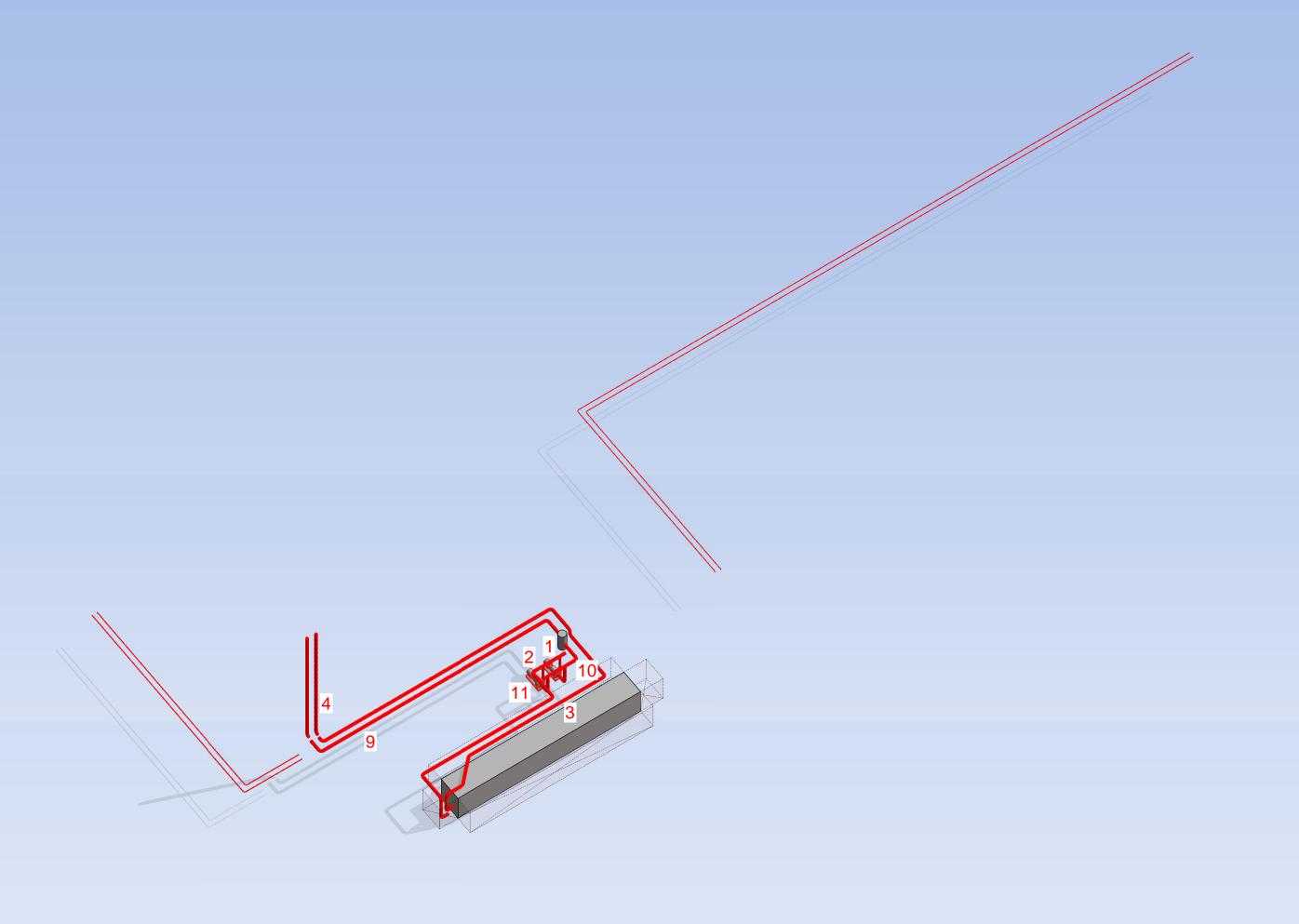
HHW Piping HHWP

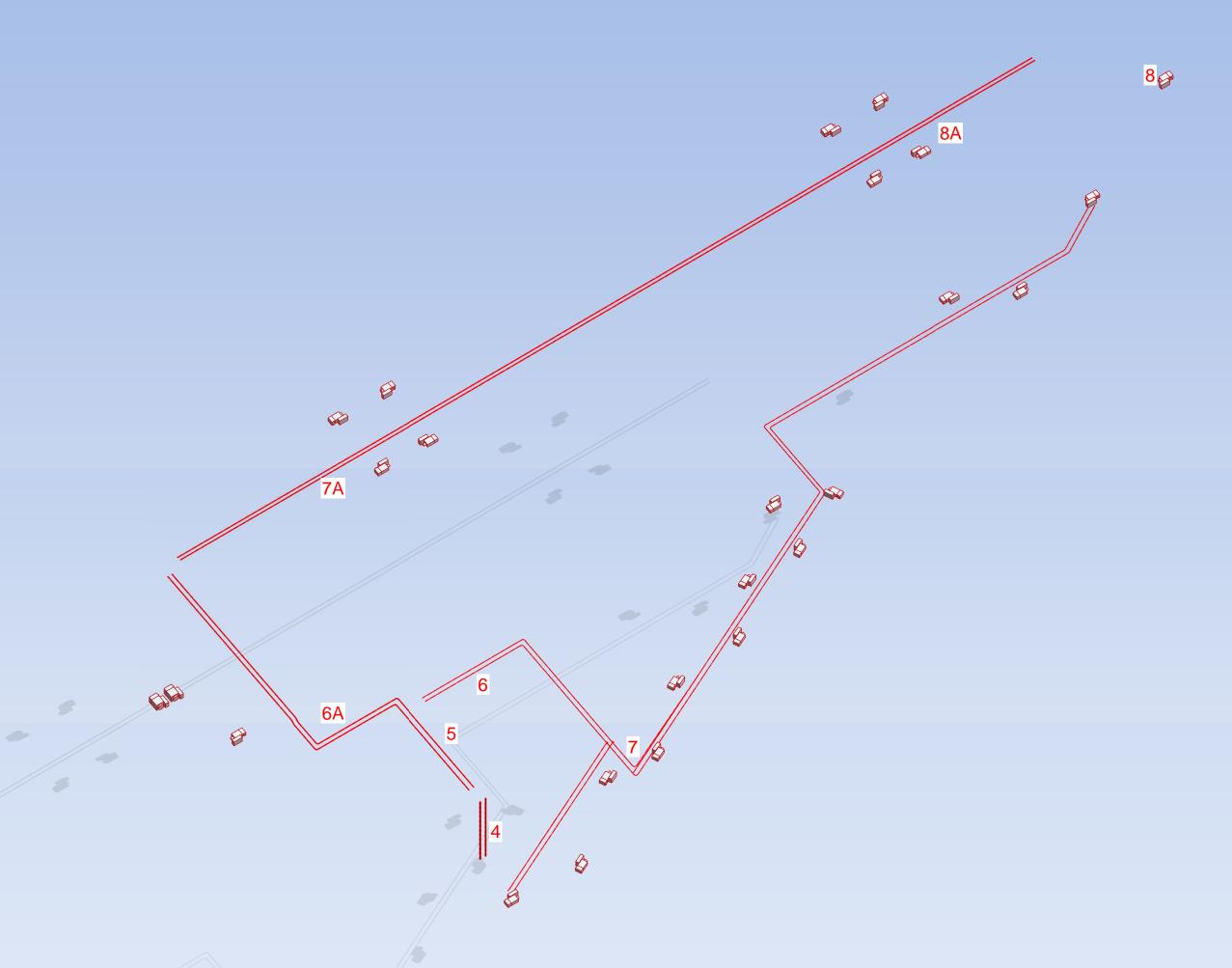
Metal Pipes - Very to extremely smooth

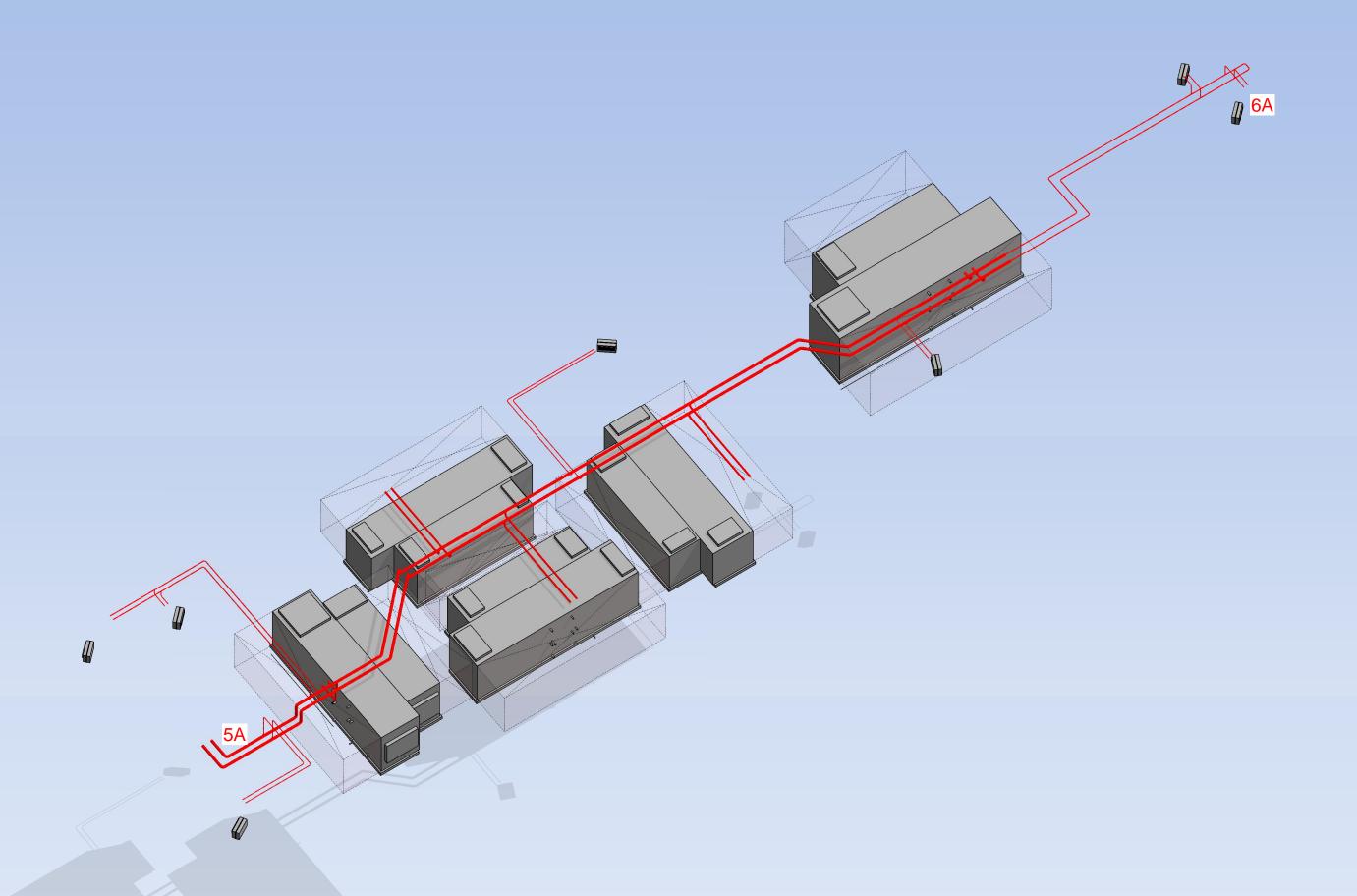
Project CNY
Pipe material = Sch40 steel
Hazen-Williams Constant = 130
Density (kg/m3) at mean temp.= 1002
Safety Factor= 15%

Safety Factor=	15%	for unknown ar	nd pipe aging	J		K	Total	Known Constant	Known Constant	Static	Dynamic	То
ection		Flow gpm	Size inches	Length Feet	Quantity of Items	Factor			Pressure Drop in kPa			
	STRAIGHT LENGTH STANDARD TEE (THRU FLO)	836.6 836.6	6	3.5	1	0.12	0.12		0	0.53 0.00	0.0 0.5	0.
1 - AFTER PUMP	CHECK VALVE BUTTERFLY ISOLATION VALVE	836.6 836.6	6 6		1	2 0.68	2 0.68		0	0.00	8.0 2.7	8. 2.
	STANDARD TEE (BRANCH FLO - PUMP HEADER) STRAIGHT LENGTH	836.6 836.6	6	3	1	0.62	0.62		0	0.00 0.45	0.0	2. 0.
	STANDARD TEE (THRU FLO - STANDBY PUMP) STRAIGHT LENGTH	836.6 836.6	6	1.5	1	0.12	0.12		0	0.00	0.0	0.
	90° ELBOW STRAIGHT LENGTH	836.6 836.6	6	5	1	0.29	0.29		0	0.00	0.0	1. 0.
A DUN DEFODE CUILLED	90° ELBOW STRAIGHT LENGTH	836.6 836.6	6	25.5	1	0.29	0.29		0	0.00 3.86	0.0	3.
2 - RUN BEFORE CHILLER	90° ELBOW STRAIGHT LENGTH	836.6 836.6	6	4.5	1	0.29	0.29		0	0.00	0.0	0.
	90° ELBOW STRAIGHT LENGTH BUTTERFLY ISOLATION VALVE	836.6 836.6 836.6	6	5	1	0.29	0.29		0 0 0	0.00 0.76 0.00	0.0	1. 0. 2.
	STRAINER (SEE APOLLO VALVES, 6", 900 GPM - 1.1 psi) 90° ELBOW	836.6 836.6	6 6		1	0.68	0.00	2.54	7.590028 0	0.00	0.0	7.
	CHILLER (MULTISTACK MHRC-1 - estimated 19.5 ft H2O) STRAIGHT LENGTH	836.6 836.6	6	1.5		0.25	0.29	19.6	58.56872 0	0.00	0.0	58
	90° ELBOW BALANCING VALVE (GLOBE STYLE)	836.6 836.6	6	1.5	1 1	0.29	0.29		0	0.00	1.2	1.
	BUTTERFLY ISOLATION VALVE STANDARD TEE (THRU FLO - BYPASS)	836.6 836.6	6		1 1	0.68	0.68		0	0.00	2.7	2.
	STRAIGHT LENGTH 90° ELBOW	836.6 836.6	6	4	1	0.29	0.29		0	0.61	0.0	0.
	STRAIGHT LENGTH 45° ELBOW	836.6 836.6	6	3	1	0.17	0.17		0	0.45 0.00	P. Drop kPa 0.0 0.5 8.0 0.5 8.0 2.7 2.5 0.0 0.5 8.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0
3 - RUN AFTER CHILLER	STRAIGHT LENGTH 45° ELBOW	836.6 836.6	6	5.5	1	0.17	0.17		0	0.83		0.
	STRAIGHT LENGTH 90° ELBOW	836.6 836.6	6	26.5	1	0.29	0.29		0	4.01 0.00		4.
	STRAIGHT LENGTH 90° ELBOW	836.6 836.6	6	9	1	0.29	0.29		0	1.36 0.00		1.
	STRAIGHT LENGTH 90° ELBOW	836.6 836.6	6	0.5	1	0.29	0.29		0	0.08	1.2	0. 1.
	STRAIGHT LENGTH 90° ELBOW	836.6 836.6	6	4.5	1	0.29	0.29		0	0.68	1.2	1.
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - DOMESTIC WATER HTR)	836.6 836.6	6	44.5	2	0.12	0.24		0	6.73 0.00	1.0	6 1
	STANDARD TEE (THRU FLO - SOUTH MAIN) GRADUAL REDUCTION (6" TO 4")	801.6 801.6	6		2	0.12	0.24		0	0.00	1.6	1
	STANDARD TEE (BRANCH FLO - NORTH MAIN) STRAIGHT LENGTH	220.3 220.3	4	124	2	0.7	1.4		0	0.00 11.66	0.0	11
	90° ELBOW STRAIGHT LENGTH	220.3 220.3	4	28	2	0.31	0.62		0	0.00 2.63	0.0	2
	90° ELBOW STANDARD TEE (THRU FLO - LEVEL 0 NORTH)	220.3 220.3	4	70	2	0.31	0.62		0	0.00	0.4	0
	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	189.2 189.2	4 4	72 8	2	0.31	0.62		0 0 0	5.11 0.00 0.57	0.7	0
	STRAIGHT LENGTH  STRAIGHT LENGTH	189.2 189.2 189.2	4 4	29	2	0.31	0.62		0	0.00	0.7	0
4 - HHW RISER S&R	90° ELBOW STRAIGHT LENGTH	189.2 189.2	4 4	4	2	0.31	0.62		0	0.00	0.7	0
	90° ELBOW STRAIGHT LENGTH	189.2 189.2	4 4	40	2	0.31	0.62		0	0.00	0.7	0
	STANDARD TEE (BRANCH FLO - LEVEL 1) GRADUAL REDUCTION (4" TO 3")	189.2 189.2	4	40	2	0.7	1.4 0.44		0	0.00	1.5	1
	STRAIGHT LENGTH 90° ELBOW	107.3 107.3	3	2	2	0.34	0.68		0	0.19	0.0	C
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - LEVEL 2)	107.3 107.3	3	28	2	0.17	0.34		0	2.62	0.0	2
	GRADUAL REDUCTION (3" TO 2.5") STRAIGHT LENGTH	107.3 68.5	3 2.5	28	2	0.22	0.44		0	0.00 3.29		3
	STANDARD TEE (THRU FLO - LEVEL 3) GRADUAL REDUCTION (2.5" TO 2")	68.5 68.5	2.5 2.5		2	0.18 0.22	0.36 0.44		0	0.00	0.4	0
	STRAIGHT LENGTH STANDARD TEE (BRANCH FLO - LEVEL 4)	35.9 35.9	2	28	2	1.4	2.8		0	2.36 0.00	1.5	1
5 - LEVEL 4 NORTH S&R	BALANCING VALVE (GLOBE STYLE) ISOLATION VALVE - BALL	35.9 35.9	2		2	9 0.06	18 0.12		0	0.00	0.1	9
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - LEVEL 4 WEST)	35.9 35.9	2	46	2	0.9	1.8		0	3.87 0.00	2.5 0.0 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 2.7 0.5 0.0 1.2 2.7 0.0 1.2 2.7 0.0 1.2 2.7 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 1.2 0.0 0.0 0.0 1.2 0.0 0.0 0.0 0.0 0.0 1.2 0.0 0.0 0.0 1.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	1
	GRADUAL REDUCTION (2" TO 1.5") 90° ELBOW	35.9 17.8	1.5	00	2	1.2	0.44 2.4		0	0.00	0.9	0
	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	17.8 17.8 17.8	1.5 1.5 1.5	10	2	1.2	2.4		0 0 0	2.17 0.00 0.77	0.9	0
6A - LEVEL 4 WEST S&R	STRAIGHT LENGTH STRAIGHT LENGTH	17.8 17.8	1.5	2	2	0.31	0.62		0	0.00	0.2	0
	STRAIGHT LENGTH STRAIGHT LENGTH	17.8 17.8	1.5	30	2	0.31	0.62		0	0.00	0.2	0 2
	GRADUAL REDUCTION (1.5" TO 1") STANDARD TEE (THRU FLO - LEVEL 4 NORTH WEST)	17.8	1.5	30	2	0.22	0.44		0	0.00	0.2	0
	STRAIGHT LENGTH 90° ELBOW	10	1 1	34	2	1.5	3		0	7.36 0.00	0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 1.2 0.0 0.9 0.9 0.0 0.9 0.4 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.7 0.0 0.0	7
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.20)	10	1 1	29	2	0.9	1.8		0	6.28		6
	STANDARD TEE (THRU FLO - VAV 4.22) STANDARD TEE (THRU FLO - VAV 4.21)	8.6 8	1		2	0.9	1.8		0	0.00		0
A - LEVEL 4 NORTH WEST S&R	STANDARD TEE (THRU FLO - VAV 4.23) GRADUAL REDUCTION (1" TO 0.75")	6.5 6.5	1 1		2	0.9 0.22	1.8 0.44		0	0.00		0
Sαn	STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.37)	5.9 5.9	0.75 0.75	180	2	0.9	1.8		0	46.49 0.00		46
	STANDARD TEE (THRU FLO - VAV 4.38) STANDARD TEE (THRU FLO - VAV 4.39)	4.4 2.9	0.75 0.75		2	0.9	1.8 1.8		0	0.00	P. Drop Repairs (P. Dro	0
	STANDARD TEE (BRANCH FLO - VAV 4.40) STRAIGHT LENGTH	1.4 0.7	0.75 0.75	15	2	2.1	4.2		0	0.00 0.07		0
	STANDARD TEE (THRU FLO - BYPASS) SHUTOFF VALVE - BALL	0.7 0.7	0.75 0.75		1 1	0.9	0.9		0	0.00	0.0	0
	STRAINER (SEE EATON, 1/2", 1 GPM - 0.1 psi) VAV 4.40 HEATING COIL (SEE TITUS DESV 4", 1 gpm - 0.5 ft l		0.75					0.231 0.5	0.6902742 1.4941	0.00	0.0	1
8A - VAV CONNECTION	2 WAY MODULATING CONTROL VALVE - GLOBE BALANCING VALVE (GLOBE STYLE)	0.7	0.75		1 1	10	10		0	0.00	0.1	0
	ISOLATION VALVE - BALL STANDARD TEE (THRU FLO - BYPASS)	0.7	0.75		1	0.08	0.08		0	0.00	0.0	0
	BALANCING VALVE (GLOBE STYLE) STRAIGHT LENGTH 90° ELBOW	0.7 801.6 801.6	0.75 6 6	4.5	1	0.29	0.29		0 0 0	0.00 0.63 0.00	0.0	1
9 - LEVEL 0 MECHANICAL ROOM RETURN	90° ELBOW STRAIGHT LENGTH 90° ELBOW	801.6 801.6	6	44	1	0.29	0.29		0	6.15 0.00	0.0	6
HOOW RETURN	STANDARD TEE (THRU FLO - BYPASS) STRAIGHT LENGTH	801.6 801.6 836.6	6	3	1	0.29	0.29		0	0.00 0.00 0.45	0.4	0
	ISOLATION VALVE - BALL AIR SEPARATOR (SEE B&G ROLAIRTROL 8F, Cv = 1020)	836.6 836.6	6	3	1	0.05	0.05	1.56	0 0 4.661592	0.45 0.00 0.00	0.2	(
	AIR SEPARATOR (SEE B&G ROLAIRTHOL 8F, CV = 1020) ISOLATION VALVE - BALL STRAIGHT LENGTH	836.6 836.6	6 6	3	1	0.05	0.05	1.30	4.661592 0 0	0.00 0.00 0.45	0.2	0
- AFTER AIR SEPARATOR	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	836.6 836.6	6	2	1	0.29	0.29		0	0.45	1.2	1
	STANDARD TEE (THRU FLO - STANDBY PUMP) STRAIGHT LENGTH	836.6 836.6	6	3	1	0.12	0.12		0	0.00	0.5	0
	STANDARD TEE (BRANCH FLO - STANDBY PUMP) STRAIGHT LENGTH	836.6 836.6	6	4	1	0.62	0.62		0	0.00	2.5	2
	BUTTERFLY ISOLATION VALVE STANDARD TEE (THRU FLO)	836.6 836.6	6		1	0.68	0.68 0.12		0	0.00	2.7 0.5	2
11 - BEFORE PUMP	STRAINER (SEE APOLLO VALVES, 6", 900 GPM - 1.1 psi)	836.6	6		1	0.12	0.12	2.54	7.590028 0	0.00	0.0	7
	STANDARD TEE (THRU FLO)	836.6	6									

| Piping Friction Head (1 way) | 323.5 | kPa | K







Project CNY
Pipe material = Sch40 steel
Hazen-Williams Constant = 130
Density (kg/m3) at mean temp.= 1002
Safety Factor= 15%

Pipe material = Sch40 steel
Hazen-Williams Constant = 130
Metal Pipes - Very to extremely smooth

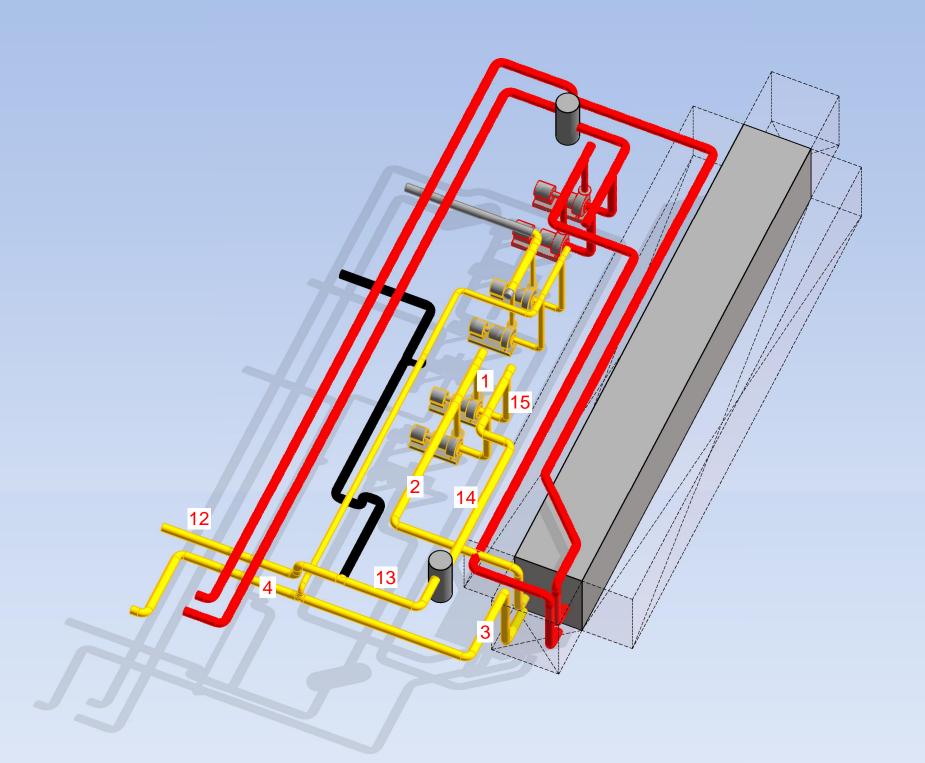
-Williams Constant = 1300
ym3) at mean temp.= 1002
Safety Factor= 15%

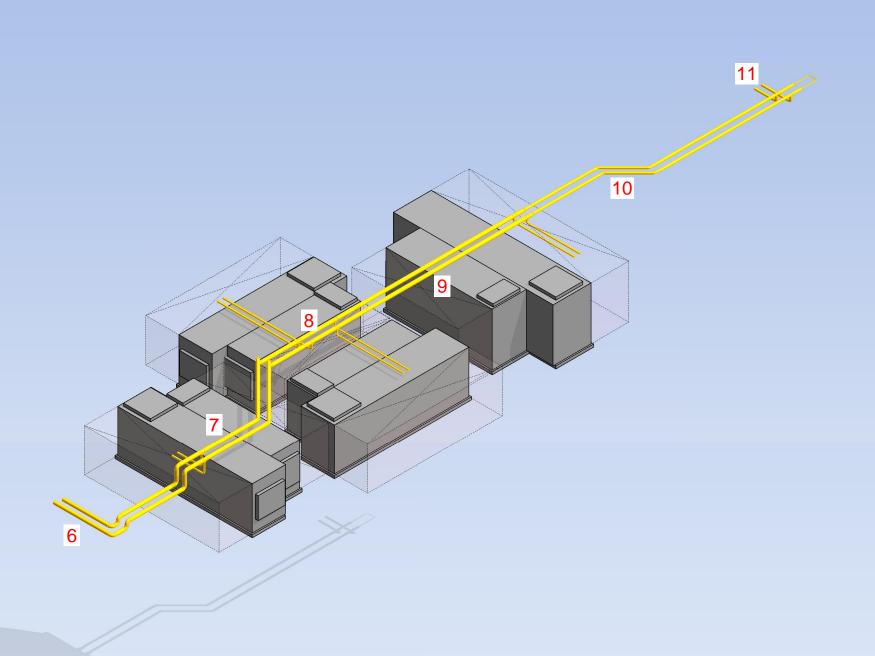
Metal Pipes - Very to extremely smooth
for unknown and pipe aging

Safety Factor=	: 15%	for unknown	and pipe agir	ng	_						.,				a		
Section		Flow	Size	Length	Flow Rate	Actual Diam.	Length	CSA	Velocity	Pv	Quantity of Items K	Total K Factor	Pressure Drop in	Pressure Drop in	Static P. Drop	P. Drop	
	STRAIGHT LENGTH	gpm 617.2	inches 6	Feet 3.5	L/s 38.9	m 0.15	m 1.1	mm2 18651	m/s 2.1	kPa 2.18	Of Items	ractor	ft H2O	kPa 0	<b>kPa</b> 0.30	<b>kPa</b> 0.0	<b>kPa</b> 0.3
1 - AFTER PUMP	STANDARD TEE (THRU FLO)	617.2	6		38.9	0.15	0.0	18651	2.1	2.18	1 0.12	0.12		0	0.00	0.3	0.3
I - AFTEN POWE	CHECK VALVE BUTTERFLY ISOLATION VALVE	617.2 617.2	6 6		38.9 38.9	0.15 0.15	0.0	18651 18651	2.1	2.18 2.18	1 0.68	0.68		0	0.00	1.5	4.4 1.5
	STANDARD TEE (BRANCH FLO) STRAIGHT LENGTH	617.2 617.2	6	2.5	38.9 38.9	0.15	0.0	18651 18651	2.1	2.18	1 0.62	0.62		0			0.2
	STANDARD TEE (THRU FLO) STRAIGHT LENGTH	617.2 617.2	6	9.5	38.9 38.9	0.15 0.15	0.0 2.9	18651 18651	2.1 2.1	2.18 2.18	1 0.12	0.12		0	0.00	0.3	0.3
	90° ELBOW	617.2	6		38.9	0.15	0.0	18651	2.1	2.18	1 0.29	0.29		0	RPa	0.6	
2 - RUN BEFORE CHILLER	STRAIGHT LENGTH 90° ELBOW	617.2 617.2	6	8	38.9 38.9	0.15	0.0	18651 18651	2.1	2.18	1 0.29	0.29		0		0.7	
	STRAIGHT LENGTH BUTTERFLY ISOLATION VALVE	617.2 617.2	6	4	38.9	0.15	1.2	18651 18651	2.1	2.18	1 0.68	0.68		0			0.3 1.5
	STRAINER (SEE APOLLO VALVES, 6", 700 GPM - 1.1 psi)	617.2	6		38.9	0.15	0.0	18651	2.1	2.18			2.54	7.590028	0.00	0.0	7.6
	90° ELBOW CHILLER (MULTISTACK MHRC-1)	617.2	6		38.9	0.15	0.0	18651	2.1	2.18	1 0.29	0.29	19.1	57.07462			0.6 57.1
	STRAIGHT LENGTH 90° ELBOW		6	2.5					2.1		1 0.29	0.29		0			0.2
	BALANCING VALVE (GLOBE STYLE) BUTTERFLY ISOLATION VALVE	617.2	6		38.9	0.15	0.0	18651	2.1	2.18	1 6	6		0	0.00	13.1	13.1
	STRAIGHT LENGTH	617.2	6	5.5	38.9	0.15	1.7	18651	2.1	2.18				0	0.47	0.0	0.5
o more remoniecem	90° ELBOW STRAIGHT LENGTH	617.2 617.2	6	5	38.9 38.9	0.15	1.5	18651 18651	2.1	2.18	1 0.29	0.29		0			0.6
	90° ELBOW STRAIGHT LENGTH	617.2	6	11	38.9 38.9	0.15	0.0	18651	2.1	2.18	1 0.29	0.29		0			0.6
	STANDARD TEE (THRU FLO)	617.2	6		38.9	0.15	0.0	18651	2.1	2.18	1 0.12	0.12		0	0.00	0.3	0.3
4 DUNIATTED COUNTS	STRAIGHT LENGTH 90° ELBOW	508.6 508.6	6	8	32.1 32.1	0.15	0.0	18651 18651	1.7	1.48	1 0.29	0.29		0		No.   No.	0.5
BRANCH	STRAIGHT LENGTH 90° ELBOW	508.6	6	4.5	32.1	0.15	1.4	18651	1.7	1.48	1 0.29	0.20		0			0.3
	STRAIGHT LENGTH	508.6	6	1	32.1	0.15	0.3	18651	1.7	1.48				0	0.06	0.0	0.1
E CHWS/D DISED	90° ELBOW STRAIGHT LENGTH	508.6	6	124	32.1	0.15	37.8	18651	1.7	1.48	2 0.29	0.58		0			0.9 7.5
	90° ELBOW ISOLATION VALVE - BALL		6		32.1 32.1	0.15	0.0	18651 18651	1.7	1.48	2 0.29	0.58		0			0.9
	STRAIGHT LENGTH	508.6	6	21	32.1	0.15	6.4	18651	1.7	1.48				0	1.26	0.0	1.3
	90° ELBOW STRAIGHT LENGTH	508.6	6	4	32.1	0.15	1.2	18651	1.7	1.48		0000		0	0.24	0.0	0.9
	90° ELBOW 90° ELBOW	508.6 508.6	6		32.1 32.1	0.15 0.15	0.0	18651 18651	1.7	1.48	2 0.29 2 0.29	0.58		0			0.9
6 - MER BRANCH S&R	STRAIGHT LENGTH 90° ELBOW	508.6	6	20	32.1	0.15	6.1	18651	1.7	1.48				0	1.20	0.0	1.2
	STRAIGHT LENGTH	508.6	6	4	32.1	0.15	1.2	18651	1.7	1.48		0000		0	0.24	0.0	0.2
	90° ELBOW STRAIGHT LENGTH	508.6 508.6	6	6	32.1 32.1	0.15	1.8	18651	1.7	1.48	2 0.29	0.58		0			0.9
	STANDARD TEE (THRU FLO - AHU 3) STRAIGHT LENGTH	508.6	6	23	32.1	0.15	0.0	18651	1.7	1.48	2 0.12	0.24		0			0.4 1.1
	45° ELBOW	439.6	6		27.7	0.15	0.0	18651	1.5	1.11	2 0.17	0.34		0	0.00	0.4	0.4
7 - MER BRANCH S&R	STRAIGHT LENGTH 90° ELBOW	439.6 439.6	6	27	27.7	0.15	0.0	18651 18651	1.5	1.11	2 0.29	0.58		0			0.6
	90° ELBOW STRAIGHT LENGTH	439.6	6	15	27.7	0.15	0.0	18651	1.5	1.11	2 0.29	0.58		0			0.6
	STANDARD TEE (THRU FLO - AHU 2)	439.6	6		27.7	0.15	0.0	18651	1.5	1.11	2 0.12	0.24		0	0.00	0.3	0.3
8 - MER BRANCH S&R	STRAIGHT LENGTH STANDARD TEE (THRU FLO - AHU 4)		6	8	22.9	0.15	0.0	18651 18651	1.2	0.75	2 0.12	0.24		0			0.3
9 - MER BRANCH S&R	GRADUAL REDUCTION (6" TO 4") STRAIGHT LENGTH	264.7	4	70	16.7	0.10	0.0	8219	2.0	2.07	2 0.22	0.44		0	0.00	0.9	0.9 9.2
	STANDARD TEE (THRU FLO - AHU 5)	264.7	4		16.7	0.10	0.0	8219	2.0	2.07	2 0.15	0.3		0	0.00	0.6	0.6
	STRAIGHT LENGTH 45° ELBOW	163.8 163.8	4	26	10.3	0.10	7.9	8219 8219	1.3	0.79	2 0.18	0.36		0			0.3
	STRAIGHT LENGTH 45° ELBOW	163.8 163.8	4	13	10.3	0.10	4.0	8219 8219	1.3	0.79	2 0.18	0.36		0			0.7
10 - MER BRANCH S&R	STRAIGHT LENGTH	163.8	4	50	10.3	0.10	15.2	8219	1.3	0.79		00000		0	2.72	0.0	2.7
	STANDARD TEE (BRANCH - AHU 1) STRAIGHT LENGTH	163.8	4	1	10.3	0.10	0.3	8219	1.3	0.79				0	0.05	0.0	0.1
	90° ELBOW STRAIGHT LENGTH		4	10		0.10	3.0		1.3		2 0.31	0.62		0			0.5
	ISOLATION VALVE - BALL STANDARD TEE (THRU FLO)	163.8	4		10.3	0.10	0.0	8219	1.3	0.79	1 0.05	0.05		0	0.00	0.0	0.0
	STRAINER (SEE APOLLO VALVES, 4", 200 GPM - 1.1 psi)	163.8	4		10.3	0.10	0.0	8219	1.3	0.79			2.54	7.590028	0.00	0.0	7.6
	STANDARD TEE (BRANCH - AIR VENT) STANDARD TEE (THRU FLO)	163.8 163.8	4		10.3	0.10	0.0	8219 8219	1.3	0.79	1 0.7 1 0.15	0.7		0			0.6
	STANDARD TEE (THRU FLO) STANDARD TEE (BRANCH - DRAIN)	163.8	4		10.3	0.10	0.0	8219	1.3	0.79	1 0.15	0.15		0			0.1
11 - CHW COIL PIPING	ISOLATION VALVE - BALL AHLI COIL (SEE AHLI SCHEDULE)	163.8	4		10.3	0.10	0.0	8219	1.3	0.79	1 0.05	0.05		0	0.00	0.0	0.0
CONNECTION	BALANCING VALVE (GLOBE STYLE)	163.8	4		10.3	0.10	0.0	8219 8219	1.3	0.79	1 6.5	6.5	11./6	35.141232	0.00	0.0	35.1 5.1
	ISOLATION VALVE - BALL STANDARD TEE (BRANCH)	163.8 163.8	4		10.3	0.10	0.0	8219 8219	1.3	0.79	1 0.05	0.05		0			0.0
	STANDARD TEE (THRU FLO) STANDARD TEE (BRANCH - AIR VENT)	163.8	4		10.3	0.10	0.0	8219	1.3	0.79	1 0.15	0.15		0	0.00	0.1	0.1
	MODULATING CONTROL VALVE	163.8	4		10.3	0.10	0.0	8219	1.3	0.79	1 0.77	0.77		0	0.00	0.6	0.6
	ISOLATION VALVE - BALL STANDARD TEE (THRU FLO)	163.8 163.8	4		10.3	0.10	0.0	8219 8219	1.3	0.79	1 0.05 1 0.15	0.05		0			0.0
	STRAIGHT LENGTH 90° ELBOW	508.6	6	0.5	32.1	0.15	0.2	18651	1.7	1.48				0	0.03	0.0	0.0
	STRAIGHT LENGTH	508.6	6	5	32.1	0.15	1.5	18651	1.7	1.48				0	0.30	0.0	0.3
10 CUMP PRANCU	90° ELBOW STRAIGHT LENGTH	508.6 508.6	6	7.5	32.1 32.1	0.15	2.3	18651 18651	1.7	1.48	1 0.29	0.29		0			0.4
12 - CHWR BRANCH	90° ELBOW STRAIGHT LENGTH	508.6	6		32.1	0.15	0.0	18651	1.7	1.48	1 0.29	0.29		0			0.4
	90° ELBOW	508.6	6		32.1	0.15	0.0	18651	1.7	1.48	1 0.29	0.29		0	0.00	0.4	0.4
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - SCHWR CONNECTION)	508.6 508.6	6	2.5	32.1	0.15	0.8	18651 18651	1.7	1.48	1 0.12	0.12		0			0.2
2 - RUN BEFORE CHILLER  S S S S S S S S S S S S S S S S S S S	STRAIGHT LENGTH 90° ELBOW	617.2 617.2	6	5	38.9	0.15	1.5	18651 18651	2.1	2.18	1 0.29	0.29		0			0.4
		617.2	6	2	38.9	0.15	0.6	18651	2.1	2.18				0	0.17	0.0	0.2
	ISOLATION VALVE - BALL	617.2	6		38.9	0.15	0.0	18651	2.1	2.18	1 0.12 1 0.05	0.12		0	0.00	0.1	0.3
	AIR SEPARATOR (SEE B&G ROLAIRTROL 6F, Cv = 632) ISOLATION VALVE - BALL	617.2 617.2	6 6		38.9 38.9	0.15 0.15	0.0	18651 18651	2.1	2.18 2.18	1 0.05	0.05	2.2	6.57404 0			6.6 0.1
	STRAIGHT LENGTH	617.2	6	10.5	38.9	0.15	3.2	18651	2.1	2.18				0	0.90	0.0	0.9
		10	0.00	0.6	0.6												
14 - CHWR RRANCH AFTED	90° ELBOW STRAIGHT LENGTH		9		38.0	0.15					1 0.29	0.29			0.00	0.6	0.6
14 - CHWR BRANCH AFTER AIR SEPARATOR	90° ELBOW STRAIGHT LENGTH 90° ELBOW	617.2	6	1			0.3	18651	2.1	2.18		8		0	0.09	0.0	
	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - CHWP STANDBY CONNECTIO	617.2 617.2 617.2	6 6		38.9 38.9	0.15 0.15	0.0	18651	2.1	2.18	1 0.12	0.12		0	0.00	0.3	0.3
AIR SEPARATOR	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - CHWP STANDBY CONNECTIO STRAIGHT LENGTH STANDARD TEE (THRU FLO - CHWP DUTY CONNECTION)	617.2 617.2 617.2 617.2 617.2	6 6 6 6	2.5	38.9 38.9 38.9 38.9	0.15 0.15 0.15 0.15	0.0 0.8 0.0	18651 18651 18651	2.1 2.1 2.1	2.18 2.18 2.18	1 0.12	0.12		0 0 0	0.00 0.22 0.00	0.3 0.0 1.4	0.3 0.2 1.4
AIR SEPARATOR	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - CHWP STANDBY CONNECTIO STRAIGHT LENGTH	617.2 617.2 617.2 617.2	6 6 6		38.9 38.9 38.9	0.15 0.15 0.15	0.0	18651 18651	2.1 2.1	2.18 2.18		0000		0	0.00 0.22	0.3	0.3 0.2
AIR SEPARATOR	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - CHWP STANDBY CONNECTIO STRAIGHT LENGTH STANDARD TEE (BRANCH - CHWP DUTY CONNECTION) STRAIGHT LENGTH BUTTERFLY ISOLATION VALVE STANDARD TEE (THRU FLO)	617.2 617.2 617.2 617.2 617.2 617.2 617.2 617.2	6 6 6 6 6 6	2.5	38.9 38.9 38.9 38.9 38.9 38.9 38.9	0.15 0.15 0.15 0.15 0.15 0.15 0.15	0.0 0.8 0.0 1.4 0.0 0.0	18651 18651 18651 18651 18651 18651	2.1 2.1 2.1 2.1 2.1 2.1 2.1	2.18 2.18 2.18 2.18 2.18 2.18 2.18	1 0.62	0.62	254	0 0 0 0 0	0.00 0.22 0.00 0.39 0.00 0.00	0.3 0.0 1.4 0.0 1.5 0.3	0.3 0.2 1.4 0.4 1.5 0.3
AIR SEPARATOR	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STRANDARD TEE (THRU FLO - CHWP STANDBY CONNECTIO STRAIGHT LENGTH STANDARD TEE (BRANCH - CHWP DUTY CONNECTION) STRAIGHT LENGTH STRAIGHT LENGTH BUTTERFLY ISOLATION VALVE	617.2 617.2 617.2 617.2 617.2 617.2 617.2	6 6 6 6 6 6	2.5	38.9 38.9 38.9 38.9 38.9 38.9	0.15 0.15 0.15 0.15 0.15 0.15	0.0 0.8 0.0 1.4 0.0	18651 18651 18651 18651 18651	2.1 2.1 2.1 2.1 2.1	2.18 2.18 2.18 2.18 2.18 2.18	1 0.62	0.62	2.54	0 0 0 0	0.00 0.22 0.00 0.39 0.00	0.3 0.0 1.4 0.0 1.5	0.3 0.2 1.4 0.4 1.5

CHW Piping CHWP

Pipe Length (1 way) [ft] 531.5 Pipe Length (2 way) [ft]





SCHW Piping SCHWP

Project CNY
Pipe material = Sch40 steel
Hazen-Williams Constant = 130
Density (kg/m3) at mean temp.= 1002
Safety Factor= 15% Metal Pipes - Very to extremely smooth for unknown and pipe aging

Safety Factor=	15%	Flow gpm	Size inches	Length Feet	Quantity of Items	K Factor	Total K Factor	Known Constant Pressure Drop in ft H2O	Known Constant Pressure Drop in kPa			Total P. Drop kPa
1 - AFTER PUMP	STRAIGHT LENGTH STANDARD TEE (THRU FLO) CHECK VALVE	325.72 325.72 325.72	6 6 6	4	1 1	0.12	0.12	11.120	0 0 0	0.11 0.00 0.00	0.0 0.1 1.2	0.1 0.1 1.2
	BUTTERFLY ISOLATION VALVE STANDARD TEE (BRANCH FLO - PUMP HEADER) STRAIGHT LENGTH	325.72 325.72 325.72	6 6 6	3	1 1	0.68 0.62	0.68 0.62		0 0 0	0.00 0.00 0.08	0.4 0.4 0.0	0.4 0.4 0.1
2 - MECHANICAL ROOM SUPPLY BRANCH	STANDARD TEE (THRU FLO) STRAIGHT LENGTH 90° ELBOW	325.72 325.72 325.72	6 6 6	0.5	1	0.12	0.12		0 0 0	0.00 0.01 0.00	0.1 0.0 0.2	0.1 0.0 0.2
	STRAIGHT LENGTH STANDARD TEE (BRANCH FLO - NORTH BRANCH) GRADUAL REDUCTION (6" TO 4")	325.72 325.72 226.48	6 6 4	9	1 1	0.62	0.62 0.22		0 0 0	0.24 0.00 0.00	0.0 0.4 0.3	0.2 0.4 0.3
	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	226.48 226.48 226.48	4 4 4	25.5 10	1	0.31	0.31		0 0	2.52 0.00 0.99	0.0 0.5 0.0	2.5 0.5 1.0
3 - LEVEL 0 NORTH BRANCH SUPPLY	STANDARD TEE (THRU FLO - FCU 0.2) 90° ELBOW STRAIGHT LENGTH	226.48 221.28 221.28	4 4 4	32.5	1	0.15	0.15 0.31		0 0	0.00	0.2 0.4	0.2 0.4 3.1
	STANDARD TEE (THRU FLO - FCU 0.3 & FCU 0.4) 90° ELBOW STRAIGHT LENGTH	221.28 211.35 211.35	4 4 4	22	1	0.15 0.31	0.15 0.31		0 0	0.00	0.2 0.4	0.2 0.4 1.9
4 - LEVEL 1 SHAFT	90° ELBOW STRAIGHT LENGTH 90° ELBOW	211.35 211.35 211.35	4 4	4	2	0.31	0.62		0 0	0.00 0.35	0.8	0.8 0.3 0.8
CROSSOVER RISER SCHW S&R	STRAIGHT LENGTH STANDARD TEE (BRANCH FLO - NORTH RISER) STRAIGHT LENGTH	211.35 211.35 211.35 164.95	4 4 4	48	2	0.7	1.4		0 0	4.18 0.00	0.0 1.8	4.2 1.8 0.7
	90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - LEVEL 2)	164.95 164.95 164.95	4 4	28	2	0.31	0.62		0 0	0.00 1.54	0.5	0.5 1.5 0.2
5 - SCHW RISER S&R	GRADUAL REDUCTION (4" TO 3") STRAIGHT LENGTH STANDARD TEE (THRU FLO - LEVEL 3)	109.8 109.8 109.8	3 3	28	2	0.13	0.44		0 0	0.00 2.73	0.5 0.0	0.5 2.7 0.4
	GRADUAL REDUCTION (3" TO 2.5") STRAIGHT LENGTH STANDARD TEE (BRANCH FLO - LEVEL 4)	54.86 54.86	2.5 2.5	28	2	0.22	0.44		0	0.00 2.18	0.3 0.0	0.4 0.3 2.2 1.0
6 - LEVEL 4 MAIN BRANCH S&R	STRAIGHT LENGTH	28.32     2     2     0.22     0.44     0     0.00       28.32     2     28     0     1.52       28.32     2     2     1     2     0     0.00       28.32     2     28     0     1.52       28.32     2     2     1     2     0     0.00       28.32     2     8     0     0.43       28.32     2     2     2     0     0.00       28.32     2     1     0     0.05       28.32     2     1     0     0.05       28.32     2     2     0.31     0.62     0     0.00       28.32     2     94     0     5.10       28.32     2     2     1     2     0     0.00	0.0 0.1	0.5 0.1 2.7								
	STANDARD TEE (BRANCH FLO - LEVEL 4 NORTH BRANCH) GRADUAL REDUCTION (2.5" TO 2")	49.86 28.32	2.5 2						0	0.00	0.8 0.2	0.8 0.2
	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	28.32 28.32	2						0	0.00 1.52	0.7	1.5 0.7 1.5
	90° ELBOW STRAIGHT LENGTH 45° ELBOW	28.32 28.32	2 2						0	0.43 0.00	0.0 0.4 0.3 0.0 0.5 0.0 0.2 0.4 0.0 0.2 0.4 0.0 0.8 0.0 0.0 0.8 0.0 0.0 0.8 0.0 0.0	0.7 0.4 0.2
	STRAIGHT LENGTH 45° ELBOW STRAIGHT LENGTH	28.32 28.32	2						0	0.00 5.10	0.2	0.1 0.2 5.1
	90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.20 ACB'S)	28.32 28.32	2	70	2	0.9	1.8		0	3.80 0.00	0.0 0.6	0.7 3.8 0.6
7 - LEVEL 4 NORTH BRANCH	GRADUAL REDUCTION (2" TO 1.5") STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.22 ACB'S)	23.46 23.46 23.46	1.5 1.5 1.5	4	2	0.22	1.8		0 0 0	0.00 0.52 0.00	0.0	0.3 0.5 1.1
S&R	STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.23 ACB'S) STRAIGHT LENGTH	21.96 21.96 20.46	1.5 1.5 1.5	4	2	0.9	1.8		0 0	1.26 0.00 0.40	1.0	1.3 1.0 0.4
	STANDARD TEE (THRU FLO - VAV 4.21 ACB'S) STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.37 ACB'S)	20.46 18.96 18.96	1.5 1.5 1.5	162	2	0.9	1.8		0 0 0	0.00 14.11 0.00	0.0	0.9 14.1 0.7
	GRADUAL REDUCTION (1.5" TO 1.25") STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.39 ACB'S)	14.1 14.1 14.1	1.25 1.25 1.25	4	2	0.22	1.8		0 0 0	0.00 0.42 0.00	0.0	0.2 0.4 0.8
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - VAV 4.40 ACB'S) STRAIGHT LENGTH	12.6 12.6 11.1	1.25 1.25 1.25	11	2	0.9	1.8		0 0 0	0.95 0.00 0.27	0.6	0.9 0.6 0.3
	STANDARD TEE (THRU FLO - VAV 4.38 ACB'S) GRADUAL REDUCTION (1.25" TO 0.75") STRAIGHT LENGTH	11.1 6.24 6.24	1.25 0.75 0.75	119	2	0.9	1.8 0.44		0 0	0.00 0.00 34.10	0.3	0.5 0.3 34.1
	STANDARD TEE (THRU BRANCH - VAV 4.42 ACB'S) ISOLATION VALVE - BALL STRAINER (SEE EATON, 3/4", 7 GPM - 0.6 psi)	6.24 6.24 6.24	0.75 0.75 0.75		1	0.08	4.2 0.08	1.386	0 0 4.1416452	0.00 0.00 0.00	0.1	2.7 0.1 4.1
	STRAIGHT LENGTH STANDARD TEE (THRU BRANCH - NORTH BRANCH) STRAIGHT LENGTH	6.24 6.24 3.12	0.75 0.75 0.75	3.5 8.5	1	2.1	2.1		0 0 0	1.00 0.00 0.67	1.4	1.0 1.4 0.7
8 - BEFORE CHILLED BEAM	90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - ACB 3.2)	3.12 3.12 3.12	0.75 0.75 0.75	2	1	0.9	0.9		0 0	0.00 0.16 0.00	0.08         0.0           0.08         0.0           0.001         0.1           0.001         0.0           0.000         0.1           0.000         0.2           0.000         0.4           0.000         0.5           0.000         0.5           0.099         0.0           0.000         0.2           0.000         0.4           3.088         0.0           0.000         0.4           1.92         0.0           0.000         0.8           4.18         0.0           0.000         0.8           4.18         0.0           0.000         0.5           0.000         0.5           0.000         0.4           1.54         0.0           0.000         0.4           0.000         0.4           0.000         0.2           0.000         0.4           0.000         0.1           0.267         0.0           0.000         0.2           2.73         0.0           0.000         0.1           0.267	0.3 0.2 0.1
	STRAIGHT LENGTH STANDARD TEE (THRU FLO - ACB 3.2) STRAIGHT LENGTH	2.08 2.08 1.04	0.75 0.75 0.75	12	1	0.9	0.9		0 0 0	0.15 0.00 0.12		0.1 0.1 0.1
	90° ELBOW STRAIGHT LENGTH ISOLATION VALVE - BALL	1.04 1.04 1.04	0.75 0.75 0.75	3	1	0.08	0.08		0 0	0.00 0.03 0.00	0.0	0.0 0.0 0.0
	CHILLED BEAM (SEE SWEGON DATA SHEET) BALANCING VALVE (GLOBE STYLE) ISOLATION VALVE - BALL	1.04 1.04 1.04	0.75 0.75 0.75		1 1	10	10	0.923	2.7581086 0 0	0.00	0.0 0.2	2.8 0.2 0.0
	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	1.04 1.04 1.04	0.75 0.75 0.75	3	1	1.7	1.7		0 0	0.03 0.00 0.12	0.0	0.0 0.0 0.1
	STANDARD TEE (THRU FLO - ACB 3.2) STRAIGHT LENGTH STANDARD TEE (THRU FLO - ACB 3.2)	1.04 2.08 2.08	0.75 0.75 0.75	4	1	0.9	0.9		0 0	0.00 0.15	0.0	0.0 0.1 0.1
9 - AFTER CHILLED BEAM	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH	3.12 3.12 3.12	0.75 0.75 0.75	2 8.5	1	1.7	1.7		0 0	0.16 0.00	0.0	0.2 0.3 0.7
	STANDARD TEE (THRU BRANCH - NORTH BRANCH) STRAIGHT LENGTH MODULATING CONTROL VALVE	3.12 6.24 6.24	0.75 0.75 0.75	3.5	1	2.1 0.86	2.1 0.86		0 0	0.00 1.00	0.3 0.0	0.3 1.0 0.6
	BALANCING VALVE (GLOBE STYLE) ISOLATION VALVE - BALL 90° ELBOW	6.24 6.24 6.24 211.35	0.75 0.75 4		1 1	0.86 10 0.08 0.31	10 0.08 0.31		0 0	0.00	6.5 0.1	6.5 0.1 0.4
	STANDARD TEE (THRU FLO - FCU 0.3 & FCU 0.4) STRAIGHT LENGTH 90° ELBOW	211.35 211.35 221.28 221.28	4 4 4	32.5	i	0.31	0.15		0 0	0.00 3.08	0.2	0.2 3.1 0.4
10 - LEVEL 0 NORTH BRANCH RETURN	STANDARD TEE (THRU FLO - FCU 0.2) STRAIGHT LENGTH 90° ELBOW	221.28 226.48 226.48	4 4 4	10	1	0.31	0.15		0	0.00 0.99	0.2	0.2 1.0 0.5
	STRAIGHT LENGTH STANDARD TEE (THRU BRANCH - NORTH BRANCH)	226.48 226.48	4 4	33.5	1	0.7	0.7		0 0	3.32 0.00	0.0 1.1	3.3 1.1
	GRADUAL EXPANSION (4" TO 6") STRAIGHT LENGTH 90" ELBOW	325.72 325.72 325.72	6 6 6	6	1	0.22	0.22		0 0 0	0.16 0.00	0.0 0.2	0.1 0.2 0.2
	STRAIGHT LENGTH STANDARD TEE (THRU BRANCH - 2/3 SCHWR BRANCH) GRADUAL REDUCTION (6" TO 4") GRADUAL TEDUCTION (6" TO 4")	325.72 325.72 217.15	6 6 4	4	1	0.62	0.62 0.22		0 0 0	0.00	0.4 0.3	0.1 0.4 0.3
	STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH CTANDARD TEE (TUDU DRANGU COUNTR & CUMO MAN	217.15 217.15 217.15	4 4	0.5	1	0.31	0.31		0 0 0	0.05 0.00 0.05	0.4 0.0	0.0 0.4 0.0
	STANDARD TEE (THRU BRANCH - SCHWR & CHWS MIX) GRADUAL EXPANSION (4" TO 6") STRAIGHT LENGTH	217.15 325.72 325.72	6 6	5.5	1 1	0.7	0.7		0 0	0.00 0.00 0.15	1.0 0.1 0.0	1.0 0.1 0.1
		325.72	6	4.5	1	0.29	0.29		0 0	0.00	0.2	0.2 0.1 0.2
	90° ELBOW STRAIGHT LENGTH 90° ELBOW	325.72 325.72	6		1	0.29	0.29			0.00	0.2	
	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - STANDBY PUMP) STRAIGHT LENGTH	325.72 325.72 325.72 325.72 325.72	6 6 6	1 3	1	0.12	0.12		0 0 0	0.03 0.00 0.08	0.0 0.1 0.0	0.0 0.1 0.1
	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - STANDBY PUMP) STRAIGHT LENGTH STANDARD TEE (THRU BRANCH - DUTY PUMP) STRAIGHT LENGTH BUTTERFLY ISOLATION VALVE	325.72 325.72 325.72 325.72 325.72 325.72 325.72 325.72 325.72	6 6 6 6 6 6	1	1 1	0.12 0.62 0.68	0.12 0.62 0.68		0 0 0 0 0	0.03 0.00 0.08 0.00 0.15 0.00	0.0 0.1 0.0 0.4 0.0 0.4	0.0 0.1 0.1 0.4 0.1 0.4
12 - BEFORE PUMP	90° ELBOW STRAIGHT LENGTH 90° ELBOW STRAIGHT LENGTH STANDARD TEE (THRU FLO - STANDBY PUMP) STRAIGHT LENGTH STANDARD TEE (THRU BRANCH - DUTY PUMP) STRAIGHT LENGTH STANDARD TEE (THRU BRANCH - DUTY PUMP)	325.72 325.72 325.72 325.72 325.72 325.72 325.72 325.72	6 6 6 6 6	1 3	1	0.12	0.12	0.924	0 0 0 0	0.03 0.00 0.08 0.00 0.15	0.0 0.1 0.0 0.4 0.0	0.0 0.1 0.1 0.4 0.1

