FOCUS
Engineering - Geomatics - Planning

Project: 061200061

CITY OF PENTICTON
FAIRVIEW SANITARY LIFT STATION REVIEW
TECHNICAL MEMORANDUM
9 MAY 2011

The Fairview Lift Station is located at the corner of Fairview Road and Industrial Avenue and services a small area. The station is fitted with 2 Flygt CP 3085.182 MT, 3 HP pumps and discharges into a 100 mm Ø asbestos cement pipe pumping to a manhole at Huth Road, 260 m away. The station's internal piping and the AC forcemain has failed and needs replacement.

The City requested Focus to review the station pumping capacity and its ability to pump into the adjacent 450 mm Ø PVC Lee Avenue Pump Station forcemain, thereby abandoning the 100 mm AC forcemain.

The following is a brief design memorandum on the proposed upgrade as depicted on Dwg. M01 attached.

A. Pump Capacity

Existing pumps are 3 HP Flygt pumps. In order for the pumps to discharge to the Lee Avenue 450 mm forcemain, they will have to match the Hydraulic Grade Line (HGL) in the main under 3 scenarios:

1. with Lee Avenue Pump Station not operating;
2. with Lee Avenue Pump Station discharging 160 l/s; or
3. with Lee Avenue Pump Station discharging 160 l/s in conjunction with a future 65 l/s discharge from Penticton Indian Band.

In each case, the static head, assuming an average water level in the wet well of 339.63 m, to be met will be:

1. Water level in AWTP (344.82 m) minus 339.62 m above = 5.2 m
2. HGL at Fairview LS with Lee PS @ 160 l/s less the 339.63 m above = 345.85 – 339.63 or 6.22 m.
3. HGL at Fairview LS with Lee PS @ 160 l/s and 65 l/s from P.I.B. less Fairview water level = 346.75 – 339.62 or 7.12 m.

In addition to the above, the HGL for each scenario will have the friction head through a new 100 mm Ø SS pipe added and this is estimated to be 0.6 m (c = 100, length 4.3 m, check valve, @ Q = 20 l/s).

The attached Sketch 1 shows the pump and system heat curve for each scenario. (Note: System Curve #4 reflects the existing system/head curve for the 3 HP pumps pumping to Huth Road.)

As can be seen from Sketch 1, all pump operating points are on the pump curve. Existing station flow is approximately 9 l/s and upgraded flow will be approximately 20 l/s through the shorter forcemain.

Based on the above analysis, the existing pumps are suitable for the upgraded service. We did a calculation of wet well operating capacity for pump starts. Maximum pump starts occur when station inflow equals half the pump capacity. Assuming a 600 mm operating water level (stop to start), we estimate the maximum pump starts to be 6 starts/hr/pump.

This exceeds bylaw requirements of 4 starts/hr/pump but it will be less than the manufacturer's recommendation of 15 starts/hr/pump.

B. Temporary Bypass Pumping

The City intends using a 0.5 HP submersible sewage pump for temporary bypass pumping during construction. This pump will be located in adjacent inflow manhole and pumped through a temporary connection to the 450 mm Lee forcemain.

Elevation of bypass MH sump = 340.38 m

Assume: Average water level in MH is 400 mm depth
i.e. water level = 340.38 + 0.4 = 340.78 m

Assume: Lee pumps operating, i.e. HGL = 345.85
Then static = 345.5 – 340.75 = 5.1 m (16 ft)

Friction: 4 m, 75 mm Ø, Q = 10 l/s, H = 0.5 m

TDH = 5.1 + 0.5 = 5.6 m (18 ft)

Attached Sketch 2 illustrates the pump/system curve for this application. As can be seen, operating point is 80gpm @ 18 ft with 2 Lee pumps operating and 110gpm at 13ft when the Lee pumps are not running. Both points are on the pump curve. We are not sure what the station inflow is but the 80 to 110 gpm is probably adequate. This will have to be monitored though.

C. Conclusion

Based on the above analysis, the Fairview Lift Station can be upgraded to discharge to the 450 mm Lee Avenue PS forcemain. Dwg. M01 reflects to upgrade proposal.

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Project Manager
rob.fortuin@focus.ca

PERFORMANCE CURVE

PRODUCT	TYPE
CP3085.182	MT

DATE	PROJECT	CURVE NO	ISSUE
2005-01-31		63-434-00-5330	5

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.83	0.77	0.66
MOTOR EFFICIENCY	77.5 %	78.5 %	76.5 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	3	hp
STARTING CURRENT ...	53	A
RATED CURRENT ...	9.6	A
RATED SPEED	1700	rpm
TOT.MOM.OF INERTIA ...	0.034	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 163 mm

MOTORTYPE	STATOR	REV
15-10-4AL	27Y	12

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	208 V	4

GEARTYPE	RATIO
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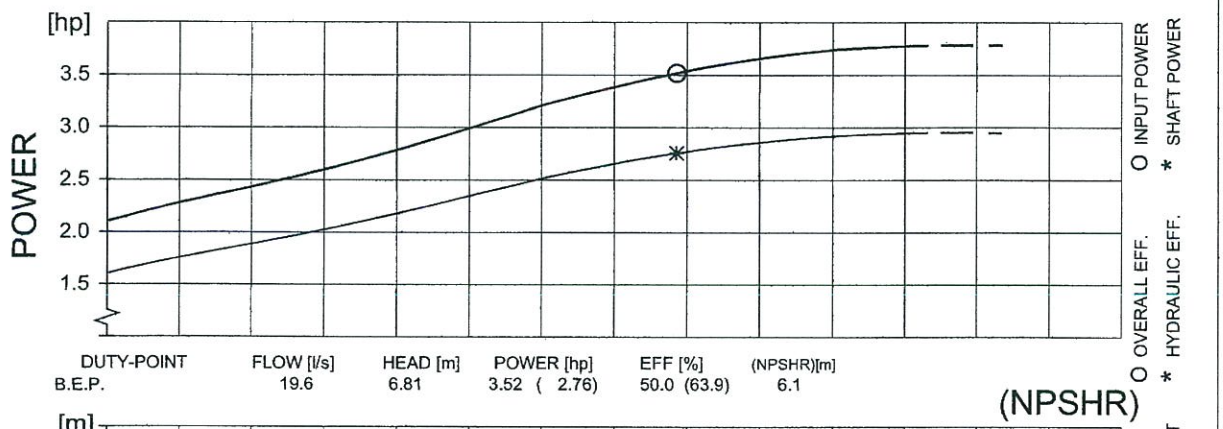
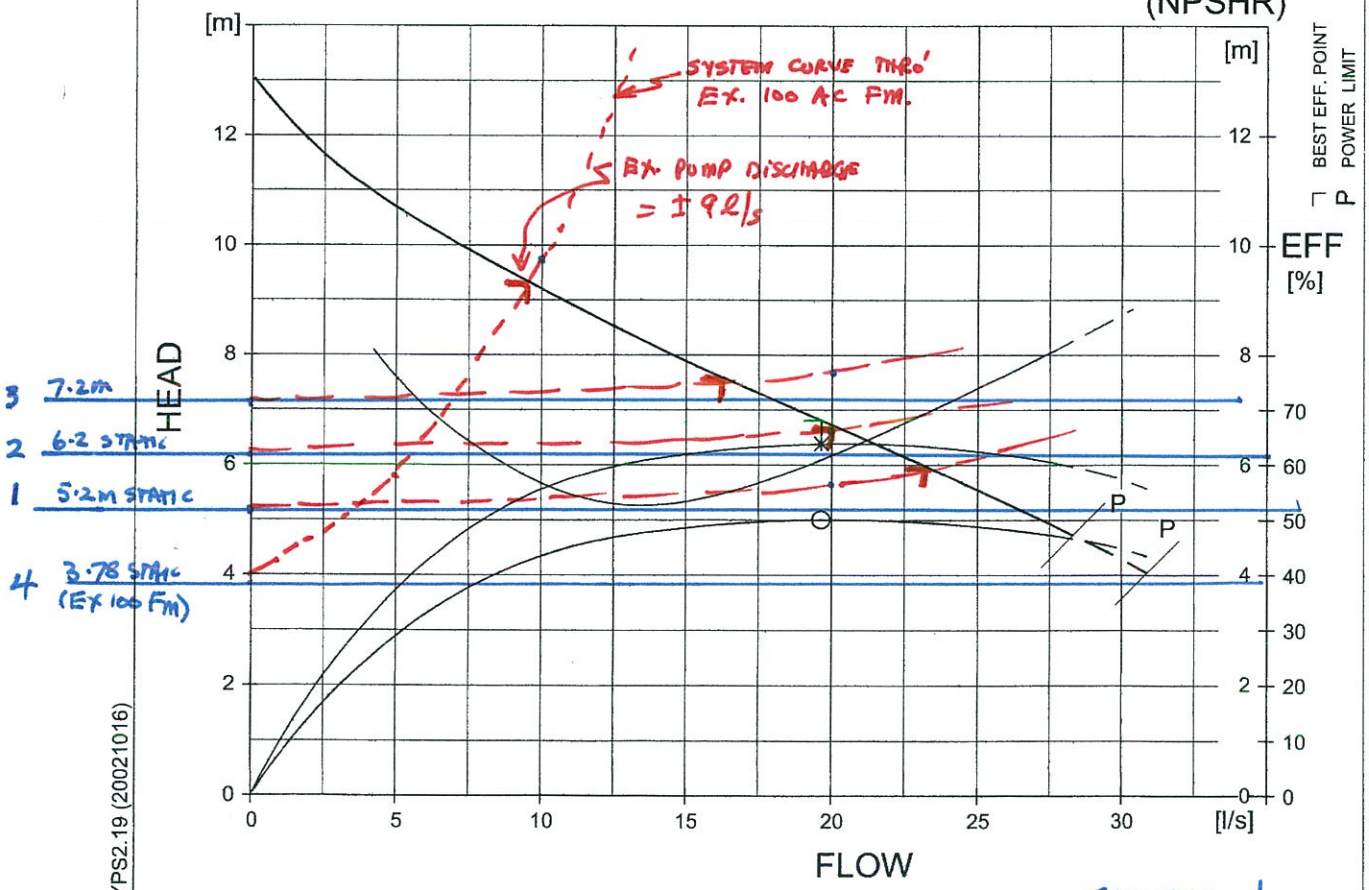
COMMENTS

INLET/OUTLET: - / 80 mm

IMP. THROUGHLET: 76 mm



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [hp]	EFF [%]	(NPSHR)[m]
B.E.P.	19.6	6.81	3.52 (2.76)	50.0 (63.9)	6.1



SKETCH 1

FLYPS2.19 (20021016)

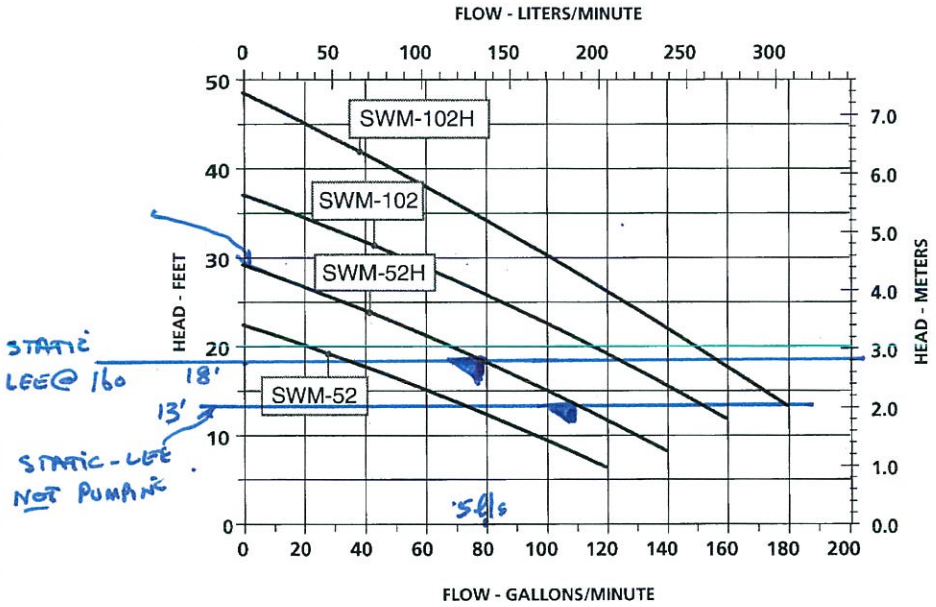
(NPSHR) = (NPSH3) + margins

Performance with clear water and rating data at 40 °C

FLYGT CURVE

SWM Series

1/2 & 1 hp Submersible Sewage Pump, 2" solids



Construction

Motor Housing	Epoxy Coated Cast Iron
Impeller Material	Cast Iron
Impeller Type	Non-clog
Volute	Epoxy Coated Cast Iron
Power Cord	SJTW SJOW (Others)
Mechanical Shaft Seal	Nitrile Parts, Stainless Steel, Carbon & Ceramic Faces
Fasteners	Stainless Steel
Shaft	416 Stainless Steel
Bearings	Ball Bearings

SSPMA Certified Pump

NOTE: FRICTION @ 5 l/s (80 gpm) THRU' ± 4m, 75mm ϕ pipe = ± 0.1m = NEGLIGIBLE

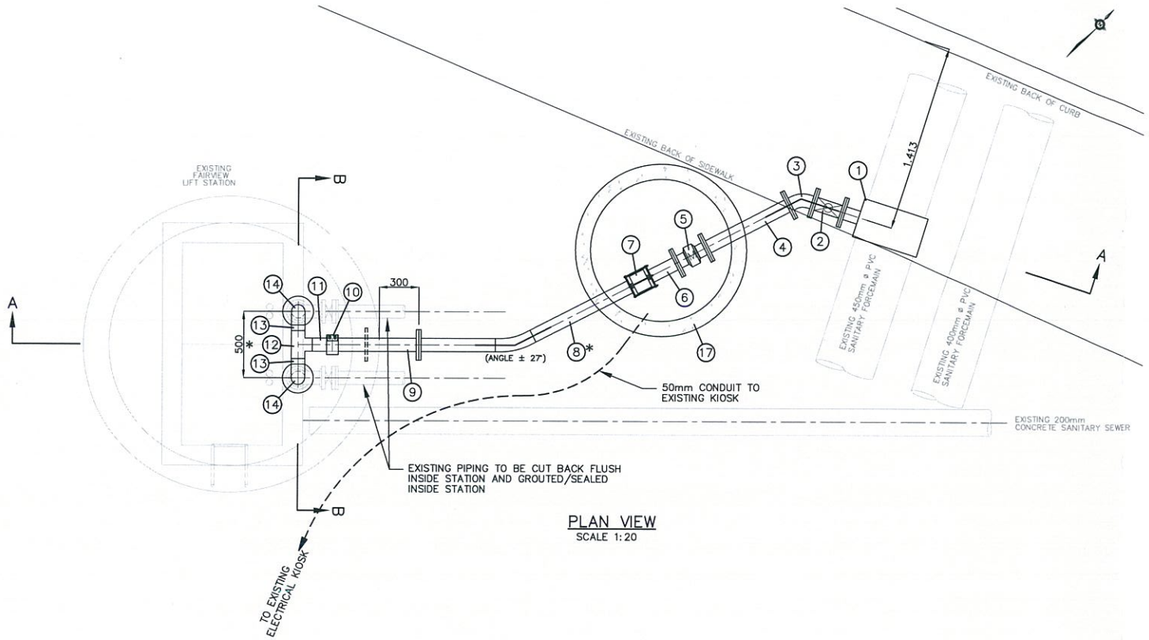
Specifications

MODEL NO.	ITEM NO.	HP	VOLTS	SFA	PHASE	TOTAL HEAD IN FEET							SHUT-OFF		SOLIDS HANDLING	WEIGHT (LBS.)	CORD LENGTH	RPM
						5	10	15	20	25	30	35	FEET	PSI				
						CAPACITIES IN U.S. GPM												
SWM-52	511213	½	115	11.6	1	135	90	56	14	-	-	-	23	10	2"	57	20'	1,750
SWM-52-AF	511214	½	115	11.6	1	135	90	56	14	-	-	-	23	10	2"	59	20'	1,750
SWM-52H	511215	½	115	11.6	1	-	128	97	68	32	-	-	29	12.6	2"	58	30'	3,450
SWM-52H-AF	511216	½	115	11.6	1	-	128	97	68	32	-	-	29	12.6	2"	60	30'	3,450
SWM-52H	511217	½	208-230	11.6	1	-	128	97	68	32	-	-	29	12.6	2"	58	30'	3,450
SWM-52-AF	511218	½	208-230	11.6	1	-	128	97	68	32	-	-	29	12.6	2"	60	30'	3,450
SWM-102	514234	1	208-230	10.7	1	-	168	144	118	85	46	-	37	16.1	2"	62	20'	1,750
SWM-102H-AF	514235	1	208-230	10.7	1	-	168	144	118	85	46	-	37	16.1	2"	64	20'	1,750
SWM-102	514236	1	208-230	4.58	3	-	168	144	118	85	46	-	37	16.1	2"	63	20'	1,750
SWM-102	514237	1	460	2.15	3	-	168	144	118	85	46	-	37	16.1	2"	63	20'	1,750
SWM-102H	514238	1	230	13.3	1	-	190	170	148	124	100	74	48	20.9	2"	61	30'	3,450
SWM-102H-AF	514239	1	230	13.3	1	-	190	170	148	124	100	74	48	20.9	2"	63	30'	3,450

This one →

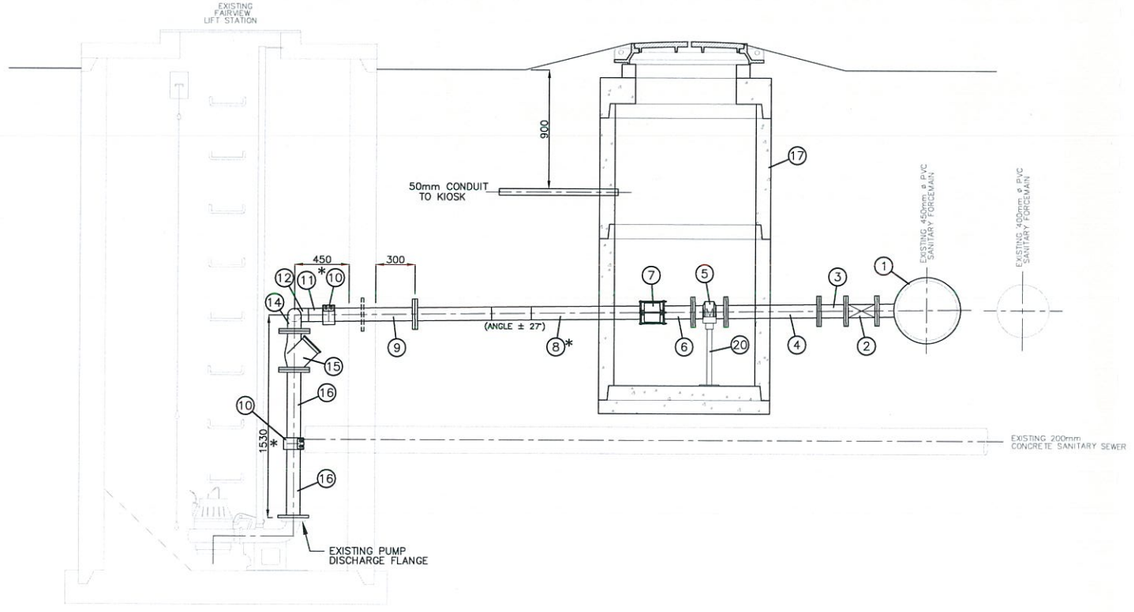
Note: Manual models do not include float switch. Automatic models include float switch.

SKETCH 2.

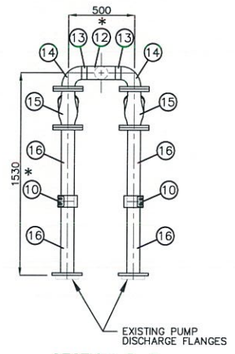


PLAN VIEW
SCALE 1:20

* – DIMENSIONS WITH ASTERIX TO BE VERIFIED IN FIELD



SECTION A–A
SCALE 1:20



SECTION B–B
SCALE 1:20

PIPING SCHEDULE ITEMS No. 1 AND No. 2 TO BE INSTALLED BY CITY OF PENTICTON

ALL PIPING SHALL BE CLASS 304L SCHEDULE 10 STAINLESS STEEL

ALL FLANGES SHALL BE CLASS 150 STAINLESS STEEL

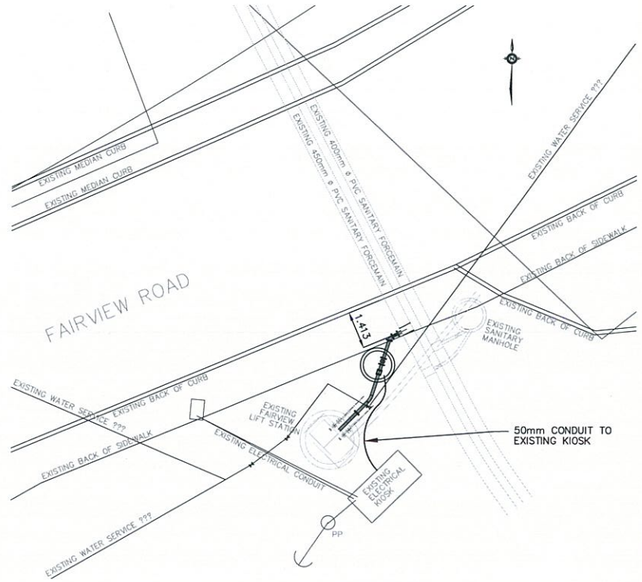
ANGLE OF FABRICATED BEND IN PIPING SCHEDULE ITEM No. 8 IS APPROXIMATELY 27 DEGREES

NOTES:

- ALL PIPING THROUGH WALLS, SLABS OR OTHER CONCRETE STRUCTURES SHALL BE WATERTIGHT AND SHALL CONTAIN A PUDDLE FLANGE WELDED TO THE PIPE.
- CONTRACTOR IS TO CONFIRM ALL DIMENSIONS AND PIPING SCHEDULE ITEMS, QUANTITIES AND JOINTS.
- ALL PIPING SHALL BE SUPPORTED FROM WALLS, FLOOR SLABS AND CEILINGS FOR THRUST RESTRAINT AND SUPPORT OF PIPE AND/OR FITTINGS. USE GRINNEL OR EQUIVALENT PIPE SUPPORTS.
- ALL PIPE SUPPORTS, INSERTS, BOLTS, NUTS AND OTHER MISCELLANEOUS METALS TO BE STAINLESS STEEL.
- SUBMIT SHOP DRAWINGS FOR REVIEW FOR ALL EQUIPMENT.

SCOPE OF WORK:

- WET WELL TO BE ISOLATED BY CITY WITH BYPASS PUMPING BY CITY.
- CITY WILL DO ALL EXCAVATION, BACKFILLING, SITE RESTORATION AND SUPPLY/INSTALL HOT TAP AND GATE VALVE.
- CONTRACTOR TO DO ALL STATION INTERNAL PIPEWORK (INCLUDING REMOVAL OF EXISTING) AND ALL WORKS TO TIE TO CITY INSTALLED GATE VALVE, INCLUDING MANHOLE.
- CONTRACTOR TO COMPLY WITH CONFINED SPACE ENTRY REGULATIONS.
- EXCAVATION TO BE FENCED BY CONTRACTOR AND SECURED OVERNIGHT.



SITE PLAN
SCALE 1:100

TO BE INSTALLED BY CITY OF PENTICTON

PIPING SCHEDULE (CONTRACTOR TO CONFIRM AND INCLUDE ALL FITTINGS NOT LISTED)

No.	SIZE	No. REQ'D	TYPE OF JOINT	DESCRIPTION
1	450x100	1	–	STAINLESS STEEL TAPPING SLEEVE – ROBAR MODEL 6606 FOR C905, DR41 PVC PIPE
2	100	1	FLxFL	GATE VALVE – NRS, S.S. BODY, BRONZE MOUNTED, SOLID WEDGE c/w V.B. AND RISER
3	100	1	FLxFL	45° BEND – STAINLESS STEEL c/w S.S. 150 lb. FLANGES
4	100	1	FLxFL	SPOOL – STAINLESS STEEL c/w S.S. 150 lb. FLANGES – LENGTH TO SUIT
5	100	1	FLxFL	MAGNETIC FLOWMETER – SITRANS F M MAG 5100 W c/w MAG 5000, IP67/NEMA 4X/6, POLYAMID ENCLOSURE, WITH DISPLAY, 115–230V AC 50/60 HZ, AND USM POTTING KIT
6	100	1	FLxPE	SPOOL – STAINLESS STEEL c/w S.S. 150 lb. FLANGE – LENGTH TO SUIT
7	100	1	–	ADAPTOR COUPLING – STAINLESS STEEL – ROBAR MODEL 1736AS
* 8	100	1	FLxPE	SPOOL – STAINLESS STEEL c/w S.S. 150 lb. FLANGE, WELDED BEND (ANGLE TO BE DETERMINED IN THE FIELD) – LENGTH TO SUIT (ANGLE ± 27°)
9	100	1	FLxPE	SPOOL – STAINLESS STEEL c/w S.S. 150 lb. FLANGE AND PUDDLE FLANGE – LENGTH TO SUIT
10	100	3	–	ADAPTOR COUPLING – TEEKAY AXILOCK–S
11	100	1	WELDxPE	SPOOL – STAINLESS STEEL – LENGTH TO SUIT
12	100x100x100	1	WELDxWELDxWELD	TEE – STAINLESS STEEL – LENGTH TO SUIT
13	100	2	WELDxWELD	SPOOL – STAINLESS STEEL – LENGTH TO SUIT
14	100	2	FLxFL	90° BEND – STAINLESS STEEL c/w S.S. 150 lb. FLANGES
15	100	2	FLxFL	CHECK VALVE – FLYGT TYPE 5087 HDL CHECK VALVE
16	100	4	FLxPE	SPOOL – STAINLESS STEEL c/w S.S. 150 lb. FLANGES – LENGTH TO SUIT
17	1050	1	–	MANHOLE c/w BASE, RISERS, LADDER RUNGS, LID, GRADE RING AND FRAME AND COVER – MAKE WATERTIGHT
18	–	–	–	–
19	–	–	–	–
20	–	1	–	ADJUSTABLE PIPE SUPPORT – GRINNEL OR APPROVED EQUAL

MAGNETIC FLOWMETER : SUPPLIER E.B. HORSEMAN & SON
#1 – 13055 80th AVENUE
SURREY, B.C. V3W 3B1
CONTACT : JOHN CINDRIC
PHONE : 604.596.7111
CELL : 604.501.2321
TOLL FREE : 1.800.242.5863
E–MAIL : jcindric@ebhorseman.com

"NOT FOR CONSTRUCTION"
PRELIMINARY 2011/05/03

DATE	REV	DESCRIPTION	BY	APPR.
2011/05/09	A	REVISIONS AS PER CITY COMMENTS	DEM	RBF

DATE	REV	DESCRIPTION	BY	APPR.

SCALE AS NOTED
DATE 2011/05/03
APPROVED RBF
DESIGN BY RBF
DRAWN BY DEM
CHECKED BY RBF

SEAL

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CITY OF PENTICTON
FAIRVIEW PUMP STATION UPGRADE – 2011
MECHANICAL – PIPING PLAN

REV. No. A
OFFICE No. 061200061
DRAWING No. M01

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