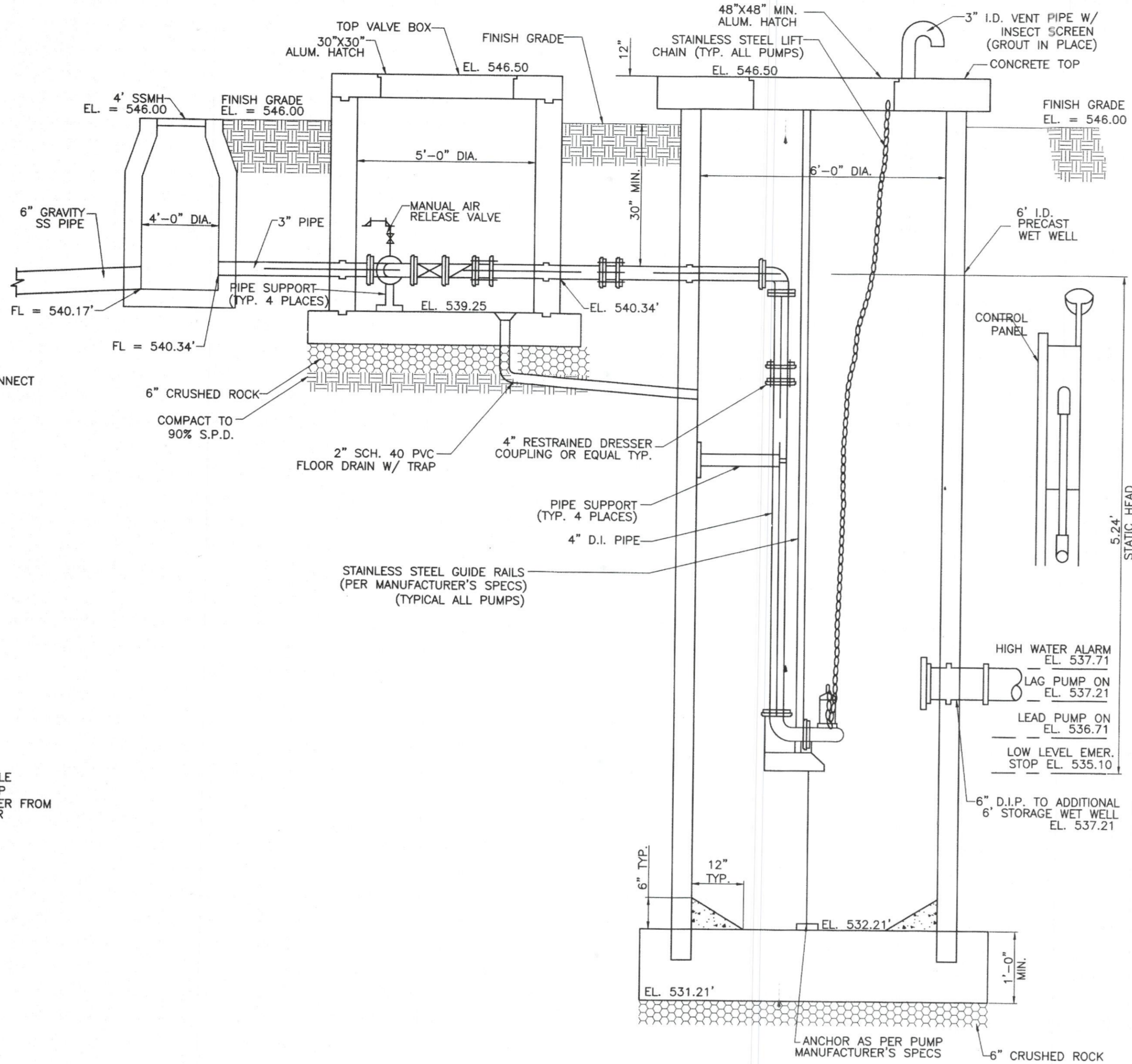
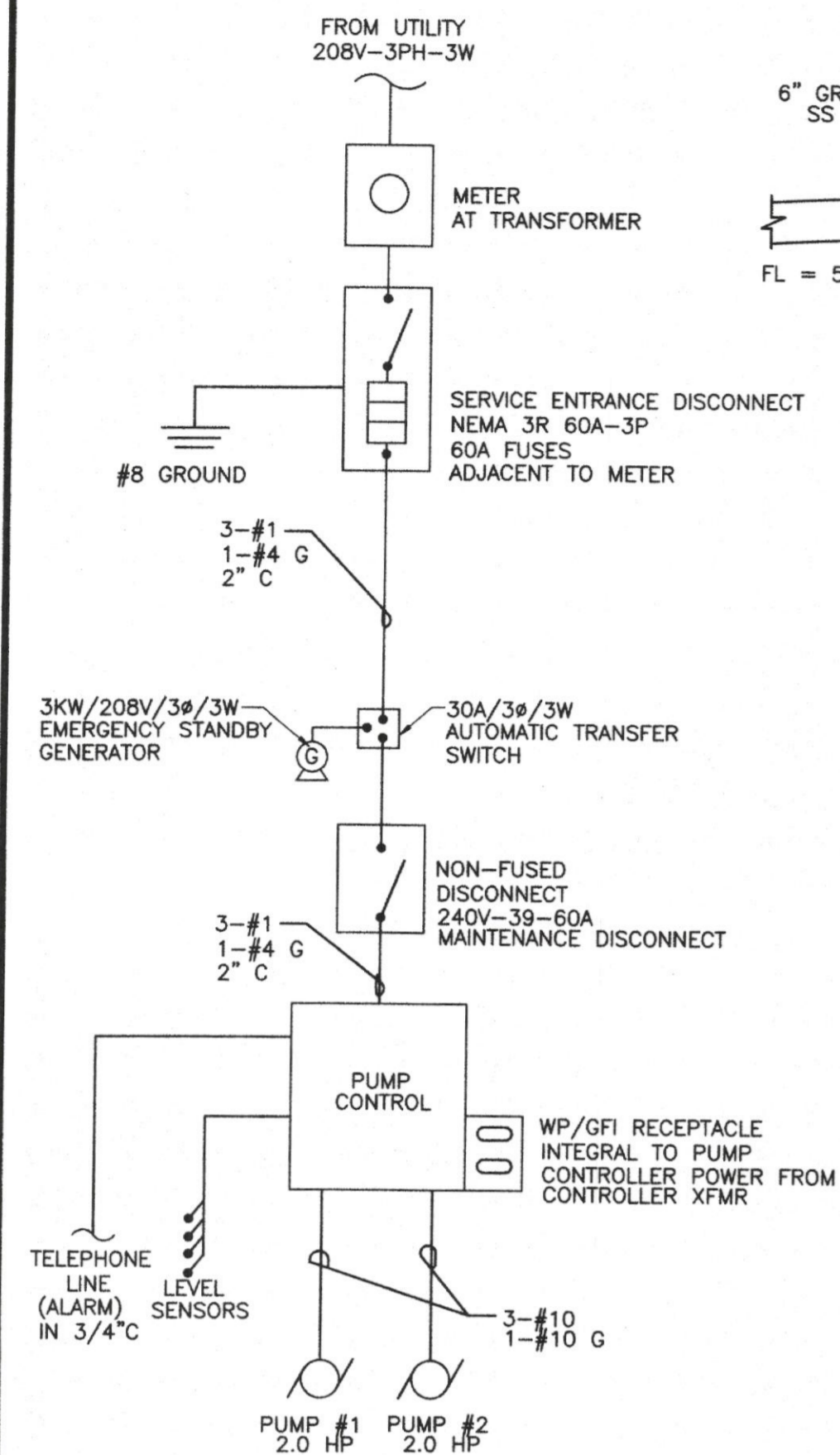


- NOTES:**
- SERVICE VOLTAGE MAY BE EITHER 208V OR 230V CONFIRM WITH OGE.
 - ROUTE UNDERGROUND INTO SITE 1-3/4" FOR TELEPHONE ALARM AND 1 1/2" FOR POWER



PROFILE VIEW

SHOWN FOR DETAIL IN PROFILE VIEW FOR ACTUAL LOCATION SEE PLAN VIEW

TABLE E103.3(5) (IPC 2006)
ALLOWANCE IN EQUIVALENT LENGTHS OF PIPE FOR FRICTION LOSS IN VALVES AND THREADED FITTINGS (FEET)

FITTING OR VALVE	PIPE SIZE (INCHES)							
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
45-DEGREE ELBOW	1.2	1.5	1.8	2.4	3.0	4.0	5.0	6.0
90-DEGREE ELBOW	2.0	2.5	3.0	4.0	5.0	7.0	8.0	10.0
TEE, RUN	0.6	0.8	0.9	1.2	1.5	2.0	2.5	3.0
TEE, BRANCH	3.0	4.0	5.0	6.0	7.0	10.0	12.0	15.0
GATE VALVE	0.4	0.5	0.6	0.8	1.0	1.3	1.6	2.0
PLUG-TYPE COCK	0.8	1.1	1.5	1.9	2.2	3.0	3.7	4.5
CHECK VALVE, SWING	5.8	8.4	11.2	14.0	16.8	22.4	28.0	33.6
GLOBE VALVE	15.0	20.0	25.0	35.0	45.0	55.0	65.0	80.0
ANGLE VALVE	8.0	12.0	15.0	18.0	22.0	28.0	34.0	40.0

FOR S: 1 INCH=25.4mm, 1 FOOT=304.8mm, 1 DEGREE=0.0175 RAD.

TABLE E103.3(6)
PRESSURE LOSS IN FITTINGS AND VALVES EXPRESSED AS EQUIVALENT LENGTH OF TUBE* (FEET)

NOMINAL OR STANDARD SIZE (INCHES)	FITTINGS				VALVES			
	90 DEGREE	45 DEGREE	SIDE BRANCH	STRAIGHT RUN	COUPLING	BALL	GATE	BUTTERFLY CHECK
3/8	0.5	1.5	-	-	-	-	-	1.5
1/2	1	3	-	-	-	-	-	3
3/4	1.5	4.5	-	-	-	-	-	4.5
1	2	6	-	-	-	-	-	6
1 1/4	3	9	-	-	-	-	-	9
1 1/2	4	12	-	-	-	-	-	12
2	6	18	-	-	-	-	-	18
2 1/2	7	21	-	-	-	-	-	21
3	9	27	-	-	-	-	-	27
3 1/2	10	30	-	-	-	-	-	30
4	12	36	-	-	-	-	-	36
5	15	45	-	-	-	-	-	45
6	18	54	-	-	-	-	-	54
8	24	72	-	-	-	-	-	72

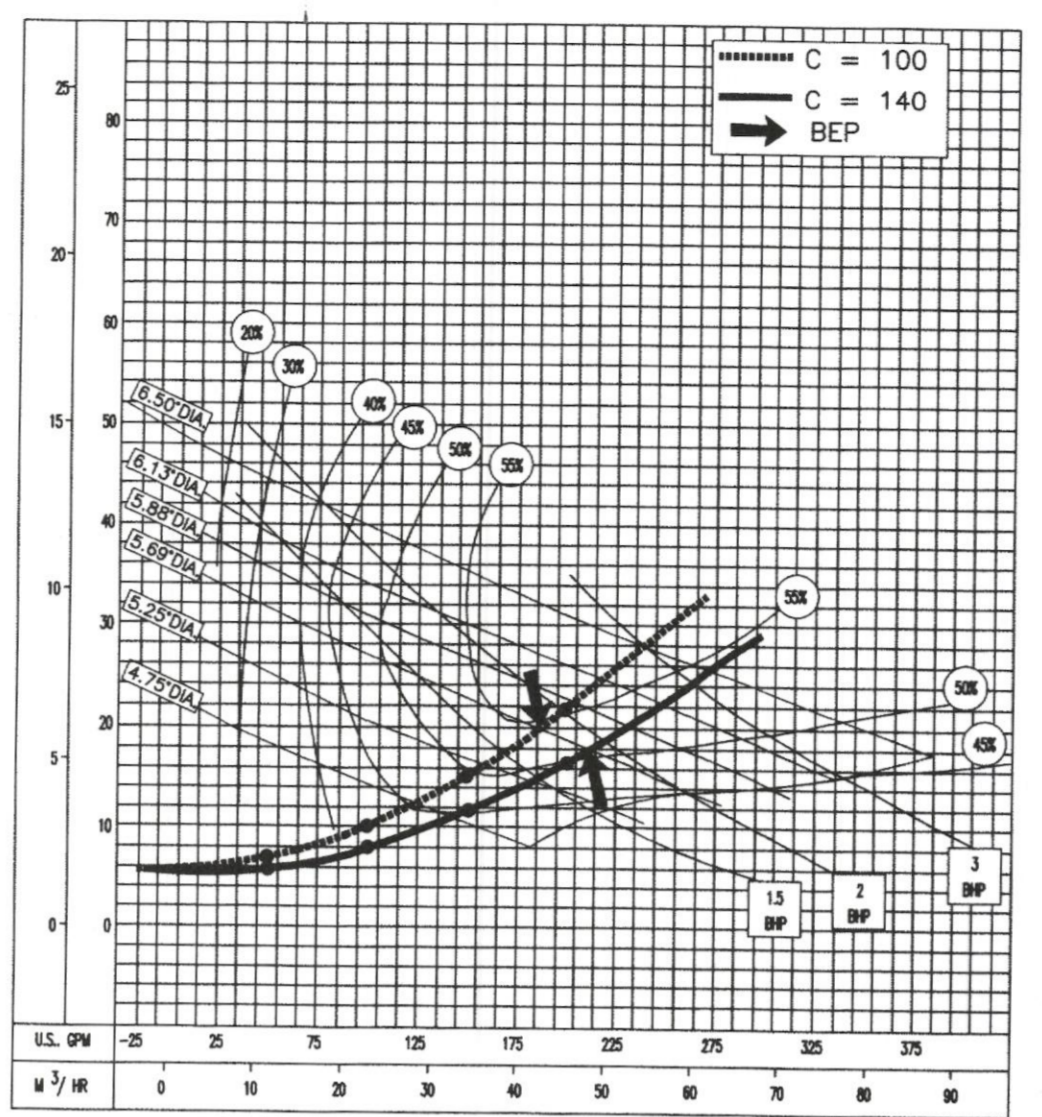
FOR S: 1 INCH=25.4mm, 1 FOOT=304.8mm, 1 DEGREE=0.0175 RAD. ALLOWANCES ARE FOR STREAMLINED SOLDERED FITTINGS AND RECESSED FITTINGS. FOR THREADED FITTINGS, DOUBLE THE ALLOWANCES SHOWN IN THE TABLE. THE EQUIVALENT LENGTHS PRESENTED ABOVE ARE BASED ON A C FACTOR OF 150 IN THE HAZEN-WILLIAMS FRICTION LOSS FORMULA. THE LENGTHS SHOWN ARE ROUNDED TO THE NEAREST HALF-FOOT.

TABLE 709.1 (IPC 2006)
DRAINAGE FIXTURE UNITS FOR FIXTURES AND GROUPS

FIXTURE TYPE	DRAINAGE FIXTURE UNIT VALUE AS LOAD FACTORS	MINIMUM SIZE OF TRAP (inches)
Automatic clothes washers, commercial	3	2
Automatic clothes washers, residential	2	2
Bathroom group as defined in Section 202 (1.6 gpf water closet)	5	-
Bathroom group as defined in Section 202 (water closet flushing greater than 1.6 gpf)	6	-
Bathtub* (with or without overhead shower or whirlpool attachments)	2	1 1/2
Bidet	1	1 1/4
Combination sink and tray	2	1 1/2
Dental lavatory	1	1 1/4
Dental unit or cuspidor	1	1 1/4
Dishwashing machines, domestic	2	1 1/2
Drinking fountain	1/2	1 1/4
Emergency floor drain	2	2
Floor drains	2	2
Kitchen sink, domestic	2	1 1/2
Kitchen sink, domestic with food waste grinder and/or dishwasher	2	1 1/2
Laundry tray (1 or 2 compartments)	2	1 1/2
Lavatory	1	1 1/4
Shower	2	1 1/2
Service sink	2	1 1/2
Sink	2	1 1/2
Urinal	4	Noted d
Urinal, 1 gallon per flush or less	2*	Noted d
Urinal, nonmeter supplied	0.5	Noted d
Wash sink (circular or multiple) each set of faucets	2	1 1/2
Water closet, flushometer tank, public or private	4*	Noted d
Water closet, private (1.6 gpf)	3*	Noted d
Water closet, private (flushing greater than 1.6 gpf)	4*	Noted d
Water closet, public (1.6 gpf)	4*	Noted d
Water closet, public (flushing greater than 1.6 gpf)	6*	Noted d

For S: 1 inch=25.4mm, 1 gallon=3.785 L (gpf=gallons per flushing cycle).
 a. For traps larger than 3 inches, use Table 709.2.
 b. A separate trap or bathtub or whirlpool bathtub attachment does not increase the drainage fixture unit value.
 c. A separate trap for a bathtub or whirlpool attachment does not increase the drainage fixture unit value.
 d. The purpose of providing traps on building drains and sewers, water closets and urinals shall not be rated at a lower drainage fixture unit unless the lower value is specifically noted for that fixture.
 e. For fixtures added to an existing unit bathroom group, add the d.f.u. value of those additional fixtures to the bathroom group fixture count.
 f. See Section 408.4 for sizing requirements for fixture drain, branch drain and drainage stack for an automatic clothes washer stoppage.

1750RPM S3SD/SB3SD
SUBMERSIBLE SEWAGE DUAL SEAL PUMPS



ANNEX E1

TABLE E103.3(3) (IPC 2006)
TABLE FOR ESTIMATING DEMAND

LOAD	DEMAND			LOAD	DEMAND		
	(Water supply fixture units)	(Gallons per minute)	(Cubic feet per minute)		(Water supply fixture units)	(Gallons per minute)	(Cubic feet per minute)
275	80.0	10.6944	275	104.5	13.96956		
300	85.0	11.3628	300	108.0	14.43744		
400	105.0	14.0364	400	127.0	16.97736		
500	124.0	16.57632	500	143.0	18.1824		
750	170.0	22.7256	750	177.0	23.66136		
1000	208.0	27.80544	1000	208.0	27.80544		
1250	239.0	31.94952	1250	239.0	31.94952		
1500	269.0	35.95992	1500	269.0	35.95992		
1750	297.0	39.70296	1750	297.0	39.70296		
2000	325.0	43.446	2000	325.0	43.446		
2500	380.0	50.7984	2500	380.0	50.7984		
3000	433.0	57.88344	3000	433.0	57.88344		
4000	535.0	70.182	4000	535.0	70.182		
5000	593.0	79.2724	5000	593.0	79.2724		

TABLE E103.3(4)
LOSS OF PRESSURE THROUGH TAPS AND TEES IN POUNDS PER SQUARE INCH (PSI)

U.S. GALLONS PER MINUTE	SIZE OF TAP OR TEE (INCHES)					
	5/8	3/4	1	1 1/4	1 1/2	2
10	1.35	0.64	0.18	0.08	-	-
20	5.38	2.54	0.77	0.31	0.14	-
30	12.10	5.72	1.62	0.69	0.33	0.10
40	-	10.20	3.07	1.23	0.58	0.18
50	-	15.90	4.49	1.92	0.91	0.28
60	-	-	4.49	2.76	1.31	0.40
70	-	-	6.46	3.78	1.78	0.55
80	-	-	8.79	4.99	2.32	0.72
90	-	-	11.50	6.21	2.94	0.91
100	-	-	14.50	7.67	3.63	1.12
120	-	-	17.94	11.00	5.23	1.61
140	-	-	25.80	15.00	7.12	2.20
150	-	-	35.20	17.20	8.16	2.52
160	-	-	19.60	9.30	3.82	0.88
180	-	-	24.80	11.80	4.92	1.12
200	-	-	30.70	14.50	6.48	1.48
225	-	-	38.80	18.40	8.50	1.96
250	-	-	47.90	22.70	10.90	2.52
275	-	-	-	27.40	13.10	1.59
300	-	-	-	32.60	16.10	1.88

FOR S: 1 INCH=25.4mm, 1 POUND PER SQUARE INCH=6.895 KPA, 1 GALLON PER MINUTE=3.785 L/min

- NOTES:**
- WET WELL MANUFACTURER SHALL CERTIFY STRUCTURAL DESIGN OF WET WELL SUPPLIED TO COMPLY WITH SITE CONDITIONS, LATERAL PRESSURES, AND CONSTRUCTION LOADS.
 - CONTRACTOR'S ELECTRICIAN SHALL VERIFY ALL ELECTRICAL COMPONENTS, WIRING, ETC. TO INSURE CODE COMPLIANCE AND TO PROVIDE A COMPLETE AND FUNCTIONAL PROJECT.
 - BACKFILL PLACEMENT AND COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH WETWELL MFG.'S RECOMMENDATIONS.
 - DUPLEX SUBMERSIBLE SEWER LIFT STATION 3" DISCHARGE SOLIDS HANDLING PUMPS 170gpm @ 21.20 FT. TDH 208V-3P
 - ACCESS HATCHES SHALL BE ALUMINUM DIAMOND TREAD, LOCKABLE, SIZE PER PLAN, SUBJECT TO MFG. RECOMMENDATION BILCO TYPE J-AL OR EQUAL.

COMPUTATION FOR SIZING THE SEWAGE PUMP

STEP 1. SYSTEM CAPACITY (GPM REQUIRED)

- LIST ALL FIXTURES
- ASSIGN A DRAINAGE FIXTURE UNIT VALVE USING ANNEX A-IPC 2006 TABLE 709.1
- DETERMINE SYSTEM CAPACITY USING ANNEX B-IPC 2006 TABLE E103.3(3)

DRAINAGE FIXTURE UNITS (DFU) SUMMARY			
QTY.	FIXTURE	DFU	TOTAL
74	WATER CLOSETS	4	296
74	LAVATORIES	1	74
28	BATHTUBS	2	56
42	SHOWER	2	84
4	CLOTHES WASHERS	3	12
1	MOP SINK	2	2
2	URINAL	4	8
3	BAR SINK	2	6
TOTAL DRAINAGE FIXTURE UNITS =			538

GIVEN 538 DFU'S AND USING IPC 2006 TABLE E103.3(3), WE ESTIMATE THE SYSTEM CAPACITY TO BE EQUAL TO: 170 GPM

STEP 2. DETERMINE MINOR LOSSES

- TOTAL DYNAMIC HEAD=STATIC HEAD + EQUIVALENT FRICTION HEAD
- STATIC HEAD FROM CIVIL PLANS (SHT. C2a) : 5.24'
- FRICTION HEAD - DETERMINE

FRICTION HEAD WORKSHEET, USING ANNEX C-IPC 2006 TABLE E103.3(5)

- ASSUME 3" DIAMETER STEEL PIPE FOR DISCHARGE (HANDLES 2" SOLIDS, A REOT PER IPC 2006 SECTION 712.4.2)

QTY.	FITTING	EQ. LENGTH	TOTAL LENGTH
3	STANDARD EL. 90 DEG.	10	30
	STANDARD EL. 45 DEG.	6	0
1	90 DEG. TEE, SIDE BRANCH	15	15
1	90 DEG. TEE, STRAIGHT RUN	3	3
	GATE VALVE	2	0
	BALANCING VALVE	4.5	0
1	PLUG-TYPE COCK	4.5	4.5
1	CHECK VALVE-SWING	33.6	33.6
	GLOBE VALVE	80	0
	ANGLE VALVE	40	0
TOTAL DRAINAGE FIXTURE UNITS =			86.1

ADD STRAIGHT PIPE LENGTH, FEET = 12.0
 NOTE: SEWAGE FROM PUMP IS DISCHARGE TO A 4" MH, SEE SHEET C2a & C2b
 TOTAL EFFECTIVE PIPE LENGTH, FEET = 98.1
 NUMBER OF 100 FOOT INCREMENT(S) = 0.98

STEP 3. DEVELOP SYSTEM CURVES

- TOTAL DYNAMIC HEAD = STATIC HEAD + EQUIVALENT FRICTION HEAD
- CONSIDER 2 FRICTION COEFFICIENTS: C=100, AND C=140
- TO DEVELOP SYSTEM CURVE, SET AT 50, 100, 150 & 200 GPM FLOW

C = 100, FAIRLY ROUGH PIPE
 FLOW RATE (GPM) = 50 100 150 200
 NO. OF 100 FOOT INCREMENT(S) = 0.98 0.98 0.98 0.98
 FRICTION LOSS/100', PSI = 0.54 1.95 4.14 7.05
 FRICTION LOSS/100', FEET = 1.25 4.50 9.56 16.29
 FRICTION HEAD, FEET = 1.22 4.41 9.37 15.99
 STATIC HEAD, FEET = 5.24 5.24 5.24 5.24
 TOTAL DYNAMIC HEAD = 6.46 9.65 14.61 21.20
 (TDH), FEET

C = 140, FAIRLY SMOOTH PIPE
 FLOW RATE (GPM) = 50 100 150 200
 NO. OF 100 FOOT INCREMENT(S) = 0.98 0.98 0.98 0.98
 FRICTION LOSS/100', PSI = 0.88 3.14 6.65 11.34
 FRICTION LOSS/100', FEET = 0.88 3.14 6.65 11.34
 FRICTION HEAD, FEET = 0.86 3.08 6.52 11.12
 STATIC HEAD, FEET = 5.24 5.24 5.24 5.24
 TOTAL DYNAMIC HEAD = 6.10 8.32 11.76 16.36
 (TDH), FEET

PLOT/OVERLAY THE SYSTEM CURVES ON THE PUMP CURVE(S)-PLEASE SEE ANNEX E1 TO E3

STEP 4. SELECTING PUMP AND CHECK MINIMUM CYCLE TIME

PUMP CAPACITY = Q X TDH X SP. GR. (LIQUID)
 3960 X EFFICIENCY ; EFF= 0.60 OR 60%

Q = 170 GPM
 TDH = 21.20 FEET
 SP. GR. = 1.00

PUMP CAPACITY = 1.52 BHP
 SEE ANNEX E - FOR TYPICAL PUMP PERFORMANCE CURVE W/ SYSTEM CURVE OVERLAY

PUMP CHARACTERISTIC:
 MINIMUM RATING = 1.52 BHP
 MINIMUM DISCHARGE SIZE = 3.00 INCHES, WITH 2" SOLIDS FOR WATER CLOSETS
 PUMP DESCRIPTION = LOW HEAD, HIGH FLOW
 PUMP INSTALLATION = DUPLEX, USE 2 PUMPS FOR COMMERCIAL APPLICATION
 RECOMM. PUMP RUNNING TIME = 15 SECONDS TO 4 MINUTES, TO PREVENT SHORT-CYCLING

CHECK MINIMUM CYCLE TIME AT BEP'S, REFER TO ANNEX E1; 1750 RPM S3SD/SB3SD PUMP
 -GIVEN DATA: C100, 2.0 BHP, 5.69" DIA. IMPELLER, Q = 185 GPM
 CYCLE TIME = STORAGE CAPACITY = 340
 Q AT BEP = 185

CYCLE TIME = 1.84 MIN.

-GIVEN DATA: C140, 2.0 BHP, 5.69" DIA. IMPELLER, Q = 215 GPM
 CYCLE TIME = STORAGE CAPACITY = 340
 Q AT BEP = 215

CYCLE TIME = 1.58 MIN.

-MINIMUM PUMP RUNNING TIME IS WITHIN ACCEPTABLE LIMITS, NO SHORT CYCLING

STEP 5. DETERMINE BASIN SIZE AND SET ELEVATIONS

CRITERIA:
 -MINIMUM BASIN SIZE = 2 X SYSTEM CAPACITY
 -MINIMIZE BASIN SIZE DUE TO CONSTRUCTION/ECONOMIC COST; HOWEVER, THE ISSUE OF WORK SPACE DURING INSTALLATION SHOULD BE CONSIDERED

SYSTEM CAPACITY = 170.0 GPM
 2 X SYSTEM CAPACITY = 340.0 GPM, 1GPM=7.48 CU.FT.
 MINIMUM WET WELL STORAGE = 45.5 CU.FT.
 WET WELL DIAMETER = 6.0 FT.; TYPICAL SIZE, BY SUPPLIERS
 WET WELL AREA = 28.3 SQ.FT.
 DIFF. IN ELEVATION = 1.61 FT.

DIFF. IN ELEVATION = MINIMUM WET WELL STORAGE (LEAD PUMP ON/LOW LEVEL STOP) -----
 WET WELL AREA

ELEVATION SETTINGS (IN FEET):
 INFLUENT ELEVATION = 537.21; LAG PUMP ON
 HIGH WATER ALARM ELEVATION = 537.71; SET 6" ABOVE INFLUENT ELEVATION
 LEAD PUMP ON ELEVATION = 535.10; LEAD PUMP ON ELEV.-DIFF. IN ELEV.
 LOW LEVEL STOP ELEVATION = 532.21; LEAD PUMP ON ELEV.-DIFF. IN ELEV.
 FLOOR ELEVATION = 532.21; TYPICAL, 5 FT. BELOW INFLUENT ELEVATION
 TOP COVER ELEVATION = 546.50

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COMFORT INN & SUITES
 VIGOR WAY,
 ROCKWALL, TX 75087
 1.74 AC.
 BY CHOICE HOTELS

PROJECT NUMBER	REVISIONS		
	DATE	REV. NO.	DESCRIPTION
023-08	05/07/09		REVISED FLOOR ELEVATION
PROJ. TEAM			
DRAWN BY			
CHECKED BY			
ISSUE DATE			
032609			

DRAWING TITLE
PROPOSED 4 STORY HOTEL
COMFORT INN & SUITES
LIFT STATION CALCULATION
AND DETAILS

DRAWING NUMBER
C2b
 PLOT DATE
 062309