A1 SIZE - 594mm x 841mm

PROCESS LEGEND – MISCELLANEOUS

EQUIPMENT FRAGMENT No. DESIGNATION

LOCATION ELEMENT
SECTION ELEMENT
PROCESS
EQUIPMENT

LLLL-S-PPP-EEE##

NOTE:
– EQUIPMENT No.'s RESTART AT 1 FOR EACH SECTION.

NON PROCESS RELATED EQUIPMENT

(ie. PANEL, SUMP PUMP, ELT.)

LOCATION ELEMENT
BUILDING
EQUIPMENT
BUILDING LEVEL
1 – LOWEST
R – ROOF
EQUIPMENT # (120/240)
LETTER 600V

LLL-B##-EEE##

PIPING LINE DESIGNATION

DIAMETER (mm)
SERVICE
PIPE SPECIFICATION
MULTIPLE PIPE SPECIFICATION No.
CONTAINMENT OR CARRIER PIPE
ELECTRIC TRACED AND INSULATED

50-PAC-CS#H-C+E+I

PIPE SIZE CONVERSION

IMPERIAL(in)	METRIC(mm)	IMPERIAL(in)	METRIC(mm)
1/8	3	14	350
1/4	6	15	380
3/8	10	16	16"
1/2	12	18	450
3/4	20	20	500
1	25	24	600
1–1/4	32	30	750
1–1/2	40	36	900
2	50	42	1050
2–1/2	65	48	1200
3	75	54	1350
4	100	60	1500
5	125	66	1650
6	150	72	1800
8	200	78	2000
10	10"	84	2100
12	300		

NOTE:
–PIPE SIZES ARE NOMINAL
–PIPE SIZES FROM 2" TO 60" CONVERSION BASED ON CSA STANDARD Z245.1
–PIPE SIZES FROM 2" AND SMALLER CONVERSION BASED ON EUROPEAN ISO STANDARD
–OTHER PIPE SIZES ARE CONVERSIONS ROUNDED TO THE NEAREST ARBITRARILY ASSIGNED WHOLE NUMBER

PIPE MATERIAL ABBREVIATIONS

SYMBOL	MATERIAL
ABS	ACRYLONITRILE BUTADIENE STYRENE
AL	ALUMINUM
AC	ASBESTOS CEMENT
CONC	CONCRETE GRAVITY
CPP	CONCRETE PRESSURE
CS#	CARBON STEEL
CU#	COPPER
DI	DUCTILE IRON
FRP	FIBREGLASS REINFORCED PLASTIC
GALV	GALVANIZED STEEL
RR	REINFORCED RUBBER
PE	POLYETHYLENE
PPL	POLYPROPYLENE LINED CARBON STL.
PVC#	POLYVINYL CHLORIDE
SS#	STAINLESS STEEL
TUB#	TUBING

FOLLOWING SYMBOL INDICATES PIPING WITH MULTIPLE MATERIAL SPECIFICATIONS
EXAMPLE : SS1 (SCH. 40 316SS) SS2 (SCH. 80 316SS)

PROCESS LEGEND – SERVICE ABBREVIATIONS

SYMBOL	COMMODITY	SYMBOL	COMMODITY
AA	AQUEOUS AMMONIA	NaOH	SODIUM HYDROXIDE
AAS	AERATION AIR SUPPLY	NaSI	SODIUM SILICATE
ACTSI	ACTIVATED SILICA	NG	NATURAL GAS
AMG	AMMONIA GAS (ANHYDROUS)	OCL	HYPOCHLORITE
AML	AMMONIA LIQUID (ANHYDROUS)	OF	OVERFLOW
AMS	AMMONIA SOLUTION	OZNE	OZONE TANK EFFLUENT
ALUM	ALUMINUM SULPHATE	OZNI	OZONE TANK INFLUENT
AS	AERATED SEWAGE	OZ	OZONE
CBD	CLARIFIER BLOWDOWN	PA	PROCESS AIR
CEN	CENTRIFUGE CENTRATE WATER	PACL	POLYALUMINUM CHLORIDE
CHW	CHEMICAL WASTE	PLY	POLYELECTROLYTE
CLD	CHLORINE DIOXIDE	PLYPH	POLYPHOSPHATE
CLG	CHLORINE GAS	PS	PRIMARY SLUDGE
CLS	CHLORINE SOLUTION	PSW	PLANT SERVICE WATER
CO2	CARBON DIOXIDE	PW	POTABLE WATER
CUS	COPPER SULPHATE	PWW	PROCESS WASTE WATER
CW	COLD WATER	RAS	RETURN ACTIVATED SLUDGE
CWR	COOLING WATER RETURN	RSD	RECIRCULATED SLUDGE DISCHARGE
CWS	COOLING WATER SUPPLY	RSS	RECIRCULATED SLUDGE SUCTION
CWW	COOLING WASTE WATER	RSW	RAW SEWAGE
DHW	DOMESTIC HOT WATER	RW	RAW WATER
DIS	DIGESTED SLUDGE	RWW	RAW WASTE WATER
DR	DRAIN	RWAS	RAW WASTE ACTIVATED SLUDGE
EE	ENGINE EXHAUST	RWL	RAINWATER LEADER
EW	EFFLUENT WATER	SA	SCOURING AIR
F	FLUORIDE	SAM	SAMPLE
FA	FLUOSILICIC ACID	SAN	SANITARY
FBW	FILTER BACKWASH SUPPLY	SCE	SECONDARY CLARIFIER EFFLUENT
FEC	FERRIC CHLORIDE	SCS	SCRUBBING SOLUTION
FEFF	FILTER EFFLUENT	SCUM	SCUM
FESU	FERRIC SULPHATE	SDG	SULPHUR DIOXIDE GAS
FHS	HYDROFLUOSILICIC ACID	SDS	SULPHUR DIOXIDE SOLUTION
FILW	FILTER TO WASTE	SETW	SETTLED WATER
FINF	FILTER INFLUENT	SG	SLUDGE GAS (DIGESTER)
FLW	FLOCCULATED WATER	SGC	SLUDGE GAS CIRCULATED (DIGESTER)
FLS	FLUORIDE SOLUTION	SGF	SLUDGE GAS FUEL (DIGESTER)
FO	FUEL OIL	SGH	SLUDGE GAS (HIGH PRESSURE)
FOF	FUEL OIL FILL	SLD	SETTLED SLUDGE
FOR	FUEL OIL RETURN	SLG	MIXED SLUDGE
FOS	FUEL OIL SUPPLY	SLU	SLUDGE UNLOADING
FOV	FUEL OIL VENT	SQW	SQUEEZE WATER (FILTER PRESS)
FSW	FILTER SURFACE WASH	STM	STORM
FW	FILTERED WATER	SUP	SUPERNATANT
GT	GRIT	TRW	TREATED WATER
HCL	HYDROCHLORIC ACID	TS	THICKENED SLUDGE
HSO	SULPHURIC ACID	TURB	TURBIDITY
HWR	HOT WATER RETURN (HEATING)	TWAS	TREATED WASTE ACTIVATED SLUDGE
HWS	HOT WATER SUPPLY (HEATING)	TWW	TREATED WASTE WATER
IA	INSTRUMENT AIR	V	VENT
KMnO	POTASSIUM PERMANGANATE	VA	VENT (AIR)
LPG	LIQUID PROPANE GAS	VP	VENT (PUMPING)
ML	MIXED LIQUOR	VT	VENT (TANK)
NaCO	SODIUM CARBONATE	WAS	WASTE ACTIVATED SLUDGE
NaHCO	SODIUM BICARBONATE	WD	WASTE DRAIN
NaOCl	SODIUM HYPOCHLORITE	WBW	WASTE BACKWASH WATER

PROCESS LEGEND – VALVE SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
VGA	GATE	VGL	GLOBE
VTW	THREE-WAY	VAN	ANGLE
VBA	BALL	VPL	PLUG (NORMALLY CLOSED)
VBU	BUTTERFLY	VPL	PLUG (NORMALLY OPEN)
VKG	KNIFE GATE	VNE	NEEDLE
VKRM	DIAPHRAGM	VPN	PINCH
VMU	MUD	SQC	SQUARE HEAD COCK
VSC	SWING CHECK	VSC	SPRING CHECK
VSC	WEIGHTED CHECK	VED	ELECTRIC CHECK
VDC	DOUBLE DOOR CHECK	VBC	BALL CHECK
KRMP	FLAP	KRMS	FOOT VALVE/ STRAINER
VAC	AIR VACUUM	VAV	AIR & VACUUM
VAR	AIR RELEASE	VSR	SAFETY RELIEF
PRV	PRESSURE REDUCING (SELF CONTAINED)	ASV	ANGLE SEAT VALVE
BPV	BACK PRESSURE (SELF CONTAINED)	PRV	PRESSURE REDUCING
SG	STOP GATE	BPV	BACK PRESSURE
SLG	SLIDE GATE	AWG	ADJUSTABLE WEIR GATE
VRO	ROTARY	STL	STOP LOGS
KRMP	DAMPER	SCG	SLUICE GATE
INJQ	INJECTION QUILL WITH CORPORATION STOP	VDB	DUCKBILL CHECK
VHYD	YARD HYDRANT	SHG	SHEAR GATE
	BLOCK AND BLEED VALVE	EDV	ENERGY DISSIPATING VALVE

1. DIRECTION OF FLOW FOR THE ABOVE SYMBOLS IS FROM LEFT TO RIGHT.
2. STATUS MAY BE SHOWN– N.O.=NORMALLY OPEN, N.C.=NORMALLY CLOSED.
3. (WKG*) WKG INDICATES VALVE TYPE AND * INDICATES SPECIFICATION No.
4. ADD ACTUATORS TO VALVES FROM VALVE ACTUATOR TABLE.

PROCESS LEGEND – P & ID SYMBOL DESIGNATIONS

SYMBOL	DESCRIPTION
	PRIMARY FLOW LINE
	SECONDARY FLOW LINE
	TERTIARY LINE
	EXISTING PRIMARY FLOW LINE
	EXISTING SECONDARY FLOW LINE
	EXISTING TERTIARY LINE
	FUTURE PRIMARY FLOW LINE
	FUTURE SECONDARY FLOW LINE
	FUTURE TERTIARY FLOW LINE
	DIRECTION OF FLOW
SLOPE 2%	DIRECTION OF SLOPE (ARROW DOWN GRADE)
	CONNECTION LINE
	LINES CROSSING OVER (BREAK LESSER LINE)
	CHANNEL
INCREASING FLOW OR FROM	LINE CONTINUATION– TO ANOTHER DRAWING
OUTWARD	LINE CONTINUATION– FROM ANOTHER DRAWING
	LINE SPECIFICATION CHANGE
	PNEUMATIC LINE
	ELECTRICAL SIGNAL
	HYDRAULIC LINE
	DATA LINK/FIELDBUS
	INSULATED LINE WITH ELECTRIC TRACING
	INSULATED LINE
	FLEXIBLE LINE

PROCESS LEGEND – EQUIPMENT

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	CENTRIFUGAL PUMP		ROTARY PUMP
	METERING PUMP		DUPLEX METERING PUMP
	VERTICAL TURBINE PUMP		CIRCULATING PUMP/INLINE PUMP
	SUBMERSIBLE PUMP		VACUUM PUMP
	SUMP PUMP		PROGRESSIVE CAVITY PUMP
	RECIPROCATING COMPRESSOR		RECIPROCATING PUMP
ENG	COMBUSTION ENGINE		BLOWER (LOBE TYPE)
	CENTRIFUGAL COMPRESSOR	GEN	GENERATOR
VAC	VACUUM PUMP		BLOWER (CENTRIFUGAL)
	INLINE MIXER		CENTRIFUGE
	MIXER		TRAVELING WATER SCREEN
	TANK (OPEN)		HEAT EXCHANGER
OR	TANK (CLOSED)		PRESSURE TANK OR ACCUMULATOR
	SWAB LAUNCHER		GAS CYLINDER (INDICATE CONTENTS)
	ULTRAVIOLET MODULE		SWAB CATCHER
	INLINE GRINDER		PROPELLER PUMP
			ROTARY ROTARY SCREEN

– DENOTES CONSTANT SPEED DRIVE
* – DENOTES VARIABLE SPEED DRIVE (* M FOR MECHANICAL, E FOR ELECTRICAL)
CONSTANT SPEED DRIVES ARE USED FOR ILLUSTRATION PURPOSES ONLY.

PROCESS LEGEND – VALVE ACTUATORS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	FLOAT		DIAPHRAGM
	GEAR		SOLENOID
	LEVER		CHAIN WHEEL
	MOTORIZED VALVE		VALVE BOX (C/W EXTENSION STEM)
	NON RISING STEM (HANDWHEEL)		QUICK OPENING
	RISING STEM (HANDWHEEL)		DOUBLE ACTION PISTON (FAIL CLOSE)
	SINGLE ACTION PISTON (FAIL OPEN)		THERMAL CONTROL VALVE
	PEDESTAL OPERATOR		

NOTE: GATE VALVES ARE USED FOR ILLUSTRATION PURPOSES ONLY

PROCESS LEGEND – INSTRUMENTATION
INSTRUMENTATION DESIGNATION – (ISA–S5.4 1991)

LETTER	FIRST LETTER: INITIATING OR MEASURED VARIABLE	MODIFIER	SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	
*** A	ANALYSIS (2)		ALARM		
B	BURNER, COMBUSTION			CLOSE/STOP/DECREASE (1)	
C				CONTROL	
D		DIFFERENTIAL		OPEN/START/INCREASE (1)	
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			FAIL (1)
G			GLASS/VIEWING DEVICE		
****H	HAND				HIGH (OPENED)
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW (CLOSED)
M	MOTOR, MOTION (1)	MOMENTARY		MOTOR (1)	MIDDLE OR INTERMEDIATE
N					ON OR OPERATE (1)
O			ORRIFICE/RESTRIILTION		OVERLOAD (1)
P	PRESSURE/VACUUM		POINT (TEST) CONNECTION	PUMP (1)	
Q	QUANTITY	INTEGRATE/TOTALIZE			
R	RADIATION		RECORD		
S	SPEED/FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE (2)		MULTIFUNCTION	MULTIFUNCTION (2)	MULTIFUNCTION (2)
V	VIBRATION, MECHANICAL ANALYSIS			VALVE/DAMPER/LOUVRE	
W	WEIGHT/FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED (2)	UNCLASSIFIED (2)	UNCLASSIFIED (2)
Y	EVENT/STATE/PRESSENCE			RELAY/COMPUTER/CONVERT	
Z	POSITION/DIMENSION			DRIVER/ACTUATOR/UNCLASSIFIED FINAL/CONTROL ELEMENT	

NOTE: THIS TABLE IS NOT ALL–INCLUSIVE.
*A; ALARM, THE ANNUNCIATING DEVICE, MAY BE USED IN THE SAME FASHION AS S, SWILTH, THE ACTUATING DEVICE.
**THE LETTERS H AND L MAY BE OMITTED IN THE UNDEFINED CASE.
1) USER'S CHOICE
2) WHEN USED, SYMBOL OR SIGNAL LINE IS ANNOTATED

WATER TREATMENT / WASTEWATER

***	DESCRIPTION	***	DESCRIPTION
ALU	ALUMINUM	ALU	ALUMINUM
F	FLUORIDE	CB	COMBUSTION GAS
CLC	CHLORINE LEAK	CH4	METHANE
CLR	CHLORINE RESIDUAL	CLC	CHLORINE LEAK
COL	COLOUR	CLR	CHLORINE RESIDUAL
CON	CONDUCTIVITY	CO	CARBON MONOXIDE
OZL	OZONE LEAK	DO	DISSOLVED OXYGEN
OZR	OZONE RESIDUAL	H2S	HYDROGEN SULPHIDE
pH	pH	pH	pH
SCD	STREAMING CURRENT DETECTOR	SS	SUSPENDED SOLIDS
Tu	TURBIDITY	Tu	TURBIDITY
SBI	SLUDGE BLANKET INTERFACE		
****	HAND SWILTH ANNOTATIONS		
FR	FORWARD/REVERSE	RLT	REMOTE–LOCAL–TEST/JOG
LOA	LOCAL–OFF–AUTO (VENDOR RPU)	RST	RESET
LOR	LOCAL–OFF–REMOTE (FACILITY PLC/SCADA)	SS	START/STOP
LOS	LOCKOUT/STOP		

GENERAL INSTRUMENTATION

SYMBOL	DESCRIPTION		SYMBOL	DESCRIPTION	
	MOUNTED LOCALLY	INSTRUMENT SYMBOLS		LOGIC GATE – AND (INTERLOCK IS EFFECTIVE ONLY IF ALL INPUTS ARE ACTIVE)	INTERLOCK SYMBOLS
	MOUNTED ON FACE OF PANEL			LOGIC GATE – OR (INTERLOCK IS EFFECTIVE IF ONE OR MORE INPUTS ARE ACTIVE)	
	MOUNTED BEHIND PANEL DOOR			LOGIC GATE – OR (INTERLOCK IS EFFECTIVE IF ONE OR MORE INPUTS ARE ACTIVE)	
	SCADA INPUT/OUTPUT	SCADA SYMBOL		COMPLEX OR UNDEFINED INTERLOCK	
	NOT ACCESSIBLE TO OPERATOR	DISTRIBUTED CONTROL OR SHARED INSTRUMENTS SYMBOLS		PANEL NUMBER n	AUTOMATION SYMBOLS
	ACCESSIBLE TO OPERATOR			MOTOR CONTROL CENTRE NUMBER n	
	AUXILIARY LOCATION			PROGRAMASIBLE CONTROLLER I/O RACK NUMBER n	
	NOT ACCESSIBLE TO OPERATOR	PROGRAMASIBLE CONTROLLER SYMBOLS		SUPPLIED AND INSTALLED BY OTHER DIVISIONS. CONNECTED BY THIS DIVISION.	
	ACCESSIBLE TO OPERATOR			RESET FOR LALTH TYPE ACTUATOR	
	PILOT LIGHT			PURGE OR FLUSHING DEVICE	MISCELLANEOUS SYMBOLS

PROCESS LEGEND – PRIMARY FLOW ELEMENTS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	WEIR		SNAP–ON FLOW METER		THERMAL WELL
	INSERT VENTURI		SONIC FLOW METER		GAUGE INDICATOR
	PITOT TUBE (SINGLE)		MAGNETIC FLOW METER		ULTRASONIC LEVEL METER
	PILOT TUBE (AVERAGING)		ORIFICE PLATE		
	FLUME		FLOW SIGHT GLASS		
	TURBINE / PROPELLER		ROTAMETER		
	POSITIVE DISPLACEMENT		STATIC INLINE MIXER		

PROCESS LEGEND – MISCELLANEOUS SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
SPT	SAMPLE POINT (12mm)		TRENCH DRAIN		STRAINER
DPT	DRAIN POINT (MIN. 12mm)		UNION	VC	VICTAULIC COUPLING
DYT	DRIP TAP		HOSE CONNECTION		BLIND FLANGE
	IN LINE STRAINER		EYEWASH		WASH BASIN
	DRAIN / OVERFLOW		AERATION SYSTEM FINE OR COARSE BUBBLE		CLEANOUT
	PIPE MATERIAL CHANGE		DIAPHRAGM SEAL	FA	FLAME ARRESTOR
FA	THERMAL TRAP ASSEMBLY (FLAME ARRESTER + THERMAL CONTROL VALVE)		CAMLOCK CONNECTION		

DRAWING NUMBER	REFERENCE DRAWINGS

NOT FOR CONSTRUCTION

ISSUED FOR TENDER

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
Dillon Consulting Limited (MB)
No. 1789 Date:

NO.	REVISIONS	DATE	DESIGN	CHECK
0	ISSUED FOR TENDER	2023/07/20	CP	BLM

DILLON CONSULTING

DESIGNED BY: CP	CHECKED BY: TC
DRAWN BY: SMZ	APPROVED BY: BLM
SCALE: NTS	RELEASED FOR CONSTRUCTION BY:
DATE: JUNE 2023	DATE:
CONSULTANT NO.: 22–3229	

ENGINEER'S SEAL
PROVINCE OF MANITOBA
C.N. POGUE
Member
35962
07/20/23
REGISTERED PROFESSIONAL ENGINEER

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

RIVERBEND LIFT PUMPING STATION
2023 UPGRADES
PROCESS AND INSTRUMENTATION DIAGRAM
LEGEND WASTEWATER LIFT PUMPING

CITY DRAWING NUMBER	SHEET	REV.	SIZE
1-0178L-P0002	001	00	A1

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