Michigan Department of Natural Resources
Finance and Operations Division
Procurement Section

TIPPY DAM RECREATION AREA

INTERIOR MECHANICAL AND ELECTRICAL IMPROVEMENTS

DNR PROJECT No. 24-3156

ADDENDUM No. 2

ORIGINAL BID OPENING DATE: Friday, April 08, 2011 at 2:00 p.m., Local Time
DATE ADDENDUM ISSUED: Friday, April 08, 2011
NEW BID DATE: THURSDAY, APRIL 21, 2011 AT 2:00 P.M.
STATE UNIT: Parks and Recreation Division

TO: ALL BIDDERS

SUBJECT: This Addendum No. 2 is issued to extend the bid opening date of the above referenced project.

ITEM #1: On Sheet M-1, changed all waste lines to be shown as existing and added note about exterior wall hydrant.

ITEM #2: On Sheet M-1, add a detail and information for base cabinet and sink in the breakroom.

ITEM #3: On Sheet E-1, deleted electrical panel.

ITEM #4: On Sheet E-2, add note "Conduit can be surface mounted as needed."

ITEM #5: On Sheet E-2, change electrical panel and 4 existing circuit breakers to be shown as existing.

ITEM #6: In specifications, Section 15400 Plumbing, deleted sections - drain and water below slab, underground water service pipe, interior hose bibb, floor cleanout and floor drain.

ITEM #6: In specifications, Section 16050 Electrical, deleted panelboard section.

Acknowledgment: Two copies of this Addendum No. 2, properly signed in the space provided below, shall be submitted with your duplicate Proposal and Contract Forms.

Paul Stoddard, R.A.
Recreation Division
(517) 373-9906

_____
(Firm Name)

_____
(Bidder's Signature and Title)

_____
(Date)

TIPPY DAM FIELD OFFCE
MECHANICAL AND ELECTRICAL BUILD OUT

TABLE OF CONTENTS

SECTION 15400 PLUMBING

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: Provide plumbing where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, and not necessarily limited to:

1. Domestic hot and cold water piping system;
2. Vent systems;
3. Plumbing fixtures and trim.

1.02 QUALITY ASSURANCE

A. Codes and Regulations:

1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.

B. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Architect/Engineer.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Division One.

B. Shop Drawings:

1. Submit shop drawings for approval before purchase on all items listed under the following sections in Part Two - Products:
   a. 2.07 Thermometers
   b. 2.09 Fixtures and Equipment

2. If the Contractor provides equipment (approved equal by the engineer) other than that upon which the design is based, it shall be his responsibility to coordinate its installation with the space available. He shall also pay for any changes caused as a result of this substitution.

C. Sterilization Certificate:

1. Upon completion of water line sterilization, deliver to the Architect/Engineer two copies of an acceptable “Certificate of Performance” for that activity.

D. Plumbing Final Inspection Certificate:

1. Upon completion of the work of this Section, deliver to the Architect/Engineer, two copies of a State of Michigan Plumbing Final Inspection Certificate.

E. Upon completion of the work of this Section, deliver to the Architect/Engineer two copies of an operation and maintenance manual and complete wiring diagrams, where applicable, for the following items:

1. Water Heater

2. Plumbing Fixtures

PART TWO - PRODUCTS

2.01 PIPE SCHEDULE

A. Vent system:

1. Above ground:

a. Service weight Cast Iron Hub-and-Spigot soil pipe and fittings.
b. Service weight Cast Iron Hubless soil pipe and fittings.
c. Schedule 40 Galvanized steel pipe with galvanized cast-iron, drainage pattern fittings.
d. PVC-DWV, Schedule 40, pipe and fittings.

B. Building Water System (domestic piping):

1. Above ground: Type "L" hard copper with sweated connections

2.02 MATERIALS

A. Cast Iron Hub-and-Spigot soil pipe and fittings:

1. Service weight cast iron pipe and fittings conforming to ASTM A74
2. Service weight compression gaskets conforming to CISPI standard HSN.

B. Cast Iron Hubless soil pipe and fittings:

1. Service weight cast iron pipe and fittings conforming to CISPI 301 and CISPI 310.

C. Galvanized Steel Pipe, (Drainage):

1. Schedule 40 galvanized steel pipe conforming to ASTM A 53.
2. Class 125, galvanized cast-iron, drainage pattern fittings with screwed joints conforming to ANSI B16.4 and ANSI B2.1.

D. PVC-DWV:

1. Schedule 40, pipe and fittings complying with ASTM D-2665 and ASTM D-2729.
2. Solvent cement joints complying with ASTM D-2564.
3. Joints - Push on type with rubber baskets conforming to ASTM D1869.
4. Fittings - Polyvinyl Chloride meeting same requirements as pipe.

E. Copper Tubing:

1. Type K, soft copper tubing conforming to ASTM B88
2. Type L, hard copper tubing conforming to ASTM B88
3. Wrought - Copper solder joint pressure fittings conforming to ANSI B16.22
4. Standard product copper tube unions as recommended by the manufacturer for use in service indicated.
5. Tin-antimony lead free solder joints conforming to ASTM B32.

F. Steel Pipe:

1. Schedule 40 seamless black steel pipe conforming to ASTM A53
2. 150 pound malleable iron, screwed fittings conforming to ASA B16.3
3. Schedule 80 X-Tru-Coat plastic coated seamless black steel pipe and fittings with welded joints. Pipe and joints shall be wrapped and primed. See Pipe Wrapping, Section 2.12.

G. Schedule 40 seamless galvanized steel pipe and fittings with screwed joints conforming to ASTM A53.

2.03 VALVES

A. Packing:

1. Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for domestic water service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

B. Gate Valves 2" and Smaller:

1. Class 125 WOG, bronze body, screwed bonnet, solid wedge, rising stem, with soldered ends. Nonrising stem may be used where there is insufficient clearance.
2. Class 125 WOG, bronze body, screwed bonnet, solid wedge, rising stem, with threaded ends.

C. Ball Valves :

1. Class 125 WOG, bronze 2 piece body, bronze ball, bronze stem, with soldered ends.
2. Class 125 WOG, bronze 2 piece body, bronze ball, bronze stem, with threaded ends.

D. Drain Valves 2" and Smaller:

1. Class 125 WOG, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection with vacuum breaker and soldered ends.
2. Class 125 WOG, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection with vacuum breaker and threaded ends.

E. Partition stop valves: Provide Chicago Faucet #1771, loose key type.

F. Temperature and Pressure Relief Valve:

1. ASME relief valve suitably sized for heater capacity as manufactured by A.W. Cash or Watts Regulator Company

G. Gas cocks:

1. 2-inch and smaller: Provide 250-lb., bronze, screwed, square head, 125#.

2.04 FLASHING

A. Where pipes of this Section pass through the roof, flash with Semco #110-4 seamless 4-lb. flashing, with steel reinforced "Vari-Pitch" boot and cast iron counterflashing sleeve.

2.05 EQUIPMENT SUPPORT

A. Where equipment is required to be suspended from ceilings, walls, or above floor, the Contractor shall furnish and install all inserts, rods, structural steel frames, brackets, and platforms required.

2.06 PIPE HANGERS

A. Water piping:

1. Provide Fee and Mason #212 split ring hangers with supporting rods. (Provide copper clad hangers for copper piping.)
2. Provide Semco "trisolators."

B. Gas piping:

1. Provide Fee and Mason #212 split ring hangers with supporting rods.

2.07 THERMOMETERS

A. Provide Powers #P/N 894-3709, or approved equal white face with 3 color temperature indication dual scale 0 degrees to 200 degrees F. Install with a 3/4" x 3/4" x 1/2" tee with temperature probe in the water flow stream being measured.

2.08 WATER HAMMER ARRESTERS

A. Provide Smith, Josam, Wade or Zurn arresters which conform to ASSE 1010. Install arresters within an effective range of quick-closing valves and locate to provide access. Size arresters according to the fixture unit method as determined by the Plumbing and Drainage Institute.

2.09 FIXTURES AND EQUIPMENT

A. Water Closet - Fixture No. 1 (ADA)

1. Kohler #K-3427 Highline floor mounted, gravity fed elongated bowl and vitreous china tank, float valve, tank cover, volt caps and left hand polished chrome trip lever. Provide with K-3427-U insuliner tank lining. . Color: White
2. Kohler #K-4652 Lustra Heavy duty white seat and cover.
3. Kohler #K7637 3/8” angle supply with stop

B. Lavatory - Fixture No. 2 (ADA)

1. Kohler K-2861 Hudson 20” x 18” wall mounted, cast iron lavatory, with drillings for 4-inch faucet centers: Color White.
2. Chicago Faucet 802A-369 faucet with 4” centers, 4” spout, 369 handles with color coded index, and E12 aerator, 2.0 GPM @ 80 PSI.
3. Kohler #K-8998 P-Trap.
4. Kohler #K-7605-P, 3/8” angle supplies with loose key stops.
5. Watts #USG-B, thermostatic control valve. Valve shall conform to ASSE 1016, to meet barrier free requirements.

C. Shower - Fixture No. 3 (ADA)

1. Florestone Model 40-40H, one piece gel-coated fiberglass shower stall for barrier-free use.
2. Zurn #Z 7100-SS-LH-MT-HW6-VB, Temp Guard Pressure Balancing Valve with metal trim, service stops, metal hose and inline vacuum breakers.

D. Service Sink - Fixture No. 4

1. Kohler #K-6719 , acid-resistant, cast iron service sink, stainless steel rim guard and #K-6673 enameled inside trap.
2. Chicago Faucet #835-RCF, service sink faucet, with vacuum breaker spout, bucket hook, 3/4-inch hose thread, 1/2-inch female unions, #633 handles, and quaturn cartridge. Provide with an adjustable top brace and rough chrome finish.

E. Pedestal Eyewash – Fixture No. 5

1. Chicago Faucet #9003-9402, Pedestal Eyewash, complete with stainless steel receptor, dual soft-flo ABS plastic anti-surge heads, push flag and foot treadle wash activator, and 1-1/4-inch galvanized steel pipe pedestal with 9-inch diameter floor flange.

F. Wall Hydrant - Fixture No. 6

1. Zurn #1320 Encased Ecolotrol “anti-siphon” automatic draining wall hydrant for flush installation. Complete with non-freeze integral backflow preventer, copper casing, all bronze interior parts, non turning operating rod with hemispherical neoprene plunger and 3/4-inch solder inlet. Stainless steel box and hinged cover with operating key lock and “WATER” stamped on cover.

G. Water Heater (Electric) – Fixture No. 7

1. Lochinvar Model No. ETA030KK with a 30 gallon storage tank. Rated at 4.5 KW upper element and 4.5 KW lower element, 240 Volts, Single Phase. Tank shall be glass lined with high density fiberglass insulation, a heavy gauge steel jacket with baked enamel finish, and tested at 300 PSI to permit a rated 150 PSI working pressure. Unit shall be furnished with factory installed Dielectric Nipples, tin coated, copper sheathed immersion type heating elements, thermostat, drain valve and relief valve tapping SET WATER LEAVING TEMPERATURE @ 115 DEGREES FAHRENHEIT.

2.010 PIPE SLEEVES AND SLEEVE SEALS

A. Pipe Sleeves - Where pipe pass through walls, floors, ceilings, roofs and foundations, provide and install proper size pipe sleeves of one of the following:

1. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6", 16 gage; over 6", 14 gage.
2. Steel-Pipe: Schedule 40 galvanized steel pipe.
3. Iron-Pipe: Cast-iron or ductile-iron pipe, with anchor flange.

B. Sleeve Seals - Provide sleeve seals for sleeves located in concrete slab floors, foundation walls below grade, or in exterior walls, of one of the following:

1. Oakum: Packed between sleeve and pipe.

2. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation; similar to "Link/Seal" as manufactured by Thunderline Corp.

2.011 PIPE ESCUTCHEONS

A. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheons to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish or unoccupied areas.

B. Pipe Escutcheons for Moist Areas: For water proof floors, and where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

2.012 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect/Engineer.

PART THREE - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PLUMBING SYSTEM LAYOUT

A. Lay out the plumbing system in careful coordination with the Drawings, determining proper elevations for all components of this system and using only the minimum number of bends to produce a satisfactorily functioning system.

B. Follow the general layout shown on the Drawings in all cases except where other work may interfere.

3.03 INSTALLATION OF PIPING AND EQUIPMENT, GENERAL

A. General:

1. All piping shall be installed parallel or perpendicular to walls, floors and ceilings.
2. Cut pipe accurately, and work into place without springing or forcing, properly clearing windows, doors, and other openings. Excessive cutting or other weakening of the building will not be permitted.
3. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.

4. Make changes in directions with fittings; make changes in main sizes with eccentric reducing fittings. Unless otherwise noted, install water supply and return piping with straight side of eccentric fittings at top of the pipe.

5. All tubing bends shall be made with a minimum radius of five times the tubing diameter.
6. Provide sufficient swing joint, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on the Drawings.
7. All piping shall be supported so that there will be no undue strain or sagging. Hangers shall have means for adjusting the lengths of the hanger rod. Where pipe is supported on rollers, covering shall be protected by saddles welded to the pipe.
8. Securely bolt all equipment, isolators, hangers, and similar items in place.
9. Support each item independently from other pipes. Do not use wire for hanging or strapping pipes.
10. Provide complete dielectric isolation between ferrous and non-ferrous metals.

B. Domestic Water System

1. Minimum depth of bury for water service piping outside the building shall be 5-feet 0-inches below grade unless otherwise indicated on the plans.
2. Install horizontal water piping with an adequate pitch upwards in direction of flow to insure the system is completely drainable, with drain valves at all low points in the system.

C. Soil and Waste Piping

1. Grade Horizontal Waste Lines as indicated on the Drawings--Connections between mains and laterals shall be made with wyes and 1/8 bends. Make changes in direction with long radius ells except in stacks where sanitary tees may be used and short radius 1/4 bends may be used in changes from horizontal to vertical.
2. Flash all vent stacks at the roof with 4-pound lead. Flashing shall extend up and be turned over the top of the vent pipe at least 1 (one) inch and fit tightly against the side of the vent pipe. flashing shall extend out 8 inches or more on the roof surface, overlapped by, and cemented by the roofing. Each vent stack shall extend above the roof a minimum of 12 inches. Painting, see Section 09900.
3. No vent outlet terminals at the roof shall be installed within 20-feet of ventilating air intakes or within 10-feet of windows.

D. Plumbing Fixtures:

1. Fixtures shall be installed complete with all waste, drain, vent piping and supplies as indicated on the drawings. All supplies shall be provided with stops.
2. Each fixture shall be installed in the location as shown on the drawings and at heights indicated on the plumbing fixture schedule and in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Fixtures when installed shall be plumb, level and rigid and shall be watertight and erected so no part of the fixture shall be subjected to strains of loads. All accessories shall be installed as specified or required to make each fixture a complete and satisfactory operating unit.
3. Upon completion of the work, the Contractor shall go over the whole work, clean and polish fixtures and equipment and remove surplus material and rubbish of every description incidental to his work from the owner's property, leaving the work in neat and clean order and complete working condition.

3.04 PIPE JOINTS

A. Copper tubing:

1. Cut square, remove burrs, and clean inside of female filling to a bright finish.

   a. Apply solder flux with brush to tubing.
   b. Remove internal parts of solder-end valves prior to soldering.

2. Provide dielectric unions at points of connection of copper tubing to ferrous piping and equipment.

3. For joining copper tubing, use:

   a. Water piping 3-inch and smaller: 95-5 solder;
   b. Water piping larger than 3-inch: "Sil-fos" brazing;
   c. Underground: "Sil-fos" brazing.

B. Screwed piping:

1. Deburr cuts.

   a. Do not ream exceeding internal diameter of the pipe.
   b. Thread to requirements of ANSI B2.1.

2. Use teflon tape on male thread prior to joining other services.
3. Use litharge and glycerin on joint prior to cleaning for air and oil piping.

C. Leaky joints:

1. Remake with new material.
2. Remove leaking section and/or fitting as directed.
3. Do not use thread cement or sealant to tighten joint.

3.05 PIPE SUPPORTS

A. Space hangers and support for horizontal steel pipes according to the following schedule:

Pipe size:	Maximum spacing on centers:
1-1/4” and smaller:	8’-0”
1-1/2” to 3”	10’-0”

B. Space hangers and supports for horizontal copper tubing according to the following schedule:

Tube Size:	Maximum spacing on centers:
1” and smaller:	6'-0"
1-1/2”	7’-0”

C. Support vertical piping with riser clamps secured to the piping and resting on the building structure. Provide at each floor unless otherwise noted.

D. Arrange pipe supports to prevent excessive deflection, and to avoid excessive bending stress.

3.06 SLEEVES AND OPENINGS

A. Install pipe sleeves of types indicated where piping passes through walls, partitions, floors, roofs, and ceilings. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves 1/4" above level floor finish, and 3/4" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

B. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings

C. Install iron-pipe sleeves at exterior penetrations, both above and below grade.

D. Install steel-pipe sleeves except as otherwise indicated.

3.07 SLEEVE SEALS

A. General: Provide sleeve seals for sleeves located in foundation walls below grade, in slab floors on grade, in exterior walls, or in fire rated walls, of one of the following:

1. Lead and Oakum: Caulk between sleeve and pipe.
2. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation. Subject to compliance with requirements, provide mechanical sleeve seals of the following or equal: Thunderline Corp.

3.08 PIPE ESCUTCHEONS

A. Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

3.09 CLEANOUTS

A. Cleanouts shall be installed where required by code, shown on the plans, and specified here in. They shall be accessibly located and set flush with the finish surface.

B. After pressure tests are made and approved, thoroughly graphite the cleanout threads.

3.010 WATER HAMMER ARRESTERS

A. Provide water hammer arresters on hot water lines and cold water lines.

1. Install in upright position at all quick closing valves, solenoids, isolated plumbing fixtures, and supply headers at plumbing fixture groups.
2. Locate and size in accordance with Plumbing and Drainage Institute Standard WH-201.

B. Where fixtures are not protected by water hammer arresters, provide 48-inch high air chambers on each water supply, properly sized and designed for maintenance and drainage. Air chambers may not be used at top of risers.

3.011 BACKFLOW PREVENTION

A. Protect plumbing fixtures, faucets with hose connections, and other equipment having plumbing connection, against possible back-siphonage.

B. Arrange for testing of backflow devices as required by the governmental agencies having jurisdiction.

3.012 CLEANING, TESTING AND DISINFECTION OF WATER SYSTEMS

A. Flush all waterlines very thoroughly to remove solids which may have accumulated during construction before installing valves. After installing valves and fixtures and testing several times equal to normal usage, disassemble and check for metallic deposits on seats, cylinders, and diaphragms to ascertain serviceable condition.

B. Testing of the water system shall consist of the following and in accordance with the Michigan State Plumbing Code:

1. Domestic Water Piping -- 100 pounds per square inch per gage hydrostatic test held tightly for 48 hours.
2. Joint test shall be done with soap suds made by thoroughly dissolving (1) one ounce castile soap in 8 ounces water and 4 ounces glycerin. Wipe all joints clean after the test.
3. Gauges, controls, and other appurtenances which may be damaged by the tests shall be valved off or removed before testing.

C. All potable water lines installed under this Contract, after they have been acceptable tested and cleaned shall be flushed and disinfected by the Contractor. Flushing and disinfection shall be performed in accordance with the current State of Michigan Plumbing Code..

3.013 BUILDING DRAINAGE AND VENT WATER TEST

A. A water test shall be applied to the drainage system either in its entirety or in sections

1. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system shall be filled with water to point of overflow.
2. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 10-foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet of the system, shall have been submitted to a test of less that a 10-foot head of water.

B. The water shall be kept in the system, or in the portion under test, for at least 1-hour or as required by the field engineer, before the inspection starts. The system shall be tight at all points.

C. Where tests show materials or workmanship to be deficient, replace or repair as directed by the field engineer, and repeat test until the specified standards are achieved.

3.014 OTHER TESTING AND ADJUSTING

A. Provide personnel and equipment, and arrange for and pay the costs of, all required tests and inspections required by governmental agencies having jurisdiction.

B. Where tests show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.

C. Adjust the system to optimum standards of operation.

3.015 OPERATING AND MAINTENANCE INSTRUCTIONS

A. The contractor shall provide the facility manager or his representative, with on site instructions for the operation and maintenance of Fixtures and Equipment listed in Part Two of this section.

END OF SECTION

SECTION 15550 VENTILATION

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: Provide complete heating and ventilation systems where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Exhaust Fan
2. Intake Air Louver
3. Supply Air Grille

B. Related work elsewhere:

1. Section 15900 – Controls
2. Section 15980 Testing and Balancing
3. Section 16500 - Electrical

1.02 QUALITY ASSURANCE

A. Codes and Standards - In addition to complying with the specified requirements, pertinent regulations of governmental agencies having jurisdiction, comply with all pertinent recommendations contained in "Duct Manual and Sheet Metal Construction for Ventilating and Air Conditioning Systems" latest edition, as published by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

B. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Architect/Engineer.

SUBMITTALS

C. Comply with pertinent provisions of Division One.

D. Shop Drawings:

1. Submit shop drawings for approval before purchase on all items listed under the follow sections in Part Two - Products:

a. 2.01 Equipment

2. Upon completion of the work of this Section, deliver to the Architect/Engineer, two copies of an operation and maintenance manual and complete wiring diagrams where applicable, for Equipment listed in Part Two of this Section.

3. If the Contractor provides equipment (approved equal by the engineer) other than that upon which the design is based, it shall be his responsibility to coordinate its installation with the space available. He shall also pay for any changes caused as a result of this substitution.

E. Mechanical Final Inspection Certificate:

1. Upon completion of the work of this Section, deliver to the Architect/Engineer, two copies of a State of Michigan Mechanical Final Inspection Certificate.

PART TWO - PRODUCTS

2.01 EQUIPMENT

A. Exhaust Fan:

1. Bath, Broan No. 696 Bathroom exhaust fan with light. 90 watt, horsepower fan motor, 100 CFM exhaust @ 1/8-inch static pressure.

2.02 DUCTWORK

A. General:

1. Ductwork shall be fabricated from 24 gauge galvanized sheet metal in accordance with SMACNA Standards.

2. Transverse Joint connection shall be S-Drive, pocket or bar slips on 7-foot centers

3. Duct work shall be true to dimensions on drawings which indicate the clear inside dimensions required. All elbows shall have center line radius equal to one and one-half time the width or diameter of the duct.

PART THREE - EXECUTION

3.01 INSTALLATION OF EQUIPMENT

A. General:

1. All equipment shall be installed in accordance with the manufacturers recommendations. Provide flexible connections between air distribution equipment and the air distribution ductwork to prevent transmission of equipment vibration.

B. Ductwork / Supply Air Grilles:

1. Ductwork, and Supply Air Grilles shall be securely anchored to building construction in an approved manner so as to be free of vibration under all conditions of operations and in accordance with SMACNA standards.

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS

A. The contractor shall provide the facility manager or his representative, with on site instructions for the operation and maintenance of Equipment listed in Part Two of this Section.

END OF SECTION

SECTION 15900 CONTROLS AND INSTRUMENTATION

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work Included: The work covered by this section consists of furnishing all labor, materials, equipment and services necessary for the proper installation of an electrically operated, automatic control system for the heating and ventilating systems.

B. Related Work Elsewhere:

1. Section 15550 Heating and Ventilation
2. Section 16050 Electrical

1.02 QUALITY ASSURANCE

A. Codes and Regulations:

1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.

B. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Architect/Engineer.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. The Contractor shall submit for approval, complete diagrams of control systems, together with a detailed description of all instruments and specialties to be used and a description of how the control system operates.

PART TWO - PRODUCTS

2.01 CONTROL DEVICES

A. General - For ease of maintenance and parts replacement to the maximum extent possible, use equipment of a single manufacturer except where control devices are an integral part of equipment supplied under other sections.

PART THREE - EXECUTION

3.01 SEQUENCE OF OPERATION

A. Toilet Exhaust Fan

1. Room single pole light switch shall cycle exhaust fan on and off.

3.02 TESTING OF CONTROLS

A. Upon completion, the entire control installation shall be subjected to test under normal conditions of use for a sufficient period of time to permit a complete examination and inspection.

B. All wiring or tubing placed within construction or concealed shall be carefully tested before being permanently covered up.

C. All defects in material or workmanship which appear during the test shall be promptly remedied, and the test again applied.

END OF SECTION

SECTION 15980 TESTING, ADJUSTING AND BALANCING

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work Included: Extent of testing, adjusting and balance work is defined to include Heating and Ventilation system, and all associated equipment and apparatus of mechanical work.. The work consists of setting speed and volume (flow), adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work if necessary.

B. Related Work Elsewhere:

1. Section 15550 Heating and Ventilation
2. Section 15900 Controls and Instrumentation
3. Section 16050 Electrical

1.02 QUALITY ASSURANCE

A. Qualifications of Contractor:

1. A firm with at least three years of successful testing, adjusting and balancing experience. The installer of the system may be the balancing contractor if criteria of the section are complied with.

B. Codes and Standards:

1. General - Comply with one of the following standards:

a. NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems"
b. AABC's Manual MN-1 "AABC National Standards"
c. SMACNA Manual "Testing, Balancing, and Adjusting of Environmental Systems"

1.03 JOB CONDITIONS

A. Do not proceed with testing, adjusting and balance until work has been completed and is operable. Ensure that there is no latent residual work still to be completed. Do not proceed until work schedule for testing, adjusting and balancing is clean and free from debris, dirt, and discarded building materials.

PART TWO - PRODUCTS

2.01 SUBMITTALS

A. Test Reports

1. Submit certified test reports signed by Test and Balance Supervisor who performed the work.

PART THREE - EXECUTION

3.01 TESTING, ADJUSTING AND BALANCING

A. Test, adjust, and balance environmental systems and components as indicated in accordance with procedures outlined in applicable standards. All air flows shall be balanced within plus or minus 10 per cent of design quantities indicated on the plans.

B. Test, adjust, and balance system during winter season for heating system, including at least one period of operation at outside conditions within 10 degrees Fahrenheit dry bulb temperature of minimum winter design condition (minus 10 degrees Fahrenheit). When seasonal operation does not permit measuring final temperatures, then take final temperature readings when seasonal operation does permit.

C. Prepare report of test results including instrumentation calibration reports in form recommended by applicable standard.

D. Patch holes in insulation, ductwork, and housing which have been cut or drilled for test purposes, in manner recommended by original installer.

E. Mark equipment settings including damper control positions, fan speed control levers, and similar controls and devices to show final settings at completion of Testing, Adjusting and Balancing work. Provide markings with paint or other suitable permanent identification materials.

END OF SECTION

SECTION 16050 ELECTRICAL BASIC MATERIAL AND METHODS

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: Provide a complete electrical service where shown on the drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Installing branch circuit wiring as indicated on the plans and specified herein.
2. Installation of electrical equipment indicated on the plans and specified herein and in sections specifying related work.
3. Electrical equipment and system testing, adjustments, marking, tagging, cleaning, painting, etc.

B. Related Work Elsewhere

1. Section 15550 Ventilation
2. Section 15600 Heating System.

1.02 QUALITY ASSURANCE

A. Codes, Standards and Regulations:

1. Provide electrical equipment and wiring devices which have been UL listed and labeled
2. Comply with NEMA standards for general and specific purpose electrical equipment and wiring devices
3. Comply with pertinent regulations of governmental agencies having jurisdiction.
4. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Field Engineer.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Division One.

B. Shop Drawings

1. Submit shop drawings for approval before purchase on all items listed under the following sections in Part Two - Products:

a. 2.03 Boxes
b. 2.04 Wiring Devices
c. 2.06 Panelboards
d. 2.07 Exhaust Fan Disconnect & Over current Protection
e. 2.08 Time Clock
f. 2.09 Lighting Fixtures and Lamps

2. If the Contractor provides equipment other than that upon which the design is based, it shall be his responsibility to coordinate its installation with the space available. He also shall pay for any changes caused as a result of this substitution.

C. Operations and Maintenance Manual:

1. Upon completion of the work of this Section, the Contractor shall deliver to the Engineer two copies of an Operation and Maintenance Manual complete with equipment description, operating instructions, repair parts lists, and control and wiring diagrams for equipment listed in Part Two of this Section

PART TWO - PRODUCTS

2.01 RACEWAYS

A. General:

1. All conduit concealed above ceilings, or exposed shall be rigid metal conduit, intermediate metal conduit or electric metallic tubing.
2. All connections to Motors and other vibrating equipment or other applications requiring flexibility shall be made with flexible steel conduit.

B. Rigid Metal Conduit:

1. Rigid metal conduit shall conform to UL Standard UL6, Federal Specification WW-C-581 and American Standards Institute (ANSI) specifications C.80.1. Zinc coating shall be applied inside and out by hot-dip galvanizing after threading. Each length of conduit shall be furnished with a coupling assembled on one end and a plastic thread protector on the other end.

C. Intermediate Metal Conduit:

1. Intermediate metal conduit shall be hot-dip galvanized and manufactured in accordance with UL Standard UL1242, Federal Specification WW-C-581 and Article 345 of the National Electric Code.

D. Electrical Metallic Tubing:

1. Electrical metallic tubing shall be hot-dip galvanized and manufactured in accordance with Federal Specification WW-C-563 and American Standards Institute (ANSI) specification C80.3.

E. Flexible Steel Conduit

1. Flexible steel conduit shall be of the single strip interlocked type, galvanized inside and outside, UL listed and manufactured in accordance with Federal Specification WW-C-566.

2.02 RACEWAY FITTINGS

A. General - Fittings shall be suitable for the application and designed for the purpose for which they are used. Hot-dipped galvanized fittings and parts shall be used for RGS conduits.

B. Unions - Threaded unions shall be Crouse-Hinds Types UNF and UNY.

C. Locknuts - Extra heavy, hot-dipped galvanized steel.

D. Bushings – Hot-dipped galvanized iron with insulating collar.

E. Hubs - Appleton Uni-Seal for connection of conduit to sheet steel enclosures.

F. Conduit Supports - One hole type, hot-dipped galvanized malleable iron.

G. Electrical metallic tubing conduit fittings shall be set screw type. Cast body or indentor fittings are not permitted.

2.03 BOXES

A. Device Boxes - Galvanized stamped steel with conduit knockouts. Where surface mounted devices are shown, cast metal boxes with a corrosion resistant finish shall be used. Do not use stamped steel boxes for these applications. Where more than one device is shown at a location, single piece multigang boxes shall be used.

B. Outlet Boxes - 4-inch square or 4-inch octagonal stamped galvanized steel with conduit knockouts.

C. Junction and Pull Boxes (Building) - Galvanized steel units with screwed-on covers, sized and located as per current State of Michigan Electrical Code.

D. Weather Proof Device Boxes - Bell Weatherproof Die Cast Aluminum Boxes with threaded hubs for rigid metal or intermediate metal conduit systems. Provide boxes with Bell Rayntite, Die Cast Aluminum Covers with neoprene gasket and corrosion resistant screws.

2.04 WIRING DEVICES

A. All wiring devices of a single type (switches, plates, receptacles, etc.) shall be of one manufacturer unless specified with manufacturer and model number. Devices shall be in accordance with the Electrical Symbol Legend.

B. Switches - Wall switches shall be Allen Bradley, Appleton, Bryant, Cutler-Hammer, Leviton, Hubbell or Pass & Seymour "AC Only" "Quiet Switches" rated 20 amps, 120/277-volt, brown toggle handle switches of the heavy-duty specification grade type meeting National Electrical Manufacturers Association (NEMA)WD-1 2.03 through 2.06 "heavy-duty" performance requirements, UL listed per UL 20 standards.

C. Occupancy Sensors (Office and Labs lighting control) – Leviton #osc10-u0w, All digital self-adjusting Ultrasonic Ceiling-Mount Occupancy Sensor. Provide with Leviton #osp20-0d0, power pack

D. Office Receptacles – General purpose receptacles as manufactured by Allen Bradley, Appleton, Bryant, Cutler-Hammer, Leviton, Hubbell or Pass & Seymour, brown “T” Slot, NEMA 5-20R configuration, rated 20 amps at 125 volts. The receptacles shall be U/L listed and meet NEMA WD-1 “Heavy Duty” performance standards.

E. Restroom & Storage Area Ground Fault Receptacles - Hubbell industrial heavy duty specification grade GFCI Receptacle #GF5362, rated 20 amps (NEMA 5-20R), 120 Volts, with built-in Class A, Group 1, ground fault protection. **The receptacles shall be wired for end-of-line type configuration**. Built-in test and reset buttons shall be provided with visible ground trip indication. **Receptacle shall include an all glass circuit board, and solid silver cadmium oxide control contacts with overlap design power contacts**. The receptacles shall be UL listed per UL Standard 498 and 943.

F. Cover Plates:

1. Wall plates shall be Type A1S1 302 stainless steel. Where wiring devices are mounted in multigang boxes, one-piece combination plates specifically manufactured for the combination shall be provided.
2. Duplex weather proof cover plates for exterior receptacles shall be equal to Bell Electric, Weatherproof Die Cast Aluminum Covers with neoprene gaskets and corrosion resistant screws, or approved equal.

2.05 WIRE AND CABLE

A. Provide factory-fabricated wire of sizes, ratings, materials and types indicated here in and on the drawings. All conductors shall be insulated for min. 75 degrees C. Rated for minimum of 600 volts. Wire and copper conductors of the following types are as follows:

1. General Building Interior: Type THHN or THWN, suitable for operations of 600 volts as specified in the National Electric Code, at conductor temperatures not to exceed 90-degrees C. in dry locations. Conductors shall be annealed copper, insulated with high-heat and moisture resistant PVC, jacketed with abrasion, moisture, gasoline and oil resistant nylon.
2. Service Entrance: Type USE, suitable for operations at 600 volts or less in wet or dry locations. Conductors shall be annealed copper, insulated with high-heat and moisture resistant PVC, jacketed with abrasion, moisture, gasoline and oil resistant nylon.
3. Grounding Conductors

    a. In metallic conduit: Insulated green copper conductors (green in color for sizes 12 and 10 and approved green markings for larger sizes).
    b. Isolated ground: Insulated green copper conductors only.

B. Wire Connectors: "Sta Kon" as manufactured by Thomas and Betts, or approved equal.

2.06 STORAGE AREA EXHAUST FAN MOTOR DISCONNECT AND OVER CURRENT PROTECTION

A. Where single-phase motors operating at 150 volts or less to ground are shown with fusible switch protection, provide Bussman Box Cover Units with Type S time delay fuses sized for motor running overload protection in accordance with National Electric Code (NEC) requirements and manufacturers' selection tables.

2.07 TIME CLOCK

A. Time Clock (Exterior Lighting)

1. Intermatic Model Number ET100C, Twenty Four Hour, single circuit, 120-volt, electronic time switch. Switch shall be rated for 1 HP @ 120-volts. Timed switch shall be housed in a NEMA-1R, lockable, steel enclosure.

2.08 LIGHTING FIXTURES AND LAMPS

A. Lighting Fixtures - As listed in the "Lighting Fixture Schedule" on the construction plans.

B. Lamps - General Electric, Sylvania, or Westinghouse.

2.09 GROUNDING MATERIALS

A. Ground Rods - 3/4 inch x 10 foot copper-clad steel, UL listed, manufactured by Copperweld, Weaver, or approved equal.

B. Rod Clamps - J. A. Weaver, U-Bolt clamp, Type UG, Square D, Type GC 110/111, or approved equal.

C. Water Pipe Clamps - J. A. Weaver, Type J or approved equal.

D. Reinforcing Bar Connection - Cadweld exothermic grounding connection Type RJ or approved equal.

E. Ground Cables (Not Grounding Conductors) - Shall be bare, stranded copper of 98 percent conductivity. Grounding electrode conductor shall be Number 6 AWG minimum and Bonding connections No. 6 AWG minimum or sized per current State of Michigan Electrical Code.

PART THREE - EXECUTION

3.01 RACEWAYS AND FITTINGS

A. Conduit - Conceal in building construction where possible. Exposed conduit shall be installed in neat symmetrical lines parallel with the center lines of the structure, walls, etc. Provide locknuts and insulated throat bushings at enclosures

B. Rigid galvanized steel or intermediate metal conduit shall be used in all applications where installed embedded in concrete or masonry construction, exposed in areas of building subject to abuse, and all exterior applications.

C. Electric metallic tubing shall be used concealed above ceilings or in stud walls, exposed in areas where not subject to physical damage, and in compliance with NEC limitations.

D. Flexible liquid tight conduit or flexible steel conduit shall be used for final connections to motors and other vibrating equipment or other applications requiring flexibility and as shown on the plans.

3.02 PULL BOXES

A. Install where necessary to terminate, tap off, or redirect multiple conduit runs. Locate so that covers are accessible after completion of construction. Support pull boxes independently of conduits entering them.

3.03 WIRE CONNECTORS AND TERMINATING DEVICES

A. Joints will be permitted only in junction and outlet boxes. All joints shall be firmly bonded together and taped or shall be made with mechanical connectors.

3.04 LIGHTING FIXTURES

A. Maintain alignment, spacing, layout, and general arrangement shown on the plans. Fixtures shall be securely mounted and shall not rotate on single box connections.

3.05 IDENTIFICATION AND MARKING

A. Equip electrical panel with a typewritten directory accurately indicating rooms and/or equipment being serviced.

B. Branch circuits shall be identified as to phase with the following colors as standard:

1. 150 volts or less to ground - black, red, white.

C. Feeders shall be identified as to phase at all terminals with tape colors corresponding to branch circuit colors.

D. When wires of different systems junction in a common box, each cable shall be grouped with its own system and identified using tags or identification strips.

E. Identify stations controlling remote equipment.

3.06 TESTING

A. All wiring shall be proof-tested for shorts, opens, and ground as a completed system.

END OF SECTION