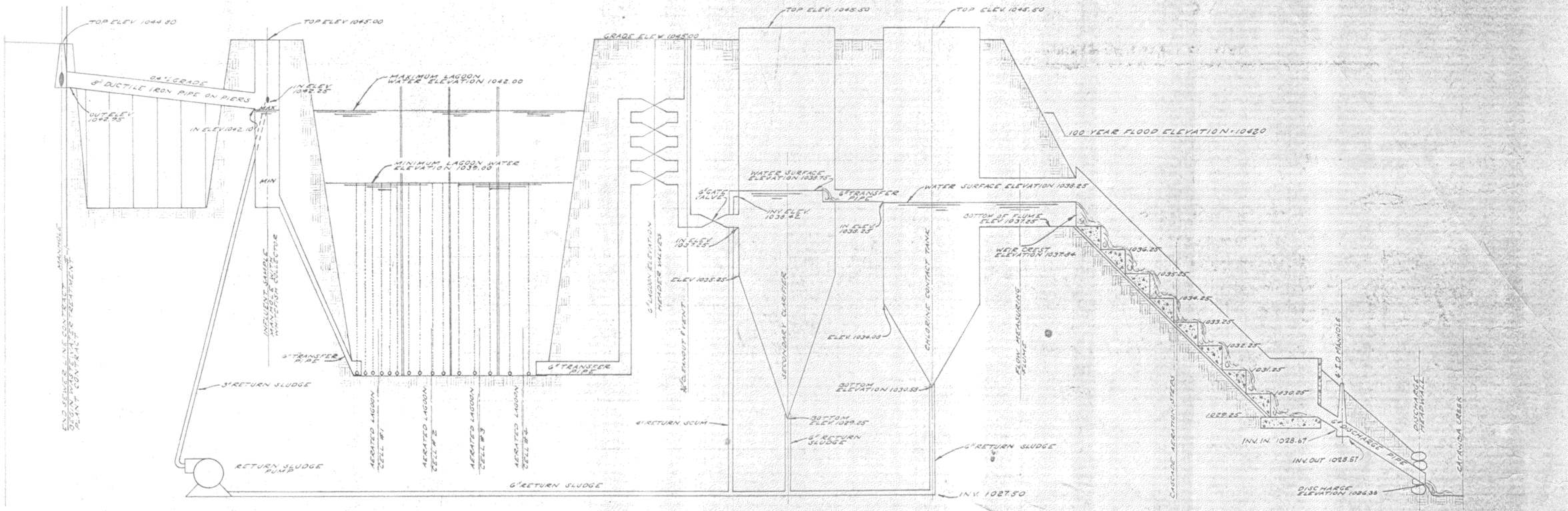

HYDRAULIC PROFILE

NO SCALE

DESIGN CRITERIA --- WASTEWATER TREATMENT PLANT

*Note: INFORMATION & DATA SHOWN ON THIS SHEET REPRESENTS "DESIGN" CRITERIA. OTHER SHEETS IN THIS SET OF PLANS SHOW "AS-BUILT" DIMENSIONS.

TREATMENT OBJECTIVE

POPULATION EQUIVALENT = 750 PERSONS BY YEAR 2000.
HYDRAULIC LOADING OF 100 GALLONS PER PERSON = 75,000 G.P.D.
WASTEWATER CHARACTERISTICS = AVERAGE MUNICIPAL SEWAGE.
INFLUENT STRENGTH = 240 MG/L BOD_5 AND SUSPENDED SOLIDS.
EFFLUENT STRENGTH = 30 MG/L BOD_5 AND SS = 87.5% REMOVAL.
EFFLUENT DISSOLVED OXYGEN CONCENTRATION = 6.50 MG/L.
EFFLUENT CHLORINE RESIDUAL CONCENTRATION = 2.0 MG/L
DISCHARGE TO CATAWBA CREEK, JAMES RIVER BASIN

INFLUENT MANHOLE

RECEIVES WASTEWATER FROM GRAVITY COLLECTION SYSTEM.
RECEIVES RETURN SLUDGE FROM CLARIFIERS AND CHLORINE TANKS.
PROVIDES ACCESS TO RAW SEWAGE FOR SAMPLING.
PROVIDES REMOVAL OF FLOATING SOLIDS AND RAGS.

AERATED LAGOON

CONFIGURATION: 4 CELLS IN SERIES - 7.5 DAYS DETENTION EACH
BERMS SLOPED 3:1 INSIDE AND OUT WITH REVENTMENT GRIDS TO PREVENT EROSION
RECYCLE OF MIXED LIQUOR SUSPENDED SOLIDS FROM CLARIFIERS.
AERATION IS PROVIDED BY 6000 FT. OF SLOTTED TUBING.
OXYGEN REQUIRED = $D L_a 1.26$ #/HR $\times 1.47 \times 0.875 = 8.05$ #/HR (WHERE D = INFLUENT BOD_5, L = COMPARATIVE ULTIMATE BOD; P = PERCENT REMOVED)

TRANSFER RATE = $\frac{R_a (C_{sw} - C_e)}{9.17} (1.024^{T-20})(A) = \frac{3(7.63-2.0)}{9.17} (1.024^{35-20})(0.8) = 1.067$ #/HR HORSEPOWER

WHERE R_a = AERATOR TRANSFER RATE, C_{sw} = OXYGEN SATURATION LEVEL, T = OPERATING TEMP.; C_e = RESIDUAL O_2 CONC., A = WASTEWATER TRANSFER COEFFICIENT

BLOWER HORSEPOWER = NOR/RS = 8.05/1.087 = 7.40 HP
BLOWERS PROVIDED - 2 - 7½ HP WITH 120 FT^3/MIN AGAINST 9 PSIG CAPACITY
BOD_5 REMOVED = 87.5% = 131.4 #/DAY.

SLUDGE PRODUCTION

TOTAL SUSPENDED SOLIDS = 240 MG/L (180 MG/L ORGANIC, 60 MG/L INORGANIC)
DESTRUCTION = 83⅓% ORGANIC, 0% INORGANIC = 30.0 MG/L ORGANIC & 60 MG/L INORGANIC
SLUDGE PRODUCTION = 90.0 MG/L $\times$ 8.34 #/MG $\times$ 0.075 MG = 56.6 #/DAY.

VOLUME OF SLUDGE = $\frac{37.5}{2.5(.35)62.4} + \frac{19.1}{1.25(.10)62.4} = 3.14\ FT^3/DAY \times 1125\ FT^3/1.R = 0.37\%$ LAGOON VOL.

CLEANING REQUIREMENTS = AT SLUDGE VOLUME = 10% = EVERY 26 YEARS.

SECONDARY CLARIFIER

DUPLEX SQUARE HOPPER BOTTOMED UNITS WITH INTERMITTANT SLUDGE RECYCLE.
DETENTION TIME = 1 HR-32 MIN, SURFACE SETTLING RATE = 586 GPD/FT^2 OVERFLOW RATE = 4033 GPD/FT^2

CHLORINE CONTACT TANK

SINGLE CIRCULAR HOPPER BOTTOMED TANK WITH INTERMITTANT SLUDGE RETURN
DETENTION TIME = 30 MIN. CHLORINE RESIDUAL = 2.0 MG/L
CHLORINE FEED CAPACITY = 25#/DAY = 40 MG/L

CASCADE AERATION STEPS

DEFICIT RATIO = $R = 1 + 0.11 A B (1 + 0.046T) H \sqrt[N]{\frac{C_S - C_A}{C_S - C_B}}$

WHERE C_S = O_2 SATURATION AT CRITICAL TEMP & ELEV = 7.63 MG/L; C_B = O_2 CONC. BELOW STEPS
B = 1.3, T = 25°C, H = 1'-0", N = # OF STEPS, C_A = O_2 CONC. ABOVE STEPS, A = 0.8
BY CALCULATION N = 8.22; THEREFORE 9 STEPS ARE PROVIDED

SLUDGE RETURN PUMPS

DUPLEX SUBMERSIBLE PUMPS, 2 HP, RATED AT 160 G.P.M. AGAINST 20 FEET T.D.H.

FLOW MEASURING EQUIPMENT

CONTROL SECTION = 45° FIBERGLASS V-NOTCH WEIR.
EQUIPMENT INCLUDES: FLOAT ACTIVATED TRANSMITTER AND TOTALIZING, INDICATING, AND RECORDING RECEIVER.

100 YEAR FLOOD ELEVATION - 1042.0

As Builts

DRAPER – ADEN ASSOCIATES, INC. ENGINEERS · SURVEYORS · PLANNERS BLACKSBURG, VIRGINIA	DESIGNED D.J.R. DRAWN L.H.W. CHECKED D.J.R. DATE SEPTEMBER 1, 1977	TOWN OF FINCASTLE WASTEWATER COLLECTION AND TREATMENT SYSTEM BOTETOURT COUNTY, VIRGINIA	REVISIONS:	SCALE: HORIZ.: NONE VERT.: 1" = 2'-0" PLAN Nº T-75-194	SHEET 15 OF 25