

## INSTALLATION OF FUEL GAS PIPING SYSTEM:

- ALL PIPING AND EQUIPMENT IS SHOWN DIAGRAMMATIC. EXACT LOCATIONS TO BE DETERMINED IN FIELD. INSTALL PIPING STRAIGHT, PLUMB AND AS DIRECT AS POSSIBLE; PROVIDE RIGHT ANGLES ON LINES PARALLEL WITH BUILDING WALLS. INSTALL PIPES CLOSE TO WALLS, PARTITIONS, CEILINGS, ETC., AND OFFSET ONLY WHERE NECESSARY TO FOLLOW WALLS AS INDICATED. LOCATE GROUPS OF PIPES PARALLEL TO EACH OTHER; SPACE INDIVIDUAL PIPES IN ORDER TO PERMIT APPLICATION OF FULL INSULATION AND TO PERMIT ACCESS FOR SERVICING VALVES.
- ALL PIPING SHALL BE BEAMED TO BE FREE OR BURRS. KEEP PIPING FREE FROM SCALE AND DIRT; PROTECT OPEN PIPE ENDS WHENEVER WORK IS SUSPENDED DURING CONSTRUCTION TO PREVENT FOREIGN MATERIAL ENTERING AND LODGING; USE TEMPORARY PLUG, PLASTIC, OR OTHER APPROVED MATERIAL FOR PROTECTION.
- ALL PIPE PENETRATIONS OF FIRE WALLS AND FLOORS SHALL BE PROVIDED WITH PIPE SLEEVES AND FIRE RATED SEALANT. ACCESS PANELS SHALL BE PROVIDED AT LOCATIONS WHERE ACCESSIBILITY IS LIMITED.
- PIPING SHALL BE ACCURATELY CUT TO MEASUREMENTS ESTABLISHED IN THE FIELD AND INSTALLED IN PLACE WITHOUT COLD SPRING OR FORCING INTO ALIGNMENT. FLAME CUTTING OF BEVEL FOR WELDED JOINTS IS NOT ALLOWED. JOINTS SHALL BE FREE OF BURRS AND ALL WELD SPLATTER AND BEADS REMOVED FROM JOINTS. JOINTS SHALL EXHIBIT FULL PENETRATION OF ROOT PASS AND FINAL PASS SHALL BE FREE OF UNDER CUTTING. WELDING PROCEDURES AND WELDS SHALL BE PERFORMED IN ACCORDANCE WITH ANSI B31.1. OBTAIN LOCAL JURISDICTION FIRE DEPARTMENT FIRE WATCH DURING WELDING OF PIPE AND TIE-INS.
- INSTALLATION AND TESTING SHALL COMPLY WITH NFPA 54 AND THE REQUIREMENTS OF THE APPROVING AUTHORITIES AND THIS SECTION. INSTALL PIPING PITCHED NOT LESS THAN 1/4" IN 15' SLOPE UPWARD TO RISERS AND DOWN TO METER AND EQUIPMENT. INSTALL BRANCH TEES OF THE SIDE OR TOP OF MAINS AND PROVIDE 6" MINIMUM SIZE DRIP LEGS AT LOW POINTS.
- PROVIDE SHUT-OFF VALVE AND UNION OR FLANGE AT EACH EQUIPMENT CONNECTION. LOCATE VALVE WITHIN 6' OF EQUIPMENT SERVED WITH UNION DOWNSTREAM OF VALVE. PROVIDE CONTROL VALVES AND SHUT-OFF VALVES IN ACCESSIBLE LOCATIONS. DO NOT LOCATE VALVES ABOVE CEILINGS. DRIP LEG TRAPS SHALL BE READILY ACCESSIBLE. IDENTIFY EACH VALVE WITH UNIQUE TAG NUMBER. VALVES INSTALLED GREATER THAN 7'-0" AFF/AFR SHALL BE CHAIN OPERATED.
- INSTALL INDEPENDENT GAS VENT PIPING FROM VENT ON GAS TRAIN AND REGULATORS TO THE BUILDING EXTERIOR (WHERE APPLICABLE).
- INSTALL SYSTEM COMPONENTS AS REQUIRED FOR PROPER TESTING AS SPECIFIED IN THIS SECTION. PROVIDE AUXILIARY ISOLATION AND PURGE VALVES AS REQUIRED FOR CONSTRUCTION PHASING AND SYSTEM TESTING. REMOVE VALVE HANDLES FROM ALL AUXILIARY CONSTRUCTION PHASING AND TESTING VALVES AS DIRECTED BY THE OWNER.
- CONNECTIONS TO EXISTING GAS SYSTEM:  
ISOLATE THE EXISTING SECTION OF PIPING BY CLOSING THE CLOSEST UPSTREAM SHUT-OFF VALVE. TEST THE VALVE BY REDUCING THE DOWNSTREAM PRESSURE TO ATMOSPHERIC PRESSURE AND CLOSING ALL OUTLETS. MONITOR THE SYSTEM PRESSURE FOR AT LEAST 2 HOURS TO DETECT ANY INCREASE IN PRESSURE BY LEAKAGE THROUGH THE VALVE.  
BEFORE TESTING THE ZONE VALVE, VERIFY THAT OUTLETS ARE NOT LEAKING BY PRESSURIZING THE SECTION OF PIPING BETWEEN THE ZONE VALVE BOX AND THE OUTLETS AND CLOSING THE ZONE VALVE BOX. THE SYSTEM SHOULD MAINTAIN THE SAME SYSTEM PRESSURE WITHOUT A PRESSURE DROP FOR AT LEAST 5 MINUTES.  
WHILE WELDING THE NEW CONNECTION, PURGE THE PIPING WITH NITROGEN BACK THROUGH THE NEW CONNECTION FROM THE CLOSEST GAS OUTLET DOWNSTREAM OF THE NEW POINT OF CONNECTION.  
PRESSURIZE THE SYSTEM WITH NITROGEN TO 45 PSIG AFTER WELDING IS COMPLETED. BLOW THE EXISTING PIPING CLEAR FROM THE CLOSEST DOWNSTREAM GAS OUTLET OUT THE NEW CONNECTION INTO A CLEAN WHITE CLOTH UNTIL THERE ARE NO SIGNS OF DISCOLORATION OR PARTICULATES.  
REPRESSURIZE THE SYSTEM WITH NATURAL GAS AND PURGE ALL OUTLETS IN THE SYSTEM STARTING WITH THE OUTLET CLOSEST TO THE SOURCE OF SUPPLY. REPEATEDLY PURGE THE EXISTING SYSTEM THROUGH THE EXISTING OUTLETS INTO A CLEAN WHITE CLOTH AT NORMAL SYSTEM WORKING PRESSURE TO VERIFY THAT NO PARTICULATES REMAIN IN THE SYSTEM.  
DO NOT MAKE THE NEW CONNECTION TO THE NEW ROUGHED-IN PIPING SYSTEM UNTIL AFTER THE 200 PSI PARTICULATE BLOW-DOWN HAS BEEN PERFORMED.  
TEST THE NEW CONNECTION JOINT WITH SOAPY WATER AT NORMAL SYSTEM WORKING PRESSURE.
- IDENTIFICATION OF PIPE DURING CONSTRUCTION: PROVIDE A 6" LONG COLOR-CODED SPRAY PAINT INDICATION ON THE BOTTOM OF PIPE SECTIONS DURING INSTALLATION. IDENTIFY EACH SECTION OF PIPE IMMEDIATELY AFTER INSTALLATION. DO NOT PAINT PIPE JOINTS.
- FINAL IDENTIFICATION OF PIPING AND EQUIPMENT: FLOW ARROWS SHALL POINT FROM THE SOURCE TO THE OUTLETS. INSTALL MARKERS ON PAINTED PIPING ONLY AFTER PAINTING IS COMPLETE AND HAS BEEN ACCEPTED BY THE OWNER. INSTALL MARKER ADJACENT TO ACCESS PANELS IF PIPING IS CONCEALED. STENCIL EQUIPMENT SUCH AS PUMPS, COMPRESSORS, AND TANKS WITH THE NAME OF THE EQUIPMENT AND EQUIPMENT NUMBER. STENCILS SHALL BE AT LEAST 6" HIGH AND SHALL BE A CONTRASTING COLOR WITH THE EQUIPMENT FINISH.
- GAS RELIEF VENT PIPING TO BE EXTENDED TO 3'-0" MIN. ABOVE ROOF AND TERMINATED WITH INSECT SCREEN.

## FUEL GAS PIPING GENERAL NOTES:

- REFERENCE STANDARDS - ALL MATERIALS, EQUIPMENT WORK AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE MAIN STATE BUILDING CODE AND FUEL GAS AND PLUMBING CODES, AND THE APPLICABLE REQUIREMENTS OF THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI), AMERICAN SOCIETY OF TESTING MATERIALS (ASTM), AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME), NATIONAL ELECTRIC MANUFACTURERS' ASSOCIATION (NEMA), AMERICAN WELDING SOCIETY (AWS), AND CAST IRON SOIL PIPE INSTITUTE (CISPI), AND ANY PERTINENT FEDERAL, STATE LOCAL CODES, LAWS AND ORDINANCES, WHICH REQUIREMENTS HAVE PRECEDENCE OVER THE SPECIFICATIONS IN THE EVENT OF ANY CONFLICT. ANY CONFLICT BETWEEN THE REQUIREMENTS OF THE ABOVE ITEMS OR WITH THESE SPECIFICATIONS SHALL BE REFERRED TO THE ENGINEER.
- PERMITS, FEES, AND NOTICES - SECURE AND PAY FOR THE BUILDING PERMITS AND FOR ALL OTHER PERMITS OR GOVERNMENTAL FEES, LICENSES, INSPECTIONS, AND NOTICES NECESSARY FOR THE EXECUTION AND COMPLETION OF THE WORK, WHICH ARE CUSTOMARILY SECURED AFTER EXECUTION OF THE CONTRACT, WHICH ARE LEGALLY REQUIRED AT THE TIME THE BIDS ARE RECEIVED. GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY BEARING ON THE PERFORMANCE OF THE WORK, GIVE SUFFICIENT NOTICE OF ITS READINESS FOR INSPECTION.
- PROJECT RECORD DOCUMENTS - MAINTAIN A SET OF DRAWINGS AT THE SITE ON WHICH SHALL BE ACCURATELY SHOWN THE ACTUAL INSTALLATION OF ALL WORK INDICATING THEREON ANY VARIATIONS FROM THE CONTRACT DRAWINGS, INCLUDING CHANGES IN SIZES, LOCATION AND DIMENSIONS. PROVIDE A COMPLETE SET OF AS-BUILT DRAWINGS TO OWNER AND ENGINEER UPON COMPLETION OF PROJECT.
- OPERATING AND MAINTENANCE INSTRUCTIONS - PROVIDE A COMPETENT ENGINEER OR TECHNICIAN TO INSTRUCT THE OPERATING PERSONNEL IN THE OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS. A COPY OF THE OPERATING AND MAINTENANCE MANUAL SHALL BE PROVIDED AT THIS TIME. PROVIDE A MINIMUM OF 40 HOURS TRAINING ON MECHANICAL SYSTEMS, OR AS SPECIFIED IN EACH MECHANICAL SECTION OF THESE SPECIFICATIONS.
- CLEANING - KEEP THE WORK AREAS, INCLUDING ANY FABRICATION, AND STORAGE AREAS, FREE FROM ACCUMULATION OF WASTE MATERIALS OR RUBBISH CAUSED BY THIS OPERATION. AT THE COMPLETION OF THE WORK REMOVE ALL CONSTRUCTION DEBRIS, TEMPORARY FACILITIES AND EQUIPMENT FROM THE WORK AREA, AS WELL AS ALL TOOLS, CONSTRUCTION EQUIPMENT, MACHINERY, AND SURPLUS MATERIALS. IF THE CONTRACTOR FAILS TO CLEAN UP AT THE COMPLETION OF THE WORK, THE OWNER MAY DO SO AND THE COST THEREOF SHALL BE CHARGED TO THE CONTRACTOR.
- CUTTING AND PATCHING - PERFORM ALL CUTTING, FITTING OR PATCHING REQUIRED TO COMPLETE THE WORK OR MAKE ITS SEVERAL PARTS FIT TOGETHER PROPERLY.
- ELECTRICAL WORK - MOTORS, COMBINATION MAGNETIC MOTOR STARTERS, SWITCHES AND CONTROLS SHALL BE FURNISHED FOR ALL ELECTRICALLY DRIVEN EQUIPMENT SPECIFIED HEREIN AND SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE ELECTRICAL SPECIFICATIONS. ELECTRICAL POWER WIRING SHALL BE FURNISHED AND INSTALLED AS INDICATED ON THE ELECTRICAL DRAWINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION AND PROPER RELATIONSHIP OF HIS WORK TO THE BUILDING STRUCTURE AND OTHER TRADES. PARTICULAR ATTENTION IS DIRECTED TO WORK IN CONGESTED AREAS SUCH AS EQUIPMENT ROOMS, FURRED SPACES ABOVE HUNG CEILING, ETC. ALL CONFLICTS SHALL BE RESOLVED BY THE GENERAL CONTRACTOR AND APPROVED BY THE ENGINEER. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS FOR PIPING TO ACCOMMODATE OBSTRUCTIONS AND TRANSITIONS AROUND OBSTRUCTION SHALL BE PROVIDED WITH NO ADDITIONAL COST TO VERIZON WIRELESS.

## FUEL GAS PRODUCTS:

- BOLTS, ANCHOR BOLTS AND NUTS - ALL NECESSARY BOLTS, ANCHOR BOLTS, NUTS, WASHERS, PLATES AND BOLT SLEEVES SHALL BE PROVIDED IN ACCORDANCE HERewith. ANCHOR BOLTS SHALL HAVE SUITABLE WASHERS, LOCK WASHERS AND HEXAGONAL NUTS. BOLTS, ANCHOR BOLTS, NUTS AND WASHERS SPECIFIED TO BE GALVANIZED, SHALL BE ZINC COATED AFTER BEING THREADED BY THE HOT-DIP PROCESS.
- PIPE HANGERS & SUPPORTS - PIPE HANGERS AND SUPPORTS, HANGER RODS, PROTECTION SADDLES AND INSERTS SHALL BE TYPE NUMBERS BASED ON MANUFACTURER'S STANDARDIZATION SOCIETY SP-69, UNLESS OTHERWISE INDICATED. PIPE COVERING PROTECTION SADDLES: TYPES 39 OR 40. PIPE HANGERS: TYPES 1, 41, AND 43, OR FEE AND MASON #212 SPLIT RING HANGERS WITH SUPPORTING RODS. SPRING HANGERS: TYPES 49, 51, OR 53. ANCHORS: GRINNELL FIG. 197 OR FEE & MASON FIG. 159. PIPE GUIDES: GRINNELL FIG. 256, C & P FIG. 1007, OR ELCEN FIG. 411.
- ALL PIPING SYSTEMS SHALL BE SEISMICALLY BRACED IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE MASSACHUSETTS STATE BUILDING CODE AND NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CURRENT EDITION. REFER TO DETAILS FOR SEISMIC PIPE BRACING.
- FUEL GAS PIPE INSIDE BUILDING: SIZES 3" AND SMALLER SHALL BE SCHEDULE 40 CARBON STEEL PIPE WITH MALLEABLE IRON SCREWED FITTINGS.
- FUEL GAS PIPE OUTSIDE OF BUILDING SHALL BE POLYMER COATED, SCHEDULE 40 BLACK PIPE AND FITTINGS WITH WELDED JOINTS. ALL HANGER MATERIALS OUTSIDE OF BUILDING TO BE HOT DIPPED GALVANIZED. ALL NUTS, WASHERS & BOLTS TO BE STAINLESS STEEL.
- FUEL GAS SHUT-OFF VALVES 2-1/2" AND SMALLER: APOLLO 77.100 FULL PORT BRONZE BODY WITH TEE HANDLE. 2-1/2" AND LARGER: NORDSTORM 143, SERCK AUDCO LSW-133-GG, OR WALWORTH 175 PSI WORKING PRESSURE IRON BODY LUBRICATED PLUG VALVE WITH FLANGED ENDS.
- GAS PRESSURE BOOSTER  
FURNISH AND INSTALL AN ETTER COMPANY, MODEL E-101P-TRNS-UPS-VZW-SPL PKG BOOSTER PACKAGE COMPLETE WITH OUTDOOR ENCLOSURE & UPS EQUIPMENT LAYOUT

### A. CAPACITY AND CONDITIONS OF SERVICE:

- 1,100 CFH OF NATURAL GAS @ 4" W.C. INLET
- 11" W.C. OUTLET PRESSURE
- 1/3 HP EXPLOSION-PROOF MOTOR; CLASS 1, GROUP D.
- PROVIDE 20A, 120V, 1Ø POWER SOURCE FOR CONTROL PANEL.
- U.L. LISTED.

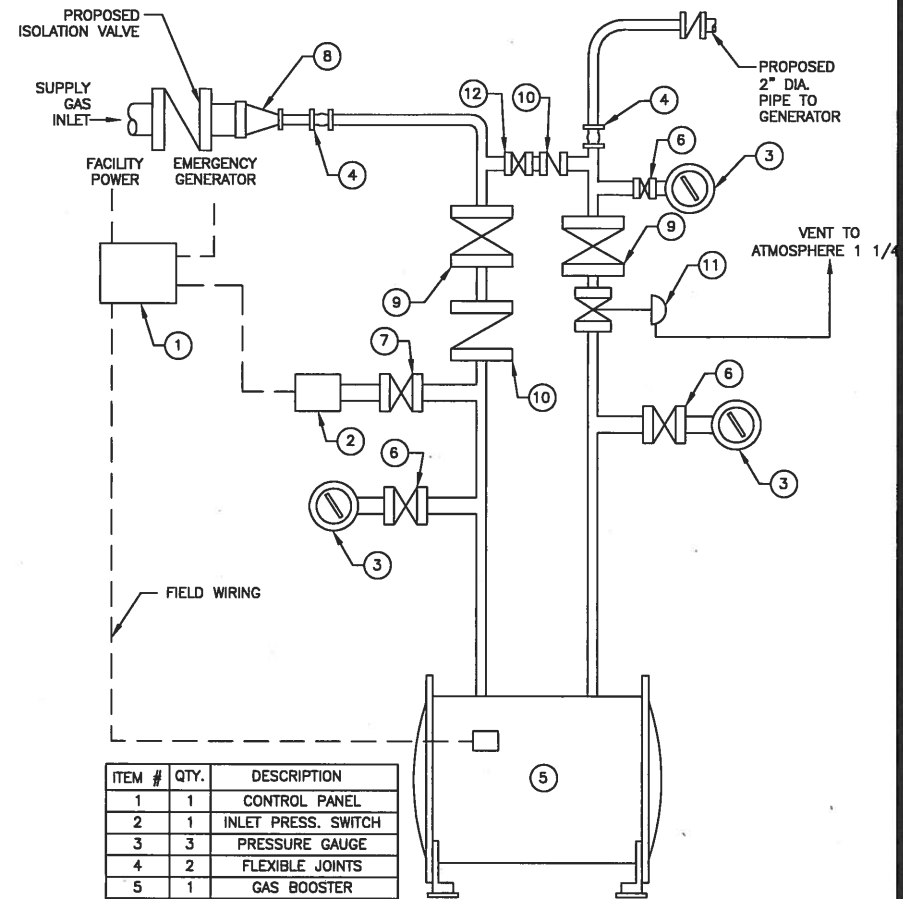
### B. THE SYSTEM SHALL INCLUDE THE FOLLOWING:

- UL LISTED MAGNETICALLY COUPLED GAS BOOSTER.
- SUPPLY PRESSURE GAGE WITH PETCOCK.
- INLET SHUT-OFF VALVE, ECLIPSE.
- INLET GAS CHECK VALVE, ECLIPSE.
- INLET FLEX HOSE WITH BRONZE OVERBRAID, MASS APPROVED.
- VENTLESS LOW GAS PRESSURE CUT OFF SWITCH, MANUAL RESET, ANTUNES LGPG.
- BY-PASS SHUT-OFF VALVE, ECLIPSE.
- BY-PASS GAS CHECK VALVE, ECLIPSE.
- OUTLET FLEX HOSE WITH STAINLESS STEEL OVERBRAID.
- OUTLET SHUT-OFF VALVE, ECLIPSE.
- DISCHARGE PRESSURE GAGE WITH PETCOCK.
- VENTLESS RECYCLING HIGH/LOW PRESSURE SWITCH FOR OPERATIONAL DEADBAND.
- LOCK UP DISCHARGE REGULATOR.
- 230V, 1Ø UPS POWER FOR GAS BOOSTER FOR GAS STARTUP FED FROM "COMMON PANEL".
- PROVIDE 2#24 CONTACT WIRES FROM TRANSFER SWITCH TO BOOSTER PANEL.

### C. PRESSURE BOOSTER SHALL BE FURNISHED WITH A FACTORY-INSTALLED EXPLOSION-PROOF JUNCTION BOX FOR ELECTRICAL POWER CONNECTION.

### D. PRESSURE BOOSTER SHALL BE FURNISHED WITH AN INTEGRATED CONTROL SYSTEM CONSISTING OF MOTOR STARTER; FUSED DISCONNECT/INTERLOCK SWITCH; BOOSTER MANUAL-OFF-AUTO SWITCH; LOW GAS PRESSURE SWITCH; HIGH GAS PRESSURE SWITCH; ALARM HORN; RELAYS; CONTROL CIRCUIT TRANSFORMER; SIGNAL LIGHTS FOR POWER, BOOSTER ON, LOW GAS PRESSURE, AND HIGH GAS PRESSURE. SYSTEM COMPONENTS, AS APPLICABLE, SHALL BE MOUNTED AND PREWIRED IN A NEMA 12 PANEL WITH NUMBERED TERMINAL STRIPS FOR CONNECTION OF EXTERNAL WIRING.

### E. PRESSURE BOOSTER SHALL BE ELECTRICALLY INTERLOCKED WITH STANDBY GENERATOR TO OPERATE ON DEMAND ONLY WHEN THE GENERATOR IS OPERATING.



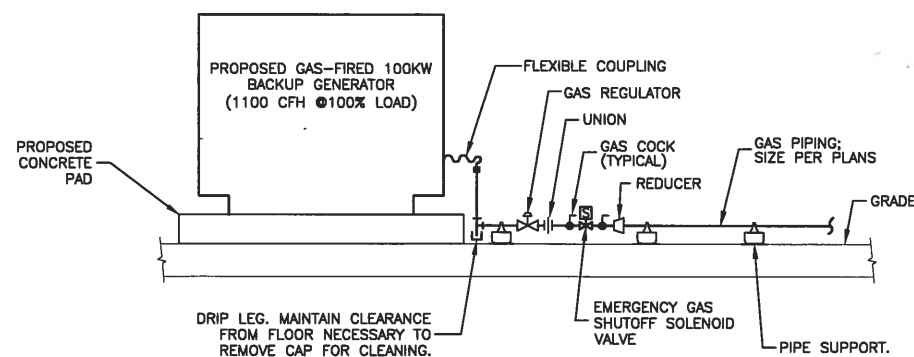
ITEM #	QTY.	DESCRIPTION
1	1	CONTROL PANEL
2	1	INLET PRESS. SWITCH
3	3	PRESSURE GAUGE
4	2	FLEXIBLE JOINTS
5	1	GAS BOOSTER
6	3	BALL VALVE
7	1	SWITCH SHUTOFF VALVE
8	1	2-1/2" TO 2" REDUCER
9	2	ISOLATION VALVE
10	2	CHECK VALVE
11	1	PRESSURE REGULATOR
12	1	BY-PASS VALVE

### NOTES:

- INSTALL PRESSURE REGULATOR (1) IN UPRIGHT/VERTICAL POSITION FOR PROPER OPERATION

## GAS BOOSTER DETAIL 1

SCALE: N.T.S.



## EMERGENCY GENERATOR GAS TRAIN 2

SCALE: N.T.S.

**verizon**  
WIRELESS

VERIZON WIRELESS  
118 FLANDERS ROAD  
WESTBOROUGH, MA 01581-3956

**PORTLAND ME  
HEAD END**

## CONSTRUCTION DRAWINGS

O	11/27/17	FOR CONSTRUCTION
C	10/30/17	90% SUBMITTAL
B	10/04/17	80% SUBMITTAL
A	04/14/17	50% SUBMITTAL

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JOB NUMBER: 50080012

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SHEET TITLE

GAS TRAIN  
NOTES & DETAILS

SHEET NUMBER