

GENERAL NOTES

ITEM SPECIAL DUPLEX PNEUMATIC EJECTOR SEWAGE LIFT STATION

FED. RD. DIVISION	STATE	PROJECT
2	OHIO	

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LAKE COUNTY
Sec. LAK-44-3.79

GENERAL:

THE CONTRACTOR SHALL FURNISH AND INSTALL ONE FACTORY-BUILT, AUTOMATIC SEWAGE LIFT STATION, COMPLETE WITH ALL NEEDED EQUIPMENT FACTORY-INSTALLED IN A WELDED STEEL CHAMBER. THE EQUIPMENT SHALL FORM A DUPLEX PNEUMATIC EJECTOR SYSTEM, COMPLETE WITH MOTOR-DRIVEN COMPRESSORS, RECEIVERS, AIR-RESERVOIRS, VALVES, INTERNAL PIPING, AUTOMATIC CONTROL, CENTRAL CONTROL PANEL WITH CIRCUIT BREAKERS AND MOTOR STARTERS, VENTILATING SYSTEM, INTERNAL WIRING, EXTERNAL WIRING AND EXTERNAL ELECTRICAL COMPONENTS.

OPERATING CONDITIONS:

EACH SEWAGE RECEIVER AND EACH COMPRESSOR SHALL BE CAPABLE OF DELIVERING 125 GALLONS PER MINUTE OF RAW, UNSCREENED SEWAGE AGAINST A TOTAL DYNAMIC HEAD OF 15 FEET INCLUDING STATIC LIFT AND PIPE FRICTION. ALL OPENINGS AND PASSAGES SHALL BE LARGE ENOUGH TO PERMIT THE PASSAGE OF TRASH OR STRINGY MATERIAL WHICH CAN PASS THROUGH A 4" HOUSE COLLECTION SYSTEM.

STRUCTURE:

THE LIFT STATION SHALL BE CONSTRUCTED BY THE MANUFACTURER IN ONE COMPLETE FACTORY-BUILT ASSEMBLY WITH THREE INDIVIDUAL COMPARTMENTS. THE TOP COMPARTMENT SHALL BE THE CONTROL-COMPRESSOR CHAMBER. THE MIDDLE SECTION SHALL BE THE AIR-STORAGE CHAMBER AND SHALL CONTAIN THE VALVES AND PIPING. THE BOTTOM COMPARTMENT SHALL BE DIVIDED TO FORM TWO SEWAGE RECEIVERS. THE THREE CHAMBERS SHALL BE CONTAINED IN A VERTICAL CYLINDER OR CYLINDERS WITH THE SHELL MADE FROM 1/4" THICK STRUCTURAL-GRADE STEEL PLATE. THE INTERMEDIATE DIVIDERS BETWEEN THE CHAMBERS SHALL BE ASME FLANGED AND DISHED HEADS OF 3/8" NOMINAL THICKNESS WITH MANHOLE OR HANDHOLE OPENINGS WHERE REQUIRED TO GIVE ACCESS. THE AIR AND SEWAGE RECEIVERS SHALL BE DESIGNED FOR A MINIMUM OF 50 P.S.I. WORKING PRESSURE AND TESTED TO 150% OF THE DESIGN PRESSURE.

WHERE THE CAST-IRON PIPES PASS THROUGH THE STATION WALLS THEY SHALL BE REINFORCED WITH 1/4" THICK STEEL SLEEVES, WELDED INSIDE AND OUT TO THE STATION WALLS. THE SPACE BETWEEN THE PIPES AND THE STEEL SLEEVES SHALL BE PACKED TIGHT WITH PORTLAND CEMENT GROUT CONTAINING EMBECCO AND SEALED TO PREVENT LEAKAGE OF WATER OR AIR. THE LENGTH OF THE STATION SHALL BE ADEQUATE TO PLACE THE COVER APPROXIMATELY 18" ABOVE THE SURROUNDING GROUND WITH THE BOTTOM LOW ENOUGH SO THAT SEWAGE WILL FLOW BY GRAVITY THROUGH THE INLET PIPE INTO THE RECEIVERS. WELDED TO THE BOTTOM OF THE STRUCTURE SHALL BE A SUPPORTING BASE ASSEMBLY CONSISTING OF FOUR (OR MORE) REINFORCED LEGS WITH GENEROUS PADS. THE COVER SHALL BE OF THE HINGED TYPE WITH SUITABLE DRIP LIP AROUND THE EDGE AND SHALL BE EQUIPPED WITH A SPRING LOADED COVER SUPPORT SYSTEM WITH LATCH TO HOLD THE COVER IN THE OPEN POSITION. THE COVER SHALL BE EPOXY COATED WITH A REFLECTIVE COLOR TO REDUCE HEAT ABSORPTION. A COVER HANDLE FOR OPENING AND A SIMPLE, DEPENDABLE LOCKING DEVICE WHICH CAN BE OPENED FROM THE INSIDE WITHOUT A KEY, SHALL BE PROVIDED.

THE ACCESS LADDERS IN THE CONTROL-COMPRESSOR CHAMBER AND AIR-STORAGE CHAMBER SHALL HAVE RUNGS WELDED TOP TO BOTTOM ON 12" CENTERS TO STEEL SIDE RAILS WHICH SHALL BE WELDED TO PLATE BRACKETS WELDED TO THE CYLINDER WALL.

LIFTING LUGS SHALL BE FURNISHED FOR UNLOADING AND ERECTION AT THE JOB SITE.

WELDING:

ALL STEEL STRUCTURAL MEMBERS SHALL BE JOINED BY ELECTRIC ARC WELDING WITH FILLETS OF ADEQUATE SECTION FOR THE JOINT INVOLVED. ALL INSERTS FOR PIPES, ETC. SHALL BE WELDED INSIDE AND OUT.

PROTECTION AGAINST CORROSION:

AFTER WELDING, ALL INSIDE AND OUTSIDE SURFACES OF THE STRUCTURE SHALL BE BLASTED WITH STEEL GRIT TO REMOVE RUST, MILLSALE, WELD SLAG, ETC. TWO HEAVY INERT COATINGS OF "VERSAFOX" EPOXY RESIN, ESPECIALLY FORMULATED BY SMITH & LOVELESS FOR ABRASION AND CORROSION RESISTANCE, SHALL BE FACTORY APPLIED TO ALL INSIDE AND OUTSIDE SURFACES PRIOR TO SHIPMENT. TWO 17-POUND PACKAGED MAGNESIUM ANODES SHALL BE PROVIDED FOR CATHODIC PROTECTION AND SHALL BE BURIED ON OPPOSITE SIDES OF THE CHAMBER DURING INSTALLATION AND SECURELY CONNECTED THERETO BY HEAVY COPPER WIRE TO COPPER TERMINALS PROVIDED BY THE MANUFACTURER.

AIR COMPRESSORS:

TWO MOTOR-DRIVEN AIR COMPRESSORS OF THE SINGLE-STAGE AIR-COOLED PISTON TYPE WITH V-BELT DRIVE SHALL BE PROVIDED COMPLETE WITH INTAKE FILTER-SILENCER. THE PISTONS SHALL BE OF ALUMINUM OR SEMI-STEEL FITTED WITH THREE COMPRESSION RINGS AND ONE OIL CONTROL RING. THE DROP-FORGED CRANKSHAFTS SHALL BE PERFECTLY BALANCED WITH INTEGRAL COUNTER WEIGHTS. THE MAIN BEARINGS SHALL BE TIMKEN ROLLER BEARINGS. THE CYLINDERS AND CYLINDER HEADS SHALL BE CAST OF NICKEL CHROME ALLOY IRON WITH DEEP VERTICAL COOLING FINNS. THE COMPRESSORS SHALL HAVE AN AUTOMATIC UNLOADER WHICH WITHHOLDS THE LOAD FROM THE COMPRESSORS UNTIL THE MOTORS HAVE REACHED FULL SPEED.

MOTORS:

THE COMPRESSORS SHALL BE DRIVEN BY 3 HP, 1750 RPM, 3 PHASE, 60 CYCLE, 220 VOLT, HORIZONTAL, SHIELDED, DRIP-PROOF, BALL-BEARING, ELECTRIC MOTORS. THE MOTORS SHALL BE 40° C. RISE CONTINUOUS DUTY TYPE WITH 15% SERVICE FACTOR.

CONTROL:

MAJOR ITEMS OF THE CONTROL SHALL BE MOUNTED WITHIN A COMMON NEMA TYPE 12 ENCLOSURE WITH OIL TIGHT "HAND-OFF-AUTOMATIC" SELECTOR SWITCH FOR EACH COMPRESSOR IN THE COVER AND WITH THREE-WAY "TEST-ON-OFF" SELECTOR SWITCHES TO PERMIT TESTING OF THE EJECTION CYCLE IN EACH RECEIVER BY INITIATING AUTOMATIC EJECTION OF THE SEWAGE. AN AUTOMATIC CONTROL SYSTEM SHALL BE PROVIDED FOR THE COMPRESSORS WITH PRESSURE SWITCHES CONNECTED TO THE AIR RESERVOIR. AN AUTOMATIC ALTERNATOR SHALL BE PROVIDED TO REVERSE THE SEQUENCE OF OPERATION OF THE COMPRESSORS ON EACH NEW CYCLE. BOTH COMPRESSORS SHALL RUN IN PARALLEL IF REQUIRED.

THERMAL-MAGNETIC CIRCUIT BREAKERS WITH DEAD FRONT SHALL BE PROVIDED, BOTH AS DISCONNECT SWITCHES AND OVERCURRENT PROTECTION AGAINST SHORT CIRCUITS OR GROUNDS OF THE MOTOR BRANCH CIRCUIT CONDUCTORS, CONTROL EQUIPMENT AND MOTORS. MAGNETIC ACROSS-THE-LINE STARTERS WITH THERMAL OVERLOAD PROTECTION AND UNDER VOLTAGE RELEASE SHALL BE SUPPLIED TO OPERATE AND PROTECT THE MOTORS.

TWO THREE-WAY VALVES, OPERATED BY PILOT SOLENOID VALVES, SHALL BE PROVIDED AND SO CONNECTED THAT THE SEWAGE RECEIVERS ARE NORMALLY VENTED OUTDOORS THROUGH A VENT LINE WITH RAIN-TIGHT CAP. WHERE REQUIRED, THE VALVES SHALL BE PROTECTED FROM FREEZING BY A THERMOSTATICALLY-CONTROLLED 1,350-WATT COMBINATION CIRCULATING-FAN AND ELECTRIC HEATER MOUNTED BELOW THE CONTROL PANEL. A SIMPLE, DEPENDABLE ELECTRODE CONTROL SHALL BE INCLUDED IN EACH RECEIVER, COMPLETE WITH SPECIALLY DESIGNED LIQUID LEVEL SENSING DEVICE TO ACTUATE THE SOLENOID VALVE WHEN THE SEWAGE RECEIVER IS FULL, THUS CLOSING OFF THE VENT CONNECTION AND INTRODUCING AIR UNDER PRESSURE TO FORCE THE SEWAGE OUT OF THE DISCHARGE LINE. DEPENDABLE, ADJUSTABLE, TIME-DELAY RELAYS SHALL BE INSTALLED TO REVERSE THE THREE-WAY VALVES WHEN THE SEWAGE LEVEL REACHES THE LOW POINT, THUS CUTTING OFF THE AIR SUPPLY AND OPENING THE VENT.

THE ELECTRODE PROBES SHALL BE OF STAINLESS STEEL AND SHALL BE PROTECTED FROM FOULING OR GROUNDING BY A CONTINUOUS, INERT JACKET OF HIGH DIELECTRIC STRENGTH AND LOW MOISTURE ABSORPTION. THE ELECTRODES SHALL BE MOUNTED WITHIN THE AIR-SUPPLY PIPE TO EACH SEWAGE RECEIVER, SO THAT THEY WILL BE BLOWN CLEAN OF

CONTROL: (CONTINUED)

CONDENSATION, ETC. ON EACH CYCLE OF OPERATION. INTERLOCKS SHALL BE PROVIDED TO PREVENT THE RECEIVERS FROM DISCHARGING AT THE SAME TIME.

VENTILATION:

VENTILATION OF THE CONTROL-COMPRESSOR CHAMBER SHALL BE BY OUTSIDE AIR, DRAWN IN BY THE COMPRESSORS AND CIRCULATED BY THE AIR-COOLING FAN BUILT INTO THE COMPRESSOR PULLEYS. THE AIR INTAKE SHALL BE COVERED WITH HEAVY SCREEN. A FIXED CLEARANCE BENEATH THE FLANGED COVER AND THE TOP OF THE CHAMBER SHALL PERMIT THE COOLING AIR TO ESCAPE, COOLING THE LID IN THE PROCESS.

LIGHTING:

A PORTABLE LIGHT SHALL BE INSTALLED ADJACENT TO THE CONTROL PANEL IN THE UPPER OR EQUIPMENT CHAMBER. THE LIGHT SHALL BE PROVIDED WITH SUFFICIENT CORD LENGTH TO ALLOW COMPLETE VISUAL INSPECTION OF MIDDLE OR AIR STORAGE CHAMBER.

SUMP EJECTOR:

ON EACH CYCLE OF OPERATION, MOISTURE ACCUMULATING IN THE BOTTOM OF THE AIR-STORAGE CHAMBER SHALL BE REMOVED AUTOMATICALLY BY BEING EXPELLED INTO THE SEWAGE RECEIVER WITH THE AIR BEING USED.

VALVES AND PIPING:

THE SEWAGE INFLUENT LINES SHALL BE 6 INCH, CLASS 150 CAST-IRON PIPE WITH MECHANICAL JOINT BELL OUTSIDE THE CHAMBER. 6 INCH BRONZE FITTED CHECK VALVES AND DOUBLE-DISC GATE VALVES SHALL BE INSTALLED IN THE INFLUENT AND DISCHARGE LINES. THE COMMON DISCHARGE OUTLET SHALL BE 6 INCH, CLASS 150 CAST-IRON PIPE WITH MECHANICAL JOINT BELL JUST OUTSIDE THE PUMP CHAMBER. VALVES SHALL BE PROVIDED SO THAT THE RECEIVERS CAN BE CONNECTED TO THE COMPRESSORS DIRECTLY TO PERMIT AUTOMATIC OPERATION WITH THE AIR RESERVOIR OPEN FOR INSPECTION. ALL AIR PIPING CONTACTED BY THE SEWAGE FUMES SHALL BE OF HEAVY ALUMINUM PIPE. ALL OTHER AIR PIPING SHALL BE CORROSION PROTECTED STEEL PIPES.

WIRING:

THE LIFT STATION SHALL BE COMPLETELY WIRED AT THE FACTORY IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE. ALL WIRING SHALL BE IN RIGID CONDUIT EXCEPT THE FLEXIBLE STEEL CONDUIT USED TO CONNECT THE MOTORS AND THE ELECTRODE HOLDERS TO THE RIGID CONDUIT.

FACTORY TESTS:

ALL EQUIPMENT IN THE LIFT STATION SHALL BE FACTORY-TESTED UPON COMPLETION TO ELIMINATE EXCESSIVE VIBRATION OR LEAKS IN THE PIPING AND TO ASSURE PROPER OPERATION OF THE AUTOMATIC CONTROL SYSTEM AND ALL AUXILIARY EQUIPMENT.