1/4"=1'-0"

**CONTROL NOTES:**

1. DRIVES WILL BE PROGRAMMED BY THE TEMPERATURE CONTROLS CONTRACTOR, WITH ALL LOGIC RESIDING IN THE DRIVE ITSELF, NO CONNECTION TO A BAS SYSTEM. DRIVES WILL BE TURNED DOWN VIA SCHEDULING ONLY (OCCUPIED/UNOCCUPIED).

**KEYED NOTES:**

1. PROVIDE VARIABLE SPEED DRIVES (QTY. 9 TOTAL) WITH BY-PASS AND INTEGRAL LOCKABLE DISCONNECT SWITCH FOR PUMP CONTROL. DRIVES FURNISHED BY TEMPERATURE CONTROLS CONTRACTOR, INSTALLED BY E.C.
2. REPLACE MOTOR (W/ CLASS B INSULATION) WITH PREMIUM EFFICIENCY INVERTER READY MOTOR WITH INTEGRAL SHAFT GROUNDING RING.
3. PROVIDE AEGIS SHAFT GROUNDING RING ON EXISTING TO REMAIN MOTOR (SHAFT). AEGIS MODEL SGR OR EQUAL.
4. EXISTING BALANCE/ISOLATION VALVE TO BE OPENED TO 100%. (TYP. ALL PUMPS).



PROJECT:  
**CITY OF MISSOULA  
SPLASH WATER PARK**

**FIM48207 - 17.01**

**VARIABLE SPEED  
PUMPING**

**MISSOULA, MONTANA**

CONSULTANTS:

REGISTRATION:

ISSUES:

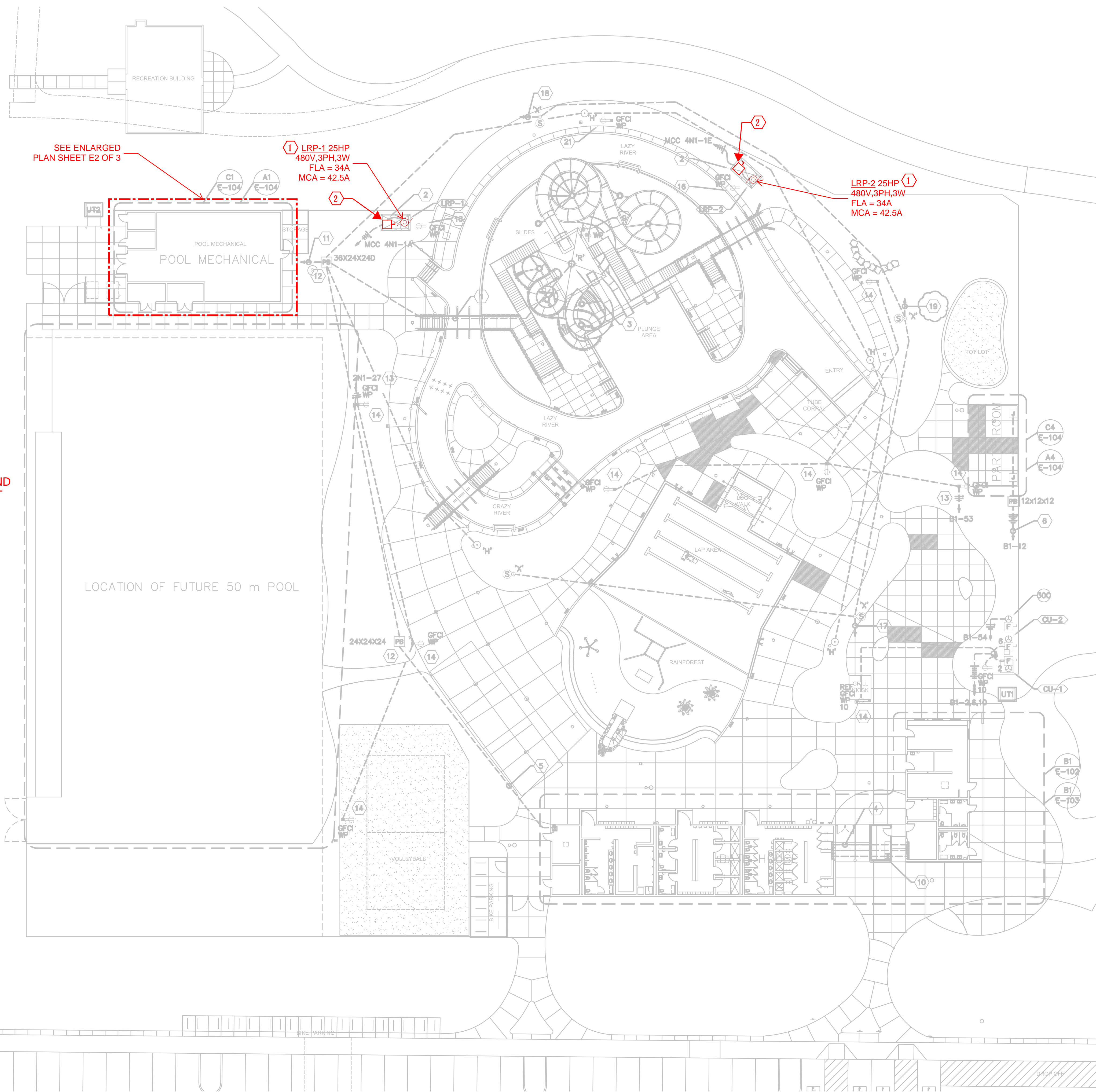
NO	DATE	DESCRIPTION
--	XXXX/2021	ISSUED FOR GMAX

DESIGNED: J. COULTER, P.E.  
DRAWN: J. COULTER, P.E.  
CHECKED: J. COULTER, P.E.  
JOB NO: 202094-002

SHEET TITLE:  
**ELECTRICAL  
RENOVATION  
PLAN**

SHEET NUMBER:

**E1 OF 3**



SEE ENLARGED  
PLAN SHEET E2 OF 3

1 LRP-1 25HP  
480V,3PH,3W  
FLA = 34A  
MCA = 42.5A

LRP-2 25HP 1  
480V,3PH,3W  
FLA = 34A  
MCA = 42.5A

**KEYNOTES:**

1. EXISTING PUMP MOTOR TO BE REPLACED WITH LIKE-IN-LINE PREMIUM EFFICIENCY INVERTER READY MOTOR WITH SHAFT GROUNDING RING.
2. EXISTING DISCONNECT TO REMAIN AND BE RE-USED. VFD LOCATION IN POOL MECHANICAL 128.

**SITE PLAN ELECTRICAL**  
SCALE = 1" = 20'

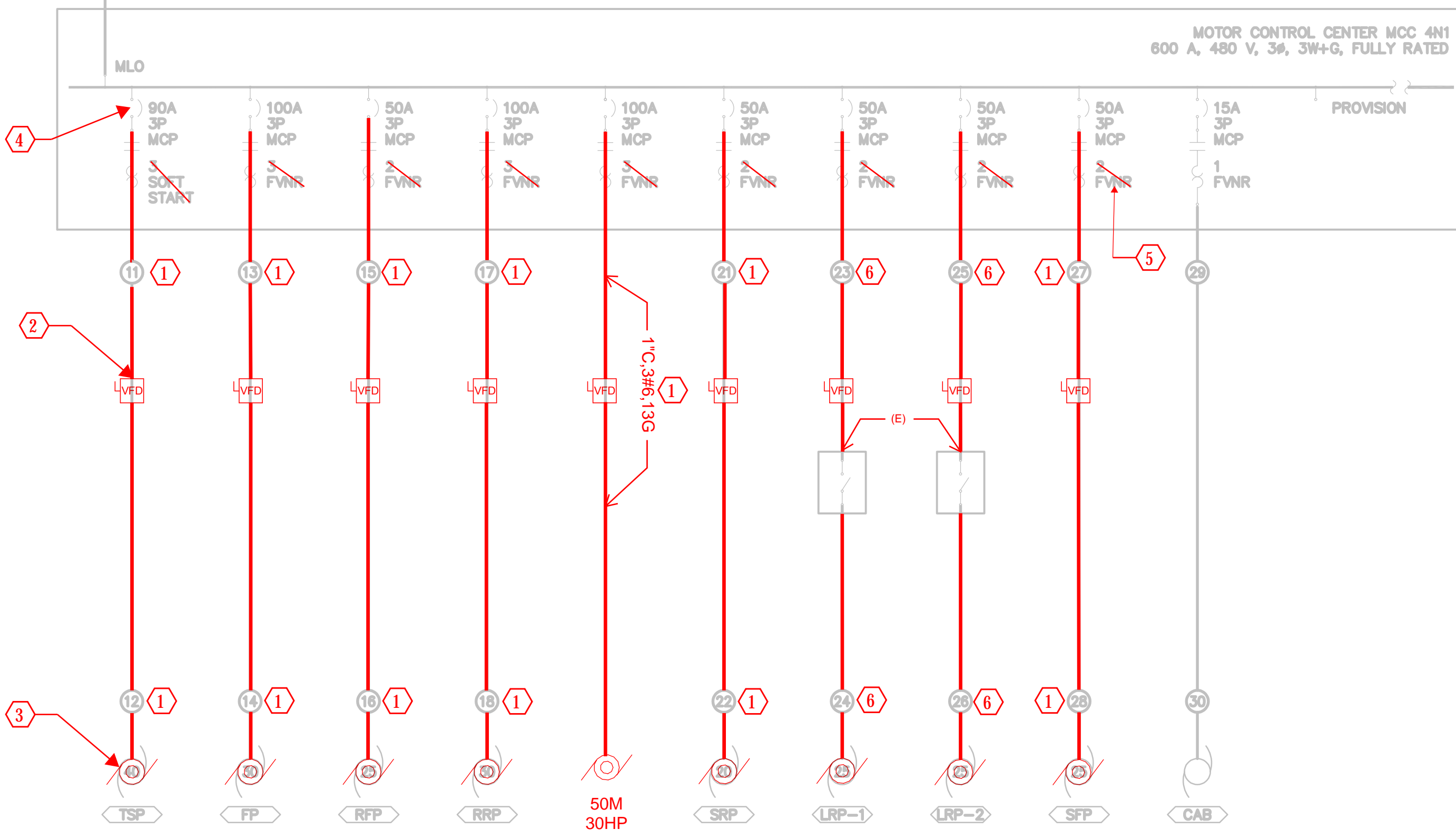
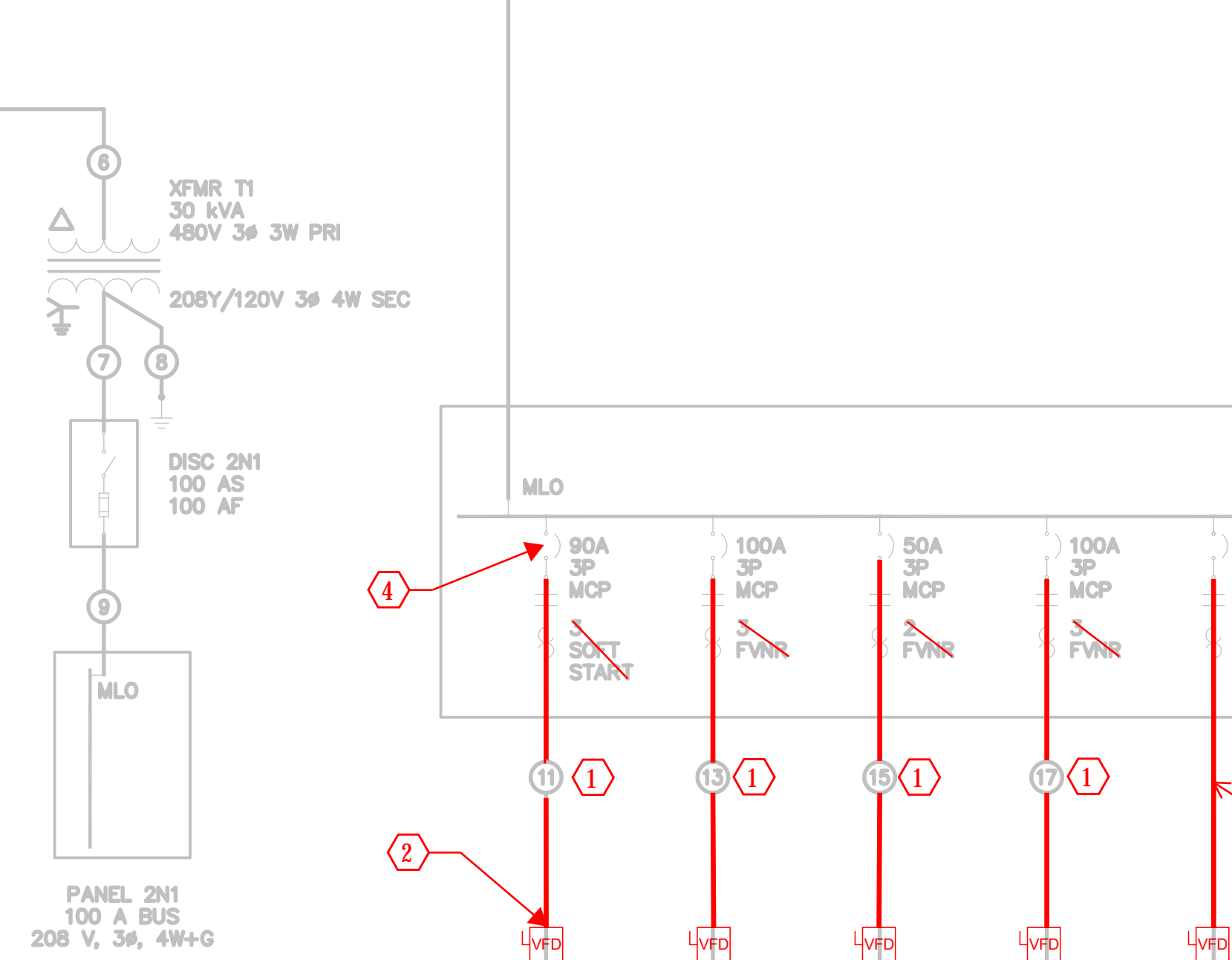
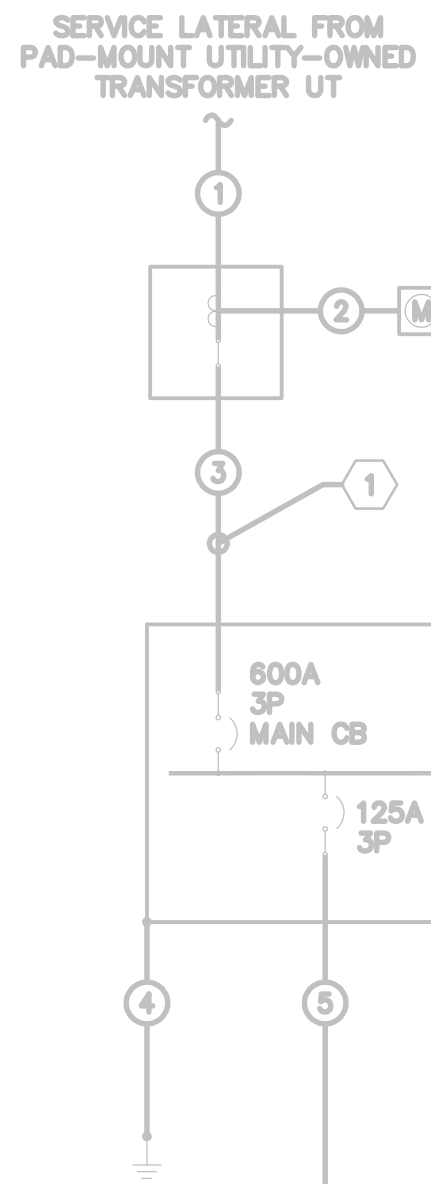






KEYNOTES:

- EXISTING CONDUIT AND WIRE TO BE REPLACED, SIZES AS INDICATED. EXISTING CONDUITS CAN BE REUSED TO THE EXTENT POSSIBLE (TYP OF 9). REFER TO FEEDER SCHEDULE.
- INSTALL DIV 23 SUPPLIED VFD WITH INTEGRAL LOCKABLE DISCONNECT (TYP OF 9)
- EXISTING PUMP MOTOR TO BE REPLACED WITH LIKE-IN-LIND PREMIUM EFFICIENCY INVERTER READY MOTOR WITH SHAFT GROUNDING RING.
- EXISTING CIRCUIT BREAKERS IN MCC-4N1 TO REMAIN AND BE REUSED.
- STARTERS FOR EXISTING PUMPS BEING REPLACED SHALL BE DISCONNECTED AND/OR REMOVED. IF TO REMAIN, THE HOA SWITCH SHALL BE IN THE 'ON' POSITION.
- EXISTING UNDERGROUND CONDUIT TO BE RE-USED.



MOTOR CONTROL CENTER 4N1														LOCATION: ROOM 128												
CUBE	LOAD DESCRIPTION	CIRCUIT BREAKER			CONTROLLER					CONNECTED LOAD KVA					SOURCE: SWBD MDS											
		TRIP TYPE	AMPS	POLES	TYPE	NEMA SIZE	CONTROL DEVICE	XFMR SEC	AUXILIARY	NOTES	MOTOR	COOL	HEAT	CONT	NON-CONT	CKT TOTAL	NUMBER OF SECTIONS: 4									
1A	LRP-1 LAZY RIVER PUMP NO. 1	MCP	50	3	FVNR	2	HOA	RED, GRN	120	1 NO, 1 NC	5					27.10							SPECIFICATIONS			
1E	LRP-2 LAZY RIVER PUMP NO. 2	MCP	50	3	FVNR	2	HOA	RED, GRN	120	1 NO, 1 NC	5					27.10							VOLTAGE (L-L): 480	PHASE: 3		
1I	CAB AIR BLOWER ROOM 128	MCP	15	3	FVNR	1	HOA	RED, GRN	120	1 NO, 1 NC						6.09							WIRE: 3	BUS CURRENT RATING (AMPS): 600		
1M	FP FLUME PUMP ROOM 128	MCP	100	3	FVNR	3	HOA	RED, GRN	120	1 NO, 1 NC	5					31.89							NEUTRAL RATING: NO NEUTRAL	SHORT CIRCUIT RATING (AMPS):		
1S	MAIN LUG COMPARTMENT																						MAIN DEVICE: MLO			
2A	TSP TUBE SLIDE PUMP	MCP	90	3	ESS	3	HOA	RED, GRN	120	1 NO, 1 NC	5					41.40							MAIN BREAKER AIC (AMPS): -	SHUNT TRIP MAIN: NO		
2O	RRP LAZY RIVER RECIRC. PUMP ROOM 128	MCP	100	3	FVNR	2	HOA	RED, GRN	120	1 NO, 1 NC	5					31.89							FEEDER BREAKER AIC (AMPS):	FEED DIRECTION: BOTTOM		
2U	PROVISION																						MOUNTING: CONCRETE PAD	NEMA ENCLOSURE TYPE: 1		
3A	RFP LAZY RIVER FEATURE PUMP ROOM 128	MCP	50	3	FVNR	2	HOA	RED, GRN	120	1 NO, 1 NC	5					27.09							MAIN DEVICE: MLO			
3G	SRP SPLASH RECIRC. PUMP ROOM 128	MCP	50	3	FVNR	2	HOA	RED, GRN	120	1 NO, 1 NC	5					21.50							MAIN BREAKER AIC (AMPS): -			
3K	SFP SPLASH FEATURE PUMP ROOM 128	MCP	50	3	FVNR	2	HOA	RED, GRN	120	1 NO, 1 NC	5					27.10							SHUNT TRIP MAIN: NO			
3O	PROVISION																						FEEDER BREAKER AIC (AMPS):			
3U	PROVISION																						FEED DIRECTION: BOTTOM			
4A	PROVISION																						MOUNTING: CONCRETE PAD			
XX	50M POOL PUMP	MCP	100	3												31.89							NEMA ENCLOSURE TYPE: 1			

FEEDER LOAD SUMMARY				
	CONN KVA	CONN AMPS	NEC KVA	NEC AMPS
PHASE A:	91.02	328.58	94.47	341.03
PHASE B:	91.02	328.58	94.47	341.03
PHASE C:	91.02	328.58	94.47	341.03
TOTAL:	273.05	985.74	283.40	1023.09

Existing load with 50M motor included. This project is not expected to add load to the system as the pumps are like-in-kind replacements.

FEEDER SCHEDULE															
MARK	TERMINATE AT	RACEWAYS		CONDUCTORS PER RACEWAY								AMPACITY	NOTES	MARK	
		QTY	TRADE SIZE	PHASE	NEUTRAL	EQUIPMENT	GND	QTY	SIZE	QTY	SIZE				
1	CT CABINET	1	3"	CONDUCTORS PROVIDED BY NWE										1	
2	METER BASE	1	1"	CONDUCTORS PROVIDED BY NWE									(1)	2	
3	MDS	2	3"	3		350	1	3/0	1	3/0	620			3	
4	MDS GROUND	1	1"					1	3/0				(2)	4	
5	PANEL 4N2	1	2"	3	1/0	1	1/0	1	6	150				5	
6	XFMR T1	1	1 1/2"	3	3	-	-	1	8	85				6	
7	DISCONNECT 2N1	1	1 1/2"	3	1	1	1	1	8	110				7	
8	XFMR T1 GROUND	1	3/4"					1	6				(2)	8	
9	PANEL 2N1	1	1 1/2"	3	1	1	1	1	8	110				9	
10	MCC 4N1	2	2 1/2"	3	250	-	-	1	2	510				10	
12	TSP	1	1"	3	4	-	-	1	8	70				12	
14	FP	1	1"	3	6	-	-	1	8	55				14	
16	RFP	1	1"	3	6	-	-	1	8	55				16	
18	RRP	1	1"	3	6	-	-	1	8	55				18	
22	SRP	1	1"	3	8	-	-	1	10	40			(3)	22	
23	LRP-1 DISCONNECT	1	1 1/4"	3	2	-	-	1	4	55				23	
24	LRP-1	1	1"	3	6	-	-	1	10	55				24	
25	LRP-2 DISCONNECT	1	1 1/2"	3	1	-	-	1	2	55			(3)	25	
26	LRP-2	1	1"	3	6	-	-	1	10	55				26	
28	SFP	1	1"	3	6	-	-	1	10	55				28	
30	CAB	1	3/4"	3	12	-	-	1	12	20				30	
32	CT CABINET	RACEWAYS & CONDUCTORS PROVIDED BY NWE													32
33	METER BASE	1	1"	CONDUCTORS PROVIDED BY NWE										33	
34	PANEL B1	1	3 1/2"	3	500	1	500	1	3	380				34	
35	B1 GROUND	1	3/4"					2					(2)	35	
36	PANEL B2	1	2 1/2"	3	4/0	1	4/0	1	1/0	230				36	

NOTES: (1) THE CONTRACTOR MAY AT HIS DISCRETION PROVIDE PARALLEL RUNS HAVING EQUAL OR GREATER TOTAL AMPACITY THAN FEEDER SPECIFIED.  
(2) GROUNDING ELECTRODE CONDUCTOR.  
(3) CONDUCTORS OVERSIZED TO AVOID VOLTAGE DROP.



PROJECT: CITY OF MISSOULA SPLASH WATER PARK

FIM48207 - 17.01

VARIABLE SPEED PUMPING

MISSOULA, MONTANA

CONSULTANTS:

REGISTRATION:

ISSUES:		
NO	DATE	DESCRIPTION
--	XX/XX/2021	ISSUED FOR GMAX

DESIGNED: J. COULTER, P.E.  
DRAWN: J. COULTER, P.E.  
CHECKED: J. COULTER, P.E.  
JOB NO: 202094-002

SHEET TITLE: ELECTRICAL RENOVATION PLAN

SHEET NUMBER:



# Aquatics FIMs

48211

# Detailed Scope of Work

**FIM ID # 48211**  
**SPL 17.04 Well for Pool Water**  
**Splash Montana**

## GENERAL

Drill a well to provide first-fill and make-up water to the water features, reducing City water and sewer costs.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. N/A
2. Mechanical
  - A. N/A
3. Controls
  - A. N/A
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. N/A
7. Lighting
  - A. N/A
8. Solar
  - A. N/A
9. Site Utilities
  - A. Drill a standard service well on property, not to exceed standard permitting allowance of 35 GPM.
  - B. Provide well development and site clean-up, as necessary.
  - C. Provide and install well pump and necessary appurtenances, including electrical connections.
  - D. Provide trenching, piping, and connection from well location to pool mechanical room.
  - E. All disturbed areas to be returned to original finish via re-sodding, re-seeding, etc.
10. Structural
  - A. N/A
11. Masonry
  - A. N/A
12. Roofing
  - A. N/A
13. Carpentry
  - A. N/A
14. Glazing
  - A. N/A
15. Painting
  - A. N/A
16. Data and Communication
  - A. N/A
17. Security Systems
  - A. N/A
18. Fire Alarm
  - A. N/A
19. Fire Sprinkler
  - A. N/A
20. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
21. Commissioning
  - A. N/A
22. Demolition and Removal Specialty Contractor
  - A. N/A
23. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Aquatics FIMs

## 48218

# Detailed Scope of Work

**FIM ID # 48218**  
**CURR 09.01 LED Lighting**  
**Currents Aquatics Center**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing				Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
458	Yes	CURRENTS INT	ENTRY	CAN-ROUND-6"	CFL 4P-V 18W- 1L	2	Compact Fluorescent 4 Pin Vertical 18 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	2	LED Kit	
459	Yes	CURRENTS INT	ENTRY	Can Round 8" BBU	CFL 4P-V 18W- 1L	2	Compact Fluorescent 4 Pin Vertical 18 Watt,1 lamp/fxtr	Kit/1x12_RC8-BBU		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts. Add remote mounted LED BBU driver and test button.	2	LED Kit	
460	Yes	CURRENTS INT	CONFERENCE	CAN-ROUND-8"	CFL 4P-V 26W- 1L	9	Compact Fluorescent 4 Pin Vertical 26 Watt,1 lamp/fxtr	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	9	LED Kit	INSTALL (1) PICO ON/OFF, (1) WIRELESS CEILING SENSOR, (1) RMJ POWPACK, (1) SURFACE MOUNT PICO BOX
461	Yes	CURRENTS INT	PARK/REC LOBBY	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
462	Yes	CURRENTS INT	PARK/REC LOBBY	TRFR-REC-1X4-BBU	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW-BBU		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast. W/ BBU	1	Direct Wire LED Tube	
463	Yes	CURRENTS INT	REC. SERVICES	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
464	Yes	CURRENTS INT	SPORTS/WELLNESS	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
465	Yes	CURRENTS INT	OUTDOOR PROGRAMS	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
466	Yes	CURRENTS INT	ADMIN/SPORTS	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
467	Yes	CURRENTS INT	OPEN	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
468	Yes	CURRENTS INT	DIRECTOR	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
469	Yes	CURRENTS INT	PARKS/TRAIL DESIGN	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
470	Yes	CURRENTS INT	OPEN OFFICE	TRFR-CTR BSKT-2X4	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH PLATE
471	Yes	CURRENTS INT	OPEN OFFICE	SCONCE-NON-LINEAR	CFL 2P-V 18W- 2L	3	Compact Fluorescent 2 Pin Vertical 18 Watt,2 lamp/fxtr	Ret/2x6.5LED-PL		RET = Retrofit Fxtr	Install (2) New 6.5W LED PL lamp, remove ballast.	3		INSTALL (1) PICO ON/OFF, (1) WIRELESS CEILING SENSOR, (1) RMJ POWPACK, (1) SURFACE MOUNT PICO BOX
472	Yes	CURRENTS INT	WORK RM	TRFR-REC-2X4	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) PICO ON/OFF, (1) WIRELESS CEILING SENSOR, (1) RMJ POWPACK, (1) SURFACE MOUNT PICO BOX
473	Yes	CURRENTS INT	IT	INDSTR-LPNDT-4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
474	Yes	CURRENTS INT	STORAGE	TRFR-REC-2X4	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
475	Yes	CURRENTS INT	BACK RR HALL	CAN-ROUND-6"-BBU	CFL 4P-V 18W- 1L	4	Compact Fluorescent 4 Pin Vertical 18 Watt,1 lamp/fxtr	Kit/1x9_RC6_BBU		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts. Add remote mounted LED BBU driver and test button.	4	LED Kit	INSTALL (1) RMJ POWPACK, (1) WIRELESS HALLWAY SENSOR
476	Yes	CURRENTS INT	BACK RR HALL	CAN-ROUND-6"	CFL 4P-V 18W- 1L	4	Compact Fluorescent 4 Pin Vertical 18 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	4	LED Kit	INSTALL (1) RMJ POWPACK, (1) WIRELESS HALLWAY SENSOR
477	Yes	CURRENTS INT	RR 1	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
478	Yes	CURRENTS INT	RR 1	CAN-ROUND-6"	CFL 4P-V 18W- 1L	1	Compact Fluorescent 4 Pin Vertical 18 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	1	LED Kit	CTRL'D
479	Yes	CURRENTS INT	RR2	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
480	Yes	CURRENTS INT	RR 2	CAN-ROUND-6"	CFL 4P-V 18W- 1L	1	Compact Fluorescent 4 Pin Vertical 18 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	1	LED Kit	CTRL'D
481	Yes	CURRENTS INT	MECHANICAL	TRFR-REC-2X4	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
482	Yes	CURRENTS INT	POOL RECEPTION	DECOR INT	CFL 2G11 16.4" 36W-6L	4	Compact Fluorescent Long Twin Tube (AKA: 2G11, Biax, PLL) 16.4 Inch 36 Watt,3 lamp/fxtr	RET/6X16_PLL		RET = Retrofit Fxtr	Install 6 new direct wire PLL lamps in fixture. Remove existing ballasts.	4		0
483	Yes	CURRENTS INT	POOL RECEPTION	CYLDR-10"	CFL 4P-H 26W- 2L	4	Compact Fluorescent 4 Pin Horizontal 26 Watt,2 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
484	Yes	CURRENTS INT	POOL RECEPTION	DECOR INT	CFL 2G11 16.4" 36W-6L	5	Compact Fluorescent Long Twin Tube (AKA: 2G11, Biax, PLL) 16.4 Inch 36 Watt,3 lamp/fxtr	RET/6X16_PLL		RET = Retrofit Fxtr	Install 6 new direct wire PLL lamps in fixture. Remove existing ballasts.	5		0
485	Yes	CURRENTS INT	POOL RECEPTION	TRACK	CFL 4P-H 18W- 2L	13	Compact Fluorescent 4 Pin Horizontal 18 Watt,2 lamp/fxtr	Ret/2x6.5LED-PL		RET = Retrofit Fxtr	Install (2) New 6.5W LED PL lamp, remove ballast.	13		0
486	Yes	CURRENTS INT	BACK HALL (NORTH)	CAN-ROUND-6"-BBU	CFL 4P-H 18W- 2L	9	Compact Fluorescent 4 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x9_RC6_BBU		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts. Add remote mounted LED BBU driver and test button.	9	LED Kit	INSTALL (3) WIRELESS HALLWAY SENSOR , (1) RMJ POWPACK
487	Yes	CURRENTS INT	BACK HALL (NORTH)	TRACK	CFL 4P-H 18W- 2L	15	Compact Fluorescent 4 Pin Horizontal 18 Watt,2 lamp/fxtr	Ret/2x6.5LED-PL		RET = Retrofit Fxtr	Install (2) New 6.5W LED PL lamp, remove ballast.	15		0



LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing				Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
488	Yes	CURRENTS INT	MEN'S LOCKER	CAN-ROUND-8"	CFL 4P-V 26W- 1L	11	Compact Fluorescent 4 Pin Vertical 26 Watt,1 lamp/fxtr	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	11	LED Kit	INSTALL (1) PICO ON/OFF, (5) WIRELESS CEILING SENSOR, (1) RMJ POWPACK, (1) SURFACE MOUNT PICO BOX
489	Yes	CURRENTS INT	MEN'S LOCKER	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	8	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	8	Direct Wire LED Tube	CTRL'D
490	Yes	CURRENTS INT	MEN'S LOCKER	TRFR-REC-1X4-BBU	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW-BBU		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast. W/ BBU	3	Direct Wire LED Tube	CTRL'D
491	Yes	CURRENTS INT	FAMILY LOCKER	CAN-ROUND-8"	CFL 4P-V 26W- 1L	12	Compact Fluorescent 4 Pin Vertical 26 Watt,1 lamp/fxtr	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	12	LED Kit	
492	Yes	CURRENTS INT	FAMILY LOCKER	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
493	Yes	CURRENTS INT	FAMILY LOCKER	TRFR-REC-1X4-BBU	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW-BBU		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast. W/ BBU	2	Direct Wire LED Tube	
494	Yes	CURRENTS INT	WOMEN'S LOCKER	CAN-ROUND-8"	CFL 4P-V 26W- 1L	11	Compact Fluorescent 4 Pin Vertical 26 Watt,1 lamp/fxtr	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	11	LED Kit	
495	Yes	CURRENTS INT	WOMEN'S LOCKER	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	9	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	9	Direct Wire LED Tube	
496	Yes	CURRENTS INT	WOMEN'S LOCKER	TRFR-REC-1X4-BBU	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW-BBU		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast. W/ BBU	2	Direct Wire LED Tube	
497	Yes	CURRENTS INT	ERIC'S OFFICE	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) PICO ON/OFF, (1) WIRELESS CEILING SENSOR, (1) RMJ POWPACK, (1) SURFACE MOUNT PICO BOX
498	Yes	CURRENTS INT	GUARD OFFICE	INDSTRL-PNDT-4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) PICO ON/OFF, (1) WIRELESS CEILING SENSOR, (1) RMJ POWPACK, (1) SURFACE MOUNT PICO BOX
499	Yes	CURRENTS INT	GUARD OFFICE	TRFR-REC-1X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	CTRL'D
500	Yes	CURRENTS INT	STORAGE/LAUNDRY	INDSTRL-PNDT-4FT	F T8 F32-32W-48" NLO- 3L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
501	Yes	CURRENTS INT	MECH ROOM ABOVE STORAGE	INDSTRL-PNDT-4FT	F T8 F32-32W-48" NLO- 3L	4	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
502	Yes	CURRENTS INT	ELEC ROOM	INDSTRL-PNDT-4FT	F T8 F32-32W-48" NLO- 3L	3	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
503	Yes	CURRENTS INT	BOILER	INDSTRL-PNDT-4FT	F T8 F32-32W-48" NLO- 3L	7	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	7	Direct Wire LED Tube	
504	Yes	CURRENTS INT	BOILER	INDSTRL-PNDT-4FT-BBU	F T8 F32-32W-48" NLO- 3L	1	Linear Fluorescent 18 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW-BBU		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast. W/ BBU	1	Direct Wire LED Tube	
505	Yes	CURRENTS INT	CHLORINE RM	VAPOR-4FT	CFL 2G11 2FT 28W- 2L	1	Compact Fluorescent Long Twin Tube (AKA: 2G11, Biax, PLL) 22.6 Inch 28 Watt,2 lamp/fxtr	Ret/2x16LED-DW-PLL		RET = Retrofit Fxtr	Install (2) New direct wire LED PLL lamps, 16watt, remove ballast.	1	LED Pin Based Lamp	
506	Yes	CURRENTS INT	POOL	DECOR INT	CFL 4P-H 42W- 2L	20	Compact Fluorescent 4 Pin Horizontal 42 Watt,2 lamp/fxtr	IN/1x37LEDF - POOL	Need to verify lamp type/wattage	IN = Install New Fxtr	Install new LED Lowbay Fixture. Pendant mount. Suspended from ceiling. Some fixtures over the pool with difficult access.	20	LED Fxtr Integral Lamp	
507	Yes	CURRENTS INT	POOL	HIGHBAY-RND-16" DIAM	CFL 4P-H 42W- 2L	9	Compact Fluorescent 4 Pin Horizontal 42 Watt,2 lamp/fxtr	IN/1x37LEDF - POOL	Need to verify lamp type/wattage	IN = Install New Fxtr	Install new LED Lowbay Fixture. Pendant mount. Suspended from ceiling. Some fixtures over the pool with difficult access.	9	LED Fxtr Integral Lamp	
508	Yes	CURRENTS INT	RIPP;ES PARTY RM	CAN-ROUND-6"	CFL 2P-H 18W- 1L	6	Compact Fluorescent 2 Pin Horizontal 18 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	6	LED Kit	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
509	Yes	CURRENTS EXT	EXTERIOR	POLE CB-1 HEAD PER POLE-RND DIR ARM-SLV	HPS-Mogul-200W-1L	3	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	N	VERIFY UTILITY OWNED	N = No Retrofit	No Retrofit Proposed	3	N	
510	Yes	CURRENTS EXT	EXTERIOR	POLE SB-1 HEAD PER POLE-SLPFTR-BRZ	HPS Mogul 250W- 1L	2	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x113LEDF_SB_TEN_III		IN = Install New Fxtr	Install new LED Shoebox rtr. Square tenon mount, type III distribution, 113W, Pole mount, 3000K Full Cutoff , Bronze, 120-277V Twistlock PC	2	LED Fixture	
511	Yes	CURRENTS EXT	EXTERIOR	POLE SB-1 HEAD PER POLE-SLPFTR-BRZ	LED Fxtr - 40W	2	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	2	N	
512	Yes	CURRENTS EXT	EXTERIOR	WP-MEDIUM FCO	LED-Fxtr-40W	4		N		N = No Retrofit	No Retrofit Proposed	4	N	
513	Yes	CURRENTS EXT	EXTERIOR	WP-MEDIUM FCO	CFL 4P-H 42W- 1L	3	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	3	LED Fixture	
514	Yes	CURRENTS EXT	EXTERIOR	WP-SMALL FCO	LED-Fxtr-25W	5		N		N = No Retrofit	No Retrofit Proposed	5	N	
515	Yes	CURRENTS EXT	EXTERIOR	WP-PORCH	LED-Fxtr-10W	3		N		N = No Retrofit	No Retrofit Proposed	3	N	
516	Yes	CURRENTS EXT	EXTERIOR	POLE SB-1 HEAD PER POLE-SQ DIR ARM-BRZ	Ind Rect 80W- 1L	2	Induction Rectangular 80 WATT,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x58LEDF_SB_SQ_III		IN = Install New Fxtr	Install new LED Shoebox rtr. Square direct arm mount, type III distribution, 58W, Pole mount, 3000K Full Cutoff , Bronze, 120-277V Twistlock PC	2	LED Fixture	
517	Yes	CURRENTS EXT	EXTERIOR	CYLDR-8"	HPS Med 70W- 1L	2	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 70 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x16_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 16 watts.	2	LED Retrofit Lamp	





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McKinstry Scope

				Existing				Proposed						
ID	In Scope	Building	Room Name	Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
518	Yes	CURRENTS EXT	EXTERIOR		HPS Mogul 50W- 1L	4	High Pressure Sodium Mogul Base (AKA: E39) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	N		N = No Retrofit	No Retrofit Proposed	4	N	

# Aquatics FIMs

## 48219

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**Currents Aquatic Center**

600 Cregg Lane  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Int. Door(s) to be weather-stripped & sealed for isolation. Pool isolation.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>1,155</b>
Annual Cost of Leakage (Kwh):	-	<b>688</b>

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. 9' tall doors	First	4 Doors
Ext. Door(s) to be weather-stripped & sealed.	First	11 Doors
Ext. Door(s) to be weather-stripped & sealed.	Second	1 Doors
Int. Door(s) to be weather-stripped & sealed for isolation. Pool isolation.	First	11 Doors

AIR LEAKAGE:	feet	inches		
Doors	88	3/32	0.69	sq ft
Doors	220	3/32	1.72	sq ft
Doors	20	3/32	0.16	sq ft
Doors	220	3/32	1.72	sq ft

Totals	-	4.28 sq ft
		0.40 sq meter

**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K      145

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Aquatics FIMs

## 48220

# Detailed Scope of Work

**FIM ID # 48220**  
**CURR 17.01 Pool & Feature Pump Variable Frequency Drives (VFDs)**  
**Currents Aquatics Center**

## GENERAL

Perform code study for pool and feature water turnover rates during occupied versus unoccupied operation modes. Add VFDs to pumps that do not have them and turn down speed as permitted by code.

## SCOPE OF WORK INCLUDES

- A. "Provide" as written below shall mean furnish and install.
- B. Mechanical
  - 1. N/A
- C. Controls
  - 1. Furnish Variable Speed drives for pool pumps (Qty. of 6), Drives shall have integral lockable disconnect switch and By-Pass. VFD's are installed by the E.C.
  - 2. Provide BACnet integration from existing BAS to the VFD's, provide 6 parameters per drive. Drives shall be programmed to run at reduced speed during unoccupied times.
  - 3. Replace motors where indicated on Sketches, motors shall be premium efficiency, inverter ready with integral shaft grounding ring.
  - 4. Provide Aegis shaft grounding ring on existing motors where shown on Sketches.
  - 5. Update controls graphics to include new installed equipment and points.
  - 6. Provide all programming necessary to operate the systems per the Design Intent set forth by McKinstry.
  - 7. All controllers will be BACnet or LON compatible (TBD).
  - 8. Wiring exposed within rooms shall be run thru conduit.
  - 9. Reference drawings for additional requirements.
  - 10. Work with TAB Contractor and McKinstry Commissioning personnel to test systems.
  - 11. Provide Owner Training (2 hours) for this FIM.
- D. Electrical
  - 1. Contractor shall be responsible for equipment, materials, accessories, and other associated requirements called for in the following scope, and as indicated in the above supporting documents.
  - 2. General circuiting requirements
    - a. Contractor shall survey existing facility drawings and power distribution system to determine available space and capacity to support this scope of work. If existing space or capacity is insufficient to meet the requirements of the scope, Contractor shall immediately notify McKinstry.
    - b. For power circuits indicated as being removed, Contractor shall remove conductors back to the associated panel, and shall remove associated starters, disconnects, and other devices. Conduit shall be cut back to within 3" of room penetration.
    - c. For new power circuits, Contractor shall furnish and install overcurrent protection, conduit conductors, starter, disconnect, and related accessories as indicated on the drawings.
    - d. Where power circuits indicated as being removed meet the requirements for new power circuits, existing components may be reused where in compliance with current NEC.
    - e. Unless otherwise specified, similar loads may be combined on a common circuit as permitted by current NEC.
  - 3. Electrical panels and disconnects serving mechanical equipment shall comply with the service clearance requirements of the NEC. Furnish and install remote mounted panels and disconnects where required by the NEC.
  - 4. **General Scope:** Electrical work to support replacement of existing starters/disconnects with

# Detailed Scope of Work

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## VFDs.

- a. Replace combination starters/disconnects with Variable Speed Drives (furnished by T.C.C.) for pool circulation pumps. Extend conduit and conductors as required.
- b. Reference electrical drawings for additional requirements.

## E. Commissioning

1. McKinstry Commissioning Engineer will fully commission the proposed control systems.

## F. TAB

1. McKinstry to provide waterside TAB for setting the reduced pump speed.

## G. Engineering

1. McKinstry to provide design engineering for this FIM.

## H. Training

1. McKinstry to oversee Owner Training for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.













# Aquatics FIMs

48221

# Detailed Scope of Work

**FIM ID # 48221**  
**CURR 01.01 Optimized Boiler Piping for Pool & DHW**  
**Currents Aquatics Center**

## GENERAL

INSTALL A DOMESTIC HOT WATER SIDE LOOP SO THAT ONE BOILER CAN PROVIDE HIGHER TEMPERATURE WATER TO PRODUCE DHW AND THE OTHER BOILERS CAN RESET DOWN INTO THE CONDENSING OPERATION BAND TO IMPROVE EFFICIENCY OF MAKING HVAC AND POOL HEATING WATER.

## SCOPE OF WORK INCLUDES

- A. "Provide" as written below shall mean furnish and install.
- B. Mechanical
  - 1. Provide heating hot water circ pump, piping, valves and appurtenances as scheduled or indicated on Sketches. Install in strict accordance with manufacturers written instructions.
  - 2. Install two-position automatic isolation valve (furnished by T.C.C.) into supply header.
  - 3. Insulate piping as indicated in master specification sheets.
  - 4. Provide pipe labeling indicating service and direction of flow for all heating water piping.
  - 5. Provide equipment labeling for all scheduled equipment. Plastic 3x5 laminated plastic tags with white letters on black background.
  - 6. Existing heating water system is a 50% propylene glycol mixture. Contractor to test system prior to work. Flush and clean new piping systems and add additional glycol with inhibitors as required to return mixture to design levels. Provide isolation valves and bypasses as required for clean and flush.
  - 7. Install temp sensor well into return water header where shown on plans (furnished by T.C.C.).
- C. Controls
  - 1. Provide all low voltage wiring, line voltage wiring, and conduit for a complete and functioning control system. Reference below for additional requirements. Note that all low voltage connections should be of non-permanent so as to facilitate commissioning point-to-point testing.
  - 2. Provide all controllers, relays, transducers, sensors, etc.. for a complete and functioning control system.
  - 3. Provide ACS Panel and ACS Relay Panel (Panels to be purchased from Aerco Boiler), wire to devices as indicated and required for system operation.
  - 4. Provide Aquastat for domestic water heating control, wire back to ACS relay panel.
  - 5. Furnish motorized header isolation valve and return water temperature sensor to M.C. for installation.
  - 6. Program Aerco master Boiler controls and ACS Panel as required to allow for Domestic Water Priority.
  - 7. Update controls graphics to include new installed equipment/parameters.
  - 8. Provide (program) reset schedule for heating water boiler supply temperature.
  - 9. Provide all programming necessary to operate the systems per the Design Intent set forth by McKinstry, including graphics, scheduling, temperature set-back, logging, etc..of all points herein.
  - 10. Reference drawings for additional requirements.
  - 11. Assist McKinstry Commissioning and TAB contractor as required.
  - 12. Provide Owner Training (2 hours) for this FIM
- D. Electrical
  - 1. Contractor shall be responsible for equipment, materials, accessories, and other associated requirements called for in the following scope, and as indicated in the above supporting documents.

# Detailed Scope of Work

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2. General circuiting requirements
    - a. Contractor shall survey existing facility drawings and power distribution system to determine available space and capacity to support this scope of work. If existing space or capacity is insufficient to meet the requirements of the scope, Contractor shall immediately notify McKinstry.
    - b. For power circuits indicated as being removed, Contractor shall remove conductors back to the associated panel, and shall remove associated starters, disconnects, and other devices. Conduit shall be cut back to within 3" of room penetration.
    - c. For new power circuits, Contractor shall furnish and install overcurrent protection, conduit conductors, starter, disconnect, and related accessories as indicated on the drawings.
    - d. Where power circuits indicated as being removed meet the requirements for new power circuits, existing components may be reused where in compliance with current NEC.
    - e. Unless otherwise specified, similar loads may be combined on a common circuit as permitted by current NEC.
  3. Electrical panels and disconnects serving mechanical equipment shall comply with the service clearance requirements of the NEC. Furnish and install remote mounted panels and disconnects where required by the NEC.
  4. **General Scope:** Electrical work to support adding domestic hot water pump.
    - a. Provide breaker, conduit and conductors as required to power circulating pump DHWP-1.
    - b. Provide combination starter/disconnect switch for circulating pump DHWP-1.
    - c. Provide 120V circuit for power to ACS panel/relay box.
    - d. Reference drawings for additional requirements.
- E. Commissioning
1. McKinstry Commissioning Engineer will fully commission the proposed controls and HVAC systems.
- F. TAB
1. McKinstry will provide waterside TAB for the following systems
    - i. Pump DHWP-1.
- G. Engineering
1. McKinstry to provide design engineering for this FIM.
- H. Training
1. McKinstry to oversee Owner Training for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond

# Detailed Scope of Work

---

those included in the scope above, Owner contingency funds will be used to cover the cost of repair.

11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.







## HEAT EXCHANGER SCHEDULE (EXISTING)

PLAN CODE	MANUFACTURER	MODEL NUMBER	COLD SIDE			BOILER SIDE (50% PROP. GLYCOL)					REMARKS
			GPM	EWT	LWT	CAPACITY MBH	GPM	EWT	LWT	$\frac{\Delta P}{IN. FT.}$	
HX-1	ALFA LAVAL	M6-MDFG	70	40	85	1582.0	90	180	140	11	PLATE & FRAME EXCHANGER FOR POOL WATER HEATER. SEE NOTE #1 BELOW.
HX-2	ALFA LAVAL	M3-DVG	6	40	105	175.0	10	180	140	11	PLATE & FRAME EXCHANGER FOR SPA WATER HEATER. SEE NOTE #1 BELOW.
HX-3	CEMLINE	JST660DW	N/A	40	140	370.0	37.0	180	160		SHELL & TUBE EXCHANGER FOR DOMESTIC HOT WATER MAKER. SEE NOTE #2 BELOW.

**GENERAL NOTES:**  
 1.) HEAT EXCHANGER TO BE OF DOUBLE WALL CONSTRUCTION. HX MATERIAL TO BE STAINLESS STEEL. PERFORMANCE CORRECTED FOR 50% PROPYLENE GLYCOL. SEE DETAIL D/M5.0.  
 2.) HEAT EXCHANGER TO BE OF DOUBLE WALL CONSTRUCTION. PERFORMANCE CORRECTED FOR 50% PROPYLENE GLYCOL. SEE DETAIL E/M5.0.

## BOILER SCHEDULE (EXISTING)

PLAN CODE	MANUFACTURER	MODEL NUMBER	INPUT (MBH)	OUTPUT (MBH)	FLUE SIZE	GAS PRES. REQ'D (W.C.)	WATER CONNECTIONS	ELECTRICAL			REMARKS
								VOLT	AMP	PHASE	
B-1	AERCO	BENCHMARK 2000	2000	1720	8"	7.5"	4"	230	15	3	SEE NOTE BELOW
B-2	AERCO	BENCHMARK 2000	2000	1720	8"	7.5"	4"	230	15	3	SEE NOTE BELOW
B-3	AERCO	BENCHMARK 2000	2000	1720	8"	7.5"	4"	230	15	3	SEE NOTE BELOW

**NOTES:** 1.) PROVIDE WITH AERCO BOILER MANAGEMENT SYSTEM TO RUN B-1 & B-2 IN PARALLEL OPERATION. B-3 TO BE STANDBY.  
 2.) SEE DETAIL A/M1.1 & G/M5.0 FOR PROPER BOILER CONNECTIONS & ETC.  
 3.) PROVIDE UNITS B-1 THROUGH B-3 WITH BOILER CSD CONTROL SYSTEM.

## PUMP SCHEDULE (EXISTING)

PLAN CODE	MANUFACTURER	MODEL NUMBER	SIZE	RPM	GPM	FT. OF HD.	ELECTRICAL DATA			REMARKS
							HP	VOLT	PH	
HWP-1	TACO	FE2506	2.5"x3"	3500	353	90	15	460	3	VFD PROVIDED BY T.C. HOT WATER PUMP, SEE NOTES BELOW
HWP-2	TACO	FE2506	2.5"x3"	3500	353	90	15	460	3	VFD PROVIDED BY T.C. HOT WATER PUMP, SEE NOTES BELOW

**NOTES:** SEE DETAIL A/M3.2 FOR DETAIL OF BASE MOUNTED PUMP ALONG WITH ALL ASSOCIATED ACCESSORIES. HWP MOTORS TO BE HIGH EFFICIENCY & COMPATIBLE WITH VAR. FREQ. DRIVES.

### HOT WATER RECIRC. PUMP SCHEDULE

PLAN CODE	MANUFACTURE	MODEL NUMBER	SIZE	GPM	FT. OF HD.	ELECTRICAL DATA			REMARKS
						HP	VOLT	PH	
HWRC-1	TACO	IL009	3/4"	2	13	0.07	120	1	BRONZE CONSTR.

UNIT TO RUN CONTINUOUSLY DURING OCCUPIED MODE AND TO BE DE-ENERGIZED DURING UN-OCCUPIED MODE.

### HOT WATER STORAGE TANK SCHEDULE

PLAN CODE	MANUFACTURER	MODEL NO.	NOMINAL GAL. CAP.	DIAMETER	REMARKS
HWT-1	CEMLINE	V1000JST	1000	60"	SEE NOTES BELOW

NOTE: PROVIDE STORAGE TANK WITH STONE-STEEL INTERIOR LINING, SUPPORT SKID, AND HEAT EXCHANGER HX-3 (SEE MECH PLANS) AS SCHEDULED.

### DOMESTIC EXPANSION TANK

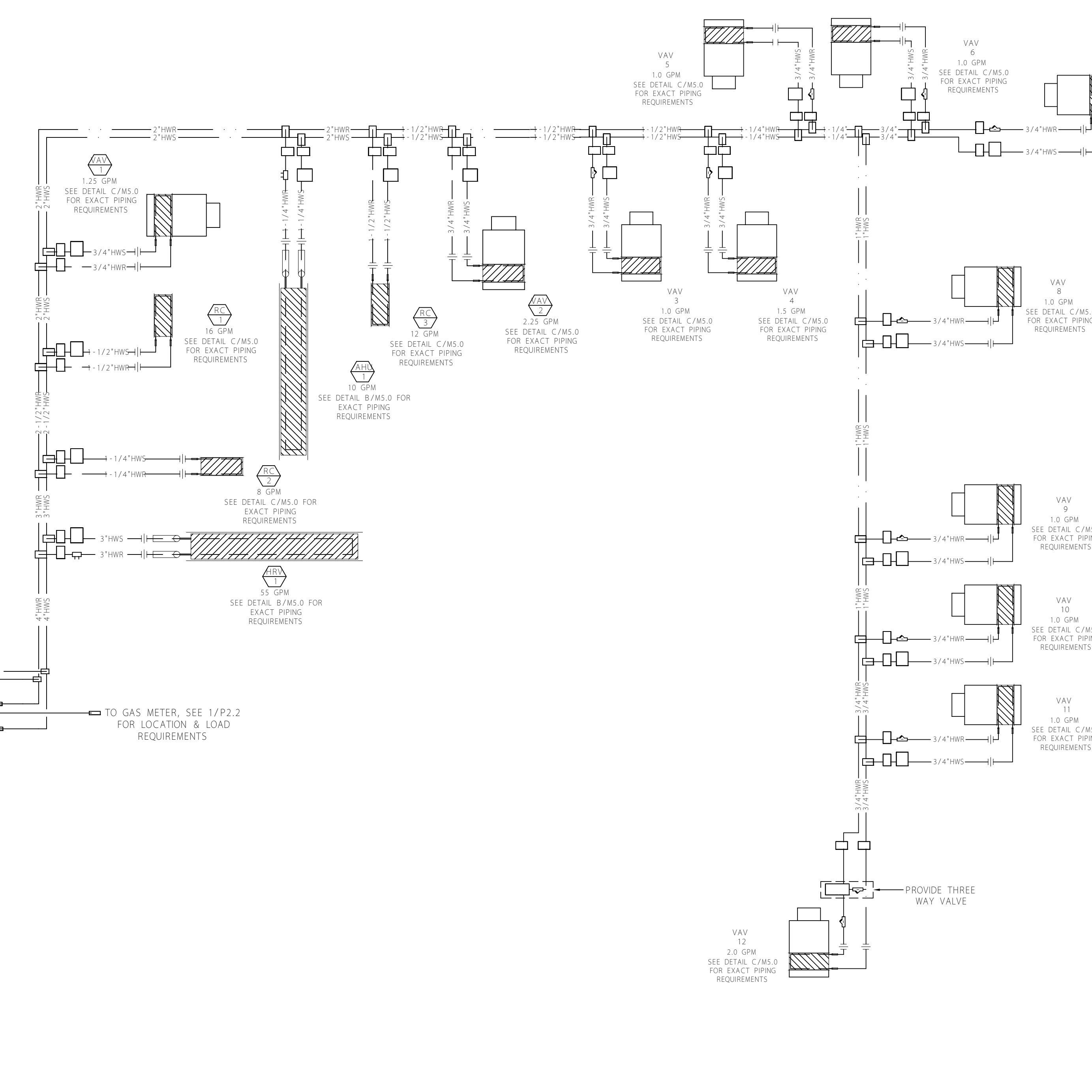
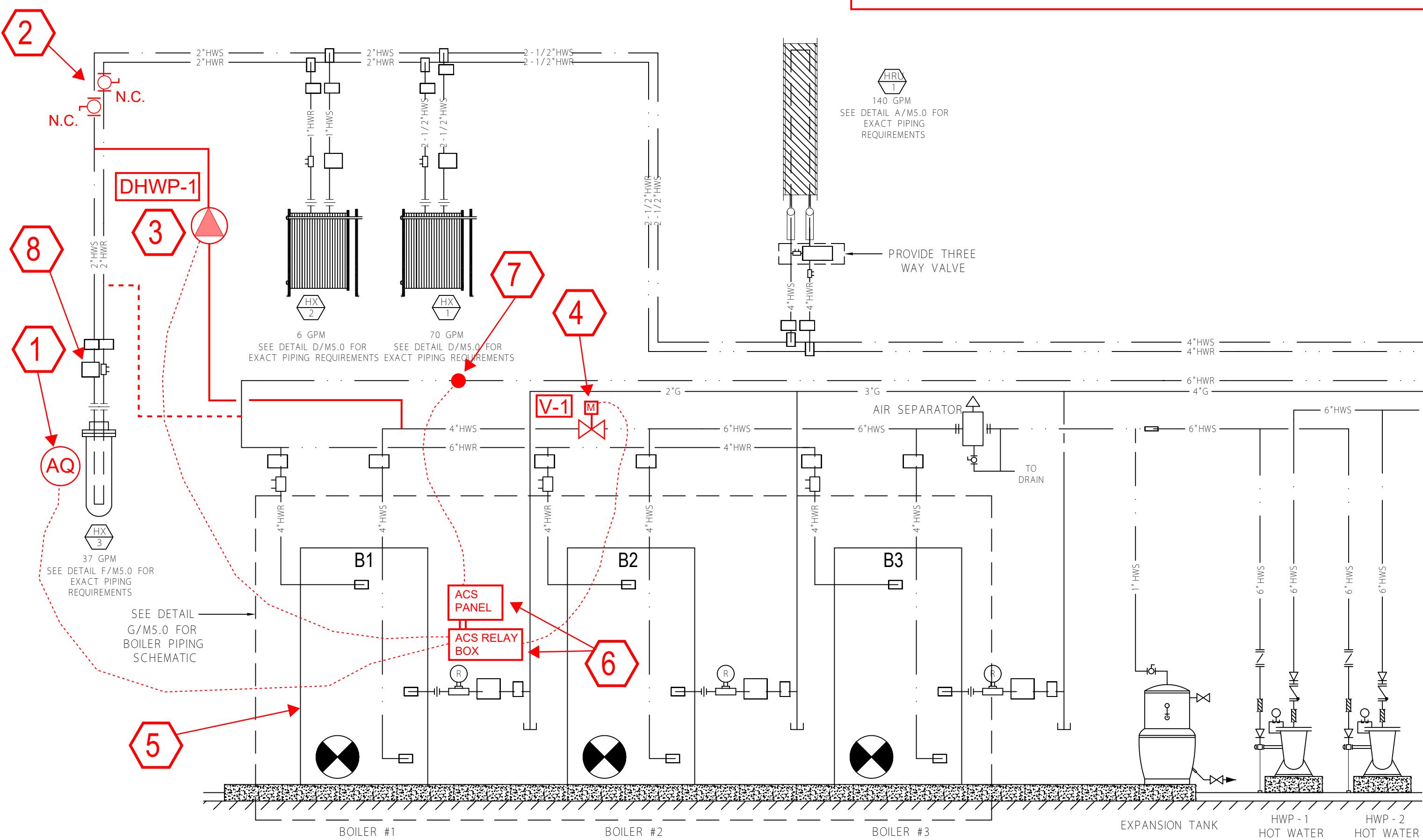
PLAN CODE	MANUF.	MODEL NUMBER	TOTAL VOLUME	ACCEPT. VOLUME	PRECHARGE PRESSURE
DET-1	TACO	PAX-254	67	34	70

UNIT TO BE ASME CONSTRUCTION, REMOVABLE BLADDER, 67 GAL. TOTAL VOLUME, GAL. 34 ACCEPTANCE VOLUME, 150 PSIG WORKING PRESSURE. CHARGE TANK (IN FIELD) TO APPROXIMATE SYSTEM DOMESTIC WATER PRESSURE.

### KEYED NOTES:

1. PROVIDE AQUASTAT IN DOMESTIC HOT WATER STORAGE TANK.
2. PROVIDE ISOLATION VALVES IN EXISTING 2" PIPING FEEDING TUBE BUNDLE (NOT REQUIRED IF EXISTING ISOLATION VALVES HOLD AND ALLOW FOR PIPING INSTALLATION AS SHOWN).
3. PROVIDE IN-LINE PUMP AS SCHEDULED, PROVIDE ISOLATION VALVES, STRAINER, AND CHECK VALVE.
4. PROVIDE TWO-POSITION MOTORIZED ISOLATION VALVE IN EXISTING 4" HEATING WATER HEADER PIPING.
5. BOILER B-1 TO BE DESIGNATED AS "DOMESTIC WATER PRIORITY". PROVIDE ALL PROGRAMMING AS REQUIRED. REFERENCE DOCUMENTS FROM BOILER MANUFACTURER.
6. PROVIDE ACS PANEL AND ACS RELAY BOX (FROM AERCO) FOR CONTROL OF DOMESTIC WATER PRIORITY COMPONENTS, INSTALL PER MFG. WRITTEN INSTRUCTIONS.
7. PROVIDE ACS RETURN WATER TEMPERATURE SENSOR (FROM AERCO) AT LOCATION SHOWN.
8. TWO-WAY VALVE SHALL BE OPEN AT ALL TIMES EXCEPT IF THE DOMESTIC WATER PRIORITY HAS BEEN DISABLED OR BOILER B-1 IS DOWN FOR MAINTENANCE.

(EXISTING)



620 WEST ADDISON STREET  
 MISSOULA MT 59801  
 (406) 214-3500

www.mckinstry.com

PROJECT:  
**CITY OF MISSOULA  
 CURRENTS  
 WATERPARK**

FIM 48221 - 01.01

**DOMESTIC WATER  
 PRIORITY**

600 Cregg Ln.  
 Missoula, MT 59801

CONSULTANTS:

REGISTRATION:

NO	DATE	DESCRIPTION
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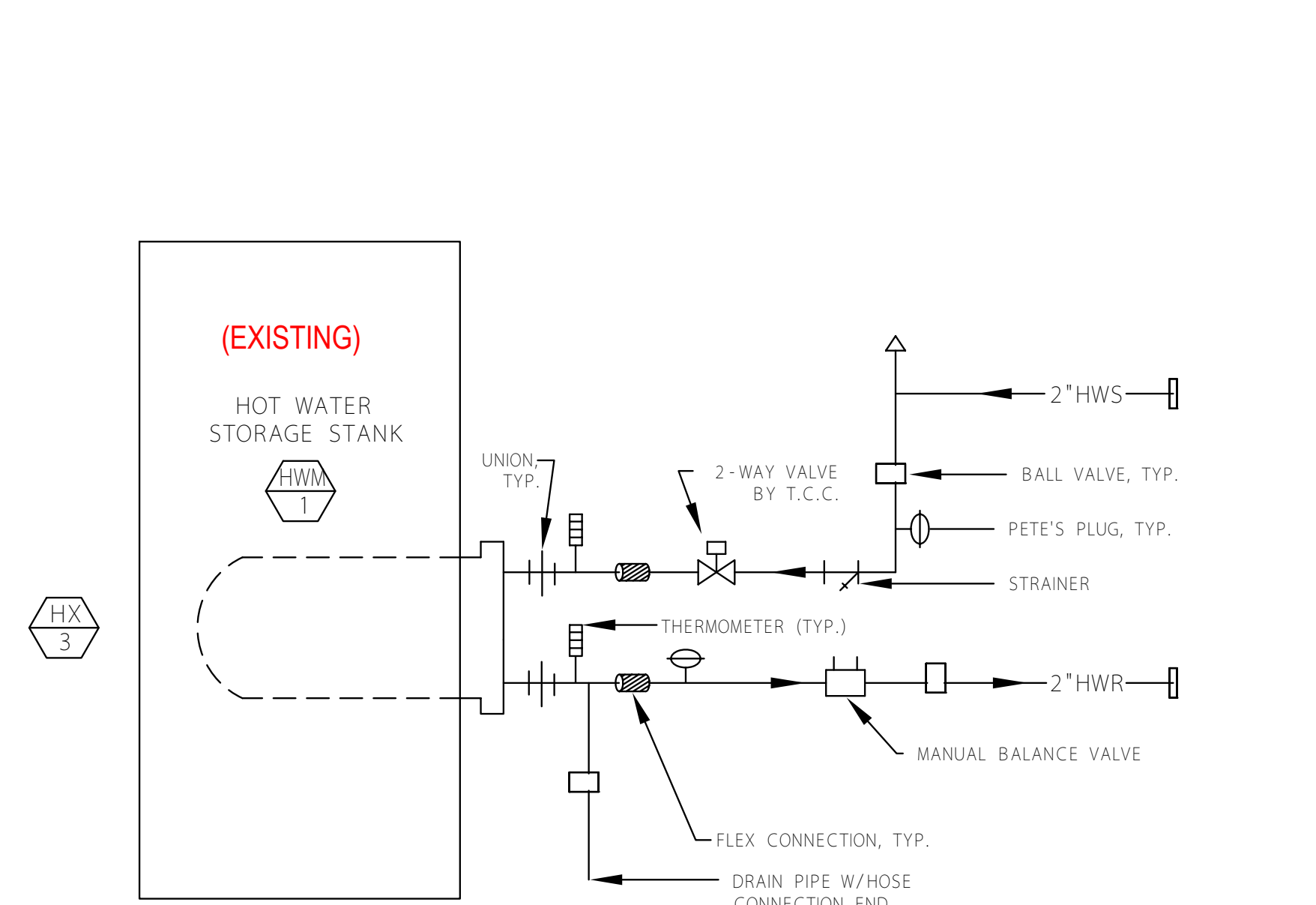
DESIGNED: PF  
 DRAWN: PF  
 CHECKED: PF  
 JOB NO: 202094

SHEET TITLE:

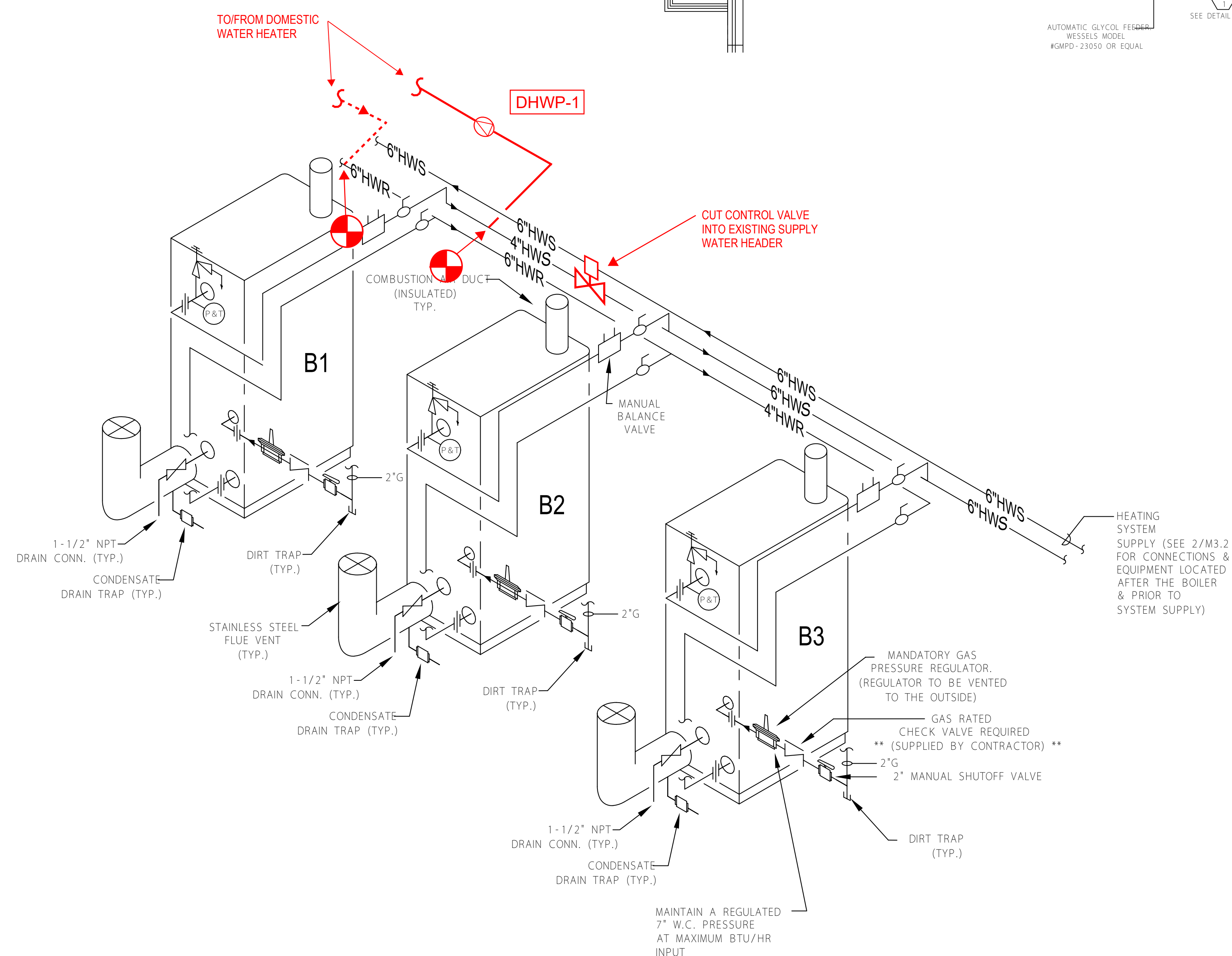
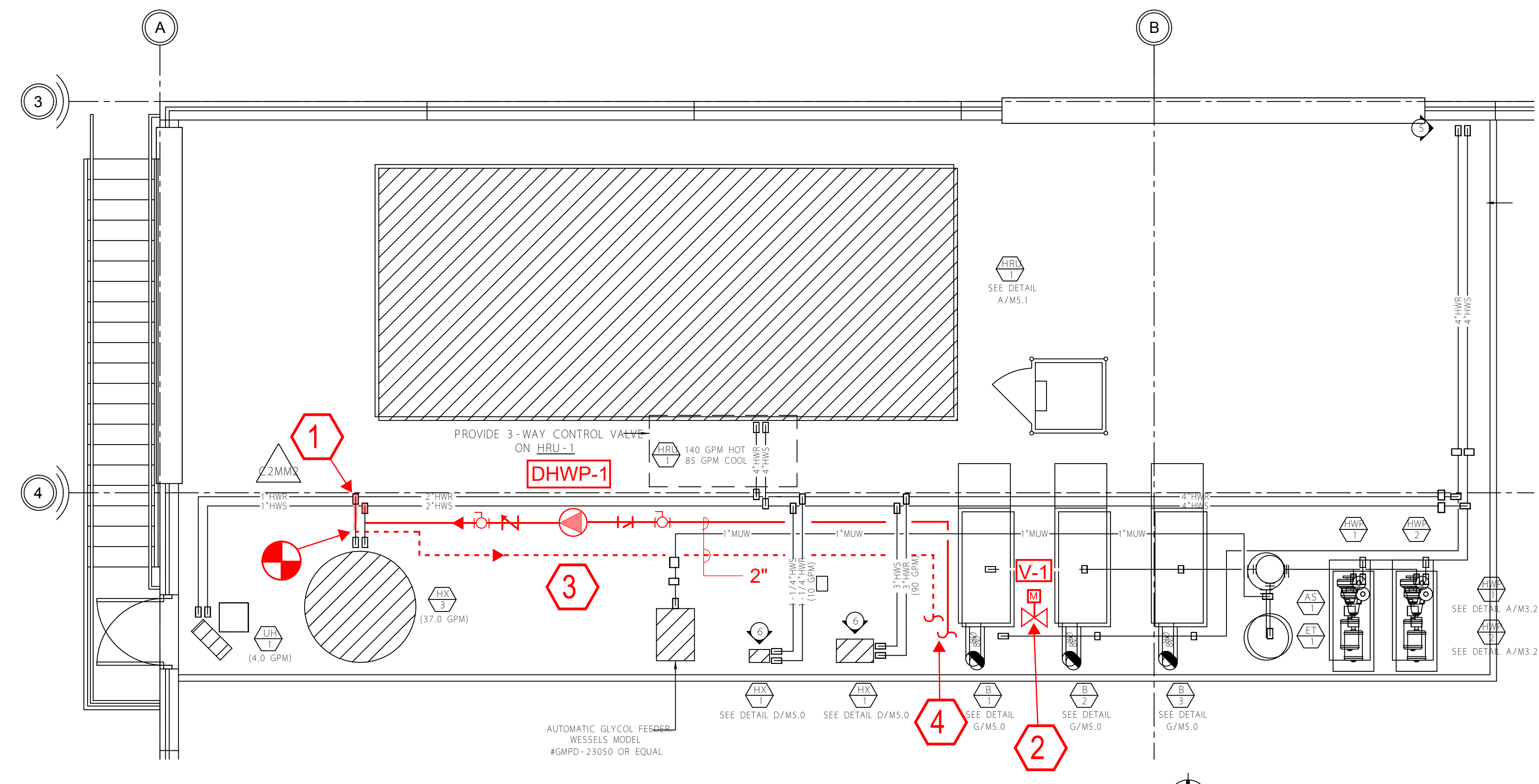
**MECHANICAL  
 PIPING  
 SCHEMATIC**

SHEET NUMBER:

**M2 OF 4**



**E** Domestic Hot Water Heat Exchanger Detail  
No Scale



**G** Boiler Piping Schematic  
No Scale

**KEYED NOTES:**

1. CONNECT TO HEATING WATER PIPING SERVING DOMESTIC WATER HEATER TUBE BUNDLE.
2. PROVIDE MOTORIZED VALVE IN HEATING WATER SUPPLY HEADER, REFERENCE SCHEMATICS.
3. PROVIDE IN-LINE PUMP AS SCHEDULED.
4. EXTEND 2" PIPING TO HEATING WATER MAINS PER SCHEMATIC.

REGISTRATION:

NO	DATE	DESCRIPTION
1	10/11/2021	ISSUED FOR GMAX

DESIGNED:	PF
DRAWN:	PF
CHECKED:	PF
JOB NO:	202094

SHEET TITLE:

**MECHANICAL  
RENOVATION  
PLAN AND  
SCHEMATIC**

SHEET NUMBER:



ISSUES:		
NO	DATE	DESCRIPTION
1	10/1/2021	ISSUED FOR GMAX

DESIGNED:	PF
DRAWN:	PF
CHECKED:	PF
JOB NO:	202094

SHEET TITLE:

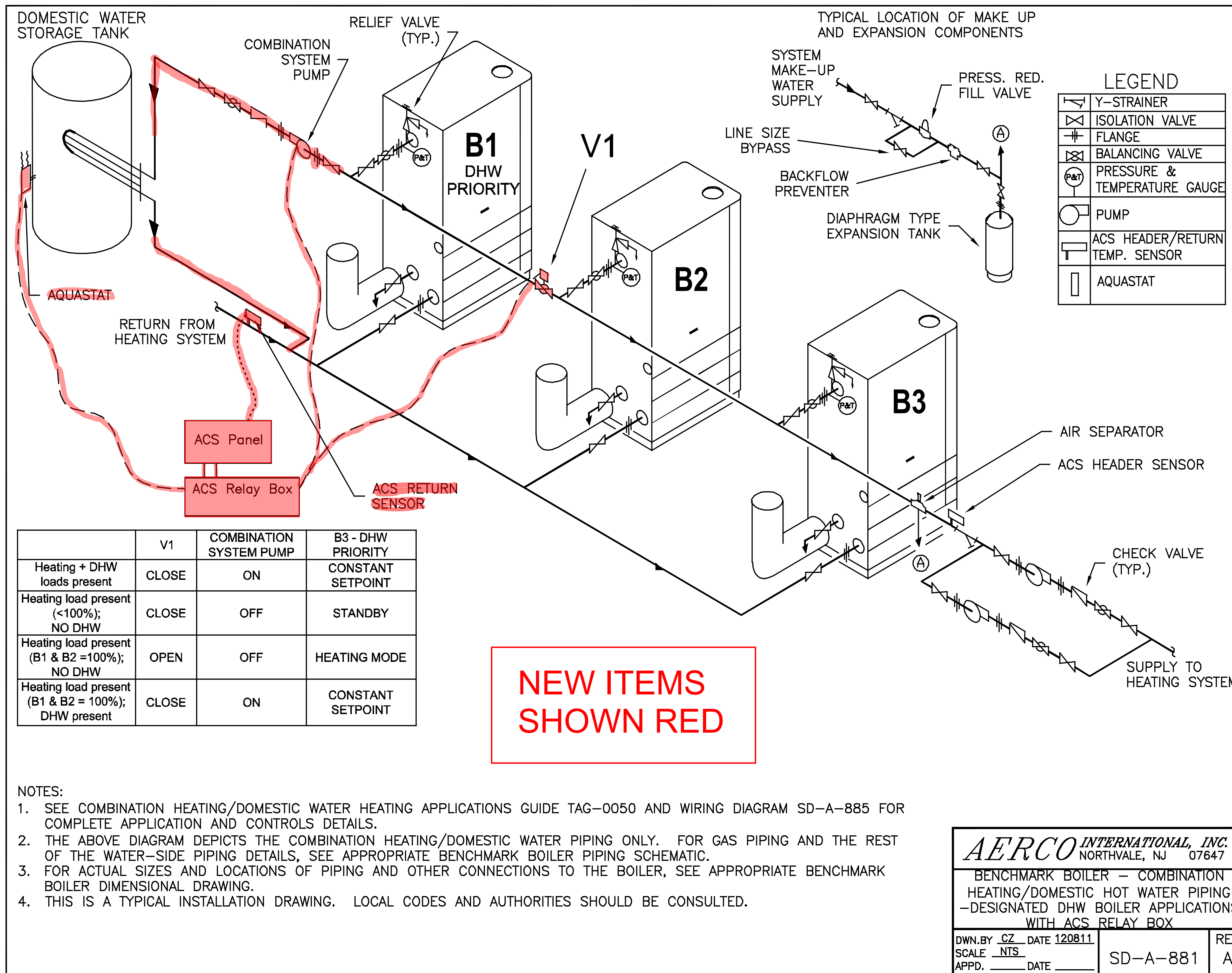
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SCHEMATIC

SHEET NUMBER:

M4 OF 4

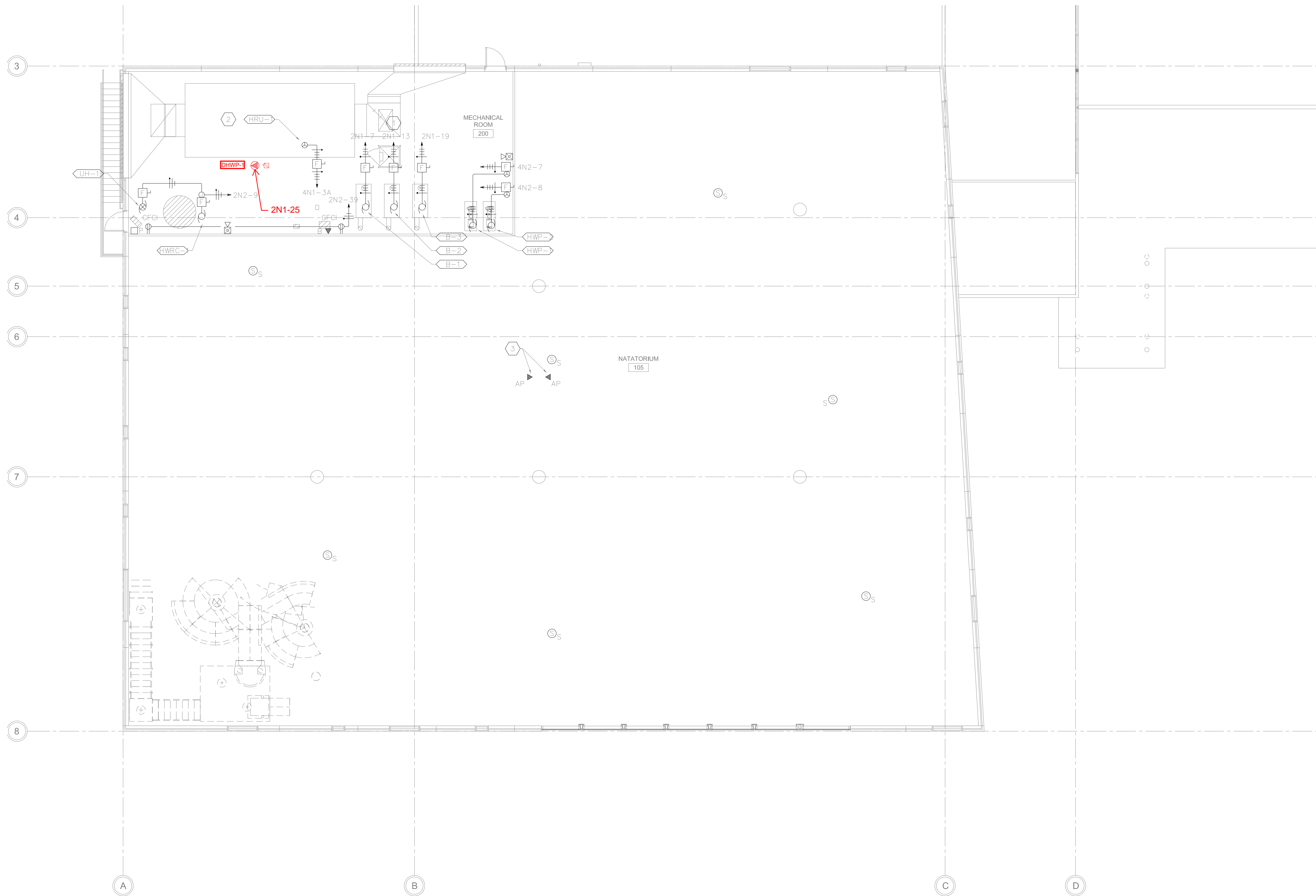
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**AERCO Control System (ACS) Combo Domestic/Space Heating Applications Guide**



**MANUFACTURERS INSTRUCTION SHEET FOR DOMESTIC HOT WATER PRIORITIZATION**

**Diagram 4: Benchmark Boiler – Combination Heating/DHW Piping (Designated DHW Boiler Applications with ACS Relay Box)**



MCKINSTRY CO.

SEATTLE:  
5005 3RD AVE SW  
SEATTLE, WA 98134  
206-762-3311  
www.mckinstry.com

PROJECT:  
**CITY OF MISSOULA  
CURRENTS  
WATERPARK**

FIM 48221 - 01.01

**DOMESTIC WATER  
PRIORITY**

PROJECT LOCATION  
XXX Missoula, MT 5980x

CONSULTANTS:

REGISTRATION:

ISSUES:

NO	DATE	DESCRIPTION
--	08/XX/2021	ISSUED FOR GMAX

DESIGNED: J. COULTER  
 DRAWN: J. COULTER  
 CHECKED: J. COULTER  
 JOB NO: 202094-002

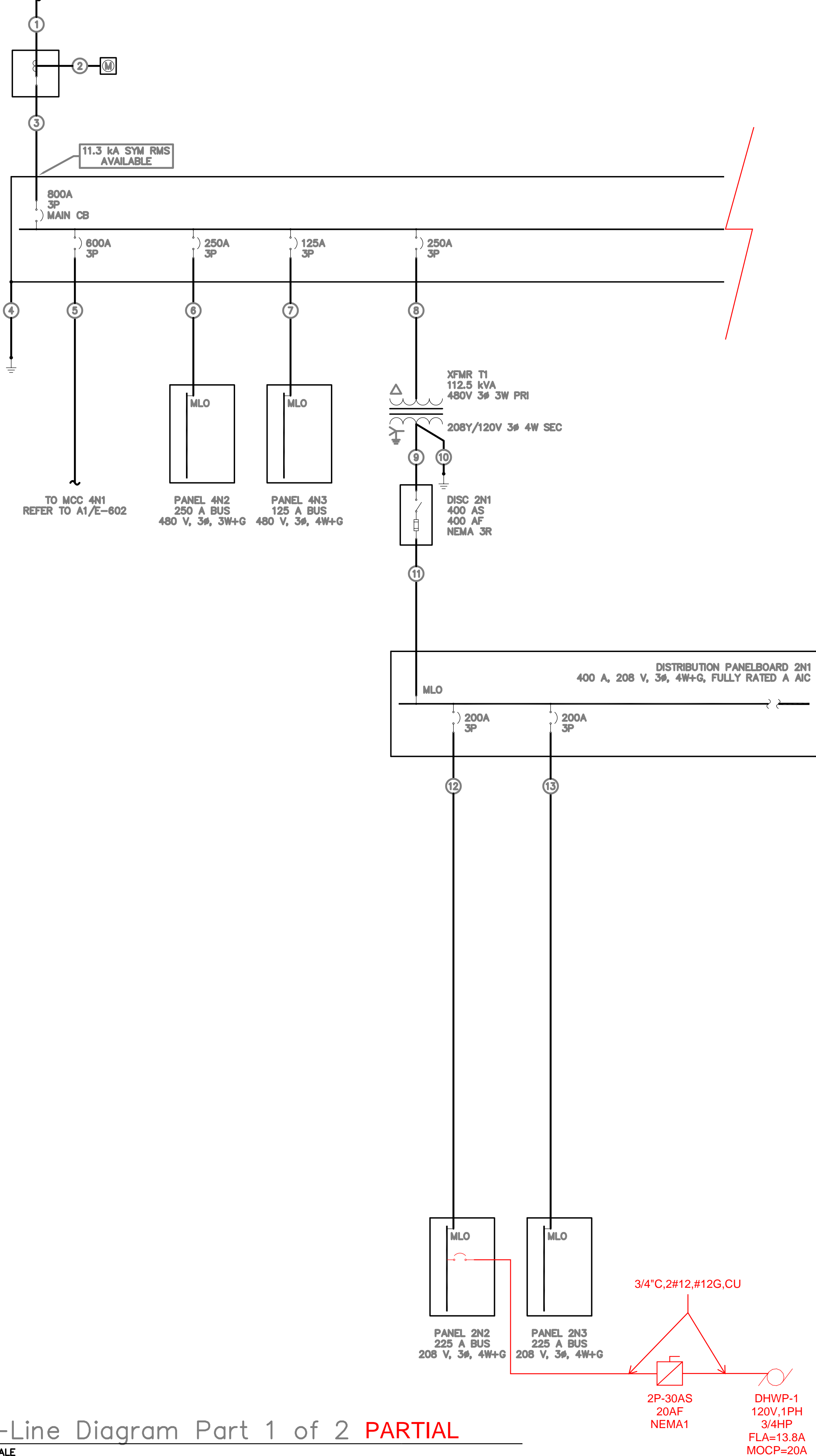
SHEET TITLE:  
**2ND FLOOR  
ELECTRICAL  
PLAN**

SHEET NUMBER:

**E1 OF 2**



SERVICE LATERAL FROM  
PAD-MOUNT UTILITY-OWNED  
TRANSFORMER UT



PANELBOARD 2N1

CKT	LOAD DESCRIPTION	PHASE	CIRCUIT BREAKER			CONNECTED LOAD KVA										NON-CONT	CKT TOTAL	LOCATION: ROOM 108		
			TRIP AMPS	POLES	NOTES	RCPT	LIGHTS	MOTOR	COOL	HEAT	CONT	SOURCE: SWBD XFMR T1	SECTION 1 OF: 1							
1	PANEL 2N2 ROOM 108	A	200	3		4.50		1.59							10.80	16.89	SPECIFICATIONS			
-	-	B	-	-		3.18		2.23							3.50	8.91	VOLTAGE (L-L): 208			
-	-	C	-	-		4.50									11.10	15.60	PHASE: 3			
7	B-1 BOILER NO. 1 RM 200	A	20	3				1.32								1.32	WIRE: 4			
-	-	B	-	-				1.32								1.32	BUS CURRENT RATING (AMPS): 400			
-	-	C	-	-				1.32								1.32	NEUTRAL RATING: 100%			
13	B-2 BOILER NO. 2 RM 200	A	20	3				1.32								1.32	SHORT CIRCUIT RATING (AMPS): FR			
-	-	B	-	-				1.32								1.32	MAIN BREAKER AIC (AMPS): MLO			
-	-	C	-	-				1.32								1.32	MAIN DEVICE RATING (AMPS): 400			
19	PROVISION	A															MAIN BREAKER AIC (AMPS): -			
21	HV-2 HEAT VENTILATOR NO. 2 RM 107	B	20	2				0.79							0.79		SHUNT TRIP MAIN: NO			
-	-	C	-	-				0.79							0.79		BRANCH BREAKER AIC (AMPS): FR			
25	DHWP-1	A	20	1				1.656							1.656		FEED DIRECTION: -			
27	PROVISION	B															MOUNTING: SURFACE			
29	PROVISION	C															NEMA TYPE ENCLOSURE: 1			
31	PROVISION	A															DOUBLE LUGS: NO			
33	PROVISION	B															FEED-THRU LUGS: NO			
35	PROVISION	C															ISOLATED GROUND BUS: NO			
37	PROVISION	A															ISOLATED NEUTRAL BUS: YES			
39	PROVISION	B																		
41	PROVISION	C																		
2	PANEL 2N3 ROOM 108	A	200	3		5.94	3.00									8.94	FEEDER LOAD BREAKDOWN			
-	-	B	-	-		4.50	3.00								0.75	8.46	CONN KVA DEMAND FACTOR			
-	-	C	-	-		4.86	2.85										NON-DWELLING RECEPTACLES 27.48 0.68			
8	B-3 BOILER NO. 3 RM 200	A	20	3				1.32								1.32	HOTEL GENERAL LIGHTING 0.00 0.50			
-	-	B	-	-				1.32								1.32	GENERAL LIGHTING 8.85 1.25			
-	-	C	-	-				1.32								1.32	KITCHEN EQUIPMENT 0.00 1.00			
14	PROVISION	A															MOTORS 18.94 1.00			
16	-	B															COOLING 0.00 1.00			
18	-	C															LARGEST MOTOR 1.656 0.25			
20	PROVISION	A															ELECTRIC SPACE HEATING 0.00 1.00			
22	-	B															CONTINUOUS LOADS 0.00 1.25			
24	-	C															NON-CONTINUOUS LOADS 26.15 1.00			
26	PROVISION	A																		
28	PROVISION	B																		
30	PROVISION	C																		
32	PROVISION	A																		
34	PROVISION	B																		
36	PROVISION	C																		
38	PROVISION	A																		
40	PROVISION	B																		
42	PROVISION	C																		
Notes:																	FEEDER LOAD SUMMARY			
																	CONN KVA	CONN AMPS	NEC KVA	NEC AMPS
PHASE A:																	31.45	261.9	27.96	232.8
PHASE B:																	21.16	176.2	19.80	164.9
PHASE C:																	28.81	239.9	26.88	223.8
TOTAL:																	81.42	226.0	74.22	206.0

PUMP SCHEDULE

DESCRIPTION	
UNIQUE TAG #	DHWP-1
INSTALLED LOCATION	BOILER ROOM
TYPE / ARRANGEMENT	IN-LINE
AREA / SYSTEM SERVED	HEATING WATER SYSTEM
MANUFACTURER DATA	
MANUFACTURER	B&G
MODEL	E-60 - 1.5x1.5x6.25
PERFORMANCE CHARACTERISTICS	
FLUID TYPE / AVERAGE FLUID TEMPERATURE	50% PROP. GLYCOL
DESIGN FLOW (GPM)	40 GPM
DESIGN HEAD (FT)	25 FT
PHYSICAL CHARACTERISTICS	
DISCHARGE / SUCTION SIZE (IN) / TYPE	2" FLANGED
ELECTRICAL CHARACTERISTICS	
VOLTAGE/PHASE/AMPS/MOCP	120V/1PH/13.8A/20A
MOTOR HORSEPOWER	3/4
MOTOR EFFICIENCY	PREMIUM
MOTOR SPEED (RPM)	1,800
ALTERNATIVE POWER SOURCE REQUIRED	N/A
VARIABLE FREQUENCY DRIVE PROVIDED BY	N/A
DISCONNECT PROVIDED BY	2P-30AS W/20AF
NOTES:	
1	
2	



CITY OF MISSOULA CURRENTS WATERPARK

FIM 48221 - 01.01

DOMESTIC WATER PRIORITY PROJECT LOCATION XXX Missoula, MT 5980x

CONSULTANTS:

REGISTRATION:

NO	DATE	DESCRIPTION
-	06/XX/2021	ISSUED FOR GMAX

DESIGNED: J. COULTER  
DRAWN: J. COULTER  
CHECKED: J. COULTER  
JOB NO: 202094-002

ELECTRICAL SCHEDULES & ONE-LINE

SHEET NUMBER:

# Aquatics FIMs

## 48222

# Detailed Scope of Work

**FIM ID # 48222**  
**CURR 01.02 Reduce Glycol Concentration**  
**Currents Aquatics Center**

## GENERAL

The system was observed to use 50% glycol which is considered high/conservative for this climate and application. Reducing system glycol percentage saves chemical cost, reduces pumping energy, and enhances heat transfer efficiency.

## SCOPE OF WORK INCLUDES

### A. Mechanical

1. Existing heating water system is a 50% propylene glycol mixture. Contractor to test system prior to work. Drain system and add water as required to reduce mixture to 30%, test mixture and provide report indicating that mixture has proper PH, glycol % and inhibitors. Total system volume is estimated at 950 gallons.
2. Properly dispose of glycol mixture, coordinate daily allowance of glycol to be dumped to sanitary drain with City of Missoula Wastewater Treatment authority.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Aquatics FIMs

## 48225



# Detailed Scope of Work

## FIM ID # 48225 Water Filtration System Replacement Currents Aquatics Center

### GENERAL

The existing water filtration system utilizes equipment that is no longer supported by the manufacturer and requires large amounts of water for backwashing. Install a new filtration system - potentially "Neptune Defender".

### SCOPE OF WORK INCLUDES

1. "Provide" as written below shall mean furnish and install.
2. Equipment Furnished by ESCO
  - A. Neptune Defender or similar filter assemblies
3. Mechanical
  - A. Receive new filters from McKinstry
  - B. Remove existing sand filters in their entirety.
  - C. Demo existing filter piping as appropriate such that the new filters can be cleanly organized and piped. One major benefit of these new filters is their vertical configuration and the floor space that frees up, we want to take full advantage of that by running clean pipe routing.
  - D. Provide and install all necessary piping and appurtenances for a complete installation, refer to manufacturer's standard detail for piping schematic.
  - E. Be present and assist during manufacturer startup and commissioning of filter system.
4. Electrical
  - A. Disconnect existing filter control panel and any other powered devices in preparation for mechanical contractor demolition.
  - B. Reconfigure conduit and conductor as needed, up to 15ft, so that new filter control board and other powered devices are adequately served.
5. Controls
  - A. All controls integral to filter assembly.
6. Commissioning
  - A. By manufacturer and McKinstry.
7. Training
  - A. By manufacturer and McKinstry.

### CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
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## Defender® Regenerative Media Filters: The Proven Choice for Superior Water Quality



### NEPTUNE BENSON

Established in 1956, Neptune Benson has proudly served the commercial aquatics industry for over six decades. Our Defender® line of regenerative media filters has become synonymous with the term “RMF” in the industry. With over 20,000 installations in 45 countries, we have the filtration and disinfection experience to help meet your water quality needs, while keeping sustainability and safety of your guests top of mind.

### REGENERATIVE MEDIA FILTRATION

Sand and regenerative media filters both operate on the principle of mechanical filtration. Sand filters trap particles in water throughout the depth of their bed. When the filter becomes dirty, it is cleaned by backwashing, a process that sends considerable amounts of water to drain. RMFs trap particles on the surface of flexible tubes coated with perlite media. When the perlite becomes loaded, RMFs regenerate by bumping, a process in which no water is lost. In addition to providing superior 1 vs 20-30 micron particulate removal, RMFs significantly reduce the amount of water sent down the drain.

### BENEFITS

- Superior Water Clarity
- 90% Water Savings
- 75% Space Savings
- 50% Energy Savings
- 30% Chemical Savings

### REGENERATIVE MEDIA FILTERS

Simply put regenerative media filters are nothing like traditional sand filters. Neptune Benson pioneered development of RMF technology to provide aquatics venues with the clearest, cleanest and safest water possible!



# Better Water Filtration

## REMOVES PARTICLES DOWN TO 1 MICRON

Defender® filters produce sparkling, crystal clear water by removing particles down to 1 micron; 20–30 times finer than typical sand filters. The difference in water clarity is like night and day. In addition, the dramatic reduction in turbidity improves transmission of UV light, which improves disinfection performance as well.

## UP TO 90% WATER SAVINGS

Nobody likes backwashing. With Defender filters you don't have to! Defender filters automatically “bump”—regenerating media for a fresh start without wasting water to drain.

- Reduces footprint and operating weight
- Eliminates backwash holding tank
- Requires smaller waste line to sewer
- Addresses backwash flow rate restrictions

## UP TO 50% IN ENERGY, FUEL AND CHEMICAL SAVINGS

Eliminating backwashing translates into significant operational savings. Consider the money that can be saved by not re-heating and chemically re-treating all of the water sent down the drain. Defender filters also operate at lower head pressures, reducing power demand and electrical costs.

## UP TO 75% SPACE AND CONSTRUCTION SAVINGS

Running out of space in your mechanical room? The footprint of Defender filters can be up to 75% smaller than equivalently sized sand filters, saving both space and construction costs.

## COST SAVINGS ANALYSIS

In addition to superior water quality, Defender filters reduce water, energy and chemical consumption, which translates into significant bottom line savings. Some facilities have realized an ROI of less than one year. Our team of experienced aquatics experts are waiting to help quantify savings for your facility.

## EXAMPLE SAVINGS ANALYSIS

Water Impact	Sand	Defender
Backwash Volume	1,483,560 gal 5,616 m <sup>3</sup>	88,938 gal* 337 m <sup>3</sup> *
Potable Water (Make-up) Fees**	\$5,192	\$311
Discharge Fees**	\$5,192	\$311
<b>Energy &amp; Fuel Impact</b>		
Pump Power Consumption (kW)	216,569	170,170
Pump Power Cost**	\$13,308	\$10,456
Heating Requirements (Therms)	4,449	489
Heating Costs**	\$4,004	\$240
<b>Chemical Impact</b>		
Chemical Costs**	\$4,451	\$267
<b>Total Costs</b>	<b>\$32,147</b>	<b>\$11,585</b>

\* Includes 5% of the sand filter backwash volume to account for makeup water  
 \*\* USD



## SYSTEM CONTROLLER

RMF operations are controlled through a fully redesigned high resolution LCD control panel. Crisp real-time graphics depicting system status, user-friendly on-screen menus and touch-screen navigation make operation simple and intuitive. Remote monitoring capabilities allow you to access system data from outside of the mechanical room.



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## Defender® FP-Series RMF Featuring PowerBump™ System

### DEVELOPED BY NEPTUNE BENSON

The FP-Series was designed by Neptune Benson, the world's most respected and trusted regenerative media filter (RMF) manufacturer. With over 60 years of experience serving the aquatics market and thousands of RMFs installed worldwide, it's no surprise that Neptune Benson continues to develop innovative products that make pools cleaner, safer and healthier for your bathers.

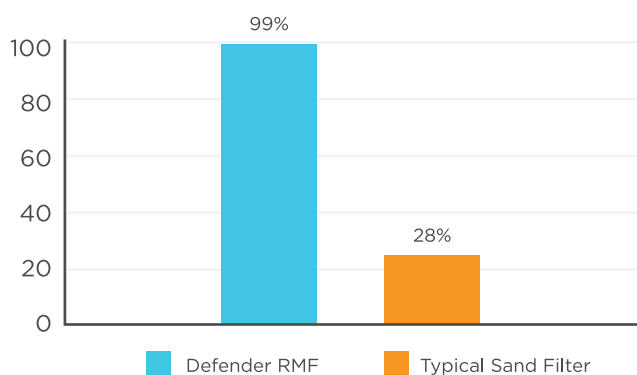
### EXPANDING THE ENVELOPE

An expanded portion of the aquatics market can now take advantage of the many benefits offered by regenerative media filters. The FP-Series is suitable for small to mid-size aquatics venues requiring flow rates between 107-300 gpm (24-68 m<sup>3</sup>/hr). With a small footprint in terms of both size and cost, the FP-Series is BIG on capability, packing many features found in our classic Defender® product line.

### REGENERATIVE MEDIA VS SAND FILTRATION

Sand and regenerative media filters both operate on the principle of mechanical filtration. Sand filters trap particles in water throughout the depth of their bed. When the bed becomes dirty/loaded, it is cleaned by backwashing, a process that sends considerable amounts of water to drain. RMFs trap particles on the surface of flexible tubes coated with perlite media. When the perlite becomes loaded, RMFs regenerate by bumping, a process in which no water is lost.

### REDUCTION OF CRYPTO SIZED PARTICLES



Based on testing by Dr. Amburgey at UNC Charlotte, Defender PowerBump system technology was reported to remove an average of 99% of 5-micron sized particles versus 28% removal with a sand filter, under manufacturer-recommended operating conditions (e.g., standard flowrate and media) for aquatics. Footnote: *Crypto* is a 5-micron sized particle (4.5-5.5 microns). Graph content and caption courtesy of UNC Charlotte.



### AT A GLANCE

- Flow rates up to 300 gpm (68 m<sup>3</sup>/hr)
- Compact size fits through 36" (91 cm) doorways
- Non-metallic fiberglass vessel eliminates corrosion concerns
- NEW PowerBump™ System eliminates moving parts
- Fully-automatic controller makes bumping quick and easy

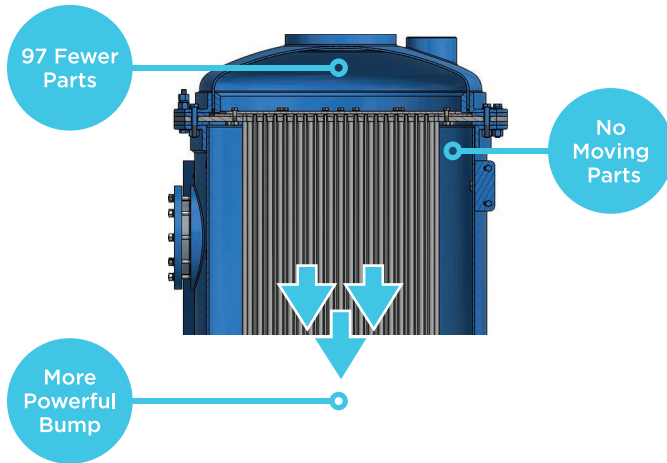


### PERFORMANCE

Compared to typical sand filters, the FP-Series RMF provides superior 1 vs 20-30 micron particulate removal, delivering superior water quality and significant operational savings—up to:

Water	90%
Energy	50%
Chemicals	30%
Space	75%

# POWERBUMP™ SYSTEM



**MORE POWERFUL**  
Drives 25 times more water through the flex-tubes, creating a 40% stronger impulse.

**MORE RELIABLE**  
Simpler design improves reliability, reduces size and facilitates maintenance.

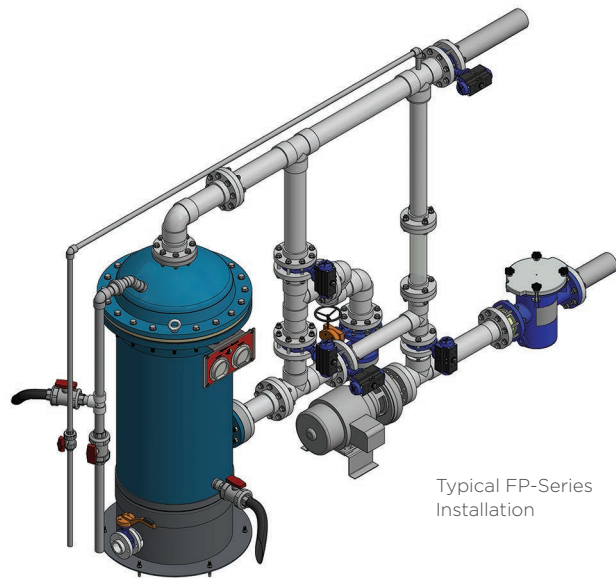
## ALL NEW POWERBUMP SYSTEM

The FP-Series RMF is revolutionary in how it operates. Constructed from corrosion-resistant fiberglass (FRP), the filter features our patent pending† PowerBump System. As opposed to bumping by pneumatically raising/lowering a tube sheet, the FP-Series bumps hydraulically, using only the flow of water. Doing so delivers a more powerful regeneration, driving 25 times more water through the flexible tube elements and creating a 40% stronger impulse. It also eliminates moving parts thereby simplifying design, improving reliability, and facilitating maintenance.

†Pending in some jurisdictions

## SPECIFICATIONS

Model	FP-24-36-366
Bumping Method	PowerBump™ System
Material of Construction	Fiberglass (FRP)
Flow Rate	107-300 gpm (24-68 m <sup>3</sup> /hr)
Filtration Rate	0.5-1.4 gpm/ft <sup>2</sup> (1.2-3.4 m <sup>3</sup> /hr/m <sup>2</sup> )
Filtration Area	214 ft <sup>2</sup> (19.9 m <sup>2</sup> )
Max Operating Pressure	50 psi (3.5 bar)
System Height	76.32" (194 cm)
System Width	32.5" (82.6 cm)
Tank Volume	105 gal (0.40 m <sup>3</sup> )
Connections	Flanged 4" (10.2 cm)
Regeneration	Push-Button Automatic
Dry Weight	310 lbs (141 kg)
Operating Weight	1,202 lbs (545 kg)
Perlite Charge	17 lbs (7.7 kg)



Typical FP-Series Installation



Certified to  
NSF/ANSI/CAN 50

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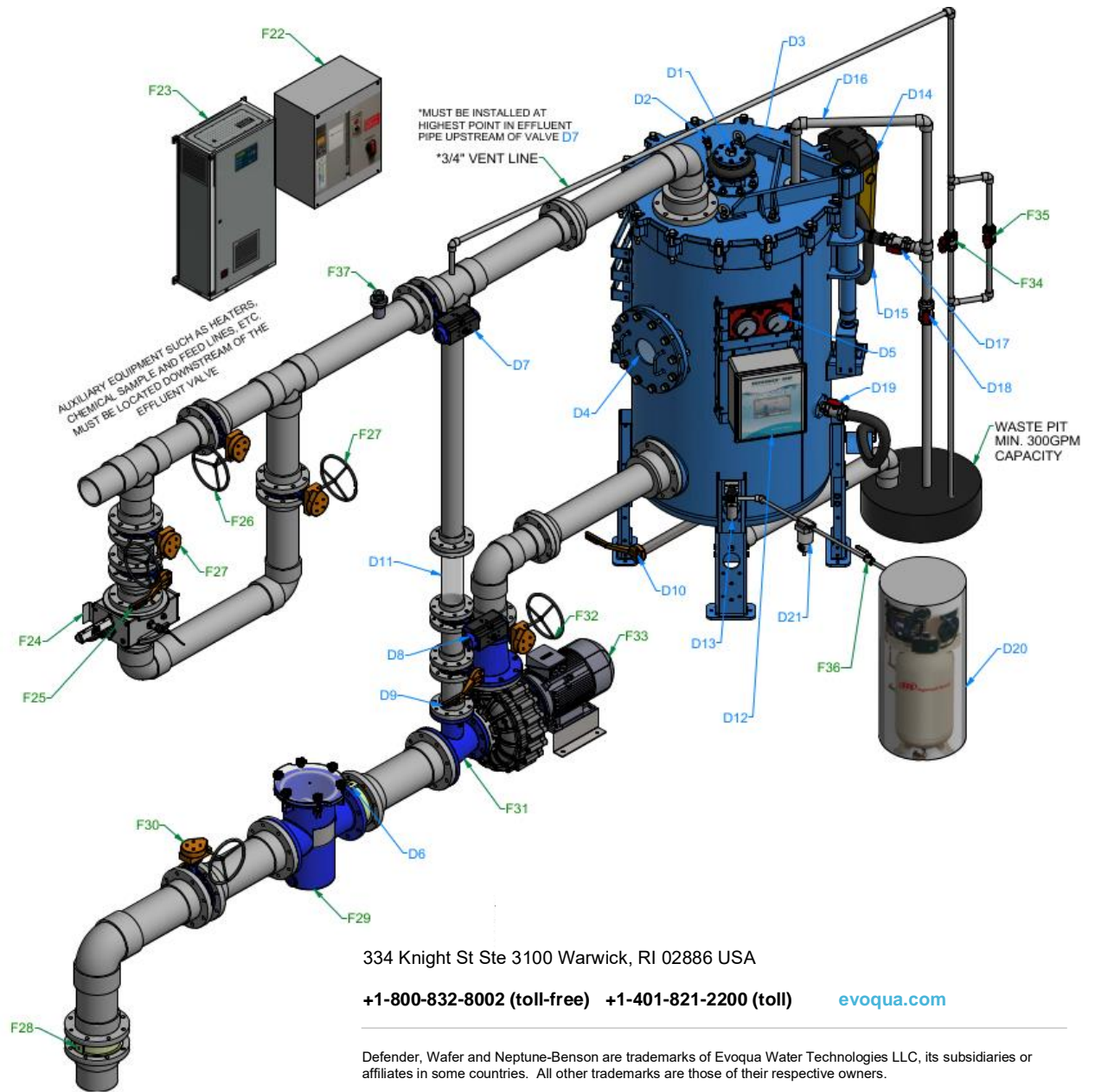


**DEFENDER® FILTER COMPONENTS – INCLUDED IN DEFENDER® PACKAGE**

Mark	Reference	Notes
D1	Pneumatic Bump Assembly	
D2	Quick Exhaust Valve	
D3	Lifting Davit	
D4	Viewing Window	
D5	Gauge Panel	
D6	Influent Check Valve	
D7	Pneumatic Effluent Valve	Install directly on precoat line tee. Locate where valve position can be easily viewed.
D8	Pneumatic Precoat Valve	Install as close as possible to pump suction piping. Precoat piping should be 2 pipe diameters smaller than effluent piping (no less than 2").
D9	System Fill Valve	Manually operated, normally open valve.
D10	Tank Drain Valve	Manually operated, normally closed valve. Extension is bolted directly to tank bottom. Must be plumbed independently to waste. Automated option available.
D11	In-line Sight Glass	Install on precoat line so it can be viewed while standing at filter control panel.
D12	RMF Control Panel	
D13	Filter Regulator	Set to 90 psi
D14	Vacuum Transfer Unit	Pre-wiring provided to RMF Control Panel.
D15	Vacuum Transfer Hose	
D16	Vacuum Transfer Piping & Fittings	SCH80 PVC fittings and pipe 1.5"
D17	Vacuum Transfer Valve	True union ball valve 1.5", normally closed.
D18	Vacuum Vent Valve	True union ball valve 1.5", normally closed. Vacuum drain line must be plumbed independently to waste.
D19	Vacuum Hose Valve with Hose	True union ball valve 1.5", normally closed.
D20	Air Compressor	Optional
D21	Water Separator	

**OPTIONAL FILTER ACCESSORIES - AVAILABLE UPON REQUEST**

Mark	Reference	Notes
F22	greenDrive™ VFD	Available in NEMA4X or with bypass.
F23	Wafer™ UV Generator	Package includes control cabinet and treatment chamber.
F24	Wafer™ UV Chamber	Installed in vertical section of piping.
F25	EZ Clean Strainer	Installed on the effluent side of the UV chamber.
F26	UV System Bypass Loop	
F27	UV Isolation Valves	Gear or lever operated valves, normally open.
F28	Check Valve	For self-priming pumps, check valve must be installed on the suction pipe below water level.
F29	Guardian Strainer	Hair and lint strainer.
F30	Strainer Isolation Valve	Gear or lever operated valve, normally open.
F31	Precoat Reducing Tee	
F32	Pump Throttling Valve	Gear or lever operated valve, normally open.
F33	Recirculating Pump	
F34	3/4" Precoat Line Vent Valve	Ball Valve, normally closed. Must be plumbed independently to waste.
F35	3/4" Precoat Line Vent Auto Valve	Shown with automated option.
F36	1/2" Shut Off Valve	
F37	Flow Meter	4-20 mA Output



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Equipment shown for schematic purposes only. Refer to project proposal and submittal for equipment supplied by Neptune Benson. Pneumatic tubing or wiring not shown for clarity.

# Aquatics FIMs

## 48226

# Detailed Scope of Work

**FIM ID # 48226**  
**CURR 17.06 Sewer Deduct Meter**  
**Currents Aquatics Center**

## GENERAL

Install a deduct meter to reduce sewer bills.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. N/A
2. Mechanical
  - A. N/A
3. Controls
  - A. N/A
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. N/A
7. Lighting
  - A. N/A
8. Solar
  - A. N/A
9. Site Utilities
  - A. Provide and install a deduct meter at appropriate location such as to submeter only pool fill and make-up water.
  - B. Provide for all necessary connections using materials matching or compatible with existing piping.
  - C. Provide power from nearest source, as necessary.
  - D. Meter shall be utility approved, AHJ City of Missoula, Missoula Water. Meter shall have a counter with visible display.
10. Structural
  - A. N/A
11. Masonry
  - A. N/A
12. Roofing
  - A. N/A
13. Carpentry
  - A. N/A
14. Glazing
  - A. N/A
15. Painting
  - A. N/A
16. Data and Communication
  - A. N/A
17. Security Systems
  - A. N/A
18. Fire Alarm
  - A. N/A
19. Fire Sprinkler
  - A. N/A
20. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
21. Commissioning
  - A. N/A
22. Demolition and Removal Specialty Contractor
  - A. N/A
23. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
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# Aquatics FIMs

## 48280

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

---

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
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**Splash Pad**

3001 Bancroft St.  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>868</b>
Annual Cost of Leakage (Kwh):	-	<b>103</b>

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. Pump house non conditioned.	First	7 Doors
The exterior doors should be weather-stripped to reduce air loss. Office and restrooms.	First	7 Doors
Ext. Door(s) to be weather-stripped & sealed. Heat only.	First	2 Doors
Ext. Door(s) to be weather-stripped & sealed. Locker rooms. Heat only	First	3 Doors
Ext. Door(s) to be weather-stripped & sealed. Glass office.	First	1 Doors

AIR LEAKAGE:	feet	inches		
Doors	140	3/32	1.09	sq ft
Doors	140	3/32	1.09	sq ft
Doors	40	3/32	0.31	sq ft
Doors	72	3/32	0.56	sq ft
Doors	20	3/32	0.16	sq ft

Totals	-		3.22 sq ft	
			0.30 sq meter	

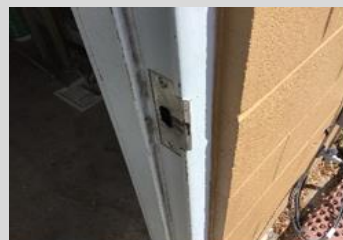
**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 145

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Aquatics FIMs

## 49269

# Investment Grade Audit

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## 49269-19.01 SPL - Water Conservation

**Description:**

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures

City of Missoula, MT V1		Demographics and Usage									
Count Bldg # Building Name Category											
	1	2	3	4	5	6	7	8	9	10	
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900	
Per Day Visitor	10	10	10	10	10	10	10	10	10	10	
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882	
Sale Tax%											
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0	
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9	
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6	
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	
	P1 Ave Daily Count	1	2	1	53	4	4	4	4	12	
	M-F days/yr ON	261	261	261	180	261	261	261	261	261	
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104	
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	FEMALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	Group Water Closet Use per day	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6	
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	
	P1 Ave Daily Count	35.8	14.0	1.9	140.0	18	65	38	45	33	
	M-F days/yr ON	261	261	261	180	261	261	261	261	261	
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104	
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7	
	FEMALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7	
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	Group Water Closet Use per day	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5	
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	
	P1 Ave Daily Count	15	34	28	2100					470	
	M-F days/yr ON	261	261	261	120	261	261	261	261	261	
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104	
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count	7.5	17.0	14.0	1050.0					235.0	
	FEMALE count	7.5	17.0	14.0	1050.0					235.0	
	Group Occupancy Days	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0	
	Group Water Closet Use per day	37.3	81.0	70.0	5250.0					1175.0	
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	
	P1 Ave Daily Count										
	M-F days/yr ON										
	Sat/Sun days/yr ON					105	260	260	260	260	
	Holiday/vacation days/yr OFF					75	60	60	60	60	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count										
	FEMALE count										
	Group Occupancy Days					30.0	210.0	210.0	210.0	210.0	
	Group Water Closet Use per day										
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8	
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0	
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0	
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0	
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1	
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6	

Demographics and Usage

City of Missoula, MT V1



**A. Fixture Usage-based Consumption Allocation** | **B. Hot Water Savings** | **C. Operational/Deferred Maintenance Savings**

City Shop	City	IC	Fixture Details	gpm flow	gpm flow	A flow	% S	Quantity	Gallons				Pre Peak Demand (gpm)	Post Peak Demand (gpm)	Pre Gallons Consumed per yr	Post Gallons consumed per yr
									Avg Daily Usage	Saved Per Day	Days Per Year Occupied	Days Per Year Occupied				
City Shop	WC	WC	4.5 GPF x Valve Only	4.50	1.28	0.21	48%	2	2.27	2.27	300	300	2.27	2.27	828.00	828.00
	WC	WC	STANDARD 2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1/2" x 1/2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1" x 1" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1 1/2" x 1 1/2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2" x 2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2 1/2" x 2 1/2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 3" x 3" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 4" x 4" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 6" x 6" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 8" x 8" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 10" x 10" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 12" x 12" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 14" x 14" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
WC	WC	HE 16" x 16" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 18" x 18" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 20" x 20" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 24" x 24" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 30" x 30" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 36" x 36" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 42" x 42" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 48" x 48" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 54" x 54" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 60" x 60" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 72" x 72" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 84" x 84" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 96" x 96" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 108" x 108" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 120" x 120" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 144" x 144" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 168" x 168" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 192" x 192" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 216" x 216" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 240" x 240" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 264" x 264" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 288" x 288" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 312" x 312" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 336" x 336" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 360" x 360" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 384" x 384" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 408" x 408" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 432" x 432" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 456" x 456" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 480" x 480" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 504" x 504" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 528" x 528" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 552" x 552" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 576" x 576" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 600" x 600" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 624" x 624" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 648" x 648" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 672" x 672" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 696" x 696" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 720" x 720" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 744" x 744" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 768" x 768" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 792" x 792" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 816" x 816" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 840" x 840" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 864" x 864" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 888" x 888" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 912" x 912" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 936" x 936" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 960" x 960" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 984" x 984" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1008" x 1008" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1032" x 1032" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1056" x 1056" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1080" x 1080" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1104" x 1104" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1128" x 1128" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1152" x 1152" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1176" x 1176" FPE	1.28													





**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs										
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Hot Water			
																		Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65°	120°	50%	758	379	223,225	2.4
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3
Fire Station 5	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65°	120°	50%	2,190	1,095	645,268	7.0
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65°	120°	50%	2,190	1,095	645,268	7.0



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs										
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Hot Water			
																		Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65°	120°	50%	12,425	6,212	3,660,889	36.6
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs												
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Hot Water			
																				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65°	120°	50%	120,600	60,300	35,533,920	355.3
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65°	120°	50%	45,457	22,728	13,393,497	133.9
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0

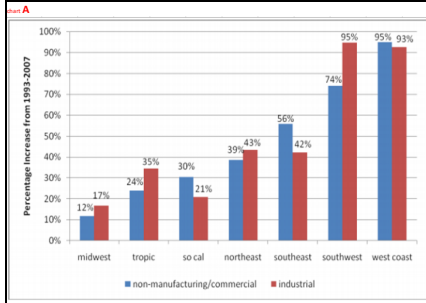


**Appendix A**

Reference Tables and Charts

**Rate Escalation Across United States from 1993 to 2007**

Source: United States Department of Energy/Analysis of Water Rate Escalations across the United States



SOURCE: [http://www.energystar.gov/a/business/tools\\_resources/target\\_finder/help/Energy\\_Units\\_Conversion\\_Table.htm](http://www.energystar.gov/a/business/tools_resources/target_finder/help/Energy_Units_Conversion_Table.htm)

**Table D**

**Energy Units Conversion Table**

The following table provides the multiplier to convert a unit of measure to kilts equivalent:

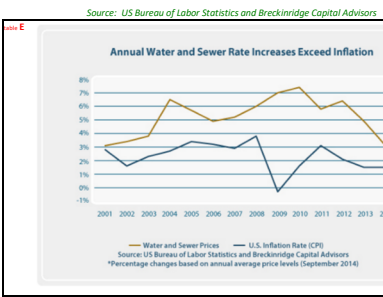
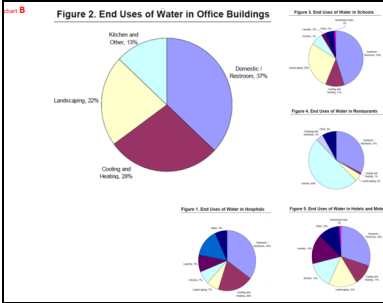
1. Locate the energy source and the applicable unit of measure.
2. Select the conversion multiplier from the right column.
3. Multiply the kWh units of energy by multiplier and this converts the energy unit to kilts equivalent.

Energy Source	Unit of Measure	Multiplier
Coal (Anthracite)	MBtu (thousand Btu)	116.3
Coal (Anthracite)	MWh (thousand watt-hours)	1163.0
Coal (Anthracite)	MWh (million watt-hours)	11,630,000
Coal (Anthracite)	Tons	25,000
Coal (Anthracite)	MM (thousand)	11,630.0
Coal (Anthracite)	MWh (million watt-hours)	11,630.0
Coal (Anthracite)	MWh (thousand watt-hours)	11,630.0
Coal (Anthracite)	Tons	25,000.0
Coal	MM (thousand)	11.63
Coal	MWh (million Btu)	100.0
Coal	MWh (million watt-hours)	1163.0
Coal	MWh (thousand watt-hours)	11,630.0
Coal	Tons	2500.0
Distilled (No. 2)	MWh (million Btu)	100.0
Distilled (No. 2)	Gallons	128.7
Distilled Chlorine Water	MWh (million Btu)	100.0
Distilled Chlorine Water	Ton Hours	12.0
Distilled Chlorine Water	MWh (MWh)	20.8
Distilled Chlorine Water	Gallons	2.0
Distilled Steam	MWh (million Btu)	100.0
Distilled Steam	MM (thousand watt-hours)	100.0
Distilled Steam	MWh (thousand watt-hours)	100.0
Distilled Steam	MWh (million watt-hours)	100,000.0
Distilled Steam	Therms	100.0
Electricity	MWh (thousand watt-hours)	1.0
Electricity	MWh (million watt-hours)	1000.0
Electricity	MWh (million Btu)	3,412.0
Electricity	MWh (thousand Btu)	3,412.0
Fuel Oil (No. 1)	MWh (million Btu)	100.0
Fuel Oil (No. 2)	MWh (million Btu)	100.0
Fuel Oil (No. 2)	Gallons	139.0
Fuel Oil (No. 4)	MWh (million Btu)	100.0
Fuel Oil (No. 4)	Gallons	139.5
Gas (No. 2, No. 4)	MWh (million Btu)	100.0
Gas (No. 2, No. 4)	Gallons	109.7
Kerosene	MWh (million Btu)	100.0
Liquid Propane	MWh (million Btu)	139.0
Liquid Propane	kcf (thousand cubic feet)	1000.0
Liquid Propane	Gallons	1000.0
Liquid Propane	cf (cubic feet)	80.0
Natural Gas	MWh (million Btu)	100.0
Natural Gas	kcf (thousand cubic feet)	100.0
Natural Gas	Therms	100.0
Natural Gas	kcf (thousand cubic feet)	101.0
Natural Gas	cf (cubic feet)	1.0
Natural Gas	MCF (million cubic feet)	100,000.0
Propane	MWh (million Btu)	100.0
Propane	kcf (thousand cubic feet)	100.0
Propane	cf (cubic feet)	1.0
Wood	MWh (million Btu)	100.0
Wood	Tons	1578.0



**Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program**

August 20, 2009



**G** Depending on the faucet, a 30-second handwash typical of an electronic unit will consume as little as 1-1/2 cups (3.8 liters) of water. A 30-second cycle is required as a minimum by the Americans with Disabilities Act. Choose the lowest-flow faucet value available—typically 0.5 gpm.

**Table H**

U.S. Average Heating Fuel Prices 1

Fuel	Actual 2008	Estimated 2009	2009 Par Unit
Propane	\$1.81	\$1.11	\$1.22/gal
Gas	\$1.11	\$1.11	\$1.02/therm
Heating Oil	\$1.11	\$1.11	\$1.02/gal
Distillate	\$1.11	\$1.11	\$1.02/gal
Propane	\$1.11	\$1.11	\$1.02/gal

**Table C**

**FEMP "Watergy" Study**

**DOMESTIC WATER USE**

**Faucets**

Calculations:  
 GPM-Gallons per flush, estimated or measured  
 GPM-GPF x (1 x Female Count + 1 x Male Count)  
 = Average gallons per day for all toilets  
 GPM-GPF/Future Count  
 =Average gallons per day per fixture

**Urinals**

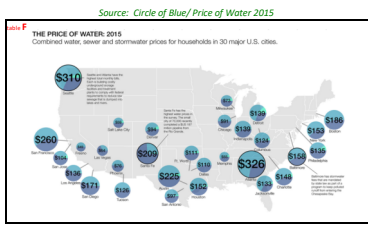
Calculations:  
 GPM-GPF x (1 x Male Count)  
 =Average gallons per day urinal

**Lavatory Sinks**

Assume 3 hand washings per 8 hour work day per male, 4 per female. Unless otherwise indicated, assume 20 sec. of flow per hand washing.

Calculations:  
 GPM-Measured gallons per minute of faucet flow  
 GPM x 0.17 GPM x (1 x Male Count + 1 x Female Count)  
 =Average gallons per day for hand washing

SOURCE: FEMP Energy Study  
[http://www.f.ere.energy.gov/femp/information/download\\_watergy.html](http://www.f.ere.energy.gov/femp/information/download_watergy.html)



**Volume conversion**

- 1 gallon (gal) = 8.34 pounds
- 1 cubic foot (ft<sup>3</sup>) = 62.4 pounds
- 1 cubic foot (ft<sup>3</sup>) = 7.48 gallons
- 1 inch (EI) = 748 gallons
- 1 acre-foot (acre-ft) = 325,851 gallons
- 1 acre-foot (acre-ft) = 43,560 cubic feet
- 1 million gallons (Mgal) = 1.07 acre-foot
- 1 million gallons (Mgal) = 132 acre-foot/year
- 1 inch of rain = 174 million gallons per square mile
- 1 inch of rain = 27,248 gallons per acre
- 100 mm per year

**Area conversion**

- 1 acre = 4 hectares
- 1 gallon = 3.8 liters
- 1 cubic foot = 0.3 cubic meters
- acft = 43,560 square feet (ft<sup>2</sup>)
- acft = 4,047 square meter (m<sup>2</sup>)
- acft = 0.001562 square mile (mi<sup>2</sup>)

**Table I**

**Benchmarks**

(Annual Basis)

Category	Value	Unit
Hotels/Motels	0.079	0.165 thousand gals. (kgal)/sq. ft.
Offices	39.5	Kgal/room
Nursing/Assisted Living	0.062 / 32.8	0.101 / 40.7 Kgal/bed
Restaurants	0.17	39.6 Kgal/department
Hotels	0.21	Kgal/room
Schools	14.3	Kgal/seat
Universities	0.012	0.019 Kgal/student
Colleges	2.7	Kgal/student

Source: Benchmarking Task Force Collaboration for Industrial, Commercial & Institutional Water Conservation, Colorado Waterwise Council, June 2007.

# Aquatics FIMs

## 49274

# Investment Grade Audit

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## 49274-19.01 CURR - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures.

City of Missoula, MT V1		Demographics and Usage									
Count Bldg # Building Name Category	Demographics and Usage										
	1	2	3	4	5	6	7	8	9	10	
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900	
Per Day Visitor	10	10	10	10	10	10	10	10	10	10	
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882	
Sale Tax%											
Population Group 1	WATER CLOSET USE (daily per person (bath))	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	
	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0	
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9	
WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6		
Population Group 2	WATER CLOSET USE (daily per person (bath))	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	
	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6	
	WATER CLOSET USE (daily per person (bath))	0.1	0.2	0.1	6.6	0.5	0.5	0.5	0.5	1.5	
WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	4.5	0.3	0.3	0.3	0.3	1.0		
WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6		
Population Group 3	WATER CLOSET USE (daily per person (bath))	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	
	WATER CLOSET USE (daily per person (bath))	35.8	14.0	1.9	140.0	18	65	38	45	33	31.3
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	261
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	104
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
	WATER CLOSET USE (daily per person (bath))	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	15.7
	WATER CLOSET USE (daily per person (bath))	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	15.7
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	365.0
	WATER CLOSET USE (daily per person (bath))	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5	78.3
	WATER CLOSET USE (daily per person (bath))	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	15.7
WATER CLOSET USE (daily per person (bath))	11.8	4.6	0.6	46.2	5.8	21.3	12.4	14.9	10.9	10.3	
WATER CLOSET USE (daily per person (bath))	7.8	0.7	0.1	7.0	0.9	3.2	1.6	2.3	1.7	1.6	
Population Group 4	WATER CLOSET USE (daily per person (bath))	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	
	WATER CLOSET USE (daily per person (bath))	15	34	28	2100					470	
	WATER CLOSET USE (daily per person (bath))	261	261	261	120	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	7.5	17.0	14.0	1050.0					235.0	
	WATER CLOSET USE (daily per person (bath))	7.5	17.0	14.0	1050.0					235.0	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	37.3	81.0	70.0	5250.0					1175.0	
	WATER CLOSET USE (daily per person (bath))	15.0	34.0	28.0	2100.0					470.0	
WATER CLOSET USE (daily per person (bath))	3.0	11.3	9.2	683.0					125.1		
WATER CLOSET USE (daily per person (bath))	1.3	3.4	2.8	210.0					47.0		
Population Group 5	WATER CLOSET USE (daily per person (bath))	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	
	WATER CLOSET USE (daily per person (bath))	0.5	2.0	0.6							
	WATER CLOSET USE (daily per person (bath))	2.5	10.0	3.0							
	WATER CLOSET USE (daily per person (bath))	10	40	10							
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%							
	WATER CLOSET USE (daily per person (bath))	30.0	210.0	210.0						210.0	
	WATER CLOSET USE (daily per person (bath))	30.0	210.0	210.0						210.0	
	WATER CLOSET USE (daily per person (bath))										
	WATER CLOSET USE (daily per person (bath))										
	WATER CLOSET USE (daily per person (bath))										
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8	
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0	
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0	
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0	
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1	
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6	

Demographics and Usage

City of Missoula, MT V1

**A. Fixture Usage-based Consumption Allocation** | **B. Hot Water Savings** | **C. Operational/Deferred Maintenance Savings**

City Shop	City	IC	Fixture Details	gpm flow	gpm flow	A flow	% S	Quantity	Gallons				Pre Peak Demand (gpm)	Post Peak Demand (gpm)	Pre Gallons Consumed per yr	Post Gallons consumed per yr
									Avg Daily Usage	Saved Per Day	Days Per Year Occupied	Days Per Year Occupied				
1 City Shop	WC	WC	4.5 GPF x Valve Only	4.50	1.28	0.21	48%	2	2.27	2.27	300	300	2.27	2.27	830.00	830.00
	WC	WC	STANDARD 2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1/2" x 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1" x 1"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1 1/2" x 1 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2" x 2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2 1/2" x 2 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 3" x 3"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 4" x 4"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 6" x 6"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 8" x 8"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 10" x 10"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 12" x 12"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 14" x 14"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
WC	WC	HE 16" x 16"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 18" x 18"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 20" x 20"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 24" x 24"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 30" x 30"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 36" x 36"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 42" x 42"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 48" x 48"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 54" x 54"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 60" x 60"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 72" x 72"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 84" x 84"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 96" x 96"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 108" x 108"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 120" x 120"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 144" x 144"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 168" x 168"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 192" x 192"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 216" x 216"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 240" x 240"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 264" x 264"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 288" x 288"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 312" x 312"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 336" x 336"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 360" x 360"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 384" x 384"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 408" x 408"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 432" x 432"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 456" x 456"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 480" x 480"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 504" x 504"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 528" x 528"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 552" x 552"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 576" x 576"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 600" x 600"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 624" x 624"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 648" x 648"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 672" x 672"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 696" x 696"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 720" x 720"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 744" x 744"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 768" x 768"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 792" x 792"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 816" x 816"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 840" x 840"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 864" x 864"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 888" x 888"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 912" x 912"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 936" x 936"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 960" x 960"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 984" x 984"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1008" x 1008"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1032" x 1032"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1056" x 1056"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1080" x 1080"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1104" x 1104"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1128" x 1128"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1152" x 1152"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1176" x 1176"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1200" x 1200"	1.28	1.28	0.00	0%	2	2.27	0.00							







**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs										
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65*	120*	50%	758	379	223,225	2.4
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3
Fire Station 5	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs										
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65*	120*	50%	12,425	6,212	3,660,889	36.6
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs												
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65*	120*	50%	120,600	60,300	35,533,920	355.3
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65*	120*	50%	45,457	22,728	13,393,497	133.9
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0



# Aquatics FIMs

## 50005

# Detailed Scope of Work

**FIM ID # 50005**  
**CURR 17.07 Chlorine Generation**  
**Currents Aquatics Center**

## GENERAL

Install an onsite sodium hypochlorite generation system.

## SCOPE OF WORK INCLUDES

1. Specialty - install the following:
  - A. Engineered Site Drawing for electric, plumbing and venting (Stamp Drawing not Required)
  - B. (1) NEXGEN 20R OSHG system – Currents
  - C. Connect the electrical supply from the pool equipment room to the required connections
  - D. 240 VAC L1 and 240 VAC L2 and ground.
  - E. Inlet and Outlet Plumbing Connections
    - 1) PVC tubing in 2 inch or PVC pipe in 2 inch
    - 2) ½ inch polypropylene or polyethylene tubing
    - 3) ¼ inch polypropylene or polyethylene tubing and a ¼ inch valve for tubing connection
    - 4) PVC 90's, 45's, couplings and saddles or adapters for the return line size encountered
  - F. 2 inch PVC pipe, 90's, 45's and couplings for the hydrogen vent
  - G. Container specified for muriatic acid solutions
  - H. Container Specified for Salt (Client must supply Salt)
  - I. All anchors and mounting hardware
2. Mechanical
  - A. N/A
3. Controls
  - A. N/A
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. N/A
7. Lighting
  - A. N/A
8. Solar
  - A. N/A
9. Site Utilities
  - A. N/A
10. Structural
  - A. N/A
11. Masonry
  - A. N/A
12. Roofing
  - A. N/A
13. Carpentry
  - A. N/A
14. Glazing
  - A. N/A
15. Painting
  - A. N/A
16. Data and Communication
  - A. N/A
17. Security Systems
  - A. N/A
18. Fire Alarm
  - A. N/A
19. Fire Sprinkler
  - A. N/A

# Detailed Scope of Work

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- 20. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
- 21. Commissioning
  - A. Contractor and McKinstry to commission and test automatic controls.
- 22. Demolition and Removal Specialty Contractor
  - A. N/A
- 23. Training
  - A. Contractor and McKinstry to provide training as required for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

- 1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
- 2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
- 3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
- 4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
- 5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
- 6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
- 7. This scope assumes the existing equipment is properly grounded.
- 8. This scope is based on re-using existing circuits and controls unless otherwise stated.
- 9. This scope does not include costing for providing any "seed" stock or extra materials.
- 10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
- 11. This scope does not include repairs to existing code issues unless explicitly described above.
- 12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# NEXGEN<sup>®</sup>20-R

From Wave Parks  
To Wading Pools,  
We Have A NEX-GEN<sup>®</sup>pH  
System To Meet  
Your Needs.



ChlorKing's NEXGEN on-site chlorine generators are leading the way to better, safer water. Their unique, forward-thinking design generates liquid chlorine from salt that is stored on site and uses the pool as the source water for the product. NEXGEN eliminates the need for storing large amounts of chlorine and doesn't generate the odors associated with traditional chlorine. Any of the NEXGEN systems can be fully customized to meet your needs and are easy to install, maintain and operate.

## The NEXGEN 20-R

The ChlorKing<sup>®</sup> NEXGEN 20-R is a stand-alone, on-site chlorine generator capable of producing 24 lbs of pH neutral equivalent chlorine per 24 hours. This is a low maintenance model which utilizes reverse polarity to clean the plates every 3 hours. The unique design uses swimming pool water to feed the generator and distribute chlorine to the pool as needed. Up to 6 bodies of water can be sanitized with one NEXGEN system using our venturi feed systems and can be used in conjunction with any ORP/pH controller. This product requires no salt in the swimming pool and will not raise TDS levels as with other chlorine generators. Hydrogen, the by-product is safely vented to atmosphere through a 2" PVC pipe on top of the production tank.

## Specifications

- Touch-screen display
  - › Size 5" x 4" color display
  - › Resistive touch membrane overlay
- Built in safety sensors
  - › Air, water, pressure, & level sensors
  - › Power supply
  - › 100 amp 24v DC water-cooled
- Electrode stacks
  - › 1-24 lb, 15,000 hr reverse polarity in clear housing
- Operating temperature - Power supply cooling
  - › 35°F (2°C) to 115°F (46°C) air temperature
  - › 40°F (4°C) to 104°F (40°C) water temperature

- Pool source water
  - › Up to 94°F (34°C) water temperature
- Electrical specifications
  - › Max primary amps – (24)
  - › Voltage / Hz – (208-240v 60Hz single phase)
  - › Breaker required – (40 amp)
- Skid dimensions & weight
  - › 48" L x 28" W x 68" H (950 lbs)
  - › 48" L x 22" W x 40" H (salt feeder)
- Plumbing requirements
  - › 2" inlet and outlet requiring 80 gpm
  - › 2" outlet for hydrogen removal to atmosphere
  - › Maximum NEXGEN venturi return line pressure (including pool return line) - 25psi



## Main Features

- On-site chlorine generator capable of producing 24 lbs (equivalent to 24 gal of 12% bleach) per 24 hrs.
- Process uses swimming pool water to produce HOCl (hypochlorous acid). No fresh water is added.
- No salt is required in the pool
- pH neutral chlorine produced (HOCl)
- Reverse polarity for low maintenance
- Programmable touch-screen with auto correct features
- Skid mounted on wheels for easy installation
- Water-cooled power supply

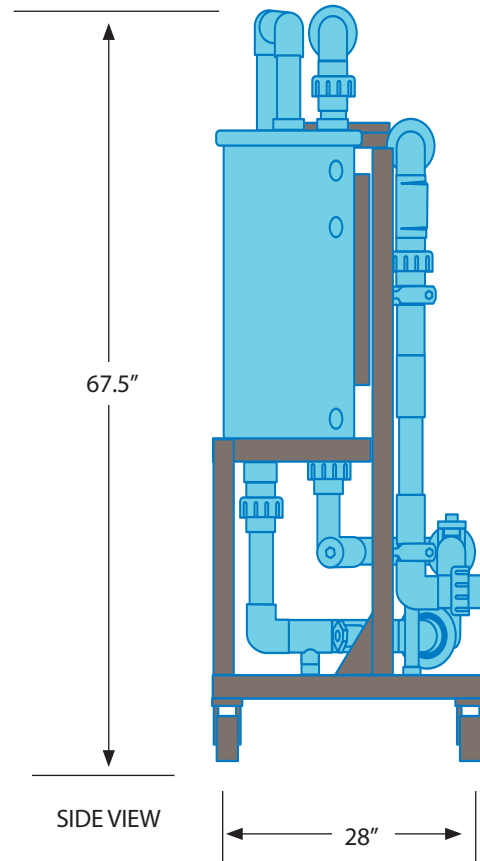
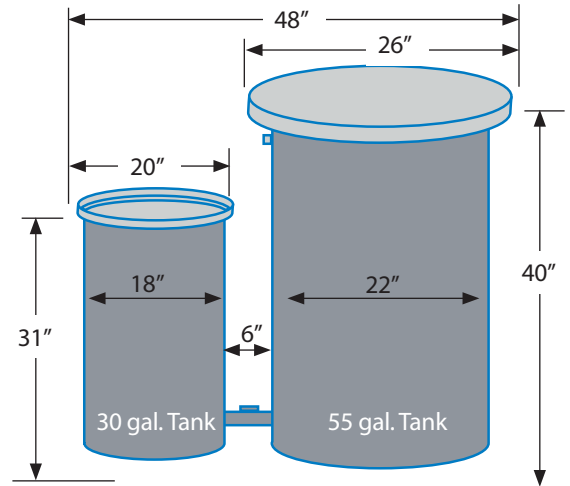
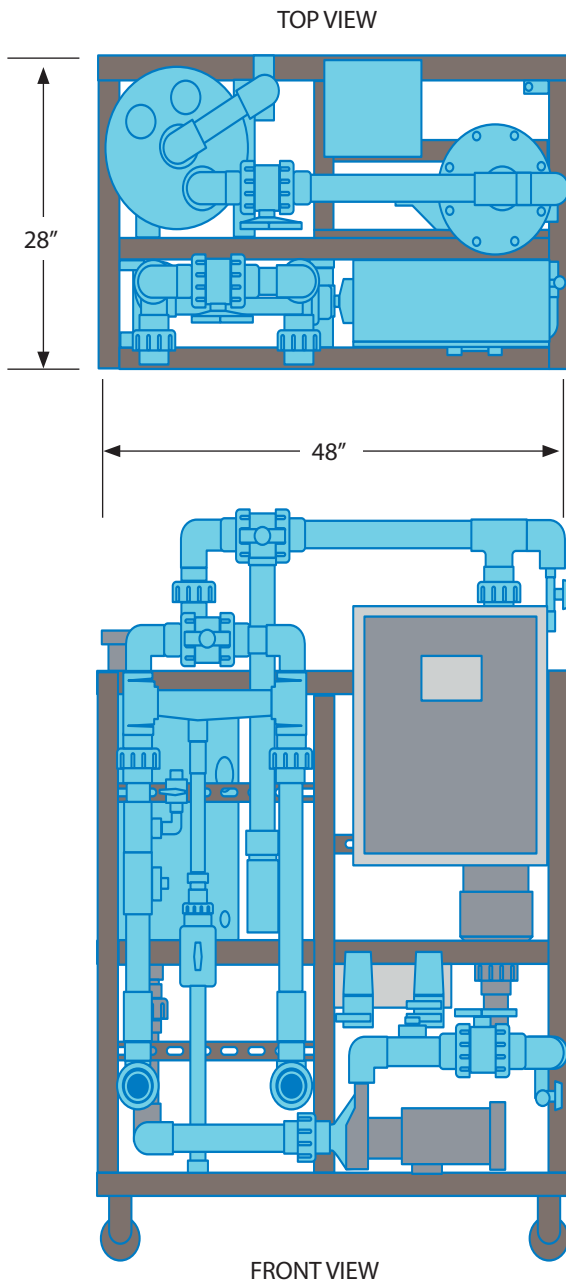
## Applications

- Commercial swimming pools
- Water-parks
- Wave and surf riders

## Order Information

- Product code: NEXGEN 20-R

# NEX-GEN20-R Dimensions & Tank Layout



ChlorKing pioneered on-site chlorine generating technology in the 1970's. Realizing the potential for swimming pools and commercial applications, the company began generating "ultimate water" with simple, yet highly advanced technology. Today, ChlorKing® leads the way in commercial saline chlorination and is consistently seeking new frontiers in sanitizing solutions including ultraviolet light technology and their NEX-GEN® pH onsite chlorine generators. These environmentally friendly solutions are changing the way we treat H<sub>2</sub>O.



Saferwaterthroughsmartertechnology.

Salt Chlorination Systems • Ultraviolet Light Systems • Mixed Oxidant Systems

ChlorKing Inc. 6767 Peachtree Industrial Blvd Norcross GA 30092 sales@chlorking.com 800.536.8180 chlorking.com



From Wave Parks  
To Wading Pools,  
We Have A NEXGEN  
System To Meet  
Your Needs.



ChlorKing's NEXGEN on-site chlorine generators are leading the way to better, safer water. Their unique, forward-thinking design generates liquid chlorine from salt that is stored on site and uses the pool as the source water for the product. NEXGEN eliminates the need for storing large amounts of chlorine and doesn't generate the odors associated with traditional chlorine. Any of the NEXGEN systems can be fully customized to meet your needs and are easy to install, maintain and operate.

## The NEXGEN 100SM-R

The ChlorKing® NEXGEN 100SM-R is a stand-alone, on-site chlorine generator capable of producing 120 lbs of pH neutral equivalent chlorine per 24 hours. This is a low maintenance model which utilizes reverse polarity to clean the plates every 3 hours. The unique design uses swimming pool water to feed the generator and distribute chlorine to the pool as needed. Up to 6 bodies of water can be sanitized with one NEXGEN system using our venturi feed systems and can be used in conjunction with any ORP/pH controller. This product requires no salt in the swimming pool and will not raise TDS levels as with other chlorine generators. Hydrogen, the by-product is safely vented to atmosphere through a 3" PVC pipe on top of the production tank.

## Specifications

- Touch-screen display
  - › Size 5" x 4" color display
  - › Resistive touch membrane overlay
- Built in safety sensors
  - › Air, water, pressure, & level sensors
- Power supply
  - › 100 amp 48v DC water-cooled
- Electrode stacks
  - › 4-30 lb, 15,000 hr reverse polarity in clear housing
- Operating temperature - power supply cooling
  - › 35°F (2°C) to 115°F (46°C) air temperature
  - › 40°F (4°C) to 104°F (40°C) water temperature

- Pool source water
  - › Up to 94°F (34°C) water temperature
- Electrical specifications
  - › Max operating amps – (77)
  - › Typical operating amps – (58)
  - › Voltage / Hz – (208-240v 60Hz single phase)
  - › Breaker required – (100 amp)
- Skid dimensions & weight
  - › 81" L x 32" W x 69" H (1,250 lbs)
  - › 56" L x 28" W x 48" H (salt feeder)
- Plumbing requirements
  - › 2" inlet and outlet requiring 80 gpm
  - › 3" outlet for hydrogen removal to atmosphere
  - › Maximum NEXGEN venturi return line pressure (including pool return line) - 25psi



## Main Features

- On-site chlorine generator capable of producing 120 lbs (equivalent to 120 gal of 12% bleach) per 24 hrs.
- Process uses swimming pool water to produce HOCl (hypochlorous acid). No fresh water is added.
- No salt is required in the pool
- pH neutral chlorine produced (HOCl)
- Programmable touch-screen with auto correct features
- Skid mounted on wheels for easy installation
- Water-cooled power supply

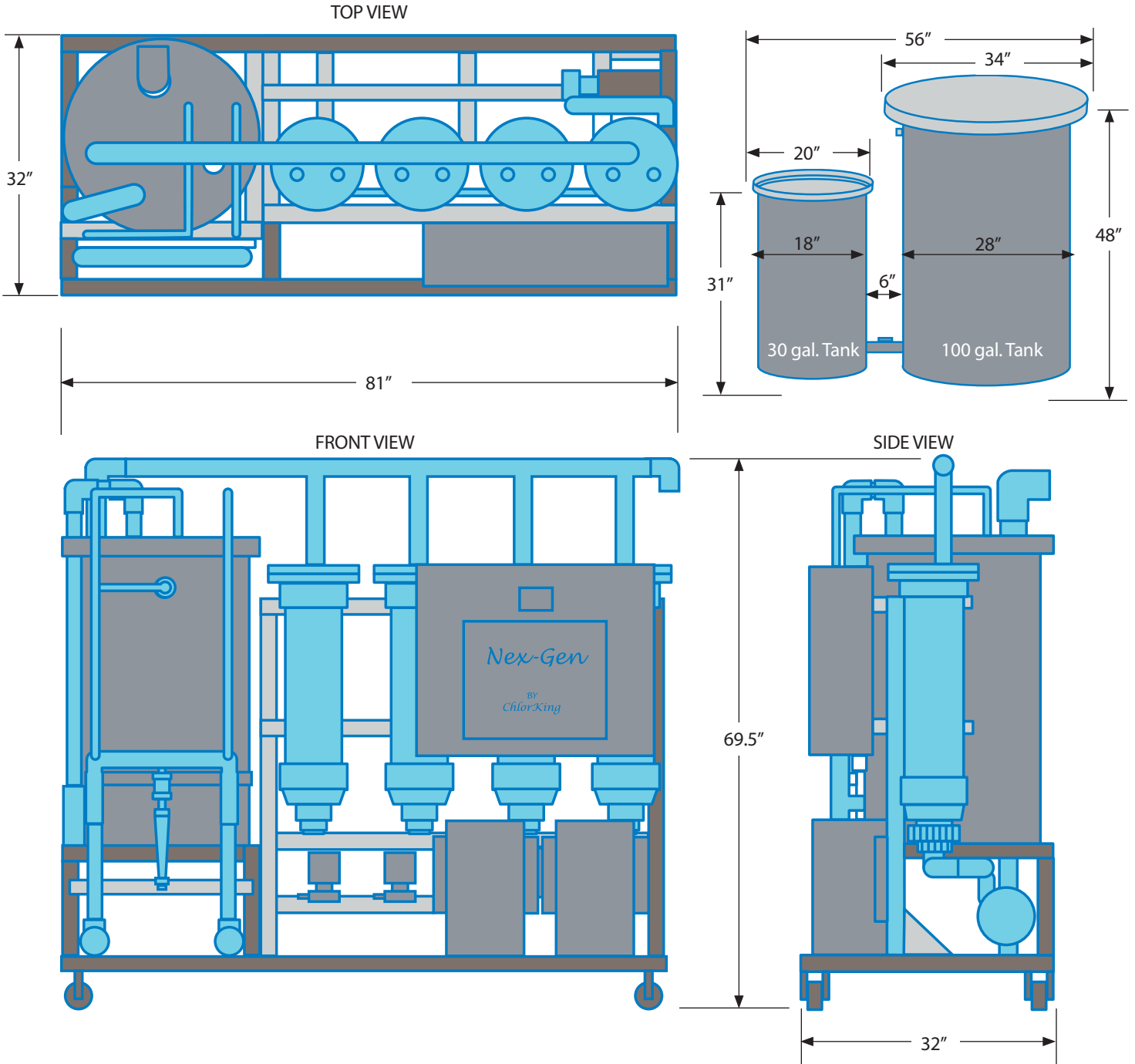
## Applications

- Commercial swimming pools
- Water-parks
- Wave and surf riders

## Order Information

- Product code: NEXGEN 100 SM-R

# NEXGEN®100SM-R Dimensions & Tank Layout



ChlorKing pioneered on-site chlorine generating technology in the 1970's. Realizing the potential for swimming pools and commercial applications, the company began generating "ultimate water" with simple, yet highly advanced technology. Today, ChlorKing® leads the way in commercial saline chlorination and is consistently seeking new frontiers in sanitizing solutions including ultraviolet light technology and their NEX-GEN® pH onsite chlorine generators. These environmentally friendly solutions are changing the way we treat H<sub>2</sub>O.



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Salt Chlorination Systems • Ultraviolet Light Systems • Mixed Oxidant Systems

ChlorKing Inc. 6767 Peachtree Industrial Blvd Norcross GA 30092 sales@chlorking.com 800.536.8180 chlorking.com

# Aquatics FIMs

## 50018

# Detailed Scope of Work

**FIM ID # 50018**  
**SPL 17.07 Chlorine Generation**  
**Splash Montana**

## GENERAL

Install an onsite sodium hypochlorite generation system.

## SCOPE OF WORK INCLUDES

1. Specialty - install the following:
  - A. Engineered Site Drawing for electric, plumbing and venting (Stamp Drawing not Required)
  - B. (1) NEXGEN 150SM-R OSHG system – Splash Pad
  - C. Connect the electrical supply from the pool equipment room to the required connections
  - D. 240 VAC L1 and 240 VAC L2 and ground.
  - E. Inlet and Outlet Plumbing Connections
    - 1) PVC tubing in 2 inch or PVC pipe in 2 inch
    - 2) ½ inch polypropylene or polyethylene tubing
    - 3) ¼ inch polypropylene or polyethylene tubing and a ¼ inch valve for tubing connection
    - 4) PVC 90's, 45's, couplings and saddles or adapters for the return line size encountered
  - F. 2 inch PVC pipe, 90's, 45's and couplings for the hydrogen vent
  - G. Container specified for muriatic acid solutions
  - H. Container Specified for Salt (Client must supply Salt)
  - I. All anchors and mounting hardware
2. Mechanical
  - A. N/A
3. Controls
  - A. N/A
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. N/A
7. Lighting
  - A. N/A
8. Solar
  - A. N/A
9. Site Utilities
  - A. N/A
10. Structural
  - A. N/A
11. Masonry
  - A. N/A
12. Roofing
  - A. N/A
13. Carpentry
  - A. N/A
14. Glazing
  - A. N/A
15. Painting
  - A. N/A
16. Data and Communication
  - A. N/A
17. Security Systems
  - A. N/A
18. Fire Alarm
  - A. N/A
19. Fire Sprinkler
  - A. N/A

# Detailed Scope of Work

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- 20. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
- 21. Commissioning
  - A. Contractor and McKinstry to commission and test automatic controls.
- 22. Demolition and Removal Specialty Contractor
  - A. N/A
- 23. Training
  - A. Contractor and McKinstry to provide training as required for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

- 1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
- 2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
- 3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
- 4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
- 5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
- 6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
- 7. This scope assumes the existing equipment is properly grounded.
- 8. This scope is based on re-using existing circuits and controls unless otherwise stated.
- 9. This scope does not include costing for providing any "seed" stock or extra materials.
- 10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
- 11. This scope does not include repairs to existing code issues unless explicitly described above.
- 12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.



# NEXGEN<sup>®</sup>20-R

From Wave Parks  
To Wading Pools,  
We Have A NEX-GEN<sup>®</sup>pH  
System To Meet  
Your Needs.



ChlorKing's NEXGEN on-site chlorine generators are leading the way to better, safer water. Their unique, forward-thinking design generates liquid chlorine from salt that is stored on site and uses the pool as the source water for the product. NEXGEN eliminates the need for storing large amounts of chlorine and doesn't generate the odors associated with traditional chlorine. Any of the NEXGEN systems can be fully customized to meet your needs and are easy to install, maintain and operate.

## The NEXGEN 20-R

The ChlorKing<sup>®</sup> NEXGEN 20-R is a stand-alone, on-site chlorine generator capable of producing 24 lbs of pH neutral equivalent chlorine per 24 hours. This is a low maintenance model which utilizes reverse polarity to clean the plates every 3 hours. The unique design uses swimming pool water to feed the generator and distribute chlorine to the pool as needed. Up to 6 bodies of water can be sanitized with one NEXGEN system using our venturi feed systems and can be used in conjunction with any ORP/pH controller. This product requires no salt in the swimming pool and will not raise TDS levels as with other chlorine generators. Hydrogen, the by-product is safely vented to atmosphere through a 2" PVC pipe on top of the production tank.

## Specifications

- Touch-screen display
  - › Size 5" x 4" color display
  - › Resistive touch membrane overlay
- Built in safety sensors
  - › Air, water, pressure, & level sensors
  - › Power supply
  - › 100 amp 24v DC water-cooled
- Electrode stacks
  - › 1-24 lb, 15,000 hr reverse polarity in clear housing
- Operating temperature - Power supply cooling
  - › 35°F (2°C) to 115°F (46°C) air temperature
  - › 40°F (4°C) to 104°F (40°C) water temperature

- Pool source water
  - › Up to 94°F (34°C) water temperature
- Electrical specifications
  - › Max primary amps – (24)
  - › Voltage / Hz – (208-240v 60Hz single phase)
  - › Breaker required – (40 amp)
- Skid dimensions & weight
  - › 48" L x 28" W x 68" H (950 lbs)
  - › 48" L x 22" W x 40" H (salt feeder)
- Plumbing requirements
  - › 2" inlet and outlet requiring 80 gpm
  - › 2" outlet for hydrogen removal to atmosphere
  - › Maximum NEXGEN venturi return line pressure (including pool return line) - 25psi



## Main Features

- On-site chlorine generator capable of producing 24 lbs (equivalent to 24 gal of 12% bleach) per 24 hrs.
- Process uses swimming pool water to produce HOCl (hypochlorous acid). No fresh water is added.
- No salt is required in the pool
- pH neutral chlorine produced (HOCl)
- Reverse polarity for low maintenance
- Programmable touch-screen with auto correct features
- Skid mounted on wheels for easy installation
- Water-cooled power supply

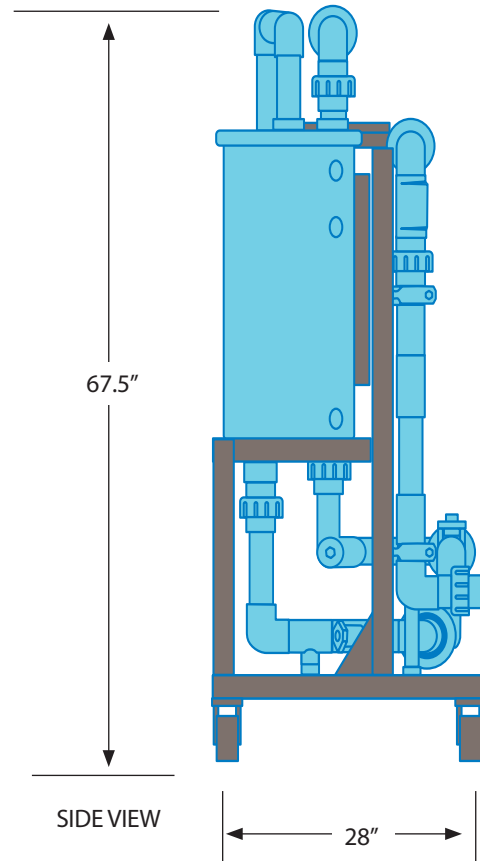
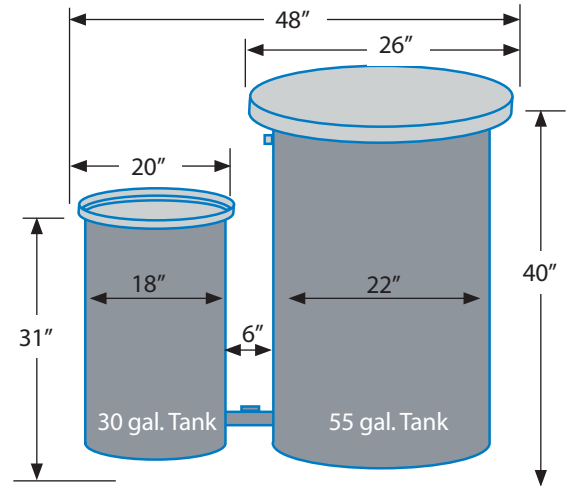
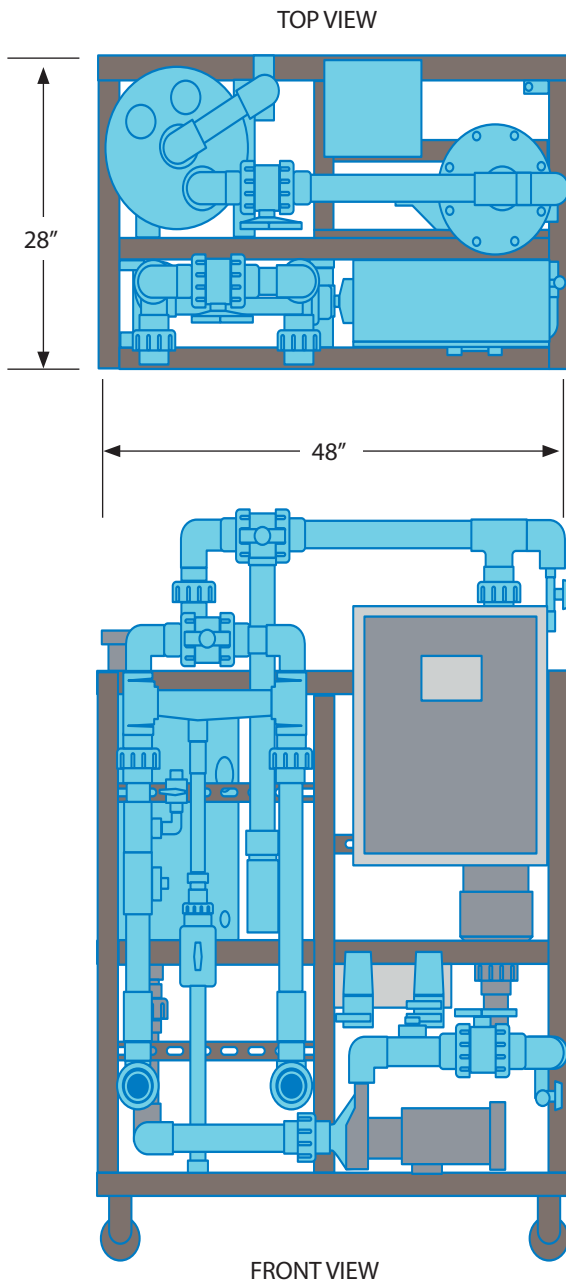
## Applications

- Commercial swimming pools
- Water-parks
- Wave and surf riders

## Order Information

- Product code: NEXGEN 20-R

# NEX-GEN20-R Dimensions & Tank Layout



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- Pool source water
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  - › Typical operating amps – (58)
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  - › Breaker required – (100 amp)
- Skid dimensions & weight
  - › 81" L x 32" W x 69" H (1,250 lbs)
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  - › Maximum NEXGEN venturi return line pressure (including pool return line) - 25psi



## Main Features

- On-site chlorine generator capable of producing 120 lbs (equivalent to 120 gal of 12% bleach) per 24 hrs.
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- pH neutral chlorine produced (HOCl)
- Programmable touch-screen with auto correct features
- Skid mounted on wheels for easy installation
- Water-cooled power supply

## Applications

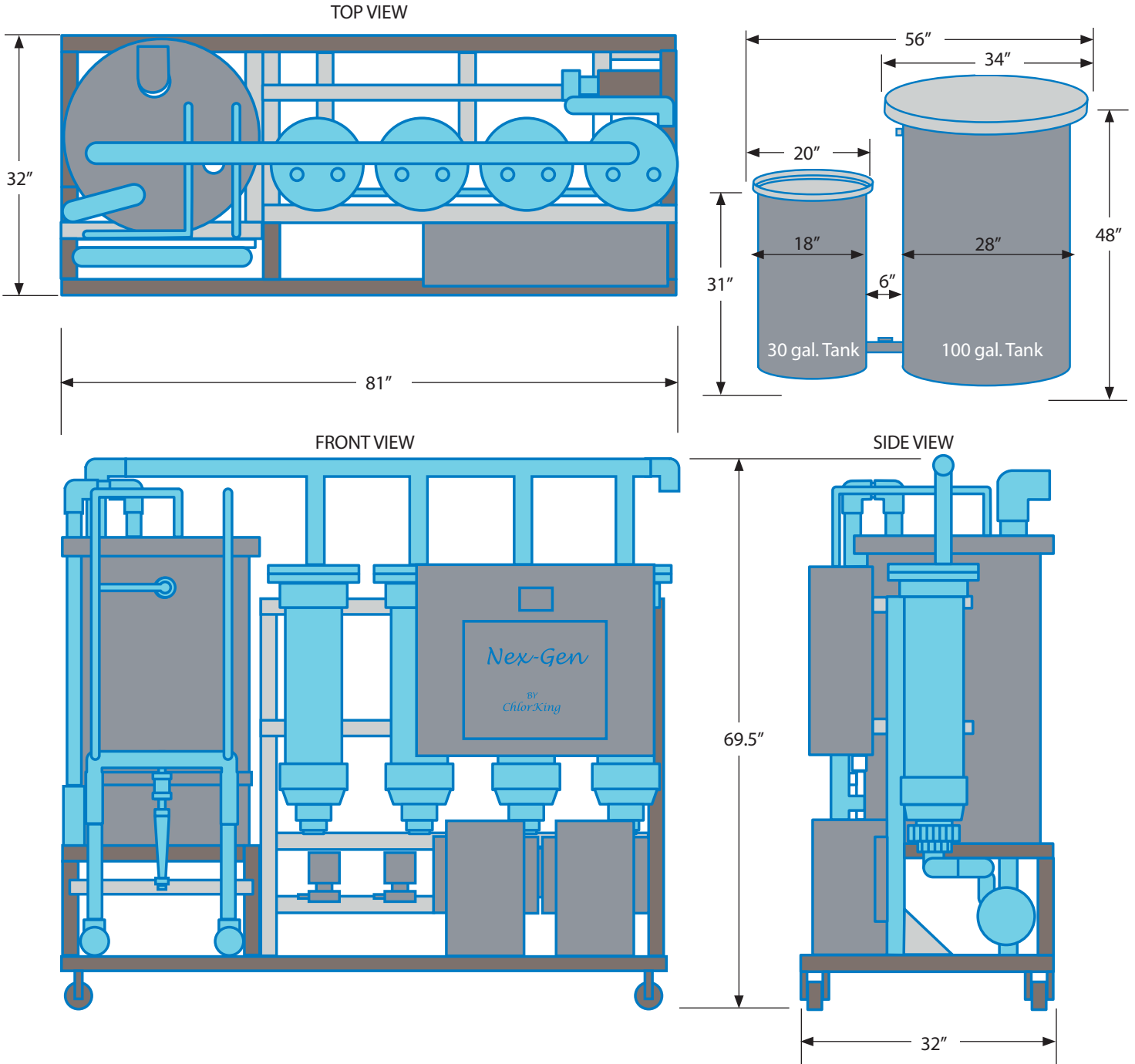
- Commercial swimming pools
- Water-parks
- Wave and surf riders

## Order Information

- Product code: NEXGEN 100 SM-R



# NEXGEN®100SM-R Dimensions & Tank Layout



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# EXHIBIT E - City of Missoula Energy Performance Contract Proposal Project Forms- City Shops Ph 1

# Table 3.1 - Energy Savings Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - City Shops  
 Date: 11/3/2022

FIM ID	Facility Improvement Measures	FIM Type	Group	Facility	Guarantee Multiplier for Positive Numbers *	Guarantee Multiplier for Negative Numbers *	Electricity				Natural Gas		Water		Sewer		Total **
							kW	kW (\$)	kWh	kWh (\$)	Therm	Therm (\$)	kgal-W	kgal-W (\$)	kgal-S	kgal-S (\$)	All (\$)
48266	SHOPS 03.02 Make-Up Air Unit & Exhaust Fans Replacements	3	Shops	City Shops - Missoula	100%	100%	0.0	\$0	51,962	\$4,776	18,900	\$18,424	0	\$0	0	\$0	\$23,200
50002	SHOPS 13.03 Overhead Door Controls	13	Shops	City Shops - Missoula	100%	100%	0.0	\$0	0	\$0	1,074	\$1,047	0	\$0	0	\$0	\$1,047
48281	SHOPS 13.01 Envelope Sealing, Caulking, etc.	13	Shops	City Shops - Missoula	90%	110%	0.0	\$0	1,106	\$102	1,858	\$1,811	0	\$0	0	\$0	\$1,912
48263	SHOPS 09.01 LED Lighting	9	Shops	City Shops - Missoula	95%	105%	62.1	\$794	18,393	\$1,691	-29	-\$28	0	\$0	0	\$0	\$2,457
							<b>62</b>	<b>\$ 794</b>	<b>71,461</b>	<b>\$ 6,568</b>	<b>21,803</b>	<b>\$ 21,254</b>	<b>0</b>	<b>\$ -</b>	<b>0</b>	<b>\$ -</b>	<b>\$ 28,616</b>

\* The savings shown in this table are less than the calculated savings unless a guarantee multiplier of 100% is shown.

\*\* The guarantee is based on Key Performance Indicators shown in Table 3.2. Refer to Section 3 of the ESP for the method of converting Key Performance Indicators to dollars during the M&V period.

\*\*\* The guarantee is based on the aggregate savings for all FIMs, not on individual FIM savings.

Confidential and Proprietary



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - City Shops  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
SHOPS 03.02 Make-Up Air Unit & Exhaust Fans Replacemements	City Shops - Missoula	A	1.	Peak Misc. Loads (W)	8,403	5,980	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Verify proper instalation and operation of new equipment. Review and verify nameplate information for new equipment meets proposed KPI values. Verify additional items per detailed M&V plan.	Review and verify nameplate information for new equipment meets proposed KPI values.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			2.	AHU Fan Power Control Type	Constant Volume (CV)	VFD				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			3.	Max AHU CFM	40,100	52,600				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			4.	Min AHU CFM %	100%	64.83%				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			5.	Min Occupied OSA (%)	64%	24.71%				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			6.	Fan BHP	31.47	18.40				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			7.	Heating Efficiency (%)	80%	85.61%				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			8.	Heat Recovery Effectiveness (%)	0%	39.26% (weighted)				Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - City Shops  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
SHOPS 09.01 LED Lighting	City Shops - Missoula	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
SHOPS 13.01 Envelope Sealing, Caulking, etc.	City Shops - Missoula	Non-Measured	1.	Exterior, interior, overhead and attic door weather stripping	No weather stripping on doors	Weather stripping installed on 13 exterior doors, 7 interior doors, 5 overhead doors, and 1 attic hatch door	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
SHOPS 13.03 Overhead Door Controls	City Shops - Missoula	Non-Measured	1.	Door Count	2	2	Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Door Count
			2.	Door Open/Close Cycles	Normal: 18/day North Bay, 19/day South Bay Plowing season: 37/day North Bay, 39/day South Bay	Normal: 18/day North Bay, 19/day South Bay Plowing season: 37/day North Bay, 39/day South Bay	Trended via traffic counter. Shops manager reported double the traffic during show plowing.	No Task, Assumed Constant	Review system and operation with building manager.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Door Open/Close Cycles
			3.	Door Open Duration	1 minute	30 seconds	Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant	Review system and operation with building manager.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Door Open Duration
			4.	Outside Air Temperature	45degF average	45degF average	Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Outside Air Temperature
			5.	Inside Air Temperature	60degF average	60degF average	Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Inside Air Temperature
			6.	Heating System Efficiency	80%	80%	Site Audit, Collect HVAC BMS data, Review As-Built drawings	No Task, Assumed Constant	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Heating System Efficiency

# Table 3.3 - Baseline Utility Rates



Project: City of Missoula  
 Scenario: Ph 1 Implementation - City Shops  
 Date: 11/2/2022

Facility	Utility	Provider	Rate Name	Rate	Unit
City Shops	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
City Shops	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
City Shops	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
City Shops	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
City Shops	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF

# Table 4.2 - Facility Improvement Measure (FIM) Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - City Shops  
 Date: November 8, 2022

FIM ID	FIM Type	Facility Improvement Measures	FIM Description	Facility	Group	Budget	Annual Utility Cost Savings	Annual Operational Savings **	Calculated SPB	Potential Incentives ***	Avoided Capital	Net Customer Cost (with Incentives)	SPB (with Incentives)
48266	03	SHOPS 03.02 Make-Up Air Unit & Exhaust Fans Replacements	The existing exhaust and make-up air system does not work effectively and is not regularly used. Install a resized and redesigned exhaust and make-up air system that will effectively evacuate the area and provide the code required ventilation.	City Shops - Missoula	City Shops	\$1,085,990	\$23,200	\$0	46.8	\$0	\$0	\$937,401	49.7
48263	09	SHOPS 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	City Shops - Missoula	City Shops	\$42,986	\$2,457	\$374	16.7	\$1,474	\$0	\$35,906	16.9
48281	13	SHOPS 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	City Shops - Missoula	City Shops	\$26,874	\$1,912	\$0	14.1	\$0	\$0	\$22,986	14.8
50002	13	SHOPS 13.03 Overhead Door Controls	Install new overhead door controls to provide for automated open/close operation with sufficient safety amenities to avoid contact with vehicles that are slow moving or parked in the doorway.	City Shops - Missoula	City Shops	\$9,499	\$1,047	\$1,000	4.3	\$0	\$0	\$6,845	3.7
<b>TOTALS</b>						\$ 1,165,350	\$ 28,616	\$ 1,374	40.5	\$ 1,474	\$ -	\$ 1,003,137	34.8

1. All savings are calculate at the base utility rates, refer to Table 3.3.
2. Per MCA, McKinstry guarantees units of energy saved, not dollars.
3. Savings guarantees are cumulative for the project rather than by individual FIM.
4. Rebates/incentives are only estimates and may change at the time of completion.
5. Avoided capital amounts are only estimates and are for illustrative purposes only.

# City Shops FIMs 48263



# Detailed Scope of Work

**FIM ID # 48263**  
**SHOPS 09.01 LED Lighting**  
**City Shops - Missoula**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.

# City Shops FIMs

## 48266

# Detailed Scope of Work

**FIM ID # 48266**  
**SHOPS 03.02 Make-Up Air Unit & Exhaust Fans Replacements**  
**City Shops - Missoula**

## GENERAL

The existing exhaust and make-up air system does not work effectively and is not regularly used. Install a resized and redesigned exhaust and make-up air system that will effectively evacuate the area and provide the code required ventilation.

## SCOPE OF WORK INCLUDES

- A. "Provide" as written below shall mean furnish and install.
- B. Mechanical
  1. Remove roof mounted exhaust air fans and make-up air units as indicated.
  2. Remove supply, return and exhaust air ductwork as shown.
  3. Cap exhaust air grilles where shown.
  4. Provide roof mounted exhaust fans, energy recovery units, duct furnaces and intake hoods as scheduled.
  5. Insulated exposed ductwork on roof with 2" polyisocyanurate and aluminum jacketing. Remaining ductwork below roof level need not be insulated.
  6. Extend gas piping to duct furnaces as shown, provide PRV, isolation valve and dirt leg. Extend vent from pressure regulator full size thru roof and terminate with gooseneck and insect screen.
  7. Provide exhaust, supply air ductwork and diffusers as shown.
  8. Provide fabric air ductwork as indicated.
  9. Provide intake ductwork and drip pans for roof intake hoods.
  10. Provide dampers for roof intake hood ductwork, actuators by T.C.C.
  11. Provide flue and combustion air ductwork for duct furnaces as shown.
  12. Cut openings in roof/structure as required for intake hood ductwork and flue/combustion air ducts.
  13. Provide equipment labeling for all scheduled equipment. Plastic 3x5 laminated plastic tags with white letters on black background.
  14. Provide Owner Training on Contractor provided equipment (4 hours).
- C. Controls
  1. Remove control items associated with mechanical equipment demolition.
  2. Remove nitrogen dioxide sensors and associated controls.
  3. Provide all low voltage wiring, line voltage wiring, and conduit for a complete and functioning control system.
  4. Provide controllers, actuators, transducers, sensors, etc. for a complete and functioning control system and as described herein.
  5. Provide damper actuators (2) open/close, (2) fully modulating for each energy recovery unit (exhaust air, bypass air (multiple) and outside air).
  6. Provide fully modulating actuators for roof intake hood dampers (2).
  7. Provide nitrogen dioxide and carbon monoxide sensors, controllers, alarms, ect..
  8. Provide front end controller including graphics for new installed equipment, parameters and appurtenances.
  9. All controllers will be BACnet or LON compatible (TBD).
  10. All wiring shall be run thru conduit.
  11. Reference drawings for additional requirements.
  12. Work with TAB Contractor and McKinstry Commissioning personnel to test systems.
  13. Provide Owner Training (8 hours) for this FIM.
- D. Electrical
  1. Contractor shall be responsible for equipment, materials, accessories, and other associated

# Detailed Scope of Work

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requirements called for in the following scope, and as indicated in the above supporting documents.

2. General circuiting requirements
    - a. Contractor shall survey existing facility drawings and power distribution system to determine available space and capacity to support this scope of work. If existing space or capacity is insufficient to meet the requirements of the scope, Contractor shall immediately notify McKinstry.
    - b. For power circuits indicated as being removed, Contractor shall remove conductors back to the associated panel, and shall remove associated starters, disconnects, and other devices. Conduit shall be cut back to within 3" of room penetration.
    - c. For new power circuits, Contractor shall furnish and install overcurrent protection, conduit conductors, starter, disconnect, and related accessories as indicated on the drawings.
    - d. Where power circuits indicated as being removed meet the requirements for new power circuits, existing components may be reused where in compliance with current NEC.
    - e. Unless otherwise specified, similar loads may be combined on a common circuit as permitted by current NEC.
  3. Electrical panels and disconnects serving mechanical equipment shall comply with the service clearance requirements of the NEC. Furnish and install remote mounted panels and disconnects where required by the NEC.
  4. **General Scope:** Electrical work to support replacement of existing exhaust and make-up air system.
    - a. Provide disconnect of existing exhaust fans and MAU for removal by others. Existing circuits, conduit, and conductors to remain and be re-used.
    - b. Provide/re-purpose breakers, disconnects, conduit and conductors for energy recovery units, duct furnaces, and exhaust air fans.
    - c. Provide smoke duct detectors for energy recovery units.
    - d. Metering: Project will result in a net increase in electrical load. 30-day metering or 12-month utility demand data will be required instead.
    - e. All panels with a net increase in load will require 30-day metering. Equipment tying into main switchboard can use utility demand data.
    - f. Reference mechanical and electrical PDF mark-ups for existing equipment locations and detailed scope of work.
- E. Architectural/Roofing:
1. Flash in roof curbs for intake hoods installed by mechanical contractor.
  2. Flash around flue and combustion air ducts for duct furnaces.
  3. Flash around additional vertical supports for energy recovery units.
- F. Structural:
1. Provide 3"x3"x3/8" angle iron between structural members/around roof openings for intake hoods support.
  2. Provide structural framing (above and below roof) for energy recovery unit support (final design TBD).
  3. Provide structural support framing for fabric air duct tensioning support.
- G. Commissioning
1. McKinstry Commissioning Engineer will fully commission the proposed controls and HVAC systems.
- H. TAB
1. Provide airside TAB for the ERV's and exhaust fans.
- I. Engineering
1. McKinstry to provide design engineering for this FIM.



# Detailed Scope of Work

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## J. Training

1. McKinstry to oversee Owner Training for this FIM.

### CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

SQUARE FOOTAGE OF OPEN AREA = 29,000 SF

EXHAUST AIR REQUIRED (MAX) = 21,500 CFM

EXHAUST AIR MINIMUM (MIN) = 1,450 CFM



620 WEST ADDISON STREET  
MISSOULA MT 59801  
(406) 214-3500

www.mckinstry.com

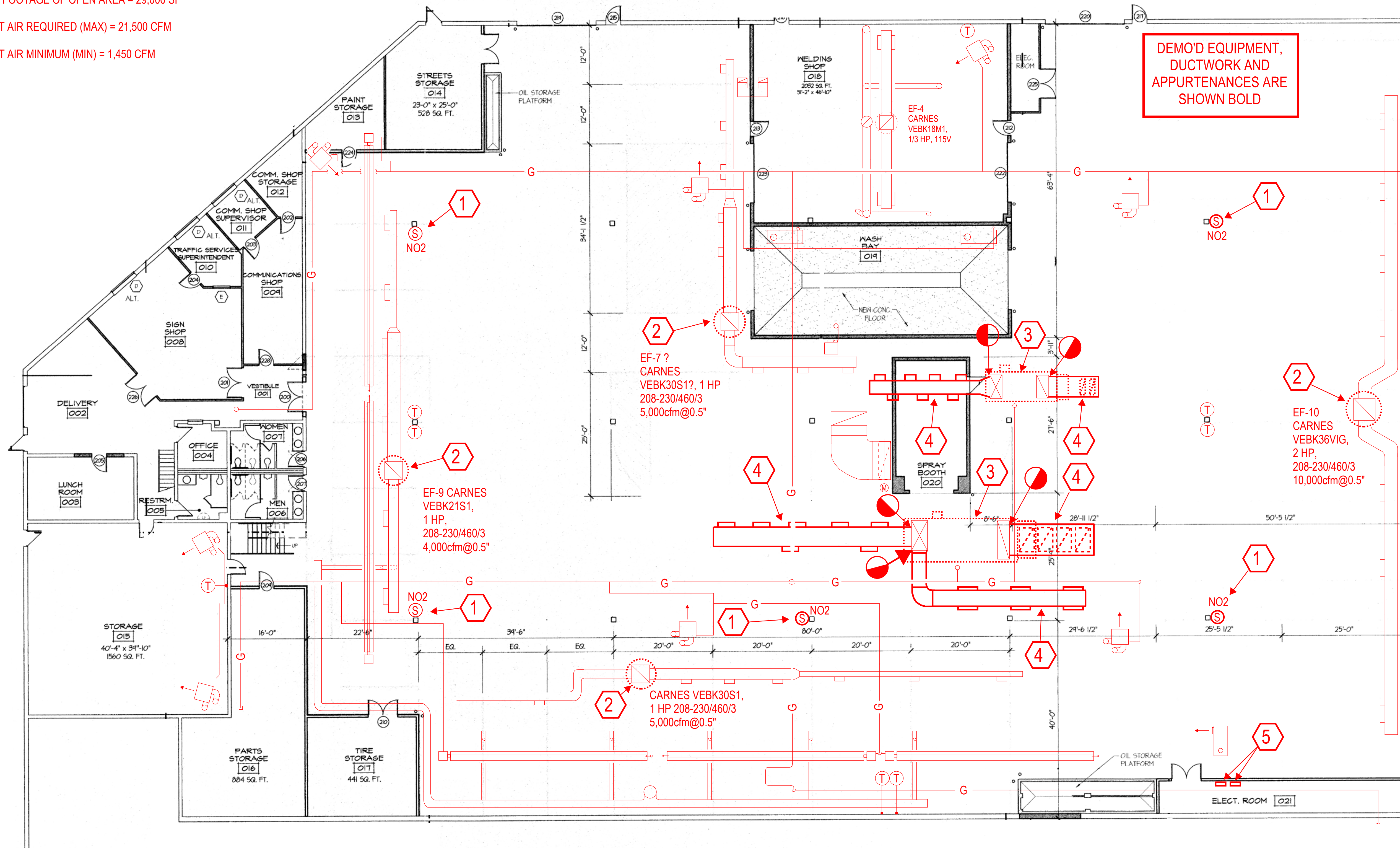
PROJECT:  
CITY OF MISSOULA  
CITY SHOPS

FIM 48266 - 03.02

REPLACE MAKE-UP  
AND EXHAUST AIR  
UNITS AND CONTROL

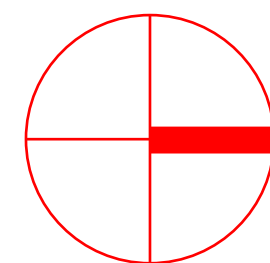
1305 Scott St.  
Missoula, MT 59802

CONSULTANTS:



# MECHANICAL DEMOLITION PLAN

SCALE AS SHOWN:



## KEYED NOTES:

1. REMOVE NITROGEN DIOXIDE SENSOR AND ASSOCIATED CONTROLLER.
2. REMOVE ROOF MOUNTED EXHAUST FAN, ROOF CURB SHALL REMAIN.
3. REMOVE ROOF MOUNTED HEATING AND VENTILATING UNIT, EXISTING ROOF DUNNAGE SHALL REMAIN. EXISTING DUCTWORK ABOVE ROOF SHALL REMAIN AND PREPARED FOR NEW CONNECTIONS. REMOVE GAS PIPING TO BELOW ROOF AND CAP, SEAL OPENING THRU ROOF.
4. REMOVE EXISTING DUCTWORK BACK TO POINT SHOWN.
5. REMOVE CONTROLS ASSOCIATED WITH THE DEMO'D EXHAUST FANS AND MAKE-UP AIR UNITS, CONDUIT, RACEWAY AND RELAYS MAY BE RE-USED IF COMPATIBLE WITH NEW CONTROL SYSTEM.

REGISTRATION:

ISSUES:		
NO	DATE	DESCRIPTION
1	10/1/2021	ISSUED FOR GMAX

DESIGNED: PF  
DRAWN: PF  
CHECKED: PF  
JOB NO: 202094

SHEET TITLE:

**MECHANICAL  
DEMOLITION  
PLAN**

SHEET NUMBER:

**M1 OF 4**



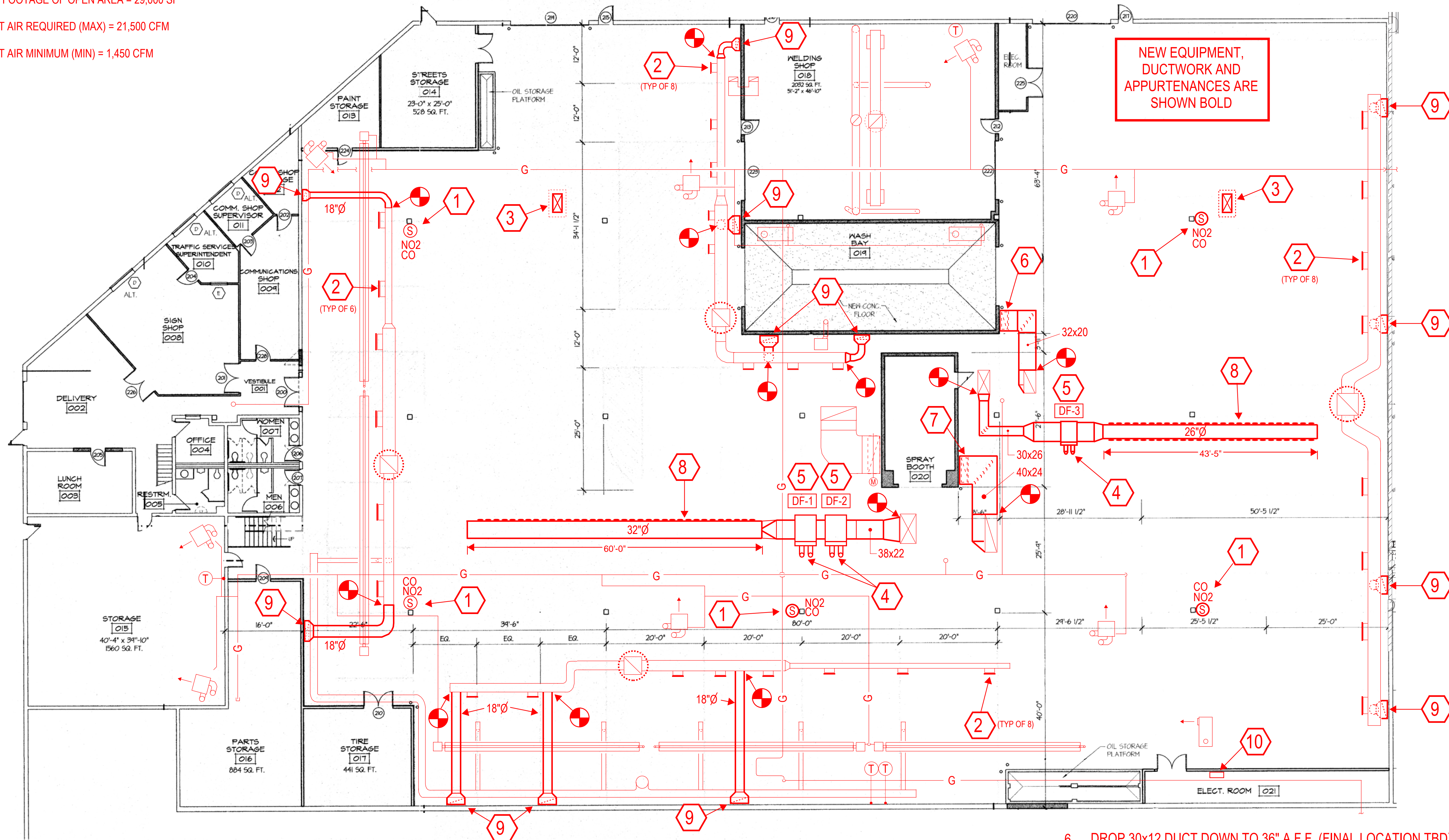




SQUARE FOOTAGE OF OPEN AREA = 29,000 SF

EXHAUST AIR REQUIRED (MAX) = 21,500 CFM

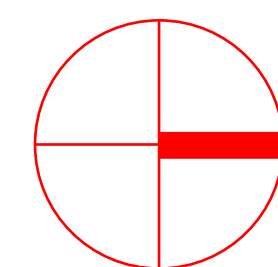
EXHAUST AIR MINIMUM (MIN) = 1,450 CFM



NEW EQUIPMENT,  
DUCTWORK AND  
APPURTENANCES ARE  
SHOWN BOLD

**MECHANICAL RENOVATION PLAN**

SCALE AS SHOWN:



**KEYED NOTES:**

1. PROVIDE NITROGEN DIOXIDE AND CARBON MONOXIDE SENSORS AND CONTROLS.
2. PROVIDE SHEETMETAL BLANK-OFF BEHIND GRILLE.
3. PROVIDE 36"x60" DUCT FROM ROOF CURB CONNECTION TO 18" BELOW DECK. PROVIDE DAMPER AND DDC ACTUATOR IN DUCT. PROVIDE 48" x 72" DRIP PAN BELOW DUCT OPENING @ APPROX. 30" BELOW DECK.
4. PROVIDE 6" DOUBLE WALL FLUE VENT AND COMBUSTION AIR DUCTS UP THRU ROOF, TERMINATE PER MFR. WRITTEN INSTRUCTIONS.
5. PROVIDE DUCT FURNACE AS SCHEDULED, EXTEND 1" GAS PIPING TO HEATER WITH ISOLATION VALVE, PRV (2 PSIG TO 11" W.C.) AND DRIP LEG.
6. DROP 30x12 DUCT DOWN TO 36" A.F.F. (FINAL LOCATION TBD). TERMINATE WITH OPEN ENDED DUCT COVERED WITH 1/2" HARDWARE CLOTH.
7. DROP 38x12 DUCT DOWN TO 36" A.F.F. (FINAL LOCATION TBD). TERMINATE WITH OPEN ENDED DUCT COVERED WITH 1/2" HARDWARE CLOTH.
8. FABRIC DUCT, SIZE AS INDICATED. DUCTSOX OR EQUAL, NON POROUS WITH SKELECORE FTS SYSTEM TO PREVENT SAG. PROVIDE ORIFICES SIZED AS REQUIRED FOR AIR DISTRIBUTION.
9. DROP 26x12 DUCT DOWN TO 36" A.F.F. (FINAL LOCATION TBD). TERMINATE WITH OPEN ENDED DUCT COVERED WITH 1/2" HARDWARE CLOTH.
10. DDC CONTROL PANEL FOR ERV, GAS DETECTION AND EXHAUST FAN CONTROL. RE-USE RELAYS FOR FAN CYCLING AS COMPATIBLE WITH REPLACEMENT EQUIPMENT.

REGISTRATION:

ISSUES:

NO	DATE	DESCRIPTION
1	10/1/2021	ISSUED FOR GMAX

DESIGNED: PF  
DRAWN: PF  
CHECKED: PF  
JOB NO: 202094

SHEET TITLE:

**MECHANICAL  
RENOVATION  
PLAN - 1ST FLOOR**

SHEET NUMBER:







# EQUIPMENT SCHEDULES

CIRCUIT BREAKER PANELBOARD																				
Name: <b>(E) HB1</b>				Bus: <b>225A</b>																
Mounting: <b>SURFACE</b>				Main: <b>MLO</b>																
Skirting: <b>N/A</b>				Volts: <b>277/480</b>				NEMA Rating: <b>1</b>												
Short Circuit Rating: <b>25,000 AIC</b>				Phase: <b>3</b>				Wire: <b>4</b>				Type: <b>Wye</b>								
Ckt#	Breaker		Outlets		Motor HP	Notes	Location/Description	Load (KVA)	Phase			Breaker		Outlets		Motor HP	Notes	Location/Description	Load (KVA)	
	Amp	P	Qty	Cat					A	B	C	Amp	P	Qty	Cat					Amp
1	20	3	1	M	5	2,3	(N) ERV-1 SUPPLY	2.110	X			2	40	3	1	M	1	(E) RTU-1	7.480	
3							"	2.110	X			4						"	7.480	
5							"	2.110		X		6						"	7.480	
7	20	3	1	M	1	2	(R) EF-7	0.727	X			8	20	3	1	M	1	(E) AIR COMP. AC-1	4.430	
9							"	0.727	X			10						"	4.430	
11							"	0.727		X		12						"	4.430	
13	20	3	1	M	1	2	(R) EF-8	0.727	X			14	20	3	1	M	1	(E) AIR COMP. AC-2	4.430	
15							"	0.727	X			16						"	4.430	
17							"	0.727		X		18						"	4.430	
19	20	3	1	M	1	2	(R) EF-9	0.727	X			20	20	3	1	M	3	2,3	(N) ERV-2 SUPPLY	1.330
21							"	0.727	X			22						"	1.330	
23							"	0.727		X		24						"	1.330	
25	20	3	1	M	2	2	(R) EF-10	1.178	X			26	20	3	1	M	3	3	(N) ERV-2 RETURN	1.330
27							"	1.178	X			28						"	1.330	
29							"	1.178		X		30						"	1.330	
31	20	3	1	M		1	EXISTING LOAD	4.430	X			32	20	3	1	M	5	3	(N) ERV-1 RETURN	2.110
33							"	4.430	X			34						"	2.110	
35							"	4.430		X		36						"	2.110	
37							"		X			38	20	3	1	M		(E) VEHICLE LIFT	4.430	
39							"			X		40						"	4.430	
41							"			X		42						"	4.430	
Connected Load Phase A: 35.44 KVA Connected Load Phase B: 35.44 KVA Connected Load Phase C: 35.44 KVA Total Connected Load: 106.32 KVA Total Demand Load: 111.93 KVA (E) Maximum Demand: KVA Total Demand Amps: 134.63 Amps								Category		Connected Load	Demand Load	Demand Factor	# or Items							
Notes: 1 (E) EXISTING LOAD TO REMAIN 2 (R) EXISTING LOAD BEING REPLACED 3 (N) NEW LOAD BEING ADDED, PROVIDE CIRCUIT BREAKER								D Dwelling Units		0.00	0.00	* See Below	n/a							
								H Hotel, Apt w/o Ckg		0.00	0.00	* See Below	n/a							
								L Lighting		0.00	0.00	1.25	0							
								R Receptacle<10kVA		0.00	0.00	First 10kVA + 50% Add'l	0							
								C Continuous Eqpmt		0.00	0.00	1.25	0							
								Z Non-Cont Eqpmt		0.00	0.00	1.00	0							
								M Motors		106.32	106.32	1.00	13							
								M Largest Motor		22.44	5.61	25% of Largest	1							
								K Kitchen Equipment		0.00	0.00	1.00	0							
								W Welding Equipment		0.00	0.00	1.00	0							
								X X-Ray Equipment		0.00	0.00	0.50	0							
* Per NEC Table 220-11																				

**EF-7, EF-8: GREENHECK MODEL GB-300, 1 HP, 208-230V/460/3 UNIT, 6,000 CFM @ 0.5" FURNISH WITH VARI-GREEN VFD, DISCONNECT SWITCH, BACKDRAFT DAMPER AND ADAPTER CURB.**

**ELECTRICAL:**  
USE EXISTING CIRCUIT AND FEEDER FOR NEW EXHAUST FAN.

**EF-9: GREENHECK MODEL GB-200, 1 HP, 208-230V/460/3 UNIT, 4,000 CFM @ 0.5" FURNISH WITH VARI-GREEN VFD, DISCONNECT SWITCH, BACKDRAFT DAMPER AND ADAPTER CURB.**

**ELECTRICAL:**  
USE EXISTING CIRCUIT AND FEEDER FOR NEW EXHAUST FAN.

**EF-10: GREENHECK MODEL GB-360, 2 HP, 208-230V/460/3 UNIT, 10,000 CFM @ 0.5" FURNISH WITH VARI-GREEN VFD, DISCONNECT SWITCH, BACKDRAFT DAMPER AND ADAPTER CURB.**

**ELECTRICAL:**  
USE EXISTING CIRCUIT AND FEEDER FOR NEW EXHAUST FAN.

**DF-1, DF-2, DF-3: DUCT FURNACE, MODINE MODEL IFS , 400 MBH INPUT, MODULATING GAS CONTROL (0-10 VDC), 120V, SEALED COMBUSTION, FURNISH WITH 409 STAINLESS STEEL HEAT EXCHANGER /BURNER/ DRIP PAN.**

**ELECTRICAL:**  
PROVIDE 3/4"C,2#12,#12G,CU FOR 120V/1PH FROM PANEL LB2

**ERV-1: ENERGY RECOVERY VENTILATOR: DAIKIN APPLIED SKYLINE AIR HANDLER MODEL OAH020GVGM, 2" DOUBLE WALL CONSTRUCTION, INSULATED BASE, 7,500 CFM SUPPLY AND RETURN FANS, 5 HP EA, 460V, 3-PHASE, ENERGY RECOVERY WHEEL WITH VFD, OA, EA AND BY-PASS AIR DAMPERS AND ACTUATORS, HINGED ACCESS DOORS WITH HANDLES, OA AND EA HOODS, PREMIUM EFFICIENCY INVERTER READY FAN MOTORS WITH BUILT-IN SHAFT GROUNDING RINGS, FACTORY MOUNTED AND WIRED VARIABLE SPEED DRIVES (DANFOSS) FOR SUPPLY AND RETURN FANS, FACTORY MOUNTED AND WIRED FUSED DISCONNECT SWITCH, 24V CONTROL TRANSFORMER, 2" MERV 8 FILTER BANKS.**

**ELECTRICAL:**  
CIRCUIT 1: 3/4"C, 3#12,#12G,CU  
CIRCUIT 2: 3/4"C,3#12,#12G,CU

**ERV-2: ENERGY RECOVERY VENTILATOR: DAIKIN APPLIED SKYLINE AIR HANDLER MODEL OAH017GVGM, 2" DOUBLE WALL CONSTRUCTION, INSULATED BASE, 5,000 CFM SUPPLY AND RETURN FANS, 3 HP EA, 460V, 3-PHASE, ENERGY RECOVERY WHEEL WITH VFD, OA, EA AND BY-PASS AIR DAMPERS AND ACTUATORS, HINGED ACCESS DOORS WITH HANDLES, OA AND EA HOODS, PREMIUM EFFICIENCY INVERTER READY FAN MOTORS WITH BUILT-IN SHAFT GROUNDING RINGS, FACTORY MOUNTED AND WIRED VARIABLE SPEED DRIVES (DANFOSS) FOR SUPPLY AND RETURN FANS, FACTORY MOUNTED AND WIRED FUSED DISCONNECT SWITCH, 24V CONTROL TRANSFORMER 2" MERV 8 FILTER BANKS.**

**ELECTRICAL:**  
CIRCUIT 1: 3/4"C, 3#12,#12G,CU  
CIRCUIT 2: 3/4"C,3#12,#12G,CU



MCKINSTRY CO.

SEATTLE:  
5005 3RD AVE SW  
SEATTLE, WA 98134  
206-762-3311  
www.mckinstry.com

PROJECT:  
**CITY OF MISSOULA  
CITY SHOPS**

FIM 48266 - 03.02

**REPLACE MAKE-UP  
AND EXHAUST AIR  
UNITS AND CONTROL**

PROJECT LOCATION  
XXX Missoula, MT 5980x

CONSULTANTS:

REGISTRATION:

ISSUES:		
NO	DATE	DESCRIPTION
	06/XX/2021	ISSUED FOR GMAX

DESIGNED: J. COULTER  
DRAWN: J. COULTER  
CHECKED: J. COULTER  
JOB NO: 202094-002

SHEET TITLE:  
**ELECTRICAL  
SCHEDULES**

SHEET NUMBER:









# City Shops FIMs

48281



# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

---

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**City Shops**

1305B Scott St.  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Int. Door(s) to be weather-stripped & sealed for isolation. Over-head Door(s) to be sealed on 4 sides.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>2,064</b>
Annual Cost of Leakage (Kwh):	-	<b>1,229</b>

**TYPE OF MEASURES:**

Ext. Door(s) to be weather-stripped & sealed. Heat only. 1305B.  
Int. Door(s) to be weather-stripped & sealed for isolation. 1305B  
Int. Door(s) to be weather-stripped & sealed for isolation. 1305B  
Over-head Door(s) to be sealed on 4 sides. 1305B  
Ext. Door(s) to be weather-stripped & sealed.1305A  
Attic Access Hatch(s), to be sealed.

Building Level	quantity or distance
First	9 Doors
First	5 Doors
Second	2 Doors
First	5 OHDoors
First	4 Doors
First	1 Hatches

AIR LEAKAGE:	feet	inches	
Doors	180	3/32	1.41 sq ft
Doors	100	3/32	0.78 sq ft
Doors	40	3/32	0.31 sq ft
OHDoors	288	3/16	4.50 sq ft
Doors	80	3/32	0.63 sq ft
Hatches	10	1/32	0.03 sq ft

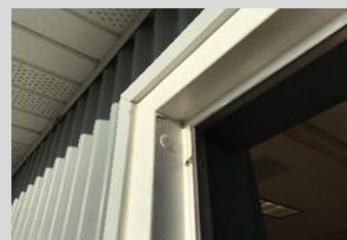
Totals	-	7.65 sq ft
		0.71 sq meter

**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm
Building K	145		

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# City Shops FIMs

## 50002

# Detailed Scope of Work

**FIM ID # 50002**  
**SHOPS 13.03 Overhead Door Controls**  
**City Shops - Missoula**

## GENERAL

Install new overhead door controls to provide for automated open/close operation with sufficient safety amenities to avoid contact with vehicles that are slow moving or parked in the doorway.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. N/A
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Demo
    - 1) Remove and haul (2) openers.
  - B. New Work
    - 1) Install (2) new openers with light curtain for more safety coverage, install light curtain on (2) new openers on south door, with lifts, less all electrical.
      - (i) Liftmaster BH501L5R Hoist opener with brake, photo eyes, and LC36 Light Curtain.
      - (ii) Liftmaster 890Max Remote
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Overhead door contractor and McKinstry to commission and test automatic controls.
21. Demolition and Removal Specialty Contractor
  - A. N/A

# Detailed Scope of Work

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## 22. Training

- A. Overhead door contractor and McKinstry to provide training as required for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.



# EXHIBIT F - City of Missoula Energy Performance Contract Proposal Project Forms- Fire Ph 1



# Table 3.1 - Energy Savings Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/3/2022

FIM ID	Facility Improvement Measures	FIM Type	Group	Facility	Guarantee Multiplier for Positive Numbers *	Guarantee Multiplier for Negative Numbers *	Electricity				Natural Gas		Water		Sewer		Total **
							kW	kW (\$)	kWh	kWh (\$)	Therm	Therm (\$)	kgal-W	kgal-W (\$)	kgal-S	kgal-S (\$)	All (\$)
48366	FS-1 04.01 Digital Controls Update & Integration	4	Fire	FS-1	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
48145	FS-1 09.01 LED Lighting	9	Fire	FS-1	95%	105%	68.4	\$875	25,207	\$2,317	-41	-\$40	0	\$0	0	\$0	\$3,152
48273	FS-1 13.01 Envelope Sealing, Caulking, etc.	13	Fire	FS-1	90%	110%	0.0	\$0	281	\$26	1,265	\$1,234	0	\$0	0	\$0	\$1,259
49265	FS-1 19.06 Water Conservation	19	Fire	FS-1	90%	110%	0.0	\$0	532	\$49	25	\$25	59	\$156	59	\$122	\$352
48367	FS-2 04.01 Digital Controls Update & Integration	4	Fire	FS-2	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
50008	FS-2 13.03 Roof Replacement	13	Fire	FS-2	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
48158	FS-2 04.01 Occupancy & Demand Controlled Ventilation for AHU	4	Fire	FS-2	100%	100%	0.0	\$0	2,669	\$245	2,489	\$2,427	0	\$0	0	\$0	\$2,672
48274	FS-2 13.01 Envelope Sealing, Caulking, etc.	13	Fire	FS-2	90%	110%	0.0	\$0	657	\$60	978	\$954	0	\$0	0	\$0	\$1,014
48157	FS-2 09.01 LED Lighting	9	Fire	FS-2	95%	105%	20.7	\$265	9,184	\$844	-14	-\$14	0	\$0	0	\$0	\$1,095
49271	FS-2 19.07 Water Conservation	19	Fire	FS-2	90%	110%	0.0	\$0	10,238	\$941	17	\$17	42	\$111	42	\$87	\$1,156
48368	FS-3 04.01 Digital Controls Update & Integration	4	Fire	FS-3	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
48164	FS-3 09.01 LED Lighting	9	Fire	FS-3	95%	105%	53.1	\$679	9,430	\$867	-17	-\$16	0	\$0	0	\$0	\$1,530
48275	FS-3 13.01 Envelope Sealing, Caulking, etc.	13	Fire	FS-3	90%	110%	0.0	\$0	564	\$52	841	\$819	0	\$0	0	\$0	\$871
49272	FS-3 19.08 Water Conservation	19	Fire	FS-3	100%	100%	0.0	\$0	12,196	\$1,121	20	\$19	49	\$131	49	\$102	\$1,373
48173	FS-4 04.01 Digital Controls Update & Integration	4	Fire	FS-4	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
48276	FS-4 13.01 Envelope Sealing, Caulking, etc.	13	Fire	FS-4	90%	110%	0.0	\$0	848	\$78	1,263	\$1,231	0	\$0	0	\$0	\$1,309
48168	FS-4 09.01 LED Lighting	9	Fire	FS-4	95%	105%	54.9	\$702	16,334	\$1,501	-21	-\$20	0	\$0	0	\$0	\$2,183
49266	FS-4 19.05 Water Conservation	19	Fire	FS-4	90%	110%	0.0	\$0	2,446	\$225	9	\$9	53	\$140	53	\$110	\$483
48369	FS-3 04.01 Digital Controls Update & Integration	4	Fire	FS-5	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0

# Table 3.1 - Energy Savings Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/3/2022

FIM ID	Facility Improvement Measures	FIM Type	Group	Facility	Guarantee Multiplier for Positive Numbers *	Guarantee Multiplier for Negative Numbers *	Electricity				Natural Gas		Water		Sewer		Total **
							kW	kW (\$)	kWh	kWh (\$)	Therm	Therm (\$)	kgal-W	kgal-W (\$)	kgal-S	kgal-S (\$)	All (\$)
50014	FS-5 13.03 5-yr Roof Maintenance	13	Fire	FS-5	90%	110%	0.0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
48179	FS-5 04.02 Occupancy Sensing & Demand Control Ventilation (DCV) for AHU	4	Fire	FS-5	100%	100%	0.0	\$0	-306	-\$28	3,126	\$3,047	0	\$0	0	\$0	\$3,019
48178	FS-5 09.01 LED Lighting	9	Fire	FS-5	95%	105%	33.3	\$426	11,274	\$1,036	-20	-\$19	0	\$0	0	\$0	\$1,443
48277	FS-5 13.01 Envelope Sealing, Caulking, etc.	13	Fire	FS-5	90%	110%	0.0	\$0	193	\$18	868	\$846	0	\$0	0	\$0	\$863
49273	FS-5 19.09 Water Conservation	19	Fire	FS-5	90%	110%	0.0	\$0	9,062	\$833	15	\$15	37	\$99	37	\$77	\$1,024
							<b>230</b>	<b>\$ 2,946</b>	<b>110,809</b>	<b>\$ 10,185</b>	<b>10,804</b>	<b>\$ 10,532</b>	<b>241</b>	<b>\$ 637</b>	<b>241</b>	<b>\$ 499</b>	<b>\$ 24,799</b>

\* The savings shown in this table are less than the calculated savings unless a guarantee multiplier of 100% is shown.

\*\* The guarantee is based on Key Performance Indicators shown in Table 3.2. Refer to Section 3 of the ESP for the method of converting Key Performance Indicators to dollars during the M&V period.

\*\*\* The guarantee is based on the aggregate savings for all FIMs, not on individual FIM savings.

Confidential and Proprietary



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors	
							Tasks	Tasks2	Tasks4			
FS-1 04.01 Digital Controls Update & Integration	FS-1	Non-Measured	1.	DDC Update			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Commission the updated control system through point-to-point testing, functional performance testing, and graphical user interface review to confirm accuracy and completeness of control system.	Meet with building manager and provide review of graphics and trends to confirm system operation.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.		
FS-1 09.01 LED Lighting	FS-1	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets	
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope	
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year	
FS-1 13.01 Envelope Sealing, Caulking, etc.	FS-1	Non-Measured	1.	Exterior, interior, and overhead door weather stripping	No weather stripping on doors	Weather stripping installed on 6 exterior doors, 3 interior doors, and 8 overhead doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency	
FS-1 19.01 Water Conservation	FS-1	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets	
FS-2 04.01 Digital Controls Update & Integration	FS-2	Non-Measured	1.	DDC Update			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Commission the updated control system through point-to-point testing, functional performance testing, and graphical user interface review to confirm accuracy and completeness of control system.	Meet with building manager and provide review of graphics and trends to confirm system operation.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.		
FS-2 04.02 Occupancy & Demand Controlled Ventilation for AHU	FS-2	A	1.	AHU Fan Power Control Type	VFD	VFD	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Verify proper OSA damper modulation based on demand (CO2 sensors). Verify sequence of operation features with functional performance testing. Verify additional items per detailed M&V plan.	Review Post-installation Cx Report to verify proper functionality of the new DCV controls.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Solar PV Production, Occupancy, Plug Loads, & Lighting Loads.	
			2.	Min AHU CFM %	53.08%	Modulated via CO2 sensors					Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
			3.	Demand Control Ventilation (DCV)	No DCV	Modulated via CO2 sensors					Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
FS-2 09.01 LED Lighting	FS-2	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets	



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
FS-2 13.01 Envelope Sealing, Caulking, etc.	FS-2	Non-Measured	1.	Exterior, interior, and overhead door weather stripping	No weather stripping on doors	Weather stripping installed on 5 exterior doors, 1 interior door, and 6 overhead doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
FS-2 13.03 Roof Replacement	FS-2	Non-Measured	1.	N/A			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittal material and confirm installation.	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
FS-2 19.01 Water Conservation	FS-2	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Kitchen equipment types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Kitchen Equipment	Validate kitchen equipment type and quantity by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
FS-3 04.01 Digital Controls Update & Integration	FS-3	Non-Measured	1.	DDC Update			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Commission the updated control system through point-to-point testing, functional performance testing, and graphical user interface review to confirm accuracy and completeness of control system.	Meet with building manager and provide review of graphics and trends to confirm system operation.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
FS-3 09.01 LED Lighting	FS-3	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
FS-3 13.01 Envelope Sealing, Caulking, etc.	FS-3	Non-Measured	1.	Exterior, interior, and overhead door weather stripping	No weather stripping on doors	Weather stripping installed on 4 exterior doors, 2 interior doors, and 5 overhead doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
FS-3 19.01 Water Conservation	FS-3	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets





# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
			2.	Kitchen equipment types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Kitchen Equipment	Validate kitchen equipment type and quantity by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
FS-4 04.01 Digital Controls Update & Integration	FS-4	Non-Measured	1.	DDC Update			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Commission the updated control system through point-to-point testing, functional performance testing, and graphical user interface review to confirm accuracy and completeness of control system.	Meet with building manager and provide review of graphics and trends to confirm system operation.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
FS-4 09.01 LED Lighting	FS-4	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
FS-4 13.01 Envelope Sealing, Caulking, etc.	FS-4	Non-Measured	1.	Exterior, interior, and overhead door weather stripping	No weather stripping on doors	Weather stripping installed on 7 exterior doors, 3 interior doors, and 8 overhead doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
FS-4 19.01 Water Conservation	FS-4	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Kitchen equipment types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Kitchen Equipment	Validate kitchen equipment type and quantity by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
FS-5 04.01 Digital Controls Update & Integration	FS-5	Non-Measured	1.	DDC Update			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Commission the updated control system through point-to-point testing, functional performance testing, and graphical user interface review to confirm accuracy and completeness of control system.	Meet with building manager and provide review of graphics and trends to confirm system operation.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
FS-5 04.02 Occupancy Sensing & Demand Control Ventilation (DCV) for AHU	FS-5	A	1.	AHU Fan Power Control Type	VFD	VFD	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Verify proper OSA damper modulation based on demand (CO2 sensors). Verify sequence of operation features with functional performance testing. Verify additional items per detailed M&V plan.	Review Post-installation Cx Report to verify proper functionality of the new DCV controls.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
			2.	Min AHU CFM %	52.75%	Modulated via CO2 sensors	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Verify proper OSA damper modulation based on demand (CO2 sensors). Verify sequence of operation features with functional performance testing. Verify additional items per detailed M&V plan.	Review Post-installation Cx Report to verify proper functionality of the new DCV controls.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Solar PV Production, Occupancy, Plug Loads, & Lighting Loads.
			3.	Demand Control Ventilation (DCV)	No DCV	Modulated via CO2 sensors	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Verify proper OSA damper modulation based on demand (CO2 sensors). Verify sequence of operation features with functional performance testing. Verify additional items per detailed M&V plan.	Review Post-installation Cx Report to verify proper functionality of the new DCV controls.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Solar PV Production, Occupancy, Plug Loads, & Lighting Loads.
FS-5 09.01 LED Lighting	FS-5	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
FS-5 13.01 Envelope Sealing, Caulking, etc.	FS-5	Non-Measured	1.	Exterior, interior, and overhead door weather stripping	No weather stripping on doors	Weather stripping installed on 4 exterior doors, 2 interior doors, and 6 overhead doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
FS-5 13.03 5-yr Roof Maintenance	FS-5	Non-Measured	1.	N/A			Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review submittal material and confirm installation.	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	
FS-5 19.01 Water Conservation	FS-5	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Kitchen equipment types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Kitchen Equipment	Validate kitchen equipment type and quantity by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets

# Table 3.3 - Baseline Utility Rates



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: 11/2/2022

Facility	Utility	Provider	Rate Name	Rate	Unit
FS-1	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
FS-1	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
FS-1	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
FS-1	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
FS-1	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF
FS-2	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
FS-2	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
FS-2	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
FS-2	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
FS-2	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF
FS-3	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
FS-3	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
FS-3	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
FS-3	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
FS-3	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF
FS-4	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
FS-4	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
FS-4	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
FS-4	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
FS-4	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF
FS-5	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
FS-5	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
FS-5	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
FS-5	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF

FS-5	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF
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# Table 4.2 - Facility Improvement Measure (FIM) Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Fire  
 Date: November 8, 2022

FIM ID	FIM Type	Facility Improvement Measures	FIM Description	Facility	Group	Budget	Annual Utility Cost Savings	Annual Operational Savings **	Calculated SPB	Potential Incentives ***	Avoided Capital	Net Customer Cost (with Incentives)	SPB (with Incentives)
48366	04	FS-1 04.01 Control System Update & Integration	Complete the controls integration and provide graphical user interface for operators. Controls for additional measures are included separately in their respective scopes of work.	FS-1	Fire	\$9,706	\$0	\$1,000	9.7	\$0	\$5,355	\$2,410	2.4
48145	09	FS-1 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	FS-1	Fire	\$44,669	\$3,152	\$649	13.1	\$1,697	\$0	\$37,145	13.1
48273	13	FS-1 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	FS-1	Fire	\$26,496	\$1,259	\$0	21.0	\$0	\$0	\$22,663	22.1
49265	19	FS-1 19.06 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, retrofit existing ice machines, retrofit irrigation controllers to enable weather-based control, install high efficiency electric hand dryers, and install on-site chemical cleaning infrastructure.	FS-1	Fire	\$6,492	\$352	\$50	17.7	\$0	\$0	\$9,141	17.7
48367	04	FS-2 04.01 Control System Update & Integration	Complete the controls integration and provide graphical user interface for operators. Controls for additional measures are included separately in their respective scopes of work.	FS-2	Fire	\$13,586	\$0	\$1,000	13.6	\$0	\$0	\$10,869	10.9
48158	04	FS-2 04.02 Occupancy & Demand Controlled Ventilation for AHU	Install space occupancy and CO2 sensor to reduce ventilation to zones when unneeded. This will allow further fan speed reduction via existing VFDs to modulate speed and air volume accordingly.	FS-2	Fire	\$43,891	\$2,672	\$0	16.4	\$0	\$0	\$35,113	16.1
48157	09	FS-2 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	FS-2	Fire	\$25,652	\$1,095	\$215	22.4	\$625	\$0	\$21,681	23.0
48274	13	FS-2 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	FS-2	Fire	\$20,602	\$1,014	\$0	20.3	\$0	\$0	\$17,621	21.3
50008	13	FS-2 13.03 Roof Replacement	The existing roof is beyond repair and has been nailed improperly to the deck, causing nails to back out and shingle loss. Replace the entire roof with 30-yr shingles, utilize the provided allowance as available for identified deck repairs, and refash penetrations and edges.	FS-2	Fire	\$159,516	\$0	\$2,000	79.8	\$0	\$114,091	\$22,346	11.2
49271	19	FS-2 19.07 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, replace and/or retrofit existing kitchen equipment, retrofit irrigation controllers to enable weather-based control, install high efficiency electric hand dryers, and install on-site chemical cleaning infrastructure.	FS-2	Fire	\$5,193	\$1,156	\$22	4.4	\$0	\$0	\$6,255	4.4
48368	04	FS-3 04.01 Control System Update & Integration	Complete the controls integration and provide graphical user interface for operators. Controls for additional measures are included separately in their respective scopes of work.	FS-3	Fire	\$9,701	\$0	\$1,000	9.7	\$0	\$0	\$7,761	7.8
48164	09	FS-3 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	FS-3	Fire	\$22,104	\$1,530	\$209	13.8	\$1,235	\$0	\$17,986	13.4
48275	13	FS-3 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	FS-3	Fire	\$17,574	\$871	\$0	20.2	\$0	\$0	\$15,031	21.2
49272	19	FS-3 19.08 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, replace and/or retrofit existing kitchen equipment, retrofit irrigation controllers to enable weather-based control, install high efficiency electric hand dryers, and install on-site chemical cleaning infrastructure.	FS-3	Fire	\$5,547	\$1,373	\$49	3.9	\$0	\$0	\$6,638	3.9
48173	04	FS-4 04.01 Digital Controls Update & Integration	Complete the controls integration and provide graphical user interface for operators. Controls for additional measures are included separately in their respective scopes of work.	FS-4	Fire	\$23,865	\$0	\$1,000	23.9	\$0	\$10,320	\$8,772	8.8
48168	09	FS-4 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	FS-4	Fire	\$47,477	\$2,183	\$486	20.6	\$2,638	\$0	\$38,646	20.2
48276	13	FS-4 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	FS-4	Fire	\$23,684	\$1,309	\$0	18.1	\$0	\$0	\$20,258	19.0
49266	19	FS-4 19.05 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, replace and/or retrofit existing kitchen equipment, retrofit irrigation controllers to enable weather-based control, install high efficiency electric hand dryers, and install on-site chemical cleaning infrastructure.	FS-4	Fire	\$6,119	\$483	\$74	11.9	\$0	\$0	\$7,394	11.9
48369	04	FS-5 04.01 Digital Controls Update & Integration	Complete the controls integration and provide graphical user interface for operators. Controls for additional measures are included separately in their respective scopes of work.	FS-5	Fire	\$13,736	\$0	\$1,000	13.7	\$0	\$0	\$10,989	11.0
48179	04	FS-5 04.02 Occupancy Sensing & Demand Control Ventilation (DCV) for AHU	Install space occupancy and CO2 sensor to reduce ventilation to zones when unneeded. This will allow further fan speed reduction via existing VFDs to modulate speed and air volume accordingly.	FS-5	Fire	\$46,204	\$3,019	\$0	15.3	\$0	\$0	\$36,963	15.0
48178	09	FS-5 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	FS-5	Fire	\$29,382	\$1,443	\$268	19.4	\$863	\$0	\$24,687	19.7
48277	13	FS-5 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	FS-5	Fire	\$16,330	\$863	\$0	18.9	\$0	\$0	\$13,968	19.9
50014	13	FS-5 13.03 5-yr Roof Maintenance	Performing a 5-yr roof maintenance contract will help to identify seasonal issues as they occur and maximize the life of the existing roof.	FS-5	Fire	\$6,489	\$0	\$600	10.8	\$0	\$0	\$5,550	9.3
49273	19	FS-5 19.09 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, replace and/or retrofit existing kitchen equipment, retrofit irrigation controllers to enable weather-based control, install high efficiency electric hand dryers, and install on-site chemical cleaning infrastructure.	FS-5	Fire	\$6,469	\$1,024	\$28	6.2	\$0	\$0	\$7,774	6.2
<b>TOTALS</b>						\$ 630,482	\$ 24,799	\$ 9,650	23.5	\$ 7,058	\$ 129,766	\$ 407,659	14.5

1. All savings are calculate at the base utility rates, refer to Table 3.3.  
 2. Per MCA, McKinstry guarantees units of energy saved, not dollars.  
 3. Savings guarantees are cumulative for the project rather than by individual FIM.  
 4. Rebates/incentives are only estimates and may change at the time of completion.  
 5. Avoided capital amounts are only estimates and are for illustrative purposes only.



# Fire Station FIMs

FS-1 48145

# Detailed Scope of Work

**FIM ID # 48145**  
**FS-1 09.01 LED Lighting**  
**FS-1**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
60	Yes	FS-1 INT	FRONT VESTIBLE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
61	Yes	FS-1 INT	FRONT HALLWAY	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	6	RET-2xLED4FT-DW	PAIR PICO WITH WALL SWITCH		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
62	Yes	FS-1 INT	FRONT OFFICE	TRFR REC 2X4	LED Lamp 12W- 2L	4	N			N = No Retrofit	No Retrofit Proposed	4	N	
63	Yes	FS-1 INT	OFFICE NORTH TO FRONT OFFICE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 3L	10	RET-3xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	10	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH PLATE
64	Yes	FS-1 INT	BATTALIONS CHIEF OFFICE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
65	Yes	FS-1 INT	WOMANS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
66	Yes	FS-1 INT	JANITOR STORAGE BETWEEN WOMANS AND MENS	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
67	Yes	FS-1 INT	MENS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
68	Yes	FS-1 INT	CHIEFS CONFERENCE ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 3L	8	RET-3xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	8	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH PLATE
69	Yes	FS-1 INT	ASSISTANT FIRE CHIEF	TRFR REC 2X4	LED Lamp 12W- 2L	4	N			N = No Retrofit	No Retrofit Proposed	4	N	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH PLATE
70	Yes	FS-1 INT	EMS COORDINATOR	TRFR REC 2X4	LED Lamp 12W- 2L	2	N			N = No Retrofit	No Retrofit Proposed	2	N	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
71	Yes	FS-1 INT	TRAINING OFFICER	TRFR REC 2X4	LED Lamp 12W- 2L	2	N			N = No Retrofit	No Retrofit Proposed	2	N	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
72	Yes	FS-1 INT	FIRE CHIEF	TRFR REC 2X4	LED Lamp 12W- 2L	4	N			N = No Retrofit	No Retrofit Proposed	4	N	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH PLATE
73	Yes	FS-1 INT	ASSISTANT FIRE CHIEF ACROSS CHIEFS OFFICE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	4	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 2G WH SWITCH PLATE
74	Yes	FS-1 INT	NORTH STAIRWELL TO BACEMENT	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	3	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
75	Yes	FS-1 INT	ELEVATOR MECH ROOM	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
76	Yes	FS-1 INT	BACEMENT HALLWAY	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	7	RET-2xLED4FT-DW	PAIR PICO WITH WALL SWITCH		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	7	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
77	Yes	FS-1 INT	EVIDENCE STORAGE	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
78	Yes	FS-1 INT	EQUIPMENT STORAGE	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
79	Yes	FS-1 INT	EQUIPMENT STORAGE	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
80	Yes	FS-1 INT	BACEMENT ELEVATOR ENTRANCE	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
81	Yes	FS-1 INT	SOUTH STAIRWELL TO BACEMENT	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	3	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
82	Yes	FS-1 INT	COMPUTER ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
83	Yes	FS-1 INT	NORTH STAIRWELL TO 2ND FLOOR	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	3	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
84	Yes	FS-1 INT	2ND FLOOR HALLWAY	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	4	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (2) WIRELESS HALLWAY SENSOR, (1) 1G WH SWITCH PLATE
85	Yes	FS-1 INT	2ND FLOOR HALLWAY	SCONCE 2FT	CFL 4P-H 42W- 1L	3	RET/1x22DW-PL-ER			RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	3	LED Compact Lamp	CTRL'D
86	Yes	FS-1 INT	OFFICE SOUTH BREAK ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
87	Yes	FS-1 INT	WORKOUT ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	4	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
88	Yes	FS-1 INT	LIVING ROOM/ KITCHEN AREA	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	5	RET-1xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	5	Direct Wire LED Tube	
89	Yes	FS-1 INT	LIVING ROOM/ KITCHEN AREA	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	



LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
90	Yes	FS-1 INT	KITCHEN AREA	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	7	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	7	Direct Wire LED Tube	
91	Yes	FS-1 INT	KITCHEN AREA	Can Round 6"	CFL 4P-H 26W- 1L	1	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	1	LED Kit	
92	Yes	FS-1 INT	MECH ROOM	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	6	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	
93	Yes	FS-1 INT	SOUTH JANITOR CLOSET	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
94	Yes	FS-1 INT	DORM SECTION HALLWAY	TRFR REC 2X4	LED Lamp 12W- 2L	3	LED LED Lamp (Non Linear Tube) 12 Watt,2 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	3	N	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS HALLWAY SENSOR, (1) 1G WH SWITCH PLATE
95	Yes	FS-1 INT	MENS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
96	Yes	FS-1 INT	MENS RESTROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
97	Yes	FS-1 INT	WOMANS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
98	Yes	FS-1 INT	WOMANS RESTROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
99	Yes	FS-1 INT	DORM ROOMS	TRFR REC 2X4	LED Lamp 12W- 2L	8	LED LED Lamp (Non Linear Tube) 12 Watt,2 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	8	N	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
100	Yes	FS-1 INT	SOUTH STAIRWELL TO 2ND FLOOR	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
101	Yes	FS-1 INT	OPEN BAY AREA	TRFR REC 2X4	F T8 F32-32W-48" NLO- 4L	24	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),4 lamp/fxtr	RET-4xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (4), remove existing fluorescent ballast.	24	Direct Wire LED Tube	
102	Yes	FS-1 INT	OPEN BAY AREA	TRFR REC 1X4	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
103	Yes	FS-1 INT	OPEN BAY AREA	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
104	Yes	FS-1 INT	EQUIPMENT ROOM FOR TANKS	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
105	Yes	FS-1 INT	STORAGE ROOM SOUTH OF TANK EQUIPMENT ROOM	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
106	Yes	FS-1 INT	LADDER UP TO MECH ROOM LEADING TO ROOF	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
107	Yes	FS-1 INT	ROOF	WP SMALL FT	HPS Mogul 100W- 1L	1	High Pressure Sodium Mogul Base (AKA: E39) 100 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x34LEDF_FL_TR		IN = Install New Fxtr	Install new LED mood, 34w, trunion mount, Bronze, 120-277V. Install hood accessory and direct towards flag.	1	LED Fixture	
108	Yes	FS-1 INT	ROPE AREA WITH LADDER GOING UP	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
109	Yes	FS-1 INT	LAUNDRY ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
110	Yes	FS-1 EXT	EXTERIOR	WP MEDIUM FT	HPS Mogul 250W- 1L	2	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x74LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 74W, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
111	Yes	FS-1 EXT	EXTERIOR	POLE DEC 1 HEAD PER POLE	HPS Med 50W- 1L	3	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x25_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 25 watts.	3	LED Retrofit Lamp	
112	Yes	FS-1 EXT	EXTERIOR	GOOSENK	Incan SI-Med A19 60W- 1L	2	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	2	LED Retrofit Lamp	
113	Yes	FS-1 EXT	EXTERIOR	POLE DEC 1 HEAD PER POLE	HPS Med 50W- 1L	3	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x25_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 25 watts.	3	LED Retrofit Lamp	
114	Yes	FS-1 EXT	EXTERIOR	POLE SB 1 HEAD PER POLE SQ DIR ARM BLK	HPS Mogul 250W- 1L	2	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x113LEDF_SB_SQ_V		IN = Install New Fxtr	Install new LED shoebox lxtr. Square direct arm mount, type V distribution, 113W, Pole mount, 3000K Full Cutoff , Bronze, 120-277V Twistlock PC	2	LED Fixture	
115	Yes	FS-1 EXT	EXTERIOR	Can Round 6"	Incan SI-Med A19 60W- 1L	1	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	1	LED Kit	
116	Yes	FS-1 EXT	EXTERIOR	SCONCE 2FT	Incan SI-Med A19 60W- 1L	1	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	1	LED Retrofit Lamp	



# Fire Station FIMs

FS-1 48273

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**FS-1**

625 E. Pine S.  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Int. Door(s) to be weather-stripped & sealed for isolation. Over-head Door(s) to be sealed on 4 sides. Heat only.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>1,406</b>
Annual Cost of Leakage (Kwh):	-	<b>312</b>

**TYPE OF MEASURES:**

- Ext. Door(s) to be weather-stripped & sealed. Heat only.
- Ext. Door(s) to be weather-stripped & sealed.
- Int. Door(s) to be weather-stripped & sealed for isolation.
- Over-head Door(s) to be sealed on 4 sides. Heat only.

Building Level	quantity or distance
First	2 Doors
First	4 Doors
First	3 Doors
First	8 OHDoors

**AIR LEAKAGE:**

	feet	inches		
Doors	40	3/32	0.31	sq ft
Doors	80	3/32	0.63	sq ft
Doors	60	3/32	0.47	sq ft
OHDdoors	416	1/8	4.33	sq ft

Totals	-	5.74 sq ft
		0.53 sq meter

**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K      140

**Example Calculation**

$$\frac{(\text{leakage} \times \text{bldg "K"}) \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Fire Station FIMs

FS-1 48366



# Detailed Scope of Work

**FIM ID # 48366**  
**FS-1 04.01 Digital Controls Update & Integration**  
**FS-1**

## GENERAL

This Fire Station has an existing DDC system but the system would benefit from updating of hardware as needed and refreshed user interface along with remote access capabilities.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Control contractor to provide and install all necessary hardware to update the control system.
  - B. Setup, programming, commissioning, testing, and demonstration of the system as required.
  - C. If a centralized control system is present, new work shall be integrated into the main system and added to the graphical user interface.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Fire Station FIMs

## FS-1 49265

# Investment Grade Audit

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## 49265-19.01 FS-1 - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures.

City of Missoula, MT V1		Demographics and Usage									
Count Bldg # Building Name Category	Demographics and Usage										
	1	2	3	4	5	6	7	8	9	10	
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900	
Per Day Visitor	10	10	10	10	10	10	10	10	10	10	
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882	
Sale Tax%											
Population Group 1	WATER CLOSET USE (daily per person (bath))	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	<2hr (Visitor)	
	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0	
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9	
Population Group 2	WATER CLOSET USE (daily per person (bath))	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	
	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6	
	WATER CLOSET USE (daily per person (bath))	0.1	0.2	0.1	6.6	0.5	0.5	0.5	0.5	1.5	
Population Group 3	WATER CLOSET USE (daily per person (bath))	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	
	WATER CLOSET USE (daily per person (bath))	35.8	14.0	1.9	140.0	18	65	38	45	33	31.3
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	261
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	104
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	15.7
	WATER CLOSET USE (daily per person (bath))	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	15.7
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	365.0
	WATER CLOSET USE (daily per person (bath))	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5	78.3
	WATER CLOSET USE (daily per person (bath))	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	15.7
Population Group 4	WATER CLOSET USE (daily per person (bath))	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	
	WATER CLOSET USE (daily per person (bath))	15	34	28	2100					470	
	WATER CLOSET USE (daily per person (bath))	261	261	261	120	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	7.5	17.0	14.0	1050.0					235.0	
	WATER CLOSET USE (daily per person (bath))	7.5	17.0	14.0	1050.0					235.0	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	37.3	81.0	70.0	5250.0					1175.0	
	WATER CLOSET USE (daily per person (bath))	15.0	34.0	28.0	2100.0					470.0	
Population Group 5	WATER CLOSET USE (daily per person (bath))	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	
	WATER CLOSET USE (daily per person (bath))	0.5	2.0	0.6							
	WATER CLOSET USE (daily per person (bath))	2.5	0.8								
	WATER CLOSET USE (daily per person (bath))	10	10	10	10	10	10	10	10	10	
	WATER CLOSET USE (daily per person (bath))	75	60	60	60	60	60	60	60	60	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))										
	WATER CLOSET USE (daily per person (bath))										
	WATER CLOSET USE (daily per person (bath))										
	WATER CLOSET USE (daily per person (bath))										
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8	
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0	
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0	
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0	
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1	
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6	

Demographics and Usage

City of Missoula, MT V1





8 Fire Station 1

Summary table for Fire Station 1 showing various metrics like Gallons Saved Per Year, Pre Peak Demand (104.48), Post Peak Demand (136.927), and Pre Gallons Consumed (85.129).

Performance metrics table for Fire Station 1 including WWSN QTY, Gas Decr, Make/Model, Combined Use, and Make-up.

Summary table for Fire Station 1 showing Total Operational Savings of \$50.26.

7 Fire Station 2

Summary table for Fire Station 2 showing various metrics like Gallons Saved Per Year, Pre Peak Demand (51.64), Post Peak Demand (74.401), and Pre Gallons Consumed (93.176).

Performance metrics table for Fire Station 2 including WWSN QTY, Gas Decr, Make/Model, Combined Use, and Make-up.

Summary table for Fire Station 2 showing Total Operational Savings of \$22.64.

6 Fire Station 3

Summary table for Fire Station 3 showing various metrics like Gallons Saved Per Year, Pre Peak Demand (77.27), Post Peak Demand (98.845), and Pre Gallons Consumed (58.091).

Performance metrics table for Fire Station 3 including WWSN QTY, Gas Decr, Make/Model, Combined Use, and Make-up.

Summary table for Fire Station 3 showing Total Operational Savings of \$49.16.

5 Fire Station 4

Summary table for Fire Station 4 showing various metrics like Gallons Saved Per Year, Pre Peak Demand (73.64), Post Peak Demand (95.859), and Pre Gallons Consumed (34.675).

Performance metrics table for Fire Station 4 including WWSN QTY, Gas Decr, Make/Model, Combined Use, and Make-up.

Summary table for Fire Station 4 showing Total Operational Savings of \$28.50.

10 Corvairs

Summary table for Corvairs showing various metrics like Gallons Saved Per Year, Pre Peak Demand (89.69), Post Peak Demand (108.491), and Pre Gallons Consumed (797.605).

Performance metrics table for Corvairs including WWSN QTY, Gas Decr, Make/Model, Combined Use, and Make-up.

Summary table for Corvairs showing Total Operational Savings of \$134.14.



**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs												
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms
																of Total Fixture Flow:	50%	120*	50%				
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65*	120*	50%	758	379	223,225	2.4		
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 5	2	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0		



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																	of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65*	120*	50%	12,425	6,212	3,660,889	36.6			
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs															
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																			of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65*	120*	50%	120,600	60,300	35,533,928	355.3			
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65*	120*	50%	45,457	22,728	13,393,497	133.9			
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			



# Fire Station FIMs

FS-2 48157



# Detailed Scope of Work

**FIM ID # 48157**  
**FS-2 09.01 LED Lighting**  
**FS-2**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
117	Yes	FS-2 INT	PUBLIC LOOBY 100	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS HALLWAY SENSOR, (1) 1G WH SWITCH PLATE
118	Yes	FS-2 INT	PUBLIC RESTROOM 102	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
119	Yes	FS-2 INT	CONTROL ROOM 103	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
120	Yes	FS-2 INT	DAY ROOM 107	VANITY 4FT	F T8 F32-32W-48" NLO- 1L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (3) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (1) 3G WH SWITCH PLATE
121	Yes	FS-2 INT	DAY ROOM 107	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	9	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	9	Direct Wire LED Tube	CTRL'D
122	Yes	FS-2 INT	DAY ROOM 107	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	3	Direct Wire LED Tube	CTRL'D
123	Yes	FS-2 INT	STATION OFFICE 104	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
124	Yes	FS-2 INT	WORKOUT ROOM 105	WRAP PNDR 4FT WIDE	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
125	Yes	FS-2 INT	JANITOR CLOSET 106	WRAP PNDR 4FT WIDE	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
126	Yes	FS-2 INT	HALLWAY 121	TRFR CTR BSKT 2X2	F T8 F17-24" NLO- 2L	4	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW	PAIR PICO WITH WALL SWITCH	RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
127	Yes	FS-2 INT	HALLWAY 117	TRFR CTR BSKT 2X2	F T8 F17-24" NLO- 2L	4	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW	PAIR PICO WITH WALL SWITCH	RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
128	Yes	FS-2 INT	HEAD CAPTAIN DORM ROOM	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
129	Yes	FS-2 INT	HEAD CAPTAIN DORM ROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
130	Yes	FS-2 INT	DORM ROOMS	Can Round 6"	CFL 4P-H 26W- 1L	5	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	5	LED Kit	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
131	Yes	FS-2 INT	DORM ROOMS	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
132	Yes	FS-2 INT	DORM RESTROOM	VANITY 2FT	F T8 F17-24" NLO- 2L	1	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
133	Yes	FS-2 INT	DORM RESTROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
134	Yes	FS-2 INT	DORM RESTROOM	VANITY 2FT	F T8 F17-24" NLO- 2L	1	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
135	Yes	FS-2 INT	DORM RESTROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
136	Yes	FS-2 INT	DORM RESTROOM	VANITY 2FT	F T8 F17-24" NLO- 2L	1	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
137	Yes	FS-2 INT	DORM RESTROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
138	Yes	FS-2 INT	HALLWAY 122	Can Round 6"	CFL 4P-H 26W- 1L	2	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	2	LED Kit	
139	Yes	FS-2 INT	SHOP 124	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
140	Yes	FS-2 INT	DECON LAUNDRY 122	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 2G WH SWITCH PLATE
141	Yes	FS-2 INT	APPARATUS ROOM 125	Highbay Rctngl Chain	LED Tube 12W- 6L	12	LED LED Linear Tube 12 Watt,6 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	12	N	
142	Yes	FS-2 EXT	SOUTH EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 2L	4	Compact Fluorescent 4 Pin Horizontal 42 Watt,2 lamp/fxtr	IN/1x28LED-FWP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	4	LED Fixture	
143	Yes	FS-2 EXT	SOUTH EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 1L	1	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LED-FWP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	1	LED Fixture	
144	Yes	FS-2 EXT	EAST EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 1L	2	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LED-FWP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
145	Yes	FS-2 EXT	EAST EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 2L	1	Compact Fluorescent 4 Pin Horizontal 42 Watt,2 lamp/fxtr	IN/1x28LED-FWP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	1	LED Fixture	
146	Yes	FS-2 EXT	NORTH EXTERIOR	FLD Grd Yoke BRZ	HPS Med 50W- 1L	1	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	N	DND - IN GROUND FLOOD	N = No Retrofit	No Retrofit Proposed	1	N	



				Existing				Proposed						
ID	In Scope	Building	Room Name	Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
147	Yes	FS-2 EXT	NORTH EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 2L	3	Compact Fluorescent 4 Pin Horizontal 42 Watt, 2 lamp/fxtr	IN/1x28LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	3	LED Fixture	

# Fire Station FIMs

FS-2 48158



# Detailed Scope of Work

**FIM ID # 48158**  
**FS-2 04.01 Occupancy & Demand Controlled Ventilation for AHU**  
**FS-2**

## GENERAL

Install space occupancy and CO2 sensor to reduce ventilation to zones when unneeded. This will allow further fan speed reduction via existing VFDs to modulate speed and air volume accordingly.

## SCOPE

- A. "Provide" as written below shall mean furnish and install.
- B. Controls
  1. Subcontractor shall survey existing facility controls as-builts and installed system to determine necessary controller capacity to support this scope of work. Include all necessary equipment, software, graphics and programming upgrades.
  2. General Requirements
    - i. For proposed scope with new control points, Subcontractor shall furnish and install devices, conduit, conductors, and related accessories. Subcontractor shall also provide a comprehensive graphical user interface (including floor plans if not existing) that enables web-browser clients to perform essential functionals of analytics, data logging/trending, archiving, alarming, dashboarding, master scheduling and database management. Furnish and install all programming necessary to operate the systems per the Design Intent set forth by McKinstry. Provide enough controller I/O for 15% expansion capacity.
    - ii. All controllers shall be LON or native BACnet and BTL listed. All BACnet IP and BACnet MSTP devices shall be discoverable by Tritium or Niagara JACE or Supervisor.
    - iii. Provide capability to store and archive a minimum of one-year trend data for 40% of control points on a 15-minute interval. Provide equipment level graphics for all new or modified equipment added to the new control system.
    - iv. Low Voltage Wiring and all required 120 V for control panels. Controls shall be responsible for providing its own transformers and 120 V power.
  3. Scope of work
    - i. Provide all controls installation necessary to facilitate the following new controls sensors and strategies:
      1. Zone occupancy, CO2 sensors, tubing, etc.:
        - a. Refer to attached sketches for sensor locations. Final locations shall be coordinated in field.
      2. Air Flow monitoring to be added to AHU-1
        - a. Total of three (3) air flow monitoring stations, to be integrated into BAS and DCV control sequences. Airflow monitoring shall be installed in supply air, return air, and outside air ductwork.
      3. Provide any new controller and software expansions to existing owner's BAS required to facilitate new scope.
      4. Provide all wiring, materials, conduit, and modifications to existing system as required for a complete installation.
      5. Assist McKinstry Commissioning and TAB with their work.
      6. Reference drawings for additional requirements.
      7. Provide (2) hours Owner Training for this FIM.

# Detailed Scope of Work

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## C. Commissioning

1. McKinstry Commissioning Engineer will fully commission the proposed controls and HVAC systems.

## D. TAB

1. Provide preconstruction TAB on all air systems. TAB shall include but not be limited to the following:
  - i. Fan airflows and differential pressures. Fan speeds where applicable
  - ii. Air terminal airflows and damper settings.
2. Provide post-construction TAB on all air systems. TAB shall include but not be limited to the following:
  - i. Fan airflows and differential pressures. Fan speeds where applicable.
  - ii. Air terminal airflows and damper settings.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

## AIR HANDLER SCHEDULE EXISTING AIR HANDLING UNIT SCHEDULE FOR REFERENCE ONLY

UNIT	MFR	MODEL	MIN OCC. OSA CFM	UNIT CFM	SA FAN				RA FAN				HEATING COIL							COOLING COIL							ELEC.			NOTES		
					SIZE/TYP	MOTOR	ESP	TSP	SIZE/TYP	MOTOR	ESP	TSP	EDB	LDB	MBH	ROWS/FPI	GPM	EWT/LWT	APD	WPO	EOB/EWB	LDB/LWB	MBH	ROWS/FPI	GPM	EWT/LWT	APD	WPO	VOLT/PH		MCA	MOP
AHU-1	McQUAY	CAH010GDAC	1,520	4,500	14.56 AF	7.5	2.5	3.88	13.22 AF	7.5	1.5	1.80	51	72	103.0	1/6	7.1	180/160	0.14	0.1	B1/64	55/53	150.0	1/6	0X	-	0.82	-	208V/3Ø	-	-	1

DATUM ELEV. FOR ACFM IS 3250 FT, STATIC PRESSURE IS INCHES WATER COLUMN, TEMPERATURES ARE IN DEGREES FAHRENHEIT, FLUID IS WATER/30% PROPYLENE GLYCOL, ENTERING TEMP IS IN DEGREES FAHRENHEIT, WATER PRESS DROP IS IN FEET OF HEAD, AIR PRESS DROP IS IN INCHES OF WATER COLUMN

ALTERNATE MANUFACTURERS: TRANE

1) MODULAR DESIGN, SEMI-CUSTOM INDOOR DRAW-THROUGH UL-LISTED AIR HANDLER. UNIT SHALL FEATURE FULL PERIMETER WELDED BASE FRAME WITH STRUCTURAL STEEL TUBING AND CROSS SUPPORT MEMBERS. UNIT BASE SHALL INCLUDE 2" THICK INSULATED DOUBLE-BOTTOM FLOOR. EXTERIOR PANELS SHALL BE INSULATED 16GA/20GA OUTER/INNER DBL-WALL CONSTRUCTION C-60 GALV. STEEL, PERFORATED LINER, WITHOUT PAINT, INCLUDING THERMAL BREAKS FROM FRAME FOR ALL SECTIONS, INSULATION SHALL BE INJECTED FOAM WITH MINIMUM R=13. ACCESS DOORS SHALL BE SOLID DBL-WALL INSULATED, HINGED, GASKETED. SUPPLY/RETURN FANS TO BE OF TYPE INDICATED, WELDED CONSTRUCTION. WATER COILS SHALL BE TESTED UNDER ARI STANDARD 410, CONSTRUCTED OF 5/8" 0.020 SEAMLESS COPPER TUBING MECHANICALLY EXPANDED INTO 0.008" ALUMINUM FIN COLLARS WITH SEAMLESS COPPER HEADERS AND NPT SCH-40 RED BRASS CONNECTIONS EXTENDED TO CABINET EXTERIOR, MOUNTED ON SUPPORT RACK SYSTEM, INCLUDE INTERMEDIATE DRAIN PAN. IAQ STYLE CONDENSATE DRAIN PAN SHALL BE PROVIDED UNDER COOLING COILS, 16GA STAINLESS STEEL, PITCHED, EXTENDED TO CABINET EXTERIOR. FILTER RACK SHALL INCLUDE MAGNETIC FILTER GAUZE. DAMPERS SHALL BE LOW-LEAKAGE AIRFOIL BLADE WITH BLADE AND JAMB SEALS, PARALLEL OPERATION ORIENTATED FOR RETURN/FRESH AIR MIXING. EACH FAN SECTION SHALL INCLUDE AN INTERIOR COURTESY LIGHT WITH EXTERIOR SWITCH. ALL ELECTRICAL COMPONENTS AND ASSEMBLIES SHALL COMPLY WITH NEMA STANDARDS. MOTORS TO BE NEMA RATED PREMIUM EFFICIENCY MOTORS. FURNISH AND INSTALL 120V/1Ø DUCT SMOKE DETECTOR. PROVIDE WITH FIELD MOUNTED VFD WITH FUSED DISCONNECT (DAN FOSS VLT 8000) ON SUPPLY AND RETURN FANS AND 3 SPARE FUSES OF EACH SIZE AND TYPE. MOUNT ON BACKBOARD ADJACENT TO VFD.



MCKINSTRY CO.

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PROJECT:  
**CITY OF MISSOULA  
FIRE STATION - 2**

FIM 48158-04.01

OCCUPANCY AND DCV  
FOR AHU

247 MOUNT AVE. MISSOULA, MT, 59801

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

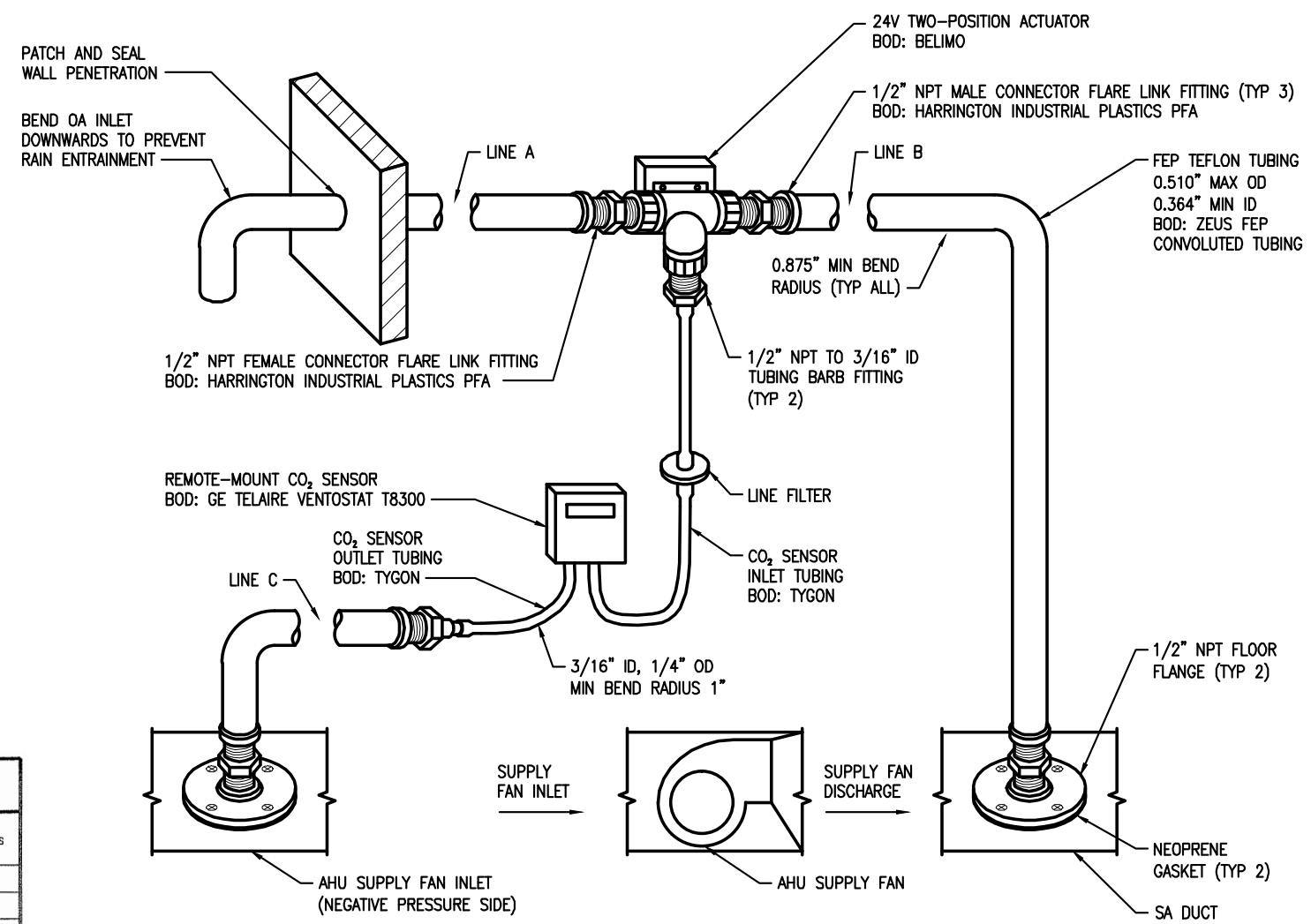
DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_



- NOTES:
1. USE TEFLON TAPE AT THREADED CONNECTIONS.
  2. SEAL DUCT PENETRATIONS AIR-TIGHT.
  3. LIMIT THE MAXIMUM LENGTH OF LINE A, B, OR C TO 100 FT OF TUBING EACH.
  4. ROUTE TUBING FOR LINE A, B, AND C TO MINIMIZE BENDING.
  5. LIMIT CO<sub>2</sub> SENSOR INLET AND OUTLET TUBING TO 3 FT EACH.
  6. INSTALL INDOORS.
  7. ROUTE LINE A TO NEAREST EXTERIOR WALL FOR OA REFERENCE.

EXISTING VAV SCHEDULE. SHOWN FOR REFERENCE ONLY.

EQUIPMENT NO.		SERVICE		AIRFLOW				HEATING CAPACITY						NO. LEVELS		MANUFACTURER & MODEL	SIZE	OPTIONS-ACCESSORIES
MAX CFM	MIN CFM	INLET STATIC	OUTLET STATIC	MBH	LAT (°F)	WATER ENT. (°F)	WATER LGV. (°F)	GPM	COIL ROWS	Δp FT H2O	RAD	DISCH						
VAV-1	SLEEP ROOMS	680	450	1.0	0.25	17.2	95	180	130	1.0	2	0.2	14	16	KRUEGER LMHS	08	-	
VAV-2	CAPTAINS ROOM	490	230	1.0	0.25	8.8	95	180	155	1.0	1	0.5	13	14	KRUEGER LMHS	08	-	
VAV-3	ENTRY/OFFICE	910	640	1.0	0.25	24.5	95	180	130	1.0	2	0.2	15	14	KRUEGER LMHS	09	-	
VAV-4	DAY ROOM	1025	580	1.0	0.25	19.4	90	180	165	4.2	1	2.8	17	16	KRUEGER LMHS	09	-	
VAV-5	APPARATUS BAY	1000	100	1.0	0.25	23.3	79	180	160	2.7	1	1.3	17	16	KRUEGER LMHS	09	-	
VAV-6	WORKOUT ROOM	370	205	1.0	0.25	24.5	95	180	155	2.1	2	1.0	16	15	KRUEGER LMHS	08	-	

ALTERNATE MANUFACTURERS: TITUS, METAL-ARE, MAILOR, CARNES  
NOTES:  
CAPACITIES BASED ON 30% PROPYLENE GLYCOL, 55 F ENTERING AIR TEMP, AND 180 F ENTERING WATER TEMP

1

## INDOOR SUPPLY AIR CO<sub>2</sub> DCV SENSOR ASSEMBLY DETAIL

NOT TO SCALE



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PROJECT:  
**CITY OF MISSOULA  
FIRE STATION - 2**  
  
FIM 48158-04.01  
  
OCCUPANCY AND DCV  
FOR AHU

247 MOUNT AVE. MISSOULA, MT, 59801

ISSUES:

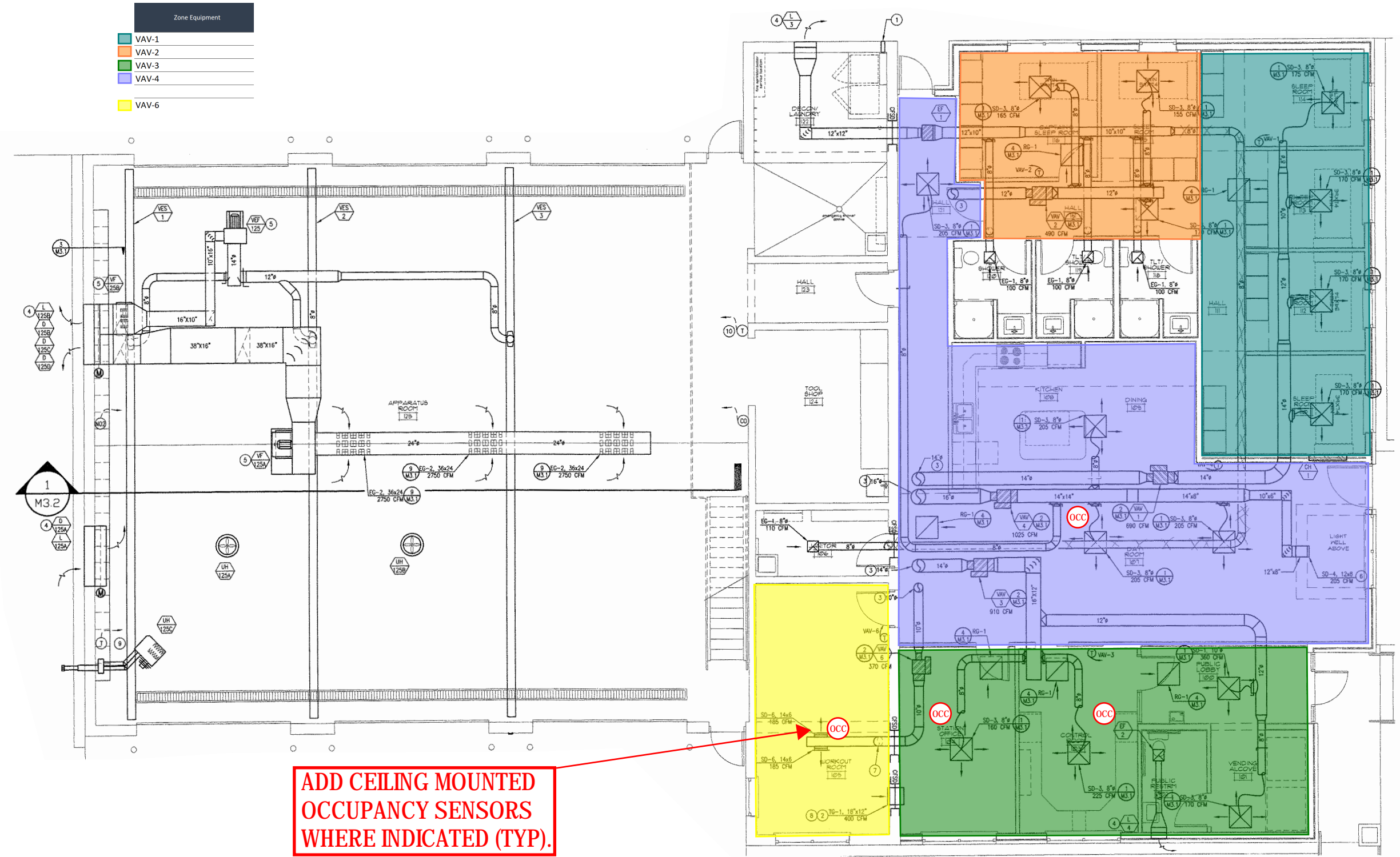
NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_  
DRAWN: \_\_\_\_\_  
CHECKED: \_\_\_\_\_  
JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_

- Zone Equipment
- VAV-1
  - VAV-2
  - VAV-3
  - VAV-4
  - VAV-6



**ADD CEILING MOUNTED  
OCCUPANCY SENSORS  
WHERE INDICATED (TYP).**

**1** **MAIN FLOOR PLAN**  
M-2 SCALE: NTS





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PROJECT:  
**CITY OF MISSOULA  
FIRE STATION - 2**

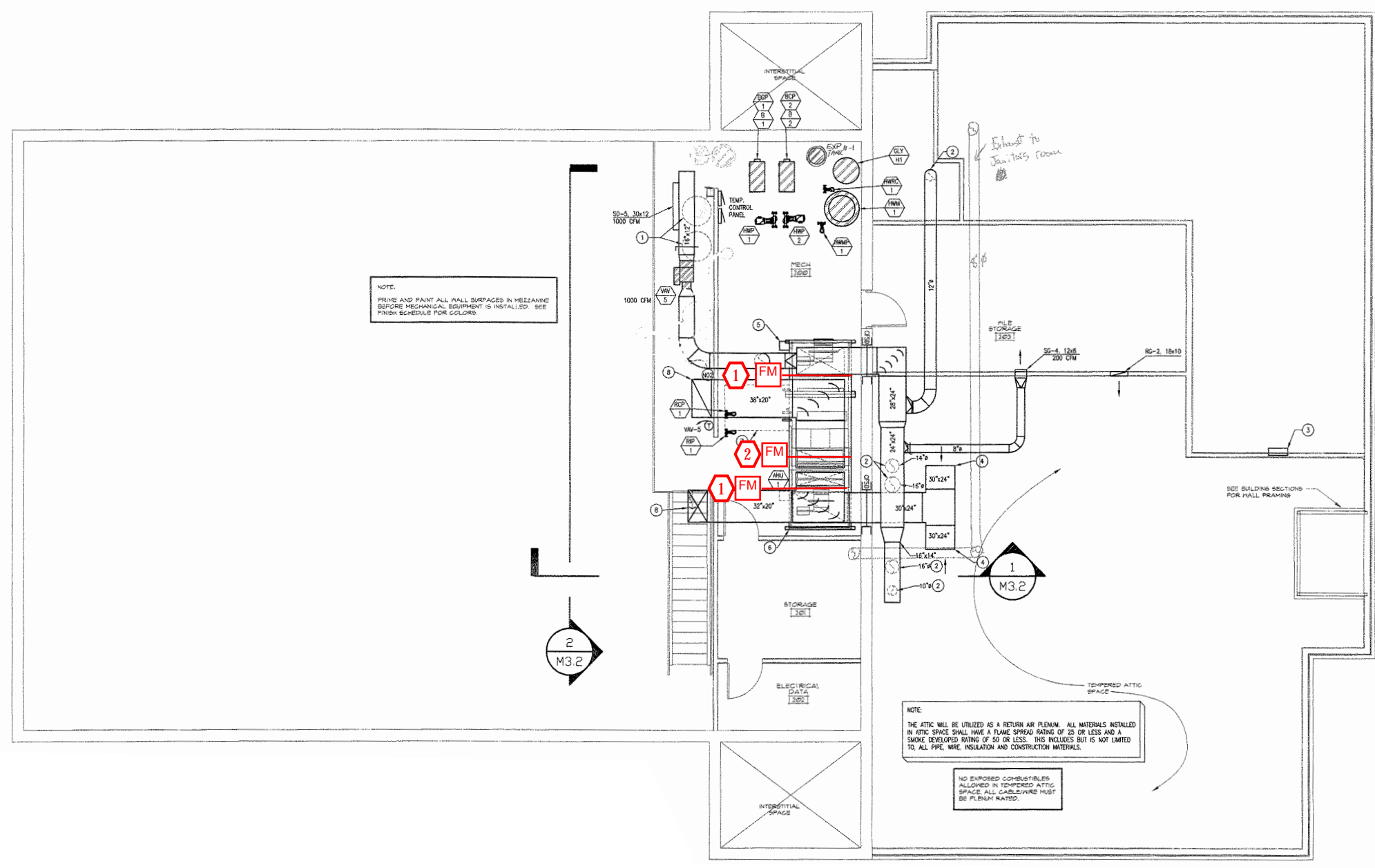
FIM 48158-04.01

OCCUPANCY AND DCV  
FOR AHU

247 MOUNT AVE. MISSOULA, MT, 59801

**KEYNOTES:**

- ① INSTALL AIRFLOW MONITORING STATION IN EXISTING AIR HANDLING UNIT SUPPLY AND RETURN AIR DUCT. INTEGRATE INTO DCV CONTROL SEQUENCES AND OWNER'S BAS.
- ② INSTALL AIRFLOW MONITORING STATION IN EXISTING AIR HANDLING UNIT OUTSIDE AIR DUCT. INTEGRATE INTO DCV CONTROL SEQUENCES AND OWNER'S BAS.



**1 MEZZANINE PLAN**  
M-3 SCALE: NTS

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_  
 DRAWN: \_\_\_\_\_  
 CHECKED: \_\_\_\_\_  
 JOB NO: \_\_\_\_\_  
 SHEET TITLE:

SHEET NUMBER:



(MultiZone VAV Fan with SA Co2+Flow stations)

1. Occupied Mode:

- 1.1. The Occupied Mode shall be determined by the fan unit schedule as entered through the EMS. The DDC system shall start the supply fan and return fans via the VFD and shall run continuously. The speed of the fan shall be set per the Supply Fan Speed control.
- 1.2. Fan Status: Provide a VFD run status indication for the Supply and Return Fans.
- 1.3. Start any associated Exhaust Fan whenever the Supply fan is running in the Occupied mode.
- 1.4. VAV boxes associated with this fan will be indexed to their "Standby" mode of operation.

2. Unoccupied Mode:

- 2.1. Whenever the air handling unit is indexed off, the supply and exhaust fan shall stop.
- 2.2. The outside air dampers will close and the return damper will open.
- 2.3. All associated VAV boxes are indexed to their "Unoccupied" mode of operation.
- 2.4. The heating valve will control for a mixed air temperature of 55 deg F.(adj)
- 2.5. A manual low temperature cut out will override the heating valves full open.

3. Demand Control Ventilation-Supply Air CO2:

- 3.1. Mount CO2 sensor in the supply duct of the air handling unit.
  - 3.2. The supply air CO2 setpoint will be calculated using the OA-CO2 value plus and adjustable offset value of 550 ppm.
  - 3.3. DCV DAMPER CONTROL: Modulate the OSA/RA dampers between the minimum and maximum flow rates at the flow station as required to maintain CO2 setpoint.
  - 3.4. The DDC and TAB contractors will work together to determine the min/max outside air flow rates.
  - 3.5. Provide an On/Off data point to disable the DCV mode of operation. When DCV is disabled the outside air damper will defaulted to the maximum outside air ventilation rate. A "DCV Disabled" alarm will appear on the EMS system graphic. The alarm message text shall read "DCV DISABLED -ENERGY SAVINGS LOST".
  - 3.6. A mixed air low limit routine may override the damper closed to prevent the mixed air temperature from dropping below 40 Deg F. to protect the heating coil.
  - 3.7. The economizer controls will also override the DCV program to provide adequate free cooling.
- \*Minimum flow rate will be the value at the flow station to maintain 15% OA ,
- \*Maximum flow rate will be the value at the flow station to maintain 30% OA

4. Discharge Air Temperature Control:

- 4.1. Discharge Air Temperature Setpoint Reset from VAV heating and cooling demand: Reset the discharge air temperature setpoint based on the heating and cooling demand from the VAV's. The reset shall be between a minimum temperature of 55° F (adj.) and a maximum temperature of 65° F (adj.). The maximum setpoint of 65° F shall be used on normal system start up.
- 4.2. Heating, Mixed air Dampers and Cooling Control: The heating, mixed air dampers, and the cooling shall be controlled in sequence to maintain the discharge air setpoint temperature. At no time shall the heating be operating when the mixed air dampers are economizing or the cooling coil is enabled. Whenever the discharge air temperature is above the setpoint, the following shall occur in sequence: The heating control shall modulate closed as sequenced below. When heating is completely off and the economizer sequence is enabled, the economizer outside air damper and return air damper will be modulated together in sequence to maintain discharge air temperature setpoint. When the outside air economizer damper is completely open, or the economizer sequence is not enabled, the cooling coil will be modulated to maintain the discharge air temperature setpoint. When the discharge air setpoint is below setpoint the reverse shall occur.
- 4.3. Cooling: While the fan is on, the discharge air temperature setpoint will decrease 1° F per 15 minutes down to the minimum setpoint when the highest VAV zone is greater than 1 degf above the zones Occupied cooling setpoint.

4.4. Heating: While the fan is on, the discharge air temperature setpoint will increase 1° F per 15 minutes up to the maximum setpoint when 2(adj.) or more VAV's are heating and their heating valves are open more than 80%.

4.5. Provide a binary data enable point for each VAV to enable/disable the heating/cooling demand in the algorithm. Provide a trend graph to show the relative stability of the discharge air temperature setpoint. All setpoints shall be adjustable.

4.6. Zone heating demand will always have priority in the discharge setpoint.routine.

5. Economizer Control:

- 5.1. When the economizer sequence is enabled by the switchover sequence below, the outside air economizer damper and return damper, will modulate in sequence to provide outside air to be used for free cooling. The dampers will modulate to maintain the discharge air temperature control sequence above.
- 5.2. The economizer sequence will be enabled whenever the outside air temperature is less than 68 degf (Adj).
- 5.3. If a campus globally shared data point is used for economizer switchover, provide a drybulb economizer backup control sequence that will enable the economizer whenever the building outside air temperature sensor is sensing below 68° F (adj.) and communication is lost to the globally shared data point

6. Fan Speed Control:

6.1. GENERAL:  
The purpose of the supply fan control is to maintain a minimum static pressure in the supply ductwork to insure proper terminal air box operation. Install a static pressure sensing probe in the main supply duct located at approximately ¼ of the way down the main supply duct and pipe to the differential pressure transmitter that shall be located in the unit temperature control panel. The inputs to the differential pressure transmitter shall be the static pressure inside of the duct and the reference input shall sense the actual space served by the air system below the duct probe. (Label the grid work below the sensor location) The DDC system shall modulate the supply fan VFD to maintain the static pressure setpoint as sensed by the static pressure sensor. If the static sensor deviates by more than 0.5 in. w.c. (adj.), an alarm shall be sent through the DDC system. Static pressure setpoint shall be as described in the Static Pressure Reset Control below.

6.2. STATIC PRESSURE RESET CONTROL:  
Static pressure setpoint shall be reset using Trim & Respond logic within the minimum range 0.5 in. w.c. to the maximum range of 1.5 in. w.c. When the fan is off, the setpoint shall be reset to 0.8 in. w.c. (adj.) and this setpoint shall be used on system start up While the fan is proven on, every two minutes, trim the setpoint by 0.2 in. w.c. if there are two or fewer zone pressure requests. If there are more than two zone pressure requests, respond by increasing the setpoint by 0.2 in. w.c. All setpoints shall be adjustable.

6.3. ZONE PRESSURE REQUEST:  
A zone pressure request is generated when a VAV damper is greater than 85% open until it drops to 75% open. Provide a binary data enable point for each zone to enable/disable the zone damper in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the static pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the static pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

6.4. Return Fan Speed Control:  
The purpose of the return fan control is to maintain a slightly positive building pressure. The return fan VFD shall lag the supply fan by 15% (adj.) to account for total exhaust from the area in which it serves while maintaining a slightly positive pressure. (Unless Building Static pressure is being used.)

6.5. Building Static Pressure Control:  
The purpose of the return fan control is to maintain a slightly positive building pressure. The return/relief fan will start whenever the supply fan is commanded on in the occupied mode. The return fan will start at minimum speed and modulate to maintain the space pressure at .05inwc (adj.) respective to outside air.

7. Safeties:

- 7.1. In general all safeties will be wired to the supply and return/relief fan VFD safety interlock circuits. VFD's shall not function in "Hand", "Auto" or Bypass conditions.
- 7.2. Electric low limit protection devices will stop the units anytime the temperature downstream of the heating coil is below 35 deg F (adj). The low temperature cutout will act independently of the DDC system via hardwired interlock to open the heating coil valve fully. A low temperature alarm will be sent to the EMS system to notify the operator.
- 7.3. Any other safety device will be in series with this circuit and alarm the operator.

8. Unit Cycling to Maintain Night Setback/Setup Temperatures:

- 8.1. The unit will be cycled on to maintain the setback and setup temperature setpoints as measured by the highest and lowest of the Vav zone sensors.
- 8.2. The unoccupied heating setpoint will be 60 deg F (adj) and unoccupied cooling setpoint will be 85 deg F.(adj).
- 8.3. Minimum on and off timers will be used to prevent excessive cycling in this mode of operation.
- 8.4. In the heating mode the outside air damper will remain closed with the return damper full open. The discharge air will be controlled for 95 deg F (adj).
- 8.5. The supply fan will run at 50% (adj.) speed, while the return/relief fan will track minus the set supply speed offset.
- 8.6. In the cooling mode the unit will control as if in the occupied mode.

9. Optimal Start Sequence:

- 10.1 This routine shall override the unoccupied cycle.
- 10.2 The DDC system will compare the Average zone temperature versus the target heating and cooling setpoints to determine the runtime required to start the unit prior to occupancy periods.
- 10.3 The maximum early start time for the optimal start will be 2hrs (adj).
- 10.4 The target temperatures will be 67 deg F for heating mode and 75 deg F for the cooling. Both will be adjustable in the EMS.
- 10.5 While running in the Optimal start mode , the DDC system will override all of its associated VAV boxes into Occupied mode.

**THIS IS A SAMPLE SEQUENCE OF OPERATION FOR DCV AND AHU CONTROL FINAL SEQUENCE TBD.**



MCKINSTRY CO.

620 WEST ADDISON STREET  
MISSOULA MT 59801  
(406) 214-3500

www.mckinstry.com

PROJECT:  
CITY OF MISSOULA  
FIRE STATION - 2

FIM 48158-04.01

OCCUPANCY AND DCV  
FOR AHU

247 MOUNT AVE. MISSOULA, MT, 59801

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_

# Fire Station FIMs

FS-2 48274

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**FS-2**

247 Mount Ave  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>1,087</b>
Annual Cost of Leakage (Kwh):	-	<b>730</b>

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. Heat only.	First	2 Doors
Ext. Door(s) to be weather-stripped & sealed.	First	3 Doors
Int. Door(s) to be weather-stripped & sealed for isolation.	First	1 Doors
Over-head Door(s) to be sealed on 4 sides. Heatonly.	First	6 OHDoors

<b>AIR LEAKAGE:</b>	<b>feet</b>	<b>inches</b>		
Doors	40	3/32	0.31	sq ft
Doors	60	3/32	0.47	sq ft
Doors	20	3/32	0.16	sq ft
OHDdoors	336	1/8	3.50	sq ft

Totals	-	4.44 sq ft
		0.41 sq meter

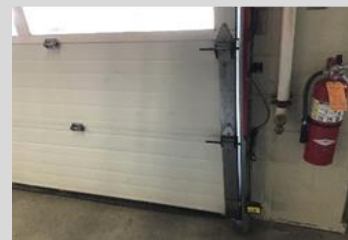
**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K      140

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$





# Fire Station FIMs

FS-2 48367

# Detailed Scope of Work

**FIM ID # 48367**  
**FS-2 04.01 Digital Controls Update & Integration**  
**FS-2**

## GENERAL

This Fire Station has an existing DDC system but the system would benefit from updating of hardware as needed and refreshed user interface along with remote access capabilities.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Control contractor to provide and install all necessary hardware to update the control system.
  - B. Setup, programming, commissioning, testing, and demonstration of the system as required.
  - C. If a centralized control system is present, new work shall be integrated into the main system and added to the graphical user interface.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
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12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Fire Station FIMs

FS-2 49271

# Investment Grade Audit

---

## 49271-19.01 FS-2 - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures.



City of Missoula, MT V1										
Demographics and Usage										
Count Bldg # Building Name Category	1	2	3	4	5	6	7	8	9	10
	City Shops	Art Museum	Central Parking	Splash Pad	Fire Station 4	Fire Station 1	Fire Station 2	Fire Station 3	Fire Station 5	Currents
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900
Per Day Visitor	10	10	10	10	10	10	10	10	10	10
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882
Sale Tax%										
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs
	P1 Ave Daily Count	1	2	1	53	4	4	4	4	12
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	FEMALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff
	P1 Ave Daily Count	35.8	14.0	1.9	140.0	18	65	38	45	33
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	FEMALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors
	P1 Ave Daily Count	15	34	28	2100					470
	M-F days/yr ON	261	261	261	120	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	7.5	17.0	14.0	1050.0					235.0
	FEMALE count	7.5	17.0	14.0	1050.0					235.0
	Group Occupancy Days	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	37.3	81.0	70.0	5250.0					1175.0
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event
	P1 Ave Daily Count									
	M-F days/yr ON									
	Sat/Sun days/yr ON					105	260	260	260	260
	Holiday/vacation days/yr OFF					75	60	60	60	60
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count									
	FEMALE count									
	Group Occupancy Days					30.0	210.0	210.0	210.0	210.0
	Group Water Closet Use per day									
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6

Demographics and Usage

City of Missoula, MT V1







**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs									
	Number of HS:	Operating Days:	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms	
City Shops	0	365	-	2.00	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Art Museum	0	335	-	2.00	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Central Parking	0	365	-	2.00	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Splash Pad	1	126	3.00	2.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65*	120*	50%	758	379	223,225	2.4
Fire Station 4	3	365	1.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3
Fire Station 1	0	365	-	2.00	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 2	0	365	1.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3
Fire Station 9	1	365	1.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3
Fire Station 5	2	365	3.00	2.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0
Currents	2	365	3.00	2.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs										
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65*	120*	50%	12,425	6,212	3,660,889	36.6
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs												
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms	
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65*	120*	50%	120,600	60,300	35,533,920	355.3
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65*	120*	50%	45,457	22,728	13,393,497	133.9
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	
Currents	0	365.00	2.00	5.00	1.50	90.00	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0	

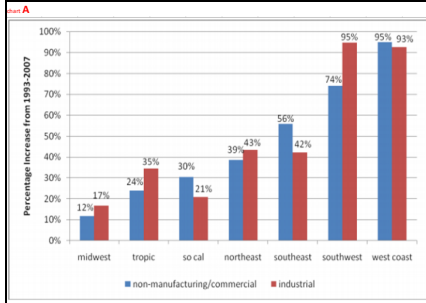


Appendix A

Reference Tables and Charts

Rate Escalation Across United States from 1993 to 2007

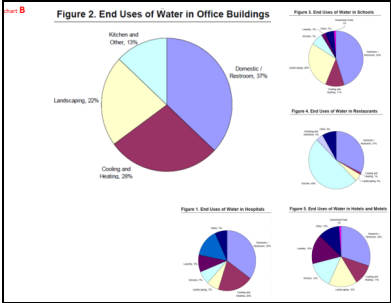
Source: United States Department of Energy/Analysis of Water Rate Escalations across the United States



SOURCE: http://www.energystar.gov/a/business/tools\_resources/target\_finder/help/Energy\_Units\_Conversion\_Table.htm



Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program August 20, 2009



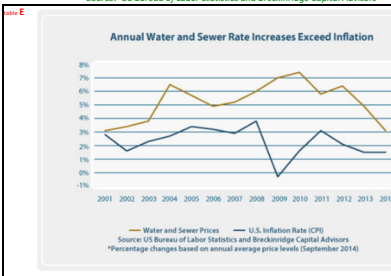
Source: US Bureau of Labor Statistics and Breckinridge Capital Advisors

FEMP "Watering" Study

Table with sections for DOMESTIC WATER USE, Fountains, Urinals, and Lavatory Sinks, including calculation formulas and assumptions.

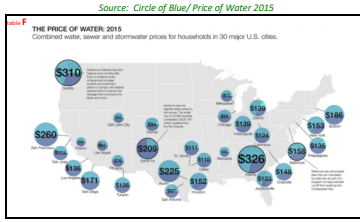
Energy Units Conversion Table

Table for Energy Units Conversion with columns for Energy Source, Unit of Measure, and Multiplier. Includes categories like Coal, Gas, Oil, and Electricity.



Depending on the faucet, a 10-second handwash typical of an electronic unit will consume as little as 1-1/2 cups (3.8 liters) of water. A 10-second cycle is required as a minimum by the Americans with Disabilities Act. Choose the lowest-flow faucet value available—typically 0.5 gpm.

Table H: U.S. Average Heating Fuel Prices 1. Includes columns for Fuel, Actual 2008, Estimated 2009, and 2010 per unit.



Tables G and H: Volume conversions (1 gallon to 8.34 pounds, etc.) and Metric conversions (1 acre to 4 hectares, etc.).

Table I: Benchmarks (Annual Basis) with columns for Category, Value, and Unit. Includes categories like Hotels/Motels, Nursing/Assisted Living, Restaurants, etc.



# Fire Station FIMs

## FS-2 50008

# Detailed Scope of Work

**FIM ID # 50008**  
**FS-2 13.03 Roof Replacement**  
**Fire Station 2**

## GENERAL

The FS-2 roof has problem problematic from early on in its life. It is believed that improper installation, perhaps due to incorrect nail length, has contributed to nails backing out and shingles coming off at a higher-than-normal rate. The entire roof must be replaced to remedy the issue. Install 30-year shingles, repair underlayment and sheeting in select areas along known leakage areas, as needed.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. N/A
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. Demo
    - 1) Remove existing flashing as necessary for demo and replacement of shingles; retain flashing for reinstallation, as applicable.
    - 2) Remove and dispose of existing roofing material.
  - B. New Work
    - 1) Inspect roof sheathing and replace as needed at Time and Materials – maximum allowance of \$3,000 subcontractor cost.
    - 2) Install Ice and Water Shield on eaves and in valleys.
    - 3) Install Synthetic underlayment.
    - 4) Install Malarkey Vista Lifetime architectural grade shingles.
    - 5) Install ridge vent and ridge cap.
    - 6) Properly terminate new roofing system around all penetrations.
    - 7) Fabricate and install all new sheet metal flashing including roof to wall, step flashing and drip edge.
    - 8) Install gutter and downspout as per plans.
    - 9) Remove debris from jobsite and dispose of debris.
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm

# Detailed Scope of Work

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- A. N/A
- 18. Fire Sprinkler
  - A. N/A
- 19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
- 20. Commissioning
  - A. N/A
- 21. Demolition and Removal Specialty Contractor
  - A. N/A
- 22. Training
  - A. Provide training as required for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Fire Station FIMs

FS-3 48164

# Detailed Scope of Work

**FIM ID # 48164**  
**FS-3 09.01 LED Lighting**  
**FS-3**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor



# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing			Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
148	Yes	FS-3 INT	ENTRY 110	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
149	Yes	FS-3 INT	ENTRY 110	Can Round 6"	CFL 4P-H 26W- 1L	2	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	2	LED Kit	
150	Yes	FS-3 INT	TRAINING ROOM 111	BOX 2X4	F T8 F32-32W-48" NLO- 4L	6	RET-4XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (4), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 2G WH SWITCH PLATE
151	Yes	FS-3 INT	REST ROOM 113	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
152	Yes	FS-3 INT	REST ROOM 113	VANITY 2FT	F T8 F17-24" NLO- 2L	1	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
153	Yes	FS-3 INT	REST ROOM 114	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
154	Yes	FS-3 INT	SLEEP QUARTERS 117	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	3	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
155	Yes	FS-3 INT	SHOWER 115	Can Round 6"	CFL 4P-H 26W- 1L	1	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	1	LED Kit	
156	Yes	FS-3 INT	SHOWER 115	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
157	Yes	FS-3 INT	SHOWER 116	Can Round 6"	CFL 4P-H 26W- 1L	1	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	1	LED Kit	
158	Yes	FS-3 INT	SHOWER 116	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
159	Yes	FS-3 INT	DORM ROOMS	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	4	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
160	Yes	FS-3 INT	DORM ROOMS	VANITY 3FT	F T8 F25-36" NLO- 2L	3	RET-2XLEDT3FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 3 Ft. LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
161	Yes	FS-3 INT	DORM ROOMS	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
162	Yes	FS-3 INT	GARAGE AREA	Indstrl Pndt 8ft	F T8 F32-32W-48" NLO- 6L	16	RET-6xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (6), remove existing fluorescent ballast.	16	Direct Wire LED Tube	
163	Yes	FS-3 INT	GARAGE AREA	BOX 2X4	F T8 F32-32W-48" NLO- 3L	2	RET-3xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
164	Yes	FS-3 INT	GARAGE AREA	INDSTR L SM 4FT	F T8 F32-32W-48" NLO- 6L	8	RET-6XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (6), remove existing fluorescent ballast.	8	Direct Wire LED Tube	
165	Yes	FS-3 INT	TOOL AREA 108	INDSTR L SM 4FT	F T8 F32-32W-48" NLO- 2L	4	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
166	Yes	FS-3 INT	MECH ROOM 107	INDSTR L SM 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
167	Yes	FS-3 INT	ENTRY ALCOVE 104	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
168	Yes	FS-3 INT	WORKOUT ROOM 106	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	3	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
169	Yes	FS-3 INT	BATHROOM 105	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
170	Yes	FS-3 INT	BATHROOM 105	VANITY NON-LINEAR	Incan SI-Med A19 60W- 3L	2	LAMP-3x9LEDSI-A19		Lamp = Relamp Fxtr	Install (2) New screw in lamp. A19, 9 W, 4000k, E26 base, 25,000 hrs.	2	LED Screw-in Lamp	
171	Yes	FS-3 INT	DAY ROOM 103	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 3L	6	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
172	Yes	FS-3 INT	DAY ROOM 103	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	1	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
173	Yes	FS-3 INT	ENTRY 101	Can Round 6"	CFL 4P-H 26W- 1L	2	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	2	LED Kit	
174	Yes	FS-3 INT	CONTROL ROOM 102	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	1	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
175	Yes	FS-3 EXT	NORTHWEST EXTERIOR	WP SMALL FT	LED Fxtr - 40W	1	N		N = No Retrofit	No Retrofit Proposed	1	N	
176	Yes	FS-3 EXT	NORTHWEST EXTERIOR	CAN ROUND 8"	CFL SI PAR38 23W- 1L	6	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	6	LED Kit	
177	Yes	FS-3 EXT	NORTHWEST EXTERIOR	BARN	HPS Med 50W- 1L	1	Ret/1x16_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 16 watts.	1	LED Retrofit Lamp	



				Existing				Proposed						
ID	In Scope	Building	Room Name	Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
178	Yes	FS-3 EXT	NORTHEAST EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 1L	1	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	1	LED Fixture	
179	Yes	FS-3 EXT	SOUTHEAST EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 1L	5	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	5	LED Fixture	

# Fire Station FIMs

FS-3 48275

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**FS-3**

1501 39th St.  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Int. Door(s) to be weather-stripped & sealed for isolation. Over-head Door(s) to be sealed on 4 sides. Heat only



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>934</b>
Annual Cost of Leakage (Kwh):	-	<b>627</b>

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. Heat only.	First	2 Doors
Ext. Door(s) to be weather-stripped & sealed.	First	2 Doors
Int. Door(s) to be weather-stripped & sealed for isolation.	First	2 Doors
Over-head Door(s) to be sealed on 4 sides. Heat only	First	5 OHDoors

AIR LEAKAGE:	feet	inches		
Doors	40	3/32	0.31	sq ft
Doors	40	3/32	0.31	sq ft
Doors	40	3/32	0.31	sq ft
OHDdoors	276	1/8	2.88	sq ft

Totals	-	3.81 sq ft
		0.35 sq meter

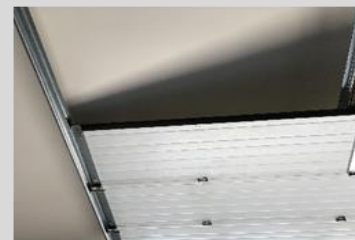
**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 140

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Fire Station FIMs

FS-3 48368

# Detailed Scope of Work

**FIM ID # 48368**  
**FS-3 04.01 Digital Controls Update & Integration**  
**FS-3**

## GENERAL

This Fire Station has an existing DDC system but the system would benefit from updating of hardware as needed and refreshed user interface along with remote access capabilities.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Control contractor to provide and install all necessary hardware to update the control system.
  - B. Setup, programming, commissioning, testing, and demonstration of the system as required.
  - C. If a centralized control system is present, new work shall be integrated into the main system and added to the graphical user interface.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.



# Fire Station FIMs

## FS-3 49272

# Investment Grade Audit

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## 49272-19.01 FS-3 - Water Conservation

**Description:**

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures

City of Missoula, MT V1										
Demographics and Usage										
Count Bldg # Building Name Category	1	2	3	4	5	6	7	8	9	10
	City Shops	Art Museum	Central Parking	Splash Pad	Fire Station 4	Fire Station 1	Fire Station 2	Fire Station 3	Fire Station 5	Currents
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900
Per Day Visitor	10	10	10	10	10	10	10	10	10	10
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882
Sale Tax%										
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs
	P1 Ave Daily Count	1	2	1	53	4	4	4	4	12
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF		30							
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	FEMALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff
	P1 Ave Daily Count	35.8	14.0	1.9	140.0	18	65	38	45	33
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF		30							
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	FEMALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors
	P1 Ave Daily Count	15	34	28	2100					470
	M-F days/yr ON	261	261	261	120	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF		30							
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	7.5	17.0	14.0	1050.0					235.0
	FEMALE count	7.5	17.0	14.0	1050.0					235.0
	Group Occupancy Days	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	37.3	81.0	70.0	5250.0					1175.0
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event
	P1 Ave Daily Count									
	M-F days/yr ON									
	Sat/Sun days/yr ON					105	260	260	260	260
	Holiday/vacation days/yr OFF									
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count									
	FEMALE count									
	Group Occupancy Days					30.0	210.0	210.0	210.0	210.0
	Group Water Closet Use per day									
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6

Demographics and Usage

City of Missoula, MT V1









**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs											
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Energy Input (BTU):	Therms
																	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Gas input (therms)		
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65°	120°	50%	758	379	223,225	2.4	
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3	
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3	
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3	
Fire Station 5	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65°	120°	50%	2,190	1,095	645,268	7.0	
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65°	120°	50%	2,190	1,095	645,268	7.0	



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs											
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Energy Input (BTU):	Therms
																	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):		
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65°	120°	50%	12,425	6,212	3,660,889	36.6	
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Energy Input (BTU):	Therms
																			Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):		
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65°	120°	50%	120,600	60,300	35,533,920	355.3	
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65°	120°	50%	45,457	22,728	13,393,497	133.9	
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	

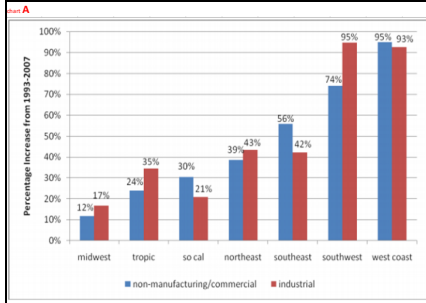


### Appendix A

Reference Tables and Charts

#### Rate Escalation Across United States from 1993 to 2007

Source: United States Department of Energy/Analysis of Water Rate Escalations across the United States



SOURCE: [http://www.energystar.gov/a/business/tools\\_resources/target\\_finder/help/Energy\\_Units\\_Conversion\\_Table.htm](http://www.energystar.gov/a/business/tools_resources/target_finder/help/Energy_Units_Conversion_Table.htm)

**Table D**

**Energy Units Conversion Table**

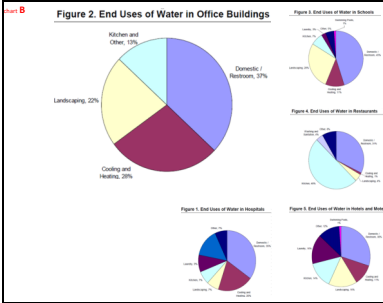
The following table provides the multiplier to convert a unit of measure to kilts equivalent:

1. Locate the energy source and the applicable unit of measure.
2. Select the conversion multiplier from the right column.
3. Multiply the kWh units of energy by multiplier and this converts the energy unit to kilts equivalent.

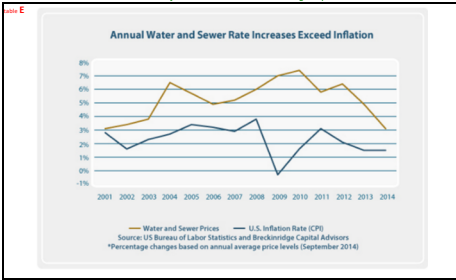
Energy Source	Unit of Measure	Multiplier
Coal (Anthracite)	MBtu (thousand Btu)	13.6
Coal (Anthracite)	MWh (thousand watt-hours)	116.15
Coal (Anthracite)	MWh (million watt-hours)	1,161.50
Coal (Anthracite)	Tons	20,000
Coal (Subbituminous)	MBtu (thousand Btu)	13.6
Coal (Subbituminous)	MWh (thousand watt-hours)	116.15
Coal (Subbituminous)	MWh (million watt-hours)	1,161.50
Coal (Subbituminous)	Tons	20,000
Coal	MBtu (thousand Btu)	13.6
Coal	MWh (million watt-hours)	116.15
Coal	Tons	20,000
Distilled (No. 2)	MBtu (thousand Btu)	13.6
Distilled (No. 2)	Gallons	138.5
Distilled Chlorinated Water	MBtu (thousand Btu)	13.6
Distilled Chlorinated Water	Foot-Heats	122.0
Distilled Chlorinated Water	MBtu (thousand Btu)	13.6
Distilled Chlorinated Water	Gallons	138.5
Distilled Steam	MBtu (thousand Btu)	13.6
Distilled Steam	MWh (million watt-hours)	116.15
Distilled Steam	MWh (thousand watt-hours)	116.15
Distilled Steam	Tons	20,000
Electricity	kWh (thousand watt-hours)	3.4
Electricity	MWh (million watt-hours)	1,000
Electricity	MWh (thousand watt-hours)	1,000
Electricity	MWh (million watt-hours)	1,000
Fuel Oil (No. 1)	MBtu (thousand Btu)	13.6
Fuel Oil (No. 1)	Gallons	138.5
Fuel Oil (No. 2)	MBtu (thousand Btu)	13.6
Fuel Oil (No. 2)	Gallons	138.5
Fuel Oil (No. 4)	MBtu (thousand Btu)	13.6
Fuel Oil (No. 4)	Gallons	138.5
Gas (Natural)	MBtu (thousand Btu)	13.6
Gas (Natural)	CCF (hundred cubic feet)	100.0
Gas (Natural)	Gallons	100.0
Gas (Natural)	ccf (hundred cubic feet)	100.0
Gas (Natural)	MBtu (thousand Btu)	13.6
Gas (Natural)	MWh (million watt-hours)	116.15
Gas (Natural)	MWh (thousand watt-hours)	116.15
Gas (Natural)	MWh (million watt-hours)	1,161.50
Gas (Natural)	SCF (standard cubic feet)	100.0
Gas (Natural)	SCF (million cubic feet)	1,000,000
Gas (Natural)	Tons	157.8
Propane	MBtu (thousand Btu)	13.6
Propane	ccf (hundred cubic feet)	100.0
Propane	Gallons	100.0
Propane	ccf (hundred cubic feet)	100.0
Propane	MBtu (thousand Btu)	13.6
Propane	MWh (million watt-hours)	116.15
Propane	Tons	157.8



#### Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program August 20, 2009



Source: US Bureau of Labor Statistics and Breckinridge Capital Advisors



Depending on the faucet, a 30-second handwash typical of an electronic unit will consume as little as 1-1/2 cups (3.8 liters) of water. A 30-second cycle is required as a minimum by the Americans with Disabilities Act. Choose the lowest-flow faucet value available—typically 0.5 gpm.

<http://onto.eria.doe.gov/ask/faq.asp>

**Table H**

U.S. Average Heating Fuel Prices 1

Fuel	Actual 2008	Forecast 2009	2009	2009	Per Unit
Propane	\$1.81	\$1.71	\$1.71	\$1.71	/Gallon
Gas	\$1.11	\$1.11	\$1.11	\$1.11	/therm
Heating Oil	\$2.11	\$2.11	\$2.11	\$2.11	/gallon
Distillate	\$1.11	\$1.11	\$1.11	\$1.11	/gallon
Propane	\$1.11	\$1.11	\$1.11	\$1.11	/gallon

#### FEMP "Watering" Study

**Table C**

**DOMESTIC WATER USE**

**Toilets**

Calculations:  
 GPM-Gallons per flush, estimated or measured  
 GPM-GPM x (1 x Female Count + 1 x Male Count)  
 =Average gallons per day for all toilets  
 GPM-GPM/Future Count  
 =Average gallons per day per fixture

**Urinals**

Calculations:  
 GPM-GPM x (1 x Male Count)  
 =Average gallons per day urinal

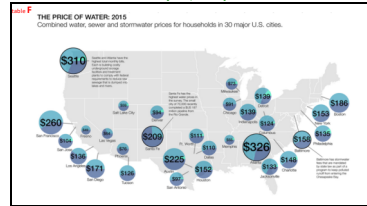
**Lavatory Sinks**

Assume 3 hand washings per 8 hour work day per male, 4 per female. Unless otherwise indicated, assume 20 sec. of flow per hand washing.

Calculations:  
 GPM-Measured gallons per minute of faucet flow  
 GPM-GPM x (1 x Male Count + 1 x Female Count)  
 =Average gallons per day for hand washing

SOURCE: FEMP Energy Study  
[http://www.f.ere.energy.gov/femp/information/download\\_watering.html](http://www.f.ere.energy.gov/femp/information/download_watering.html)

Source: Circle of Blue/Price of Water 2015



**Volume conversion**

- 1 gallon (gal) = 8.34 pounds
- 1 cubic foot (ft<sup>3</sup>) = 62.4 pounds
- 1 cubic foot (ft<sup>3</sup>) = 7.48 gallons
- 1 inch (EI) = 748 gallons
- 1 acre-foot (acre-ft) = 325,851 gallons
- 1 acre-foot (acre-ft) = 43,560 cubic feet
- 1 million gallons (Mgal) = 3.07 acre-foot
- 1 million gallons (Mgal) = 132 acre-foot/year
- 1 inch of rain = 174 million gallons per square mile
- 1 inch of rain = 27,248 gallons per acre
- 100 mm per year

**Area conversion**

- 1 acre = 4 hectares
- 1 gallon = 3.8 liters
- 1 cubic foot = 0.3 cubic meters
- acft = 43,560 square feet (ft<sup>2</sup>)
- acft = 4,047 square meter (m<sup>2</sup>)
- acft = 0.000562 square mile (mi<sup>2</sup>)

**Table I**

**Benchmarks**

(Annual Basis)

Category	Value	Unit
Hotels/Motels	0.079	0.165 thousand gals. (kgal)/sq. ft.
Offices	39.5	Kgal/room
Nursing/Assisted Living	0.062 / 32.8	0.101 / 40.7 Kgal/bed
Restaurants	0.17	39.6 Kgal/department
Hotels/Motels	0.21	0.21 Kgal/ft <sup>2</sup> , ft.
Schools	0.012	0.019 Kgal/ft <sup>2</sup> , ft.
Universities	2.7	2.7 Kgal/student

Source: Benchmarking Task Force Collaboration for Industrial, Commercial & Institutional Water Conservation, Colorado Waterwise Council, June 2007.

# Fire Station FIMs

FS-4 48168

# Detailed Scope of Work

**FIM ID # 48168**  
**FS-4 09.01 LED Lighting**  
**FS-4**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
180	Yes	FS-4 INT	TRAINING ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 3L	16	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	16	Direct Wire LED Tube	INSTALL (5) WIRELESS WALL SWITCH, (4) WIRELESS CEILING SENSOR, (1) 5G WH SWITCH PLATE
181	Yes	FS-4 INT	TRAINING ROOM CLOSET	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
182	Yes	FS-4 INT	TRAINING ROOM CLOSET	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
183	Yes	FS-4 INT	HALLWAY	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
184	Yes	FS-4 INT	HALLWAY	SCONCE 2FT	CFL 4P-H 42W- 1L	2	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	2	LED Compact Lamp	
185	Yes	FS-4 INT	MENS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
186	Yes	FS-4 INT	WOMENS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
187	Yes	FS-4 INT	HALLWAY	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
188	Yes	FS-4 INT	HALLWAY	SCONCE 2FT	CFL 4P-H 42W- 1L	4	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	4	LED Compact Lamp	
189	Yes	FS-4 INT	HALLWAY	SCONCE NON-LINEAR	CFL 2P-H 26W- 2L	3	Compact Fluorescent 2 Pin Horizontal 26 Watt,2 lamp/fxtr	Ret/2x9.5LEDDW-PL		RET = Retrofit Fxtr	Install (2) New direct wire 4 pin led lamp. Remove existing ballast.	3	LED Retrofit Lamp	INSTALL (2) WIRELESS WALL SWITCH, (1) WIRELESS HALLWAY SENSOR, (1) 2G WH SWITCH PLATE
190	Yes	FS-4 INT	JANITOR CLOSET	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
191	Yes	FS-4 INT	WORKOUT ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
192	Yes	FS-4 INT	DAYROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	6	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
193	Yes	FS-4 INT	DAYROOM	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	6	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	6	Direct Wire LED Tube	CTRL'D
194	Yes	FS-4 INT	DORM ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
195	Yes	FS-4 INT	DORM ROOM	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
196	Yes	FS-4 INT	DORM ROOM	VANITY 2FT	F T8 F17-24" NLO- 2L	5	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
197	Yes	FS-4 INT	DORM ROOM	SCONCE 2FT	CFL 4P-H 42W- 1L	2	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	2	LED Compact Lamp	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
198	Yes	FS-4 INT	CAPTAIN DORM ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
199	Yes	FS-4 INT	CAPTAIN DORM ROOM	VANITY 2FT	F T8 F17-24" NLO- 2L	1	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
200	Yes	FS-4 INT	MENS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
201	Yes	FS-4 INT	WOMENS RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
202	Yes	FS-4 INT	FRONT OFFICE EAST SIDE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 3L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
203	Yes	FS-4 INT	FRONT OFFICE EAST SIDE	CAN ROUND 6"	CFL 2P-H 18W- 2L	2	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	2	LED Kit	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
204	Yes	FS-4 INT	MECH	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
205	Yes	FS-4 INT	MECH	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	6	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	
206	Yes	FS-4 INT	EQUIPMENT ROOM	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
207	Yes	FS-4 INT	APPARATUS ROOM	Highbay Rctngl Chain	F T8 F32-32W-48" NLO- 6L	16	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),6 lamp/fxtr	IN/1x104LEDF-HB		IN = Install New Fxtr	Install new LED Highbay Bay. 104W, chanin mounted.	16	LED FIXTURE	
208	Yes	FS-4 INT	APPARATUS ROOM	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
209	Yes	FS-4 INT	APPARATUS ROOM	STRIP PNDR 8FT	F T8 F96-96"-1Pin NLO- 2L	2	Linear Fluorescent T8 8FT-Single Pin (AKA: Slimline) Normal Ballast Factor,2 lamp/fxtr	RET-4XLEDT4FT-DW-KIT		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (4), remove existing fluorescent ballast.	2	Direct Wire LED Tube	





LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
210	Yes	FS-4 INT	APPARATUS ROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
211	Yes	FS-4 INT	ELECTRICAL ROOM	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	
212	Yes	FS-4 INT	LAUNDRY ROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
213	Yes	FS-4 INT	TOOL STORAGE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
214	Yes	FS-4 INT	SHOP OFFICE	TRFR REC 2X4	F T8 F32-32W-48" NLO- 3L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH 2POLE, (1) 2G WH SWITCH AND BLANK PLATE
215	Yes	FS-4 INT	APPARATUS ROOM	Highbay Rctngl Chain	LED Tube 15W- 6L	14	LED LED Linear Tube 15 Watt,6 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	14	N	
216	Yes	FS-4 EXT	NORTHWEST EXTERIOR	WP MEDIUM FT	HPS Mogul 250W- 1L	1	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x74LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 74W, 3000K full cutoff, bronze, 120-277V.	1	LED Fixture	
217	Yes	FS-4 EXT	NORTHWEST EXTERIOR	WP MEDIUM FT	HPS Mogul 250W- 1L	2	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x74LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 74W, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
218	Yes	FS-4 EXT	NORTHWEST EXTERIOR	SCONCE NON-LINEAR	Incan SI-Med A19 60W- 1L	1	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER	NEED PICTURE AND WATTAGE ESTIMATE	Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	1	LED Retrofit Lamp	
219	Yes	FS-4 EXT	NORTHWEST EXTERIOR	WP MEDIUM FT	LED Fxtr - 50W	1	LED LED Fxtr ,50 Watt	N		N = No Retrofit	No Retrofit Proposed	1	N	
220	Yes	FS-4 EXT	NORTHEAST WALLPACK	SCONCE NON-LINEAR	Incan SI-Med A19 60W- 1L	2	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER	NEED PICTURE AND WATTAGE ESTIMATE	Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	2	LED Retrofit Lamp	
221	Yes	FS-4 EXT	SOUTHEAST EXTERIOR	WP MEDIUM FT	HPS Mogul 150W- 1L	3	High Pressure Sodium Mogul Base (AKA: E39) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	3	LED Fixture	
222	Yes	FS-4 EXT	SOUTHEAST EXTERIOR	SCONCE NON-LINEAR	Incan SI-Med A19 60W- 1L	1	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER	NEED PICTURE AND WATTAGE ESTIMATE	Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	1	LED Retrofit Lamp	
223	Yes	FS-4 EXT	SOUTHEAST EXTERIOR	WALL BKT 2FT	LED Fxtr - 50W	1	LED LED Fxtr ,50 Watt	N		N = No Retrofit	No Retrofit Proposed	1	N	
224	Yes	FS-4 EXT	CONTROL ROOM	JAR	CFL 4P-V 42W- 1L	1	Compact Fluorescent 4 Pin Vertical 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	1	LED Compact Lamp	
225	Yes	FS-4 EXT	EXTERIOR	WP MEDIUM FT	HPS Mogul 150W- 1L	2	High Pressure Sodium Mogul Base (AKA: E39) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x74LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 74W, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	

# Fire Station FIMs

FS-4 48173

# Detailed Scope of Work

**FIM ID # 48173**  
**FS-4 04.01 Digital Controls Update & Integration**  
**FS-4**

## GENERAL

This Fire Station has an existing DDC system but the system would benefit from integrating other major equipment, updating of hardware as needed, and refreshed user interface along with remote access capabilities.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Control contractor to provide and install all necessary hardware to update the control system.
  - B. Setup, programming, commissioning, testing, and demonstration of the system as required.
  - C. If a centralized control system is present, new work shall be integrated into the main system and added to the graphical user interface.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Fire Station FIMs

## FS-4 48266

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**FS-4**

Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Int. Door(s) to be weather-stripped & sealed for isolation. Over-head Door(s) to be sealed on 4 sides. Heat only



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>1,403</b>
Annual Cost of Leakage (Kwh):	-	<b>942</b>

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. Heat only.	First	3 Doors
Ext. Door(s) to be weather-stripped & sealed.	First	4 Doors
Int. Door(s) to be weather-stripped & sealed for isolation.	First	3 Doors
Over-head Door(s) to be sealed on 4 sides. Heat only.	First	8 OHDoors

AIR LEAKAGE:	feet	inches		
Doors	60	3/32	0.47	sq ft
Doors	80	3/32	0.63	sq ft
Doors	60	3/32	0.47	sq ft
OHDoors	400	1/8	4.17	sq ft

Totals	-		5.73 sq ft
			0.53 sq meter

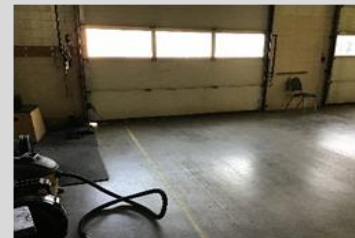
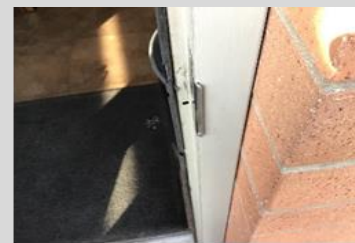
**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 140

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Fire Station FIMs

FS-4 48276

# Investment Grade Audit

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## 49266-19.01 FS-4 - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures

City of Missoula, MT V1		Demographics and Usage									
Count Bldg # Building Name Category	City of Missoula, MT V1										
	1	2	3	4	5	6	7	8	9	10	
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900	
Per Day Visitor	10	10	10	10	10	10	10	10	10	10	
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882	
Sale Tax%											
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0	
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9	
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6	
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	
	P1 Ave Daily Count	1	2	1	53	4	4	4	4	12	
	M-F days/yr ON	261	261	261	180	261	261	261	261	261	
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104	
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	FEMALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9	
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	Group Water Closet Use per day	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6	
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	
	P1 Ave Daily Count	35.8	14.0	1.9	140.0	18	65	38	45	33	
	M-F days/yr ON	261	261	261	180	261	261	261	261	261	
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104	
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7	
	FEMALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7	
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	Group Water Closet Use per day	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5	
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	
	P1 Ave Daily Count	15	34	28	2100					470	
	M-F days/yr ON	261	261	261	120	261	261	261	261	261	
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104	
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count	7.5	17.0	14.0	1050.0					235.0	
	FEMALE count	7.5	17.0	14.0	1050.0					235.0	
	Group Occupancy Days	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0	
	Group Water Closet Use per day	37.3	81.0	70.0	5250.0					1175.0	
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	
	P1 Ave Daily Count										
	M-F days/yr ON										
	Sat/Sun days/yr ON					105	260	260	260	260	
	Holiday/vacation days/yr OFF					75	60	60	60	60	
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	MALE count										
	FEMALE count										
	Group Occupancy Days					30.0	210.0	210.0	210.0	210.0	
	Group Water Closet Use per day										
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8	
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0	
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0	
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0	
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1	
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6	









**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs												
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms
																of Total Fixture Flow:	50%	120*	50%				
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65*	120*	50%	758	379	223,225	2.4		
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0		
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 5	2	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0		



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																	of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65*	120*	50%	12,425	6,212	3,660,889	36.6			
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs															
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																			of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65*	120*	50%	120,600	60,300	35,533,928	355.3			
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65*	120*	50%	45,457	22,728	13,393,497	133.9			
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0.0			



# Fire Station FIMs

FS-5 48178

# Detailed Scope of Work

**FIM ID # 48178**  
**FS-5 09.01 LED Lighting**  
**FS-5**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.





ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
226	Yes	FS-5 INT	PUBLIC AREA 100	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS WALL SENSOR, (2) 1G WH SWITCH PLATE
227	Yes	FS-5 INT	PUBLIC AREA 100	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	CTRL'D
228	Yes	FS-5 INT	PUBLIC AREA 100	TRFR CTR BSKT 2X2	F T8 F17-24" NLO- 2L	2	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	CTRL'D
229	Yes	FS-5 INT	TRAINING ROOM 102	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	6	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (4) WIRELESS WALL SWITCH, (2) WIRELESS WALL SENSOR, (1) 4G WH SWITCH PLATE
230	Yes	FS-5 INT	TRAINING ROOM 102 CLOSET	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
231	Yes	FS-5 INT	PUBLIC TOILET 104	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
232	Yes	FS-5 INT	PUBLIC TOILET 106	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
233	Yes	FS-5 INT	JANITOR 107	WRAP SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
234	Yes	FS-5 INT	CONTROL ROOM 130	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
235	Yes	FS-5 INT	DAYROOM 128	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 3L	9	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	9	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS WALL SENSOR, (1) 2G WH SWITCH PLATE
236	Yes	FS-5 INT	DAYROOM 128	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
237	Yes	FS-5 INT	DAYROOM 128	STRIP SM 3FT	F T8 F25-36" NLO- 1L	1	Linear Fluorescent T8 3FT Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1XLED3FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 3 Ft. LED tubes (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
238	Yes	FS-5 INT	DAYROOM 128	STRIP SM 2FT	F T8 F17-24" NLO- 1L	1	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1XLED2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
239	Yes	FS-5 INT	STATION OFFICE 129	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 3L	2	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
240	Yes	FS-5 INT	HALLWAY 125	TRFR CTR BSKT 2X2	F T8 F17-24" NLO- 2L	4	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
241	Yes	FS-5 INT	WORK OUT ROOM 124	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
242	Yes	FS-5 INT	DORM HALL 114	TRFR CTR BSKT 2X2	F T8 F17-24" NLO- 2L	5	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) PICO ON/OFF (2) WIRELESS HALLWAY SENSOR, (2) 1G WH SWITCH PLATE
243	Yes	FS-5 INT	DORM HALL 114	SCONCE 2FT	CFL 4P-H 42W- 1L	5	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	5	LED Compact Lamp	
244	Yes	FS-5 INT	SLEEP ROOM 111,112,115,116,117	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
245	Yes	FS-5 INT	CAPTAIN SLEEP ROOM 118	TRFR CTR BSKT 2X4	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
246	Yes	FS-5 INT	BATHROOM 110	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
247	Yes	FS-5 INT	BATHROOM 110	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
248	Yes	FS-5 INT	BATHROOM 109	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
249	Yes	FS-5 INT	BATHROOM 109	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
250	Yes	FS-5 INT	BATHROOM 108	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
251	Yes	FS-5 INT	BATHROOM 108	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
252	Yes	FS-5 INT	HALLWAY 119, 122	Can Round 6"	Incan SI-Med A19 60W- 1L	2	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	2	LED Kit	
253	Yes	FS-5 INT	TOOL SHOP 121	STRIP PNDR 4FT	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	5	Direct Wire LED Tube	
254	Yes	FS-5 INT	LAUNDRY 123	VAPOR 4FT	F T8 F32-32W-48" NLO- 3L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fxtr	RET-3XLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (3), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
255	Yes	FS-5 INT	APPARTUS ROOM 120	Highbay Rctngl Chain	LED Tube 15W- 6L	16	LED LED Linear Tube 15 Watt,6 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	16	N	



LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
256	Yes	FS-5 INT	MECH 201	STRIP PNDR 4FT	F T8 F32-32W-48" NLO- 2L	6	Linear Fluorescent 18 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	
257	Yes	FS-5 INT	STORAGE TRAINING 201	WRAP PNDR 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent 18 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
258	Yes	FS-5 INT	ELEC DATA 200	WRAP PNDR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent 18 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
259	Yes	FS-5 EXT	WEST EXTERIOR	Can Round 6"	CFL 2P-H 18W- 2L	1	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	1	LED Kit	
260	Yes	FS-5 EXT	WEST EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 1L	3	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	3	LED Fixture	
261	Yes	FS-5 EXT	EAST EXTERIOR	WP MEDIUM FT	CFL 4P-H 42W- 1L	5	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	IN/1x28LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 29W, 3000K full cutoff, bronze, 120-277V.	5	LED Fixture	
262	Yes	FS-5 EXT	SOUTH EXTERIOR	WALL BKT 2FT	LED Fxtr - 15W	1	LED LED Fxtr ,15 Watt	N		N = No Retrofit	No Retrofit Proposed	1	N	
263	Yes	FS-5 EXT	SOUTH EXTERIOR	BOLLARD	CFL 4P-V 42W- 1L	5	Compact Fluorescent 4 Pin Vertical 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	5	LED Compact Lamp	
264	Yes	FS-5 EXT	SOUTH EXTERIOR	Can Round 6"	CFL 2P-H 18W- 2L	4	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	4	LED Kit	

# Fire Station FIMs

## FS-5 48179

# Detailed Scope of Work

**FIM ID # 48179**

## **FS-5 04.01 Occupancy Sensing & Demand Control Ventilation (DCV) for AHU FS-5**

### GENERAL

Install space occupancy and CO2 sensor to reduce ventilation to zones when unneeded. This will allow further fan speed reduction via existing VFDs to modulate speed and air volume accordingly.

- A. "Provide" as written below shall mean furnish and install.
- B. Controls
  - 1. Subcontractor shall survey existing facility controls as-builts and installed system to determine necessary controller capacity to support this scope of work. Include all necessary equipment, software, graphics and programming upgrades.
  - 2. General Requirements
    - i. For proposed scope with new control points, Subcontractor shall furnish and install devices, conduit, conductors, and related accessories. Subcontractor shall also provide a comprehensive graphical user interface (including floor plans if not existing) that enables web-browser clients to perform essential functionals of analytics, data logging/trending, archiving, alarming, dashboarding, master scheduling and database management. Furnish and install all programming necessary to operate the systems per the Design Intent set forth by McKinstry.
    - ii. All controllers shall be LON or native BACnet and BTL listed. All BACnet IP and BACnet MSTP devices shall be discoverable by Tritium or Niagara JACE or Supervisor.
    - iii. Provide capability to store and archive a minimum of one-year trend data for 40% of control points on a 15-minute interval. Provide equipment level graphics for all new or modified equipment added to the new control system.
    - iv. Low Voltage Wiring and all required 120 V for control panels. Controls shall be responsible for providing its own transformers and 120 V power.
  - 3. Scope of work
    - i. Provide all controls installation necessary to facilitate the following new controls sensors and strategies:
      - 1. Zone occupancy, CO2 sensors, tubing, etc.:
        - a. Refer to attached sketches for sensor locations. Final locations shall be coordinated in field.
      - 2. Refer to attached control diagram for typical VAV control schematic.
      - 3. Air Flow monitoring to be added to AHU-1
        - a. Total of three (3) air flow monitoring stations, to be integrated into BAS and DCV control sequences. Airflow monitoring shall be installed in supply air, return air, and outside air ductwork.
      - 4. Provide any new controller and software expansions to existing owner's BAS required to facilitate new scope.
      - 5. Provide all wiring, materials, conduit, and modifications to existing system as required for a complete installation.
      - 6. Assist McKinstry Commissioning and TAB with their work.
      - 7. Reference drawings for additional requirements.
      - 8. Provide (2) hours Owner Training for this FIM.
- C. Commissioning
  - 1. McKinstry Commissioning Engineer will fully commission the proposed controls and HVAC systems.

# Detailed Scope of Work

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## D. TAB

1. Provide preconstruction TAB on all air systems. TAB shall include but not be limited to the following:
  - i. Fan airflows and differential pressures. Fan speeds where applicable
  - ii. Air terminal airflows and damper settings.
2. Provide post-construction TAB on all air systems. TAB shall include but not be limited to the following:
  - i. Fan airflows and differential pressures. Fan speeds where applicable.
  - ii. Air terminal airflows and damper settings.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**EXISTING FAN SCHEDULE. SHOWN FOR REFERENCE ONLY.**

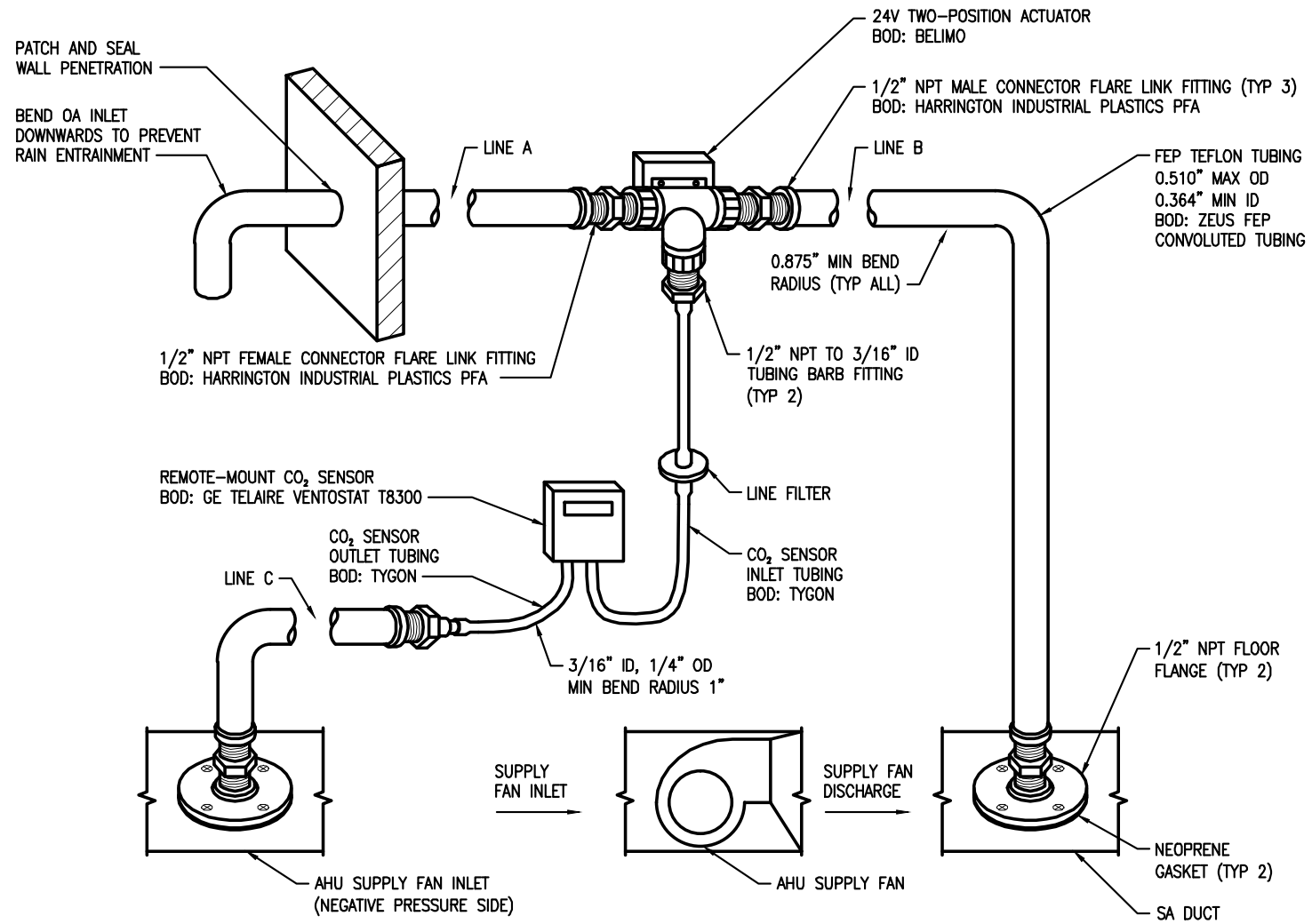
FAN SCHEDULE													
MARK	MFR	APPLICATION	CATALOG MODEL	SIZE	CFM	FAN RPM	EXT S.P. IN. WG	SOUND LEVEL SONES	MOTOR			ELEC	NOTES
									SIZE-HP	RPM	EFF		
EF-107	COOK	GEN. EXH	GN	862	700	888	0.38	-	185W	-	SEE SPEC	120V/1φ	②
VF-120A	COOK	HI VENT	CPS	270	6750	778	1.00	-	2	1725	SEE SPEC	240V/1φ	①
VF-120B	COOK	LOW VENT	GC	920	1250	922	0.38	-	1/2	925	SEE SPEC	120V/1φ	②
VEF-120	NEDERMAN	VEHICLE	NIF	403-1	2500	3500	7.00	-	5	1725	SEE SPEC	240V/1φ	③
V-123	COOK	AIR CIRC.	GC	640	300	854	0.25	-	206W	-	SEE SPEC	120V/1φ	②

NOTES:  
 ① INDUSTRIAL BACKWARD INCLINED SINGLE WIDTH SINGLE INLET CENTRIFUGAL EXHAUST SET MOUNTED ON STEEL BASE WITH SHAFT SEALS AND SPLIT PILLOW BLOCK BEARINGS. FAN HOUSING SHALL BE FULLY WELDED AND CONSTRUCTED WITH 14 GAUGE SCROLL AND 12 GAUGE SIDE PANELS, MINIMUM. FAN WHEEL SHALL BE ALL STEEL CONSTRUCTION. HOUSING SHALL BE FITTED WITH OPTIONAL DRAIN TAPPING, BOLTED ACCESS DOOR, INLET AND OUTLET COMPANION FLANGES AND MOTOR/DRIVE GUARD. PROVIDE WITH UPBLAST DISCHARGE AND CW OR CCW ROTATION AS REQUIRED (SEE PLANS).  
 ② INLINE BLOWER WITH GALVANIZED STEEL FORWARD CURVED FAN, ACOUSTICALLY INSULATED HOUSING, BACKDRAFT DAMPER, PERMANENTLY LUBRICATED O.D.P. MOTOR WITH THERMAL OVERLOAD PROTECTION. FURNISH WITH FIELD MOUNTED FAN SPEED CONTROL WITH 'OFF', COOK MODEL FSC. MODEL GC SHALL INCLUDE WHITE ALUMINUM CEILING GRILLE.  
 ③ FAN IS SHIPPED LOOSE WITH THE VEHICLE EXHAUST SYSTEM, DATA IS PROVIDED FOR INFORMATION. INDUSTRIAL BACKWARD INCLINED SINGLE WIDTH SINGLE INLET CENTRIFUGAL EXHAUST SET MOUNTED ON STEEL BASE WITH SHAFT SEALS AND SPLIT PILLOW BLOCK BEARINGS. FAN HOUSING SHALL BE FULLY WELDED AND CONSTRUCTED WITH 14 GAUGE SCROLL AND 12 GAUGE SIDE PANELS, MINIMUM. FAN WHEEL SHALL BE ALL STEEL CONSTRUCTION. HOUSING SHALL BE FITTED WITH OPTIONAL DRAIN TAPPING, BOLTED ACCESS DOOR, INLET AND OUTLET COMPANION FLANGES AND MOTOR/DRIVE GUARD. PROVIDE WITH HORIZONTAL DISCHARGE AND CW OR CCW ROTATION AS REQUIRED (SEE PLANS).  
 DATUM ELEVATION IS 3190 FEET, TEMPERATURE IS 70° F UNLESS OTHERWISE NOTED, STATIC PRESSURE IS IN INCHES WATER COLUMN, LWA IS IN DECIBELS.

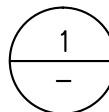
**EXISTING VAV SCHEDULE. SHOWN FOR REFERENCE ONLY.**

TERMINAL UNIT SCHEDULE																		
MARK	MFR	MODEL	SIZE	INLET	OUTLET	VENTILATION AIR					HEATING COIL				NC LEVELS		NOTES	
						MAX CFM	MIN CFM	LAT	INLET S.P.	DISCH. S.P.	MBH	ROWS	GPM	LWT	Δp FT H2O	RAD		DISCH
VAV-102	KRUEGER	LMHS	12	12"φ	16x15	1300	900	102	0.75	0.20	40.5	2	2.0	132.6	0.90	-	11	①
VAV-116	KRUEGER	LMHS	06	6"φ	12x8	375	375	99	0.75	0.20	15.9	2	1.0	142.8	0.30	13	14	①
VAV-118	KRUEGER	LMHS	10	10"φ	14x13	1100	900	96	0.75	0.20	35.3	2	2.0	138.6	0.70	11	14	①
VAV-120	KRUEGER	LMHS	09	9"φ	14x3	1000	750	101	0.75	0.20	32.9	2	2.0	141.5	0.70	13	15	①
VAV-124	KRUEGER	LMHS	07	7"φ	12x10	600	400	103	0.75	0.20	18.5	2	1.0	136.6	0.40	13	16	①
VAV-128	KRUEGER	LMHS	09	9"φ	14x13	850	700	103	0.75	0.20	32.0	2	2.0	142.6	0.70	11	12	①
VAV-130	KRUEGER	LMHS	14	14"φ	20x18	2050	1900	97	0.75	0.20	76.5	2	4.0	135.2	2.10	10	14	①

NOTES:  
 ① SINGLE DUCT TERMINAL UNIT WITH AIRFLOW SENSOR PNEUMATIC PIPING STUBBED OUT OF BOX FOR CONNECTION TO CONTROLLERS PROVIDED BY THE TEMPERATURE CONTROLS CONTRACTOR. PROVIDE OPTIONAL FACTORY HANGER BRACKETS AND HOT WATER REHEAT COIL. PROVIDE IN RIGHT OR LEFT HAND UNIT AS REQUIRED (SEE PLANS). PROVIDE WITH OPTIONAL 1" INTERNAL FOIL-FACED SEALED LINER WHICH COMPLIES WITH UL 181 AND NFPA 90A.  
 DATUM ELEV. FOR ACFM IS 3190 FT, HEATING COIL RATINGS ARE FOR FLUID AT 180°F E.W.T. AND 55°F E.A.T.. FLUID IS WATER/35% PROPYLENE GLYCOL, WATER PRESS DROP IS IN FEET OF WATER COLUMN, TEMPERATURES ARE IN DEGREES FAHRENHEIT.



- NOTES:  
 1. USE TEFLON TAPE AT THREADED CONNECTIONS.  
 2. SEAL DUCT PENETRATIONS AIR-TIGHT.  
 3. LIMIT THE MAXIMUM LENGTH OF LINE A, B, OR C TO 100 FT OF TUBING EACH.  
 4. ROUTE TUBING FOR LINE A, B, AND C TO MINIMIZE BENDING.  
 5. LIMIT CO<sub>2</sub> SENSOR INLET AND OUTLET TUBING TO 3 FT EACH.  
 6. INSTALL INDOORS.  
 7. ROUTE LINE A TO NEAREST EXTERIOR WALL FOR OA REFERENCE.



**INDOOR SUPPLY AIR CO<sub>2</sub> DCV SENSOR ASSEMBLY DETAIL**

NOT TO SCALE



MCKINSTRY CO.

620 WEST ADDISON STREET  
 MISSOULA MT 59801  
 (406) 214-3500

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PROJECT:  
**CITY OF MISSOULA  
 FIRE STATION - 5**

FIM 48179-04.01

OCCUPANCY SENSING AND  
 DEMPAND CONTROL

6425 LOWER MILLER CREEK ROAD,  
 MISSOULA MT, 59803

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

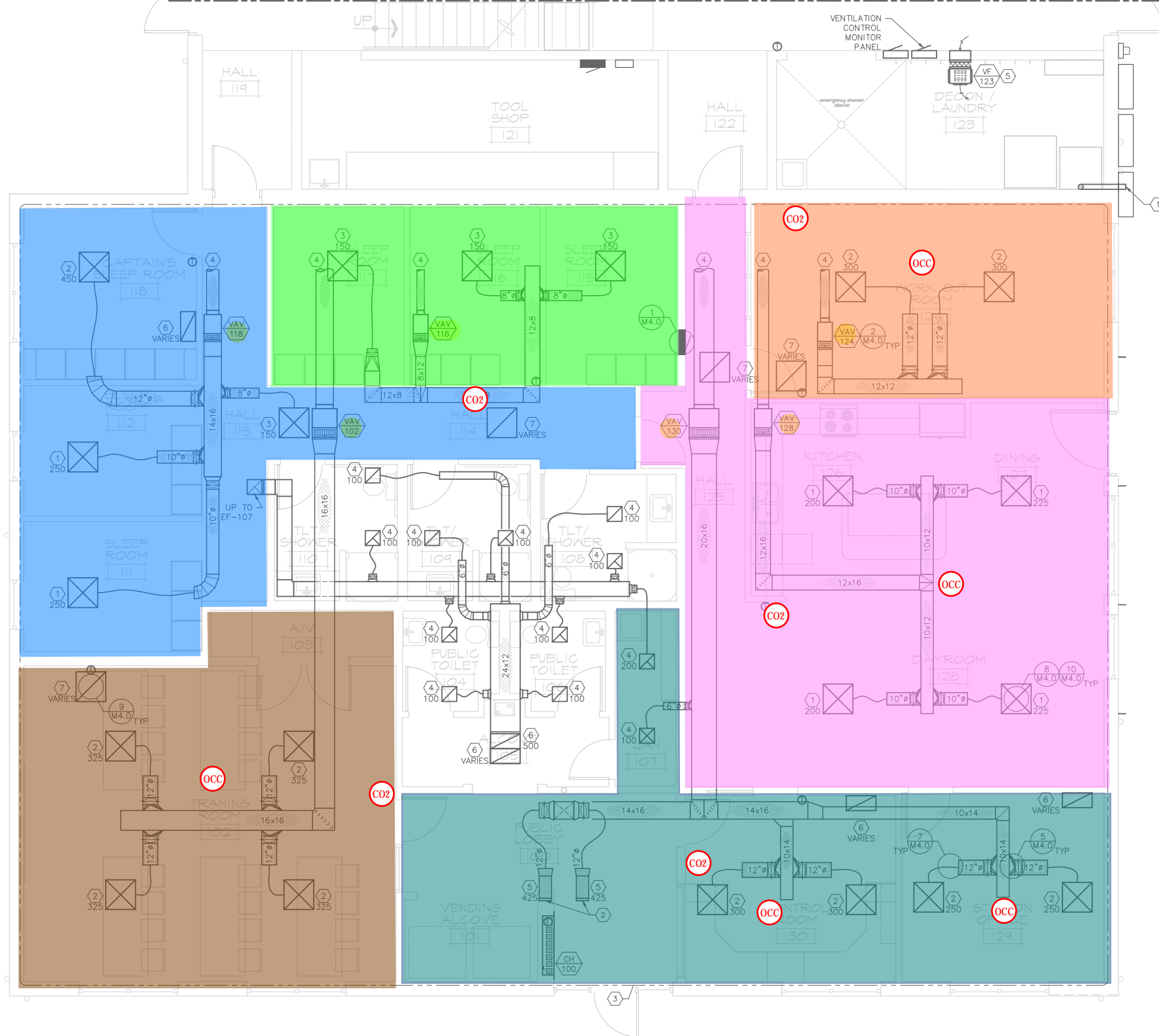
SHEET TITLE:

SHEET NUMBER:



SEE M1.1 FOR CONTINUATION

SEE M1.1 FOR CONTINUATION



Zone Equipment	Code Minimum Ventilation (cfm)	Min Allowable Ventilation during DCV (cfm)	Current MAX Primary Air Supply (cfm)	Current MIN Primary Air Supply (cfm)
VAV 118	57	45	1100	900
VAV 116	35	25	450	375
VAV 124	84	25	600	400
VAV 128	131	40	850	700
VAV 130	59	45	2050	1900
VAV 102	263	65	1300	900



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**OCCUPANCY SENSING AND  
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6425 LOWER MILLER CREEK ROAD,  
MISSOULA MT, 59803

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

DRAWN: \_\_\_\_\_

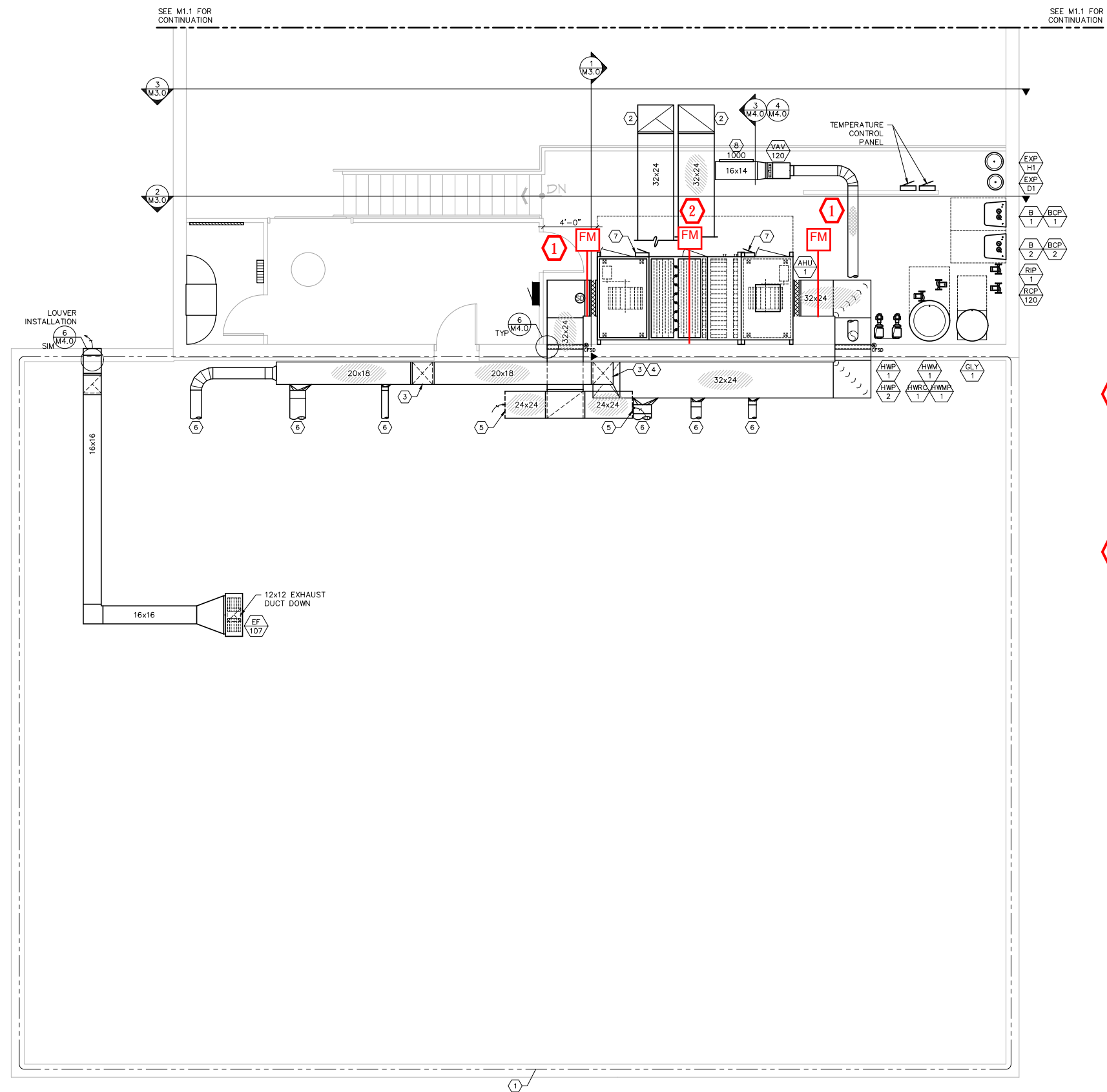
CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_

**1 MAIN LEVEL FLOOR PLAN**  
M-2 SCALE: NTS



SEE M1.1 FOR CONTINUATION

SEE M1.1 FOR CONTINUATION



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PROJECT:  
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FIM 48179-04.01

**OCCUPANCY SENSING AND  
DEMAND CONTROL**

6425 LOWER MILLER CREEK ROAD,  
MISSOULA MT, 59803

**KEYNOTES:**

- 1** INSTALL AIRFLOW MONITORING STATION IN EXISTING AIR HANDLING UNIT SUPPLY AND RETURN AIR DUCT. INTEGRATE INTO DCV CONTROL SEQUENCES AND OWNER'S BAS.
- 2** INSTALL AIRFLOW MONITORING STATION IN EXISTING AIR HANDLING UNIT OUTSIDE AIR DUCT. INTEGRATE INTO DCV CONTROL SEQUENCES AND OWNERS BAS. SEE NEXT SHEET FOR LOCATION.

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_

**1** **MEZZANINE FLOOR PLAN**  
M-3 SCALE: NTS



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MISSOULA MT 59801  
(406) 214-3500

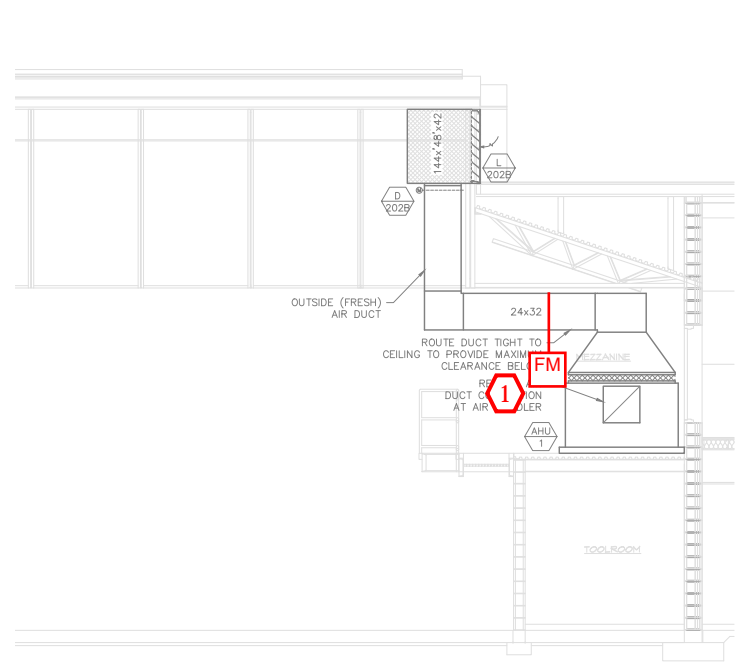
www.mckinstry.com

PROJECT:  
**CITY OF MISSOULA  
FIRE STATION - 5**

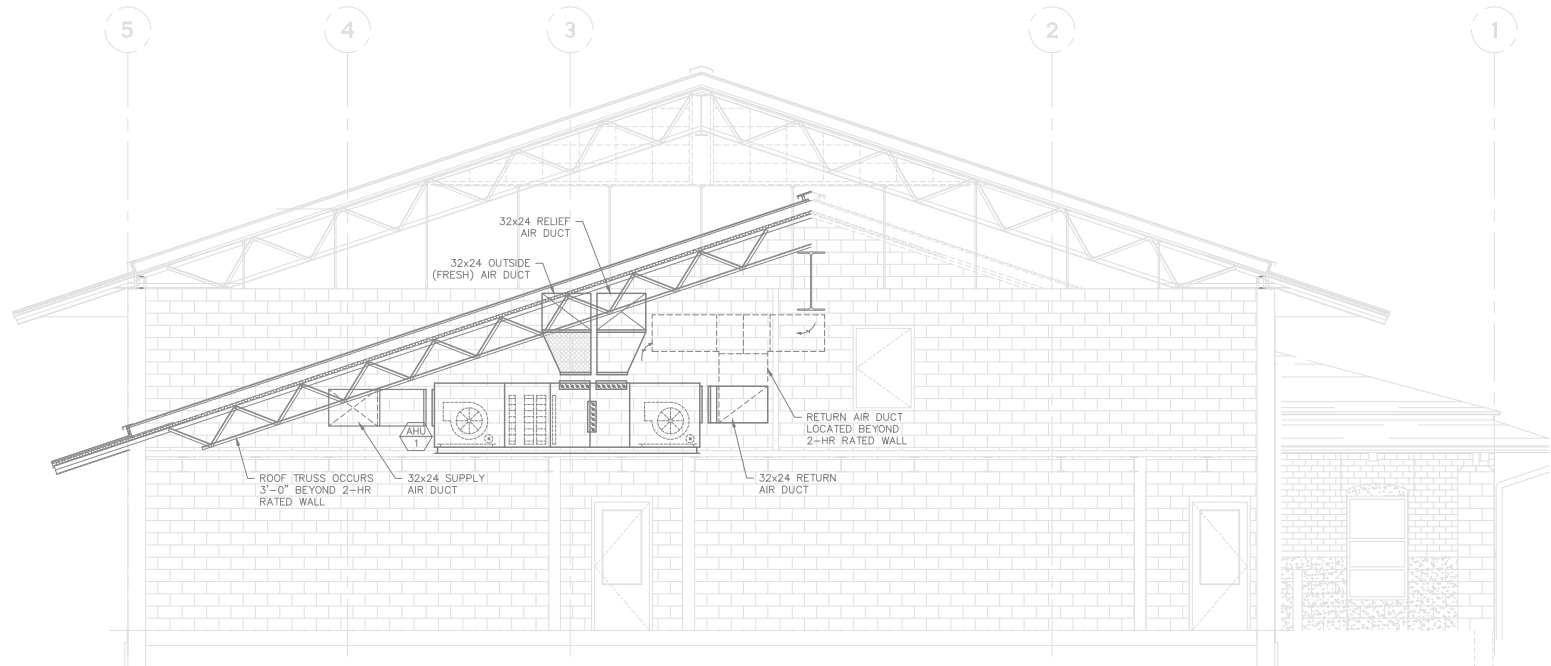
FIM 48179-04.01

**OCCUPANCY SENSING AND  
DEMAND CONTROL**

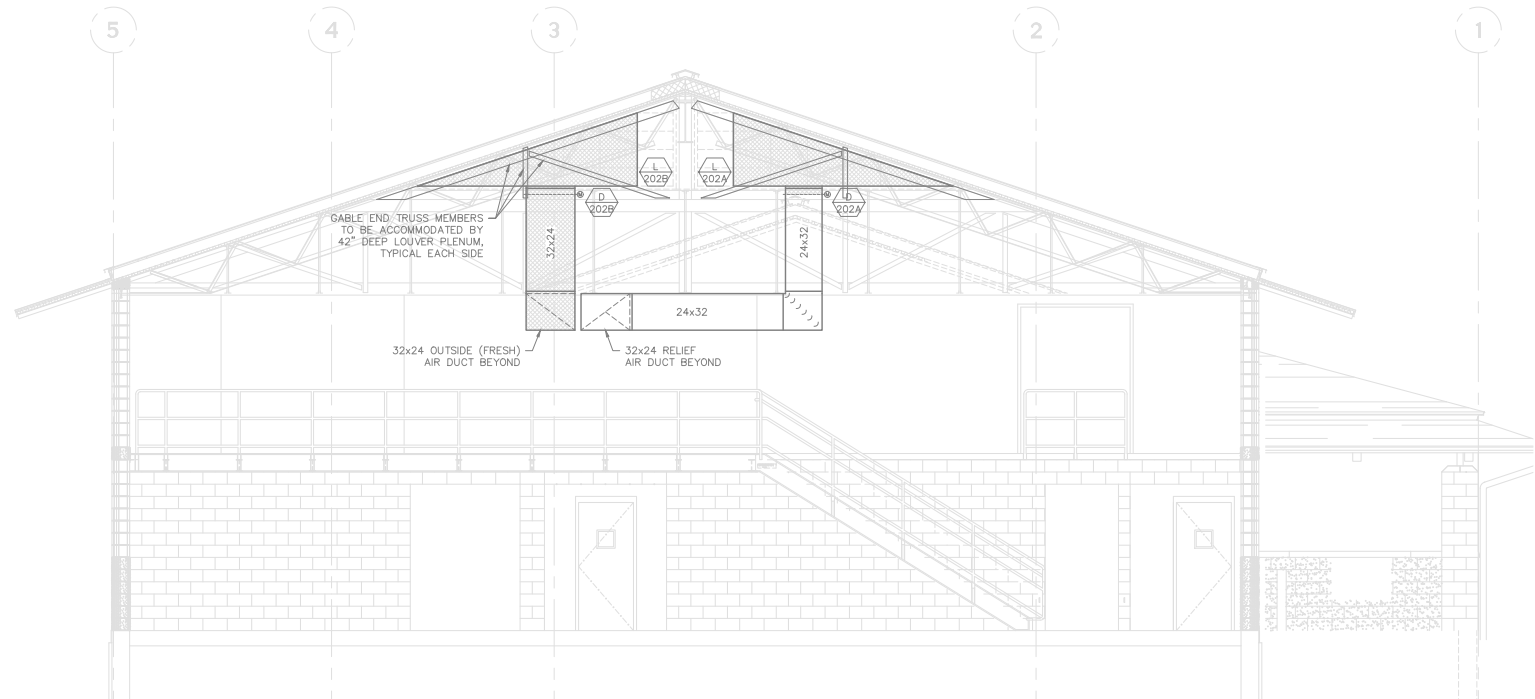
6425 LOWER MILLER CREEK ROAD,  
MISSOULA MT, 59803



**1 MECHANICAL SECTION**  
SCALE: 1/4"=1'-0"



**2 MECHANICAL SECTION**  
SCALE: 1/4"=1'-0"



**3 MECHANICAL SECTION**  
SCALE: 1/4"=1'-0"

**1 KEYNOTES:**  
INSTALL AIRFLOW MONITORING  
STATION IN EXISTING AIR HANDLING  
UNIT OUTSIDE AIR DUCT. INTEGRATE  
INTO DCV CONTROL SEQUENCES  
AND OWNER'S BAS.

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_

**1 AHU-1 SECTIONS**  
SCALE: NTS

1. Occupied Mode:

- 1.1. The Occupied Mode shall be determined by the fan unit schedule as entered through the EMS. The DDC system shall start the supply fan and return fans via the VFD and shall run continuously. The speed of the fan shall be set per the Supply Fan Speed control.
- 1.2. Fan Status: Provide a VFD run status indication for the Supply and Return Fans.
- 1.3. Start any associated Exhaust Fan whenever the Supply fan is running in the Occupied mode.
- 1.4. VAV boxes associated with this fan will be indexed to their "Standby" mode of operation.

2. Unoccupied Mode:

- 2.1. Whenever the air handling unit is indexed off, the supply and exhaust fan shall stop.
- 2.2. The outside air dampers will close and the return damper will open.
- 2.3. All associated VAV boxes are indexed to their "Unoccupied" mode of operation.
- 2.4. The heating valve will control for a mixed air temperature of 55 deg F.(adj)
- 2.5. A manual low temperature cut out will override the heating valves full open.

3. Demand Control Ventilation-Supply Air CO2:

- 3.1. Mount CO2 sensor in the supply duct of the air handling unit.
- 3.2. The supply air CO2 setpoint will be calculated using the OA-CO2 value plus and adjustable offset value of 550 ppm.
- 3.3. DCV DAMPER CONTROL: Modulate the OSA/RA dampers between the minimum and maximum flow rates at the flow station as required to maintain CO2 setpoint.
- 3.4. The DDC and TAB contractors will work together to determine the min/max outside air flow rates.
- 3.5. Provide an On/Off data point to disable the DCV mode of operation. When DCV is disabled the outside air damper will default to the maximum outside air ventilation rate. A "DCV Disabled" alarm will appear on the EMS system graphic. The alarm message text shall read "DCV DISABLED –ENERGY SAVINGS LOST" .
- 3.6. A mixed air low limit routine may override the damper closed to prevent the mixed air temperature from dropping below 40 Deg F. to protect the heating coil.
- 3.7. The economizer controls will also override the DCV program to provide adequate free cooling.

\*Minimum flow rate will be the value at the flow station to maintain 15% OA ,

\*Maximum flow rate will be the value at the flow station to maintain 30% OA

4. Discharge Air Temperature Control:

- 4.1. Discharge Air Temperature Setpoint Reset from VAV heating and cooling demand: Reset the discharge air temperature setpoint based on the heating and cooling demand from the VAV's. The reset shall be between a minimum temperature of 55° F (adj.) and a maximum temperature of 65° F (adj.). The maximum setpoint of 65° F shall be used on normal system start up.
- 4.2. Heating, Mixed air Dampers and Cooling Control: The heating, mixed air dampers, and the cooling shall be controlled in sequence to maintain the discharge air setpoint temperature. At no time shall the heating be operating when the mixed air dampers are economizing or the cooling coil is enabled. Whenever the discharge air temperature is above the setpoint, the following shall occur in sequence: The heating control shall modulate closed as sequenced below. When heating is completely off and the economizer sequence is enabled, the economizer outside air damper and return air damper will be modulated together in sequence to maintain discharge air temperature setpoint. When the outside air economizer damper is completely open, or the economizer sequence is not enabled, the cooling coil will be modulated to maintain the discharge air temperature setpoint. When the discharge air setpoint is below setpoint the reverse shall occur.
- 4.3. Cooling: While the fan is on, the discharge air temperature setpoint will decrease 1° F per 15 minutes down to the minimum setpoint when the highest VAV zone is greater than 1 degf above the zones Occupied cooling setpoint.

4.4. Heating: While the fan is on, the discharge air temperature setpoint will increase 1° F per 15 minutes up to the maximum setpoint when 2(adj.) or more VAV's are heating and their heating valves are open more than 80%.

4.5. Provide a binary data enable point for each VAV to enable/disable the heating/cooling demand in the algorithm. Provide a trend graph to show the relative stability of the discharge air temperature setpoint. All setpoints shall be adjustable.

4.6. Zone heating demand will always have priority in the discharge setpoint.routine.

5. Economizer Control:

- 5.1. When the economizer sequence is enabled by the switchover sequence below, the outside air economizer damper and return damper, will modulate in sequence to provide outside air to be used for free cooling. The dampers will modulate to maintain the discharge air temperature control sequence above.
- 5.2. The economizer sequence will be enabled whenever the outside air temperature is less than 68 degf (Adj).
- 5.3. If a campus globally shared data point is used for economizer switchover, provide a drybulb economizer backup control sequence that will enable the economizer whenever the building outside air temperature sensor is sensing below 68° F (adj.) and communication is lost to the globally shared data point

6. Fan Speed Control:

6.1. GENERAL:  
The purpose of the supply fan control is to maintain a minimum static pressure in the supply ductwork to insure proper terminal air box operation. Install a static pressure sensing probe in the main supply duct located at approximately ¼ of the way down the main supply duct and pipe to the differential pressure transmitter that shall be located in the unit temperature control panel. The inputs to the differential pressure transmitter shall be the static pressure inside of the duct and the reference input shall sense the actual space served by the air system below the duct probe. (Label the grid work below the sensor location) The DDC system shall modulate the supply fan VFD to maintain the static pressure setpoint as sensed by the static pressure sensor. If the static sensor deviates by more than 0.5 in. w.c. (adj.), an alarm shall be sent through the DDC system. Static pressure setpoint shall be as described in the Static Pressure Reset Control below.

6.2. STATIC PRESSURE RESET CONTROL:  
Static pressure setpoint shall be reset using Trim & Respond logic within the minimum range 0.5 in. w.c. to the maximum range of 1.5 in. w.c. When the fan is off, the setpoint shall be reset to 0.8 in. w.c. (adj.) and this setpoint shall be used on system start up While the fan is proven on, every two minutes, trim the setpoint by 0.2 in. w.c. if there are two or fewer zone pressure requests. If there are more than two zone pressure requests, respond by increasing the setpoint by 0.2 in. w.c. All setpoints shall be adjustable.

6.3. ZONE PRESSURE REQUEST:  
A zone pressure request is generated when a VAV damper is greater than 85% open until it drops to 75% open. Provide a binary data enable point for each zone to enable/disable the zone damper in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the static pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the static pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

6.4. Return Fan Speed Control:  
The purpose of the return fan control is to maintain a slightly positive building pressure. The return fan VFD shall lag the supply fan by 15% (adj.) to account for total exhaust from the area in which it serves while maintaining a slightly positive pressure. (Unless Building Static pressure is being used. )

6.5. Building Static Pressure Control:  
The purpose of the return fan control is to maintain a slightly positive building pressure. The return/relief fan will start whenever the supply fan is commanded on in the occupied mode. The return fan will start at minimum speed and modulate to maintain the space pressure at .05inwc (adj.) respective to outside air.

7. Safeties:

- 7.1. In general all safeties will be wired to the supply and return/relief fan VFD safety interlock circuits. VFD's shall not function in "Hand" , "Auto" or Bypass conditions.
- 7.2. Electric low limit protection devices will stop the units anytime the temperature downstream of the heating coil is below 35 deg F (adj). The low temperature cutout will act independently of the DDC system via hardwired interlock to open the heating coil valve fully. A low temperature alarm will be sent to the EMS system to notify the operator.
- 7.3. Any other safety device will be in series with this circuit and alarm the operator.

8. Unit Cycling to Maintain Night Setback/Setup Temperatures:

- 8.1. The unit will be cycled on to maintain the setback and setup temperature setpoints as measured by the highest and lowest of the Vav zone sensors.
- 8.2. The unoccupied heating setpoint will be 60 deg F (adj) and unoccupied cooling setpoint will be 85 deg F.(adj).
- 8.3. Minimum on and off timers will be used to prevent excessive cycling in this mode of operation.
- 8.4. In the heating mode the outside air damper will remain closed with the return damper full open. The discharge air will be controlled for 95 deg F (adj).
- 8.5. The supply fan will run at 50% (adj.) speed, while the return/relief fan will track minus the set supply speed offset.
- 8.6. In the cooling mode the unit will control as if in the occupied mode.

9. Optimal Start Sequence:

- 10.1 This routine shall override the unoccupied cycle.
- 10.2 The DDC system will compare the Average zone temperature versus the target heating and cooling setpoints to determine the runtime required to start the unit prior to occupancy periods.
- 10.3 The maximum early start time for the optimal start will be 2hrs (adj).
- 10.4 The target temperatures will be 67 deg F for heating mode and 75 deg F for the cooling. Both will be adjustable in the EMS.
- 10.5 While running in the Optimal start mode , the DDC system will override all of its associated VAV boxes into Occupied mode.

**THIS IS A SAMPLE SEQUENCE OF OPERATION FOR DCV AND AHU CONTROL FINAL SEQUENCE TBD.**



MCKINSTRY CO.

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MISSOULA MT 59801  
(406) 214-3500

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PROJECT:

**CITY OF MISSOULA  
FIRE STATION - 5**

**FIM 48179-04.01**

**OCCUPANCY SENSING AND  
DEMAND CONTROL**

6425 LOWER MILLER CREEK ROAD,  
MISSOULA MT, 59803

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED: \_\_\_\_\_

DRAWN: \_\_\_\_\_

CHECKED: \_\_\_\_\_

JOB NO: \_\_\_\_\_

SHEET TITLE: \_\_\_\_\_

SHEET NUMBER: \_\_\_\_\_

# Fire Station FIMs

FS-5 48277

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

---

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**FS-5**

6501 L. Miller Creek  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Int. Door(s) to be weather-stripped & sealed for isolation. Over-head Door(s) to be sealed on 4 sides. Heat only



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>964</b>
Annual Cost of Leakage (Kwh):	-	<b>214</b>

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. Heat only.	First	2 Doors
Ext. Door(s) to be weather-stripped & sealed.	First	2 Doors
Int. Door(s) to be weather-stripped & sealed for isolation.	First	2 Doors
Over-head Door(s) to be sealed on 4 sides. Heat only.	First	6 OHDoors

AIR LEAKAGE:	feet	inches		
Doors	40	3/32	0.31	sq ft
Doors	40	3/32	0.31	sq ft
Doors	40	3/32	0.31	sq ft
OHDoors	288	1/8	3.00	sq ft

Totals	-		3.94 sq ft
			0.37 sq meter

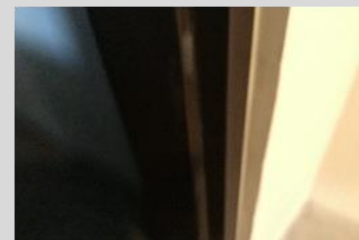
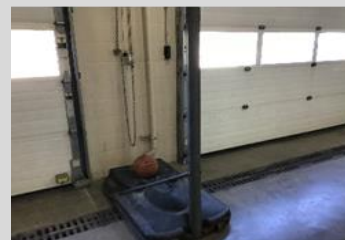
**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 140

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Fire Station FIMs

## FS-5 48369

# Detailed Scope of Work

**FIM ID # 48369**  
**FS-5 04.01 Digital Controls Update & Integration**  
**FS-5**

## GENERAL

This Fire Station has an existing DDC system but the system would benefit from updating of hardware as needed and refreshed user interface along with remote access capabilities.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Control contractor to provide and install all necessary hardware to update the control system.
  - B. Setup, programming, commissioning, testing, and demonstration of the system as required.
  - C. If a centralized control system is present, new work shall be integrated into the main system and added to the graphical user interface.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Fire Station FIMs

## FS-5 49273



# Investment Grade Audit

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## 49273-19.01 FS-5 - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures

City of Missoula, MT V1										
Demographics and Usage										
Count Bldg # Building Name Category	1	2	3	4	5	6	7	8	9	10
	City Shops	Art Museum	Central Parking	Splash Pad	Fire Station 4	Fire Station 1	Fire Station 2	Fire Station 3	Fire Station 5	Currents
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900
Per Day Visitor	10	10	10	10	10	10	10	10	10	10
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882
Sale Tax%										
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs
	P1 Ave Daily Count	1	2	1	53	4	4	4	4	12
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	FEMALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff
	P1 Ave Daily Count	35.8	14.0	1.9	140.0	18	65	38	45	33
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	FEMALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors
	P1 Ave Daily Count	15	34	28	2100					470
	M-F days/yr ON	261	261	261	120	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	7.5	17.0	14.0	1050.0					235.0
	FEMALE count	7.5	17.0	14.0	1050.0					235.0
	Group Occupancy Days	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	37.3	81.0	70.0	5250.0					1175.0
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event
	P1 Ave Daily Count									
	M-F days/yr ON									
	Sat/Sun days/yr ON					105	260	260	260	260
	Holiday/vacation days/yr OFF					75	60	60	60	60
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count									
	FEMALE count									
	Group Occupancy Days					30.0	210.0	210.0	210.0	210.0
	Group Water Closet Use per day									
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6

Demographics and Usage

City of Missoula, MT V1



6 Fire Station 1

Summary table for Fire Station 1 with columns for Meter, Actuator, and Allocated values.

Actuator: 424,241

Allocated: 140,000

Meter: 104.48

Meter Age Offset: C

Main data table for Fire Station 1 showing fixture details, flow rates, and quantities.

Summary table for Fire Station 1 showing water and energy usage metrics.

Summary table for Fire Station 1 showing plumbing and fixture costs.

7 Fire Station 2

Summary table for Fire Station 2 with columns for Meter, Actuator, and Allocated values.

Actuator: 225,863

Allocated: 74,535

Meter: 61.64

Meter Age Offset: C

Main data table for Fire Station 2 showing fixture details, flow rates, and quantities.

Summary table for Fire Station 2 showing water and energy usage metrics.

Summary table for Fire Station 2 showing plumbing and fixture costs.

8 Fire Station 3

Summary table for Fire Station 3 with columns for Meter, Actuator, and Allocated values.

Actuator: 303,750

Allocated: 100,238

Meter: 77.27

Meter Age Offset: C

Main data table for Fire Station 3 showing fixture details, flow rates, and quantities.

Summary table for Fire Station 3 showing water and energy usage metrics.

Summary table for Fire Station 3 showing plumbing and fixture costs.

9 Fire Station 4

Summary table for Fire Station 4 with columns for Meter, Actuator, and Allocated values.

Actuator: 203,460

Allocated: 67,142

Meter: 73.64

Meter Age Offset: C

Main data table for Fire Station 4 showing fixture details, flow rates, and quantities.

Summary table for Fire Station 4 showing water and energy usage metrics.

Summary table for Fire Station 4 showing plumbing and fixture costs.

10 Corvallis

Summary table for Corvallis with columns for Meter, Actuator, and Allocated values.

Actuator: 2,378,266

Allocated: 1,379,394

Meter: 89.69

Meter Age Offset: C

Main data table for Corvallis showing fixture details, flow rates, and quantities.

Summary table for Corvallis showing water and energy usage metrics.

Summary table for Corvallis showing plumbing and fixture costs.



**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs												
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms
																of Total Fixture Flow:	50%	120*	50%				
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0	
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0	
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0	
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65*	120*	50%	758	379	223,225	2.4		
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0	
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%	730	365	215,089	2.3		
Fire Station 5	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0		
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%	2,190	1,095	645,268	7.0		



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																	of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65*	120*	50%	12,425	6,212	3,660,889	36.6			
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs															
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																			of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65*	120*	50%	120,600	60,300	35,533,920	355.3			
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65*	120*	50%	45,457	22,728	13,393,497	133.9			
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%	0	0	0	0	0.0		





# Fire Station FIMs

## FS-5 50014

# Detailed Scope of Work

**FIM ID # 50014**  
**FS-5 13.03 5-yr Roof Maintenance**  
**Fire Station 5**

## GENERAL

Performing a 5-yr roof maintenance contract will help to identify seasonal issues as they occur and maximize the life of the existing roof.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. N/A
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - 1) Maintenance
    - (i) Inspect and maintain including cleaning gutters, re sealing shingles and installing fasteners and sealant where necessary, twice a year
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# EXHIBIT G -City of Missoula Energy Performance Contract Proposal Project Forms- Missoula Art Museum Ph 1

# Table 3.1 - Energy Savings Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Missoula Art Museum  
 Date: 11/3/2022

FIM ID	Facility Improvement Measures	FIM Type	Group	Facility	Guarantee Multiplier for Positive Numbers *	Guarantee Multiplier for Negative Numbers *	Electricity				Natural Gas		Water		Sewer		Total **
							kW	kW (\$)	kWh	kWh (\$)	Therm	Therm (\$)	kgal-W	kgal-W (\$)	kgal-S	kgal-S (\$)	All (\$)
48186	ART 04.01 Control System Update	4	MAM	Missoula Art Museum	90%	110%	0.0	\$0	12,643	\$1,162	1,511	\$1,473	0	\$0	0	\$0	\$2,635
48278	ART 13.01 Envelope Sealing, Caulking, etc.	13	MAM	Missoula Art Museum	90%	110%	0.0	\$0	256	\$23	380	\$370	0	\$0	0	\$0	\$394
49267	ART 19.01 Water Conservation	19	MAM	Missoula Art Museum	100%	100%	0.0	\$0	14,322	\$1,316	326	\$318	221	\$586	221	\$459	\$2,679
48183	ART 09.01 LED Lighting	9	MAM	Missoula Art Museum	95%	105%	78.9	\$1,009	19,616	\$1,803	-35	-\$34	0	\$0	0	\$0	\$2,778
48188	ART 04.03 Conference Room Independent Zone & Thermostat	4	MAM	Missoula Art Museum	90%	110%	4.1	\$52	1,250	\$115	199	\$194	0	\$0	0	\$0	\$361
48187	ART 04.02 Add Office Zone & Thermostat	4	MAM	Missoula Art Museum	90%	110%	1.8	\$23	417	\$38	67	\$65	0	\$0	0	\$0	\$126
							<b>85</b>	<b>\$ 1,084</b>	<b>48,503</b>	<b>\$ 4,458</b>	<b>2,447</b>	<b>\$ 2,385</b>	<b>221</b>	<b>\$ 586</b>	<b>221</b>	<b>\$ 459</b>	<b>\$ 8,972</b>

\* The savings shown in this table are less than the calculated savings unless a guarantee multiplier of 100% is shown.

\*\* The guarantee is based on Key Performance Indicators shown in Table 3.2. Refer to Section 3 of the ESP for the method of converting Key Performance Indicators to dollars during the M&V period.

\*\*\* The guarantee is based on the aggregate savings for all FIMs, not on individual FIM savings.

Confidential and Proprietary



# Table 3.2 - M&V Plan Outline

Project: City of Missoula  
 Scenario: Ph 1 Implementation - Missoula Art Museum  
 Date: 11/3/2022

FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual	Ongoing Owner Responsibilities	Stipulated Factors
							Tasks	Tasks2	Tasks4		
ART 04.01 Control System Update	Missoula Art Museum	A	1.	Unoccupied Space Temperature Setpoints	Unoccupied Cooling = 75F, Unoccupied Heating = 70F	Unoccupied Cooling = 80F, Unoccupied Heating = 65F	Site Audit, Collect HVAC BMS data	Verify a sampling of space temperature setpoints for unoccupied conditions. Verify additional items per detailed M&V plan.	Review a sampling of unoccupied space temperature setpoints.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			2.	HVAC Occupied Schedule	HVAC occupied schedule 12 hours/day Tue - Sat	HVAC occupied schedule 10 hours/day Tue-Sat	Site Audit, Collect HVAC BMS data	Verify HVAC system schedule. Verify additional items per detailed M&V plan.	Review the HVAC system occupied schedule.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
ART 04.02 Add Office Zone & Thermostat	Missoula Art Museum	A	1.	Occupied Space Temperature Setpoints	Occupied Cooling = 72F, Occupied Heating = 72F	Occupied Cooling = 74F, Occupied Heating = 70F	Site Audit, Collect HVAC BMS data	Verify a sampling of space temperature setpoints for occupied conditions. Verify additional items per detailed M&V plan.	Review a sampling of occupied space temperature setpoints.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
ART 04.03 Conference Room Independent Zone & Thermostat	Missoula Art Museum	A	1.	Occupied Space Temperature Setpoints	Occupied Cooling = 72F, Occupied Heating = 72F	Occupied Cooling = 74F, Occupied Heating = 70F	Site Audit, Collect HVAC BMS data	Verify a sampling of space temperature setpoints for occupied conditions. Verify additional items per detailed M&V plan.	Review a sampling of occupied space temperature setpoints.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
ART 09.01 LED Lighting	Missoula Art Museum	A	1.	Fixture Types and Quantities	See Detailed Lighting Audit (Approximately TBD Fixtures)	See Detailed Lighting Audit (Approximately TBD Fixtures)	Comprehensive Lighting Audit Performed to Determine Quantity, Type, and Locations of Lighting Fixtures	Validate fixture type and quantity of installed fixtures by location (Review of lighting sub-contractors lighting record/as-built documentation)	Verify continued lighting operation with on-site owner staff	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Fixture Input Power (Watts)	See Detailed Lighting Audit	See Detailed Lighting Audit	Pre-Installation Test of Sample of Lighting Fixtures with a Watt Meter	Review measured fixture wattage or amperage & volts of a statistical sample of installed light fixtures provided by lighting sub-contractor	No Task, Assumed Constant	Use Correct Replacement LED Lamps & Drivers and/or LED Fixtures After Warranty Period Concludes	Measured Fixtures are Distributed Throughout Entire Scope
			3.	Fixture Annual Operating Hours	See Detailed Lighting Audit	See Detailed Lighting Audit	Mutually Agreed Upon Based on Operating Hours/Year Provided by Client	Mutually agreed upon based on operating hours/year provided by client	No Task, Assumed Constant	Maintain Lighting Hours as Described in the Detailed Lighting Audit	Lighting Fixture Operating Hours/Year
ART 13.01 Envelope Sealing, Caulking, etc.	Missoula Art Museum	Non-Measured	1.	Exterior and interior door weather stripping	No weather stripping on exterior doors	Weather stripping installed on 7 exterior doors and 4 interior doors	Site Audit	Verify weather stripping is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
			2.	Pipe penetration sealant	No sealant around pipe penetrations from the sub basement	Two pipe penetrations from the sub basement sealed with foam	Site Audit	Verify foam sealant is present and installed properly	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline building leakage and wind factor, baseline HVAC system efficiency
ART 19.01 Water Conservation	Missoula Art Museum	Non-Measured	1.	Plumbing fixture types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Plumbing Fixtures	Validate plumbing fixture type and quantity of installed fixtures by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets
			2.	Kitchen equipment types	See Detailed Water Audit	See Detailed Water Audit	Comprehensive Audit Performed to Determine Quantity, Type, and Locations of Kitchen Equipment	Validate kitchen equipment type and quantity by location (Review of water sub-contractors record/as-built documentation)	No Task, Assumed Constant	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Average Daily Use, Any and All Increases or Decreases to Operations and Maintenance Budgets



# Table 3.3 - Baseline Utility Rates



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Missoula Art Museum  
 Date: 11/2/2022

Facility	Utility	Provider	Rate Name	Rate	Unit
Missoula Art Museum	Electric - Consumption	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 0.091917	kWh
Missoula Art Museum	Electric - Demand	NorthWestern Energy	General Service - 1 Secondary, Demand	\$ 12.787448	kW
Missoula Art Museum	Natural Gas - Consumption	NorthWestern Energy	General Service Natural Gas	\$ 0.974795	therm
Missoula Art Museum	Metered Water Use Fee Volume Rate	City of Missoula	Metered Sewer Use Fee Volume Rate	\$ 1.980000	CCF
Missoula Art Museum	Metered Sewer Use Fee Volume Rate	City of Missoula	Metered Water Use Fee Volume Rate	\$ 1.550000	CCF

# Table 4.2 - Facility Improvement Measure (FIM) Summary



Project: City of Missoula  
 Scenario: Ph 1 Implementation - Missoula Art Museum  
 Date: November 8, 2022

FIM ID	FIM Type	Facility Improvement Measures	FIM Description	Facility	Group	Budget	Annual Utility Cost Savings	Annual Operational Savings **	Calculated SPB	Potential Incentives ***	Avoided Capital	Net Customer Cost (with Incentives)	SPB (with Incentives)
48186	04	ART 04.01 Control System Update	Update the existing control system with Electro Controls to provide new hardware, optimized graphics, enhanced alarms, and custom trend reporting to assist with accreditation reports.	Missoula Art Museum	MAM	\$10,325	\$2,635	\$0	3.9	\$0	\$69,599	(\$61,339)	-28.7
48187	04	ART 04.02 Add Office Zone & Thermostat	Add a VAV box and thermostat to separate the open office area from the private office as separate zones on the AHU system.	Missoula Art Museum	MAM	\$24,556	\$126	\$0	194.5	\$0	\$0	\$21,035	203.5
48188	04	ART 04.03 Conference Room Independent Zone & Thermostat	Add a VAV box and thermostat to separate the conference room as a separate zone on the AHU system.	Missoula Art Museum	MAM	\$23,044	\$361	\$0	63.9	\$0	\$0	\$19,740	67.0
48183	09	ART 09.01 LED Lighting	Retrofit and/or replace existing fixtures with LED technology.	Missoula Art Museum	MAM	\$68,584	\$2,778	\$764	23.3	\$2,120	\$0	\$57,519	23.5
48278	13	ART 13.01 Envelope Sealing, Caulking, etc.	Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.	Missoula Art Museum	MAM	\$6,813	\$394	\$0	17.3	\$0	\$0	\$5,828	18.2
49267	19	ART 19.02 Water Conservation	Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures, replace and/or retrofit existing kitchen equipment, install high efficiency electric hand dryers, and install on-site chemical cleaning infrastructure.	Missoula Art Museum	MAM	\$17,058	\$2,679	\$95	6.2	\$0	\$0	\$21,828	6.2
<b>TOTALS</b>						\$ 150,381	\$ 8,972	\$ 859	16.3	\$ 2,120	\$ 69,599	\$ 64,610	6.7

1. All savings are calculate at the base utility rates, refer to Table 3.3.
2. Per MCA, McKinstry guarantees units of energy saved, not dollars.
3. Savings guarantees are cumulative for the project rather than by individual FIM.
4. Rebates/incentives are only estimates and may change at the time of completion.
5. Avoided capital amounts are only estimates and are for illustrative purposes only.

# Missoula Art Museum FIMs

## 48183

# Detailed Scope of Work

**FIM ID # 48183**  
**ART 09.01 LED Lighting**  
**Missoula Art Museum**

## GENERAL

Retrofit and/or replace existing fixtures with LED technology.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.
21. Demolition and Removal Specialty Contractor

# Detailed Scope of Work

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- A. N/A
- 22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing			Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
265	Yes	ART MUSEUM INT	COLLECTIONS VAULT B00	WRAP PNDD 4FT	F T8 F32-32W-48" NLO- 2L	12	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	12	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (2) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
266	Yes	ART MUSEUM INT	ELEVATOR EQUIPMENT B05	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
267	Yes	ART MUSEUM INT	MECHANICAL ROOM B01	JAR	Incan SI-Med A19 60W- 1L	1	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	1	LED Retrofit Lamp	
268	Yes	ART MUSEUM INT	STAIRS B03	SCONCE NON-LINEAR	CFL 2P-H 22W- 2L	2	Ret/2x6.5LED-PL		RET = Retrofit Fxtr	Install (2) New 6.5W LED PL lamp, remove ballast.	2		0
269	Yes	ART MUSEUM INT	WORKROOM B02	TRFR CTR BSKT 2X4	F T12 F34-34W-48" EB- 2L	4	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (2) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
270	Yes	ART MUSEUM INT	WORKROOM B02	TRACK	HAL SI PAR 38 60W- 1L	4	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	4	LED Retrofit Lamp	CTRL'D
271	Yes	ART MUSEUM INT	WORKROOM B02	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	1	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
272	Yes	ART MUSEUM INT	RECEIVING ROOM B07A	WRAP PNDD 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
273	Yes	ART MUSEUM INT	RECEIVING ROOM B07A	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
274	Yes	ART MUSEUM INT	GLASS STORAGE B07B	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
275	Yes	ART MUSEUM INT	REGISTAR OFFICE B08	INDIR SM 4FT	F T8 F32-32W-48" NLO- 1L	2	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
276	Yes	ART MUSEUM INT	HALL B06	CAN ROUND 6"	CFL 2P-H 18W- 2L	3	Kit/1x15_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 15 watts. Set kelvin temp to 4000K. Install clear alzak trim	3	LED Kit	
277	Yes	ART MUSEUM INT	ELECTRICAL EQUIPMENT B09	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
278	Yes	ART MUSEUM INT	LOWER LOBBY B10	CAN ROUND 6"	CFL 2P-H 18W- 2L	3	Kit/1x15_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 15 watts. Set kelvin temp to 4000K. Install clear alzak trim	3	LED Kit	
279	Yes	ART MUSEUM INT	LOWER LOBBY B10	TRACK	CFL SI PAR38 23W- 1L	3	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
280	Yes	ART MUSEUM INT	LOWER LOBBY B10	TRACK	HAL SI PAR 38 60W- 1L	3	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
281	Yes	ART MUSEUM INT	LOWER LOBBY B10	Can Round 6"	CFL 4P-H 26W- 1L	4	Kit/1x10_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 10 watts. Set kelvin temp to 4000k. Install clear alzak trim	4	LED Kit	
282	Yes	ART MUSEUM INT	STAGING AREA B18	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
283	Yes	ART MUSEUM INT	STORAGE B16	WRAP PNDD 4FT	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
284	Yes	ART MUSEUM INT	JANITOR CLOSET B17	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
285	Yes	ART MUSEUM INT	MENS RESTROOM B15	VANITY 4FT	F T8 F32-32W-48" NLO- 1L	2	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
286	Yes	ART MUSEUM INT	MENS RESTROOM B15	Can Round 6"	CFL 4P-H 26W- 1L	5	Kit/1x10_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 10 watts. Set kelvin temp to 4000k. Install clear alzak trim	5	LED Kit	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
287	Yes	ART MUSEUM INT	WOMENS RESTROOM B14	VANITY 4FT	F T8 F32-32W-48" NLO- 1L	2	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	2	Direct Wire LED Tube	CTRL'D
288	Yes	ART MUSEUM INT	WOMENS RESTROOM B14	Can Round 6"	CFL 4P-H 26W- 1L	5	Kit/1x10_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 10 watts. Set kelvin temp to 4000k. Install clear alzak trim	5	LED Kit	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
289	Yes	ART MUSEUM INT	KITCHEN B19	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	2	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
290	Yes	ART MUSEUM INT	KITCHEN B19	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	2	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
291	Yes	ART MUSEUM INT	CLASSROOM B11-B12	INDIR SM 4FT	F T8 F32-32W-48" NLO- 1L	18	RET-1xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	18	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 1G WH SWITCH PLATE
292	Yes	ART MUSEUM INT	CLASSROOM B11-B12	TRACK	Incan SI-Med A19 60W- 1L	1	LAMP-1x9LEDSI-A19		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, 9 watt, 4000k, E26 base, 25,000 hrs.	1	LED Retrofit Lamp	CTRL'D
293	Yes	ART MUSEUM INT	CLASSROOM B11-B12	Can Round 6"	CFL 4P-H 26W- 1L	8	Kit/1x15_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 15 watts. Set kelvin temp to 4000K. Install clear alzak trim	8	LED Kit	CTRL'D
294	Yes	ART MUSEUM INT	STORAGE B20	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	RET-2xLED4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	





ID	In Scope	Building	Room Name	Existing				Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
295	Yes	ART MUSEUM INT	LOBBY E04	Can Round 8"	CFL 2P-H 18W- 2L	1	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x19_RC8_CT			Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 19 watts. Set kelvin temp to 4000K. Install clear alzak trim piece in	1	LED Kit	
296	Yes	ART MUSEUM INT	LOBBY E04	Can Round 6"	CFL 4P-H 26W- 1L	1	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x10_RC6_CT			Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 10 watts. Set kelvin temp to 4000K. Install clear alzak trim	1	LED Kit	
297	Yes	ART MUSEUM INT	LOBBY E04	Can Round 8"	CFL 2P-H 18W- 2L	5	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x19_RC8_CT			Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 19 watts. Set kelvin temp to 4000K. Install clear alzak trim piece in	5	LED Kit	
298	Yes	ART MUSEUM INT	LOBBY E04	DECOR INT	LED Lamp 20W- 1L	3	LED LED Lamp (Non Linear Tube) 20 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	3	N	
299	Yes	ART MUSEUM INT	BOOKSTORE GALLERY E00	STRIP SM 3FT	HAL LI 3FT 30W- 1L	9	Halogen Incandescent LINEAR 3 FOOT LENGTH 30 Watt,1 lamp/fxtr	IN/1XLED3'-TAPE KIT INSTRUCTIONS			IN = Install New Fxtr	Install 3 foot sections of tape light. Every (2) three foot sections in display cubby will have one power supply. If only one strip use 1 power supply. (3)	9	LED Fxtr Integral Lamp	
300	Yes	ART MUSEUM INT	BOOKSTORE GALLERY E00	TRACK	LED Lamp 15W- 1L	7	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	7	N	
301	Yes	ART MUSEUM INT	COAT ROOM E01	Can Round 6"	CFL 4P-H 26W- 1L	3	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x15_RC6_CT			Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 15 watts. Set kelvin temp to 4000K. Install clear alzak trim	3	LED Kit	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
302	Yes	ART MUSEUM INT	RESTROOM E02	Can Round 6"	CFL 4P-H 26W- 1L	1	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x15_RC6_CT			Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 15 watts. Set kelvin temp to 4000K. Install clear alzak trim	1	LED Kit	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
303	Yes	ART MUSEUM INT	RESTROOM E02	VANITY 4FT	F T8 F32-32W-48" NLO- 1L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	CTRL'D
304	Yes	ART MUSEUM INT	ELEVATOR 105	Can Round 4"	Incan SI-Med A15 40W- 1L	9	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A15 (AKA: Fan or appliance Light) 40 Watt,1 lamp/fxtr	Kit/1x9_RC4_CT			Kit = Install Kit	Install 4" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 9 watts. Set kelvin temp to 4000K. Install clear alzak trim	9	LED Kit	
305	Yes	ART MUSEUM INT	HALL 106	SCONCE 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (3) RMJ POWPACK, (4) WIRELESS HALLWAY SENSOR
306	Yes	ART MUSEUM INT	HALL 106	Can Round 8"	CFL 2P-H 18W- 2L	6	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x15_RC8_CT			Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 15 watts. Set kelvin temp to 4000k. Install clear alzak trim	6	LED Kit	CTRL'D
307	Yes	ART MUSEUM INT	HALL 106	TRACK	LED Lamp 15W- 1L	7	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	7	N	CTRL'D
308	Yes	ART MUSEUM INT	HALL 106	WP MEDIUM FT	CFL 4P-H 42W- 2L	6	Compact Fluorescent 4 Pin Horizontal 42 Watt,2 lamp/fxtr	RET/2x22DW-PL-ER			RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	6		0 CTRL'D
309	Yes	ART MUSEUM INT	ELECTRICAL EQUIPMENT 115	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
310	Yes	ART MUSEUM INT	GALLERY 113	STRIP SM 2FT	F T8 F17-24" NLO- 1L	72	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1XLEDT2FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tube (1), remove existing fluorescent ballast.	72	Direct Wire LED Tube	
311	Yes	ART MUSEUM INT	GALLERY 113	TRACK	LED Lamp 15W- 1L	20	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	20	N	
312	Yes	ART MUSEUM INT	GALLERY 113	TRACK	LED Lamp 15W- 1L	9	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	9	N	
313	Yes	ART MUSEUM INT	GALLERY 113	Can Round 8"	CFL 2P-H 18W- 2L	8	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x15_RC8_CT			Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 15 watts. Set kelvin temp to 4000k. Install clear alzak trim	8	LED Kit	
314	Yes	ART MUSEUM INT	GALLERY 113	TRACK	LED Lamp 15W- 1L	1	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	1	N	
315	Yes	ART MUSEUM INT	STORAGE 114	WRAP PNDD 4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
316	Yes	ART MUSEUM INT	STORAGE	INDSTR SM 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
317	Yes	ART MUSEUM INT	STORAGE	INDSTR SM 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
318	Yes	ART MUSEUM INT	GALLERY 100, 104	TRACK	LED Lamp 15W- 1L	4	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	4	N	
319	Yes	ART MUSEUM INT	GALLERY 100, 104	TRACK	LED Lamp 15W- 1L	2	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	2	N	
320	Yes	ART MUSEUM INT	GALLERY 100, 104	TRACK	LED Lamp 15W- 1L	10	LED LED Lamp (Non Linear Tube) 15 Watt,1 lamp/fxtr	N			N = No Retrofit	No Retrofit Proposed	10	N	
321	Yes	ART MUSEUM INT	HOLDING 109	WRAP PNDD 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
322	Yes	ART MUSEUM INT	ELECTRICAL EQUIPMENT 212	INDSTR PNDD 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW			RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
323	Yes	ART MUSEUM INT	STAIRWELL	SCONCE 3FT	CFL 4P-H 42W- 1L	4	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER			RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	4	LED Compact Lamp	
324	Yes	ART MUSEUM INT	STAIRWELL	Can Round 8"	CFL 2P-H 18W- 2L	9	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x19_RC8_CT			Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 19 watts. Set kelvin temp to 4000K. Install clear alzak trim piece in	9	LED Kit	



ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
325	Yes	ART MUSEUM INT	STAIRWELL	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
326	Yes	ART MUSEUM INT	GALLERY 205	TRACK	HAL SI PAR 38 60W-1L	8	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	8	LED Retrofit Lamp	
327	Yes	ART MUSEUM INT	GALLERY 205	TRACK	CFL SI PAR38 23W-1L	2	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	
328	Yes	ART MUSEUM INT	GALLERY 205	TRACK	CFL SI PAR38 23W-1L	3	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
329	Yes	ART MUSEUM INT	GALLERY 208	TRACK	HAL SI PAR 38 60W-1L	3	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
330	Yes	ART MUSEUM INT	GALLERY 208	TRACK	CFL SI PAR38 23W-1L	1	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	1	LED Retrofit Lamp	
331	Yes	ART MUSEUM INT	RESORCE ROOM 207	CAN ROUND 6"	CFL 2P-H 18W- 2L	4	Compact Fluorescent 2 Pin Horizontal 18 Watt,2 lamp/fxtr	Kit/1x15_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 15 watts. Set kelvin temp to 4000K. Install clear alzak trim	4	LED Kit	
332	Yes	ART MUSEUM INT	RESORCE ROOM 207	TRACK	CFL SI PAR38 23W-1L	2	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	
333	Yes	ART MUSEUM INT	RESORCE ROOM 207	TRACK	HAL SI PAR 38 60W-1L	4	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	4	LED Retrofit Lamp	
334	Yes	ART MUSEUM INT	RESORCE ROOM 207	STRIP SM 2FT	HAL LI 2FT 20W- 1L	3	Halogen Incandescent LINEAR 2 FOOT LENGTH 20 WATT,1 lamp/fxtr	IN/1XLED2'-TAPE KIT INSTRUCTIONS		IN = Install New Fxtr	Install 2 foot sections of tape light. Every (2) two foot sections in display cubby will have one power supply. (3) Kits are included for total project -	3	LED Fxtr Integral Lamp	
335	Yes	ART MUSEUM INT	RESORCE ROOM 207	STRIP SM 2FT	HAL LI 2FT 20W- 1L	1	Halogen Incandescent LINEAR 2 FOOT LENGTH 20 WATT,1 lamp/fxtr	IN/1XLED2'-TAPE KIT		IN = Install New Fxtr	Install 2 foot sections of tape light. Every (2) two foot sections in display cubby will have one power supply. (3) Kits are included for total project -	1	LED Fxtr Integral Lamp	
336	Yes	ART MUSEUM INT	OFFICES 210	DIR-IND PNDD 4FT	F T8 F32-32W-48" NLO- 2L	12	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	12	Direct Wire LED Tube	INSTALL (3) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (1) 3G WH SWITCH PLATE
337	Yes	ART MUSEUM INT	DIRECTOR 209	DIR-IND PNDD 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (3) WIRELESS WALL SWITCH, (1) WIRELESS CEILING SENSOR, (1) 3G WH SWITCH PLATE
338	Yes	ART MUSEUM INT	DIRECTOR 209	TRACK	CFL SI PAR38 23W-1L	2	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	CTRL'D
339	Yes	ART MUSEUM INT	RESTROOM 211	VANITY 4FT	F T8 F32-32W-48" NLO- 1L	1	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
340	Yes	ART MUSEUM INT	RESTROOM 211	CAN ROUND 6"	CFL 4P-H 26W- 1L	1	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x10_RC6_CT		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Medium Setting 10 watts. Set kelvin temp to 4000k. Install clear alzak trim	1	LED Kit	CTRL'D
341	Yes	ART MUSEUM INT	ATTIC	INDSTRL SM 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4F1-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
342	Yes	ART MUSEUM INT	GALLERY 200, 203	TRACK	CFL SI PAR38 23W-1L	5	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	5	LED Retrofit Lamp	
343	Yes	ART MUSEUM INT	GALLERY 200, 203	TRACK	CFL SI PAR38 23W-1L	3	Compact Fluorescent Screw-In PAR38 23 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
344	Yes	ART MUSEUM INT	GALLERY 200, 203	TRACK	HAL SI PAR 38 60W-1L	3	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,1 lamp/fxtr	Lamp-1x15.5LEDSI-PAR38-DIMMABLE		Lamp = Relamp Fxtr	Install (1) New dimmable 15.5 watt screw in lamp. Par38, E26 medium base, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
345	Yes	ART MUSEUM EXT	EAST EXTERIOR	CAN ROUND 8"	Incan SI-Med A19 60W- 1L	4	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	4	LED Kit	
346	Yes	ART MUSEUM EXT	EAST EXTERIOR	WP MEDIUM FT	LED Fxtr - 40W	4	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	4	N	
347	Yes	ART MUSEUM EXT	EAST EXTERIOR	WP MEDIUM FT	LED Fxtr - 40W	2	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	2	N	
348	Yes	ART MUSEUM EXT	EAST EXTERIOR	POLE DEC 1 HEAD PER POLE	LED Fxtr - 70W	2	LED LED Fxtr ,70 Watt	N		N = No Retrofit	No Retrofit Proposed	2	N	
349	Yes	ART MUSEUM EXT	NORTH EXTERIOR	POLE DEC 1 HEAD PER POLE	LED Fxtr - 70W	3	LED LED Fxtr ,70 Watt	N		N = No Retrofit	No Retrofit Proposed	3	N	
350	Yes	ART MUSEUM EXT	NORTH EXTERIOR	WP MEDIUM FT	LED Fxtr - 40W	2	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	2	N	
351	Yes	ART MUSEUM EXT	NORTH EXTERIOR	WP MEDIUM FT	LED Fxtr - 40W	3	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	3	N	
352	Yes	ART MUSEUM EXT	NORTH EXTERIOR	WP MEDIUM FT	LED Fxtr - 40W	2	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	2	N	
353	Yes	ART MUSEUM EXT	WEST EXTERIOR	POLE CB 2 HEAD PER POLE MAST SLV	HPS Mogul 200W-1L	2	High Pressure Sodium Mogul base (AKA: E39) 200 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x77LEDF_CB		IN = Install New Fxtr	Install new LED Cobra Head, silver, 120-277V Type V Dist.	2	LED Fixture	
354	Yes	ART MUSEUM EXT	SOUTH EXTERIOR	WP MEDIUM FT	LED Fxtr - 40W	1	LED LED Fxtr ,40 Watt	N		N = No Retrofit	No Retrofit Proposed	1	N	

# Missoula Art Museum FIMs

## 48186

# Detailed Scope of Work

**FIM ID # 48186**  
**ART 04.01 Control System Update**  
**Missoula Art Museum**

## GENERAL

The existing controls system has proven difficult to operate due to a number of factors. This measure proposes to update the system with the existing controls provider to ensure the latest hardware, software, and user interface are present in the system.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Provide a comprehensive review of the controls system.
  - B. Replace non-functioning hardware components.
  - C. Review and update SOO programming.
  - D. Review and update graphical user interface.
  - E. Set up and provide training for trending, alarming, and remote monitoring.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. By controls provider and McKinstry.
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. By controls provider and McKinstry.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Missoula Art Museum FIMs 48187



# Detailed Scope of Work

**FIM ID # 48187**  
**ART 04.02 Add Office Zone & Thermostat**  
**Missoula Art Museum**

## GENERAL

Add a VAV box and thermostat to separate the open office area from the private office as separate zones on the AHU system.

## SCOPE OF WORK INCLUDES

- A. "Provide" as written below shall mean furnish and install.
- B. Mechanical
  - 1. Remove ductwork as indicated on the attached sketches.
  - 2. Provide terminal unit with heating coil, ductwork, piping, valves and appurtenance as shown.
  - 3. Cut wall opening, frame as required and provide combination fire/smoke damper, coordinate requirements with Fire Alarm Contractor, install per manufacturers written instructions. Patch wall as required to restore fire/smoke rating.
  - 4. Install automatic control valve furnished by Temperature Controls Contractor.
  - 5. Insulate piping and ductwork per master specifications sheets. Note: medium pressure ductwork upstream of terminal unit VV-10 shall have 1" acoustical liner. Dimensions shown are clear inside.
  - 6. Provide pipe labeling indicating service and direction of flow for all heating water piping.
  - 7. Provide equipment labeling for all scheduled equipment. Plastic 3x5 laminated plastic tags with white letters on black background.
  - 8. Existing heating water system is a 30% propylene glycol mixture. Contractor to test system prior to work and add additional glycol as required to return mixture to design levels.
- C. Controls
  - 1. Provide all low voltage wiring, line voltage wiring, and conduit for a complete and functioning control system
  - 2. Provide controller and thermostat for new terminal unit. Thermostat shall be DDC style with occupant override button and temperature adjustment.
  - 3. Update control graphics to include new terminal unit and revised zoning.
  - 4. Furnish control valve for new terminal unit heating coil (install by M.C.).
  - 5. Provide all programming necessary to operate the systems per the Design Intent set forth by McKinstry.
  - 6. All controllers will be BACnet or LON compatible (TBD).
  - 7. Wiring exposed within rooms shall be run thru wire-mold.
  - 8. Wiring exposed above ceilings shall be plenum rated.
  - 9. Wiring in mechanical room shall be in conduit.
  - 10. Reference drawings for additional requirements.
  - 11. Work with McKinstry Commissioning personnel to test systems.
  - 12. Provide Owner Training (1 hour) for this FIM.
- D. Electrical
  - 1. N/A.
- E. Fire Alarm
  - 1. Integrate combination fire/smoke damper into existing Fire Alarm System, coordinate requirements with Mechanical Contractor. Provide all required fire alarm wiring.
- F. Commissioning
  - 1. McKinstry Commissioning Engineer will fully commission the proposed controls and HVAC systems.

# Detailed Scope of Work

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## G. TAB

1. McKinstry Commissioning Engineer to provide air and waterside TAB for the new and revised terminal units.

## H. Engineering

1. McKinstry to provide design engineering for this FIM.

## I. Training

1. McKinstry to oversee Owner Training for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
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# Missoula Art Museum FIMs

## 48188

# Detailed Scope of Work

**FIM ID # 48188**  
**ART 04.03 Conference Room Independent Zone & Thermostat**  
**Missoula Art Museum**

## GENERAL

Add a VAV box and thermostat to separate the conference room as a separate zone on the AHU system.

## SCOPE OF WORK INCLUDES

- A. "Provide" as written below shall mean furnish and install.
- B. Mechanical
  - 1. Remove ductwork as indicated on the attached sketches.
  - 2. Provide terminal unit with heating coil, ductwork, piping, valves and appurtenance as shown.
  - 3. Cut wall opening and provide combination fire/smoke damper, coordinate requirements with Fire Alarm Contractor, install per manufacturers written instructions. Patch wall as required to restore fire/smoke rating.
  - 4. Install automatic control valve furnished by Temperature Controls Contractor.
  - 5. Insulate piping and ductwork per master specifications sheets. Note: medium pressure ductwork upstream of terminal unit VV-11 shall have 1" acoustical liner. Dimensions shown are clear inside.
  - 6. Provide pipe labeling indicating service and direction of flow for all heating water piping.
  - 7. Provide equipment labeling for all scheduled equipment. Plastic 3x5 laminated plastic tags with white letters on black background.
  - 8. Existing heating water system is a 30% propylene glycol mixture. Contractor to test system prior to work and add additional glycol as required to return mixture to design levels.
- C. Controls
  - 1. Provide all low voltage wiring, line voltage wiring, and conduit for a complete and functioning control system
  - 2. Provide controller and thermostat for new terminal unit. Thermostat shall be DDC style with occupant override button and temperature adjustment.
  - 3. Update control graphics to include new terminal unit and revised zoning.
  - 4. Furnish control valve for new terminal unit heating coil (install by M.C.).
  - 5. Provide all programming necessary to operate the systems per the Design Intent set forth by McKinstry.
  - 6. All controllers will be BACnet or LON compatible (TBD).
  - 7. Wiring exposed within rooms shall be run thru wire-mold.
  - 8. Wiring exposed above ceilings shall be plenum rated.
  - 9. Wiring in mechanical room shall be in conduit.
  - 10. Reference drawings for additional requirements.
  - 11. Work with McKinstry Commissioning personnel to test systems.
  - 12. Provide Owner Training (1 hour) for this FIM.
- D. Electrical
  - 1. N/A.
- E. Fire Alarm
  - 1. Integrate COMBINATION fire/smoke damper into existing Fire Alarm System, coordinate requirements with Mechanical Contractor. Provide all required fire alarm wiring.
- F. Commissioning
  - 1. McKinstry Commissioning Engineer will fully commission the proposed controls and HVAC systems.

# Detailed Scope of Work

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## G. TAB

1. McKinstry Commissioning Engineer to provide air and waterside TAB for the new and revised terminal units.

## H. Engineering

1. McKinstry to provide design engineering for this FIM.

## I. Training

1. McKinstry to oversee Owner Training for this FIM.

## CLARIFICATIONS AND EXCLUSIONS

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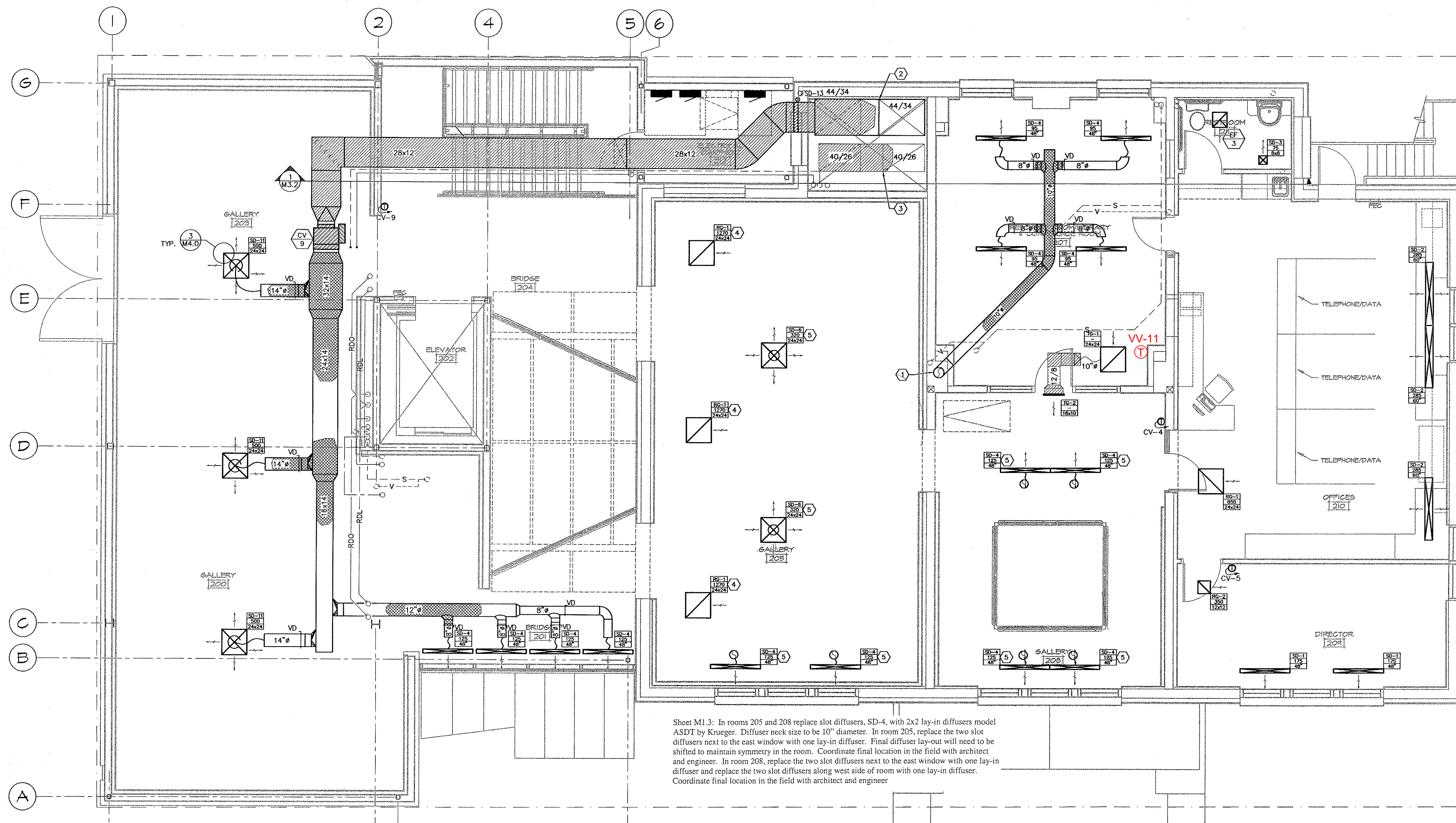
PROJECT:  
**CITY OF MISSOULA  
ART MUSEUM -**

**FIM 48188 - 04.03**

**ADD CONFERENCE  
ROOM ZONE AND  
THERMOSTAT**

PROJECT LOCATION  
XXX Missoula, MT 5980x

CONSULTANTS:



Sheet M1.3: In rooms 205 and 208 replace slot diffusers, SD-4, with 2x2 lay-in diffusers model ASDT by Krueger. Diffuser neck size to be 10" diameter. In room 205, replace the two slot diffusers next to the east window with one lay-in diffuser. Final diffuser lay-out will need to be shifted to maintain symmetry in the room. Coordinate final location in the field with architect and engineer. In room 208, replace the two slot diffusers next to the east window with one lay-in diffuser and replace the two slot diffusers along west side of room with one lay-in diffuser. Coordinate final location in the field with architect and engineer.

**SECOND FLOOR MECHANICAL RENOVATION PLAN** — N

**KEYED NOTES:**

1. PROVIDE DDC THERMOSTAT WITH OCCUPANT OVERRIDE AND TEMPERATURE ADJUSTMENT SLIDE.

**NOTE:**  
AREAS OF THIS BUILDING WILL BE UTILIZED AS RETURN AIR PLENUMS. ALL MATERIALS INSTALLED IN CEILING SPACES SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS, AND A SMOKE DEVELOPED RATING OF 50 OR LESS. THIS INCLUDES, BUT IS NOT LIMITED TO, ALL PIPE, WIRE, INSULATION, AND CONSTRUCTION MATERIALS.

ALL DUCTWORK DOWNSTREAM OF CONSTANT VOLUME BOXES IS TO BE EXTERIOR INSULATED. ALL DUCTWORK UPSTREAM OF CONSTANT VOLUME BOXES IS TO BE INTERIOR LINED WITH CLOSED CELL ACOUSTICAL LINER.

ISSUES:

NO	DATE	DESCRIPTION
--	06/XX/2021	ISSUED FOR GMAX

DESIGNED: P. FALLON  
DRAWN: P. FALLON  
CHECKED: P. FALLON  
JOB NO: XXXX-00X

SHEET TITLE:  
**MECHANICAL  
RENOVATION  
PLAN - SECOND  
FLOOR**

SHEET NUMBER:  
**M2 OF 4**









# Missoula Art Museum FIMs

## 48278

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

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**Missoula Art Museum**

335 N Pattee St.  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss. Pipe Penetrations to be sealed with 1 or 2 part foam. To isolate sub basement. Int. Door(s) to be weather-stripped & sealed for isolation.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>422</b>
Annual Cost of Leakage (Kwh):	-	<b>284</b>

**TYPE OF MEASURES:**

	<b>Building Level</b>	<b>quantity or distance</b>
Ext. Door(s) to be weather-stripped & sealed.	Basement	2 Doors
Ext. Door(s) to be weather-stripped & sealed.	First	3 Doors
Ext. Door(s) to be weather-stripped & sealed. Mezzanine	Upper	2 Doors
Int. Door(s) to be weather-stripped & sealed for isolation.	First	3 Doors
Int. Door(s) to be weather-stripped & sealed for isolation. Door to sub basement.	Basement	1 Doors
Pipe Penetrations to be sealed with 1 or 2 part foam. To isolate sub basement.	Basement	2 Penetrations

<b>AIR LEAKAGE:</b>	<b>feet</b>	<b>inches</b>		
Doors	40	3/32	0.31	sq ft
Doors	60	3/32	0.47	sq ft
Doors	40	3/32	0.31	sq ft
Doors	60	3/32	0.47	sq ft
Doors	20	3/32	0.16	sq ft
Penetrations	1/2	1/8	0.01	sq ft

Totals	-		1.72 sq ft
			0.16 sq meter

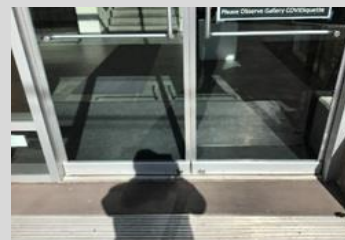
**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 140

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$





# Missoula Art Museum FIMs 49267

# Investment Grade Audit

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## 49267-19.01 ART - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures

City of Missoula, MT V1										
Demographics and Usage										
Count Bldg # Building Name Category	1	2	3	4	5	6	7	8	9	10
	City Shops	Art Museum	Central Parking	Splash Pad	Fire Station 4	Fire Station 1	Fire Station 2	Fire Station 3	Fire Station 5	Currents
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900
Per Day Visitor	10	10	10	10	10	10	10	10	10	10
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882
Sale Tax%										
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	1	2	1	53	4	4	4	4	12
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3	1.7	1.7	1.7	1.7	5.0
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9	0.3	0.3	0.3	0.3	0.9
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9	0.2	0.2	0.2	0.2	0.6
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs
	P1 Ave Daily Count	1	2	1	53	4	4	4	4	12
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	FEMALE count	0.4	0.9	0.4	26.3	2.0	2.0	2.0	2.0	5.9
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	0.5	1.1	0.5	34.1	2.6	2.6	2.6	2.6	7.6
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff
	P1 Ave Daily Count	35.8	14.0	1.9	140.0	18	65	38	45	33
	M-F days/yr ON	261	261	261	180	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	FEMALE count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	15.7
	Group Occupancy Days	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors
	P1 Ave Daily Count	15	34	28	2100					470
	M-F days/yr ON	261	261	261	120	261	261	261	261	261
	Sat/Sun days/yr ON	104	104	104	104	104	104	104	104	104
	Holiday/vacation days/yr OFF	30	30	30	30	30	30	30	30	30
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count	7.5	17.0	14.0	1050.0					235.0
	FEMALE count	7.5	17.0	14.0	1050.0					235.0
	Group Occupancy Days	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0
	Group Water Closet Use per day	37.3	81.0	70.0	5250.0					1175.0
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event
	P1 Ave Daily Count									
	M-F days/yr ON									
	Sat/Sun days/yr ON					105	260	260	260	260
	Holiday/vacation days/yr OFF					75	60	60	60	60
	% Male	50%	50%	50%	50%	50%	50%	50%	50%	50%
	MALE count									
	FEMALE count									
	Group Occupancy Days					30.0	210.0	210.0	210.0	210.0
	Group Water Closet Use per day									
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6

Demographics and Usage

City of Missoula, MT V1

**A. Fixture Usage-based Consumption Allocation** | **B. Hot Water Savings** | **C. Operational/Deferred Maintenance Savings**

City Shop	City	IC	Fixture Details	gpm flow	gpm flow	A flow	% S	Quantity	Gallons				Pre Peak Demand (gpm)	Post Peak Demand (gpm)	Pre Gallons Consumed per yr	Post Gallons consumed per yr
									Avg Daily Usage	Saved Per Day	Days Per Year Occupied	Days Per Year Occupied				
City Shop	WC	WC	4.5 GPF x Valve Only	4.50	1.28	0.21	48%	2	2.27	2.27	300	300	2.27	2.27	837.00	837.00
	WC	WC	STANDARD 2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1/2" x 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1" x 1"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1 1/2" x 1 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2" x 2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2 1/2" x 2 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 3" x 3"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 4" x 4"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 6" x 6"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 8" x 8"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 10" x 10"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 12" x 12"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 14" x 14"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
WC	WC	HE 16" x 16"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 18" x 18"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 20" x 20"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 24" x 24"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 30" x 30"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 36" x 36"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 42" x 42"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 48" x 48"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 54" x 54"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 60" x 60"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 72" x 72"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 84" x 84"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 96" x 96"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 108" x 108"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 120" x 120"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 144" x 144"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 168" x 168"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 192" x 192"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 216" x 216"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 240" x 240"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 264" x 264"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 288" x 288"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 312" x 312"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 336" x 336"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 360" x 360"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 384" x 384"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 408" x 408"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 432" x 432"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 456" x 456"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 480" x 480"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 504" x 504"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 528" x 528"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 552" x 552"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 576" x 576"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 600" x 600"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 624" x 624"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 648" x 648"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 672" x 672"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 696" x 696"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 720" x 720"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 744" x 744"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 768" x 768"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 792" x 792"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 816" x 816"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 840" x 840"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 864" x 864"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 888" x 888"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 912" x 912"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 936" x 936"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 960" x 960"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 984" x 984"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1008" x 1008"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1032" x 1032"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1056" x 1056"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1080" x 1080"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1104" x 1104"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1128" x 1128"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1152" x 1152"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1176" x 1176"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1200" x 1200"	1.28	1.28	0.00	0%	2	2.27	0.00</							







**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs											
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Energy Input (BTU):	Therms
																	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Gas input		
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65°	120°	50%	758	379	223,225	2.4	
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3	
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3	
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65°	120°	50%	730	365	215,089	2.3	
Fire Station 5	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65°	120°	50%	2,190	1,095	645,268	7.0	
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65°	120°	50%	2,190	1,095	645,268	7.0	



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs											
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Energy Input (BTU):	Therms
																	Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Gas input		
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65°	120°	50%	12,425	6,212	3,660,889	36.6	
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Energy Input (BTU):	Therms
																			Hot Water of Total Fixture Flow:	Total Water saved (gal):	Hot Water saved (gal):	Gas input		
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65°	120°	50%	120,600	60,300	35,533,920	355.3	
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65°	120°	50%	45,457	22,728	13,393,497	133.9	
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65°	120°	50%	0	0	0	0.0	



# EXHIBIT H - City of Missoula Energy Performance Contract Proposal Project Forms- Parking Ph 1

# Parking FIMs

48197

# Detailed Scope of Work

**FIM ID # 48197**  
**BANK 09.01 LED Lighting**  
**Bank Street**

## GENERAL

Replace the existing light fixtures with new parking garage specific LED fixtures. Fixtures to have onboard occupancy and dimming controls.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.



# Detailed Scope of Work

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21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing				Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
355	Yes	BANK ST PARKING LOT EXT	TOP PARKING LOT OPEN LOT	POLE DEC 1 HEAD PER POLE	HPS Med 50W- 1L	12	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x25_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 25 watts.	12	LED Retrofit Lamp	
356	Yes	BANK ST PARKING LOT EXT	TOP PARKING LOT OPEN LOT	POLE DEC 1 HEAD PER POLE	HPS Med 50W- 1L	20	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x25_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 25 watts.	20	LED Retrofit Lamp	
357	Yes	BANK ST PARKING LOT EXT	TOP PARKING LOT OPEN LOT	DRUM RND 12" DIAM	HPS Med 50W- 1L	4	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x16_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 16 watts.	4	LED Retrofit Lamp	
358	Yes	BANK ST PARKING LOT EXT	TOP PARKING LOT NORTH WALKING AREA	SCONCE 2FT	CFL 4P-H 42W- 1L	12	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER	Verify if bulb will fit 7.5"x2.3"	RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	12	LED Compact Lamp	
359	Yes	BANK ST PARKING LOT EXT	TOP PARKING LOT NORTH WALKING AREA	BOLLARD	CFL SI PAR30 15W- 1L	3	Compact Fluorescent Screw-In PAR30 15 Watt,1 lamp/fxtr	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	3	LED Retrofit Lamp	
360	Yes	BANK ST PARKING LOT EXT	TOP PARKING LOT NORTH WALKING AREA	BOLLARD	CFL SI PAR30 15W- 1L	7	Compact Fluorescent Screw-In PAR30 15 Watt,1 lamp/fxtr	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	7	LED Retrofit Lamp	
361	Yes	BANK ST PARKING LOT EXT	WEST STAIRS	SCONCE 2FT	CFL 4P-H 42W- 1L	10	Compact Fluorescent 4 Pin Horizontal 42 Watt,1 lamp/fxtr	RET/1x22DW-PL-ER	Verify if bulb will fit 7.5"x2.3"	RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	10	LED Compact Lamp	
362	Yes	BANK ST PARKING LOT EXT	BOTTOM FLOOR PARKING LOT INSIDE CAR LOT	POLE DEC 1 HEAD PER POLE	HPS Med 50W- 1L	6	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 50 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	Ret/1x25_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A21, medium base, enclosed rated 25 watts.	6	LED Retrofit Lamp	
363	Yes	BANK ST PARKING LOT EXT	BOTTOM FLOOR PARKING LOT INSIDE CAR LOT	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	41	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	41	LED Fixture	FIOC
364	Yes	BANK ST PARKING LOT EXT	BOTTOM FLOOR PARKING LOT INSIDE CAR LOT	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	2	LED Fixture	FIOC
365	Yes	BANK ST PARKING LOT EXT	BOTTOM FLOOR PARKING LOT INSIDE CAR LOT	CAN ROUND 8"	Incan SI-Med A19 40W- 1L	3	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 40 Watt,1 lamp/fxtr	Kit/1x12_RC8		Kit = Install Kit	Install 8" New Retrofit Downlight Kit. Kit has 3 settings - set to Low Setting 12 watts.	3	LED Kit	
366	Yes	BANK ST PARKING LOT EXT	BOTTOM FLOOR PARKING LOT INSIDE CAR LOT	EM 1 Face Bugeyes	Emergency HAL 1W - 2L	18	Emergency Halogen 1W ,2 lamp/fxtr	N		N = No Retrofit	No Retrofit Proposed	18	N	
367	Yes	BANK ST PARKING LOT EXT	BOTTOM FLOOR PARKING LOT INSIDE CAR LOT STORAGE	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	

# Parking FIMs

## 48199

# Detailed Scope of Work

**FIM ID # 48199**  
**PARK 09.01 LED Lighting**  
**Park Place**

## GENERAL

Replace the lamps in the existing light fixtures with new LED type-A tubes and drivers. Fixtures already have onboard occupancy and dimming controls that will remain but the system will be assessed and reprogrammed as part of the installation.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and

# Detailed Scope of Work

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vendors, as necessary.

21. Demolition and Removal Specialty Contractor

A. N/A

22. Training

A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.





LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing				Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
420	Yes	PARK PLACE PARKING LOT INT	SOUTH WEST STAIRWELL	DRUM RND 12" DIAM	Incan SI-Med A19 40W- 3L	3	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 40 Watt,3 lamp/fixtr	Lamp/3x12LEDSI-A19-ER		Lamp = Relamp Fxtr	Install 3 New screw in lamps. A19, 12 watt, 4000K, enclosed rated, 25,000 hours.	3	LED Retrofit Lamp	
421	Yes	PARK PLACE PARKING LOT INT	NORTH SIDE COVERED AREA, FRONT OF ELEVATOR	VAPOR 4FT	F T8 F32-32W-48" NLO- 3L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),3 lamp/fixtr	RET/3XLEDT4FT-DIM_LIMELIGHT		RET = Retrofit Fxtr	Install 1 type C dimmable capable driver and 4ft LED tubes (3), remove existing fluorescent ballast. Any reprogramming of sensors or control system	2		LIMELIGHT EXISTING CONTROL SYSTEM - REPROGRAM BY LUTRON
422	Yes	PARK PLACE PARKING LOT EXT	4TH LVL PARKING	POLE SB 2 HEAD PER POLE SQ DIR ARM BLK	HPS Mogul 250W-2L	3	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,2 lamp/fixtr or PER Pole (If Pole Mounted)	IN/2x113LEDF_SB_SQ_III		IN = Install New Fxtr	Install (2) new LED Shoebox fixtr's at each pole. Square arm mount, type III distribution, 113W, Pole mount, 3000K Full Cutoff , Bronze, 120-277V	3	LED Fixture	
423	Yes	PARK PLACE PARKING LOT INT	4TH LVL SOUTH WEST COVERED AREA	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	3	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET/2XLEDT4FT-DIM_LIMELIGHT		RET = Retrofit Fxtr	Install 1 type C dimmable capable driver and 4ft LED tubes (2), remove existing fluorescent ballast. Any reprogramming of sensors or control system	3		LIMELIGHT EXISTING CONTROL SYSTEM - REPROGRAM BY LUTRON
424	Yes	PARK PLACE PARKING LOT INT	ELECTRICAL ROOM NORTHEAST 3RD LVL	STRIP PNDT 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	
425	Yes	PARK PLACE PARKING LOT INT	3RD LVL CAR LOT AREA GOING TO 2ND LVL	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	41	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET/2XLEDT4FT-DIM_LIMELIGHT		RET = Retrofit Fxtr	Install 1 type C dimmable capable driver and 4ft LED tubes (2), remove existing fluorescent ballast. Any reprogramming of sensors or control system	41		LIMELIGHT EXISTING CONTROL SYSTEM - REPROGRAM BY LUTRON
426	Yes	PARK PLACE PARKING LOT INT	2ND LVL CAR LOT GOING TO 1ST LVL	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	36	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET/2XLEDT4FT-DIM_LIMELIGHT		RET = Retrofit Fxtr	Install 1 type C dimmable capable driver and 4ft LED tubes (2), remove existing fluorescent ballast. Any reprogramming of sensors or control system	36		LIMELIGHT EXISTING CONTROL SYSTEM - REPROGRAM BY LUTRON
427	Yes	PARK PLACE PARKING LOT INT	1ST LVL CAR LOT GOING TO BACEMENT LVL	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	46	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET/2XLEDT4FT-DIM_LIMELIGHT		RET = Retrofit Fxtr	Install 1 type C dimmable capable driver and 4ft LED tubes (2), remove existing fluorescent ballast. Any reprogramming of sensors or control system	46		LIMELIGHT EXISTING CONTROL SYSTEM - REPROGRAM BY LUTRON
428	Yes	PARK PLACE PARKING LOT INT	B1 LVL GOING DOWN TO END	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	30	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET/2XLEDT4FT-DIM_LIMELIGHT		RET = Retrofit Fxtr	Install 1 type C dimmable capable driver and 4ft LED tubes (2), remove existing fluorescent ballast. Any reprogramming of sensors or control system	30		LIMELIGHT EXISTING CONTROL SYSTEM - REPROGRAM BY LUTRON
429	Yes	PARK PLACE PARKING LOT INT	B1 LVL SPRINKLER ROOM	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4ft LED tubes (2), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
430	Yes	PARK PLACE PARKING LOT INT	NORTH SIDE STAIRWELL	DRUM RND 12" DIAM	Incan SI-Med A19 40W- 3L	8	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 40 Watt,3 lamp/fixtr	Lamp/3x12LEDSI-A19-ER		Lamp = Relamp Fxtr	Install 3 New screw in lamps. A19, 12 watt, 4000K, enclosed rated, 25,000 hours.	8	LED Retrofit Lamp	
431	Yes	PARK PLACE PARKING LOT INT	ELEVATOR	STRIP SM 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fixtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	
432	Yes	PARK PLACE PARKING LOT EXT	EXTERIOR ROAD LVL	SCONCE NON-LINEAR	CFL 4P-V 42W- 1L	11	Compact Fluorescent 4 Pin Vertical 42 Watt,1 lamp/fixtr	RET/1x22DW-PL-ER		RET = Retrofit Fxtr	Install (1) New direct wire, enclosed rated led lamp. Remove existing ballast.	11	LED Compact Lamp	

# Parking FIMs

## 48200

# Detailed Scope of Work

**FIM ID # 48200**  
**PARK 04.01 Elevator Equipment Heater Thermostat**  
**Park Place**

## GENERAL

The elevator equipment room electric resistance wall heater was observed on. Install a simple thermostat to maintain the room at the minimum temperature appropriate for the equipment housed inside.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. Control contractor to provide and install all necessary hardware for controls as described.
  - B. Setup, programming, commissioning, testing, and demonstration of the system as required.
  - C. If a centralized control system is present, new work shall be integrated into the main system and added to the graphical user interface.
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. N/A
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Parking FIMs

48201



# Detailed Scope of Work

**FIM ID # 48201  
CEN 09.01 LED Lighting  
Central Park**

## GENERAL

Replace the existing light fixtures with new parking garage specific LED fixtures. Fixtures to have onboard occupancy and dimming controls.

## SCOPE OF WORK INCLUDES

1. Equipment Furnished by ESCO
  - A. Lighting materials as specified in the lighting spreadsheet.
2. Mechanical
  - A. N/A
3. Controls
  - A. Electrical contractor to provide and install all necessary controls per the attached lighting spreadsheet.
4. Acoustical
  - A. N/A
5. Vibration Isolation
  - A. N/A
6. Electrical
  - A. Demo
    - 1) Electrical contractor to remove fixtures, lamps, ballasts, wiring, etc. as necessary to provide and install per the lighting spreadsheet attached.
  - B. New Work
    - 1) Provide and install all lighting material including fixtures, lamps, ballasts, wiring, controls, etc. to provide a complete installation per the lighting spreadsheet attached.
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. N/A
11. Roofing
  - A. N/A
12. Carpentry
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
13. Glazing
  - A. N/A
14. Painting
  - A. Repair, patch, and paint as necessary for a complete installation and to restore existing finishes to match surrounding conditions.
15. Data and Communication
  - A. Coordinate with UM IT to facility networked controls for all applicable areas per the lighting spreadsheet attached. Specifically of note is the UC Theater area.
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. Lighting systems to be tested and commissioned by McKinstry personnel and their hired lighting subcontractors and vendors, as necessary.

# Detailed Scope of Work

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21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. McKinstry and Electrical Contractor to provide joint training to UM facilities staff for installed equipment and systems.

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
4. Any electrical systems, wiring, conduit, etc. that necessitates replacement to have a safe, satisfactory installation.
5. Additions or alterations to the existing egress lighting systems are not part of this scope.
6. This scope assumes the existing fixtures are properly grounded.
7. This scope is based on re-using existing circuits and controls unless otherwise stated in the lighting audit spreadsheets.
8. This scope does not include costing for providing any "seed" stock or extra materials.
9. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
10. This scope does not include repairs to existing code issues.



ID	In Scope	Building	Room Name	Existing			Proposed							
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type	
368	Yes	CENTRAL PARK PARKING LOT INT	SOUTHWEST STAIRWELL	JAR	Incan SI-Med A19 60W- 1L	4	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	4	LED Retrofit Lamp	
369	Yes	CENTRAL PARK PARKING LOT INT	SOUTHWEST STAIRWELL	WALL BKT 2FT	HPS Med 150W- 1L	2	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
370	Yes	CENTRAL PARK PARKING LOT INT	SOUTHWEST STAIRWELL	WP MEDIUM FT	HPS Med 150W- 1L	12	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	12	LED Fixture	
371	Yes	CENTRAL PARK PARKING LOT INT	TOP FLOOR PARKING LOT	POLE SB 2 HEAD PER POLE RND DIR ARM BLK	HPS Mogul 250W- 2L	4	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,2 lamp/fxtr or PER Pole (If Pole Mounted)	IN/2x113LEDF_SB_SQ_III		IN = Install New Fxtr	Install (2) new LED Shoebox fxtr's at each pole. Square arm mount, type III distribution, 113W, Pole mount, 3000K Full Cutoff, Bronze, 120-277V	4	LED Fixture	
372	Yes	CENTRAL PARK PARKING LOT INT	TOP FLOOR PARKING LOT	SCONCE 2FT	Incan SI-Med A19 60W- 1L	3	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	3	LED Retrofit Lamp	
373	Yes	CENTRAL PARK PARKING LOT INT	TOP FLOOR PARKING LOT EAST SIDE STORAGE	VAPOR 4FT	F T8 F32-32W-48" NLO- 1L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	1	LED Fixture	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
374	Yes	CENTRAL PARK PARKING LOT INT	2ND FLOOR DOWN TO 1ST FLOOR	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	59	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	59	LED Fixture	FIOC
375	Yes	CENTRAL PARK PARKING LOT INT	2ND FLOOR DOWN TO 1ST FLOOR	SCONCE 3FT	HAL SI PAR 38 60W- 2L	3	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,2 lamp/fxtr	Lamp/2x15.5LEDSI/Par38		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par38, E26 medium base, 15.5 watts, 4000k, 50,000 hrs, 120-277V.	3	LED Retrofit Lamp	
376	Yes	CENTRAL PARK PARKING LOT INT	2ND FLOOR DOWN TO 1ST FLOOR	SCONCE 2FT	Incan SI-Med A19 60W- 1L	6	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	6	LED Retrofit Lamp	
377	Yes	CENTRAL PARK PARKING LOT INT	2ND FLOOR STORAGE	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	4	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	4	LED Fixture	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
378	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	59	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	59	LED Fixture	FIOC
379	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT	SCONCE 2FT	Incan SI-Med A19 60W- 1L	15	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	15	LED Retrofit Lamp	
380	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT	SCONCE 3FT	HAL SI PAR 38 60W- 2L	2	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,2 lamp/fxtr	Lamp/2x15.5LEDSI/Par38		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par38, E26 medium base, 15.5 watts, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	
381	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT LEASE PARKING DOWN TO BACEMENT	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	27	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	27	LED Fixture	FIOC
382	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT LEASE PARKING DOWN TO BACEMENT	SCONCE 2FT	Incan SI-Med A19 60W- 1L	1	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	1	LED Retrofit Lamp	
383	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT LEASE PARKING DOWN TO BACEMENT	SCONCE 3FT	HAL SI PAR 38 60W- 2L	2	Halogen Incandescent Screw-In PAR38-4.75 inch Diam. 60 Watt,2 lamp/fxtr	Lamp/2x15.5LEDSI/Par38		Lamp = Relamp Fxtr	Install (1) New screw in lamp. Par38, E26 medium base, 15.5 watts, 4000k, 50,000 hrs, 120-277V.	2	LED Retrofit Lamp	
384	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR CAR LOT LEASE PARKING DOWN TO BACEMENT	WP MEDIUM FT	HPS Med 150W- 1L	2	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
385	Yes	CENTRAL PARK PARKING LOT INT	SPRINKLER ROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	6	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	6	LED Fixture	
386	Yes	CENTRAL PARK PARKING LOT INT	ROOM RIGHT TO THE SPRINKLER ROOM	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	5	LED Fixture	
387	Yes	CENTRAL PARK PARKING LOT INT	NORTHWEST STAIRWELL	JAR	Incan SI-Med A19 60W- 1L	4	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	4	LED Retrofit Lamp	
388	Yes	CENTRAL PARK PARKING LOT INT	NORTHWEST STAIRWELL	WALL BKT 2FT	HPS Med 150W- 1L	2	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
389	Yes	CENTRAL PARK PARKING LOT INT	NORTHWEST STAIRWELL	WP MEDIUM FT	HPS Med 150W- 1L	15	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	15	LED Fixture	
390	Yes	CENTRAL PARK PARKING LOT INT	3RD FLOOR EAST LOBBY	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	4	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4ft LED tube (1), remove existing fluorescent ballast.	4	Direct Wire LED Tube	
391	Yes	CENTRAL PARK PARKING LOT INT	3RD FLOOR EAST LOBBY	CAN ROUND 6"	CFL 4P-H 26W- 1L	16	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	16	LED Kit	
392	Yes	CENTRAL PARK PARKING LOT INT	EAST STAIRWELL	JAR	Incan SI-Med A19 60W- 1L	4	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	4	LED Retrofit Lamp	
393	Yes	CENTRAL PARK PARKING LOT INT	EAST STAIRWELL	WALL BKT 2FT	HPS Med 150W- 1L	2	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	2	LED Fixture	
394	Yes	CENTRAL PARK PARKING LOT INT	EAST STAIRWELL	WP MEDIUM FT	HPS Med 150W- 1L	7	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	7	LED Fixture	
395	Yes	CENTRAL PARK PARKING LOT INT	2ND FLOOR EAST LOBBY	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	8	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4ft LED tube (1), remove existing fluorescent ballast.	8	Direct Wire LED Tube	
396	Yes	CENTRAL PARK PARKING LOT INT	2ND FLOOR EAST LOBBY	CAN ROUND 6"	CFL 4P-H 26W- 1L	10	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x13_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to High Setting 13 watts.	10	LED Kit	
397	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR EAST LOBBY	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	8	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4ft LED tube (1), remove existing fluorescent ballast.	8	Direct Wire LED Tube	



LXL  
McKinstry Scope

ID	In Scope	Building	Room Name	Existing				Proposed						
				Fixture Type	Lamp & Ballast Type	# of Fixtures	Lamp Type (exist)	Fixture Code	User Flag	Upgrade Type	Description	# of Fixtures	Lamp Type	Controls Type
398	Yes	CENTRAL PARK PARKING LOT INT	1ST FLOOR EAST LOBBY	Can Round 6"	CFL 4P-H 26W- 1L	10	Compact Fluorescent 4 Pin Horizontal 26 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	10	LED Kit	
399	Yes	CENTRAL PARK PARKING LOT INT	ELEVATOR	Can Round 6"	Incan SI-Med A19 60W- 1L	6	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	6	LED Kit	
400	Yes	CENTRAL PARK PARKING LOT INT	CART STORAGE BY ENTRANCE GATE ON MAINSTREET	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	5	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	5	LED Fixture	INSTALL (1) WIRELESS WALL SWITCH, (1) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
401	Yes	CENTRAL PARK PARKING LOT INT	BREAKROOM BY ENTRANCE GATE ON MAINSTREET	TRFR REC 2X2	F T8 F17-24" NLO- 2L	6	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	6	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (2) 1G WH SWITCH PLATE
402	Yes	CENTRAL PARK PARKING LOT INT	BREAKROOM BY ENTRANCE GATE ON MAINSTREET	TRFR REC 2X2	F T8 F17-24" NLO- 2L	2	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	CTRL'D
403	Yes	CENTRAL PARK PARKING LOT INT	STORAGE BY ENTRANCE GATE ON MAINSTREET	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	1	LED Fixture	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
404	Yes	CENTRAL PARK PARKING LOT INT	PARKING COMMISSION AREA	TRFR REC 2X2	F T8 F17-24" NLO- 2L	3	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	3	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (2) 1G WH SWITCH PLATE
405	Yes	CENTRAL PARK PARKING LOT INT	PARKING COMMISSION AREA	Can Round 6"	Incan SI-Med A19 60W- 1L	5	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	5	LED Kit	CTRL'D
406	Yes	CENTRAL PARK PARKING LOT INT	BACKAREA OF THE PARKING COMMISSION	SCONCE 2FT	Incan SI-Med A19 60W- 1L	3	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Lamp/1x12_LEDSI-ER		Lamp = Relamp Fxtr	Install (1) New screw in lamp. A19, enclosed rated/damp location E26 medium base, 12 watts, 4000k, 25,000 hrs, 120-277V.	3	LED Retrofit Lamp	
407	Yes	CENTRAL PARK PARKING LOT INT	BACKAREA OF THE PARKING COMMISSION	TRFR REC 2X2	F T8 F17-24" NLO- 2L	12	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	12	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (2) 1G WH SWITCH PLATE
408	Yes	CENTRAL PARK PARKING LOT INT	BACKAREA OF THE PARKING COMMISSION	Can Round 6"	Incan SI-Med A19 60W- 1L	4	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	4	LED Kit	
409	Yes	CENTRAL PARK PARKING LOT INT	PRIVATE OFFICE	STRIP SM 4FT	F T8 F32-32W-48" NLO- 1L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),1 lamp/fxtr	RET-1xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tube (1), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
410	Yes	CENTRAL PARK PARKING LOT INT	PRIVATE OFFICE	TRFR REC 2X2	F T8 F17-24" NLO- 2L	2	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	2	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
411	Yes	CENTRAL PARK PARKING LOT INT	CAVINS IN BETWEEN RESRTOOM AND BREAKROOM	Can Round 6"	Incan SI-Med A19 60W- 1L	2	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Kit/1x9_RC6		Kit = Install Kit	Install 6" New Retrofit Downlight Kit. Kit has 3 settings - set to Middle Setting 9 watts.	2	LED Kit	
412	Yes	CENTRAL PARK PARKING LOT INT	RESTROOM	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
413	Yes	CENTRAL PARK PARKING LOT INT	BREAKROOM PRIVATE OFFICE	VANITY 4FT	F T8 F32-32W-48" NLO- 2L	1	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	1	Direct Wire LED Tube	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
414	Yes	CENTRAL PARK PARKING LOT INT	DOWN THE HALL EAST	TRFR REC 2X2	F T8 F17-24" NLO- 2L	9	Linear Fluorescent T8 2FT Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT2FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 2Ft LED tubes (2), remove existing fluorescent ballast.	9	Direct Wire LED Tube	INSTALL (2) WIRELESS WALL SWITCH, (2) WIRELESS CEILING SENSOR, (2) 1G WH SWITCH PLATE
415	Yes	CENTRAL PARK PARKING LOT INT	STORAGE NORTHEAST	TRFR REC 2X4	F T8 F32-32W-48" NLO- 2L	9	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	RET-2xLEDT4FT-DW		RET = Retrofit Fxtr	Direct-wire UL Type B 4Ft LED tubes (2), remove existing fluorescent ballast.	9	Direct Wire LED Tube	INSTALL (1) WIRELESS WALL SWITCH, (2) WIRELESS WALL SENSOR, (1) 1G WH SWITCH PLATE
416	Yes	CENTRAL PARK PARKING LOT INT	STORAGE NORTHEAST	VAPOR 4FT	F T8 F32-32W-48" NLO- 2L	2	Linear Fluorescent T8 4FT-32W (Most Common) Normal Ballast Factor (Most Common),2 lamp/fxtr	IN/1x30LEDF_VT		IN = Install New Fxtr	Install new LED vapor tite fixture. Set occupancy dimming level to 30% when no motion detected.	2	LED Fixture	INSTALL (1) WIRED WALL OCCUPANCY SENSOR SWITCH, (1) SWITCH 1G WH PLATE
417	Yes	CENTRAL PARK PARKING LOT EXT	MAINSTREET UNDER ENTRANCE	JAR	Incan SI-Med A19 60W- 1L	2	Standard Incandescent Screw-In Medium Base (AKA: Standard, E26, Edison) A19 (AKA: Regular Shape) 60 Watt,1 lamp/fxtr	Ret/1x12_LEDSI-ER		RET = Retrofit Fxtr	Install (1) New screw in lamp, remove ballast. A19, enclosed rated 12 watt, 4000k, E26 base, 25,000 hrs.	2	LED Retrofit Lamp	
418	Yes	CENTRAL PARK PARKING LOT EXT	ALLY WAY NORTH	WP MEDIUM FT	HPS Med 150W- 1L	5	High Pressure Sodium Medium Base (AKA: Standard, E26, Edison) 150 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x42LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 42, 3000K full cutoff, bronze, 120-277V.	5	LED Fixture	
419	Yes	CENTRAL PARK PARKING LOT EXT	ALLY WAY NORTH	WP LARGE FT	HPS Mogul 250W- 1L	1	High Pressure Sodium Mogul Base (AKA: E39) 250 Watt,1 lamp/fxtr or PER Pole (If Pole Mounted)	IN/1x74LEDF-WP-FC		IN = Install New Fxtr	Install new wall pack fixture 74W, 3000K full cutoff, bronze, 120-277V.	1	LED Fixture	

# Parking FIMs

48204

# Detailed Scope of Work

**FIM ID # 48204**  
**CEN 13.01 Water Leakage Remediation**  
**Central Park**

## GENERAL

Identify the source of water ingress to the east side of the garage into the mechanical chase and maintenance area. This can likely be addressed via some regrading, a threshold, and sealing the curb around the mechanical chase.

## SCOPE OF WORK INCLUDES

1. Mechanical
  - A. N/A
2. Controls
  - A. N/A
3. Acoustical
  - A. N/A
4. Vibration Isolation
  - A. N/A
5. Electrical
  - A. N/A
6. Lighting
  - A. N/A
7. Solar
  - A. N/A
8. Site Utilities
  - A. N/A
9. Structural
  - A. N/A
10. Masonry
  - A. Provide grading as necessary to maximum height allowable to slope away from door and threshold and back to garage deck for natural drainage.
11. Roofing
  - A. N/A
12. Carpentry
  - A. Provide watertight door threshold sealed and affixed to structure.
  - B. Provide watertight rubber door sweep.
  - C. Provide and install additional curb material around mechanical chase opening. Seal and caulk all existing and new work watertight.
13. Glazing
  - A. N/A
14. Painting
  - A. N/A
15. Data and Communication
  - A. N/A
16. Security Systems
  - A. N/A
17. Fire Alarm
  - A. N/A
18. Fire Sprinkler
  - A. N/A
19. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
20. Commissioning
  - A. N/A
21. Demolition and Removal Specialty Contractor
  - A. N/A
22. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

# Parking FIMs

48279

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**Park Place Parking**

201 E Front  
Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

Ext. Door(s) to be weather-stripped & sealed. To sprinkler room.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>46</b>
Annual Cost of Leakage (Kwh):	-	--

**TYPE OF MEASURES:**

Ext. Door(s) to be weather-stripped & sealed. To sprinkler room.

**Building Level**

**quantity or distance**

Main level

1 Doors

<b>AIR LEAKAGE:</b>	<b>feet</b>	<b>inches</b>	
Doors	20	3/32	0.16 sq ft

Totals	-		0.16 sq ft
			0.01 sq meter

**ASSUMPTIONS & CALCULATIONS:**

Power Rate		N/A	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 150

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD x 24 x 60}) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Parking FIMs

49268



# Investment Grade Audit

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## 49268-19.01 CEN - Water Conservation

### Description:

Reduce water consumption and related chemical and energy costs through the following: replace and/or retrofit of the existing plumbing fixtures

City of Missoula, MT V1		Demographics and Usage									
Count Bldg # Building Name Category											
	1	2	3	4	5	6	7	8	9	10	
Per Square Foot Per Person Allocation Business	900	100	100	100	100	100	100	100	100	900	
Per Day Visitor	10	10	10	10	10	10	10	10	10	10	
Square Footage	71,655	14,671	115,377	3,560	19,103	15,512	8,547	7,650	9,337	22,882	
Sale Tax%											
Population Group 1 <b>&lt;2hr (Visitor)</b>	WATER CLOSET USE (daily per person (bath))	<b>1</b>	<b>2</b>	<b>1</b>	<b>53</b>					<b>12</b>	
	WATER CLOSET USE (daily per person (bath))	261	261	261	180	261	261	261	261	261	
	WATER CLOSET USE (daily per person (bath))	104	104	104	104	104	104	104	104	104	
	WATER CLOSET USE (daily per person (bath))	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3						
	WATER CLOSET USE (daily per person (bath))	0.4	0.9	0.4	26.3						
	WATER CLOSET USE (daily per person (bath))	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	WATER CLOSET USE (daily per person (bath))	0.3	0.7	0.3	22.3						
	WATER CLOSET USE (daily per person (bath))	0.1	0.1	0.1	3.9						
	WATER CLOSET USE (daily per person (bath))	0.0	0.1	0.0	2.9						
Population Group 2 <b>Visitor &lt;4hrs</b>	Ave hrs/day ON	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	Visitor <4hrs	
	P1 Ave Daily Count	<b>1</b>	<b>2</b>	<b>1</b>	<b>53</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>12</b>	
	P1 Ave Daily Count	261	261	261	180	261	261	261	261	261	
	P1 Ave Daily Count	104	104	104	104	104	104	104	104	104	
	P1 Ave Daily Count	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	P1 Ave Daily Count	0.4	0.9	0.4	26.3						
	P1 Ave Daily Count	0.4	0.9	0.4	26.3						
	P1 Ave Daily Count	365.0	335.0	365.0	180.0	365.0	365.0	365.0	365.0	365.0	
	P1 Ave Daily Count	0.5	1.1	0.5	34.1						
	P1 Ave Daily Count	0.1	0.2	0.1	8.6						
Population Group 3 <b>8 hr Regular / Staff</b>	Ave hrs/day ON	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	8 hr Regular / Staff	
	P1 Ave Daily Count	<b>35.8</b>	<b>14.0</b>	<b>1.9</b>	<b>140.0</b>	<b>18</b>	<b>65</b>	<b>38</b>	<b>45</b>	<b>33</b>	
	P1 Ave Daily Count	261	261	261	180	261	261	261	261	261	
	P1 Ave Daily Count	104	104	104	104	104	104	104	104	104	
	P1 Ave Daily Count	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	P1 Ave Daily Count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	
	P1 Ave Daily Count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	
	P1 Ave Daily Count	89.6	35.0	4.7	350.0	44.3	161.3	93.8	112.5	82.5	
	P1 Ave Daily Count	17.9	7.0	0.9	70.0	8.9	32.3	18.8	22.5	16.5	
	P1 Ave Daily Count	11.8	4.6	0.6	46.2	5.8	21.3	12.4	14.9	10.9	
Population Group 4 <b>Visitors</b>	Ave hrs/day ON	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	Visitors	
	P1 Ave Daily Count	<b>15</b>	<b>34</b>	<b>28</b>	<b>2100</b>					<b>470</b>	
	P1 Ave Daily Count	261	261	261	120	261	261	261	261	261	
	P1 Ave Daily Count	104	104	104	104	104	104	104	104	104	
	P1 Ave Daily Count	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	P1 Ave Daily Count	7.5	17.0	14.0	1050.0					235.0	
	P1 Ave Daily Count	7.5	17.0	14.0	1050.0					235.0	
	P1 Ave Daily Count	365.0	335.0	365.0	120.0	365.0	365.0	365.0	365.0	365.0	
	P1 Ave Daily Count	37.3	81.0	70.0	5250.0					1175.0	
	P1 Ave Daily Count	15.0	34.0	28.0	2100.0					470.0	
Population Group 5 <b>Miscellaneous Event</b>	Ave hrs/day ON	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	Miscellaneous Event	
	P1 Ave Daily Count										
	P1 Ave Daily Count						105	260	260	260	
	P1 Ave Daily Count						10	10	10	10	
	P1 Ave Daily Count						75	60	60	60	
	P1 Ave Daily Count	50%	50%	50%	50%	50%	50%	50%	50%	50%	
	P1 Ave Daily Count										
	P1 Ave Daily Count						30.0	210.0	210.0	210.0	
	P1 Ave Daily Count										
	P1 Ave Daily Count										
TOTAL POPULATION	52.3	51.4	31.3	2345.0	21.7	72.5	45.5	53.0	41.0	524.8	
Occupancy Days	365.0	335.0	365.0	126.3	365.0	365.0	365.0	365.0	365.0	365.0	
Total Water Closet Use per day	127.9	121.8	75.4	5656.4	46.9	165.6	98.1	116.8	86.8	1266.0	
Total Urinal Use per day	33.1	41.3	29.1	2180.5	9.4	33.1	19.6	23.3	17.3	488.0	
Total Faucet Use per day	16.9	16.1	10.0	746.6	6.2	21.8	12.9	15.4	11.5	167.1	
Total Shower Use per day	3.3	4.1	2.9	217.0	0.9	3.2	1.9	2.3	1.7	48.6	

Demographics and Usage

City of Missoula, MT V1

**A. Fixture Usage-based Consumption Allocation** | **B. Hot Water Savings** | **C. Operational/Deferred Maintenance Savings**

City Shop	City	IC	Fixture Details	gpm flow	gpm flow	A flow	% S	Quantity	Gallons				Pre Peak Demand (gpm)	Post Peak Demand (gpm)	Pre Gallons Consumed per yr	Post Gallons consumed per yr
									Avg Daily Usage	Saved Per Day	Days Per Year Occupied	Days Per Year Occupied				
City Shop	WC	WC	4.5 GPF x Valve Only	4.50	1.28	0.21	48%	2	2.27	2.27	300	300	2.27	2.27	828.00	828.00
	WC	WC	STANDARD 2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	2" FPE	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1/2" x 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1" x 1"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 1 1/2" x 1 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2" x 2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 2 1/2" x 2 1/2"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 3" x 3"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 4" x 4"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 6" x 6"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 8" x 8"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 10" x 10"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 12" x 12"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
	WC	WC	HE 14" x 14"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00
WC	WC	HE 16" x 16"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 18" x 18"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 20" x 20"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 24" x 24"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 30" x 30"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 36" x 36"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 42" x 42"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 48" x 48"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 54" x 54"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 60" x 60"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 72" x 72"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 84" x 84"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 96" x 96"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 108" x 108"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 120" x 120"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 144" x 144"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 168" x 168"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 192" x 192"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 216" x 216"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 240" x 240"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 264" x 264"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 288" x 288"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 312" x 312"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 336" x 336"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 360" x 360"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 384" x 384"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 408" x 408"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 432" x 432"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 456" x 456"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 480" x 480"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 504" x 504"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 528" x 528"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 552" x 552"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 576" x 576"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 600" x 600"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 624" x 624"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 648" x 648"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 672" x 672"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 696" x 696"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 720" x 720"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 744" x 744"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 768" x 768"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 792" x 792"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 816" x 816"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 840" x 840"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 864" x 864"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 888" x 888"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 912" x 912"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 936" x 936"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 960" x 960"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 984" x 984"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1008" x 1008"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1032" x 1032"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1056" x 1056"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1080" x 1080"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1104" x 1104"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1128" x 1128"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1152" x 1152"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1176" x 1176"	1.28	1.28	0.00	0%	2	2.27	0.00	300	0.00	0.00	0.00	0.00	0.00	
WC	WC	HE 1200" x 1200"	1.28	1.28	0.00	0%	2	2.27	0.00</							





**HS (Kitchen Hand Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of HS:	Operating Days:	Kitchen Staff	Hand washing Person/ MIN/Day:	Hand washing MIN /Day:	AVG GPM of SINK	Total Pre Retrofit Gallons:	Annual	New GPM of Sink	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Gas input (BTU):	Therms
																	of Total Fixture Flow:	50%	120*	50%				
City Shops	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Art Museum	0	335	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Central Parking	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Splash Pad	1	126	3.00	2.00	6.00	2.50	15.00	1,894.03	1.50	9.00	1,136.42	1,894	1,136	77.0%	65*	120*	50%			758	379	223,225	2.4	
Fire Station 4	3	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%			730	365	215,089	2.3	
Fire Station 1	0	365	-	2.00	-	2.50	-	-	1.50	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 2	0	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%			730	365	215,089	2.3	
Fire Station 3	1	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%			730	365	215,089	2.3	
Fire Station 5	2	365	1.00	2.00	2.00	2.50	5.00	1,825.00	1.50	3.00	1,095.00	1,825	1,095	77.0%	65*	120*	50%			730	365	215,089	2.3	
Currents	2	365	3.00	2.00	6.00	2.50	15.00	5,475.00	1.50	9.00	3,285.00	5,475	3,285	77.0%	65*	120*	50%			2,190	1,095	645,268	7.0	



**DS (Kitchen Dish Sprayers)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs													
	Number of DS:	Operating Days:	Washing HRS /Day:	Washing MIN /Day:	Sessions / Day Per Person	AVG GPM of Spray	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Pre Rinse Sprayer	Total Post Retrofit Gallons:	Annual	Total usage before:	Total usage after:	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																	of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Art Museum	0	335.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Central Parking	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Splash Pad	1	126.27	2.00	120.00	2.00	1.42	170.40	21,516.18	0.60	72.00	9,091.34	21,516	9,091	77.0%	65*	120*	50%			12,425	6,212	3,660,889	36.6	
Fire Station 4	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 1	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 2	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 3	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 5	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Currents	0	365.00	-	-	2.00	1.42	-	-	0.60	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	



**PREP (Pedal Valve On Prep Sinks)**

	General				Current Inputs			Post-Retrofit Inputs			Hot Water Savings Calcs															
	Number of Prep Sinks:	Operating Days:	Pre Meals / Day Per Person	AVG GPM of SINK	Pre Prep Hours /Day:	Pre Prep SINK MINUTES /Day:	Total Pre Retrofit Gallons:	Annual	New GPM of Sink with Knee Valve	Post Prep Hours/Day:	Post Prep SINK MINUTES /Day:	Total Post Retrofit Gallons:	Annual	Total usage before (gal):	Total usage after (gal):	HW Heater efficiency:	Make-up Water Temp:	Hot Water Supply Temp:	Hot Water				Total Water saved (gal):	Hot Water saved (gal):	Energy Input (BTU):	Therms
																			of Total Fixture Flow:	50%	120* <th>50%</th>	50%				
City Shops	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Art Museum	1	335.00	2.00	5.00	1.50	90.00	450.00	150,750.00	1.50	1.00	60.00	90.00	30,150.00	150,750	30,150	77.0%	65*	120*	50%			120,600	60,300	35,533,920	355.3	
Central Parking	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Splash Pad	1	126.27	2.00	5.00	1.50	90.00	450.00	56,820.90	1.50	1.00	60.00	90.00	11,364.18	56,821	11,364	77.0%	65*	120*	50%			45,457	22,728	13,393,497	133.9	
Fire Station 4	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 1	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 2	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 3	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Fire Station 5	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	
Currents	0	365.00	2.00	5.00	1.50	90.00	-	-	1.50	1.00	60.00	-	-	0	0	77.0%	65*	120*	50%			0	0	0	0.0	





# Parking FIMs

49275

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.

# Detailed Scope of Work

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## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**Bank Street Parking**

Missoula, MT

**VISUAL COMMENTS or RECOMMENDATIONS:**

Ext. Door(s) to be weather-stripped & sealed. To sprinkler room. Ext. Door(s) to be weather-stripped & sealed. To electrical room.



**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>93</b>
Annual Cost of Leakage (Kwh):	-	--

**TYPE OF MEASURES:**

	Building Level	quantity or distance
Ext. Door(s) to be weather-stripped & sealed. To sprinkler room.	Main level	1 Doors
Ext. Door(s) to be weather-stripped & sealed. To electrical room.	Main level	1 Doors

AIR LEAKAGE:	feet	inches		
Doors	20	3/32	0.16	sq ft
Doors	20	3/32	0.16	sq ft

Totals	-		0.31 sq ft
			0.03 sq meter

**ASSUMPTIONS & CALCULATIONS:**

Power Rate		N/A	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 150

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



# Parking FIMs

49276

# Detailed Scope of Work

**FIM ID # 48219, 48273, 48274, 48275, 48276, 48277, 48278, 48279, 48280, 48281  
CURR, FS-1, FS-2, FS-3 FS-4, FS-5, ART, CEN, SPL, SHOPS 13.01 Envelope Sealing,  
Caulking, etc.  
Multiple Facilities**

## GENERAL

Perform a comprehensive envelope evaluation and remediation effort including sealing, caulking, weatherstripping, etc.

## SCOPE OF WORK INCLUDES

1. Applicable Facilities / FIMs
  - A. FS-1 48273, FS-2 48274, FS-3 48275, FS-4 48276, FS-5 48277, ART 48278, CEN 48279, SPL 48280, SHOPS 48281
2. Envelope
  - A. Provide and install weather stripping, sealing, caulking, door sweeps, etc. as indicated on BES audit.
3. Mechanical
  - A. N/A
4. Controls
  - A. N/A
5. Acoustical
  - A. N/A
6. Vibration Isolation
  - A. N/A
7. Electrical
  - A. N/A
8. Lighting
  - A. N/A
9. Solar
  - A. N/A
10. Site Utilities
  - A. N/A
11. Structural
  - A. N/A
12. Masonry
  - A. N/A
13. Roofing
  - A. N/A
14. Carpentry
  - A. N/A
15. Glazing
  - A. N/A
16. Painting
  - A. N/A
17. Data and Communication
  - A. N/A
18. Security Systems
  - A. N/A
19. Fire Alarm
  - A. N/A
20. Fire Sprinkler
  - A. N/A
21. Testing, Adjusting, and Balancing (TAB)
  - A. N/A
22. Commissioning
  - A. N/A
23. Demolition and Removal Specialty Contractor
  - A. N/A
24. Training
  - A. Provide training as required for this FIM.



# Detailed Scope of Work

---

## CLARIFICATIONS AND EXCLUSIONS

1. McKinstry no longer executes subcontracts for abatement of asbestos and lead paint. Abatement of asbestos and lead paint shall be the responsibility of the building owner who should contract directly with qualified abatement specialists. However, McKinstry will gladly help coordinate and plan around any abatement activities that are necessary for the completion of the McKinstry scope of work. McKinstry did not receive a good faith survey of hazardous materials and none was identified that would affect this scope of work.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
3. It is assumed all ductwork is clean and functional, no duct cleaning or replacement has been included unless specifically indicated otherwise.
4. It is assumed all piping systems are leak free and in working order. Replacement of piping system and components are not included unless specifically indicated otherwise.
5. If this scope is not contracted within 30 days of the proposal date, pricing will need to be adjusted to reflect market escalation of labor, materials, and equipment.
6. Work outside of normal business hours (0700-1800) and/or in excess of 40 hrs/wk.
7. This scope assumes the existing equipment is properly grounded.
8. This scope is based on re-using existing circuits and controls unless otherwise stated.
9. This scope does not include costing for providing any "seed" stock or extra materials.
10. Should an authority having jurisdiction call upon McKinstry to repair or rectify real or potential code violations beyond those included in the scope above, Owner contingency funds will be used to cover the cost of repair.
11. This scope does not include repairs to existing code issues unless explicitly described above.
12. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.

**Central Park Parking**

100-128 W Main St.  
Missoula, MT



**VISUAL COMMENTS or RECOMMENDATIONS:**

The exterior doors should be weather-stripped to reduce air loss.

**COST AND PAYBACK ANALYSIS:**

Annual Cost of Leakage (Therms):	-	<b>506</b>
Annual Cost of Leakage (Kwh):	-	<b>15</b>

**TYPE OF MEASURES:**

	<b>Building Level</b>	<b>quantity or distance</b>
Ext. Door(s) to be weather-stripped & sealed. Heat only.	Main level	6 Doors
Ext. Door(s) to be weather-stripped & sealed. Offices.	Main level	2 Doors
Ext. Door(s) to be weather-stripped & sealed. Sprinkler room, Heat only.	Lower	2 Doors
Ext. Door(s) to be weather-stripped & sealed. Heat only. Stairwell.	Second	1 Doors
Ext. Door(s) to be weather-stripped & sealed. Heat only. Stairwell.	Third	1 Doors

<b>AIR LEAKAGE:</b>	<b>feet</b>	<b>inches</b>		
Doors	120	3/32	0.94	sq ft
Doors	40	3/32	0.31	sq ft
Doors	40	3/32	0.31	sq ft
Doors	20	3/32	0.16	sq ft
Doors	20	3/32	0.16	sq ft

Totals	-		1.88 sq ft
			0.17 sq meter

**ASSUMPTIONS & CALCULATIONS:**

Power Rate		\$0.080	per Kwh
Heating Fuel	100% Natural Gas	\$0.800	perTherm

Building K 145

**Example Calculation**

$$\frac{(\text{leakage x bldg "K"} \times (\text{wind P factor}) \times (\text{HDD} \times 24 \times 60) \times (.075) \times (.243)}{100,000 \times \text{System Efficiency\%}}$$



**APPENDIX A: General Conditions of the Contract for Construction**

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**GENERAL CONDITIONS  
OF THE CONTRACT FOR CONSTRUCTION  
FOR ENERGY PERFORMANCE CONTRACT**

Based on State of Montana Version - Revised 04/06/12

**1. ARTICLE 1 – GENERAL PROVISIONS**

**1.1. BASIC DEFINITIONS**

**1.1.1. AFFILIATE** shall mean any subsidiary of Contractor, and any other entity in which Contractor has a financial interest or which has a financial interest in Contractor (including without limitation parent companies, related businesses under the same holding company, or any other business controlled by, under common control with, or which controls Contractor).

**1.1.2. CONTRACT**: This entire Contract for Construction is formed by the Contract Documents, and is an Attachment to the Master Energy Performance Contract and Appendices. The Contract Documents shall not be construed to create a contractual relationship of any kind between: (1) the Owner and any Contractor's Consultant, Sub-consultant, Subcontractor, Sub-subcontractor, or Supplier; or, (2) between any persons or entities other than the Owner and Contractor.

**1.1.3. CONTRACT DOCUMENTS** consist of the General Conditions of the Contract for Construction between Owner and Contractor (hereinafter the "Contract"), Investment Grade Audit Report, Drawings, and Specifications, and are an attachment to the Master Energy Performance Contract and Addenda issued prior to execution. The Master Energy Performance Contract and Addenda are in addition to and not in lieu of the General Conditions of the Contract for Construction. In the event of a conflict, discrepancy, contradiction, or inconsistency within the Contract Documents and for the resolution of same, the following order of hierarchy and control shall apply and prevail:

1) Master Energy Performance Contract (EPC); 2) Addenda; 3) General Conditions; 4) Schedules, Exhibits & Appendices; 5) Investment Grade Audit Report; 6) Specifications; 7) Drawings; 8) Sample Forms.

If a conflict, discrepancy, contradiction, or inconsistency occurs within or between the Specifications and the Drawings, resolution shall be controlled by the following:

**1.1.3.1.** As between figures, dimensions, or numbers given on drawings and any scaled measurements, the figures, dimensions, or numbers shall govern;

**1.1.3.2.** As between large scale drawings and small scale drawings, the larger scale drawings shall govern;

**1.1.3.3.** As between the technical specifications and drawings; the technical specifications shall govern.

**1.1.3.4.** Shop Drawings and Submittals: Shop drawings and other submittals from the Contractor, subcontractors, or suppliers do not constitute a part of the Contract Documents.

The Contractor acknowledges, understands and agrees that the Contract Documents cannot be changed except as provided herein by the terms of this Contract. No act(s), action(s), omission(s), or course of dealing(s) by the Owner with the Contractor shall alter the requirements of the Contract Documents and that alteration can be accomplished only through a written Modification process defined herein.

1.1.4. **CONTRACT SUM** is the Maximum Allowable Phase Cost for all Facility Improvement Measures (FIM's) as identified in the proposal for each phase of the Contract, combined as Projects in a Phase.. The Maximum Allowable Phase Cost is the guaranteed cost for the Work which may be modified in accordance with Article 7 herein. The Contract Sum is the sum of all materials, labor, Equipment, auditing, design, engineering, construction management services, subcontracted services, overhead, profit, Contractor contingency, Allowances, Contractor's Montana State Gross Receipts Tax, bonds, insurance, permits, Energy Performance Contractor fee, Measurement and Verification (M & V) Services, and Annual Services, related to each Project and Phase and agreed upon by the parties.

1.1.5. **DRAWINGS** are the graphic and pictorial portions of the Contract Documents showing the design, intent, location, and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

1.1.6. **PHASE** means a group of Projects.

1.1.7. **PROJECT** is each individual or defined group of FIM's as agreed to by the Parties from time to time under the Contract. Each Project shall consist of the total construction and installation of Equipment, and Services defined as the Work to be performed in a specified location within the Project Site, under the Contract Documents, and as defined in Master Energy Performance Contract Schedules.

1.1.8. **SPECIFICATIONS** are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

1.1.9. **INVESTMENT GRADE AUDIT REPORT ("AUDIT REPORT")** is the study, for each phase of work, which includes detailed descriptions of the improvements (FIM's) recommended for each Project, the estimated costs of the improvements, and the utility and operations and maintenance cost savings projected to result from the recommended improvements for each Project and Phase. The Audit Report may also be referred to as the Investment Grade Audit Report (IGAR) and may consist of one or more reports.

1.1.10. **TIME** is of the essence in performance, coordination, and completion of the Work contemplated herein. The Owner may suffer damages if the Work is not completed as specified herein. When any duration or time period is referred to in the Contract Documents by days, the first day of a duration or time period shall be determined as the day following the current day of any event or notice starting a specified duration. All durations in the Contract Documents are **calendar days** unless specifically stated otherwise.

1.1.11. **WORK** means the installation of Equipment, construction and Services required by the Contract, and includes all labor, materials, Equipment and Services provided or to be provided by the Contractor to completely fulfill the Contract and Contractor's obligations. The Work may constitute the whole or part, or several, Projects, or a Phase.

## 1.2. **CORRELATION, INTER-RELATIONSHIP, AND INTENT OF THE CONTRACT DOCUMENTS**

1.2.1. The intent of the Contract Documents is to include all items and all effort necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and inter-related, and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

1.2.2. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. It is the Contractor's responsibility to control the Work under the Contract.

**1.2.3.** Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### **1.3. CAPITALIZATION**

Terms capitalized in these General Conditions include those which are: (1) specifically defined; and, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs and Clauses in the document.

### **1.4. INTERPRETATION**

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### **1.5. EXECUTION OF THE CONTRACT AND CONTRACT DOCUMENTS**

**1.5.1.** The Master Energy Performance Contract shall be signed by the Owner and Contractor. Execution of the Contract by the Contractor constitutes the complete and irrevocable binding of the Contractor and his Surety to the Owner for complete performance of the Work and fulfillment of all obligations. By execution of the Contract, the Contractor acknowledges that it has reviewed and familiarized itself with all aspects of the Contract Documents and agrees to be bound by the terms and conditions contained therein.

**1.5.2.** Execution of the Master Energy Performance Contract by the Contractor is a representation that the Contractor has visited the Project Site(s), become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

**1.5.3.** The Contractor acknowledges that it has taken all reasonable actions necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to: (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, gas, electric power, phone service, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation, topography, and conditions of the ground; and, (5) the character of equipment and facilities needed for performance of the Work. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory geotechnical work done by the Owner, as well as from the drawings and specifications made a part of this contract, as applicable. Any failure of the Contractor to take the action described and acknowledged in this paragraph will not relieve the Contractor from responsibility for properly ascertaining and estimating the difficulty and cost of successfully performing the Work or for proceeding to successfully perform the Work without additional expense to the Owner.

**1.5.4.** The Owner assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Owner, nor does the Owner assume responsibility for any understanding reached or representation made by any of its officers, agents, or employees concerning conditions which can affect the Work unless that understanding or representation is expressly stated in the Contract Documents.

**1.5.4.1.** Performance of any portion of the Work, beyond that required for complying with the specifications and all other requirements of the Contract shall be deemed to be for the convenience of the Contractor and shall be at the Contractor's sole expense.

**1.5.4.2.** There shall be no increase in the contract price or time allowed for performance which is for the convenience of the Contractor.



## **1.6. OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER INSTRUMENTS OF SERVICE**

**1.6.1.** The Drawings, Specifications and other documents, including those in electronic form, prepared by the Contractor and the Contractor's Consultant are Instruments of Service through which the Work to be executed by the Contractor is described. Neither the Contractor, Contractor's Consultant, nor any Subcontractor, Sub-subcontractor or material nor equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Contractor and Contractor's Consultant, except as defined in Article 11 in the Master Energy Performance Contract. The Drawings, Specifications and other documents prepared by the Contractor and Contractor's Consultant, and copies thereof are for use solely with respect to this Project(s). They are not to be used by the Contractor; Contractor's Consultant, or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project(s) outside the scope of the Work without the specific written consent of the Owner. The Contractor, Contractor's Consultant, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Contractor or Contractor's Consultant appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings Specifications and other documents prepared by the Contractor and Contractor's Consultant. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project(s) is not to be construed as publication in derogation of the Contractor and Contractor's Consultant's copyrights or other reserved rights.

**1.6.2.** Owner's Disclaimer of Warranty: The Owner has requested the Contractor prepare the Contract Documents for the Project(s) which are adequate for constructing the Project(s). However, the Owner makes no representation, guarantee, or warranty of any nature whatsoever to the Contractor concerning information provided by the Owner in the development of such documents. The Contractor hereby acknowledges and represents that it has not, does not, and will not rely upon any such representation, guarantee, or warranty concerning the such information as no such representation, guarantee, or warranty have been or are hereby made.

## **2. ARTICLE 2 – THE OWNER**

### **2.1. The City of Missoula**

**2.1.1.** The Owner is the City of Missoula and is the sole entity to be identified as Owner in the Contract and as referred to throughout the Contract Documents as if singular in number.

**2.1.2.** Contractor or Contractor's Consultant does not have authority to bind the Owner. The observations and participations of the Owner or its authorized representative do not alleviate any responsibility on the part of the Contractor. The Owner reserves the right to observe the work and make comment. Any action or lack of action by the Owner shall not be construed as approval of the Contractor's performance.

**2.1.3.** The Owner reserves the right to require the Contractor to provide lien releases at any time. The Owner reserves the right to withhold progress payments until such lien releases are received for all work for which prior progress payments have been made. Upon the Owner's demand for lien releases (either verbally or written), the Contractor, all sub-contractors and material suppliers shall provide such releases with every subsequent application for payment through Phase Final Acceptance..

**2.1.4.** Except for permits and fees, including those required under Subparagraph 3.7.1, and as defined in Master Energy Performance Contract Articles and Schedules, which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**2.1.5.** Information or services required of the Owner by the Contract Documents shall be furnished by the Owner with reasonable promptness. Any other information or services relevant to the Contractor's performance of the Work under the Owner's control shall be furnished by the Owner after receipt from the Contractor of a written request for such information or services.

## **2.2. OWNER'S RIGHT TO STOP WORK**

**2.2.1** If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Subparagraph 12.2 or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. However, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3. The issuance of a stop work order by the Owner shall not give rise to a claim by the Contractor or any subcontractor for additional cost, time, or other adjustment.

**2.2.2** Notwithstanding the obligations under the Master Energy Performance Contract, if the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may after such seven-day period give the Contractor a second written notice to correct such deficiencies within a three-day period. If the Contractor within such three-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may submit a claim, under Paragraph 4.4, or revert to Mediation under Paragraph 4.5, or Arbitration under Paragraph 4.6.

## **2.3. (Paragraph deleted)**

## **2.4. OWNER'S RIGHT TO PERSONNEL**

**2.4.1.** The Owner reserves the right to have the Contractor and/or subcontractors remove person(s) and/or personnel from any and all work on the Project(s) with cause but without cost to the Owner. Such requests from the Owner may be made verbally or in writing and must be done directly with the Contractor. Cause may be, but not limited to, any of the following: incompetence, poor workmanship, poor scheduling abilities, poor coordination, disruption to the facility or others, poor management, causes delay or delays, disruption of the Project(s), will not strictly adhere to facility procedures and Project requirements either knowingly or unknowingly, insubordination, drug/alcohol use, possession of contraband, belligerent acts or actions, etc. The Contractor shall provide replacement person(s) and/or personnel acceptable to the Owner at no cost to the Owner.

**2.4.2.** Any issue or circumstance relating to or resulting out of this clause shall not be construed or interpreted to be interference with or impacting upon the Contractor's responsibilities and liabilities under the Contract Documents.

**2.4.3.** Person(s) and/or personnel who do not perform in accordance with the Contract Documents, shall be deemed to have provided the Owner with cause to have such persons removed from any and all involvement in the Work.

**2.4.4.** The Contractor agrees to indemnify and hold harmless the Owner from any and all causes of action, demands, claims, damages, awards, attorneys' fees, and other costs brought against the Owner by any and all person(s) or personnel as a result of actions under this clause.

## **2.5. OWNER'S RESPONSIBILITIES**

**2.5.1.** Unless otherwise provided for in this Contract, the Owner shall provide information regarding the requirements and parameters of the Project(s) in a timely manner.

**2.5.2.** The Owner shall examine documents submitted by the Contractor and shall promptly render decisions pertaining thereto, in any event not later than 14 days from receipt of documents.

**2.5.3.** The Owner shall furnish all services, including but not limited to inspections, testing, and reporting, that are not designated as part of the Contractor's responsibility, or authorize the Contractor to furnish them as a change in service or scope, as necessary for the execution of the Project(s).

**2.5.4.** If the Owner observes or otherwise becomes aware of any error, fault, omission, or defect in the Project(s), or non-conformance with the Contract Documents, he shall give prompt notice thereof to the Contractor.

### **3. ARTICLE 3 – THE CONTRACTOR**

#### **3.1. GENERAL**

**3.1.1.** The Contractor is the person or entity identified as such in the Contract and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative(s) at various stages of pre-design, design, construction, and warranty.

**3.1.1.1** For the purposes of this Contract, the Contractor shall include all consultants and sub-consultants employed or contracted to undertake Services in connection with the Project(s). The Contractor shall provide all professional services required to complete the Project(s), including but not limited to the provision of administrative support, and production services. The Contractor's representations and responsibilities in the performance of professional services are further defined in Article 4.

**3.1.2.** Construction Contractor Registration: The Contractor is required to be registered with the Department of Labor and Industry under 39-9-201 and 39-9-204 MCA prior to the Contract being executed by the Owner. The Contractor must demonstrate that it has registered immediately upon notice of award and prior to the commencement of any Work. The Owner will not execute a contract for construction nor issue a Notice to Proceed to a Contractor who is not registered per 39-9-401(a) MCA. It is solely the Contractor's responsibility to ensure that all Subcontractors are registered in accordance with Title 39, Chapter 9, MCA.

**3.1.3.** (Paragraph deleted)

**3.1.4.** The Contractor shall perform the Work in accordance with the Contract Documents.

**3.1.5.** (Paragraph deleted)

**3.1.6.** Quality Control (i.e. ensuring compliance with the Contract Documents) and Quality Assurance (i.e. confirming compliance with the Contract Documents) are the responsibility of the Contractor. Testing, observations, and/or inspections performed or provided by the Owner are solely for the Owner's own purposes and are for the benefit of the Owner. The Owner is not liable or responsible in any form or fashion to the Contractor regarding quality assurance or extent of such assurances. The Contractor shall not, under any circumstances, rely upon the Owner's testing or inspections as a substitute or in lieu of its own Quality Control or Assurance programs.

#### **3.2. REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

**3.2.1.** Since the Contract Documents are complementary and inter-related, before starting the construction phase of each portion of the Work, the Contractor shall carefully study and compare the various Drawings and other Contract Documents relative to that portion of the Work, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions affecting the Work. These obligations are for the purpose of facilitating construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents. However, any errors, inconsistencies or omissions discovered by the Contractor shall be reported promptly to the Owner.

**3.2.2.** (Paragraph deleted)

**3.2.3.** (Paragraph deleted)

**3.2.4.** Except as otherwise expressly provided in this Contract, the Contractor assumes all risks, liabilities, costs, and consequences of performing any effort or work in accordance with any written or oral order (including but not limited to direction, instruction, interpretation, or determination) of a person not authorized in writing by the Owner to issue such an order.

**3.2.5.** By entering into this Contract, the Contractor acknowledges that it has informed itself fully regarding the requirements of the Contract Documents and all applicable laws, building codes, ordinances and regulations. Contractor hereby expressly acknowledges, guarantees, and warrants to the Owner that:

**3.2.5.1.** the Contract Documents are sufficient in detail and scope to enable Contractor to construct the finished Project;

**3.2.5.2.** no additional or further work should be required by Owner at the time of Owner's acceptance of the Work; and,

**3.2.5.3.** when the Contractor's work is finished and the Owner accepts, the Work will be complete and fit for the purpose intended by the Contract Documents.

**3.2.6.** The Contractor acknowledges its continuing duty to review and evaluate the Contract Documents during the performance of its Services and shall immediately notify the Owner of any problems, conflicts, defects, deficiencies, inconsistencies, errors, or omissions it discovers in the Contract Documents and the Work to be constructed; and, any variances it discovers between the Contract Documents and applicable laws, statutes, building codes, rules or regulations.

**3.2.7.** If the Contractor performs any Work which it knows or should have known due to its experience, ability, qualifications, and expertise in the construction industry, that involves problems, conflicts, defects, deficiencies, inconsistencies, errors, or omissions in the Contract Documents and the Work to be constructed and, any variances between the Contract Documents and applicable laws, statutes, building codes, rules or regulations, without prior written notification to and without prior authorization to proceed from the Owner, the Contractor shall be responsible for and bear the costs and delays (including costs of any delay) of performing such Work and all corrective actions.

**3.2.8.** If the Work involves modifications, renovations, or remodeling of an existing structure(s) or other man-made feature(s), the Contractor certifies, warrants and guarantees that it has reviewed, evaluated, and become familiar with all available as-built and record drawings, plans and specifications, and has thoroughly inspected and become familiar with the structure(s) or man-made feature(s).

**3.2.9.** Any and all claims resulting from the Contractor's failure, including those of any subcontractor or supplier, to visit, carefully review, evaluate, and become familiar with all aspects of the site, available geotechnical information, and local conditions at which the Project is to be constructed shall be deemed void and waived by the Contractor.

### **3.3. CONSTRUCTION ADMINISTRATION, SUPERVISION AND CONSTRUCTION PROCEDURES**

**3.3.1.** The Contractor shall provide professional design, engineering, construction supervision and project management Services for the Project(s), in accordance with the Contract Documents, specifically but not limited to Articles 3 and 4.

**3.3.2.** The Contractor shall provide construction administration for the Project(s) construction and installation of the Equipment, all defined as the Work, and, supervise and direct the Work using the Contractor's best skill and attention recognizing that time and quality are of the essence of the Work. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, in accordance with the Contract Documents. It is the responsibility of and incumbent upon the Contractor to ensure, confirm, coordinate, inspect and oversee all Work (which is inclusive of but not limited to all submittals, change orders, schedules, workmanship, and appropriate staffing with enough competent and qualified personnel) so that the Work is not impacted in terms of any delays,

costs, damages, or additional time, or effort on the part of the Owner. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and shall not proceed with that portion of the Work without further written instructions from the Owner. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage. The Contractor will be required to: review any specified construction or installation procedure; advise the Owner if the specified procedure deviates from good construction practice; to advise the Owner if following the procedure will affect any warranties, including the Contractor's general warranty, or of any objections the Contractor may have to the procedure and shall propose any alternative procedure which the Contractor will warrant and guarantee. The Contractor is required to: review any specified construction or installation procedure; advise the Owner if the specified procedure deviates from good construction practice; to advise the Owner if following the procedure will affect any warranties, including the Contractor's general warranty, or of any objections the Contractor may have to the procedure and to propose any alternative procedure which the Contractor will warrant.

**3.3.3.** The Contractor shall furnish management, supervision, coordination, labor and services that: (1) expeditiously, economically, and properly completes the Work; (2) comply with all requirements of the Contract Documents; and, (3) are performed in a quality workmanlike manner and in accordance with the standards currently practiced by persons and entities performing or providing comparable management, supervision, labor and services on projects of similar size, complexity, cost, and nature to this Project(s). However, the standards currently practiced within the construction industry shall not relieve the Contractor of the responsibility to perform the Work to the level of quality, detail, and excellence defined and intended by the Contract Documents.

**3.3.4.** All services and labor rendered by the Contractor, including any subcontractors or suppliers, shall be performed under the immediate supervision at the site of persons possessing expertise and the requisite knowledge in the discipline or trade of service being rendered. The Contractor shall maintain such supervision and personnel at all times that the Contractor's personnel, subcontractors, and/or suppliers are at the Project Site(s). The Contractor or his designated representative shall never be absent from the site during performance of any portion of the Work by any entity under the supervision and direction of the Contractor. Full time attendance by the Contractor from commencement of construction and installation through Project and Phase Final Acceptance is an explicit requirement of this Contract. The Contractor's Project Manager or superintendent, or other designated employee shall keep the Owner informed about the progress and quality of the portion of the Work completed, and the Schedule, in accordance with the Contract Documents.

**3.3.5.** The Contractor shall be responsible to the Owner for acts, damages, errors, and omissions of the Contractor's employees, subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

**3.3.6.** The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

**3.3.7.** Communication and Construction Administration procedures are defined in Article 4.

#### **3.4. LABOR, WAGES, AND MATERIALS**

**3.4.1.** Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, permits, licenses, goods, products, equipment, tools, construction equipment and machinery, water, heat, all utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work in accordance with the Contract Documents, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

**3.4.2.** The Contractor may make substitutions but must inform the Owner, in accordance with the Contract.

**3.4.3.** The Contractor shall enforce strict discipline, appropriate behavior, and good order among the Contractor's employees, subcontractors at every tier and level, and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

**3.4.4. Prevailing Wages and Montana Residents.**

**3.4.4.1.** The Contractor and all subcontractors at any level or tier of the Work shall give preference to the employment of bona fide Montana residents in the performance of the Work and shall pay the standard prevailing rate of wages, including fringe benefits for health and welfare and pension contributions and travel allowance provisions in effect and applicable to the county or locality in which the work is being performed. (18-2-403, MCA)

**3.4.4.2.** At least 50% of the workers, as defined by the Department of Labor & Industry (DOLI), must be bona fide Montana residents. (18-2-401, 18-2-402, MCA)

**3.4.4.3.** (Paragraph deleted)

**3.4.4.4.** The Commissioner of The Montana Department of Labor and Industry (DOLI) has established the standard prevailing rate of wages in accordance with 18-2-401 and 18-2-402, MCA. A copy of the Rates entitled "State of Montana, Prevailing Wage Rates" are bound herein. The Commissioner of the Montana DOLI has established the resident requirements in accordance with 18-2-409, MCA. The Contractor and all subcontractors at any level or tier of the Work shall direct any and all questions concerning prevailing wage and Montana resident issues for all aspects of the Work to DOLI.

**3.4.4.5.** The Contractor and all subcontractors at any tier or level of the Work, and as determined by the Montana DOLI, shall classify all workers in the Project(s) in accordance with the State of Montana, Prevailing Wage Rates. In the event the Contractor is unable to classify a worker in accordance with these rates he shall contact DOLI for a determination of the classification and the prevailing wage rate to be paid.

**3.4.4.6.** Contractor and all subcontractors at any tier or level of the Work shall be responsible for obtaining wage rates for all workers prior to their performing any work on the Project(s). The Contractor is required to pay and insure that its subcontractors at any tier or level and others also pay the prevailing wage determined by the DOLI, insofar as required by Title 18 of the MCA and the pertinent rules and standards of DOLI.

**3.4.4.7.** It is not the responsibility of the Owner to determine who classifies as a subcontractor, sub-subcontractor, material man, supplier, or any other person involved in any aspect of the Work at any tier or level. All such determinations shall be the sole responsibility of the Contractor, subcontractors, sub-subcontractors, material men, suppliers and others involved in the Project(s) at any tier or level. The Contractor, subcontractors, sub-subcontractors, material men, suppliers and others involved in the Project(s) shall indemnify and hold harmless the Owner from all claims, attorneys' fees, damages and/or awards involving prevailing wage or Montana resident issues. Any changes to wages or penalties for failure to pay the correct wages will be the sole responsibility of the Contractor and/or his subcontractors and no further charges or claims shall be made to the Owner. If the parties mutually agree or an arbitrator or court determines that any change in wages is due and any part is attributable to the Owner, the Owner's sole liability shall be for the amount of wages ordered only and not for other expenses, charges, penalties, overhead, profit or other mark-ups.

**3.4.4.8.** In accordance with 18-2-422(1) MCA, each job classification's standard prevailing wage rate, including fringe benefits, that the contractors and employers shall pay during construction of the Project(s) is included herein by both reference to DOLI's "Building" or "Heavy/Highway" schedules and as part of these Contract Documents.

**3.4.4.9.** Contractor and every employer, including all subcontractors at any tier or level, is required by 18-2-422(2) MCA to maintain payroll records in a manner readily capable of being



certified for submission under 18-2-423 MCA, for a period of not less than 3 years after the Contractor's, Subcontractor's, or employer's completion of Work on the Project(s) or the Project and Phase Final Acceptance by the Owner, whichever is later.

**3.4.4.10.** Each contractor is required by 18-2-422(3) MCA to post in a visible and accessible location a statement of all wages and fringe benefits in compliance with 18-2-423.

### **3.5. CONSTRUCTION WARRANTY AND GUARANTEE**

**3.5.1.** The Warranty and Guarantee to be provided by the Contractor in this Paragraph 3.5 is in addition to the Contractor's obligations in respect of Energy Savings Guarantee and Cost Savings Guarantee contained within the Master Energy Performance Contract, Articles and Schedules and Appendices,

**3.5.2.** The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be new and of good quality unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and rejected. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

**3.5.3.** The Contractor shall and does hereby warrant and guarantee all work, workmanship, and materials for the full warranty periods as applied to each Project(s) and Phase, as specified in the Contract Documents.

**3.5.3.1.** The warranty period shall be defined as commencing with Substantial Completion (or with each Substantial Completion if there is more than one) of the Project(s), or Phase, or any portion thereof, and continuing for one (1) calendar year.

**3.5.3.2.** If more than one Substantial Completion is issued, the Project(s) warranty period should continue for one (1) calendar year from the date of the final Substantial Completion being issued by the Owner.

**3.5.3.3.** All anticipated interim Substantial Completions and Final Project Acceptances must be planned in advance and detailed in the Project scope and schedules, and approved by the Owner prior to commencement of Work on the Project(s).

**3.5.4.** In addition to the one (1) calendar year warranty and guarantee specified in this herein above, the Contractor warrants and guarantees all materials and workmanship for the roofing system for a period of two (2) calendar years from the date of Substantial Completion of the Project(s) or Phase. This warranty shall cover all labor and materials for roof and roofing finish systems (e.g. flashing, terminations, parapet caps, etc.) repairs from moisture penetration and/or defects in workmanship.

**3.5.5.** Manufacturer and product warranty and guarantees, as provided by the manufacturer or as specified in the Contract Documents, are in addition to the Contractor's warranty.

**3.5.6.** Contractor is not responsible for routine maintenance, or repairs during the warranty period, except as provided in Master Energy Performance Contract. Contractor is not responsible for maintenance, repairs or making manufacturer warranty claims relating to the Equipment after the warranty period has expired.

**3.5.7.** Contractor shall assign to the Owner all available manufacturer's warranties relating to the Equipment and deliver the written warranties to Owner for attachment to this Contract. Contractor shall pursue rights and remedies against the manufacturers under the warranties in the event of Equipment

malfunction, improper or defective function, or defects in parts, workmanship, or performance. Contractor shall, during the warranty period, notify the Owner whenever defects in Equipment parts or performance occur that give rise to rights and remedies and when those rights and remedies are exercised by Contractor, in accordance with this Contract. During this period, Contractor shall be liable to the Owner for the cost of any risk of damage or damage to the Equipment and its performance, including damage to property and equipment of the Owner or to the Project Site(s), due to Contractor's failure to exercise its warranty rights.

### **3.6. TAXES**

**3.6.1.** The Contractor is responsible for and shall pay all sales, consumer, use, and similar taxes for the Work provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

**3.6.2.** In compliance with 15-50-206 MCA, the Contractor will have 1% of his gross receipts withheld by the Owner from all payments due and sent to the Montana Department of Revenue. Each subcontractor who performs work greater than \$5,000 shall have 1% of its gross receipts withheld by the Contractor and sent to the Montana Department of Revenue. The Contractor shall notify the Department of Revenue on the Department's prescribed form.

### **3.7. PERMITS, FEES, AND NOTICES**

**3.7.1.** Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract, including but not limited to, the building permit fee, electrical, plumbing, sewer connection fee and mechanical permit fee, and any required fees and which are legally required.

**3.7.2.** The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities applicable to performance of the Work.

**3.7.3.** If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations, and does so without providing notice to the Owner, the Contractor shall assume responsibility for such Work and shall bear the costs attributable to correction. The Contractor shall be solely responsible to insure that all work it performs is in full compliance with all prevailing and applicable codes and regulations.

**3.7.4.** Incident Reporting: The Contractor shall immediately notify the Owner, both orally and in writing, of the nature and details of all incidents which may adversely affect the quality or progress of the Work, including, but not limited to, union disputes, accidents, delays, damages to Work, and other significant occurrences. Such notices are in addition to any other notices required regarding claims.

### **3.8. ALLOWANCES**

**3.8.1.** The Contractor may include in the Contract Sum all allowances stated in the Contract Documents, specifically in the proposal for each phase. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner or Contractor may direct.

**3.8.1.1.** whenever costs are more than or less than stated allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect: (1) the difference between actual costs and the allowances under Clause 3.8.2.1; and, (2) changes in Contractor's costs under Clause 3.8.2.2.

**3.8.2.** Materials and equipment under an allowance shall be reviewed by the Owner.

### **3.9. CONTRACTOR'S PERSONNEL**

**3.9.1.** The Contractor shall employ competent and qualified personnel, supervisors, project managers, project engineers, project superintendent, and all others who shall be assigned to the Work throughout its duration. Contractor's personnel extend to those employed by the Contractor whether at the site or not. The Owner shall have right to review and approve or reject all replacement of Contractor's personnel. All personnel assigned by the Contractor to the Work shall possess the requisite experience, skills, abilities, knowledge, and integrity to perform the Work.

**3.9.2.** The superintendent and others as assigned shall be in attendance at the Project Site(s) during the performance of any and all Work. The superintendent shall represent the Contractor. All communications given to the Contractor's personnel such as the project manager or the superintendent, whether verbal, electronic or written, shall be as binding as if given to the Contractor.

**3.9.3.** It is the Contractor's responsibility to appropriately staff, manage, supervise and direct the Work which is inclusive of the performance, acts, and actions of his personnel and subcontractors. As such, the Contractor further agrees to indemnify and hold harmless the Owner, and to protect and defend both from and against all claims, attorneys' fees, demands, causes of action of any kind or character, including the cost of defense thereof, arising in favor of or against the Owner, Contractor, their agents, employees, or any third parties on account of the performance, behavior, acts or actions of the Contractor's personnel or subcontractors.

**3.9.4.** Prior to the commencement of any work, the Contractor shall prepare and submit a personnel listing and organizational chart in a format acceptable to the Owner which lists by name, phone number (including cell phone), job category, and responsibility the Contractor's key/primary personnel who will work on the Project(s). The Contractor shall promptly inform the Owner in writing of any proposed replacements, the reasons therefore, and the name and qualifications of any proposed replacements. The Owner shall have the right to reject any proposed replacements without cost or claim being made by the Contractor. The chart shall be provided to the Owner at the time of the pre-construction conference.

**3.9.5.** The Contractor shall immediately remove for the duration of the Phase, any person engaging in discriminatory conduct, including but not limited to, making an inappropriate racial, sexual, or ethnic comment, statement, joke, or gesture toward any other individual.

**3.9.6.** The Contractor shall immediately remove for the duration of the Phase, any person who is incompetent, careless, disruptive, or not working in harmony with others.

### **3.10. SCHEDULES**

**3.10.1.** The Contractor shall, promptly on agreement of a Project(s), prepare and submit for the Owner's information a Contractor's schedule for the Work, to include design, pre-construction and construction activities, as applicable. The Owner shall provide Owner's schedule constraints, by building, to the Contractor prior to draft schedule submission by the Contractor. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and per the requirements of the Contract Documents, shall be related to the Project(s) or Phase to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The Contractor's schedule shall be in the "Critical Path Method" and shall show the Critical Path of the Work in sufficient detail to evaluate the Contractor's progress. A request for time extension by the Contractor will not be allowed unless a change in the Work is approved by the Owner and materially affects the Critical Path. It is the Contractor's responsibility to demonstrate that any time extensions requests materially affect the Critical Path.

**3.10.2.** The Contractor shall prepare and keep current, for the Owner's approval, a schedule of submittals which is coordinated with the Contractor's Schedule and allows the Owner reasonable time to review submittals.

**3.10.3.** The Contractor shall perform the Work in accordance with the most recent schedule submitted to the Owner.

**3.10.4.** The Contractor's operations and provision of Services (including but not limited to the Contractor's forces employed, sequences of operations, and methods of operation) at all times during the performance of the contract shall be: (a) subject to the review of the Owner; and, (b) sufficient to insure the completion of the Work within the specified performance period.

**3.10.5.** The Critical Path Method Schedule prepared by the Contractor must be in a form that is acceptable the Owner.

**3.10.5.1.** The Schedule shall show the estimated progress of the Project(s) and Phase through the individual time periods allowed for completion of each discipline, trade, phase, section, and aspect of the Work. The Contractor shall provide written reports of all logic and resource loading data with the Schedule and with all updates to the Schedule.

**3.10.5.2.** The Schedule shall show percent complete, progress to date, Project(s) work, and projected time to complete the work for all activities. The percent complete and minor schedule changes, including additions of activities, change orders, construction change directives, changes to sequences of activities and significant changes in activity demands must be shown by a revised Schedule. A written report providing details about the changes and what actions are anticipated to get the work completed in the contractual time period shall be submitted with the revised schedule.

**3.10.5.3.** The Schedule shall include coordinate dates for performance of all activities and divisions of the Work, including shipping and delivery, off-site requirements and tasks, so the Work can be completed in a timely and orderly fashion consistent with the required dates of Substantial Completion and Final Acceptance.

**3.10.5.4.** The Schedule shall include: (i) the required Project(s) and/or Phase commencement date, the required dates of Substantial Completion(s), Project Final Acceptance(s) and Phase Final Acceptance for the complete Phase and all Project(s); (ii) any guideline and milestone dates required by the Owner or the Contract Documents; (iii) subcontractor and supplier schedules; (iv) a submittal schedule which allows sufficient time for review and action by the Owner; (v) the complete sequence of all construction activities with start and completion dates; and, (vi) required decision dates.

**3.10.5.5.** By receiving, reviewing, and/or commenting on the Schedule or any portion thereof (including logic and resource loading), the Owner does not assume any of the Contractor's responsibility or liability that the Schedule be coordinated or complete, or for timely and orderly completion of the Work.

**3.10.5.6.** Receiving, reviewing, and/or commenting on the Schedule, any portion thereof, or any revision thereof, does not constitute an approval, acknowledgement, or acceptance of any duration, dates, milestones, or performance indicated therein.

**3.10.5.7.** A printout of the Schedule's logic showing all activities and all resource loading is required with the Schedule and with all updates to the Schedule.

**3.10.6.** The Contractor shall review and compare, at a minimum on a weekly basis, the actual status of the Work on Project(s) against its Schedule.

**3.10.7.** The Contractor shall routinely, frequently, and periodically (but not less than monthly) update and/or revise its Schedule to show actual progress of the Work through the date of the update or revision, projected level of completion of each remaining activity, activities modified since the previous update or revision, and major changes in scope or logic. The updated/revised Schedule shall be accompanied by a narrative report which: (1) states and explains any modifications of the critical path,

if any, including any changes in logic; (2) defines problem areas and lists areas of anticipated delays; (3) explains the anticipated impact the change in the critical path or problems and delays will have on the entire Schedule and the completion of the Work; (4) provides corrective action taken or proposed; and, (5) states how problems or delays will be resolved in order to deliver the Work by the required phasing milestones (if any), Project Substantial Completion(s), Project Final Acceptance dates, and Phase Final Acceptance date.

**3.10.8.** Delay in Performance: If at any time the Contractor anticipates that performance of the Work will be delayed or has been delayed, the Contractor shall: (1) immediately notify the Owner by separate and distinct correspondence of the probable cause and effect of the delay, and possible alternatives to minimize the delay; and, (2) take all corrective action reasonably necessary to deliver the Work by the required dates. Nothing in this paragraph or the Contract Documents shall be construed by the Contractor as a granting by the Owner of constructive acceleration. The results of failure to anticipate delays, or to timely notify the Owner of an anticipated or real delay, are entirely the responsibility of the Contractor whether compensable or not.

**3.10.9.** Early Completion: The Contractor may attempt to achieve Project Substantial Completion(s) on or before the date(s) required in the Contract. However, such early completion shall be for the Contractor's sole convenience and shall not create any real or implied additional rights to Contractor or impose any additional obligations on the Owner. The Owner will not be liable for nor pay any additional compensation of any kind to the Contractor for achieving Project Substantial Completion(s) or Project or Phase Final Acceptance prior to the required dates as set forth in the Contract. The Owner will not be liable for nor pay any additional compensation of any kind should there be any cause whatsoever that the Contractor is not able to achieve Project Substantial Completion(s) earlier than the contractually required dates of Project Substantial Completion(s) or Project or Phase Final Acceptance.

**3.10.10.** Float in Schedule. Any and all float time in the Contractor's schedule, regardless of the path or activity, shall accrue to the benefit of the Owner and the Work, and not to the Contractor. Float also includes any difference shown between any early completion dates shown on the Contractor's Schedule for any phasing milestone(s), Project Substantial Completion(s) or Project or Phase Final Acceptance and the dates or durations as required by the Contract Documents.

**3.10.11.** Modification of required Project Substantial Completion(s) or Project or Phase Final Acceptance Dates: Modification of the required dates shall be accomplished only by duly authorized, accepted, and approved change orders stating the new date(s) with specificity on the change order form. All rights, duties, and obligations, including but not limited to the Contractor's liability for actual, delay, and/or liquidated damages, shall be determined in relation to the date(s) as modified.

### **3.11. DOCUMENTATION AND AS-BUILT CONDITIONS AT THE SITE**

**3.11.1.** The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and accurately marked to record current field changes and selections made during construction, and one record copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Owner at any time and shall be delivered for submittal to the Owner upon completion of the Work.

**3.11.2.** The Owner shall not be required to process final payment on a Phase until all documentation and data required by the Contract Documents is submitted to and approved by the Owner including, but not limited to, the As-Built record documents, as appropriate.

**3.11.3.** The as-built record documents shall be neatly and clearly marked during construction to record all deviations, variations, changes, and alterations as they occur during construction along with such supplementary notes and details necessary to clearly and accurately represent the as-built condition. The as-built drawings shall be available at all times to the Owner.

### **3.12. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

**3.12.1.** Definitions:

**3.12.1.1.** Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

**3.12.1.2.** Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

**3.12.1.3.** Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

**3.12.2.** Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Owner is subject to the limitations of Subparagraph 4.2.7. Informational submittals upon which the Owner is not expected to take responsive action may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Owner without action.

**3.12.3.** The Contractor shall review, approve, and submit to the Owner, Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents within sixty (60) calendar days of being issued the Project commencement unless noted otherwise and shall do so in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Any and all items submitted by the Contractor which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor, or in the opinion of the Owner, have not been reviewed for compliance by the Contractor even if marked as such, may be returned by the Owner without action and shall not result in any accusation or claim for delay or cost by the Contractor. Any submittal that, in the opinion of the Owner is incomplete in any area or detail may be rejected and returned to the Contractor. It is the responsibility of and incumbent upon the Contractor to ensure and confirm that all submittals are complete, accurate, and in conformance to the Contract Documents prior to submission.

**3.12.4.** By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents and guarantees to the Owner that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**3.12.5.** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Owner. Should the Contractor, Subcontractors or Sub-subcontractors install, construct, erect or perform any portion of the Work without approval of any requisite submittal, the Contractor shall bear the costs, responsibility, and delay for removal, replacement, and/or correction of any and all items, material, and /or labor.

**3.12.6.** The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Owner's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Owner in writing of such deviation at the time of submittal and: (1) the Owner has given written approval to the specific deviation as a minor change in the Work; or, (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Owner's approval thereof.

**3.12.7.** The Contractor shall direct specific attention, in writing or on re-submitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Owner on previous submittals. In the absence of such written notice the Owner's approval of a re-submission shall not apply to such revisions.

**3.12.8.** Unless noted otherwise in the Contract Documents, the Contractor shall submit to the Owner within sixty (60) days from the date of the Project commencement a minimum of one (1) complete copy



of all shop/setting drawings, schedules, cut sheets, products, product data, and samples required for the complete Work. Electronic copies may be acceptable subject to area of work and Owner's approval. Copies shall be reviewed, marked, stamped and approved on each and every copy by the Contractor prior to submission to the Owner or they shall be returned without review or action. The Owner shall review with reasonable promptness, in not more than 14 days, making corrections, rejections, or other actions as appropriate. The Owner's approval or actions on shop/setting drawings, schedules, cut sheets, products, product data, or samples shall not relieve the Contractor from responsibility for, nor deviating from, the requirements of the plans and specifications. Any deviations from the plans and specifications requested or made by the Contractor shall be brought promptly to the attention of the Owner.

### **3.13. USE OF SITE AND ACCESS TO WORK**

**3.13.1.** The Contractor shall provide the Owner access to the Work at all times wherever located.

**3.13.2.** The Owner shall provide access to the Project Site(s) for Contractor to perform any function related to this Contract during regular business hours, or such other reasonable hours as may be requested by Contractor and acceptable to the Owner. The Owner shall grant Contractor immediate access to make emergency repairs or corrections as it may, in its discretion, determine are needed. Contractor shall immediately notify the Owner when emergency action is taken and follow up with written notice within three (3) business days, specifying the action taken, the reasons for the action, and the impact upon the Project(s) or Phase, if any.

**3.13.3.** The Contractor shall confine operations at the Project Site(s) to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

**3.13.4.** The Contractor shall not damage, endanger, compromise or destroy any part of the Project or the site, including but not limited to work performed by others, monuments, stakes, bench marks, survey points, utilities, existing features or structures. The Contractor shall be fully and exclusively responsible for and bare all costs and delays (including and costs of delay) for any damage, endangerment, compromise, or destruction of any part of the Project Site(s).

**3.13.5.** The Contractor acknowledges that there exists sufficient space on the Project Site(s) for the installation and operation of the construction operations and the Equipment. Contractor is responsible for all aspects of protecting the equipment during construction.

**3.13.6.** The Owner shall take reasonable steps to protect the Equipment from harm, theft, and misuse after Final Acceptance has been obtained.

**3.13.7.** All Contractor and Contractor employees, subcontractors and sub-consultants shall comply with City of Missoula parking regulations.

**3.13.8.** Unless otherwise agreed in the Contract Documents, and indicated on the drawings, all employee, subcontractor and sub-consultants must purchase a parking permit from the City of Missoula Police and all vehicles shall be parked in designated parking lots. If allowed in the Contract Documents, the Contractor will be allowed a maximum number of vehicles to be parked within fenced Project(s) site areas, such vehicles should be Contractor vehicles with company signs clearly visible. No personal vehicles may be parked at the Project site. A driver of a vehicle not allowed to be parked at the Project site must unload equipment, tools, or materials, and the vehicle must be immediately thereafter moved to a designated lot or leave campus. Vehicles parked in the Project site, other than those allowed on the Contract Documents, may be ticketed and towed.

**3.13.9.** Access to the Project site may be only by a route designated in the Contract Documents. In cases where a different route must be used for a specific purpose, permission must be obtained from Owner. In no case should vehicles be used on non-vehicular pavement areas. Access routes are for delivery of equipment, tools, and not for parking.

**3.13.10.** Site staging areas for lay-down of materials and equipment, if required, shall be coordinated with Owner and will be designated on the Drawings prior to construction commencing. If not designated, staging is intended to be in the construction area boundaries. Staged materials and equipment must be secured on the ground surface or in trailers. If a site staging area(s) is required outside of the construction area boundaries it shall be fenced as laid out in the Contract Documents.

**3.13.11.** The Contractor shall coordinate his operations with the Owner in order that the Owner will have maximum use of existing facilities surrounding the area of the Work, as agreed upon, at all times during normal working hours. Contractor further agrees to coordinate his operations so as to avoid interference with the Owner's normal operations to as great an extent as possible.

**3.14. CUTTING AND PATCHING**

**3.14.1.** The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

**3.14.2.** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

**3.15. RECYCLING, CLEAN UP AND SITE CONTROL**

**3.15.1.** The Contractor shall recycle waste materials resulting from the construction and installation. Such materials may include, but not be limited to cardboard, metals such as copper, paper, plastic or other packaging, lumber. Any costs or savings as a result of waste recycling will be attributed to the Contractor. The Contractor shall offer to the Owner at no cost any salvaged materials or equipment that could be re-used.

**3.15.2.** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract during performance of the Work and at the direction of the Owner. At completion of the Work, the Contractor shall remove from and about the Project Site(s), waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.

**3.15.3.** The Contractor shall have no use of the Owner's garbage or waste receptacles, with the exception of flattened cardboard and paper to be recycled, which may be disposed of in the Owner's recycling containers. A recycling container will not be provided by the Owner specifically for this purpose.

**3.15.4.** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

**3.16. (Paragraph Deleted)**

**3.17. ROYALTIES, PATENTS AND COPYRIGHTS**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner harmless from loss on account thereof.

**3.18. INDEMNIFICATION**

**3.18.1.** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work to the extent caused by the negligent or intentional acts or omissions of the Contractor, a Subcontractor, a

Consultant or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph. The Contractor agrees that it will defend, protect, indemnify and save harmless the State of Montana and the Owner against and from all claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys' fees), and losses from any cause whatever (including patent, trademark and copyright infringement) except to the extent caused by the Owner's negligence. This includes any suits, claims, actions, losses, costs, damages of any kind, including the State and Owner's legal expenses, arising out of, in connection with, or incidental to the Contract, but does not include any such suits, claims, actions, losses, costs or damages which are the solely the result of the negligent acts, actions, losses, costs, or damages which are acts, omissions or misconduct of the Owner if they do not arise out of, depend upon or relate to a negligent act, omission or misconduct of the Contractor in whole or in part.

**3.18.2.** In claims against any person or entity indemnified under this Paragraph 3.18 by an employee of the Contractor, a Subcontractor, a Consultant or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Subparagraph 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor, a Consultant, under workers' compensation acts, disability benefit acts or other employee benefit acts.

#### **4. ARTICLE 4 – PROFESSIONAL DESIGN AND ENGINEERING SERVICES AND CONSTRUCTION ADMINISTRATION**

##### **4.1. PROFESSIONAL DESIGN AND ENGINEERING SERVICES**

**4.1.1.** The Contractor shall provide all professional services required to complete the Project(s), including but not limited to the provision of all administrative support, and production services.

**4.1.2.** Contractor's representations and responsibilities in the performance of professional services under this Contract:

**4.1.2.1.** By signing this Contract, the declaration is made that the Contractor is professionally qualified, registered, and licensed to practice in the State of Montana. All analysis, design, equipment selections, specifications, and all aspects connected with design, installation, and construction of energy-savings measures, done by the Contractor shall be performed by an engineer (and /or other qualified professional as appropriate) licensed in the State of Montana in accordance with 18-2-121 and 12-2-122, MCA.

**4.1.2.2.** The Contractor shall be responsible for the professional quality, technical accuracy, and coordination of all designs, drawings, specifications, estimates, and other instruments of service furnished under this Contract. The Contractor shall, without additional compensation, correct all errors, omissions, or other deficiencies discovered over the course of the Project(s) and Phase.

**4.1.2.3.** Neither the Owner's review, approval, acceptance of, nor payment for Services provided under this Contract shall be construed as a waiver of any rights under this Contract or of any cause of action arising out of the performance of this Contract. The Contractor shall remain liable to the Owner for any and all damages caused by the Contractor's negligent performance of any of the Services provided under this Contract.

**4.1.2.4.** The Contractor acknowledges that the services provided to the Owner shall include reasonable justification and explanation of the Contractor's professional decisions. It is understood that these decisions may be reasonably relied upon by other parties delivering services to the Owner, when provided in compliance with the requirements of the Project(s) and Phase.

**4.1.2.5.** The Contractor shall provide the Services and information required of him as expeditiously as possible to ensure the orderly progress of the Project(s) and Phase.

**4.1.2.6.** The Contractor shall take minutes at all meetings pertaining to the Project(s) and Phase, and distribute typewritten copies to all parties attending the meeting.

**4.1.2.7.** The Contractor shall make every effort to accommodate the directives and requests of the Owner during the design process. Where the Contractor cannot, or will not, comply with a directive or request, the Contractor shall provide reasonable explanation and work with the Owner to develop an acceptable solution.

**4.1.2.8.** The Contractor shall coordinate with the local building official during the design and development of the Project to ensure that the construction being proposed will comply with their requirements. The Contractor shall assist the Owner with the submittal and filing of all documents required for the purposes of plan review.

**4.1.3. Contractor Services shall include:**

**4.1.3.1. PRE-DESIGN INVESTIGATIONS:** Notwithstanding that Pre-Design Investigations may have been completed for the Technical Energy Audit Report, Pre-Design Investigations shall include, but not be limited to, the following:

**4.1.3.1.1.** Preliminary review of the Owner's program, schedule requirements, and if applicable availability of additional capital funding. The Contractor shall review this information to determine whether or not any adjustments are necessary. The Contractor shall inform the Owner if, after review, the Contractor anticipates that additional information will be required to complete the Project.

**4.1.3.1.2.** Preliminary review of the Owner's record documents for all facilities, site improvements, and other existing conditions that may be affected by the Project.

**4.1.3.1.3.** Preliminary review of the Project Site(s), with special consideration for context, access, staging, existing pedestrian and vehicular traffic patterns, utilities, hazardous materials, as well as other factors that may influence the Project.

**4.1.3.1.4.** The Contractor shall document their findings and maintain this information throughout the course of the Project(s).

**4.1.3.2. SCHEMATIC DESIGN:**

**4.1.3.2.1.** Notwithstanding that the Schematic Design phase may have been completed during the Energy Audit phase, it shall commence with the completion of the Pre-Design Investigations and shall conclude with the Owner's approval of the Schematic Design (35%) submittal.

**4.1.3.2.2.** If not previously completed and approved during the Energy Audit phase the Contractor shall prepare Schematic Design documents for the Project(s). These documents shall illustrate the conceptual design of the Project by representing the scale and relationship of its various components. Initial selections of major building systems and materials shall be indicated. At a minimum, these documents shall consist of drawings, outline specifications, and a preliminary estimate of construction cost if at variance with the Rough Order of Magnitude estimate.

**4.1.3.2.3.** If not previously completed during the Energy Audit phase, the Contractor shall submit two (2) complete sets of Schematic Design documents to the Owner for review. Partial document sets will not be accepted. The Owner will provide review comments within 14 days of receipt of documents.

**4.1.3.3. DESIGN DEVELOPMENT:**

**4.1.3.3.1.** Design Development shall commence with the Owner's approval of the Schematic Design submittal and shall conclude with the Owner's approval of the Design Development

(65%) submittal. Some Project scopes may not require a Design Development submittal and may proceed to the Construction Document phase directly after Schematic Design, with Owner approval.

**4.1.3.3.2.** The Contractor shall prepare Design Development documents for the Project. These documents shall fully illustrate the size and character of the various components and systems that comprise the Project, including, but not limited to, architectural components and assemblies, structural systems, mechanical systems, fire protection systems, and electrical systems. At a minimum, these documents shall consist of drawings, specifications, as well as product data sheets for products and assemblies proposed by the Contractor.

**4.1.3.3.3.** The Contractor shall provide detailed information relating to construction methods, with solutions for access arrangements, staging, existing pedestrian and vehicular traffic patterns, utilities, hazardous materials, as well as other factors that may influence the Project and use of the Project Site(s). The Contractor shall submit three (3) complete sets of Design Development documents to the Owner for review. Partial document sets will not be accepted. The Owner will provide review comments within 14 days of receipt of documents. An in-person table-top review may be required for Projects of sufficient magnitude.

**4.1.3.4. CONSTRUCTION DOCUMENTS:**

**4.1.3.4.1.** With the Owner's approval of the Design Development submittal, the Consultant shall commence work on the Construction Documents. These documents shall fully illustrate the design and set forth in detail the requirements for the construction of the Project(s). At a minimum, these documents shall consist of drawings, and specifications.

**4.1.3.4.2.** The Contractor shall submit three (3) complete sets of the Contract Documents to the Owner for one final review (95%). Partial sets will not be accepted. The Owner will provide written review comments, within 14 days of receipt.

**4.1.3.4.3.** When final revisions are complete, the Contractor shall submit three (3) complete sets of Contract Documents to the Owner for their files (two (2) to Facilities Planning, Design, & Construction, and one (1) to Auxiliaries Services). These documents shall consist of drawings and specifications. Every sheet of the drawing set shall bear the seal and signature of the project consultant or sub-consultant responsible for its preparation.

**4.1.3.5. PROJECT AND PHASE CLOSEOUT, RECORD DRAWINGS AND ELECTRONIC FILES:**

**4.1.3.5.1.** The Contractor shall continue to provide administration of the construction through the date established for Final Project and Phase Completion and Warranty expiration(s).

**4.1.3.5.2.** Once the Project(s) or Phase is considered Substantially Complete, the Contractor and Owner shall inspect the Project and generate a written report that identifies Work items that need to be completed or corrected for the Project(s) or Phase to be considered complete. Once the Work items have been corrected or completed, the Contractor shall invite the Owner to re-inspect the Work to verify that the Project(s) or Phase has reached Final Completion.

**4.1.3.5.3.** The Contractor shall provide the Owner with two (2) complete sets of "as-built" Record Drawings printed on 20 lb. bond paper. The Contractor shall also furnish the Owner with full sets of Record Drawings in AutoCAD electronic media format (both .dwg and .plt files), full sets of Record Drawings in PDF electronic media format and all Project Manuals (Specifications) on compact discs labeled with the Project and Phase name and the Owner's Project number(s). One disk of electronic drawing files shall be solely read-only Project plot files and the other disk shall contain a full set of as-built drawings with .dwg extensions. Both disks shall also include an index of the drawings and an index of all layers with full descriptions. All items shall be provided not less than thirty (30) calendar days after the date of Interim Final Acceptance and/or Final Completion.

**4.1.3.6. WARRANTY PERIOD**

**4.1.3.6.1.** The Contractor shall continue to provide the Owner with administration services from the date established for Final Completion through the latter of the following dates:

**4.1.3.6.1.1.** In the absence of warranty deficiencies, the date the Warranty expires.

**4.1.3.6.1.2.** In the event of warranty deficiencies, the date the Contractor completes the correction of deficiencies to the Owner's satisfaction.

**4.1.3.6.2.** Within thirty (30) calendar days prior to the date the Warranty is to expire, the Owner and the Contractor shall re-inspect the Work to determine if any warranty deficiencies exist. If warranty deficiencies exist, the Owner shall direct the Contractor to make the repairs necessary to correct the deficiencies. The Owner, on request of the Contractor, shall re-inspect the Work to verify that the warranty deficiencies have been corrected.

**4.1.3.7.** Unless noted otherwise, no instruments of service required under this Contract may be considered Reimbursable Expenses. The costs for all instruments of service are to be included in the Contract Sum.

**4.1.4.** Contractor's Records. The State of Montana and its agencies shall have access to all records, correspondence, and files of the Contractor, his employees and consultants, pertaining to the administration of the Contract undertaken on behalf of the Owner. This access shall be continuing and survive the termination of the Contract for either cause or convenience. Such records shall be kept in a generally recognized format and shall be available to the Owner, Legislative Auditor, the Legislative Fiscal Analyst, or his authorized representative, at a mutually convenient time for a minimum period of three (3) years after completion and acceptance of the Phase by the Owner.

## **4.2. CONSTRUCTION ADMINISTRATION**

**4.2.1.** The Contractor shall provide administration of the construction and installation of Equipment for the Project(s) as described in the Contract Documents, throughout the complete duration of the Project(s) and Phase, including the warranty period(s).

**4.2.2.** The Contractor will keep the Owner informed about the progress and quality of the portion of the Work completed, and endeavor to guard the Owner against defects and deficiencies in the Work; and ensure that the Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. The Owner will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Contractor's Work. The Owner will neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, for the safety of any person involved in the Work, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

**4.2.3.** The Owner will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents.

**4.2.4.** Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall regularly communicate with each other as necessary, about matters arising out of or relating to the Contract, through the designated Owner's Representative, or other designated Representative, as agreed from time to time.

**4.2.4.1.** The designated Owner's Representative will be \_\_\_\_\_, and

**4.2.4.2.** The designated Contractor's Project Manager, Project Superintendent, or other designated employee or consultant, as agreed prior to construction and installation commencing, and

**4.2.4.3.** Communications by and with Contractor's consultants, Subcontractors and material suppliers shall be through the Contractor to the Owner. Communications by and with separate contractors shall be through the Owner to the Contractor.



**4.2.4.4.** The Contractor shall attend a Pre-Construction Conference(s) prior to commencement of construction activities of a Project(s), at a time mutually agreed upon by the Owner and the Contractor. The Contractor shall confirm the Contractor's Schedule for the construction portion of the Work. Notwithstanding the requirements in the Contract Documents, coordination of operating requirements of the affected buildings, and surrounds, Schedule of activities and Owner requirements will be discussed, as well as the order in which the Contractor intends to pursue the work. This Schedule will be reviewed and must be mutually agreed upon by the Contractor and Owner.

**4.2.4.5.** The Contractor shall conduct weekly (or as agreed by the Owner) progress meetings with the Owner in order to ensure the orderly progress of the Project(s) and Phase, process Contract documentation and review Contractor's Applications for Payment, and discuss construction processes and issues, in accordance with the terms of the Contract.

**4.2.5.** The Owner will evaluate, review and certify all Contractor's Applications for Payment in accordance with this Contract. The Contractor is fully aware that the Owner has established a billing cycle for processing payments in Article 9 of these General Conditions. The Contractor and all Subcontractors are subject to all provisions of Title 28, Chapter 2, Part 21, MCA regarding all aspects of the Work.

**4.2.6.** The Owner will have authority to reject Work that does not conform to the Contract Documents. Whenever the Owner considers it necessary or advisable, the Owner will have authority to require inspection or testing of the Work in accordance with the General Conditions and any applicable technical specification requirements, whether or not such Work is fabricated, installed or completed.

**4.2.7.** The Contractor will review and approve or take other appropriate action upon the Subcontractor's submittals such as Shop Drawings, Product Data and Samples, and forward approved submittals to the Owner for review and approval, or other action, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Owner's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Owner's judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Owner's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Paragraphs 3.3, 3.5 and 3.12. The Owner's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Owner, of any construction means, methods, techniques, sequences or procedures. The Owner's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

**4.2.8.** Notwithstanding the provisions in the Master Energy Performance Contract relative to the Utility and Cost Savings Guarantee, the Owner will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Article 7.

**4.2.9.** The Contractor will determine the date or dates of Project Substantial Completion(s) and the date of Project and Phase Final Acceptance, and will notify the Owner for final inspections by the Owner and the Contractor. The Contractor will forward for the Owner's review and approval, written warranties and related documents required by the Contract and assembled by the Contractor, and the Owner will issue a final Certificate for Payment, if applicable, upon compliance with the requirements of the Contract Documents.

**4.2.10.** Interpretations and decisions of the Owner will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and initial decisions, the Owner will endeavor to secure faithful performance of the Contract by the Owner and the Contractor.

**4.2.11.** The Owner's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

**4.2.12.** The Owner's observations or inspections do not alleviate any responsibility on the part of the Contractor. The Owner reserves the right to observe and inspect the work and make comment. Action or lack of action following observation or inspection is not to be construed as approval of Contractor's performance.

### **4.3. CLAIMS AND DISPUTES**

**4.3.1.** Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extensions of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes, controversies, and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be initiated by written notice. The responsibility to substantiate Claims shall rest solely with the party making the Claim.

**4.3.1.1.** Time Limits on Claims. Claims by either party must be initiated within 21 calendar days after discovery of occurrence of the event giving rise to such claim. The following shall apply to the initiation of a claim:

**4.3.1.1.1.** A written notice of a claim must be provided to the relevant party within 21 calendar days after discovery of the occurrence of the event or the claim is waived by the claiming party and void in its entirety.

**4.3.1.1.2.** Claims must be initiated by separate, clear, and distinct written notice within the 21-calendar day time frame to the relevant party and must contain the notarized statement in Subparagraph 4.3.1.5 when the claim is made by the Contractor. Discussions in any form with either party, whether at the site or not, do not constitute initiation of a claim. Notes in Project and Phase meeting minutes, email correspondence, change order proposals, or any other form of documentation does not constitute initiation of a claim. The written notice must be a separate and distinct correspondence provided in hardcopy and electronic copy to the relevant party and must delineate the specific event and outline the causes and reasons for the claim whether or not cost or time have been fully determined. Written remarks or notes of a generic nature are invalid in their entirety. Comments made at progress meetings, project site visits, inspections, emails, voice mails, and other such communications do not meet the requirement of providing notice of claim.

**4.3.1.1.3.** Physical Injury or Physical Damage. Should the Owner or Contractor suffer physical injury or physical damage to person or property because of any error, omission, or act of the other party or others for whose acts the other party is legally and contractually liable, claim will be made in writing to the other party within a reasonable time of the first observance of such physical injury or physical damage but in no case beyond 30 calendar days of the first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. The provisions of this paragraph shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose. In all such cases, the indemnification provisions of the Contract shall be effectual and the Contractor's insurance shall be primary and in full effect.

**4.3.1.2.** All Claims must contain sufficient justification and substantiation with the written notice or they may be rejected without consideration with no additional impact or consequence to the Contract Sum, Contract Time, or matter(s) in question in the Claim.

**4.3.1.3.** If additional compensation is claimed, the exact amount claimed and a breakdown of that amount into the following categories shall be provided with each and every claim:

**4.3.1.3.1.** Direct costs (as listed in Subparagraph 7.3.9.1 through 7.3.9.5);

**4.3.1.3.2.** Indirect costs (as defined in Paragraph 7.2.5); and,

**4.3.1.3.3.** Consequential items (i.e. time extensions, credits, logic, reasonableness, impacts, disruptions, dilution) for the change.

4.3.1.4. If additional time is claimed the following shall be provided with each and every claim:

4.3.1.4.1. The specific number of days and specific dates for which the additional time is sought;

4.3.1.4.2. The specific reasons, causes, and/or effects whereby the Contractor believes that additional time should be granted; and,

4.3.1.4.3. The Contractor shall provide analyses, documentation, and justification of its claim for additional time in accordance with the latest Critical Path Method Schedule in use at the time of event giving rise to the claim.

4.3.1.5. With each and every claim, the Contractor shall submit to the Owner a notarized statement containing the following language:

“Under penalty of law (including perjury and/or false/fraudulent claims against the State), the undersigned,

\_\_\_\_\_  
(Name) (Title)

Of \_\_\_\_\_  
(Company) (Date)

hereby certifies, warrants, and guarantees that this claim made for Work on this Contract is a true statement of the costs, adjustments and/or time sought and is fully documented and supported under the contract between the parties.

\_\_\_\_\_  
(Signature) (Date)”

**4.3.2. Continuing Contract Performance.**

Pending final resolution of a Claim except as otherwise agreed in writing or as provided in Paragraph 9.8 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents on the portion of the Work not involved in a Claim.

**4.3.3. Claims for Cost or Time for Concealed or Unknown Conditions.**

If conditions are encountered at the site which are: (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents; or, (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed.

4.3.3.1. The Contractor and Owner will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Owner determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Owner shall so notify the Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the date of the Owner's decision.

4.3.3.2. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in

the Contract Sum or Contract Time, the adjustment shall be subject to further proceedings pursuant to Paragraph 4.4.

**4.3.3.3.** Nothing in this paragraph shall relieve the Contractor of its obligation to adequately and sufficiently investigate, research, and examine the site, the site survey, topographical information, and the geotechnical information available whether included by reference or fully incorporated in the Contract Documents.

**4.3.4. Claims for Additional Cost.**

**4.3.4.1.** If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Article 10.

**4.3.4.2.** If the Contractor believes additional cost is involved for reasons including but not limited to: (1) a written interpretation from the Owner; (2) an order by the Owner to stop the Work solely for the Owner's convenience or where the Contractor was not at least partially at fault; (3) a written order for a minor change in the Work issued by the Owner; (4) failure of payment by the Owner per the terms of the Contract; (5) termination of the Contract by the Owner; or, (6) other reasonable grounds, Claim must be filed in accordance with this Paragraph 4.3.

**4.3.5. Claims for Additional Time**

**4.3.5.1.** If the Contractor wishes to make Claim for an increase in the Contract Time, written notice as specified in these General Conditions shall be provided along with the notarized certification. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay for the same event or cause only one Claim is necessary. However, separate and distinct written notice is required for each separate event.

**4.3.5.2. Weather Delays:**

**4.3.5.2.1.** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction activities.

**4.3.5.2.2.** Inclement or adverse weather shall not be a prima facie reason for the granting of an extension of time, and the Contractor shall make every effort to continue work under prevailing conditions. The Owner may grant an extension of time if an unavoidable delay occurs as a result of inclement/severe/adverse weather and such shall then be classified as a "Delay Day". Any and all delay days granted by the Owner are and shall be non-compensable in any manner or form. The Contractor shall comply with the notice requirements concerning instances of inclement/severe/adverse weather before the Owner will consider a time extension. Each day of inclement/severe/adverse weather shall be considered a separate instance or event and as such, shall be subject to the notice requirements.

**4.3.5.2.3.** An "inclement", "severe", or "adverse" weather delay day is defined as a day on which the Contractor is prevented by weather or conditions caused by weather resulting immediately there from, which directly impact the current controlling critical-path operation or operations, and which prevent the Contractor from proceeding with at least 75% of the normal labor and equipment force engaged on such critical path operation or operations for at least 60% of the total daily time being currently spent on the controlling operation or operations.

**4.3.5.2.4.** The Contractor shall consider normal/typical/seasonal weather days and conditions caused by normal/typical/seasonal weather days for the location of the Work in the planning and scheduling of the Work to ensure completion within the Contract Time. No time extensions will be granted for the Contractor's failure to consider and account for such weather days and conditions caused by such weather for the Contract Time in which the Work is to be accomplished.

**4.3.5.2.5.** A “normal”, “typical”, or “seasonal” weather day shall be defined as weather that can be reasonably anticipated to occur at the location of the Work for each particular month involved in the Contract Time. Each month involved shall not be considered individually as it relates to claims for additional time due to inclement/adverse/severe weather but shall consider the entire Contract Time as it compares to normal/typical/seasonal weather that is reasonably anticipated to occur. Normal/typical/seasonal weather days shall be based upon U.S. National Weather Service climatic data for the location of the Work or the nearest location where such data is available.

**4.3.5.2.6.** The Contractor is solely responsible to document, prepare and present all data and justification for claiming a weather delay day. Any and all claims for weather delay days shall be tied directly to the current critical-path operation or operations on the day of the instance or event which shall be delineated and described on the Critical-Path Schedule and shall be provided with any and all claims. The Contractor is solely responsible to indicate and document why the weather delay day(s) claimed are beyond those weather days which are reasonably anticipated to occur for the Contract Time. Incomplete or inaccurate claims, as determined by the Owner, may be returned without consideration or comment.

**4.3.5.3.** Where the Contractor is prevented from completing any part of the Work with specified durations or phases due to delay beyond the control of both the Owner and the Contractor, an extension of the contract time or phase duration in an equal amount to the time lost due to such delay shall be the Contractor’s sole and exclusive remedy for such delay.

**4.3.5.4.** Delays attributable to and/or within the control of subcontractors and suppliers are deemed to be within the control of the Contractor.

**4.3.5.5.** In no event shall the Owner be liable to the Contractor, any subcontractor, any supplier, Contractor’s surety, or any other person or organization, for damages or costs arising out of or resulting from: (1) delays caused by or within the control of the Contractor which include but are not limited to labor issues or labor strikes on the Project, federal, state, or local jurisdiction enforcement actions related directly to the Contractor’s Work (e.g. safety or code violations, etc.); or, (2) delays beyond the control of both parties including but not limited to fires, floods, earthquakes, abnormal weather conditions, acts of God, nationwide material shortages, pandemics, actions or inaction by utility owners, emergency declarations by federal, state, or local officials enacted in the immediate vicinity of the Project, or other contractors performing work for the Owner.

Notwithstanding any other provision(s) of this or any related agreement(s), if McKinstry’s work is delayed, disrupted, suspended, or otherwise impacted as a direct or indirect result of COVID-19 (coronavirus), including, but not limited to, by (1) disruptions to material and/or equipment supply; (2) illness of McKinstry’s workforce and/or unavailability of labor; (3) government quarantines, closures, or other mandates, restrictions, and/or directives; (4) owner or contractor restrictions and/or directives; and/or (5) fulfillment of McKinstry’s contractual or legal health and safety obligations associated with COVID-19; then, McKinstry shall be entitled to a reasonable equitable adjustment to its scope, schedule, duration, and price to account for such delays, disruptions, suspensions, and impacts.

#### **4.3.6. Claims for Consequential Damages**

**4.3.6.1.** The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

**4.3.6.1.1.** damages incurred by the Owner for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and,

**4.3.6.1.2.** damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, income, and for loss of profit.

**4.3.6.2.** This mutual waiver is applicable, without limitation, to all consequential damages due to either party’s termination in accordance with Article 14. Nothing contained in this waiver of consequential damages shall be deemed to preclude an award of liquidated or actual damages,

when applicable, in accordance with the requirements of the Contract Documents.

#### **4.4. RESOLUTION OF CLAIMS, DISPUTES, AND CONTROVERSIES**

**4.4.1.** Claims shall be referred initially to the Owner and/or Contractor for a decision. If a decision is not reached within ten (10) days of the receipt of the Claim, either party may take one or more of the following actions: (1) request additional supporting data from the claimant or a response with



supporting data from the other party; (2) reject the Claim in whole or in part; (3) approve the Claim; (4) suggest a compromise

**4.4.2.** If either party requests additional supporting data to be provided in support of the Claim, such party shall respond within ten (10) days after receipt of such request and shall provide a response on the requested supporting data, if no response is provided then the Claim is deemed rejected, unless a demand is made by either party to initiate mediation proceedings.

**4.4.3.** Upon receipt of a Claim against the Contractor or at any time thereafter, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**4.4.4.** A Claim subject to or related to liens or bonds shall be governed by applicable law regarding notices, filing deadlines, and resolution of such Claim prior to any resolution of such Claim by the either party, by mediation except for claims made by the Owner against the Contractor's bonds.

#### **4.5. MEDIATION**

**4.5.1.** Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Subparagraphs 4.3.6, 7.2.6, 7.3.8, 9.11.4 and 9.11.5 shall, after initial decision by the Owner or Contractor, or thirty (30) days after submission of the Claim, be subject to mediation as a condition precedent to the institution of legal or equitable proceedings by either party.

**4.5.2.** The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect and/or those rules specified in the contract documents or separately agreed upon between the parties. Construction Industry Mediation Rule M-2 (filing with AAA) is void. The parties shall mutually agree upon a mediator who shall then take the place of AAA in the Construction Industry Mediation Rules. The parties must mutually agree to use AAA and no filing of a request for mediation shall be made to AAA by either party until such mutual agreement has been made. Request for mediation shall be filed in writing with the other party to the Contract and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

**4.5.3.** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.



## **5. ARTICLE 5 – SUBCONTRACTORS**

### **5.1. DEFINITIONS**

**5.1.1.** A Subcontractor is a person or entity who has a direct or indirect contract at any tier or level with the Contractor or any Subcontractor to the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

### **5.2. CONTRACTOR'S OBLIGATIONS UNDER SUBCONTRACTS:**

**5.2.1.** No use of a Subcontractor or supplier shall relieve the Contractor of any of its obligations or liabilities under the Contract. Except as may expressly otherwise be provided in this Contract, the Contractor shall be fully responsible and liable for the acts or omissions of all Subcontractors and suppliers including persons directly or indirectly employed by them. The Contractor shall have sole responsibility for managing and coordinating the operations of its Subcontractors and suppliers, including the settlement of disputes with or between the Contractor and any such Subcontractor or supplier.

**5.2.2.** The Contractor shall include in each subcontract and require each Subcontractor to include in any lower tier subcontract, any provisions necessary to make all of the provisions of the Contract Documents, including the General Conditions and Contractor's Project and Phase schedule, fully effective as applied to Subcontractors. Contractor shall indemnify Owner for any additional cost based on a subcontractor claim which results from the failure of Contractor to incorporate the provisions of this Contract in each subcontract. The Contractor shall provide all necessary Plans, Specifications, Hazardous Materials reports and instructions to its suppliers and Subcontractors to enable them to properly perform their work.

**5.2.3.** Retainage from Subcontractors. Except with the Owner's prior approval, payments to Subcontractors shall be subject to retainage of no more than 5%.

**5.2.4.** Contractor shall comply, and require Subcontractor compliance with, State of Montana Department of Labor & Industries prevailing wage rates.

**5.2.5.** Work may be subcontracted on other than a low price basis, including without limitation, through competitive negotiation.

**5.2.6.** Contractor shall notify Owner in writing in advance before award of any proposed Subcontract. Owner reserves the right to disapprove any proposed Subcontractors, suppliers and Subcontract or supply contract awards, based on legal standards of responsibility. Owner shall not unreasonably disapprove any proposed Subcontractor or supplier and increased costs due to Owner's disapproval shall be cause for an increase in the Maximum Allowable Price.

**5.2.7.** Contractor's subcontracting records shall not be considered public records unless declared so by a court of competent jurisdiction, in which case the contractor or subcontractor shall be liable to the City for any attorney fees or costs imposed by a court of competent jurisdiction related to violations of state public records laws.

**5.2.8.** Protests. Contractor, acting as an independent contractor, shall be solely responsible for resolving procurement protests of Subcontractors and suppliers. Contractor shall indemnify, defend, protect and hold harmless Owner from and against any such procurement protests and resulting claims or litigation unless protest exists in whole or in part by the Owner's actions, directions, or negligence, who shall then share its proportionate responsibility for claims or litigation. Contractor shall act as an independent contractor, and not an agent of Owner, in connection with any procurement protest. The provisions of this Article are solely for the benefit of Owner, and do not grant any rights or remedies (including third party beneficiary rights) to any Offer or other protester, in connection with any procurement protest or claim.

**5.2.9.** Contractor, as soon as practicable after agreement of a Phase and not later than (30) days after Notice to Proceed, shall furnish in writing to the Owner the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Owner will promptly reply to the Contractor in writing stating whether or not the Owner, after due investigation, has reasonable objection to any such proposed person or entity.

**5.2.10.** The Contractor shall not contract with a proposed person or entity to which the Owner has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

**5.2.11.** If the Owner has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner has no reasonable objection.

**5.2.12.** The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner makes reasonable objection to such substitute.

### **5.3. GENERAL SUBCONTRACTING REQUIREMENTS**

**5.2.1** The Contractor shall comply with the laws of the State of Montana with regard to the procurement of subcontractors and suppliers.

### **5.4. SUBCONTRACTUAL RELATIONS**

**5.4.1.** By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner. Each subcontract agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement which may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub- subcontractors.

**5.4.2.** Upon written request by the Owner, the Contractor may require its subcontractors to provide to it performance and payment securities for their portion of the Work in the types and form defined in statute (18-2-201 and 18-2-203 MCA) for all sub-contractual agreements.

**5.4.3.** The Contractor shall prepare a Subcontractors' and Suppliers' chart in CSI division format acceptable to the Owner which lists by name, all contact information, job category, and responsibility the Contractor's Subcontractors (at all tiers or levels) and Suppliers with a pecuniary interest in the Project of greater than \$5,000.00, or in other such form agreed by the Owner. The Contractor shall not enter into any agreement with any subcontractor or supplier to which the Owner raises a timely objection. The Contractor shall promptly inform the Owner in writing of any proposed replacements, the reasons therefore, and the name and qualifications of any proposed replacements. The Owner shall have the right to reject any proposed replacements without cost or claim being made by the Contractor. The chart shall be provided to the Owner at the time of the pre-construction conference but no less than 30 days after award of the Contract.

**5.4.4.** All Contractors and Subcontractors to this contract must comply with all Montana Department of Labor and Industry requirements, regulations, rules, and statutes.

**5.4.5.** In compliance with state statutes, the Contractor will have the 1% Gross Receipts Tax withheld from all payments. Each "Public Contractor" includes all Subcontractors with contracts greater than \$5,000 each. The Contractor and all Subcontractors will withhold said 1% from payments made to all Subcontractors with contracts greater than \$5,000.00 and make it payable to the Montana Department of Revenue. The Contractor and all Subcontractors shall also submit documentation of all contracts greater than \$5,000.00 to the Montana Department of Revenue on the Department's prescribed form.

**5.4.6.** Construction Contractor Registration: All Subcontractors at any tier or level are required to be registered with the Department of Labor and Industry under 39-9-201 and 39-9-204 MCA prior to the Contract being executed by the Owner. Subcontractors shall demonstrate to the Contractor that it has registered or promises that it will register immediately upon notice of award and prior to the commencement of any work.

## **6. ARTICLE 6 – CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **6.1. OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS**

**6.1.1.** Notwithstanding the terms of the Master Energy Performance Contract and Utility and Cost Savings Guarantee, the Owner reserves the right to perform construction or operations in conjunction with and not in conflict with the Project(s) with the Owner's own forces, and to award separate contracts for other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation, provided only that such work will not materially affect the Utility and Cost Savings Guarantee, and that the Contractor approves in writing to such work. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim or move to mediation or arbitration as provided in Paragraph 4.3.

**6.1.2.** If separate contracts are awarded for different portions of the Phase or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

**6.1.3.** The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

**6.1.4.** Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

### **6.2. MUTUAL RESPONSIBILITY**

**6.2.1.** The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

**6.2.2.** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Owner apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's

completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

**6.2.3.** The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a separate contractor because of delays, improperly timed activities or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, and damage to the Work or defective construction of a separate contractor. The Owner shall be responsible for costs incurred payable to a separate Contractor if Work is in addition to Work to be performed under the terms of this Contract, and it shall not be subject to the limits of the Guaranteed Cost of Work.

**6.2.4.** The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in Subparagraph 10.2.5.

**6.2.5.** The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Paragraph 3.14.

### **6.3. OWNER'S RIGHT TO CLEAN UP**

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and will charge the Contractor for direct costs associated with such clean up, on an open book basis. Such costs are in addition to the Maximum Allowable Phase Cost.

## **7. ARTICLE 7 – CHANGES IN THE WORK**

### **7.1. GENERAL**

**7.1.1.** Notwithstanding the Cost Savings Guarantee and Maximum Allowable Phase Cost for the Work, Changes in the Work may be accomplished, in accordance with the Contract, after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive, or order for a minor change in the Work subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. Minor changes as ordered by the Owner has the definition provided in Paragraph 7.4

**7.1.2.** A Change Order shall be based upon agreement among the Owner and Contractor; and may or may not be agreed to by the Contractor; an order for a minor change in the Work and a Construction Change Directive may be issued by the Owner alone.

**7.1.3.** Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

**7.1.4.** No act, omission, or course of dealing, shall alter the requirement that Change Orders or Construction Change Directives shall be in writing and signed by the Owner, and that Change Orders and Construction Change Directives are the exclusive method for effecting any adjustment to the Contract. The Contractor understands and agrees that neither the Contract Sum nor the Contract Time can be changed by implication, oral agreement, verbal directive, or unsigned Change Order.

### **7.2. CHANGE ORDERS**

**7.2.1.** A Change Order is a written instrument prepared by the Contractor or the Owner and signed by the Contractor and the Owner, stating their agreement upon all of the following:

- 7.2.1.1.** change in the Work;
- 7.2.1.2.** the amount of the adjustment, if any, in the Contract Sum; and,
- 7.2.1.3.** the extent of the adjustment, if any, in the Contract Time.



**7.2.2.** The cost or credit to the Owner resulting from a change in the Work shall be determined as follows:

**7.2.2.1.** Per the limitations of this Subparagraph, plus the overhead and profit mark-up structure indicated in the proposal for each phase, as the original basis for pricing Change Orders for the Phase. If either party believes that the scale and/or scope of the Change Order is not properly reflected in the pricing in the proposal, then the parties will negotiate a mutually agreed upon mark-up for the specific Change Order or Construction Change Directive; or

**7.2.2.2.** By one of the methods in Subparagraph 7.3.4., or as determined by the Owner per Subparagraph 7.3.9, plus the overhead and profit mark-up per Subparagraph 7.2.2.1; and

**7.2.2.3.** In accordance with the Master Energy Performance Contract and Investment Grade Audit Report, Contractor's costs may include Professional Services costs, Construction Administration costs, Measurement and Verification (M & V) and Annual Services as identified in Schedule D Master Energy Performance Contract, as appropriate and directly related to the scale and/or scope of the Change Order, and.

**7.2.2.4.** The Contractor's proposed increase or decrease in cost shall be limited to costs listed in Subparagraph 7.3.9.1 through 7.3.9.5.

**7.2.3.** The Contractor shall not submit any Change Order, response to requested cost proposals, or requested changes which are incomplete and do not contain full breakdown and supporting documentation in the following three areas:

**7.2.3.1.** Itemized Direct costs (only those listed in Subparagraph 7.3.9.1 through 7.3.9.5 are allowable);

**7.2.3.2.** Itemized Indirect costs (limited as a percentage on each Change Order per Subparagraph 7.2.2); and

**7.2.3.3.** Itemized Consequential items (e.g. time extensions, credits, logic, reasonableness, impacts, disruptions, dilution).

**7.2.3.4.** The Contractor shall provide a complete description summarizing all work involved.

**7.2.4.** Any Change Order, responses to requested proposals, or requested changes submitted by the Contractor which, in the opinion of the Owner, are incomplete, may be rejected and returned to the Contractor without comment. It is the responsibility of and incumbent upon the Contractor to ensure and confirm that all Change Orders, responses to requested proposals, or requested changes are complete prior to submission.

**7.2.5.** Overhead, applicable to all areas and sections of the Contract Documents, means "Indirect Costs" as referenced in Subparagraph 7.2.3.2. Indirect costs are inclusive of, but not limited to, the following: home office overhead; off-site supervision; home office project management; change order and/or proposal preparation, research, negotiation and associated travel; effects of disruption and dilution of management and supervision off-site; time delays; coordination of trades; postage and shipping; and, effective increase in guarantee and warranty durations. Indirect costs applicable to any and all changes in the work, either through Change Order or Construction Change Directive, are limited to the percentage allowance for overhead in Subparagraph 7.2.2.

**7.2.6.** By signature on any Change Order, the Contractor certifies that the signed Change Order is complete and includes all direct costs, indirect costs and consequential items (including additional time, if any) and is free and clear of all claims or disputes (including, but not limited to, claims for additional costs, additional time, disruptions, and/or impacts) in favor of the Contractor, subcontractors, material suppliers, or other persons or entities concerning the signed change order and on all previously contracted Work and does release the Owner from such claims or demands.

**7.2.7.** Any and all changes or adjustments to the Contract Time requested or claimed by the Contractor as a result of a Change Order shall require documentation and justification for the

adjustment by a Critical Path Method analysis of the Contractor's most recent Critical Path Schedule in use prior to the change. Changes which affect or concern activities containing float or slack time (i.e. not on the critical path) and which can be accomplished within such float or slack time shall not result in an increase in the Contract Time.

**7.2.8.** Supervision generally means on-site, field supervision and not home office overhead, off-site management or off-site supervision. Home office supervision shall be considered only as it directly relates to project specific personnel and where no Project office is separately provided, if agreed by the parties in accordance with Article 3 of this Contract.

**7.2.9.** Labor means those persons engaged in construction occupations as defined in Montana Prevailing Wage Rates for Building Construction or Heavy/Highway as bound in the Contract Documents and does not include design, engineering, superintendence, management, on-site field supervision, home office or other off-site management, off-site supervision, office or clerical work.

### **7.3. CONSTRUCTION CHANGE DIRECTIVES**

**7.3.1.** A Construction Change Directive is a written order prepared by the Owner directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

**7.3.2.** Any and all changes or adjustments to the Contract Time requested or claimed by the Contractor as a result of a Construction Change Directive, shall require documentation and justification for the adjustment by a Critical Path Method analysis of the Contractor's most recent Critical Path Schedule in use prior to the change. Changes that affect or concern activities containing float or slack time (i.e. not on the critical path) and which can be accomplished within such float or slack time shall not result in an increase in the Contract Time.

**7.3.3.** A Construction Change Directive shall be used in the absence of agreement on the terms of a Change Order.

**7.3.4.** If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

**7.3.4.1.** mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

**7.3.4.2.** unit prices stated in the Contract Documents or subsequently agreed upon;

**7.3.4.3.** cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee;

**7.3.4.4.** By actual cost as shown by the Contractor's and Subcontractor's itemized invoices; or

**7.3.4.5.** as provided in Subparagraph 7.3.9.

**7.3.5.** Costs shall be limited to the following: cost of materials, including cost of delivery; cost of labor, including social security, old age and unemployment insurance and fringe benefits under collective bargaining agreements; workers' compensation insurance; bond premiums; and rental value of power tools and equipment.

**7.3.6.** Overhead and profit allowances shall be limited on all Construction Change Directives to those identified in 7.2.2.

**7.3.7.** Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Owner of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

**7.3.8.** A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

**7.3.9.** If the Contractor does not respond or disagrees with the method for adjustment in the Contract Sum in writing within seven (7) calendar days, the method and the adjustment made shall be determined by the Owner on the basis of reasonable expenditures and/or savings of those performing the Work directly attributable to the change including, in the case of an increase in the Contract Sum, plus an allowance for overhead and profit as listed under Subparagraph 7.2.2. In such case, and also under Clause 7.3.4.3, the Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Subparagraph 7.3.9 shall be limited to the following:

**7.3.9.1.** costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance as determined by the Prevailing Wage Schedules referenced in the Contract Documents;

**7.3.9.2.** costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

**7.3.9.3.** rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

**7.3.9.4.** costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

**7.3.9.5.** additional costs for design, construction administration and costs of additional field supervision and field office personnel directly attributable to the change.

**7.3.10.** The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Owner. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

**7.3.11.** Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Owner will make an interim determination for purposes of monthly certification for payment for those costs. That determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a claim in accordance with Article 4.3.

**7.3.12.** When the Owner and Contractor reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

#### **7.4. MINOR CHANGES IN THE WORK**

The Owner will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly or within thirty (30) days, or as agreed between the parties.

### **8. ARTICLE 8 – TIME**

#### **8.1. DEFINITIONS**

**8.1.1.** Time is of the essence in performance, coordination, and completion of the Work contemplated herein. The Owner may suffer damages if the Work is not completed as specified herein. When any

duration or time period is referred to in the Contract Documents by days, the first day shall be determined as the day following the current day of any event or notice starting a specified duration.

**8.1.2.** Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

**8.1.3.** The date of commencement of the Work is the date established in the NOTICE TO PROCEED AS ISSUED BY THE OWNER.

**8.1.4.** The date the Contractor reaches Project Substantial Completion is the date certified by the Owner in accordance with Paragraph 9.9.

**8.1.5.** The term "day" as used in the Contract Documents shall mean **calendar day** unless otherwise specifically defined.

**8.1.6.** Liquidated Damages. The Owner will suffer loss if the project is not substantially complete on the date set forth in the contract documents. The Contractor and his surety shall be liable for and shall pay to the Owner the sums detailed in the proposal for each phase hereinafter stipulated as liquidated damages for each calendar day of delay until the work is substantially complete.

**8.1.7.** The Contractor shall not be charged actual damages when delay in completion of the Work is due to:

**8.1.7.1.** Any preference, priority or allocation order issued by the government;

**8.1.7.2.** Unforeseeable cause beyond the control and without the fault or negligence of the Contractor, such as acts of God or of the public enemy, fires, floods, epidemics, quarantine restrictions, freight embargoes, and unusually severe weather. All such occurrences resulting in delay must be documented and approved by Change Order.

**8.1.7.3.** Any delays of Subcontractors or suppliers occasioned by any of the causes specified in 8.1.7.1 and 8.1.7.2 of this article.

**8.1.7.4.** The Contractor is completely obligated and responsible to provide written notice of each day of delay as provided for in Paragraph 4.3.

**8.1.8.** **Contract Time.** All work shall reach Substantial Completion as defined in the Phase Installation Schedules included in the proposal for each phase.

**8.1.8.1.** The Owner will issue a written Notice to Proceed on satisfactory receipt of the signed Contract and all required bonds, insurance and other required submittals. Work commenced before receipt of the Notice to Proceed will be entirely at the Contractor's risk.

## **8.2. PROGRESS AND COMPLETION**

**8.2.1.** Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Contract the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

**8.2.2.** The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the date on the Notice to Proceed and in no case prior to the effective date of insurance required by Article 11 to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance.

**8.2.3.** The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

**8.2.4.** If the Contractor falls behind the latest construction schedule by more than 14 calendar days through its own actions or inaction, neglect, inexperience, lack of oversight or management of the Work including that of any Subcontractors, written notice to the Owner shall be provided within three (3) days with explanation of how the Contractor intends to get back on schedule. Response to getting back on schedule consists of providing a sufficient number of qualified workers and/or proper materials or an acceptably reorganized schedule to regain the lost time in a manner acceptable to the Owner.

### **8.3. DELAYS AND EXTENSIONS OF TIME**

**8.3.1.** If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or by a separate contractor employed by the Owner, or by changes ordered in the Work, or by fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending mediation and arbitration, or by other causes which the Owner determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Owner may determine.

**8.3.2.** Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.3.

**8.3.3.** This Paragraph 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

**8.3.4.** By the act of signing the Contract, the Contractor signifies that he/she and all subcontractors can perform the work within the stated schedule and that subcontractors, manufacturers, and suppliers, are known to be able to support the schedule. Time extension may be granted for unforeseen conditions or events out of the Contractor's control causing delay in delivery of materials or causing delay in the Contractor's ability to perform the work within the Contract Documents. The Contractor is expected to take all possible measures and bear all reasonable costs in order to anticipate, control, counteract, and expedite such delay-causing conditions, including finding alternative sources of materials, equipment, shipping, and labor. Notification of any claim for schedule delay must be made in writing to the Owner within seven (7) days of the causing event or of first knowledge of a known delay causing condition with supporting documentation as required by the Owner. The Owner will respond in writing within one week to claims of delay. No claims of delay will be entertained after the date of completion as stated on the Notice to Proceed or as extended by previously approved delay claims.

## **9. PAYMENTS AND COMPLETION**

### **9.1. CONTRACT SUM**

The Contract Sum is defined herein and stated in the Contract and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

### **9.2. CONTRACT SUM RECONCILIATION AND MAXIMUM ALLOWABLE PHASE COST**

**9.2.1.** The Contract Sum is the Maximum Allowable Phase Cost and is guaranteed not to exceed by the Contractor, unless it is adjusted by an Owner instructed modification resulting in a Change Order or Construction Change Directive, or Change Order or Construction Change Directive as a result of concealed or unknown conditions, and in accordance with Contract.

**9.2.2.** The Maximum Allowable Phase Cost shall include:

**9.2.2.1.** Professional design services as defined in Article 7.

**9.2.2.2.** Construction administration services as defined in Article 7.

**9.2.2.3.** Labor, material, supplies, subcontracted services, and equipment and transportation thereof, associated with the construction and installation of the Equipment, and as defined within the Contract Documents.

**9.2.2.4.** Indirect and Direct costs as defined in Article 7.

**9.2.2.5.** Costs associated with Measurement and Verification (M & V) services and Annual Services if agreed by Owner.

**9.2.2.6.** Additional Owner instructed costs agreed as a Contract modification by Change Order or Construction Change Directive in accordance with this Contract.

**9.2.3.** The Maximum Allowable Phase Cost does not include Owner Contingency, and costs associated with Owner's expenses.

**9.2.4. RECONCILIATION.** At Final Phase Completion or at any time mutually agreed between the Owner and the Contractor, Contractor and Owner shall undertake a reconciliation of the actual Indirect and Direct Phase costs incurred on an open book basis in accordance with the terms of the Master Energy Performance Contract. If Phase costs at Reconciliation and/or Completion exceed the aggregated estimated amounts listed in the Schedule of Values as part of the sum of the Maximum Allowable Phase Cost and Contract adjustments for each Phase in accordance with Section 3.7.4 of the Master Energy Performance Contract, the additional costs will be borne by the Contractor. If Phase costs at Completion are less than the aggregated estimated amounts listed in the Schedule of Values as part of the sum of the Maximum Allowable Phase Cost and Contract adjustments, the savings will be refunded to the Owner in accordance with the Master Energy Performance Contract. The Owner may choose to carry out additional Work by contract modification at this time.

**9.2.4.1.** Professional design services, construction administration services, Measurement and Verification services and any additional Annual Services as agreed in the proposal for each phase are not subject to Reconciliation.

### **9.3. SCHEDULE OF VALUES**

Before the first Application for Payment, the Contractor shall submit to the Owner a Schedule of Values allocated to various portions of the Work and/or Projects, or as agreed by the Owner, prepared in such form and supported by such data to substantiate its accuracy as the Owner may require. This schedule shall be used as a basis for reviewing the Contractor's Applications for Payment.

### **9.4. APPLICATIONS FOR PAYMENT**

**9.4.1.** The Contractor shall submit to the Owner an itemized monthly Application for Payment for operations completed on a percentage complete basis in accordance with the Schedule of Values. Such application shall be signed and supported by such data substantiating the Contractor's right to payment as the Owner may reasonably require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage if provided for in the Contract Documents.

**9.4.2.** Per Title 28, Chapter 2, Part 2103, the Owner shall approve the Contractor's payment request within twenty-one (21) calendar days after it is received by the Owner, unless any portion of the request is disapproved by the Owner in accordance with this Contract.

**9.4.3.** As provided in Subparagraph 7.3.11, such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives, or by interim determinations of the Owner, but not yet included in Change Orders.

**9.4.4.** Applications for payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier.

**9.4.5.** Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the



Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

**9.4.6.** The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

**9.4.7.** Until the work is complete, the Owner will pay 95% of the amount due the Contractor on account of progress payments.

**9.4.7.1.** If the Work and its progress are not in accordance with all or any part, piece, or portion of the Contract Documents, the Owner may, at its sole discretion and without claim by the Contractor, increase the amount held as retainage to whatever level deemed necessary to effectuate performance and progress of the Work, for anticipated repairs, warranties or completion of the Work by the Contractor or through the letting of other contracts. The Contractor will not be entitled to additional costs, expenses, fees, time, and such like, in the event the Owner increases the amount held as retainage due to non-compliance and/or non-performance with all or any part, piece, or portion of the Contract Documents.

**9.4.7.2.** Prior to the first application for payment, the Contractor shall submit the following information on the appropriate forms:

**9.4.7.2.1.** Schedule of Values (Form 100 or other Form agreed with the Owner): This form shall contain a breakdown of the labor, material and other costs associated with the various portions of the work and shall be the basis for the progress payments to the Contractor.

**9.4.7.2.2.** Project/Phase Progress Schedule: If no Schedule (or revised Schedule) is provided with each and every Periodic Estimates for Partial Payment, the Owner may return the pay request, or hold it, and may choose not pay for any portion of the Work until the appropriate Schedule, indicating all changes, revisions and updates, is provided. No claim for additional costs or interests will be made by the Contractor or any subcontractor on account of holding or non-payment of the Periodic Estimate for Partial Payment request.

**9.4.7.2.3.** List of Subcontractors: The Contractor shall list all subcontractors undertaking Work in excess of \$5,000.

**9.4.7.3.** **Progress Payments.** The Contractor may submit application for progress payments on the Periodic Estimate for Partial Payment (Form 101 or other such form agreed by the Owner, in accordance with paragraph 9.7.

**9.4.7.4.** The Contractor may submit obligations/securities in a form specified in 18-1-301 Montana Code Annotated (MCA) to be held by a Financial Institution in lieu of retainage by the Owner. The Owner will establish the amount that would otherwise be held as retainage. Should the Contractor choose to submit obligations/securities in lieu of retainage, the Owner will require the Financial Institution to execute the Owner's "Account Agreement for Deposit of Obligations Other Than Retainage" (Form 120) prior to submission of any obligations/securities in accordance with 18-1-302 MCA. The Contractor must extend the opportunity to participate in all obligations/securities in lieu of retainage on a pro rata basis to all subcontractors involved in the Project(s) and shall be solely responsible for the management and administration of same. The Owner assumes no liability or responsibility from or to the Contractor or Subcontractors regarding the latter's participation.

9.4.7.5. The Contractor shall maintain a monthly billing cycle.

9.5. Paragraph deleted

9.6. DECISIONS TO WITHHOLD PAYMENT

9.6.1. The Owner may withhold or reject an application for payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Owner's opinion the Contractor has not performed the Work in accordance with the Contract Documents, and/or as defined herein. If the Contractor and Owner cannot agree on a revised amount, the Owner will promptly issue a revised application for payment for the amount for which the Owner approves. The Owner may also withhold an application for payment or, because of subsequently discovered evidence, may nullify the whole or a part of an application for payment previously issued, to such extent as may be necessary in the Owner's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Subparagraph 3.3.5, because of:

9.6.1.1. Contractor's failure to correct defective or damaged Work;

9.6.1.2. third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

9.6.1.3. failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

9.6.1.4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

9.6.1.5. damage to the Owner or another contractor, including its subcontractors and suppliers;

9.6.1.6. reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or,

9.6.1.7. persistent failure to carry out the Work or obligations to the Owner in accordance with the Contract Documents.

9.6.1.8. Contractor's failure to accurately represent the Work performed in the payrequest;

9.6.1.9. inclusion in the pay request of any amounts in dispute or part of a claim;

9.6.1.10.

9.6.2. When the above reasons for withholding payment are removed, payment shall be made for amounts previously withheld.

9.7. PROGRESS PAYMENTS

9.7.1. After the Owner has approved an application for payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents or the Owner may take any action the Owner deems necessary under Paragraph 9.6.

9.7.1.1. Progress payments or Periodic Estimates for Partial Payment shall be on a form provided by the Owner (Form 101 or other alternative form as agreed by the Owner) and submitted to the Owner. Payment shall be requested for the labor and material incorporated in the work to date and for materials suitably stored, less the aggregate of previous payments, the retainage, and the 1% Gross Receipts Tax.

9.7.1.2. The Contractor, by submission of any partial pay request, certifies that every request for partial payment is correct, true and just in all respects and that payment or credit had not previously been received. The Contractor further warrants and certifies, by submission of any partial pay request, that all previous work for which payment has been received is free and clear of

all liens, disputes, claims, security interests, encumbrances, or causes of action of any type or kind in favor of the Contractor, subcontractors, material suppliers or other persons or entities and does release the Owner from such.

**9.7.1.3.** Progress payments do not constitute official acceptance of any portion of the work or materials whether stored on or off-site.

**9.7.1.4.** In compliance with 15-50-206 MCA, the Contractor will have 1% of his gross receipts withheld by the Owner from all payments due. Each subcontractor who performs work greater than \$5,000 shall have 1% of its gross receipts withheld by the Contractor. The Contractor shall notify the Department of Revenue on the department's prescribed forms.

**9.7.2.** The Contractor shall promptly pay each Subcontractor in accordance with Title 28, Chapter 1, Part 21, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

**9.7.3.** The Contractor is prohibited from holding higher amounts in retainage on any Subcontractor than the Owner is holding from the Contractor.

**9.7.4.** The Owner will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner on account of portions of the Work done by such Subcontractor.

**9.7.5.** Owner shall have an obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

**9.7.6.** Payment to material suppliers shall be treated in a manner similar to that provided in Subparagraphs 9.7.2 through 9.7.5.

**9.7.7.** A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project Site(s) by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

**9.7.8.** Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

**9.7.9.** Progress payments may include the appropriate percentage of professional services, construction administration services and Energy Performance Contractor fee relative to Project(s) progress and actual Work completed.

## **9.8. FAILURE OF PAYMENT**

If the Owner does not approve payment to the Contractor within thirty-five (35) calendar days after the receipt of a certified Application for Payment, then the Contractor may, upon seven additional days' written notice to the Owner, suspend the Work until payment of the amount owing has been received. Nothing in the Paragraph shall limit the Owner's rights and options as provided in Paragraph 9.6. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

## **9.9. SUBSTANTIAL COMPLETION**

**9.9.1.** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**9.9.2.** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Owner a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**9.9.3.** Upon receipt of the Contractor's list, the Owner will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Owner's Inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Owner. In such case, the Contractor shall then submit a request for another inspection by the Owner to determine Substantial Completion.

**9.9.4.** The Contractor shall ensure the Project(s) is substantially complete prior to requesting any inspection by the Owner so that no more than one (1) inspection is necessary to determine Substantial Completion for all or any portion of the Work. If the Contractor does not perform adequate inspections to develop a comprehensive list as required in Subparagraph 9.9.2 and does not complete or correct such items upon discovery or notification, the Contractor shall be responsible and pay for the costs of the Owner's additional inspections to determine Substantial Completion.

**9.9.5.** Prior to the inspection, the Contractor shall fully complete the final clean-up of the Project Site(s) which, unless otherwise stated in the Contract Documents, shall consist of:

**9.9.5.1.** Removal of all debris and waste. All construction debris and waste shall be removed from the campus grounds. Use of the City of Missoula trash containers will not be permitted.

**9.9.5.2.** Removal of all stains, smears, marks of any kind from surfaces including existing surfaces if said damage is the result of the work.

**9.9.5.3.** Removal of all temporary structures and barricades.

**9.9.6.** When the Work or designated portion thereof is substantially complete, the Owner will prepare a Certificate of Substantial Completion or partial Completion which shall establish the date of Substantial Completion and which shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance. After issuance of the Certificate of Substantial Completion, the Contractor shall finish and complete all remaining items within thirty (30) calendar days of the date on the Certificate. The Owner shall identify and fix the time for completion of specific items which may be excluded from the thirty (30) calendar day time limit. Failure to complete any items within the specified time frames may be deemed by the Owner as default of the contract on the part of the Contractor.

**9.9.7.** The Certificate of Substantial Completion shall be submitted to the Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety if there are claims or past payment issues, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

## **9.10. PARTIAL OCCUPANCY OR USE**

**9.10.1.** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities

assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Owner as provided under Subparagraph 9.9.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by mediation or arbitration.

**9.10.2.** Immediately prior to such partial occupancy or use, the Owner and Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

**9.10.3.** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

## **9.11. FINAL COMPLETION AND FINAL PAYMENT**

**9.11.1.** Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner will promptly make such inspection and, when the Owner finds the Work acceptable under the Contract Documents and the Contract fully performed, the Owner will approve the Contractor's final Certificate for Payment.

**9.11.2.** Neither final payment nor any remaining retainage shall become due until the Contractor submits to the Owner:

**9.11.2.1.** completed Contractor's Affidavit of Completion, Payment of Debts and Claims and Release of Liens (Form 106) that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied;

**9.11.2.2.** a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner;

**9.11.2.3.** a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents

**9.11.2.4.** Consent of Surety to make final payment (Form 103) for contracts greater than or equal to \$50,000; and,

**9.11.2.5.** if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner.

**9.11.3.** The Contractor and his surety accepts and assumes responsibility, liability, and costs for and agrees to defend and hold harmless the Owner for and against any and all actions as a result of the Owner making final payment.

**9.11.4.** By submitting any Application for Payment to the Owner, the Contractor and his surety certify and declare that all bills for materials, supplies, utilities and for all other things furnished or caused to be furnished by the Contractor and all Subcontractors and used in the execution of the Contract will be fully paid upon receipt of Final Payment and that there are no unpaid obligations, liens, claims, security interests, encumbrances, liabilities and/or demands of State Agencies, subcontractors, suppliers, mechanics, laborers or any others resulting from or arising out of any work done, caused to be done or ordered to be done by the Contractor under the contract.

**9.11.5.** In consideration of the prior payments and the final payment made and all payments made for authorized changes, the Contractor releases and forever discharges the Owner from any and all obligations, liens, claims, security interests, encumbrances and/or liabilities arising by virtue of the contract and authorized changes between the parties, either verbal or in writing, and any and all claims and demands of every kind and character whatsoever against the Owner, arising out of or in any way relating to the contract and authorized changes.

**9.11.6.** The date of Final Payment by the Owner shall constitute Final Acceptance of the Work. The determining date for the expiration of the warranty period shall be as specified in Paragraphs 3.5 and 12.2.2.

**9.11.7.** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, the Owner shall, upon application by the Contractor, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Owner. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

**9.11.8.** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:

**9.11.8.1.** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

**9.11.8.2.** failure of the Work to comply with the requirements of the Contract Documents; or,

**9.11.8.3.** terms of special warranties required by the Contract Documents.

**9.11.9.** Acceptance of final payment by the Contractor, a Subcontractor, or material supplier, shall constitute a waiver of any and all obligations, liens, claims, security interests, encumbrances and/or liabilities against the Owner except those previously made in writing per the requirements of Paragraph 4.3 and as yet unsettled at the time of submission of the final Application for Payment.

**9.11.10.** The Owner's issuance of Final Payment does not constitute a waiver or release of any kind regarding any past, current, or future claim the Owner may have against the Contractor and/or the surety.

**9.11.11.** In accordance with the Contract Documents, an interim Final Project Acceptance Certificate may be issued for a Project(s) prior to Final Acceptance being issued on the entire Phase. An interim Project Final Acceptance does not constitute a Final payment in accordance with this Paragraph 9.11.

## **10. ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY**

### **10.1. SAFETY PRECAUTIONS AND PROGRAMS**

**10.1.1.** The Contractor shall be responsible for initiating, maintaining and supervising all safety, safety precautions, and safety programs in connection with the performance of the Contract.

**10.1.2.** Contractor represents and warrants to Owner that it knows and understands all requirements of federal, state and local safety statutes, rules, and regulations (Laws), and all other governing bodies and the safety provisions of all applicable codes as such requirements and provisions relate to work to be completed under this Contract and agrees to be bound by such. Contractor agrees to comply with all such provisions and requirements and to perform work under this contract in a safe manner with the highest regard for safety of his employees and all other individuals at the work site. Contractor further agrees to maintain his tools, equipment, and moving vehicles in a safe operating condition and take all



other actions necessary to provide a safe working environment for performance of work required under this contract. Material data safety sheets are to be kept on site by the contractor and available at all times.

**10.1.3.** Safety shall be a prime concern at all times for the Contractor and for all Consultants and Subcontractors (at any tier or level). The Contractor shall be solely responsible for and have control over the means, methods, techniques, sequences and procedures for coordinating and constructing the Work, including all site safety, safety precautions, safety programs, and safety compliance with OSHA and all other governing bodies.

**10.1.4.** The Contractor agrees to and accepts all responsibility for safety throughout the duration of the Work. The Contractor agrees that the Owner is not and cannot be held liable for, identifying safety violations or hazardous conditions. The Contractor agrees that it will defend, protect, indemnify and hold harmless the Owner against and from all claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys' fees), and losses from any cause whatsoever with regard to injuries, accidents, lawsuits, claims, actions, losses, costs, damages of any kind, including the Owner's legal expenses, arising out of, in connection with, or incidental to the Contract.

## **10.2.        SAFETY OF PERSONS AND PROPERTY**

**10.2.1.** The Contractor shall take precautions for safety of, and shall provide protection to prevent damage, injury or loss to:

**10.2.1.1.** employees on the Work and other persons who may be affected thereby;

**10.2.1.2.** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and,

**10.2.1.3.** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

**10.2.2.** The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

**10.2.3.** The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, and as approved by Owner, safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities. The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient flasher lights, flagmen, danger signals, and signs, and shall take all necessary precautions for the protection of the work and the safety of the public.

**10.2.3.1.** The Contractor recognizes that the Work will be conducted in and around buildings and areas that are occupied and will continue to function for the purposes of the City of Missoula. The Contractor shall conduct a Project safety meeting prior to the start of the Work, with the Owner's Representative and all others that the Owner's Representative deems necessary. The purpose of the meeting shall be to produce Project specific rules and guidelines pertaining to but not restricted to: safety of persons in and around the area of the Work including type and location of fencing, guards, signage, etc.; closing of existing campus circulation routes and designation of alternate routes, including creation of temporary routes of access as required; creation and location of temporary signage as required to maintain accessible routes for disability access to and around the site of the Work. The Contractor shall be solely responsible for implementing all required means and methods for site safety and security that maybe agreed upon in this meeting.

**10.2.3.2.** Contractor shall notify Owner in advance any time his operations will disrupt use of and access to existing accessible routes. Contractor is solely responsible for maintaining existing accessible routes in the area of the Project with the exception of temporary interruptions lasting

one day or less. Contractor is responsible for erecting signage identifying temporary re-routing of accessible routes. Such re-routing shall be coordinated with Owner in advance.

**10.2.4.** The Contractor shall notify the Owner if use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, and the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

**10.2.5.** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.

**10.2.6.** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner.

**10.2.7.** The Contractor shall not encumber or load or permit any part of the construction site to be encumbered or loaded so as to endanger the safety of any person(s).

### **10.3. HAZARDOUS MATERIALS AND/OR SUBSTANCES**

**10.3.1.** "Hazardous Materials/Substances" means any substance: (a) the presence of which requires investigation, or remediation under any federal, state or local statute, rule, regulation, ordinance, order, policy or common law; (b) that is or becomes defined as "hazardous waste," "hazardous substance," pollutant, or contaminant under any federal, state or local statute, rule, regulation, or ordinance or amendments thereto; (c) that is toxic, explosive, corrosive flammable, or otherwise hazardous and is or becomes regulated by any government authority, agency, board, commission or instrumentality of the United States, the state of Montana or any political subdivision thereof; (d) gasoline, diesel fuel or other petroleum hydrocarbons; (e) containing contains polychlorinated biphenyls (PCBs) or asbestos; or (f) the presence of which causes or threatens to cause a nuisance or trespass on the work site or adjacent property.

**10.3.2.** The Contractor is solely responsible for all compliance with all regulations, requirements, and procedures governing Hazardous Materials/Substances at the Work Site or that Contractor brings on the site. The Contractor is solely responsible for remediation, costs, damages, loss, and/or expenses for all Hazardous Materials/Substances brought to the site.

**10.3.3.** If the Contractor encounters Hazardous Materials/Substances during the course of the Work, whether or not identified in the Contract Documents Work, the Contractor agrees that:

**10.3.3.1.** Encountering any Hazardous Materials/Substances during performance of the Work does not necessarily mean a change in conditions has occurred nor is it evidence that the Contractor is due additional Contract Time or an increase in the Maximum Allowable Phase Cost. If encountering Hazardous Materials/Substances is determined to be a change in conditions to the Contract Documents, and Article 7 applies in determining any additional compensation or extension of time claimed by the Contractor.

**10.3.3.2.** The Contractor is solely responsible for securing the Work in accordance with this Article 10 involving any Hazardous Materials/Substances against unlawful, unregulated, or improper intrusion, disturbance, or removal. The Contractor shall implement protections and take protective actions throughout the performance of the Work to prevent exposure to workers, occupants, and contamination of the site or area.

**10.3.3.3.** If the Contractor is unable to or fails to properly secure the Work against unlawful, unregulated, or improper intrusion, disturbance, or removal of Hazardous Materials/Substances, the Contractor shall immediately implement protections and take protective actions, up to and including stopping Work in the area or on the item affected, to prevent exposure to workers, occupants, and contamination of the site or area. The Contractor shall immediately notify the Owner in writing giving details of the failure and the corrective actions taken. If the condition is an emergency and notice cannot be provided in writing, then Contractor shall orally and immediately notify the Owner of the condition followed by a full written explanation. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss.

**10.3.3.4.** If the Contractor notifies the Owner and takes precautions in accordance with this Article 10 upon encountering materials/substances suspected of containing asbestos or polychlorinated biphenyls that are unidentified in the Contract Documents, the Owner shall verify if the unidentified material or substance contains asbestos or polychlorinated biphenyls and shall arrange for the removal or other measures as necessary to allow the Contractor to proceed with the Work. In accordance with the provisions of the Master Energy Performance Contract, the Owner may request, and if the Contractor agrees, for the Contractor to arrange directly for verification of and the removal of the materials or other measures necessary in order to expedite the Work in a timely and efficient manner. The Contract Time may be extended as appropriate if the Work affected is on the critical path and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs as provided in Article 7. Should the Contractor fail to notify the Owner upon encountering asbestos, polychlorinated biphenyls, or materials/substances suspected of containing asbestos or polychlorinated biphenyls, that are unidentified in the Contract Documents, the Contractor is solely responsible for all mitigation in accordance with Article 10.

**10.3.4.** The Contractor shall indemnify, hold harmless, and defend the Owner from and against all claims, liabilities, fines, penalties, orders, causes of action, judgments, losses, costs and expenses, including but not limited to court costs and reasonable attorneys' fees, arising from, in connection with, or incidental to the Contractor's handling, disposal, encountering, or release of Hazardous Materials/Substances.

#### **10.4. EMERGENCIES**

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Paragraph 4.3 and Article 7. In the event of an emergency the Contractor should contact the City of Missoula Police Department or other appropriate local emergency services (e.g., 911), as soon as possible.

#### **10.5. UTILITIES**

**10.5.1.** Underground Utilities: Buried utilities, including, but not limited to, electricity, gas, steam, air, water, telephone, sewer, irrigation, broadband coaxial computer cable, and fiber optic cables are very vulnerable and damage could result in loss of service. Telephone, broadband and fiber optic cables are especially sensitive and the slightest damage to these components will result in disruption of the operations of the campus.

**10.5.2.** "One Call" and City of Missoula private locator must be notified by phone and in writing at least 72 hours (3 business days) prior to digging to arrange and assist in the location of buried utilities in the field. The Contractor shall mark the boundary of the work area. The boundary area shall be indicated with white paint and white flags. In winter, pink paint and flags will be accepted.

**10.5.3.** After buried utilities have been located, Contractor shall be responsible for any utilities damaged while digging. Such responsibility shall include all necessary care including hand digging. Contractor's responsibility shall also include maintaining markings after initial locate. The area for such responsibility, unless otherwise indicated, shall extend 24 inches to either side of the marked center line of a buried utility line. In cases of multiple or overlapping utilities or inconclusive electronic locating signals, Owner may specifically indicate a wider area for Contractor's responsibility.

**10.5.4.** Contractor's responsibility shall include repair or replacement of damaged utilities. In the event of damage to the 15 KV electrical distribution system, the broadband or fiber optic cables, repair will consist of replacement from termination to termination. Owner will verify repair and recertification. Contractor will also be responsible for all costs associated with re-terminations and re-certification.

**10.5.5.** Any buried utilities exposed by the operations of the Contractor shall be marked on the plans and adequately protected by the Contractor. If any buried utilities not located are exposed, the Contractor shall immediately contact Owner. If, after exposing an unlocated buried utility, the Contractor continues digging without notifying Owner and further damages the utility, the Contractor will be responsible for any costs incurred.

**10.8.6.** Damage to irrigation systems during seasons of no irrigation that are not immediately and adequately repaired and tested will require the Contractor to return when the system is in service to complete the repair. The Contractor will bear all costs associated with any repairs if damaged by them.

**10.8.7.** In the event of a planned interruption of any existing utility service, the Contractor shall make arrangements with Owner at least 72 hours (3 business days) in advance. Shutdowns of the broadband or fiber optic cables will normally require 5 working days notice. The Contractor shall bear all costs associated with the interruptions and restorations of service.

## **11. ARTICLE 11 - INSURANCE AND BONDS**

### **11.1 CONTRACTOR'S LIABILITY INSURANCE**

**11.1.1** The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the State of Montana with a rating no less than "A-", such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

**11.1.1.1** claims under workers' compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;

**11.1.1.2** claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

**11.1.1.3** claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

**11.1.1.4** claims for damages insured by usual personal injury liability coverage;

**11.1.1.5** claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting there from;

**11.1.1.6** claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

**11.1.1.7** claims for bodily injury or property damage arising out of completed operations; and,

**11.1.1.8** claims involving contractual liability insurance applicable to the Contractor's obligations under Paragraph 3.18.

**11.1.2** The insurance required by Subparagraph 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverage, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until termination of any coverage required to be maintained after final payment.

**11.1.3** Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverage afforded under the policies will not be canceled or allowed to expire at any time prior to Final Acceptance and then not until at least 30 days' prior written notice has been given to the Owner. If any of the foregoing insurance coverage is required to remain in force after final payment, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.

**11.1.4** At the request of the Owner, the Contractor shall provide copies of all insurance policies to the Owner.

## **11.2 INSURANCE. GENERAL REQUIREMENTS**

**11.2.1** The Contractor shall maintain for the duration of the contract, at its cost and expense, insurance against claims for injuries to persons or damages to property, including contractual liability, which may arise from or in connection with the performance of the Work by the Contractor, its agents, employees, representatives, assigns, or subcontractors. The Contractor is responsible for all deductibles regardless of policy or level of coverage. The Owner reserves the right to demand, and the Contractor agrees to provide, copies of any and all policies at any time.

**11.2.2** Hold Harmless and Indemnification: The Contractor shall protect, defend, and save the state, its elected and appointed officials, agents, and employees, while acting within the scope of their duties as such, harmless from and against all claims, liabilities, demands, causes of action, and judgments whatsoever (including the cost of defense and reasonable attorney fees) arising in favor of or asserted by third parties on account of damage to property, personal injury, or death which injury, death, or damage, arises out of services performed or omissions of services or in any way results from the negligent acts or omissions of the Contractor, its agents, agents, or subcontractors.

**11.2.3** Contractor's Insurance: insurance required under all sections herein shall be in effect for the duration of the contract that extends through the warranty period. Insurance required herein shall be provided by insurance policies issued only by insurance companies currently authorized to do business in the state of Montana. No Contractor or Sub-contractor shall commence any Work under this contract until all required insurance has been obtained. During the term of this contract, the Contractor shall, not less than thirty days prior to the expiration date of any policy for which a certificate of insurance is required, deliver to the Owner a certificate of insurance with respect to the renewal insurance policy. The Contractor shall furnish one copy of insurance certificates of insurance herein required, which shall specifically set forth evidence of all coverage required by these contract documents and which shall be signed by authorized representatives of the insurance company or companies evidencing that insurance as required herein is in force and will not be canceled, limited or restricted without thirty days' written notice by certified mail to the contractor and the Owner. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. Additionally, all certificates shall include the Project and Phase name(s) and reference numbers.

**11.2.4** Certificates of Insurance and Endorsements. All certificates of insurance and the additional insured endorsements are to be received by the state prior to issuance of the Notice to Proceed. The contractor is responsible to ensure that all policies and coverage contain the necessary endorsements for the State being listed as an additional insured. The state reserves the right to require complete copies of all insurance policies at any time to verify coverage. The contractor shall notify the state within 30 days of any material change in coverage.

## **11.3 WORKERS' COMPENSATION INSURANCE**

The Contractor shall carry **Workers' Compensation Insurance**. Such Workers' Compensation Insurance shall protect the Contractor from claims made by his own employees, the employees of any Sub-contractor, and also claims made by anyone directly or indirectly employed by the Contractor or Sub-contractor. The Contractor shall require each Sub-contractor similarly to provide Workers' Compensation Insurance.

## 11.4 **COMMERCIAL GENERAL LIABILITY INSURANCE**

**11.4.1** Each Contractor shall carry per occurrence coverage **Commercial General Liability Insurance** including coverage for premises; operations; independent contractor's protective; products and completed operations; products and materials stored off-site; broad form property damage and comprehensive automobile liability insurance with not less than the following limits of liability:

**11.4.1.1** **\$1,000,000 per occurrence; aggregate limit of \$2,000,000;**

**11.4.1.2** The **Commercial General and Automobile Liability Insurance** shall provide coverage for both bodily injury, including accidental death, sickness, disease, occupational sickness or disease, personal injury liability coverage and property damage which may arise out of the work under this contract, or operations incidental thereto, whether such work and operations be by the Contractor or by any Subcontractor or by anyone directly or indirectly employed by the Contractor or by Sub-contractor, or by anyone for whose acts any of them may be liable. The Contractor shall maintain the liability insurance required herein for a period of not less than one year after final payment or anytime the Contractor goes on to the location of the Phase.

**11.4.1.3** The Contractor's liability insurance policies shall list the City of Missoula as an additional insured. The City of Missoula includes its officers, elected and appointed officials, employees and volunteers and political subdivisions thereof. Should the Contractor not be able to list the state as an additional insured, the Contractor shall purchase a per occurrence Owner's/Contractor's Protective Policy (OCP) with the City of Missoula as the insured party in the same occurrence and aggregate limits as that indicated above for the Contractor's Commercial General Liability Policy.

**11.4.1.4** Property damage liability insurance shall be written without any exclusion for injury to or destruction of any building, structure, wires, conduits, pipes, or other property above or below the surface of the ground arising out of the blasting, explosion, pile driving, excavation, filling, grading or from the moving, shoring, underpinning, raising, or demolition of any building or structure or structural support thereof.

**11.4.1.5** The Contractor's insurance coverage shall be PRIMARY insurance as respects the State, its officers, elected and appointed officials, employees and volunteers. Any insurance or self-insurance maintained by the state, its officers, elected and appointed officials, employees and volunteers shall be excess of the Contractor's insurance and shall not contribute to it. No waivers of subrogation or endorsements limiting, transferring, or otherwise indemnifying liable or responsible parties of the Contractor or any subcontractor will be accepted.

## 11.5 **PROPERTY INSURANCE (ALL RISK)**

**11.5.1** New Construction (and for Projects involving new construction): At its sole cost and expense, the contractor shall keep the building and all other improvements on the premises insured during construction through issue of Final Acceptance against the following hazards:

**11.5.1.1** Loss or damage by fire and such other risks (including earthquake damage for those areas with a shaking level at 10g or above as indicated on the seismic map, <http://rmtd.mt.gov/aboutus/publications/files/NEHRP.pdf>) in an amount sufficient to permit such insurance to be written at all times on a replacement cost basis. This may be insured against by attachment of standard form extended coverage endorsement to fire insurance policies. Certificates of Insurance MUST indicate earthquake coverage if coverage is required per the above referenced map.

**11.5.1.2** Loss or damage from leakage or sprinkler systems now or hereafter installed in any building on the premises.

**11.5.1.3** Loss or damage by explosion of gas turbines, steam turbines, heat recovery steam generators, steam boilers, pressure vessels, and oil or gasoline storage tanks, or similar apparatus now or hereafter installed in a building or buildings on the premises.



## 11.5.2 Building Renovation (for Projects involving building renovation or remodeling)

**11.5.2.1** The contractor shall purchase and maintain Builder's Risk/Installation insurance on a "special causes of loss" form (so called "all risk") for the cost of the work and any subsequent modifications and change orders. The contractor is not responsible for insuring the existing structure for Builder's Risk/Installation insurance.

**11.5.2.2** At its sole cost and expense, the contractor shall insure all property construction on the premises throughout the term of the agreement against the following hazards:

**11.5.2.2.1** Loss or damage by fire and such other risks (including earthquake damage for those areas with a shaking level at 10g or above as indicated on the seismic map at <http://rmtd.mt.gov/aboutus/publications/files/NEHRP.pdf>) in an amount sufficient to permit such insurance to be written at all times on a replacement cost basis. This may be insured against by attachment of standard form extended coverage endorsement to fire policies. Certificates of Insurance MUST indicate earthquake coverage if coverage is required per the above referenced map.

**11.5.2.2.2** Loss or damage from leakage or sprinkler systems now or hereafter installed in any building on the premises.

**11.5.2.2.3** Loss or damage by explosion of steam boilers, pressure vessels, oil or gasoline storage tanks, or similar apparatus now or hereafter installed in a building or buildings on the premises.

## 11.6 **ASBESTOS ABATEMENT INSURANCE**

**11.6.1** If Asbestos Abatement is identified as part of the Work under this contract, the Contractor or any subcontractor involved in asbestos abatement shall purchase and maintain **Asbestos Liability Insurance** for coverage of bodily injury, sickness, disease, death, damages, claims, errors or omissions regarding the asbestos portion of the work ***in addition to*** the CGL Insurance by reason of any negligence in part or in whole, error or omission committed or alleged to have been committed by the Contractor or anyone for whom the Contractor is legally liable.

**11.6.2** Such insurance shall be in "per occurrence" form and shall clearly state on the certificate that asbestos work is included in the following limits:

**11.6.2.1** **\$1,000,000 per occurrence; aggregate limit of \$2,000,000.**

**11.6.3** Asbestos Liability Insurance as carried by the asbestos abatement subcontractor in these limits in lieu of the Contractor's coverage is acceptable provided the Contractor and the State of Montana are named as additional insured's and that the abatement subcontractor's insurance is PRIMARY as respects both the Owner and the Contractor. If the Contractor or any other subcontractor encounters asbestos, all operations shall be suspended until abatement with the associated air monitoring clearances are accomplished. The certificate of coverage shall be provided by the asbestos abatement subcontractor to both the Contractor and the Owner.

## 11.7 **PERFORMANCE BOND AND LABOR & MATERIAL PAYMENT BOND**

**11.7.1** For contracts equal to a greater than \$50,000 the Contractor shall furnish a Performance Bond in the amount of 100% of the contract price as security for the faithful performance of his contract (18-2-201 MCA). The Contractor shall also furnish a Labor and Material Payment Bond in the amount of 100% of the contract price as security for the payment of all persons performing labor and furnishing materials in connection therewith (18-2-201MCA). The contract price for the purposes of bonding shall be defined as all direct and indirect Phase costs in accordance with this Contract, and shall exclude professional design services, construction administration, performance assurance, also known as monitoring and verification services. The bonds shall be executed on forms furnished by the Owner and no other forms or endorsements will be acceptable. The bonds shall be signed in compliance with state statutes (33-17-1111 MCA). Bonds shall be secured from a state licensed bonding company.

Power of Attorney is required with each bond. Attorneys-in-fact who sign contract bonds must file with each bond a certified and effectively dated copy of their power of attorney:

11.7.1.1 One original copy shall be furnished with each set of bonds.

11.7.1.2 Others furnished with a set of bonds may be copies of that original.

11.7.2 The Owner reserves the right at any time during the performance of Work to require bonding of Subcontractors provided by the General Contractor. Should this occur, the Owner will cover the direct cost. This shall not be construed as to in any way affect the relationship between the General Contractor and his Subcontractors.

11.7.3 Surety must have an endorsement stating that their guarantee of Contractor's performance automatically covers the additional contract time added to a Contractor's contract by Change Order.

11.7.4 A change in the Contractor's organization shall not constitute grounds for Surety to claim a discharge of their liability and requires an endorsement from Surety so stating.

11.7.5 The Contractor is required to notify Surety of increase in contract amount resulting from Change Orders within 48 hours of submitting an application for Change Order and submit a copy of Surety's written acknowledgment and consent to Owner before Change Order can be approved. A fax with hard copy to follow is acceptable. If hard copy is not received by Owner before Application for Payment on any portion or all of said Change Order, it will not be accepted by Owner for payment.

11.7.6 The Surety must take action within 30 days of notice of default on the part of the Contractor or of any claim on bonds made by the Owner or any Subcontractor or supplier.

11.8 **Cancellation.** All insurance certificates shall contain a provision that coverage provided by the policies will not be cancelled without at least thirty (30) days prior notice to the Owner.

## 12 **ARTICLE 12 - CORRECTION OF WORK**

12.1. **(Paragraph deleted)**

### 12.2. **BEFORE OR AFTER SUBSTANTIAL COMPLETION**

12.2.1. The Contractor shall promptly correct Work that fails to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections and compensation for the Owner's services and expenses made necessary thereby, shall be at the Contractor's expense. The Contractor is responsible to discover and correct all defective work and shall not rely upon the Owner's observations.

12.2.2. Rejection and Correction of Work in Progress. During the course of the Work, the Contractor shall inspect and promptly reject any Work that:

12.2.2.1. does not conform to the Construction Documents; or,

12.2.2.2. does not comply with any applicable law, statute, building code, rule or regulation of any governmental, public and quasi-public authorities, and agencies having jurisdiction over the Project(s).

12.2.3 The Contractor shall promptly correct or require the correction of all rejected Work, whether observed before or after Substantial Completion. The Contractor shall bear all costs of correcting such Work, including additional testing, inspections, and compensation for all services and expenses necessitated by such corrective action, and such costs should not form part of the Maximum Allowable Cost of Work.

### 12.3. **AFTER SUBSTANTIAL COMPLETION AND AFTER FINAL ACCEPTANCE**

**12.3.1.** In addition to the Contractor's obligations under this Contract, if, within one (1) year after the date of an interim Final Project Acceptance and Final Phase Acceptance, as applicable, of the Work or designated portion thereof or after the date for commencement of warranties, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, the Owner may correct it in accordance with Article 6.

12.3.1.1 The Contractor shall remedy any and all deficiencies due to faulty materials or workmanship and pay for any damage to other work resulting there from, which shall appear within the period of Substantial Completion through one (1) year from the date of interim Final Project Acceptance and/or Final Phase Acceptance in accordance with the terms and conditions of the Contract and with any special guarantees or warranties provided in the Contract Documents. The Owner shall give notice of observed deficiencies with reasonable promptness. All questions, claims or disputes arising under this Article shall be decided by the Owner. All manufacturer, product and supplier warranties are in addition to this Contractor warranty.

12.3.1.2 The Contractor shall respond within seven (7) days after notice of observed deficiencies has been given and he shall proceed to immediately remedy these deficiencies.

12.3.1.3 Should the Contractor fail to respond to the notice or not remedy those deficiencies; the Owner shall have this work corrected at the expense of the Contractor.

12.3.1.4. Latent defects shall be in addition to those identified above and shall be the responsibility of the Contractor per the statute of limitations for a written contract (27-2-208 MCA) starting from the date of Final Project Acceptance and Final Phase Acceptance.

**12.3.2.** The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work.

**12.3.3.** The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Paragraph 12.2.

**12.4.** The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

**12.5.** The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

**12.6.** Nothing contained in this Paragraph 12.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the one-year period for correction of Work as described in Subparagraph 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

**12.7. Acceptance of Nonconforming Work:** If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of

requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

13. **ARTICLE 13 - MISCELLANEOUS PROVISIONS**

13.1. **GOVERNING LAW.** The Contract shall be governed by the laws of the State of Montana and venue for all legal proceedings shall be the Fourth Judicial District, Missoula County.

13.2. **SUCCESSORS AND ASSIGNS.** The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempt to make such assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3. **WRITTEN NOTICE** shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice.

13.4. **RIGHTS AND REMEDIES**

13.4.1. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

13.4.2. No action or failure to act by the Owner or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

13.5. **TESTS AND INSPECTIONS**

13.5.1. Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Owner timely notice of when and where tests and inspections are to be made so that the Owner may be present for such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

13.5.2. If the Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Subparagraph 13.5.1, the Owner will instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Owner of when and where tests and inspections are to be made so that the Owner may be present for such procedures. Such costs, except as provided in Subparagraph 13.5.3 shall be at the Owner's expense.

13.5.3. If such procedures for testing, inspection or approval under Subparagraphs 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Owner's services and expenses shall be at the Contractor's expense and not be within the Guaranteed Maximum Price.

13.5.4. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Owner.

13.5.5. If the Owner is to observe tests, inspections or approvals required by the Contract Documents, the Owner will do so promptly and, where practicable, at the normal place of testing.

13.5.6. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.6. **INTEREST.** Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

**13.7. COMMENCEMENT OF STATUTORY LIMITATION PERIOD**

13.7.1. As between the Owner and Contractor:

13.7.1.1. **Before Substantial Completion.** As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

13.7.1.2. **Between Substantial Completion and Final Certificate for Payment.** As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and,

13.7.1.3. **After Final Payment.** As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any Warranty provided under Paragraph 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

**13.8. RECORDS, ACCOUNTING, AUDITING**

**13.8.1 Payroll and Basic Records.** Payrolls and basic records pertaining to the Phase shall be kept on a generally recognized accounting basis and shall be available to the Owner, Legislative Auditor, the Legislative Fiscal Analyst or his authorized representative at mutually convenient times. Accounting records shall be kept by the Contractor for a period of three years after the date of the Owner's Final Acceptance of the Phase.

**13.8.2. Accounting and Audit Access.** The Contractor shall keep full and detailed accounts and exercise such controls as may be necessary for proper financial management under this Contract; the accounting and control systems shall be satisfactory to Owner. Owner and Owner's representatives, including the State of Montana accountants and auditors, shall be afforded reasonable and regular access to the Contractor's records, books, correspondence, instructions, drawings, receipts, subcontracts, purchase orders, vouchers, memoranda and other data relating to this Contract, and the Contractor shall preserve these for a period of three (3) years after final payment, or for such longer period as may be required by law.

**13.8.3. Periodic and Final Audits.** Owner may, at its discretion, perform periodic audits of the Cost of the Work and any other reimbursable costs associated with the Phase. Owner intends to conduct a final audit of reimbursable costs prior to the Contract closeout. The Contractor shall cooperate fully with Owner in the performance of such audits. Disputes over audit findings or conclusions shall be subject to the process set forth in the General Conditions.

**14. ARTICLE 14 – TERMINATION OR SUSPENSION OF THE CONTRACT**

**14.1. TERMINATION BY THE CONTRACTOR**

14.1.1. The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

14.1.1.1. issuance of an order of a court or other public authority having jurisdiction which requires all Work to be stopped; or,

14.1.1.2. an act of government, such as a declaration of national emergency which requires all Work to be stopped.

14.1.2. The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Paragraph 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

14.1.3. If one of the reasons described in Subparagraph 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit but not damages.

14.1.4. If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner, terminate the Contract and recover from the Owner as provided in Subparagraph 14.1.3.

## **14.2. TERMINATION BY THE OWNER FOR CAUSE**

14.2.1. The Owner may terminate the Contract if the Contractor:

14.2.1.1. persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

14.2.1.2. fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

14.2.1.3. persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or,

14.2.1.4. otherwise is guilty of any breach of a provision of the Contract Documents.

14.2.2. When any of the above reasons exist, the Owner may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

14.2.2.1. take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

14.2.2.2. accept assignment of subcontracts pursuant to Paragraph 5.4; and,

14.2.2.3. finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.



14.2.3. When the Owner terminates the Contract for one of the reasons stated in Subparagraph 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

14.2.4. If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, notwithstanding the terms of the Master Energy Performance Contract, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be upon application, and this obligation for payment shall survive termination of the Contract.

**14.3. SUSPENSION BY THE OWNER FOR CONVENIENCE**

14.3.1. The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

14.3.2. The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Subparagraph 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

14.3.2.1. that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or,

14.3.2.2. that an equitable adjustment is made or denied under another provision of the Contract.

**14.4. TERMINATION BY THE OWNER FOR CONVENIENCE**

14.4.1. The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

14.4.2. Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

14.4.2.1. cease operations as directed by the Owner in the notice;

14.4.2.2. take actions necessary, or that the Owner may direct, for the protection and preservation of the Work, and;

14.4.2.3. except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

14.4.3. In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed. The Contractor shall provide a full and complete itemized accounting of all costs.

**15. ARTICLE 15 - EQUAL OPPORTUNITY**

15.1. The Contractor and all Sub-contractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or age and shall comply with all Federal and State laws concerning fair labor standards and hiring practices. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, color, sex, national origin or age. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

15.2. The Contractor and all Sub-contractors shall, in all solicitations or advertisements for employees placed by them or on their behalf; state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, national origin or age.

[END OF GENERAL CONDITIONS]