

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 220516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

- 1.1 REQUIREMENTS
A. PROVIDE FOR EXPANSION OF PLUMBING PIPING IN ACCORDANCE WITH INDUSTRY STANDARDS AND GOOD INSTALLATION PRACTICES.

END OF SECTION 220516

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

- 1.1 SLEEVE-SEAL SYSTEMS
A. FIELD-ASSEMBLED, MODULAR SEALING-ELEMENT UNIT FOR FILLING ANNULAR SPACE BETWEEN PIPING AND SLEEVE.
1. SEALING ELEMENTS: EPDM OR RUBBER
2. PRESSURE PLATES: STAINLESS STEEL
3. CONNECTING BOLTS AND NUTS: STAINLESS STEEL
- 1.2 SLEEVE-SEAL FITTINGS
A. MANUFACTURED PLASTIC, SLEEVE-TYPE, PLASTIC OR RUBBER WATERSTOP ASSEMBLY MADE FOR IMBEDDING IN CONCRETE SLAB OR WALL.
- 1.3 GROUT
A. NONSHRINK, FACTORY PACKAGED.
- 1.4 SLEEVE AND SLEEVE-SEAL SCHEDULE
A. EXTERIOR CONCRETE WALLS ABOVE GRADE:
1. PIPING SMALLER THAN 4": GALVANIZED-STEEL WALL SLEEVES
B. EXTERIOR CONCRETE WALLS BELOW GRADE:
1. PIPING SMALLER THAN 4": GALVANIZED-STEEL WALL SLEEVES
C. CONCRETE SLABS-ON-GRADE:
1. PIPING SMALLER THAN 4": GALVANIZED-STEEL WALL SLEEVES
D. CONCRETE SLABS ABOVE GRADE:
1. PIPING SMALLER THAN 4": PVC-PIPE SLEEVES
E. INTERIOR PARTITIONS:
1. PIPING SMALLER THAN 4": GALVANIZED-STEEL PIPE SLEEVES OR PVC-PIPE SLEEVES

END OF SECTION 230517

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

- 1.1 PRODUCTS
A. LIQUID-IN-GLASS THERMOMETERS:
1. COMPACT-STYLE, LIQUID-IN-GLASS THERMOMETERS:
a. CASE: CAST ALUMINUM ; 6-INCH (152-MM) SIZE.
b. CASE FORM: STRAIGHT.
c. TUBE: GLASS WITH MAGNIFYING LENS AND BLUE ORGANIC LIQUID.
d. TUBE BACKGROUND: NONREFLECTIVE ALUMINUM WITH ETCHED SCALE IN DEG F.
B. PRESSURE GAGES:
1. DIRECT-MOUNTED, METAL-CASE, DIAL-TYPE PRESSURE GAGES:
a. CASE: LIQUID-FILLED CAST ALUMINUM 4-1/2-INCH (114-MM) DIAMETER.
b. PRESSURE-ELEMENT ASSEMBLY: BOURDON TUBE UNLESS OTHERWISE INDICATED.
c. PRESSURE CONNECTION: BRASS, WITH NPS 1/4 (DN 8), ASME B1.20.1 PIPE THREADS AND BOTTOM-OUTLET TYPE UNLESS BACK-OUTLET TYPE IS INDICATED.
d. DIAL: NONREFLECTIVE ALUMINUM WITH ETCHED SCALE IN PSI.
e. WINDOW: GLASS.
f. RING: METAL.
g. ACCURACY: GRADE A, PLUS OR MINUS 1 PERCENT OF MIDDLE HALF OF SCALE RANGE.

END OF SECTION 230519

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

- 1.1 COMPONENTS
A. VIBRATION ISOLATORS:
1. OPEN-SPRING ISOLATORS: FREESTANDING, LATERALLY STABLE.
2. PIPE-RISER RESILIENT SUPPORT: ALL-DIRECTIONAL, ACOUSTICAL PIPE ANCHOR.
3. RESILIENT PIPE GUIDES.
4. RESTRAINED-AIR-SPRING ISOLATORS: FREESTANDING, SINGLE OR MULTIPLE, COMPRESSED-AIR BELLOWS WITH VERTICAL-LIMIT STOP RESTRAINT.
5. ELASTOMERIC HANGERS.
6. SPRING HANGERS: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION AND WITH VERTICAL-LIMIT STOP.
B. SEISMIC RESTRAINT DEVICES:
1. SNUBBERS: WELDED STRUCTURAL-STEEL SHAPES AND REPLACEABLE RESILIENT ISOLATION WASHERS AND BUSHINGS.
2. RESTRAINT CHANNEL BRACINGS: MFMA-4, SHOP- OR FIELD-FABRICATED BRACING ASSEMBLIES.
3. RESTRAINT CABLES: [ASTM A 603 GALVANIZED] [ASTM A 492 STAINLESS]-STEEL CABLES.
4. HANGER-ROD STIFFENER: STEEL TUBE OR STEEL SLOTTED-SUPPORT-SYSTEM SLEEVE WITH INTERNALLY BOLTED CONNECTIONS TO HANGER ROD.
5. RESILIENT ISOLATION WASHERS AND BUSHINGS: ONE-PIECE, MOLDED, OIL- AND WATER-RESISTANT NEOPRENE, WITH A FLAT WASHER FACE.
6. ANCHOR BOLTS: MECHANICAL TYPE, SEISMIC RATED.
C. VIBRATION ISOLATION EQUIPMENT BASES:
1. STEEL BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS.
2. INERTIA BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS READY FOR FIELD-APPLIED, CAST-IN-PLACE CONCRETE.

- 1.2 FIELD QUALITY CONTROL
A. TESTING: BY CONTRACTOR.

END OF SECTION 230548

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

- 1.1 QUALITY ASSURANCE
A. QUALITY STANDARD FOR PIPING IDENTIFICATION: ASME A13.1.
- 1.2 PRODUCTS
A. EQUIPMENT LABELS: PLASTIC.
B. WARNING SIGNS AND LABELS: 1/16 INCH (1.6 MM) THICK WITH ADHESIVE. LETTER SIZE NOT LESS THAN 1/4 INCH (6.4 MM) FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES (600 MM), 1/2 INCH (13 MM) FOR VIEWING DISTANCES UP TO 72 INCHES (1830 MM), AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-QUARTERS THE SIZE OF PRINCIPAL LETTERING.
C. PIPE LABELS: SELF-ADHESIVE.
D. DUCT LABELS: 1/16 INCH (1.6 MM) THICK WITH ADHESIVE. LETTER SIZE NOT LESS THAN 1/4 INCH (6.4 MM) FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES (600 MM), 1/2 INCH (13 MM) FOR VIEWING DISTANCES UP TO 72 INCHES (1830 MM), AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-QUARTERS THE SIZE OF PRINCIPAL LETTERING.
E. STENCILS: ALUMINUM.
F. VALVE TAGS: BRASS, 0.032-INCH (0.8-MM) MINIMUM THICKNESS.
G. WARNING TAGS: 3 BY 5-1/4 INCHES (75 BY 133 MM) MINIMUM FASTENERS.
H. THERMOSTAT LABELS: 1/8" (3MM) HIGH WHITE LETTERS ON KELLY GREEN OR BLACK PHENOLIC BACKGROUND (E.G. "AC-1: WORKROOM").

END OF SECTION 230553

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

- 1.1 SUMMARY
A. TAB FOR THE FOLLOWING:
1. BALANCING AIR SYSTEMS:
a. CONSTANT-VOLUME AIR SYSTEMS.
b. DUAL-DUCT SYSTEMS.
c. VARIABLE-AIR-VOLUME SYSTEMS.
d. MULTIZONE SYSTEMS.
e. INDUCTION-UNIT SYSTEMS.
2. TAB EQUIPMENT:
a. HEAT EXCHANGERS.
b. MOTORS.
c. CONDENSING UNITS.
d. HEAT-TRANSFER COILS.
3. TAB EXISTING SYSTEMS AND EQUIPMENT.
4. SOUND TESTS.
5. VIBRATION TESTS.
6. DUCT LEAKAGE TESTS.
7. CONTROL SYSTEM VERIFICATION.
- 1.2 QUALITY ASSURANCE
A. ASHRAE COMPLIANCE: APPLICABLE REQUIREMENTS IN ASHRAE 62.1, SECTION 7.2.2 - "AIR BALANCING."
B. ASHRAE/IESNA COMPLIANCE: APPLICABLE REQUIREMENTS IN ASHRAE/IESNA 90.1, SECTION 6.7.2.3 - "SYSTEM BALANCING."
- 1.3 EXECUTION
A. TOLERANCES: PLUS OR MINUS 10 PERCENT OF DESIGN VALUES.
B. FINAL REPORT: PREPARE A CERTIFIED WRITTEN REPORT; TABULATE AND DIVIDE THE REPORT INTO SEPARATE SECTIONS FOR TESTED SYSTEMS AND BALANCED SYSTEMS. INCLUDE THE FOLLOWING:
1. GENERAL PROJECT DATA
2. SYSTEM DIAGRAMS
3. AIR-HANDLING-UNIT TEST REPORTS
4. APPARATUS-COIL TEST REPORTS
5. FAN TEST REPORTS
6. DUCT TRAVERSE REPORTS
7. INSTRUMENT CALIBRATION REPORTS
C. INSPECTIONS: RANDOM CHECKS BY CONSTRUCTION MANAGER TO VERIFY FINAL TAB REPORT.

END OF SECTION 230593

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230713 - DUCT INSULATION

- 1.1 QUALITY ASSURANCE
A. SURFACE-BURNING CHARACTERISTICS: FLAME-SPREAD INDEX OF 25, AND SMOKE-DEVELOPED INDEX OF 80 FOR INSULATION INSTALLED INDOORS; OR 75, AND SMOKE-DEVELOPED INDEX OF 150 FOR INSULATION INSTALLED OUTDOORS;
ACCORDING TO ASTM E 84.
B. ADHESIVES: VOC CONTENT OF 50 G/L OR LESS FOR INDOOR APPLICATIONS.
- 1.2 DUCT INSULATION SCHEDULE, GENERAL
A. PLENUMS AND DUCTS REQUIRING INSULATION:
1. INDOOR, CONCEALED SUPPLY AND OUTDOOR AIR.
2. INDOOR, EXPOSED SUPPLY (WHERE POSSIBILITY OF CONDENSATION).
3. INDOOR, EXPOSED OUTDOOR AIR.
4. INDOOR, CONCEALED RETURN LOCATED IN UNCONDITIONED SPACE.
5. INDOOR, EXPOSED RETURN LOCATED IN UNCONDITIONED SPACE.
6. INDOOR, CONCEALED OVEN AND WAREWASH EXHAUST.
7. INDOOR, EXPOSED OVEN AND WAREWASH EXHAUST.
8. INDOOR, CONCEALED EXHAUST BETWEEN ISOLATION DAMPER AND PENETRATION OF BUILDING EXTERIOR.
9. INDOOR, EXPOSED EXHAUST BETWEEN ISOLATION DAMPER AND PENETRATION OF BUILDING EXTERIOR.
10. OUTDOOR, CONCEALED SUPPLY AND RETURN.
11. OUTDOOR, EXPOSED SUPPLY AND RETURN.
B. ITEMS NOT INSULATED:
1. METAL DUCTS WITH DUCT LINER OF SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1.
2. FACTORY-INSULATED FLEXIBLE DUCTS.
3. FACTORY-INSULATED PLENUMS AND CASINGS.
4. FLEXIBLE CONNECTORS.
5. VIBRATION-CONTROL DEVICES.
6. FACTORY-INSULATED ACCESS PANELS AND DOORS.
- 1.3 INDOOR DUCT AND PLENUM INSULATION SCHEDULE
A. CONCEALED, ROUND AND FLAT-OVAL, SUPPLY-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
B. CONCEALED, ROUND AND FLAT-OVAL, RETURN-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
C. CONCEALED, ROUND AND FLAT-OVAL, OUTDOOR-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
D. CONCEALED, ROUND AND FLAT-OVAL, EXHAUST-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
E. CONCEALED, RECTANGULAR, SUPPLY-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
F. CONCEALED, RECTANGULAR, RETURN-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
G. CONCEALED, RECTANGULAR, OUTDOOR-AIR DUCT INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
H. CONCEALED, RECTANGULAR, EXHAUST-AIR DUCT INSULATION BETWEEN ISOLATION DAMPER AND PENETRATION OF BUILDING EXTERIOR: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
I. CONCEALED, SUPPLY-AIR PLENUM INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
J. CONCEALED, RETURN-AIR PLENUM INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
K. CONCEALED, OUTDOOR-AIR PLENUM INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
L. CONCEALED, EXHAUST-AIR PLENUM INSULATION: FLEXIBLE ELASTOMERIC OR MINERAL-FIBER BLANKET.
M. EXPOSED, RECTANGULAR, SUPPLY-AIR DUCT INSULATION: MINERAL-FIBER BOARD
N. EXPOSED, RECTANGULAR, RETURN-AIR DUCT INSULATION: MINERAL-FIBER BOARD
O. EXPOSED, RECTANGULAR, OUTDOOR-AIR DUCT INSULATION: MINERAL-FIBER BOARD
P. EXPOSED, RECTANGULAR, EXHAUST-AIR DUCT INSULATION: MINERAL-FIBER BOARD
Q. EXPOSED, SUPPLY-AIR PLENUM INSULATION: MINERAL-FIBER BOARD
R. EXPOSED, RETURN-AIR PLENUM INSULATION: MINERAL-FIBER BOARD
S. EXPOSED, OUTDOOR-AIR PLENUM INSULATION: MINERAL-FIBER BOARD
T. EXPOSED, EXHAUST-AIR PLENUM INSULATION: MINERAL-FIBER BOARD
- 1.4 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE
A. CONCEALED, ROUND AND FLAT-OVAL, SUPPLY-AIR DUCT INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.
B. CONCEALED, ROUND AND FLAT-OVAL, RETURN-AIR DUCT INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.
C. CONCEALED, ROUND AND FLAT-OVAL, OUTDOOR-AIR DUCT INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.
D. CONCEALED, RECTANGULAR, SUPPLY-AIR DUCT INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.
E. CONCEALED, RECTANGULAR, RETURN-AIR DUCT INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.
F. CONCEALED, SUPPLY-AIR PLENUM INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.
G. CONCEALED, RETURN-AIR PLENUM INSULATION: MINERAL-FIBER BLANKET AND MINERAL-FIBER BOARD.

END OF SECTION 230713

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 230800 - COMMISSIONING OF HVAC

- 1.1 COMMISSIONING PROCESS ACTIVITIES
A. TESTING PREPARATION
1. CERTIFY THAT HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT HAVE BEEN INSTALLED, CALIBRATED, AND STARTED AND ARE OPERATING ACCORDING TO THE CONTRACT DOCUMENTS.
2. CERTIFY THAT HVAC&R INSTRUMENTATION AND CONTROL SYSTEMS HAVE BEEN COMPLETED AND CALIBRATED, THAT THEY ARE OPERATING ACCORDING TO THE CONTRACT DOCUMENTS, AND THAT PRETEST SET POINTS HAVE BEEN RECORDED.
3. CERTIFY THAT TESTING, ADJUSTING, AND BALANCING PROCEDURES HAVE BEEN COMPLETED AND THAT TESTING, ADJUSTING, AND BALANCING REPORTS HAVE BEEN SUBMITTED, DISCREPANCIES CORRECTED, AND CORRECTIVE WORK APPROVED.
4. SET SYSTEMS, SUBSYSTEMS, AND EQUIPMENT INTO OPERATING MODE TO BE TESTED (E.G., NORMAL SHUTDOWN, NORMAL AUTO POSITION, NORMAL MANUAL POSITION, UNOCCUPIED CYCLE, EMERGENCY POWER, AND ALARM CONDITIONS).
5. INSPECT AND VERIFY THE POSITION OF EACH DEVICE AND INTERLOCK IDENTIFIED ON CHECKLISTS.
6. CHECK SAFETY CUTOUPS, ALARMS, AND INTERLOCKS WITH SMOKE CONTROL AND LIFE-SAFETY SYSTEMS DURING EACH MODE OF OPERATION.
7. TESTING INSTRUMENTATION: INSTALL MEASURING INSTRUMENTS AND LOGGING DEVICES TO RECORD TEST DATA AS DIRECTED BY THE CMA.
8. PROVIDE FOR ANY ADDITIONAL TESTING AND SUPPORT AS MAY BE REQUIRED BY LOCAL AUTHORITIES AND THE COMMISSIONING AGENT.
B. REQUIRED COMMISSIONING DOCUMENTATION:
1. SUBMITTALS DELIVERY AND REVIEW PLAN.
2. IDENTIFICATION OF INSTALLED SYSTEMS, ASSEMBLIES, EQUIPMENT, AND COMPONENTS.
3. CONSTRUCTION CHECKLISTS.
4. CERTIFICATE OF COMPLETION.
5. CERTIFICATE OF READINESS.
6. TEST AND INSPECTION REPORTS AND CERTIFICATES.
7. CORRECTIVE ACTION DOCUMENTS.
8. VERIFICATION OF TESTING, ADJUSTING, AND BALANCING REPORTS.
9. PROVIDE ANY ADDITIONAL DOCUMENTATION AS MAY BE REQUIRED BY LOCAL AUTHORITIES AND THE COMMISSIONING AGENT.

END OF SECTION 230800

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 231123 - FACILITY NATURAL-GAS PIPING

- 1.1 SUMMARY
A. NATURAL-GAS PIPING WITHIN THE BUILDING AND DISTRIBUTION ON THE PROJECT SITE.
- 1.2 PERFORMANCE REQUIREMENTS
A. MINIMUM OPERATING-PRESSURE RATINGS:
1. PIPING AND VALVES: 100 PSIG (690 KPA) MINIMUM UNLESS OTHERWISE INDICATED.
2. SERVICE REGULATORS: 65 PSIG (450 KPA) MINIMUM UNLESS OTHERWISE INDICATED.
3. MINIMUM OPERATING PRESSURE OF SERVICE METER: 5 PSIG (34.5 KPA).
B. NATURAL-GAS SYSTEM PRESSURES WITHIN BUILDINGS: 0.5 PSIG (3.45 KPA) OR LESS.
- 1.3 MATERIALS
A. PIPING SPECIALTIES:
1. APPLIANCE FLEXIBLE CONNECTORS LISTED WITH CAPACITY MEETING OR EXCEEDING APPLIANCE RATING.
2. QUICK-DISCONNECT DEVICES.
3. Y-PATTERN STRAINERS.
4. WEATHERPROOF VENT CAP.
B. MANUAL GAS SHUTOFF VALVES:
1. TWO-PIECE, FULL-PORT BRONZE BALL VALVES WITH BRONZE TRIM.
2. BRONZE PLUG VALVES.
3. CAST-IRON, NONLUBRICATED PLUG VALVES.
4. PE BALL VALVES.
5. VALVE BOXES.
C. PRESSURE REGULATORS:
1. LINE PRESSURE REGULATORS.
2. APPLIANCE PRESSURE REGULATORS.
D. DIELECTRIC FITTINGS: DIELECTRIC UNIONS.
E. DETECTABLE WARNING TAPE FOR UNDERGROUND PIPING.
- 1.4 OUTDOOR PIPING SCHEDULE
A. UNDERGROUND PIPING: STEEL PIPE WITH WELDED JOINTS.
B. ABOVEGROUND PIPING: STEEL PIPE WITH THREADED JOINTS.
C. BRANCH PIPING IN CAST-IN-PLACE CONCRETE: ANNEALED-TEMPER COPPER TUBE WITH BRAZED JOINTS.
D. CONTAINMENT CONDUIT: STEEL PIPE WITH WELDED JOINTS.
- 1.5 INDOOR PIPING SCHEDULE FOR PRESSURES LESS THAN 0.5 PSIG (3.45 KPA)
A. ABOVEGROUND BRANCH PIPING NPS 1 (DN 25) AND SMALLER: STEEL PIPE WITH THREADED JOINTS.
B. ABOVEGROUND DISTRIBUTION PIPING: STEEL PIPE WITH THREADED JOINTS.
C. UNDERGROUND PIPING: STEEL PIPE WITH THREADED JOINTS.
D. CONTAINMENT CONDUIT AND VENT PIPING: STEEL PIPE WITH WELDED JOINTS.

END OF SECTION 231123

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PROJECT NAME:
**RENOVATION OF
STARBUCKS COFFEE
PORTLAND, 1080
FOREST AVE.**
PROJECT ADDRESS:
1080 FOREST AVENUE
PORTLAND, ME 04103
CUMBERLAND COUNTY

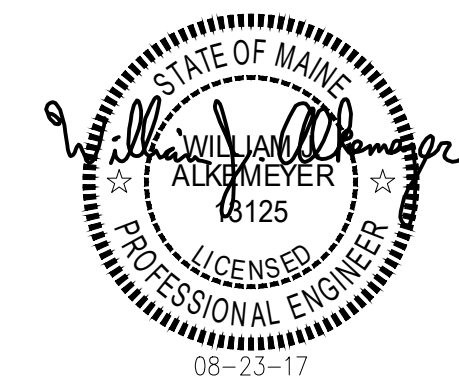
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Revision Schedule			
Rev	Date	By	Description

SHEET TITLE:
**MECHANICAL OUTLINE
SPECIFICATONS**

SCALE: AS SHOWN

SHEET NUMBER:
M-0002



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