

DESIGN DATA AND SPECIFICATIONS

GENERAL

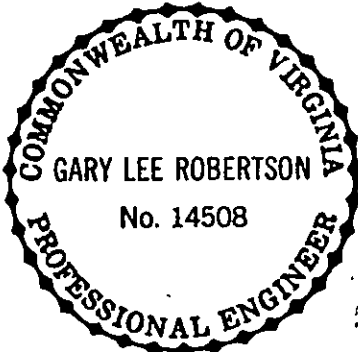
TREATMENT PLANT FACILITIES

1. PUMPS (WELLS)
GOULDS SUBMERSIBLE PUMP - 22 STAGES MODEL - 35CD50, 5 H.P. MOTOR - 230 VOLT SINGLE PHASE WITH FRANKLIN MOTOR CONTROL BOX NO. 00104 OR APPROVED EQUAL.
2. STORAGE TANK
A. 34,000 GALLON STORAGE (25' 0" DIA. X 10' 9" HIGH) AWWA STD. D103 (CONSTRUCTION)
B. WATER LEVEL CONTROL
ALLEN BRADLEY PRESSURE CONTROL SWITCH MODEL 836 C3J, 0.4 TO 4.0 PSI DIFFERENTIAL, NEMA TYPE 4 ENCLOSURE
C. COATING
COATING SHALL BE A GLASS FUSED TO STEEL COATING IN ACCORDANCE WITH SECTION 10.4 OF THE AWWA STD. R103
3. DISINFECTION
A. STORAGE TANK
WATER CONTAINING 50 PPM CHLORINE SHALL BE PLACED IN THE TANK TO SUCH A DEPTH THAT WHEN THE TANK IS FILLED THE RESULTANT CHLORINE CONCENTRATION SHALL BE NO LESS THAN 2 PPM. THE WATER CONTAINING 50 PPM CHLORINE SHALL BE HELD IN THE TANK FOR 24 HOURS BEFORE THE TANK IS FILLED. THE FULL TANK, IN TURN, SHALL BE ALLOWED TO STAND FOR 24 HOURS, AFTER WHICH THE TANK MAY BE PUT INTO SERVICE WITHOUT DRAINING THE WATER USED TO DISINFECT IT. TWO OR MORE SUCCESSIVE SAMPLES, TAKEN AT 24 HOUR INTERVALS, AND ANALYZED BY A CERTIFIED LABORATORY, SHALL INDICATE BACTERIOLOGICALLY SATISFACTORY WATER BEFORE THE FACILITY IS RELEASED FOR USE.
B. WATER MAIN
DISINFECTION IN ACCORDANCE WITH AWWA C601-81: APPLICATION OF 5 GRAM CALCIUM HYPOCHLORITE TABLET PER JOINT OF PIPE AND 1 OUNCE OF HYPOCHLORITE GRANULES PER 500 FEET OF PIPE; FILLING PIPE AT WATER FLOW RATE OF 1.0 F.P.S. OR LESS; ELIMINATION OF AIR POCKETS AND 24 HOUR CONTACT PERIOD; COLLECTION AND TESTING OF 2 WATER SAMPLES (BACTERIOLOGICAL TESTING) AT 24 HOUR INTERVALS AND MAXIMUM SPACING ALONG WATER LINE OF 2000 FEET. ALL TESTING MUST BE SATISFACTORY OR TOTAL TESTING REPEATED.
4. CONTROLS (WELLS)
WELL PUMPS TO BE CONTROLLED BY PRESSURE CONTROL SWITCH LOCATED AT STORAGE TANK. 14/3 CABLE TO BE BURIED WITH WATER LINES FROM TANK TO WELL.
WELLS SHALL HAVE DROP CABLE SIZE 6 FROM STARTER TO PUMP. SUPPLY WIRE FROM TRANSFORMER TO STARTER SHALL BE SIZE 4 (FOR MAX. 100' RUN).
5. PIPING (MEETING AWWA STANDARD FOR POTABLE WATER USE)
A. WELL PIPING AND FITTINGS
WELL PIPING AND FITTINGS AND BLOWOFFS LESS THAN 4" IN DIAMETER TO BE STANDARD STRENGTH GALVANIZED STEEL.
B. EXTERIOR PIPING
EXTERIOR PIPING 1" OR LESS IN DIAMETER TO BE TYPE "K" COPPER OR POLYTHYLENE P.E. 3408 (160 PSI).
EXTERIOR PIPING LARGER THAN 1" IN DIAMETER SHALL BE PVC PIPE SDR 21 (200) MEETING STANDARD ASTM D2241.
C. FITTINGS
VALVES, TEES, BENDS AND FIRE HYDRANTS TO BE MECHANICAL JOINT. CAST IRON CONSTRUCTION MEETING AWWA STANDARDS FOR A PRESSURE CLASS OF 150 PSI.
D. TESTING
PRESSURE AND LEAKAGE TESTING OF ALL WATER MAINS PER AWWA STANDARD; PRESSURE TEST @ 150 PSI FOR ONE HOUR; LEAKAGE TEST @ 150 PSI FOR TWO HOURS FOR MAXIMUM ALLOWABLE LEAKAGE OF 23.3 GPD, PER MILE OF PIPE, PER INCH OF DIAMETER.
6. WATER PRESSURE
MAXIMUM PRESSURE - 74 PSI; NORMAL MINIMUM WORKING PRESSURE - 34 PSI; MINIMUM DESIGN PRESSURE (EL.942.0)
7. SCREENS
SCREENS FOR OUTLET ENDS OF OVERFLOW, BLOWOFF AND DRAIN PIPES SHALL BE 1/2" X 1/2" MESH, MINIMUM 17 GAUGE, GALVANIZED HARDWARE CLOTH. THE HARDWARE CLOTH SHALL BE CRIMPED AROUND END OF PIPE AND SECURED WITH GALVANIZED STEEL WIRE.
8. PIPE COVER
A MINIMUM COVER OF THREE (3) FEET OVER THE PROPOSED LINE IS REQUIRED.
9. NOTIFICATION
NO WORK SHALL BEGIN WITHOUT NOTIFYING FRANKLIN COUNTY 24 HOURS IN ADVANCE. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL NECESSARY PERMITS.
10. PLAN APPROVAL
NO WORK SHALL BEGIN WITHOUT WRITTEN APPROVAL OF CONSTRUCTION PLANS.
11. INSPECTION
WORK SHALL BE SUBJECT TO INSPECTION BY THE COUNTY INSPECTORS AND DESIGN ENGINEER.
12. VALVE BOXES
CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND UNCOVERING ALL VALVE BOXES AFTER SURFACE TREATMENT OF ROADS AND ADJUSTING BOXES TO FINAL ROAD GRADES, IF NECESSARY.
13. CONFLICTS
ALL EXISTING UTILITIES MAY BE SHOWN OR MAY NOT BE SHOWN IN THE EXACT LOCATION. THE CONTRACTOR SHALL COMPLY WITH THE STATE WATER WORKS REGULATIONS, SECTION 12.05.03. WHERE LINES CROSS.
14. PLAN DEVIATION
THE CONTRACTOR SHALL NOTIFY THE COUNTY OF ANY FIELD CORRECTIONS TO THE APPROVED PLANS PRIOR TO SUCH CONSTRUCTION.
15. TRENCH COMPACTION
ALL TRENCHES WITHIN THE EXISTING OR FUTURE VIRGINIA STATE DEPARTMENT OF HIGHWAYS & TRANSPORTATION RIGHTS-OF-WAY MUST BE COMPACTED IN SIX INCH LAYERS.
16. FIELD STAKING
ALL LINES TO BE STAKED PRIOR TO CONSTRUCTION.

17. AS-BUILT PLANS
CONTRACTOR TO COORDINATE WITH THE ENGINEER TO PROVIDE AS-BUILT PLANS
18. STANDARDS
ALL CONSTRUCTION SHALL BE IN ACCORDANCE TO APPROVED CONSTRUCTION PRACTICES OF THE APPLICABLE TRADES (REF. #12).
19. SEPARATION
COMMONWEALTH OF VIRGINIA WATERWORKS REGULATIONS PROVIDING FOR MINIMUM 10 FEET HORIZONTAL OR 18 INCH VERTICAL SEPARATION BETWEEN WATER AND SEWER LINE SHALL BE PROVIDED (WATER LINE TO BE ABOVE SEWER LINE). ALSO WATER LINES SHALL BE MINIMUM OF 30 FEET FROM ANY SUBSURFACE DRAINFIELD.
20. BOOSTER SYSTEM
A. PUMPS TO BE GOULDS 3657 (OR APPROVED EQUAL), WITH SHP, 240 V, SINGLE PHASE 3500 RPM MOTORS. IMPELLER TO BE 5-1/4".
B. PRESSURE TANKS SHALL BE 2,500 GALLON (HIGH PRESSURE) AND 1,500 GALLON (CONTACT) HYDRO-PNEUMATIC (AWWA STD). THE TANKS SHALL BE PAINTED BOTH EXTERIOR AND INTERIOR IN ACCORDANCE WITH AWWA D102 STANDARDS. SURFACE PREPARATION SHALL BE IN ACCORDANCE WITH SSPC-SP10. EXTERIOR APINT SYSTEM SHALL BE EITHER TNE MEC 70/71-3, PENNSBURY COATINGS, WATER TANK SYSTEM NUMBER 10 OR EQUAL. INTERIOR PAINT SYSTEM SHALL BE EITHER TNE MEC 20-1 PENNSBURY COATINGS, 2 COAT HIGH BUILD EPOXY SYSTEM OR EQUAL.
C. CONTROLS SHALL BE AS FOLLOWS:
- PUMPS TO BE CONTROLLED BY HEAVY DUTY PRESSURE SWITCHES ON DISCHARGE PIPING OF HYDRO-PNEUMATIC TANK. PUMPS TO SHUT OFF AT 40 PSI. LEAD PUMP SHALL START AT 30 PSI. IF LEAD PUMP DOES NOT KEEP UP, PUMP 2 SHALL CUT ON AT 25 PSI. PUMP 3 SHALL CUT ON AT 20 PSI.
- ALL PUMPS SHALL HAVE HOA SWITCHES
- CONTROL CIRCUITS SHALL BE 120 V
- ELECTRICAL SERVICE SHALL BE PROVIDED WITH LIGHTENING ARRESTORS
- ALL RECEPTABLES AND SWITCHES SHALL HAVE MINIMUM 20 AMP RATING
- TWO 20 AMP GFI CIRCUITS AND RECEPTABLES SHALL BE PROVIDED
- HOUR RUN METERS SHALL BE PROVIDED FOR EACH PUMP MOTOR
- ALL WIRING TO BE COPPER AND SIZED APPROPRIATELY
D. CONTRACTOR SHALL SUPPLY ENGINEER WITH COMPLETE SHOP DRAWINGS INCLUDING COMPLETE PARTS LIST.
E. DISINFECTION OF PIPING AND BOOSTER STATION SHALL BE IN ACCORDANCE WITH AWWA STANDARDS.
F. PIPE SUPPORTS TO BE PLACED AT MAJOR FITTINGS AND OTHER LOCATIONS AS DEEMED NECESSARY. ADDITIONAL PIPE SUPPORTS MAY BE REQUIRED DURING CONSTRUCTION. PIPE SUPPORTS SHALL BE EITHER POURED CONCRETE WITH CRADLES FOR PIPE (FELT PLACED BETWEEN PIPE AND CONCRETE) OR METAL SUPPORTS WITH CRADLES FOR PIPE DESIGNED FOR APPROPRIATE STRENGTH.
G. CONTRACTOR TO COORDINATE ELECTRICAL SERVICE WITH APCO. ELECTRICAL SERVICE SHALL BE SIZED TO MEET NEC REQUIREMENTS.
H. AIR VOLUME CONTROLLER TO BE AIR RITE MODEL 610 OR APPROVED EQUAL.

1. DESIGN AND OPERATION CHARACTERISTICS:
A. DESIGN CAPACITY FOR 3 UNITS 125,280 GPD @ 24 HOURS/DAY NORMAL DEMAND 130 LOTS @ 400 GPD/LOT = 52,000 GPD
B. OPERATING FLOW RATE - 78 GPM (PRESENT); 87 GPM - ULTIMATE DESIGN
C. OPERATING TIME PER DAY - 11.1 HOURS AT NORMAL PEAK CAPACITY
D. OPERATING PRESSURE - INLET PRESSURE FROM WELL AT APPROXIMATELY 45 PSI AND OUTLET PRESSURE TO STORAGE AT APPROXIMATELY 39 PSI.
E. FILTER BACKWASH AND REGENERATION
BACKWASH RATE - 10 GPM PER SQUARE FOOT = 96 GPM
BACKWASH INTERVAL PER FILTER - 40 OPERATION HOURS OR APPROXIMATELY 50,000 GALLONS PER FILTER
REGENERATION INTERVAL - PER MANUFACTURER'S RECOMMENDATIONS
BACKWASH PRESSURE - APPROXIMATELY 30 PSI
BACKWASH VOLUME - 960 GALLONS PER FILTER FOR AN ESTIMATED 10 MINUTE BACKWASH
2. GENERAL DESCRIPTION OF OPERATION
A. TREATMENT
THE SYSTEM IS DESIGNED TO REMOVE IRON AND MANGANESE FROM THE WELLS RAW WATER BY THE USE OF PRESSURE FILTERS UTILIZING GREENSAND. CHEMICAL FEEDERS ARE INCLUDED TO ADD CHLORINE, SODA ASH AND POTASSIUM PERMANGANATE PRIOR TO FILTRATION. ALL CHEMICAL SOLUTIONS ARE TO BE PREPARED IN THE CHEMICAL TANKS FROM DRY CHEMICALS USING ELECTRIC MIXERS. CHEMICALS ARE TO BE STORED IN THEIR ORIGINAL CONTAINERS IN THE SPACE PROVIDED AND PORTIONS ARE TO BE MEASURED BY WEIGHING. A 1500 GALLON IN LINE PRESSURE TANK LOCATED BETWEEN THE CHEMICAL FEEDERS AND THE FILTERS WILL SERVE AS A CONTACT TANK FOR THE CHEMICALLY TREATED WATER. THE WELL PUMPS PROVIDE THE PRESSURE TO DELIVER THE WATER FROM THE WELL THROUGH THE TREATMENT SYSTEM AND DISCHARGE TO THE STORAGE TANK.
B. FILTER BACKWASH AND WASTEWATER DISPOSAL
BACKWASH WATER IS TO BE TAPPED FROM THE MAIN DISCHARGE LINE GOING TO THE STORAGE TANK. FILTERS ARE TO BE BACKWASHED INDIVIDUALLY ON A ROTATING SCHEDULE SUCH THAT NO MORE THAN ONE (1) FILTER IS BACKWASHED IN ANY 24 HR. PERIOD. PRESSURE GAUGES AND FLOW METERS ON BOTH THE INLET AND OUTLET PIPES AT EACH FILTER ARE TO BE MONITORED DAILY FOR USE AS A BASIS FOR SCHEDULING FILTER BACKWASH. BACKWASH IS TO BE INITIATED MANUALLY BY THE FLOW CONTROL VALVE ON EACH FILTER. THE RATE OF FLOW OF THE BACKWASH IS TO BE CONTROLLED BY A THROTTLING VALVE AND FLOW METER ON THE MAIN BACKWASH FEED LINE. THE BACKWASH WASTE WATER IS TO BE DISCHARGED INTO A SUMP IN THE FLOOR OF THE FILTER ROOM WHICH DRAINS TO THE BACKWASH WASTE WATER DISPOSAL SYSTEM.
3. EQUIPMENT
ALL EQUIPMENT SHALL BE INSTALLED AND OPERATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
A. PRESSURE FILTERS SHALL BE RAIN SOFT SERIES "F" 42" FILTERS AS MANUFACTURED BY THE RAIN SOFT WATER CONDITIONING COMPANY OR EQUAL (THREE REQUIRED). THE FILTER MEDIA SHALL CONSIST OF 14 CUBIC FEET (18" DEPTH) OF MANGANESE GREENSAND (16.6 MESH) FORMULATED FROM A GLAUCONITE GREENSAND WITH A CAPACITY OF IRON REMOVAL OF 12,000 PPM PER CUBIC FOOT AND A UNIFORMITY COEFFICIENT OF 1.5. EACH FILTER SHALL HAVE A MINIMUM OF 18" LAYER OF GRADED ANTHROCITE COAL ON THE GREENSAND FILTER MEDIA. EACH FILTER SHALL BE FITTED WITH SAMPLE TAPS AT THE TOP AND MID POINT OF THE GREENSAND FILTER MEDIA. ONE (1) CHEMICAL TANK FOR REGENERATION SOLUTION SHALL BE PROVIDED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
B. FLOW CONTROL VALVES SHALL BE PROVIDED FOR EACH FILTER AND SHALL BE 1-1/2" SOLO SERIES 404 CCA VALVES AS MANUFACTURED BY AQUA MAT INC. OR EQUAL. EACH VALVE SHALL HAVE 3 OPERATING POSITIONS. - ?BACKWASH, REGENERATION, AND SERVICE? AND SERVICE WITH ADJUSTABLE BACKWASH AND NOZZLE. RAW WATER SHALL BYPASS THROUGH THE VALVES TO SERVICE DURING THE BACKWASH AND REGENERATION CYCLES.
C. THE CHEMICAL FEED SYSTEM SHALL BE CHEM-TECH INTERNATIONAL OR EQUAL.
THE FEED SYSTEM SHALL PROVIDE FOR THE FOLLOWNG:
FOR CHLORINE AND POTASSIUM PERMANGANATE, THE FEED PUMP SHALL BE SERIES 100, MODEL 030 (0 TO 30 GPD), WITH SERIES 6,000 POLYETHYLENE TANK, MODEL 6155 (55 GALLONS); FOR SODA ASH THE FEED PUMPS SHALL BE SERIES 200, MODEL 2-100 (0 TO 100 GPD) WITH A SERIES 8000 POLYTHYLENE TANK, MODEL 8100 (100 GALLONS). THE TANKS SHALL BE EQUIPPED WITH STANDS AND PUMP MOUNTING BRACKETS AND EACH TANK SHALL BE EQUIPPED WITH ELECTRIC MIXERS.
D. TEST EQUIPMENT SHALL BE FURNISHED WITH THE CAPABILITY OF ALLOWING THE TEST FOR CHLORINE, IRON, PH, ALKALINITY, MANGANESE, AND TEMPERATURE. THE TEST FOR CHLORINE RESIDUAL SHALL BE BY EITHER THE DPD OR AMPERIMETRIC TITRATION METHODS. EACH COMPANY TEST UNITS (CAT #2231-02; 1433-00 & 1467-00). TEST UNITS FOR PH SHALL BE HACH COMPANY (CAT # 1470-11) AND IRON (CAT #1464-00 (IR-18) OR APPROVED EQUAL.
E. THE FLOW METERS SHALL BE BADGER 2" DISK METER OR EQUAL.
F. A SET OF SCALES FOR WEIGHING DRY CHEMICALS SHALL BE PROVIDED WITH THE SCALES HAVING A MINIMUM CAPACITY OF AT LEAST 50 POUNDS AND AN ACCURACY OF +/- 0.1 POUNDS.
G. THE EXHAUST FANS SHALL BE 12" WITH WALL SHUTTERS AND A CAPACITY OF 600 CFM. THE HEATER SHALL BE A 4,000 WATT HEAVY DUTY FAN FORCED WALL HEATER.
H. ALL HOSE BIBS SHALL BE EQUIPPED WITH VACUUM BREAKERS, WATTS NO. 8A OR EQUAL, UNLESS NOTED OTHERWISE.
I. THE DEHUMIDIFIER SHALL BE EBCO OASIS MODEL 22 QUART OR APPROVED EQUAL FOR 340 SQUARE FEET OF FLOOR AREA FOR WET ENVIRONMENT.

4. PIPE AND FITTINGS
ALL INTERIOR PIPE AND FITTINGS FOR WATER, LARGER THAN 1", SHALL BE SCHEDULE 80 PVC, SOLVENT JOINTS, MARKED "NSF-PW" FOR DRINKING WATER. ALL INTERIOR PIPE AND FITTINGS FOR WATER 1" AND SMALLER SHALL BE STANDARD TYPE L COPPER, HARD TEMPER WITH CAST OR WROUGHT SOLDER FITTINGS. PIPE AND FITTINGS FOR WATER LINES THROUGH AND BELOW THE FLOOR SLAB SHALL BE SCHEDULE 80 PVC, "NSF-PW" FOR DRINKING WATER. ALL PIPE AND FITTINGS FOR THE WASTEWATER DISPOSAL SYSTEM SHALL BE SCHEDULE 40 PVC. PIPING BELOW FLOOR SHALL BE BEDDED IN MINIMUM 6" SAND.
5. CHEMICAL FEED
THE FOLLOWING FEED RATES SHOWN ARE BASED UPON A FLOW 77 GPM.
A. CHLORINE - CALCIUM HYPOCHLORITE (HTH), PELLETIZED, WITH 70% AVAILABLE CHLORINE. INITIAL FEED SOLUTION TO BE 1.99 POUNDS CHLORINE PER DAY (2.50% AVAILABE CHLORINE WHICH WILL ALLOW AN INITIAL FEED RATE TO BE 9.5 GPD.
B. SODA ASH - SODIUM CARBONATE (50% AVAILABLE SODA ASH); INITIAL FEED SOLUTION TO BE 0.25 POUNDS PER GALLON WHICH WILL ALLOW AN INITIAL FEED RATE OF 34.7 GPD 20 PPM).
C. POTASSIUM PERMANGANATE - INITIAL FEED SOLUTION OF 1 OZ. PER 5 GALLONS FOR AN INITIAL FEED RATE OF 13.5 GPD.
D. POTASSIUM PERMANGANATE FOR FILTER REGENERATION TO BE IN ACCORDANCE WITH THE FILTERS MANUFACTURER'S RECOMMENDATIONS.
E. FEEDER MOTORS TO BE CONTROLLED AUTOMATICALLY BY PRESSURE SWITCH LOCATED ON THE STORAGE TANK. MOTOR CONTROLS SHALL BE EQUIPPED WITH ADEQUATE DELAYS TO CUT ON AFTER WELL PUMP IS RUNNING AND TO CUT OFF SIMULTANEOUSLY WITH WELL PUMP.
6. BACKWASH - WASTEWATER TREATMENT
A. BACKWASH VOLUMES
MAXIMUM PER FILTER = 960 GALLONS (96 GPM FOR 10 MIN.)
MAXIMUM FILTER BACKWASH PER DAY = 1 PER 24 HOUR INTERVAL
PEAK DAILY FLOW = 960 GALLONS
B. ABSORPTION AREA
ASSUME 30 MINUTE PERCOLATION RATE
AREA REQUIRED = 960 GALLONS @ 174 S.F./100 GAL. = 1670 S.F.
PERCOLATION TRENCH = 3.0' X 95'
NUMBER PERCOLATION TRENCHES REQUIRED = 6
C. MATERIALS AND INSTALLATION
MATERIALS AND INSTALLATION TO BE IN ACCORDANCE WITH REQUIREMENTS OF THE VIRGINIA DEPARTMENT OF HEALTH FOR SUBSURFACE SOIL ABSORPTION SYSTEMS.



REVISION	DATE	DESCRIPTION
DESIGNED		WAVERLY WATER SYSTEM NOTES & DESIGN DATA SNYDER - HUNT CORPORATION
DRAWN		
CHECKED		
LUMSDEN ASSOCIATES, P.C. ENGINEERS-SURVEYORS-PLANNERS ROANOKE, VIRGINIA		SCALE NONE DATE 24 MAR, 1989
		COMM BB-248 SHEET 2 OF 5