ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

BILL OF QUANTITIES

OCTOBER 25, 2019

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Table of Contents

	Page No.
1.0 Introduction	1
2.0 Gross Floor Areas	2

BILL OF QUANTITIES

A - Project Key Quantities	A1 - A2
B - Architectural/ Structural (Civil)	B1 - B39
C - Process Systems Tie-in	C1 - C6
D - Process Systems	D1 - D40
E - Process Support Systems	E1 - E8
F - Building Support Systems tie-in (Mechanical)	F1 - F3
G - Building Support Systems (Mechanical)	G1 - G17
H - Electrical	H1 - H24

1.0 Introduction

1.1 General

This Bill of Quantities are intended to provide a realistic assessment of the quantities as per Documents provided to via USP key on August 30th 2019 by OPG for the Heavy Water Management Building - West Annex.

Accordingly, this Bill of Quantities should only be considered within the full context of the above noted documentation.

1.2 Methodology

Generally, quantities are measured in accordance with acceptable industry standards.

2.0 Gross Floor Areas

Gross Floor Areas:	m2
Basement (Elevation 87.000)	1,034
First Floor (elevation 100.000)	1,034
Condensate Platform (elevation 104.32)	33
Second Floor (elevation 107.800)	1,034
Mezzanine Floor (elevation 111.600)	69
Stairwell # 1 at roof level (elevation 115.000)	22
Total Gross Floor Area	**3,226**

Volume	GFA (m2)	Height	Volume (m3)
Basement (elevation 87.000)	1,034	14.45	14,941
First Floor (elevation 100.000)	1,034	7.80	8,065
Condensate Platform (elevation 104.32)	33	included	
Second Floor (elevation 107.800)	1,034	7.20	7,445
Mezzanine Floor (elevation 111.600)	69	included	
Stairwell # 1 (elevation 115.000)	22	3.10	68
Total Gross Volume			**30,519**

A - Project Key Quantities

KEY QUANTITIES

Item Ref.	Item Description	Quantity	Unit
	The following are project key quantities		
1.	Excavation total volume	14,041	m3
2.	Secant piles - support of excavation	3,045	m2
3.	Concrete total volume	4,593	m3
4.	Re-bar total weight	871,874	kg
5.	Masonry - blockwalls total No.		
	- 200X200X400mm	26,986	No.
	- 300X200X400mm	538	No.
6.	Structural steel total weght	589,043	kg
7.	Process piping		
	- 2 1/2" dia and smaller	8,206	m
	- 3" - 4" dia.	1,230	m
	- 10" dia.	60	m
	- 14" dia.	60	m
	- 30" dia.	60	m
8.	Process pipe valves		
	- 2 1/2" dia and smaller	998	No.
	- 3 - 4" dia.	29	No.
	- 10 to 14" dia.	12	No.
9.	Process pipe fittings		
	- 2 1/2" dia and smaller	4,072	No.
	- 3 - 4" dia.	591	No.
	- 10 to 14" dia.	41	No.
	- 30" dia.	5	No.

BILL OF QUANTITIES

KEY QUANTITIES

Item Ref.	Item Description	Quantity	Unit
10.	Process tanks		
	- 100m3 tanks, class 6	15	No.
	- 100m3 tanks, class 3	4	No.
	- 50m3 tanks, class 3	2	No.
	- 25m3 tanks, class 3	4	No.
	- 22m3 tanks, class 3	1	No.
	- 3.8m3 stanless steel tank for drainage	2	No.
11.	Process pumps		
	- Pumps 10.5 l/s @ 155.5 head, class 6	2	No.
	- Pumps 3.8 l/s @ 96 head, class 6	2	No.
	- Pumps 5 l/s @ 30m head	2	No.
	- Pumps 5 l/s @ 38m head	2	No.
	- Pumps 3.8 l/s @ 1,035kPa head	2	No.
	- Pumps 3.8 l/s @ 25 head	2	No.
	- Pumps 85GPM @ 140' head - drainage	4	No.
	- Pump 83 l/s @ 23m head - drainage	1	No.
12.	Electrical feeders		
	- Main feeder length	19,100	m
	- Termination	1,000	No.
	- Branch wiring	12,000	m
	- Cable connector/ termination	1,500	No.
13.	Cable tray total length	494	m

B - Architectural/ Structural (Civil)

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ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
02	**Existing conditions**		
02.01	Cut and remove roadway	638	m2
02.02	Cut and remove existing curb	167	m

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
03	**Concrete and Formwork**		
	At Basement (Elevation 87+000) level		
03.01	Drainage sub-slab 250mm thick	966	m2
	- Concrete 35MPa supply and place	242	m3
	- Edge formwork	35	m2
	- Pre applied sheet membrane waterproofing - note 2 of 23840-10008	966	m2
03.02	Basement slab on sub-slab 1000mm thick	966	m2
	- Concrete 35MPa supply and place	966	m3
	- Edge formwork	140	m2
	- Re-bar	188,929	kg
	- Form key	134	m
	- Water stop	134	m
03.03	Topping slab 200mm thick	798	m2
	- Concrete 35MPa supply and place	160	m3
	- Edge formwork	26	m2
03.04	Wall below grade / Basement wall 1220mm thick	1,680	m2
	- Concrete 35MPa supply and place	2,050	m3
	- Form work to sides (allowed to both sides - to be confirmed)	3,368	m2
	- Re-bar	293,599	kg
	- Form key	269	m
	- Water stop	269	m
03.05	Reinforced concrete partition wall 305mm thick	248	m2
	- Concrete 35MPa supply and place	76	m3
	- Form work to sides	496	m2
	- Re-bar	9,880	kg
03.06	Reinforced concrete partition wall 200mm thick	54	m2
	- Concrete 35MPa supply and place	11	m3
	- Form work to sides	107	m2
	- Re-bar	2,145	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
03	**Concrete and Formwork (Cont'd)**		
	At Basement (Elevation 87+000) level		
03.07	Reinforced concrete partition wall 200mm thick w/ radiation shielding design & 2 hr fire rated	283	m2
	- Concrete 35MPa supply and place	57	m3
	- Form work to sides	566	m2
	- Re-bar	11,115	kg
03.08	Reinforced concrete suspended slab 200mm thk	6	m2
	- Concrete 35MPa supply and place	1	m3
	- Formwork to soffit	6	m2
	- Re-bar	228	kg
	At First Floor (Elevation 100+000) level		
03.09	Reinforced concrete composite slab 700mm thick on 76mm corrugated deck (deck measured elsewhere)	918	m2
	- Concrete 35MPa supply and place	677	m3
	- Edge formwork	148	m2
	- Re-bar	286,371	kg
03.10	Reinforced concrete curb 300x300	127	m
	- Concrete 35MPa supply and place	11	m3
	- Edge formwork	76	m2
	- Re-bar	incl. above	kg
	At Second Floor (Elevation 107+800) level		
03.11	Reinforced concrete composite slab 114mm thick on 38mm corrugated deck (deck measured elsewhere)	884	m2
	- Concrete 35MPa supply and place	118	m3
	- Edge formwork	23	m2
	- Re-bar	33,881	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
03	**Concrete and Formwork (Cont'd)**		
03.12	Reinforced concrete pad 102mm on composite slab deck (composite deck meas elsewhere)	71	m2
	- Concrete 35MPa supply and place	7	m3
	- Edge formwork	5	m2
	- Re-bar	incl. above	kg
03.13	Roughen surface level channel 300W x 75D (det S8/S9 dwg 23840-10013) apply bonding agent and filled w/ 35Mpa non-shrink grout	56	m
	At Roof (Elevation 115+000) level		
03.14	Reinforced concrete composite slab 83mm thick on 38mm corrugated deck (deck measured elsewhere)	896	m2
	- Concrete 35MPa supply and place	91	m3
	- Edge formwork	14	m2
	- Re-bar	22,531	kg
03.15	Reinforced concrete bulkhead curb 420mm height	15	m
	- Concrete 35MPa supply and place	2	m3
	- Formwork	13	m2
	- Re-bar	incl. above	kg
03.16	Reinforced concrete bulkhead beam 440mm width x 330mm deep	4	m
	- Concrete 35MPa supply and place	1	m3
	- Formwork	3	m2
	- Re-bar	incl. above	kg
	Plant Drainage Platform		
03.17	Reinforced concrete suspended slab 200mm thk	23	m2
	- Concrete 35MPa supply and place	7	m3
	- Formwork to soffit	23	m2
	- Re-bar	1,596	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
03	**Concrete and Formwork (Cont'd)**		
	Pipe Chase		
03.18	Slab on grade 600mm thick	41	m2
	- 2 layers of 150mm thick compacted granular A fill	12	m3
	- 100mm lean concrete pad	41	m2
	- Concrete 35MPa supply and place	25	m3
	- Edge formwork	13	m2
	- Re-bar (floor, wall & roof all inclusive)	16,843	kg
	- Form key	24	m
	- Water stop	24	m
03.19	Wall below grade 600mm thick	41	m2
	- Concrete 35MPa supply and place	25	m3
	- Form work to sides (allowed to both sides - to be confirmed)	83	m2
	- Re-bar	incl. above	kg
	- Form key	24	m
	- Water stop	24	m
	- Wall waterproofing	42	m2
03.20	Reinforced concrete composite slab 600mm thick on 38mm corrugated deck (deck measured elsewhere)	41	m2
	- Concrete 35MPa supply and place	26	m3
	- Edge formwork	13	m2
	- Re-bar	incl. above	kg
	- Roof waterproofing	41	m2
	- Edge waterproofing	13	m2
03.21	Low strength concrete fill (U-fill) to 1.70m depth from 96.300 to 98.000 (ref: note 52 on dwg 23840-10051)	70	m3
	Loading Dock Extension/Causeway		
03.22	Strip footing 900mm width x 400mm height	11	m
	- Concrete 35MPa supply and place	4	m3
	- Edge formwork	9	m2
	- Re-bar	345	kg
	- Form key	11	m

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
03	**Concrete and Formwork (Cont'd)**		
	Loading Dock Extension/Causeway		
03.23	Foundation wall 300mm thick	9	m2
	- Concrete 35MPa supply and place	3	m3
	- Form work to sides	17	m2
	- Re-bar	691	kg
	- Wall waterproofing	9	m2
03.24	Reinforced concrete slab on grade 250mm thick w/ edge thickening	28	m2
	- Concrete 35MPa supply and place	8	m3
	- Edge formwork	-	m2
	- Re-bar	1,905	kg
03.25	Stub column 550mm x 550mm width x 890mm height	2	No.
	- Concrete 35MPa supply and place	1	m3
	- Form work to sides	4	m2
	- Re-bar	238	kg
03.26	Reinforced concrete partition wall 300mm thick	15	m2
	- Concrete 35MPa supply and place	4	m3
	- Form work to sides	29	m2
	- Re-bar	696	kg
	Condensate Platform		
03.27	Reinforced concrete composite slab 114mm thick on 38mm corrugated deck (deck measured elsewhere)	41	m2
	- Concrete 35MPa supply and place	6	m3
	- Edge formwork	3	m2
	- Re-bar	35	kg
	- Re-bar (welded wire mesh)	41	m2

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
03	**Concrete and Formwork (Cont'd)**		
	Mezzanine level at elevation 111+600		
03.28	Reinforced concrete composite slab 114mm thick on 38mm corrugated deck (deck measured elsewhere)	69	m2
	- Concrete 35MPa supply and place	9	m3
	- Edge formwork	5	m2
	- Re-bar	60	kg
	- Re-bar (welded wire mesh)	69	m2
	Precast Concrete		
	At First Floor (Elevation 100+000) level		
03.29	Walls above grade - Precast wall panel 300mm thick w/ 2 hr fire rating	984	m2
	At Second Floor (Elevation 107+800) level (including parapet)		
03.30	Walls above grade - Precast wall panel 300mm thick w/ 2 hr fire rating	1,165	m2
	At Stair # 1 (Elevation 115+000) level (including parapet)		
03.31	Walls above grade - Precast wall panel 300mm thick w/ 2 hr fire rating	61	m2
	Loading Dock Extension/Causeway		
03.32	Walls above grade - Precast wall panel 300mm thick w/ 2 hr fire rating	151	m2

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
04	**Masonry**		
	At First Floor (Elevation 100+000) level		
04.01	Type 3: CMU wall 190mm deep nominal load bearing concrete masonry units w/ galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.); 2 hour (min) fire rating	20	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	263	No.
04.02	Type 4: CMU wall 190mm deep nominal load bearing concrete masonry units w/ galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.)	312	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	4,095	No.
04.03	Type 5: CMU wall 190mm deep nominal load bearing concrete masonry units w/ galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.); 2 hour (min) fire rating	449	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	5,893	No.
04.04	Type 7: CMU wall 190mm deep nominal load bearing concrete masonry units w/ galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.); fill all CMU cells with grout	249	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	3,268	No.
04.05	Type 12: CMU wall 190mm deep nominal load bearing concrete masonry units w/ 100mm solid cap block and galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.)	13	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	171	No.
04.06	Type 13: CMU wall 190mm deep nominal load bearing concrete masonry units w/ 100mm solid cap block and galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.); fill all CMU cells with grout	20	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	263	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
04	**Masonry**		
04.07	Type 13A: CMU wall 190mm thick	151	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	1,982	No.
04.08	Exterior 300mm thick single whythe CMU wall	41	m2
	- CMU block nominal size 300mm x 200mm x 400mm w/ 5% wastage	538	No.
	At Second Floor (Elevation 107+800) level		
04.09	Type 4: CMU wall 190mm deep nominal load bearing concrete masonry units w/ galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.)	274	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	3,596	No.
04.10	Type 5: CMU wall 190mm deep nominal load bearing concrete masonry units w/ galvanized welded wire horizontal joint reinforcement in evry other course (400mm O.C.); 2 hour (min) fire rating	568	m2
	- CMU block nominal size 200mm x 200mm x 400mm w/ 5% wastage	7,455	No.
	Masonry accessories		
	At Basement (Elevation 87+000) level		
04.11	Control joint - saw cut groove 3mm min and fill w/ premolded joint filler	103	m
04.12	Expasion joint - 12mm premolded joint filler & sealer	257	m
04.13	Construction joint - w/ 15M 760mm long dowel @ 600 c/c	19	m

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals**		
	Structural Steel Framing		
	At First Floor (Elevation 100+000) level		
05.01	Beams		
	- 2 x L102x102x6.4	65	kg
	- HSS203x203x9.5	1,026	kg
	- HSS254x254x13	15,422	kg
	- W200x22	687	kg
	- W310x33	216	kg
	- W310x74	714	kg
	- W360x45	8,703	kg
	- W530x92	16,456	kg
	- W610x101	811	kg
	- W610x174	27,897	kg
	- W690x350	8,680	kg
	- W760x134	1,264	kg
	- W760x350	2,132	kg
	- W760x484	7,880	kg
	- W760x531	31,833	kg
	At Second Floor (Elevation 107+800) level		
05.02	Beams		
	- 2 x L102x102x6.4	3	kg
	- 2 x L152x102x11	1,254	kg
	- 2 x L203x152x13	3,945	kg
	- C130x13 at surface level channel (detail S8/S9 of dwg 23840-10013)	696	kg
	- C150x12	30	kg
	- C230x20	347	kg
	- HSS203x203x9.5	11,044	kg
	- MC250x42.4	157	kg
	- PL12 x 278mm height	502	kg
	- PL9.5 x 200 height x 4000mm long	60	kg
	- W310x45	218	kg
	- W310x60	3,766	kg
	- W310x74	19,549	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Structural Steel Framing		
	At Second Floor (Elevation 107+800) level		
05.03	Beams		
	- W360x57	1,444	kg
	- W460x74	2,258	kg
	- W610x82	1,961	kg
	- W610x101	7,620	kg
	- W610x125	2,208	kg
	- W610x140	5,919	kg
	- W610x155	6,609	kg
	- W610x285	2,269	kg
	- W610x372	3,616	kg
	- W690x125	20,571	kg
	- W690x192	5,282	kg
	- W690x217	11,900	kg
	- W690x240	4,284	kg
	- W690x289	2,757	kg
	- W690x323	3,098	kg
	At Roof (Elevation 115+000) level		
05.04	Beams		
	- 2 x L152x102x11	1,551	kg
	- 2 x L203x152x13	3,993	kg
	- L102x102x10	148	kg
	- L102x102x10	28	kg
	- L102x102x10	25	kg
	- MC250x42.4	1,765	kg
	- W310x60	287	kg
	- W310x74	2,860	kg
	- W360x57	1,552	kg
	- W360x72	1,014	kg
	- W460x74	3,559	kg
	- W610x101	9,553	kg
	- W610x125	3,403	kg
	- W610x140	2,351	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Structural Steel Framing		
	At Roof (Elevation 115+000) level		
05.05	Beams		
	- W610x82	19,791	kg
	- W610x155	6,815	kg
	- W610x174	3,351	kg
	At Condensate Platform (Elevation 104+320) level		
05.06	Beams		
	- L102x102x6.4	175	kg
	- L76x76x6.4	53	kg
	- W310x39	1,639	kg
	- W310x74	365	kg
	- W610x155	533	kg
	At Mezzanine (Elevation 111+600) level		
05.07	Beams		
	- 2 x L102x102x6.4	288	kg
	- C250x23	354	kg
	- L102x102x6.4	60	kg
	- W310x37	394	kg
	- W310x74	830	kg
	- W360x33	683	kg
	- W610x82	2,736	kg
	- W610x113	1,093	kg
	At Stair#1 Roof (Elevation 118+100) level		
05.08	Beams		
	- HSS127x127x6.4	680	kg
	- W150x30	268	kg
	- W360x33	1,003	kg
	Hoist at elevation 107+800) level		
05.09	Beams		
	S250x52	289	kg
	W200x31	297	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Structural Steel Framing		
	Hoist at elevation 115+000) level		
05.10	Beams		
	- HSS102x102x13	30	kg
	- S250x52	628	kg
	- W200x31	596	kg
	Pipe Rack at elevation 110+300		
05.11	Beams & Bracing		
	- 2 x L76x76x6.4	146	kg
	- L76x76x6.4	894	kg
	- W150x37	365	kg
	- W200x27	5,750	kg
05.12	Column		
	- W150x37	2,394	kg
05.13	Base Plate		
	- PL13x250x250mm w/ 4 no. 1/2" HILTI KWIK bolt 60mm dia anchor bolt	23	No.
	Monorail at elevation 115+000		
05.14	Beams		
	- S250x52	958	kg
	- W200x46	513	kg
	Vent Stack at elevation 115+100		
05.15	Beams & Bracing		
	- 2 x L102x102x6.4	68	kg
	- C200x21	151	kg
	- W150x30	96	kg
	- W360x45	306	kg
	- W460x68	441	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Structural Steel Framing		
	Basement level to Ground level		
05.16	Columns		
	- W360x262	3,458	kg
	- W360x314	4,145	kg
	- W360x382	5,042	kg
	- W360x463	6,112	kg
	- W360x592	7,814	kg
05.17	Base Plate		
	- Type A - 45x600x600mm w/ 4 no. 25 dia anchor bolt	2	No.
	- Type A - 50x600x600mm w/ 4 no. 25 dia anchor bolt	2	No.
	- Type A - 70x650x650mm w/ 4 no. 25 dia anchor bolt	1	No.
	Ground level to Upper level		
05.18	Columns		
	- W150x30	279	kg
	- W310x143	26,560	kg
	- W310x226	6,725	kg
	- W310x283	12,632	kg
	- W310x342	5,089	kg
05.19	Base Plate		
	- Type A - 45x550x550mm w/ 4 no. M30 anchor bolt; HSS254x254x13 shear key, grout in 305x305x235 shear pocket	4	No.
	- Type B - 35x550x550mm w/ 4 no. M25 anchor bolt; HSS203x203x13 shear key, grout in 255x255x205 shear pocket	2	No.
	- Type C - 35x500x500mm w/ 4 no. M25 anchor bolt; PL50x350x130 shear key, grout in 100x440x155 shear pocket	3	No.
	- Type D - 50x550x550mm w/ 4 no. M25 anchor bolt	4	No.
	- Type E - 35x500x500mm w/ 4 no. M25 anchor bolt	5	No.
	- Type F - 19x360x175mm w/ 4 no. 19 dia bolt and PL12 stiffener	2	No.
	- Type F - 19x360x216mm w/ 4 no. 19 dia bolt and PL12 stiffener	1	No.
	At First Floor (Elevation 100+000) level		
05.20	Metal Decking		
	- 76mm x 1.52mm Vicwest RD306 deck or approved equal	751	m2

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	At Second Floor (Elevation 107+800) level		
05.21	Metal Decking		
	- 38mm galvanized metal deck	883	m2
	- 6.4mm bent plate, approx 320mm width along the perimeter	3,314	kg
	At Roof (Elevation 115+000) level		
05.22	Metal Decking		
	- 38mm galvanized metal deck	917	m2
	- 6.4mm bent plate, approx 290mm width along the perimeter	2,423	kg
	Pipe Chase		
05.23	Metal Decking		
	- 76mm x 1.52mm Vicwest RD306 deck or approved equal	27	m2
	Platforms at elevation 87+540 & 88+400		
05.24	1-1/4" x 3/16" (32mm x 5mm) Steel Grating	19	m2
05.25	Platform stair 1100mm width and 7x305mm depth treads; 8 eq. risers = 1440mm w/ handrail, 915mm height	1	No.
05.26	Platform stair 1100mm width and 2x305mm depth treads; 3 eq. risers = 540mm w/ handrail, 915mm height	2	No.
05.27	Platform handrail 1100mm height w/ handrail, 915mm height	22	m
05.28	Access ladder type D3, from 88.4 to 87.0 (D3 on dwg 23860-10030) w/ handrail, 915mm height	3	No.
	Platforms at elevation 91+370, 93+000, 94+000, 94+870, 96+400 & 96+500		
05.29	1-1/4" x 3/16" (32mm x 5mm) Steel Grating	189	m2
05.30	Platform stair 1100mm width and 8x305mm depth treads; 9 eq. risers = 1500mm w/ handrail, 915mm height	1	No.
05.31	Platform stair 1100mm width and 7x305mm depth treads; 8 eq. risers = 1440mm w/ handrail, 915mm height	1	No.
05.32	Platform stair 1100mm width and 5x305mm depth treads; 6 eq. risers = 1000mm w/ handrail, 915mm height	1	No.
05.33	Platform stair 1100mm width and 2x305mm depth treads; 3 eq. risers = 440mm w/ handrail, 915mm height	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Platforms at elevation 91+370, 93+000, 94+000, 94+870, 96+400 & 96+500		
05.34	Platform handrail 1100mm height	283	m
05.35	Platform self closing gate	22	No.
05.36	PL5x125 Kick plate (at edge of grating against tank wall)	58	m
05.37	Access ladder w/ safety cage from 94.000 to 96.500 w/ handrail, 915mm height	17	No.
05.38	Access ladder w/ safety cage from 94.000 to 96.400 w/ handrail, 915mm height	2	No.
05.39	Access ladder w/ safety cage from 94.440 to 94.870 w/ handrail, 915mm height	1	No.
05.40	Platforms - beams and bracing		
	- C200x17	55	kg
	- C200x21	1,304	kg
	- C250x23	7,991	kg
	- HSS254x254x13	7,161	kg
	- L76x76x6.4	4,625	kg
	- L152x102x9.5	132	kg
	- L203x102x13	343	kg
	- MC460x63.5	324	kg
05.41	Platforms - hanger		
	- L102x102x9.5	9,734	kg
05.42	Platforms - Support post		
	- L76x76x9.5	60	kg
	- HSS152x152x9.5	223	kg
	- Pipe support column baseplate PL50 - 460x460 (ref det 9 of dwg 23850-10013)	11	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Metal fabrications		
05.43	6mm checker plate cover 250mm x 600mm c/w 3pc HSS50x50x6 accros the width	1	No.
05.44	6mm checker plate cover 300mm x 800mm c/w 3pc HSS50x50x6 accros the width	1	No.
05.45	Stair #1: hot dipped galvanised steel staircase 1100mm wide, from elevation 87+000 to elevation 115+420, c/w metal hand rail;		
	- steel prefabricated bar grating tread w/ integral abrasive nosing and 100mmx5mm toe kick welded to trads 1100mm x 280mm	145	No.
	- C250x22.8 stair stringers	53	m
	- C200x17.1 header (each 1030mm long)	35	m
	- C250x22.8 landing stringer (each 2400mm long)	41	m
	- C200x17.1 at sides of landing (4 no. at each)	80	m
	- landing - steel welded or pressure locked bar grating w/ 32mm heigh x 5mm bearing bars @ 30mm O.C.	55	m2
	- L152x152x7.9 steel L expansion at landing	41	m
	- 35mm dia handrail & guard rail w/ 20mm dia vertival balusters at 100mm O.C.	59	m
05.46	Stair #2: hot dipped galvanised steel staircase 1100mm wide, from elevation 87+000 to elevation 111+600, c/w metal hand rail;		
	- steel prefabricated bar grating tread w/ integral abrasive nosing and 100mmx5mm toe kick welded to trads 1100mm x 280mm	128	No.
	- C250x22.8 stair stringers	46	m
	- C200x17.1 header (each 1030mm long)	29	m
	- C250x22.8 landing stringer (each 2400mm long)	34	m
	- C200x17.1 at sides of landing (4 no. at each)	73	m
	- landing - steel welded or pressure locked bar grating w/ 32mm heigh x 5mm bearing bars @ 30mm O.C.	44	m2
	- L152x152x7.9 steel L expansion at landing	34	m
	- 35mm dia handrail & guard rail w/ 20mm dia vertival balusters at 100mm O.C.	48	m
	Sum Pit		
05.47	100x100x12.5 stainless steel angle fixed w/ nelson studs	6	m

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Loading Dock Extension/Causeway		
05.48	Roof at elevation 107+100 and floor at elevation 104+500		
	Beams and bracing		
	- 2-L152x152x9.5	504	kg
	- C200x21	28	kg
	- C310x39	2,374	kg
	- C310x45	1,844	kg
	- W310x39	964	kg
	- W360x33	99	kg
	- W360x51	1,120	kg
	- W530x92	224	kg
05.49	Columns		
	- C200x86	2,412	kg
05.50	Base Plate		
	- 300x250x25mm	2	No.
	- 300x300x25mm	2	No.
05.51	1-1/4" x 3/16" (32mm x 5mm) steel grating at elevation 104+500	30	m2
05.52	38mm galvanized metal deck at elevation 107+100	72	m2
05.53	Access ladder w/ safety cage from 100+000 to 104+500	1	No.
	Condensate Platform		
05.54	35mm dia guardrail 1070mm H assembly w/ top, intermed & bottom horizontal	6	m
05.55	35mm dia guardrail 1070mm H assembly w/ top, inter & bottom hori - removable	5	m
05.56	Embaded steel wall plate		
	- EP57006, width 300mm x length 400mm; 19kg per plate	79	No.
	- EP57007, width 300mm x length 700mm; 33kg per plate	23	No.
	- EP57008, width 300mm x length 1000mm; 47kg per plate	25	No.
	- EP57009, width 300mm x length 1300mm; 61kg per plate	10	No.
	- EP57010, width 300mm x length 1600mm; 75kg per plate	9	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	- EP57011, width 300mm x length 1900mm; 89kg per plate	2	No.
	- EP57012, width 300mm x length 2200mm; 104kg per plate	5	No.
	- EP57013, width 300mm x length 2500mm; 118kg per plate	1	No.
	- EP57014, width 300mm x length 2800mm; 132kg per plate	9	No.
	- EP57015, width 300mm x length 3100mm; 146kg per plate	3	No.
	- EP57016, width 300mm x length 3400mm; 160kg per plate	9	No.
	- EP57017, width 300mm x length 3700mm; 174kg per plate	6	No.
	- EP57018, width 300mm x length 4000mm; 188kg per plate	1	No.
05.57	Pipe Chase		
	- Embaded steel wall plate PL19, width 300mm x height 1350mm	10	No.
	- L76x51x13; each 630mm long	48	No.
	- 2L76x51x13; each 630mm long	24	No.
05.58	Base Ring (at elevation 87+000)		
	- Base ring 4190mm dia x 25.4mm steel plate w/ 18-M20/30 HSL-3, 183mm long anchorage	19	No.
	- Base ring 3380m dia x 12.7mm steel plate w/ 18-M16/25 HSL-3, 153mm long anchorage	2	No.
	- Base ring 2745m dia x 12.7mm steel plate w/ 18-M12/25 HSL-3, 153mm long anchorage	4	No.
	- Base ring 1830m dia x 12.7mm steel plate w/ 18-M12/25 HSL-3, 153mm long anchorage	1	No.
05.59	Embedment at 1st Floor (at elevation 100+000)		
	- PL20x650x350 plate for fire protection support stanchion	1	No.
	- PL20x500x500 plate for emergency eye wash station	1	No.
	- PL20x200x200 plate for cable riser support	8	No.
	- PL20x2642x1143 plate for weigh scales WS3 & WS4	1	No.
	- PL20x600x600 plate for HG1470 frame pipe support	2	No.
	- PL20x600x600 plate for HG1469 frame pipe support	2	No.
	- PL20x1143x1321 plate for weigh scales WS2	1	No.
	- PL20x600x600 plate for HG1468 frame pipe support	1	No.
	- PL20x1000x1000 plate for tooling cabinet	1	No.
	- PL20x1143x1321 plate for weigh scales WS1	1	No.
	- PL20x1100x750 plate for emergency eye wash stn and hot water tank	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	- PL20x600x600 plate for HG1467 frame pipe support	2	No.
	- PL20x350x350 plate for pipe support	1	No.
	- PL20x950x200 plate for sampling panel	2	No.
	- PL20x600x300 plate for telecom rack	1	No.
	- PL20x450x450 plate for pipe support	1	No.
	- PL20x550x550 plate for pipe support	1	No.
	- PL20x300x1000 plate for pipe support	1	No.
05.60	Embedment at 1st Floor (at elevation 107+800)		
	- PL25x250x675 plate for battery bank	7	No.
	- PL20x200x200 plate for cable riser support	4	No.
	- PL20x300x500 plate for backup diesel generator panel	2	No.
	- PL20x500x300 plate for electrical	4	No.
	- PL20x300x300 plate for chill water skid	12	No.
	- PL20x300x500 plate for electrical	4	No.
	- PL20x500x300 plate for chiller	8	No.
	- PL20x200x200 plate for cable riser support	4	No.
	- PL20x300x300 plate for condensor water skid	12	No.
	- PL25x300x500 plate for transformers	2	No.
	- PL20x300x300 plate for compressor	8	No.
	- PL16x250x250 plate	1	No.
	- PL20x500x500 plate	2	No.
	- PL20x300x500 plate	6	No.
	- PL20x350x350 plate for pipe support	8	No.
	- PL20x700x350 plate for pipe support	1	No.
	- PL20x300x300 plate for mechanical	12	No.
	- PL9.5x200x4000 plate for exterior wall opening	1	No.
	- PL20x400x400 plate	1	No.
	- C130x13x5000 long base support for elect. Equipment	8	No.
	- C130x13x1825 long base support for elect. Equipment	1	No.
	- C130x13x6600 long base support for elect. Equipment	1	No.
	- C130x13x8430 long base support for elect. Equipment	1	No.
05.61	Embedment at Roof (at elevation 115+000)		
	- PL20x300x300 plate for mechanical	6	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
05	**Metals (Cont'd)**		
	Miscellaneous structural steels and ancillary connections		
05.62	Ancillary connections allowance @ 10%	53,549	kg

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection**		
07.01	Preprufe 300R waterproofing membrane		
	- underneath the basement slab	966	m2
	- vertical lap over wall membrane	278	m2
07.02	Preprufe 160R waterproofing membrane backed by plywood infill	1,735	m2
07.03	Wall insulation	361	m2
07.04	Metal flashing w/ hydrolic waterstop	139	m
07.05	Roof Covering at elevation 115.000 and 118.100 (refer detail S2 of drawing NK38-DRAW-23860-10065)	902	m2
	- Single ply TPO membrane (60mil reinforced)	902	m2
	- Polyisocyanurate/ Polyurethane Insulation board (RSI 5.64) min 90mm thickness	902	m2
	- Air/Vapour retarder	902	m2
	- Dens deck thermal barrier mechanically fastened to steel deck	902	m2
07.06	Insulated stack curb (refer detail S3 of dwg NK38-DRAW-23860-10021)	1	No.
07.07	Pedestrian roof protection mats	28	m2
07.08	Parapet flashing	153	m
	Loading Dock Extension/Causeway		
07.09	Roof covering (refer detail S2 of drawing NK38-DRAW-23860-10065)	64	m2
	- Single ply TPO membrane (60mil reinforced)	64	m2
	- Polyisocyanurate/ Polyurethane Insulation board (RSI 5.64) min 90mm thickness	64	m2
	- Air/Vapour retarder	64	m2
	- Dens deck thermal barrier mechanically fastened to steel deck	64	m2
07.10	Parapet and flashing assembly (detail S1 of 23860-10065)	6	m
07.11	Parapet and flashing assembly (detail S2 of 23860-10065)	22	m
07.12	Flashing assembly (detail S3 of 23860-10065)	6	m
07.13	Roof drain w/ cast aluminum dome strainer w/ acc (detail S4 of 23860-10065)	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
	Fireproofing		
07.14	Carboline "A/D Firefilm III" thin film intumescent fire resistive material or approved equal to structural steel members and floor slabs		
	- First Floor (elevation 100.000)	1,034	m2
	- Condensate Platform (elevation 104.32)	33	m2
	- Second Floor (elevation 107.800)	1,034	m2
	- Mezzanine Floor (elevation 111.600)	69	m2
	- Roof (elevation 115.000)	1,034	m2
	- Stairwell # 1 at roof level (elevation 118.100)	22	m2
07.15	Firestops		
	Stairwell #2- Hilti CPS-S-SIL GG sealant to HSS 203x203x13mm structural steel-columns penetration through 200mm thick concrete block wall stair 2 North wall; FTH 0.75hr	3	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to HSS 203x203x13mm structural steel-columns penetration through 200mm thick concrete block wall stair 2 South wall; FTH 0.75hr	3	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W610x140mm structural steel penetration through 200mm thick concrete block wall stair 2 North wall; FH 0.75hr	2	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W610x140mm structural steel penetration through 200mm thick concrete block wall stair 2 South wall; FH 0.75hr	2	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel penetration through 200mm thick concrete block wall stair 2 North wall; FH 0.75hr	1	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel penetration through 200mm thick concrete block wall stair 2 South wall; FH 0.75hr	1	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W610x113mm structural steel penetration through 200mm thick concrete block wall stair 2 North wall; FH 0.75hr	1	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W610x113mm structural steel penetration through 200mm thick concrete block wall stair 2 South wall; FH 0.75hr	1	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W610x82mm structural steel penetration through 200mm thick concrete block wall stair 2 North wall; FH 0.75hr	3	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W610x82mm structural steel penetration through 200mm thick concrete block wall stair 2 South wall; FH 0.75hr	3	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel-wall header penetration through 200mm thick concrete block wall stair 2 North wall; FTH 0.75hr	2	No.
	Stairwell #2- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel-wall header penetration through 200mm thick concrete block wall stair 2 South wall; FTH 0.75hr	2	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to HSS 203x203x13mm structural steel-columns penetration through 200mm thick concrete block wall stair 1 North wall; FTH 0.75hr	3	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to HSS 203x203x13mm structural steel-columns penetration through 200mm thick concrete block wall stair 1 South wall; FTH 0.75hr	3	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W610x101mm structural steel penetration through 200mm thick concrete block wall stair 1 North wall; FH 0.75hr	2	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W610x101mm structural steel penetration through 200mm thick concrete block wall stair 1 South wall; FH 0.75hr	2	No.
	Pipe Chase - 3M sealant to 60mm pipe penetration through 1200mm thick reinforced concrete East wall; FHT 2hr	6	No.
	Pipe Chase - 3M sealant to 33mm pipe penetration through 1200mm thick reinforced concrete East wall; FHT 2hr	2	No.
	Pipe Chase - 3M sealant to 48mm pipe penetration through 1200mm thick reinforced concrete East wall; FHT 2hr	6	No.
	Pipe Chase - 3M sealant to 89mm pipe penetration through 1200mm thick reinforced concrete East wall; FHT 2hr	6	No.
	Pipe Chase - FS-ONE sealant to penetration through 1200mm thick reinforced concrete East wall; FHT 2hr	3	No.
	Loading area- 3M fire dam spray 200 or 3M fire barrier 1000/1003 to 76 (h) x610 (w)mm cable tray with cables penetration through 200mm thick block wall East wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M CP 25 WB+ to 25mm teck cable penetration through 200mm thick block wall South wall; FH 0.75hr	2	No.
	Stairwell #1- 3M firedam spray 200 to teck cable penetration through 200mm thick block wall North wall; FH 0.75hr	2	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	Stairwell #1- Hilti-CP637 firestop mortar to 6 x 4/C12 AWG teck cable penetration through 200mm thick block wall North wall; FH 0.75hr	1	No.
	Stairwell #1- 3M firedam spray 200 to teck cable penetration through 200mm thick block wall South wall; FH 0.75hr	3	No.
	Stairwell #2- 3M CP 25 WB+ to 25mm teck cable penetration through 200mm thick block wall North wall; FH 0.75hr	1	No.
	Stairwell #2- 3M CP 25 WB+ to 25mm teck cable penetration through 200mm thick block wall South wall; FH 0.75hr	1	No.
	Stairwell #2- Hilti-CP637 firestop mortar to 6 x 4/C12 AWG teck cable penetration through 200mm thick block wall North wall; FH 0.75hr	1	No.
	Stairwell #2- 3M firedam spray 200 to teck cable penetration through 200mm thick block wall North wall; FH 0.75hr	6	No.
	Stairwell #2- 3M firedam spray 200 to teck cable penetration through 200mm thick block wall South wall; FH 0.75hr	1	No.
	Loading area- 3M CP 25 WB+ to 20mm teck cable penetration through 190mm thick block wall West block wall; F/FH 0.75hr	1	No.
	Loading area- 3M CP 25 WB+ to 43mm teck cable penetration through 190mm thick block wall East wall; F/FH 0.75hr	1	No.
	Gamma room- 3M fire dam spray 200 or 3M fire barrier 1000/1003 to 76.2x609.6mm cable tray with cables penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	loading area- 3M fire dam spray 200 or 3M fire barrier 1000/1003 to 76.2x609.6mm cable tray with cables penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	Loading area- 3M moldable putty 101.6 pvc pipe to 101.6mm teck cable in pvc sleeve penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	2	No.
	Stairwell #1- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick reinforced concrete East wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick reinforced concrete North wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M CP 25 WB+ to 20mm armored cable penetration through 200mm thick reinforced concrete East wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M CP 25 WB+ to 25.4mm condu it penetration through 200mm thick reinforced concrete South wall; FH 0.75hr	1	No.
	Stairwell #1 W003- 3M CP 25 WB+ to 25.4mm teck cable penetration through 200mm thick reinforced concrete East wall; FH 0.75hr	1	No.
	Stairwell #2- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick reinforced concrete West wall; F/FH 0.75hr	1	No.
	Stairwell #2- 3M CP 25 WB+ to 20mm armored cable penetration through 200mm thick reinforced concrete West wall; F/FH 0.75hr	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	Stairwell #2- 3M CP 25 WB+ to 25.4mm teck cable penetration through 200mm thick block wall West wall; FH 0.75hr	2	No.
	Stairwell #2- 3M CP 25 WB+ to 25.4mm teck cable penetration through 200mm thick reinforced concrete North wall; FH 0.75hr	1	No.
	Stairwell #2- 3M fire dam spray 200 or 3M fire barrier 1000/1003 to 25.4mm teck cable penetration through 200mm thick reinforced concrete North wall; FH 0.75hr	1	No.
	Un-assigned w100- 3M moldable putty 101.6 pvc pipe to 101.6mm teck cable in pvc sleeve penetration through 700mm thick block wall floor; F/FH 0.75hr	2	No.
	Un-assigned w100- 3M moldable putty 101.6 pvc pipe to 101.6mm teck cable in pvc sleeve penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	3	No.
	HVAC shaft (stairwell #1)- 1041x432mm duct penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.
	HVAC shaft (stairwell #1)- 1372 x762mm duct penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	HVAC shaft (stairwell #2)- 1118x737mm duct penetration through 200mm thick block wall West wall; F/FH 0.75hr	1	No.
	HVAC shaft (stairwell #2)- 762 x381mm duct penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.
	HVAC shaft (stairwell #2)- 990x406mm duct penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.
	Loading area- 3M-FB-3000 WT to 114mm insulated pipe penetration through 300mm thick block wall East wall; F/FH 0.75hr	1	No.
	Loading area- 3M-FB-3000 WT to 168mm pipe penetration through 300mm thick block wall East wall; F/FH 0.75hr	1	No.
	Loading area- 3M-FB-3000 WT to 48mm pipe penetration through 300mm thick block wall East wall; F/FH 0.75hr	1	No.
	Loading area- 3M-FB-3000 WT to 60mm insulated pipe penetration through 300mm thick block wall East wall; F/FH 0.75hr	2	No.
	Loading area- 3M-FB-3000 WT to 60mm pipe penetration through 300mm thick block wall East wall; F/FH 0.75hr	3	No.
	Pipe shaft- FB-3000 WT to 33mm pipe penetration through 200mm thick block wall tbd; F/FH 0.75hr	1	No.
	Pipe shaft- FB-3000 WT to 60mm pipe penetration through 200mm thick block wall tbd; F/FH 0.75hr	2	No.
	Stairwell #1- FB-3000 WT to 114mm pipe penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	Stairwell #2- FB-3000 WT to 114mm pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	Causeway- 3M CP 25 WB+ to 19mm conduit penetration through 156mm thick dry wall East wall; F/FH 0.75hr	5	No.
	Causeway- 3M CP 25 WB+ to 25mm teck cable penetration through 156mm thick dry wall East wall; F/FH 0.75hr	1	No.
	Causeway- 3M CP 25 WB+ to 25mm teck cable penetration through 300mm thick reinforced concrete East wall; F/FH 0.75hr	2	No.
	Causeway- 3M CP 25 WB+ to 43mm teck cable penetration through 300mm thick reinforced concrete East wall; F/FH 0.75hr	1	No.
	Causeway- 3M CP-25 WB+ caulking to 60mm insulated pipe penetration through 156mm thick drywall East wall; F/FH 0.75hr	2	No.
	Causeway- 3M fire barrier rated foam FIP 1-step to 76(h)x610(w)mm cable tray with cables penetration through 156mm thick dry wall East wall; F/FH 0.75hr	1	No.
	Causeway- 3M-FB-3000 WT to 114mm insulated pipe penetration through 156mm thick drywall East wall; F/FH 0.75hr	1	No.
	Causeway- 3M-FB-3000 WT to 114mm pipe penetration through 300mm thick reinforced concrete East wall; F/FH 0.75hr	1	No.
	Causeway- 3M-FB-3000 WT to 168mm pipe penetration through 156mm thick drywall East wall; F/FH 0.75hr	1	No.
	Causeway- 3M-FB-3000 WT to 48mm pipe penetration through 156mm thick drywall East wall; F/FH 0.75hr	1	No.
	Causeway- 3M-FB-3000 WT to 60mm pipe penetration through 156mm thick drywall East wall; F/FH 0.75hr	3	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel penetration through 200mm thick concrete block wall stair 1 North wall; FH 0.75hr	2	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel penetration through 200mm thick concrete block wall stair 1 South wall; FH 0.75hr	2	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel-wall header penetration through 200mm thick concrete block wall stair 1 East wall; FH 0.75hr	1	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel-wall header penetration through 200mm thick concrete block wall stair 1 North wall; FH 0.75hr	1	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W360x57mm structural steel-wall header penetration through 200mm thick concrete block wall stair 1 South wall; FH 0.75hr	1	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W610x101mm structural steel penetration through 200mm thick concrete block wall stair 1 North wall; FH 0.75hr	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W610x101mm structural steel penetration through 200mm thick concrete block wall stair 1 South wall; FH 0.75hr	1	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W610x125mm structural steel penetration through 200mm thick concrete block wall stair 1 North wall; FH 0.75hr	1	No.
	Stairwell #1- Hilti CPS-S-SIL GG sealant to W610x125mm structural steel penetration through 200mm thick concrete block wall stair 1 South wall; FH 0.75hr	1	No.
	Pipe shaft- 3M-FB-3000 WT to 114mm insulated pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.
	Pipe shaft- 3M-FB-3000 WT to 114mm insulated pipe penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	Pipe shaft- 3M-FB-3000 WT to 33mm insulated pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.
	Pipe shaft- 3M-FB-3000 WT to 48mm pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	2	No.
	Pipe shaft- 3M-FB-3000 WT to 48mm pipe penetration through 200mm thick block wall South wall; F/FH 0.75hr	3	No.
	Pipe shaft- 3M-FB-3000 WT to 60mm insulated pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	2	No.
	Pipe shaft- 3M-FB-3000 WT to 60mm insulated pipe penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	Pipe shaft- 3M-FB-3000 WT to 60mm insulated pipe penetration through 200mm thick block wall West wall; F/FH 0.75hr	1	No.
	Pipe shaft- 3M-FB-3000 WT to 60mm pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	2	No.
	Pipe shaft- 3M-FB-3000 WT to 60mm pipe penetration through 200mm thick block wall West wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M-FB-3000 WT to 60mm pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M-FB-3000 WT to 60mm pipe penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	Stairwell #2- 3M-FB-3000 WT to 60mm pipe penetration through 200mm thick block wall North wall; F/FH 0.75hr	2	No.
	Stairwell #2- 3M-FB-3000 WT to 60mm pipe penetration through 200mm thick block wall South wall; F/FH 0.75hr	2	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	Loading area- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick block wall East wall; F/FH 0.75hr	5	No.
	Stairwell #1- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick block wall North wall; F/FH 0.75hr	4	No.
	Stairwell #1- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	Stairwell #1- 3M CP 25 WB+ to 20mm armored cable penetration through 200mm thick block wall North wall; F/FH 0.75hr	2	No.
	Stairwell #2- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick block wall North wall; F/FH 0.75hr	4	No.
	Stairwell #2- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick block wall South wall; F/FH 0.75hr	1	No.
	Stairwell #2- 3M CP 25 WB+ to 19mm conduit penetration through 200mm thick concrete floor; F/FH 0.75hr	1	No.
	Stairwell #2- 3M CP 25 WB+ to 20mm armored cable penetration through 200mm thick block wall North wall; F/FH 0.75hr	2	No.
	Drum handling- 3M-FB-3000 wt to 33Mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	Drum wash area- 3M-FB-3000 wt to 33Mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	Drum wash area- 3M silicone sealant to 60mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	HVAC shaft (stairwell #1)- 1422x965mm duct penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	HVAC shaft (stairwell #2)- 1219x1016mm duct penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	Loading area- 3M silicone sealant to 26mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	Loading area- 3M silicone sealant to 89mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	North of stairwell #2- 3M-FB-3000 wt to 114mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	North of stairwell #2- 3M-FB-3000 wt to 60mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	1	No.
	Pipe shaft- 33mm pipe penetration through 115mm thick mortar floor; F/FH 0.75hr	1	No.
	Pipe shaft- 48mm pipe penetration through 115mm thick mortar floor; F/FH 0.75hr	3	No.
	Pipe shaft- 60mm pipe penetration through 115mm thick mortar floor; F/FH 0.75hr	5	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
07	**Thermal and Moisture Protection (Cont'd)**		
07.15	Firestops (cont'd)		
	South of stairwell #2- 3M-FB-3000 wt to 114mm pipe penetration through 700mm thick reinforced concrete floor; F/FH 0.75hr	2	No.
	Stairwell #1- 3M-FB-3000 wt to 60mm pipe penetration through 200mm thick reinforced concrete North wall; F/FH 0.75hr	1	No.
	Stairwell #2- 3M-FB-3000 wt to 60mm pipe penetration through 100mm thick reinforced concrete North wall; F/FH 0.75hr	1	No.
	Stairwell #2- 3M-FB-3000 wt to 60mm pipe penetration through 100mm thick reinforced concrete West wall; F/FH 0.75hr	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
08	**Doors, Entrances and Windows**		
	At Basement (Elevation 87+000) level		
08.01	Smooth painted hollow metal door with hollow metal frame; frame secured to concrete with conceled expansion anchors; shim and caulk both sides		
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert; 1.5 hr fire proof self closing single door	4	leaf
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert	2	leaf
	At Platform (Elevation 91+370) level		
08.02	Smooth painted hollow metal door with hollow metal frame; frame secured to concrete with conceled expansion anchors; shim and caulk both sides		
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert; 1.5 hr fire proof self closing single door	1	leaf
	At Platform (Elevation 94+000) level		
08.03	Smooth painted hollow metal door with hollow metal frame; frame secured to concrete with conceled expansion anchors; shim and caulk both sides		
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert; 1.5 hr fire proof self closing single door	2	leaf
	- 900mmX2150mmx45mm single door	2	leaf
	At First Floor (Elevation 100+000) level		
08.04	Smooth painted hollow metal door with hollow metal frame drill opened, filled solid w/ grout and capped; frame secured to concrete with conceled expansion anchors; shim and caulk both sides		
	- 900mmX2150mmx45mm single door, insulated core to provide U metric of 2.2 or better; with Aluminum sill	2	leaf
	- 900mmX2150mmx45mm single door, insulated core to provide U metric of 2.2 or better; with Aluminum sill; shall accommodate 25mm raised floor	1	leaf
	- 900mmX2150mmx45mm, insulated core to provide U metric of 2.2 or better; with Aluminum sill; shall accommodate 25mm raised floor; 1.5 hr fire proof self closing single door	1	leaf

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
08	**Doors, Entrances and Windows (Cont'd)**		
08.05	Smooth painted hollow metal door with hollow metal frame drill opened, filled solid w/ grout and capped; frame secured to concrete with conceled expansion anchors; shim and caulk both sides		
	- 900mmX2150mmx45mm, insulated core to provide U metric of 2.2 or better; with Aluminum sill; shall accommodate 25mm raised floor; 1.5 hr fire proof self closing single door; door to provide max. temp. rise of 250° C in 30 min	1	leaf
08.06	Smooth painted hollow metal door with hollow metal frame; jamb filled solid w/ grout; shim and caulk both sides		
	- 1210mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert	1	leaf
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert; 1.5 hr fire proof self closing single door; shall accommodate 25mm raised floor	4	leaf
	- 800mmX2150mmx45mm; shall accommodate 25mm raised floor	1	leaf
	- 1210mmX2150mmx45mm; with Aluminum sill; 1.5 hr fire proof self closing single door; shall accommodate 25mm raised floor	1	leaf
	- 900mmX2150mmx45mm; 1.5 hr fire proof single door; shall accommodate 25mm raised floor; door to provide max. temp. rise of 250° C in 30 min	1	leaf
	- 900mmX2150mmx45mm single door	2	leaf
08.07	Motorised steel overhead door, galvanized coiling steel slats; w/ door track		
	- 2500mmX2500mm; 1.5 hr fire proof door	2	No.
08.08	Steel sliding door w/ glass viewing panel insert and overhead sliding track		
	- 2X(1600mmX2500mm)	1	pair
08.09	Smooth painted hollow metal door with hollow metal frame; shim and caulk both sides		
	- 900mmX2150mmx45mm with approx 600x600mm 1/4" thick wired glass insert, 1.5 hr fire proof single door; door to provide max. temp. rise of 250° C in 30 min	1	leaf

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
08	**Doors, Entrances and Windows (Cont'd)**		
08.10	Stainless steel access door; MIFAB insulated fire rated access door or equivalent		
	- 810mmX810mm	1	leaf
	- 405mmX405mm	1	leaf
	- 760mmX560mm	1	leaf
	At Condensate Platform (Elevation 104+320) level		
08.11	Smooth painted hollow metal door with hollow metal frame; jamb filled solid w/ grout; shim and caulk both sides		
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert; 1.5 hr fire proof self closing single door	1	leaf
	At Second Floor (Elevation 107+800) level		
08.12	Smooth painted hollow metal door with hollow metal frame; jamb filled solid w/ grout; shim and caulk both sides		
	- 900mmX2150mmx45mm with 100x600mm 1/4" thick wired glass insert; 1.5 hr fire proof self closing single door	5	leaf
	- 900mmX2150mmx45mm; 1.5 hr fire proof self closing single door	3	leaf
	- 900mmX2150mmx45mm	2	leaf
	- 2X(900mmX2150mmx45mm); 1.5 hr fire proof self closing double door	1	pair
	- 2X(900mmX2700mmx45mm); 1.5 hr fire proof self closing double door	1	pair
08.13	Steel sliding door w/ overhead sliding track		
	- 2750mmX2500mm	1	No.
	- 2750mmX2500mmx45mm; 1.5 hr fire proof self closing double door; insulated core to provide U metric of 2.2 or better	1	No.
08.14	Smooth painted hollow metal door with double egress hollow metal frame		
	- 2X(900mmX2150mmx45mm) double door	1	pair

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
08	**Doors, Entrances and Windows (Cont'd)**		
	At Roof (Elevation 115+000) level		
08.15	Smooth painted hollow metal door with hollow metal frame drill opened, filled solid w/ grout and capped; frame secured to concrete with conceled expansion anchors; shim and caulk both sides		
	- 900mmX2150mmx45mm, insulated core to provide U metric of 2.2 or better; with Aluminum sill; shall accommodate 25mm raised floor; 1.5 hr fire proof self closing single door; door to provide max. temp. rise of 250° C in 30 min	1	leaf
	Louvers and Vents		
	At Second Floor (Elevation 107+800) level		
08.16	Louver 4847mm width x 5375mm height	1	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
09	**Finishings**		
09.01	Ceiling finish (none as per finish schedule)		
	- ceiling to basement	778	m2
	- ceiling to mezzanine	20	m2
	- ceiling to 1st floor	853	m2
	- ceiling to 2nd floor	876	m2
	- ceiling to stair#1 lower roof	22	m2
	- ceiling to condensation plate	33	m2
09.02	Floor finish (none as per finish schedule)		
	- basement floor, Sikacan Fastflor CR epoxy floor coating	778	m2
	- mezzanine floor	20	m2
	- 1st floor	853	m2
	- 2nd floor	876	m2
	- stair#1 lower roof level floor(covered under staircase measurement)	-	m2
	- condensation plate	33	m2
09.03	Wall finish (none as per finish schedule)		
	- at basement	3,025	m2
	- at 1st floor	760	m2
	- at 2nd floor	2,359	m2
09.04	Wall finish (Paint on concrete and CMU)		
	- floor to 1st floor	2,329	m2
	- floor to 2nd floor	239	m2
	- floor to stair#1 lower roof	58	m2
	Loading Dock Extension/Causeway		
09.05	45min fire rated 16mm type 'X' gyp board wall w/ steel studs @ 400mm o/c	12	m2
09.06	Paint finish to gypsum wall	12	m2
09.07	Bulkhead: 45min fire rated 16mm type 'X' gyp board w/ steel studs @ 400mm o/c (ref: D2 & D3 of NK38-D5A-23860-0014 Rev 01 of DEC 120906 Rev 002)	12	m

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
31	**Earthwork**		
31.01	Clearing and grubbing	2,576	m2
31.02	Basement excavtion and disposal; 50.415x19.000x14.300	13,698	m3
31.03	Support of excavation - secant piles	2,826	m2
31.04	Secant piles head 1.5m depth removal	208	m2
31.05	Rock Anchor (ref: detail S1 of NK38-DRAW-23840-10004 of EC# 120471 rev 003 & D3 of NK38-DRAW-23840-10010 of EC# 120471 rev 004)	223	No.
31.06	Rock Anchor (SC)	3	No.
	Pipe Chase		
31.07	Excavtion and disposal	288	m3
31.08	Compacted granular B fill to 1.30m depth from 98.000 to 99.300 (ref: note 52 on dwg 23840-10051)	53	m3
31.09	Support of excavation - secant piles (tbc)	219	m2
31.10	Pipe chase pile (ref detail D1 of dwg 23840-10017)	16	No.
	Loading Dock Extension/Causeway		
31.11	Excavtion and disposal	55	m3
31.12	Back fill w/ imported material	45	m3

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
32	**Site Improvements**		
32.01	New curb	92	m
32.02	Barrier free access (refer NK38-DRAW-15100-10011)	35	m2
32.03	Extra over for Barrier free access ramp (refer NK38-DRAW-15100-10011)	1	No.
32.04	Barrier free access (refer NK38-DRAW-15100-10011): Expansion joint	25	m
32.05	Barrier free access (refer NK38-DRAW-15100-10011): Dummy joints (refer dwg)	23	m
32.06	New asphalt paving	Nil	m2
32.07	Reinstate asphalt paving	111	m2
32.08	Reinforced concrete Entry Pad 1.5m wide x 2.5m long w/ W.W.F & broom finis	3	No.
32.09	Bollards (refer NK38-DRAW-15100-10011)	6	No.
32.10	Turf and grasses	1,082	m2
	Argon Tank Pad		
32.11	Slab on grade 300mm thick	16	m2
	- 300mm thick crushed stone	23	m3
	- 25mm sand levelling bed	57	m2
	- 100mm styrofoam "SM" insulation	57	m2
	- Concrete 35MPa supply and place	5	m3
	- Edge formwork	5	m2
	- Re-bar (floor, wall & roof all inclusive)	676	kg
32.12	Bollard post 915mm height above ground + 1220mm in concrete footing; filled w/ concrete and painted Yellow	7	No.
32.13	Galvanized steel wire mesh chain link fence	11	m
32.14	Galvanized steel gate 4' width x 8' height	2	No.

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
33	**Site Utilities**		
33.01	Underground inactive drainage line 79110-wgapab		
	- 4" ø. Pipe, c.s., sch.40	13	m
	- Flange, pipe, slip on, 4" ø, c.s., 150 lb	1	EA
	- Flange, weld neck flat face, 4" ø, c.s., 150 lb	1	EA
	- Elbow, 6" ø., buttweld ,c.s. ,45 deg, long radius	2	EA
	- Structural support, allow	1	EA
	- Reducer, 6" x 4", pipe, concentric, c.s.	1	EA
	- Elbow, 4" ø., c.s., 45 deg, long radius, sch. 40	6	EA
	- 6" ø. pipe, c.s. sch. 40	6	m
	- Tee, 4" ø., buttweld, c.s.,standard	1	EA
	- Metal support, allow	1	LS
33.02	Sub drain		
	- 150mm ø. perforated PVC pipe, outer ø 159.385mm, min wall thickness 2.54mm, 12.7mm holes at 125mm enters with two rows parallel to the axis of the pipe	270	m
	- 150mm ø solid pvc pipe, outer ø 159.385mm, min wall thickness 2.54mm c/w filter fabric	15	m
	- Elbow, 150mm ø PVC 90 degrees, solvent weld, SDR 35, color white	7	EA
	- Tee, 150mm ø. solvent weld, schedule SDR 35, color white	11	EA
	- Cross, 150mm ø. PVC SDR 35 cross	4	EA
	- Allow for excavation	22	m3
	- Back fill with clear stone, type 1 or type 2, as per OPSS 1004	20	m3
	- Coupling, 150mm ø, PVC coupling, solvent weld, sir 35 with all accessories	95	EA
33.03	Cut & cap of underground 6" air line		
	- Cap, 4" ø., buttweld, carbon steel	1	EA
	- Cap, 6" ø., buttweld, carbon steel	2	EA
	- Allow for excavation& back fill	1	LS
	- Cap, 4" ø., buttweld, carbon steel	2	EA
33.04	Cut & cap of underground construction 12" steam & 3" condensate return lines		
	- Cap, 3" ø., buttweld, carbon steel	2	EA
	- Cap, 6" ø., buttweld, carbon steel	1	EA
	- Cap, 12" ø., buttweld, carbon steel	1	EA

ARCHITECTURAL/ STRUCTURAL

Item Ref.	Item Description	Quantity	Unit
33	**Site Utilities (Cont'd)**		
33.05	Yard drainage temporary provision (civil)		
	- Priming pump (diesel engine set), 1450 GPM @ 8m head c/w level control switch with valves, etc.	2	EA
	- 6" ø. PVC pressure pipe	61	m
	- 150mm ø solid pvc pipe, outer ø 159.385mm, min wall thickness 2.54mm c/w filter fabric		m
	- Reducer, 250 mm X 150mm ø PVC, sch 80.	3	EA
	- Coupling, 6" ø PVC, sch 80	3	EA
	- Elbow, 6" ø PVC 45 degrees, sch 80	6	EA
	- Elbow, 6" ø PVC 90 degrees, sch 80	6	EA
	- Elbow, 6" ø, 90 degrees, type B	3	EA
	- Flanch, 6" ø, sch 80 PVC c/w gasket, bolt / connection	3	EA
	- Hose, blue line, 6" ø	61	m
	- Step bow, 6" ø type B	3	EA
	- Suction hose, 6" X 10" ø	12	EA
	- Suction Basket low profile, 6" ø	3	EA
	- Cherne pneumatic plug	4	EA
	- Heat tracing, allow	61	m
	- Repair existing corrugated, galvanized steel connection	1	LS

C - Process Systems Tie-in

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

Report Date: Oct 25, 2019
Page No.: C - 1

PROCESS SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems**		
01.01	Tie into mod. D2O supply system for HWMB West annex		
	- Tee, pipe, 2", buttweld, stainless steel 304L, schedule 40, class 3	1	EA
	- Elbow, pipe, 2", buttweld, stainless steel 304L, 90 deg. schedule 40	1	EA
	- 2" stainless steel pipe, schedule 40, plain ends, spool piece 1 m long, class 3	1	EA
	- Diaphragm valve, 2" ø, stainless steel	1	EA
	- Cap, 2" ø stainless steel, class 3	1	EA
	- Cap, 1/2" ø stainless steel, class 6	1	EA
	- 1/2" ø branch spool pipe, stainless steel, allow , class 3	1	EA
	- Nipple, 1/2" stainless steel, class 6	1	EA
	- Tie into existing system	1	EA
01.02	Tie into PHT D2O supply system for HWMB West annex		
	- 2" ø stainless pipe schedule 40, plain ends, spool piece 3 m long, class 6	1	EA
	- 2 1/2" ø stainless steel pipe, schedule 40, plain ends, spool piece 1 m long, class 6	1	EA
	- Cap, 2" ø stainless steel, class 6	1	EA
	- Cap, 2 1/2" ø stainless steel, class 6	1	EA
	- Elbow, 2-112" ø stainless sch. 41, class 6	1	EA
	- Globe valve, 2 1/2" ø, stainless steel	1	EA
	- Tee, 2-112" ø stainless sch. 40, class 6	1	EA
	-Diaphragm valve, 2" ø, stainless steel, class 6	1	EA
01.03	Relocation of 30" LPSW discharge line		
	- 30" ø, pipe, sch 40, seamless pipe, plain ends., class 6	60	m
	- Elbow, 30" ø, long radius, class 6	5	EA
	- Magnesium anodes delivering 26 ma on the coated pipe for a period of 40a	11	EA
	- Epoxy coating, for 30" dia. pipe, bitumastic 300m part a & b	60	m
	- Excavation, allow, 6m deep, 3m wide	1,080	m3
	- Trench box, allow, quantity for both sides	720	m2
	- Granular a bedding backfilling balance of trench from min. 300mm above the top of pipe, conforming to OPSS1010	687	m3
	- Screened sand backfill material	334	m3

PROCESS SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.03	Relocation of 30" LPSW discharge line (cont'd)		
	- Un shrinkable fill per OPSS 1359	70	m3
	- Cad weld mold for connecting #12 awg (stranded) to carbon steel lug (Erica part number CAHHA-1G)	1	EA
	- Welding metal for making cad welds (Erica part number CA 15)	20	EA
	- 1/4" x 3" carbon steel bar to connect anode to pipe	1	EA
	- Elbow, NPS 30", 90 deg. long radius, class 6	1	EA
	- Sleeve for making cad weld (Erica part no. CAB-133-1H)	20	EA
01.04	Tie into upgrader system for HWMB West annex		
	- Tee, pipe, 1 1/2", buttweld, stainless steel 304L, schedule 40, class 3	1	EA
	- Tee, pipe, 2", buttweld, stainless steel 304L, schedule 40, class 3	1	EA
	- Elbow, pipe, 1 1/2", buttweld, stainless steel 304L, 90 deg. schedule 40, class 3	1	EA
	- Elbow, pipe, 2", buttweld, stainless steel 304L, 90 deg. schedule 40, class 3	1	EA
	- 1 1/2" stainless steel pipe, schedule 40, plain ends, spool piece up to 2 m long, class 3	2	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel, class 3	2	EA
	- Cap, 1 1/2" ø stainless steel, class 3	1	EA
	- Weldolet, 1 1/2" to 1/2" ø stainless steel, class 3	1	EA
	- Weldolet, 2" to 1/2" ø stainless steel, class 3	1	EA
	- 1/2" ø branch spool pipe, stainless steel, allow 1 m, class 6	2	EA
	- Cap, 1/2" stainless steel, class 3	1	EA
	- Cap, 1/2" stainless steel, class 6	2	EA
	- Tie into existing system	1	EA
01.05	D2O tanks, piping & equipment for D2O supply (PHT/ Moderator) in HWMB West annex		
	- Fire barrier.	10	EA

PROCESS SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
02	**TRF feed product system**		
02.01	Tie into TRF incoming and outgoing system for HWMB West		
	- Tee, pipe, 2" ø, buttweld, stainless steel 304L, schedule 40, class 3	1	EA
	- Tee, pipe, 2" ø, buttweld, stainless steel 304L, schedule 40, class 6	1	EA
	- 2" ø stainless steel pipe, schedule 40, plain ends, spool piece 4 m long, class 3	1	EA
	- 2" ø stainless steel pipe, schedule 40, plain ends, spool piece 5 m long, class 6	1	EA
	- Cap, 2" ø stainless steel, class 3	3	EA
	- check valve, 2" ø, stainless steel, class 6	1	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3	2	EA
	- Elbow, pipe, 2" ø, buttweld, stainless steel 304L, 90 deg. schedule 40, class 3	1	EA
	- Elbow, pipe, 2" ø, buttweld, stainless steel 304L, 90 deg. schedule 40, class 6	3	EA
	- Tie into existing system	2	EA
02.02	Tie into TRF feed and product system for HWMB West annex		
	- Tee, pipe, 1" ø, buttweld, stainless steel 304L, schedule 40, class 6	1	EA
	- 1" ø stainless steel pipe, schedule 40, plain ends, class 6	18	m
	- Cap, 1" ø stainless steel, class 6	1	EA
	- globe valve, 1" ø, stainless steel, class 6	1	EA
	- Elbow, pipe, 1", buttweld, stainless steel 304L, 90 deg. schedule 40, class 6	9	EA
	- Tie into tank	2	EA

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

PROCESS SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
03	**D2O Clean-up System**		
03.01	Tie into clean up system for HWMB West annex		
	- 1 1/2" ø stainless steel pipe, schedule 40, plain ends, spool piece 3 m long, class 3	3	EA
	- Branch, pipe, 1-1/2” to ½” ø stainless weldolet stainless steel, class 3	3	EA
	- Cap, 1 1/2" ø stainless steel, class 3	3	EA
	- Cap,1/2" ø stainless steel, class 6	3	EA
	- Elbow, pipe, 1/12" ø, buttweld, stainless steel 304L, 90 deg. schedule 40, class 3	3	EA
	- Nipple, 1/2" ø stainless steel, class 6	3	EA
	- Tee, pipe, 1 1/2" ø, buttweld, stainless steel 304L, schedule 40, class 3	3	EA
	- Check valve, 1 1/2" ø, stainless steel	3	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel	3	EA
	- Tie into existing system	3	EA

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

Report Date: Oct 25, 2019
Page No.: C - 5

PROCESS SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
04	**Active Drain System**		
04.01	Mechanical modifications to the loading bay		
	- 1" ø, piping, carbon steel, sch 80	28	m
	- 1 1/2" ø, piping, carbon steel, sch 81	1	m
	- Coupling, 1-1/2" x 1" ø, socket weld, carbon steel	1	EA
	- Union, pipe, 1" ø, socket weld carbon steel	2	EA
	- Elbow, 1" ø, socket weld, carbon steel, 90 deg	4	EA
	- Elbow, 1" ø, socket weld, carbon steel, 45 deg	1	EA
	- Elbow, 1-1/2” ø, threaded, carbon steel	1	EA
	- Cap, 1" ø, socket weld, carbon	2	EA
	- Trap, steam, thermostatic, 1" ø, 125 psi, bronze/semi-steel	1	EA
	- Strainer, y, 1" ø, socket weld, 20 mesh type 304 ss screen, 1/2npt blowdown connection	1	EA
	- Valve, gate, 1" ø, 600/800 lb socket weld, carbon steel	1	EA
	- Hi temperature insulation for up to 1 1/2" ø condensate pipe	29	m

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

PROCESS SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
05	**Inactive Drain System**		
05.01	Tie-in to inactive plant drainage (roof/condensate)		
	- 2" ø pipe, C.S, spool piece.-5 m length c/w support & fittings	1	EA
	- Gate valve, 2" ø, C.S	1	EA
	- Cap, 2" ø, CS	1	EA
	- Elbow, 2" ø, CS	3	EA
	- Tie into existing	1	LS

D - Process Systems

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems**		
01.01	Equipment, tanks and pumps		
	- Pumps P11/12, pump, D2O collection, 10.5 l/s @ 155.5 m head, class 6	2	EA
	- Tank skid TK-14 to 21, D2O collection, 100 m3, stainless steel head, Class 6	8	EA
	- Pumps P17/18, pump, D2O collection, 3.8 l/s @ 96 m head	2	EA
	- Tank skid TK22 to 28, D2O collection, 100 m3, stainless steel head, class 6	7	EA
	- HX-6/7, heat exchanger, vertical, D2O recovery, stainless steel, 145kpa tube side, 1035kpa{g) shell side	2	EA
01.02	Pipe supports and miscellaneous fittings		
	- Pipe supports as per detail on drg. NK38-DRAW-38008-10001-0001 to 0231, drg. NK38-DRAW-38008-10088	386	EA
	- 1" carbon steel pipe, schedule 80, bevelled ends, up to 2 m spool piece	3	EA
	- 1 1/2" carbon steel pipe, schedule 80, bevelled ends, 2 m spool feeder pipe	5	EA
	- 1 1/2" carbon steel pipe, schedule 80, bevelled ends, 5 m spool feeder pipe	1	EA
	- 2" carbon steel pipe, schedule 80, bevelled ends, 2 m spool piece	2	EA
	- 2" carbon steel pipe, schedule 80, bevelled ends, 5 m spool piece	1	EA
	- 2 1/2" carbon steel pipe, schedule 80, bevelled ends, 2 m spool feeder pipe	1	EA
	- 2 1/2" carbon steel pipe, schedule 80, bevelled ends, 5 m spool feeder pipe	1	EA
	- 3" carbon steel pipe, schedule 80, bevelled ends, 2 m spool piece	3	EA
	- 3" carbon steel pipe, schedule 80, bevelled ends,	22	m
	- 4" carbon steel pipe, schedule 80, 2 m spool feeder pipe	1	EA
01.03	West annex PHT pump suction piping		
	- 3/4" ø stainless steel pipe, schedule 40, up to 4 m spool, class 6	2	EA
	- 1/2" ø stainless steel pipe, schedule 40, up to 4 m spool, class 6	1	EA
	- 1" ø stainless steel pipe, schedule 40, 1 m spool, class 6	1	EA
	- 1 1/2" ø stainless steel pipe, schedule 40, 4 m spool, class 6	1	EA
	- 2" to 3/4" ø stainless steel weldolet pipe, schedule 40, allow 2 m spool	1	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.03	West annex PHT pump suction piping (Cont'd)		
	- 3 1/2" ø, stainless steel pipe, schedule 40, class 6	12	m
	- 4" ø stainless steel pipe, schedule 40, class 6	38	m
	- Adapter, tube to pipe, 3/4" ø to 3/8" tube, class 6	8	EA
	- Adapter, tube to pipe, 1/2" ø to 3/8" tube, class 6	1	EA
	- Cap, 1/2" ø stainless steel	1	EA
	- Elbow, 1" ø stainless steel, 90 deg., class 6	8	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow, 3 1/2" ø stainless steel, 90 deg., class 6	5	EA
	- Elbow, 3 1/2" ø stainless steel, 45 deg., class 6	10	EA
	- Elbow, 4" ø stainless steel, 90 deg., class 6	26	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	9	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 4" stainless steel, weld neck, class 6	4	EA
	- Reducer, 3 1/2" to 3" stainless steel, concentric, class 6	8	EA
	- Reducer, 4" to 3 1/2" stainless steel, concentric, class 6	2	EA
	- Reducer, 4" to 3" stainless steel, concentric, class 6	2	EA
	- Tee, reducing 4" to 3 1/2" ø stainless steel, class 6	7	EA
	- Tee, reducing 4" to 3" ø stainless steel, class 6	1	EA
	- Tee, 4" ø stainless steel, class 6	2	EA
	- Weldolet, 2" to 3/4" stainless steel, class 6	1	EA
	- Weldolet, 4" to 1/2" stainless steel, class 6	2	EA
	- Weldolet, 4" to 3/4" stainless steel, class 6	1	EA
	- threaded cap,1 1/2" ø stainless steel, class 6	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required, class 6	1	LS
	- Ball valve, 3/4" ø, stainless steel, class 6	1	EA
	- Ball valve, 1" ø, stainless steel, class 6	8	EA
	- Diaphragm valve, 3 1/2" ø, stainless steel, class 6	8	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel, class 6	2	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	8	EA
	- Globe valve, 4" ø, stainless steel, class 6	2	EA
	- Strainer valve, 4" ø, stainless steel, class 6	1	EA
	- Connection to pump, class 6	2	EA
	- Connection to tank, class 6	8	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.04	West annex PHT pump discharge piping		
	- 3/8" ø stainless steel, schedule 40, class 6	-	m
	- 1/2" ø stainless steel, schedule 40, class 6	65	m
	- 2" ø stainless steel, schedule 40, 3 m spool, class 3	1	EA
	- 3/4" ø stainless steel, schedule 40, class 6	143	m
	- 1" ø stainless steel, schedule 40, class 6	116	m
	- 1 1/2" ø stainless steel, schedule 40, 5 m spool , class 6	1	EA
	- 2" ø stainless steel, schedule 40, 2 m spool, class 6	2	EA
	- 2" ø, stainless steel pipe, schedule 40, class 6	72	m
	- 3" ø, stainless steel pipe, schedule 40, class 6	54	m
	- adopter, 1/2" to 3/8" stainless steel, class 6	6	EA
	- adopter, 3/4" to 3/8" stainless steel, class 6	2	EA
	- Cap, 1/2" stainless steel, class 6	4	EA
	- Cap, 3/4" stainless steel, class 6	6	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	3	EA
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	8	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	41	EA
	- Elbow, 1" ø stainless steel, 90 deg., class 6	23	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 6	2	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	25	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 6	13	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 3/4" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 1 1/2" stainless steel, weld neck, class 6	1	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	2	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 6	12	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 6	4	EA
	- orifice 2" stainless steel, class 6	2	EA
	- Reducer, 3/4" to 1/2" ø stainless steel, concentric, class 6	4	EA
	- Reducer, 1" to 3/4" ø stainless steel, concentric, class 6	3	EA
	- Reducer, 2" to 1" ø stainless steel, concentric, class 6	1	EA
	- Reducer, 3" to 2" ø stainless steel, concentric, class 6	3	EA
	- Tee, 3/4" ø stainless steel, class 6	1	EA
	- Tee, 3/4"x 3/4" x 1/2" ø stainless steel, class 6	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.04	West annex PHT pump discharge piping (cont'd)		
	- Tee, 1" ø stainless steel, class 6	5	EA
	- Tee, 2 x 2 x 1" ø stainless steel, class 6	4	EA
	- Tee, 2 x 2 x 1 1/2" ø stainless steel, class 6	2	EA
	- Tee, 2" ø stainless steel, class 6	10	EA
	- Tee, 3" ø stainless steel, class 6	2	EA
	- Weldolet, 2" to 1/2" stainless steel, class 6	3	EA
	- Weldolet, 2" to 3/4" stainless steel, class 6	5	EA
	- Weldolet, 3" to 1/2" stainless steel, class 6	6	EA
	- Weldolet, 2 1/" to 1/2" stainless steel, class 6	1	EA
	- Weldolet, 3" to 3/4" stainless steel, class 6	3	EA
	- Weldolet, 4" to 1/2" stainless steel, class 6	-	EA
	- adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required, class 3 & 6	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	7	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	11	EA
	- Check valve, 1" ø, stainless steel, class 6	1	EA
	- Check valve, 2" ø, stainless steel, class 3	2	EA
	- Check valve, 2" ø, stainless steel, class 6	4	EA
	- Check valve, 3" ø, stainless steel, class 6	3	EA
	- Diaphragm valve, 3/4" ø, stainless steel, class 6	2	EA
	- Diaphragm valve, 1" ø, stainless steel, class 6	2	EA
	- Diaphragm valve, 2" ø, pneumatic, stainless steel, class 6	2	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3	2	EA
	- Diaphragm valve, 2" ø, stainless steel, class 6	1	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	3	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	2	EA
	- Globe valve, 2" ø, stainless steel, class 6	1	EA
	- Globe valve, 3" ø	2	EA
	- Globe valve, 3" ø, pneumatic actuator, stainless steel, class 6	1	EA
	- Relive valve, 3/4" ø, stainless steel, class 6	1	EA
	- Relive valve, 1 1/2" ø, stainless steel, class 6	1	EA
	- Needle valve, 3/8" ø, stainless steel, class 6	-	EA
	- Flow indicator gauge, 3/4" ø, stainless steel, class 6	1	EA
	- Connection to pump, class 6	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.05	West annex PHT tank inlet and vent piping		
	- 1/2" ø stainless steel, schedule 40, 1 m spool, class 6	1	EA
	- 1/2" ø stainless steel, schedule 40, 5 m spool, class 6	1	EA
	- 3/4" ø stainless steel, schedule 40, 2 m spool, class 6	1	EA
	- 3/4" ø stainless steel, schedule 40, class 6	11	m
	- 2" ø, stainless steel pipe, schedule 40, class 3	52	m
	- 2" ø, stainless steel pipe, schedule 40, class 6	114	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	40	m
	- Cap, 1/2" ø stainless steel, class 6	1	EA
	- Cap, 3/4" ø stainless steel, class 6	1	EA
	- Cap, 2" ø stainless steel, class 6	10	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	1	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	8	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 6	20	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	15	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	31	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	2	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	7	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 6	3	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 3	1	EA
	- Tee, 2" ø stainless steel, class 3	1	EA
	- Tee, 2" ø stainless steel, class 6	16	EA
	- Weldolet, 2" to 1/2" ø stainless steel, class 3	4	EA
	- Weldolet, 2" to 1/2" ø stainless steel, class 6	2	EA
	- Weldolet, 2" to 3/4" ø stainless steel, class 6	1	EA
	- adopters, unions, nipples, orifices' etc. up to 1 1/2" ø, allow as required, class 6	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	2	EA
	- Diaphragm valve, 2" ø, stainless steel, class 6	8	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	1	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	8	EA
	- Relive valve, 2" ø, stainless steel, class 6	1	EA
	- Vacuum relive valve, 2" ø, stainless steel, class 6	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.06	West annex mod pump suction piping		
	- 3/4" ø stainless steel, schedule 40, 3 m spool, class 6	2	EA
	- 2 1/2" ø, stainless steel pipe, schedule 40, class 3	37	m
	- adopter, 1/2" to 3/8" ø, stainless steel, class 3	1	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	8	EA
	- Elbow, 2 1/2" ø stainless steel, 45 deg., class 3	13	EA
	- Elbow, 2 1/2" ø stainless steel, 90 deg., class 3	19	EA
	- Tee, 21/2x 2" ø stainless steel, class 3	1	EA
	- Tee, 21/2" ø stainless steel, class 3	7	EA
	- Flange c/w gasket & studs, 2 1/2" stainless steel, weld neck, class 3	4	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	2	EA
	- Reducer, 2 1/2" to 2" stainless steel, concentric, class 3	2	EA
	- Reducer, 3" to 2 1/2" stainless steel, concentric	7	EA
	- Strainer 2 1/2" stainless steel, class 6	1	EA
	- Threaded cap,1" ø stainless steel, class 3	1	EA
	- Weldolet 2" to 3/4" ø, stainless steel, class 3	1	EA
	- Weldolet 2 1/2" to 3/4" ø, stainless steel, class 3	1	EA
	- Weldolet 2 1/2" to 1/2" stainless steel, class 3	1	EA
	- Cap, 1/2" ø, stainless steel, class 6	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required, class 3	1	LS
	- Ball valve, 3/4" ø, stainless steel, class 6	1	EA
	- Ball valve, 1" ø, stainless steel, class 3	7	EA
	- Ball valve, 1" ø, stainless steel, class 6	1	EA
	- Diaphragm valve, 2 1/2" ø, stainless steel, class 3	9	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	7	EA
	- Connection to pump, class 3	2	EA
	- Connection to tank	7	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.07	West annex mod pump discharge piping		
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	5	EA
	- 1/2" ø, stainless steel pipe, schedule 40, class 6	33	m
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	129	m
	- 1" ø, stainless steel pipe, schedule 40, class 3	78	m
	- 1" ø, stainless steel pipe, schedule 40, class 6	48	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	72	m
	- 2" ø stainless steel, schedule 40, 5 m spool, class 6	1	EA
	- 2" ø, stainless steel pipe, schedule 40, class 3	196	m
	- 2" ø, stainless steel pipe, schedule 40, class 6	12	m
	- Cap, 1/2" ø stainless steel, class 6	9	EA
	- Cap, 3/4" ø stainless steel, class 6	9	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	21	EA
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	8	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	43	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	17	EA
	- Elbow,1" ø stainless steel, 90 deg., class 6	11	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg., class 3	16	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 3	1	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	16	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	44	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 3/4" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 1 1/2" stainless steel, weld neck, class 3	3	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	14	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 6	1	EA
	- Flange c/w gasket & studs, 2" stainless steel, spectacle, class 3	1	EA
	- Orifice, 2" ø, stainless steel, class 6	1	EA
	- Reducer, 3/4 " to 1/2" ø, stainless steel, concentric, class 6	6	EA
	- Reducer, 1 " to 3/4" ø, stainless steel, concentric, class 6	2	EA
	- Reducer, 1 1/2 " to 1" ø, stainless steel, concentric, class 6	1	EA
	- Reducer, 2 " to 1" ø, stainless steel, concentric, class 6	1	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.07	West annex mod pump discharge piping (cont'd)		
	- Reducer, 2 " to 1 1/2" ø stainless steel, concentric, class 3	2	EA
	- Tee, 3/4" x1/2" ø, stainless steel, class 6	1	EA
	- Tee, 3/4" ø, stainless steel, class 6	1	EA
	- Tee,1" ø stainless steel, class 6	3	EA
	- Tee, 1 x 1 x 1/2" ø stainless steel, class 3	1	EA
	- Tee, 1 1/2 " ø stainless steel, class 3	1	EA
	- Tee, 1 1/2 x 1 1/2 x 3/4" ø stainless steel, class 6	1	EA
	- Tee, 2 x 2 x 1" ø stainless steel, class 6	2	EA
	- Tee, 2 x 2 x 1 1/2" ø stainless steel, class 3	2	EA
	- Tee, 2 x 2 x 1 1/2" ø stainless steel, class 6	1	EA
	- Tee, 2" ø stainless steel, class 3	10	EA
	- Tee, 2" ø stainless steel, class 6		EA
	- Weldolet 1" to 3/4" stainless steel, class 1	1	EA
	- Weldolet 1 1/2" to 1/2" stainless steel, class 3	1	EA
	- Weldolet 2" to 3/4" stainless steel, class 3	11	EA
	- Weldolet 2" to 1/2" stainless steel, class 3	7	EA
	- Weldolet 2" to 1/2" stainless steel, class 6	3	EA
	- Weldolet 2 1/2" to 1/2" stainless steel, class 3	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required, class 6	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	6	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	12	EA
	- Relief valve, 3/4" ø, stainless steel, class 6	1	EA
	- Relief valve, 1 1/2" ø, stainless steel, class 3	1	EA
	- Check valve, 1" ø, stainless steel, class 3	1	EA
	- Check valve, 1 1/2" ø, stainless steel, class 3	1	EA
	- Check valve, 2" ø, stainless steel, class 3	10	EA
	- Diaphragm valve, 3/4" ø, stainless steel, class 6	2	EA
	- Diaphragm valve, 1" ø, stainless steel, class 6	1	EA
	- Diaphragm valve, 1 /2" ø, stainless steel, class 3	1	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3	8	EA
	- Diaphragm (pneumatic) valve, 2" ø, stainless steel, class 3	4	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	3	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	2	EA
	- Flow indicator gauge, 3/4" ø, stainless steel, class 6	1	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.08	west annex mod tank inlet and vent piping		
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	10	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	62	m
	- 2" ø, stainless steel pipe, schedule 40, class 3	160	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	22	m
	- Cap, 1/2" ø stainless steel, class 3	2	EA
	- Cap, 3/4" ø stainless steel, class 6	1	EA
	- Cap, 2" ø stainless steel, class 3	8	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	1	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	8	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	27	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg., class 3	3	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 3	32	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	36	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	1	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	6	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	2	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 3	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required, class 3	1	LS
01.09	west annex vapour recovery piping		
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	3	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 2" ø stainless steel, schedule 40, class 3	60	m
	- 2" ø, stainless steel pipe, schedule 40, class 6	80	m
	- Cap, 3/4" ø stainless steel, class 6	1	EA
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	19	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	53	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 6	4	EA
	- Flange c/w gasket & studs, 1 1/2" stainless steel, weld neck, class 6	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.09	west annex vapour recovery piping (cont'd)		
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 6	47	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	4	EA
	- Reducer, 2 " to 1" stainless steel, concentric, class 6	12	EA
	- Tee, 2 x 2 x 1 1/2" ø stainless steel, class 6	4	EA
	- Tee, 2" ø stainless steel, class 3	4	EA
	- Tee, 2" ø stainless steel, class 6	16	EA
	- Weldolet 2" to 1/2" stainless steel, class 6	4	EA
	- Weldolet 2" to 3/4" stainless steel, class 6	1	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	1	EA
	- Air release valve, 2" ø, stainless steel, class 6	1	EA
	- Relief valve, 2" ø, stainless steel, class 3	3	EA
	- Relief valve, 2" ø, stainless steel, class 6	4	EA
	- regulating valve, 3/4" ø, stainless steel, class 6	4	EA
	- regulating valve, 1" ø, stainless steel, class 6	2	EA
	- Check valve, 2" ø, stainless steel, class 3	3	EA
	- Check valve, 2" ø, stainless steel, class 6	3	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3	6	EA
	- Diaphragm valve, 2" ø, stainless steel, class 6	20	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	4	EA
01.10	west annex vapour recovery drain piping		
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	45	m
	- 1" ø, stainless steel pipe, schedule 40, class 3	37	m
	- 1 1/2" ø, stainless steel pipe, schedule 40		m
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	2	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	13	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	17	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 3	2	EA
	- Reducer, 1 " to 3/4" stainless steel, concentric, class 3	2	EA
	- Tee,1" ø stainless steel, class 3	2	EA
	- Tee, 1 x 1 x 3/4" ø stainless steel, class 3	1	EA
	- adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required	1	LS
	- Diaphragm valve, 1" ø, stainless steel, class 3	3	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.11	west annex 87 m el. tie in piping		
	- 1/2" ø, stainless steel pipe, schedule 40, class 6	20	m
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 2" ø stainless steel, schedule 40, class 3	73	m
	- 2" ø, stainless steel pipe, schedule 40, class 6	37	m
	- 3" ø, stainless steel pipe, schedule 40, class 6	34	m
	- Cap, 1/2" ø stainless steel, class 6	8	EA
	- Cap, 3/4" ø stainless steel, class 6	4	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	20	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 6	41	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 3	2	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	25	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	10	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	2	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 6	10	EA
	- Reducer, 3" to 2 1/2" stainless steel, concentric, class 6	1	EA
	- Weldolet 2" to 1/2" stainless steel, class 3	6	EA
	- Weldolet 2" to 3/4" stainless steel, class 3	3	EA
	- Weldolet 3" to 1/2" stainless steel, class 3	2	EA
	- Weldolet 3" to 3/4" stainless steel, class 3	1	EA
	- Tee, 2" ø stainless steel, class 3	1	EA
	- adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	8	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	4	EA
01.12	west annex tunnel and 94 m el. tie in piping		
	- 1/2" ø, stainless steel pipe, schedule 40, class 6	49	m
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 1" ø, stainless steel pipe, schedule 40, class 3	37	m
	- 1" ø, stainless steel pipe, schedule 40, class 6	35	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	163	m
	- 2" ø stainless steel, schedule 40, class 3	278	m
	- 2" ø, stainless steel pipe, schedule 40, class 6	20	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	287	m

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.12	west annex tunnel and 94 m el. tie in piping (cont'd)		
	- 3" ø, stainless steel pipe, schedule 40, class 6	21	m
	- Cap, 1/2" ø stainless steel, class 6	24	EA
	- Cap, 3/4" ø stainless steel, class 6	1	EA
	- Elbow, 1/2" ø stainless steel, 45 deg., class 6	19	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	42	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	5	EA
	- Elbow,1" ø stainless steel, 45 deg., class 3	3	EA
	- Elbow,1" ø stainless steel, 45 deg., class 6	4	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	11	EA
	- Elbow,1" ø stainless steel, 90 deg., class 6	9	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	25	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 3	60	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 3	23	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 6	3	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	96	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	4	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 6	3	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	28	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	93	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 6	6	EA
	- Reducer, 1" to 1/2" ø stainless steel, concentric, class 3	1	EA
	- Reducer, 1 " to 1/2" ø stainless steel, concentric, class 6	1	EA
	- Reducer, 1 1/2 " to 1" ø stainless steel, concentric, class 3	1	EA
	- Reducer, 3 " to 1 1/2" ø stainless steel, concentric, class 3	1	EA
	- Reducer, 3" to 2"ø stainless steel, concentric, class 3	2	EA
	- Tee,1" ø stainless steel, class 3	1	EA
	- Tee,1" ø stainless steel, class 6	1	EA
	- Tee, 1 1/2 " ø stainless steel, class 3	6	EA
	- Tee, 2" ø stainless steel, class 3	1	EA
	- Tee, 3"x1" ø stainless steel, class 3	1	EA
	- Weldolet, 1 1/2" to 1/2" stainless steel, class 3	12	EA
	- Weldolet, 1 1/2" to 3/4" stainless steel, class 3	3	EA
	- Weldolet, 2" to 1/2" stainless steel, class 3	5	EA
	- Weldolet, 2" to 1/2" stainless steel, class 6	1	EA
	- Weldolet, 2" to 1/2" stainless steel, class 3	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.12	west annex tunnel and 94 m el. tie in piping (cont'd)		
	- Weldolet, 2" to 3/4" stainless steel, class 3	1	EA
	- Weldolet, 3" to 1/2" stainless steel, class 3	9	EA
	- Weldolet, 3" to 1/2" stainless steel, class 6	1	EA
	- Weldolet, 3" to 3/4" stainless steel, class 3	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	6	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	1	EA
	- Diaphragm valve, 1 1 /2" dia, stainless steel	1	EA
01.13	west annex 100m el. tie in piping		
	- 1/2" ø, stainless steel pipe, schedule 40, class 6	35	m
	- 1" ø, stainless steel pipe, schedule 40, class 3	70	m
	- 1" ø, stainless steel pipe, schedule 40, class 6	74	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	107	m
	- 2" ø stainless steel, schedule 40, class 3	112	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	71	m
	- Cap, 1/2" ø stainless steel, class 6	8	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	15	EA
	- Elbow,1" ø stainless steel, 45 deg., class 6	3	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	22	EA
	- Elbow,1" ø stainless steel, 90 deg., class 6	17	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	5	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	19	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	31	EA
	- Reducer, 1 1/2 " to 1" stainless steel, concentric, class 3	1	EA
	- Reducer, 2 " to 1 1/2" stainless steel, concentric, class 3	1	EA
	- Reducer, 3 " to 1 1/2" stainless steel, concentric, class 3	2	EA
	- Tee, 1 x 1 x 1/2" ø stainless steel, class 3	2	EA
	- Tee, 1 1/2 " ø stainless steel, class 3	1	EA
	- Weldolet, 1 1/2" to 1/2" stainless steel, class 3	3	EA
	- Weldolet, 1 1/2" to 3/4" stainless steel, class 3		EA
	- Weldolet, 2" to 1/2" stainless steel, class 3	1	EA
	- Weldolet, 3" to 1/2" stainless steel, class 3	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**PHT and Moderator D2O Systems (Cont'd)**		
01.13	west annex 100m el. tie in piping (cont'd)		
	- adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow as required	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	7	EA
01.14	sampling panel (cabinet) 63811-pl10115, west annex hwmb		
	-3/8" ø stainless steel, schedule 40, up to 5 m spool, class 6	40	m
	- adopters, unions, nipples, orifices, o ring etc. up to 3/8" ø, allow as required	1	LS
	- Ball valve, 3/8" ø, stainless steel, class 6	10	EA
	- Ball valve, 3/8" ø, 3 way stainless steel, class 6	7	EA
	- Needle valve, 3/8" ø, stainless steel, class 6	7	EA
	- flow indicating meter, 1/4" ø, stainless steel, class 6	1	EA
	- hypodemic sampling station, 3/8" tube Connections, stainless steel	5	EA
	- sample cabinet	1	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**TRF Feed Product System**		
02.01	Equipment, tanks and pumps		
	- Pumps P13/14, trf product pump, 5 l/s @ 30 m head c/w VFD	2	EA
	- Pumps P15/16, trf feed pump, 5 l/s @ 38 m head c/w VFD	2	EA
	- Tank skid TK-29 to 32, TRF feed & product tanks, D2O storage, 100 m3, class 3	4	EA
02.02	Pipe Supports		
	- Pipe supports as per detail on drg. NK38-DRAW-38008-10001-0018/0049/0053/0054/0223/0225/0226/0232 to 0241/0243/0244/02450246/0248/0249/0250/0309/0310	70	EA
	- 1 1/2" carbon steel pipe, schedule 80, bevelled ends, up to 5 m spool pipe	1	EA
	- 2" carbon steel pipe, schedule 80, bevelled ends	7	m
	- 2 1/2" carbon steel pipe, schedule 80, bevelled ends, up to 5 m spool feeder pipe	1	EA
	- 3" carbon steel pipe, schedule 80, bevelled ends, up to 5 m spool piece	1	EA
02.03	West annex TRF pump suction / discharge piping		
	- 3/8" ø stainless steel, class 6	95	m
	- 3/8" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 1/2" ø, stainless steel pipe, schedule 40, class 6		m
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	2	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø stainless steel, schedule 80, up to 5 m spool, class 6	1	EA
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	94	m
	- 1" ø stainless steel, schedule 40, up to 5 m spool, class 3	2	EA
	- 1" ø, stainless steel pipe, schedule 40, class 3	40	m
	- 1" ø, stainless steel pipe, schedule 40, class 6	29	m
	- 1 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 2" ø carbon steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	79	m
	- 2" ø stainless steel, schedule 40, class 3	208	m
	- 2" ø, stainless steel pipe, schedule 40, class 6	15	m
	- 2 1/2" ø, stainless steel pipe, schedule 40, class 3	85	m

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**TRF Feed Product System (Cont'd)**		
02.03	West annex TRF pump suction / discharge piping (cont'd)		
	- 3" ø, stainless steel pipe, schedule 40, class 3	98	m
	- Cap, 3/8" ø stainless steel, class 6	6	EA
	- Cap, 1/2" ø stainless steel, class 6	4	EA
	- Cap,1" ø stainless steel, class 3	4	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	53	EA
	- Elbow,1" ø stainless steel, 45 deg., class 6	2	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	9	EA
	- Elbow,1" ø stainless steel, 90 deg., class 6	18	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	4	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 3	14	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 3	8	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	88	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	2	EA
	- Elbow, 2 1/2" ø stainless steel, 45 deg., class 3	3	EA
	- Elbow, 2 1/2" ø stainless steel, 90 deg., class 3	15	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	3	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	31	EA
	- Flange c/w gasket & studs, 3/4" stainless steel, weld neck, class 6	4	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 6	4	EA
	- Flange c/w gasket & studs, 1 1/2" stainless steel, weld neck, class 3	9	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	20	EA
	- Flange c/w gasket & studs, 2 1/2" stainless steel, weld neck, class 3	6	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 3	3	EA
	-Orifice, 1 1/2" ø-18 mm , stainless steel, class 3	1	EA
	-Orifice, 2" ø-12.5 mm , stainless steel, class 3	2	EA
	-Orifice, 2" ø-13.5 mm , stainless steel, class 3	1	EA
	-Orifice, 2" ø-20 mm , stainless steel, class 6	1	EA
	-Orifice, 2" ø-22 mm , stainless steel, class 3	1	EA
	-Orifice, 2" ø-26 mm , stainless steel, class 3	1	EA
	-Orifice, 2" ø-29 mm , stainless steel, class 3	1	EA
	-Orifice, 2" ø-29 mm , stainless steel, class 6	1	EA
	- Reducer, 3/4 " to 1/2" stainless steel, concentric, class 6	4	EA
	- Reducer, 1 " to 3/4" stainless steel, concentric, class 6	4	EA
	- Reducer, 2 " to 1" stainless steel, concentric, class 6	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**TRF Feed Product System (Cont'd)**		
02.03	West annex TRF pump suction / discharge piping (cont'd)		
	- Reducer, 2 1/2 " to 2" stainless steel, concentric, class 3	4	EA
	- Reducer, 3" to 1 1/2" stainless steel, concentric, class 3	4	EA
	- Reducer, 3" to 2" stainless steel, concentric, class 3	2	EA
	- Reducer, 3" to 2 1/2" stainless steel, concentric, class 3	4	EA
	- strainer 2 1/2" stainless steel, class 6 (replace existing with flange section pipe)	2	EA
	- Tee, 3/4" x1/2" ø stainless steel, class 6	8	EA
	- Tee, 3/4" ø stainless steel, class 6	10	EA
	- Tee,1" ø stainless steel, class 6	4	EA
	- Tee, 1 x 1 x 3/4" ø stainless steel, class 3	2	EA
	- Tee, 1 1/2" ø stainless steel, class 3	2	EA
	- Tee, 2" ø stainless steel, class 6	2	EA
	- Tee, 2"x1" ø stainless steel, class 3	2	EA
	- Tee, 2 x1 1/2" ø stainless steel, class 3	2	EA
	- Tee, 2" ø stainless steel, class 3	21	EA
	- Tee, 2 1/2" ø stainless steel, class 3	4	EA
	- Tee, 2"x3/4" ø stainless steel, class 3	2	EA
	- Tee, 3" ø stainless steel, class 3	5	EA
	- Weldolet, 1 1/2" to 3/4" stainless steel, class 3	8	EA
	- Weldolet, 2 1/2" to 1/2" stainless steel, class 3	1	EA
	- Weldolet, 2" to 3/4" stainless steel, class 3	17	EA
	- Weldolet, 2 1/2" to 3/4" stainless steel		EA
	- Weldolet, 2" to 1 1/2" stainless steel, class 3	6	EA
	- Weldolet, 2 1/2" to 3/4" stainless steel, class 3	4	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	4	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	16	EA
	- Ball valve, 1" ø, stainless steel, class 3	4	EA
	- Ball valve, 1" ø, stainless steel, class 6	2	EA
	- Relief valve, 3/4" ø, stainless steel, class 6	4	EA
	- Relief valve, 1 1/2" ø, stainless steel, class 3	3	EA
	- Check valve, 1" ø, stainless steel, class 3	1	EA
	- Check valve, 1 1/2" ø, stainless steel, class 3	3	EA
	- Check valve, 2" ø, stainless steel, class 3	12	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**TRF Feed Product System (Cont'd)**		
02.03	West annex TRF pump suction / discharge piping (cont'd)		
	- Diaphragm valve, 3/4" ø, stainless steel, class 6	4	EA
	- Diaphragm valve, 1" ø, stainless steel, class 3	2	EA
	- Diaphragm valve, 1 1 /2" ø, stainless steel, class 3	3	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3	11	EA
	- Diaphragm valve, 2 1/2" ø, stainless steel, class 3	4	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	4	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	8	EA
	- Flow indicating meter, 3/4" ø, stainless steel, class 6	2	EA
02.04	West annex TRF tank inlet and vent piping		
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	2	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 2" ø stainless steel, schedule 40, class 3	73	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	44	m
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	4	EA
	- Elbow, 2" ø stainless steel, 45 deg., class 3	14	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	23	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	4	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	5	EA
	- Tee, 2" ø stainless steel, class 3	8	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	3	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 3	1	EA
	- Weldolet, 2 1/2" to 1/2" stainless steel, class 3	1	EA
	- Weldolet, 2" to 1/2" stainless steel, class 3	2	EA
	- cap, 1/2" ø stainless steel, class 6	2	EA
	- cap, 2" ø stainless steel	5	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Relief valve, 2" ø, stainless steel, class 3	3	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3, pneumatic	4	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	1	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Downgraded D2O System**		
03.01	Equipment, tanks and pumps		
	- P7/8, Downgraded pump, 3.8 l/s @ 1035 kPa head	2	EA
	- Tank skid TK-8/9, Downgraded tanks, D2O storage, 50 m3, class 3	2	EA
	- Tank skid TK-10, Downgraded tank, D2O storage, 25 m3, class 3	1	EA
	- Tank skid TK-11, RV Discharge tank, D2O storage, 22 m3, class 3	1	EA
03.02	Pipe Supports		
	- Pipe supports as per detail on drg. NK38-DRAW-38008-10001-0224/0242/0247/0251 to 0290/299/300	126	EA
03.03	West annex downgraded pump suction / discharge piping		
	- 1/2" ø stainless steel, schedule 80, up to 5 m spool, class 6	1	EA
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	2	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 3/4" ø stainless steel, schedule 80, up to 5 m spool, class 6	2	EA
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	101	m
	- 1" ø stainless steel, schedule 40, up to 5 m spool, class 3	2	EA
	- 1" ø, stainless steel pipe, schedule 40, class 3	119	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	139	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 6	7	m
	- 1 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	27	m
	- 2" ø stainless steel, schedule 40, class 3	44	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	25	m
	- Cap, 1/2" ø stainless steel, class 6	1	EA
	- Cap, 3/4" ø stainless steel, class 6	1	EA
	- Cap,1" ø stainless steel, class 6	1	EA
	- Coupler, quick connect, 3/4" ø stainless steel, class 6	6	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	20	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	64	EA
	- Elbow,1" ø stainless steel, 45 deg., class 3	6	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	58	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	15	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 3	42	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 6	5	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Downgraded D2O System (Cont'd)**		
03.03	West annex downgraded pump suction / discharge piping (cont'd)		
	- Elbow, 2" ø stainless steel, 45 deg., class 3	8	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	24	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	7	EA
	- Flange c/w gasket & studs, 3/4" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 1" ø stainless steel, weld neck, class 3	2	EA
	- Flange c/w gasket & studs, 1" ø stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 1 1/2" ø stainless steel, weld neck, class 3	16	EA
	- Flange c/w gasket & studs, 2" ø stainless steel, weld neck, class 3	7	EA
	- Flange c/w gasket & studs, 3" ø stainless steel, weld neck, class 3	1	EA
	- Reducer, 3/4 " to 1/2" ø stainless steel, concentric, class 6	6	EA
	- Reducer, 1 " to 3/4" ø stainless steel, concentric, class 6	2	EA
	- Reducer, 2 " to 1" ø stainless steel, concentric, class 6	2	EA
	- Reducer, 2 1/2 " to 2" ø stainless steel, concentric, class 3	4	EA
	- Reducer, 3" to 1 1/2" ø stainless steel, concentric, class 3	2	EA
	- strainer 2" ø stainless steel, class 6 (replace existing with flange section pipe)	1	EA
	- Tee,3/4" x1/2" ø stainless steel, class 6	4	EA
	- Tee,3/4" ø stainless steel, class 6	3	EA
	- Tee,1" ø stainless steel, class 6	2	EA
	- Tee, 1x 1/2" ø stainless steel, class 3	1	EA
	- Tee, 1x 3/4" ø dia stainless steel, class 6	1	EA
	- Tee, 1 1/2 " ø stainless steel, class 3	12	EA
	- Tee, 1 1/2 x 1" ø stainless steel, class 3	4	EA
	- Tee, 2" ø stainless steel, class 6	1	EA
	- Tee, 2"x1" ø stainless steel, class 3	1	EA
	- Tee, 2 x 3/4" ø stainless steel, class 6	1	EA
	- Tee, 2" ø stainless steel, class 3	5	EA
	- Tee, 3" ø stainless steel, class 3	1	EA
	- Weldolet, 1 1/2" to 1/2" stainless steel, class 3	13	EA
	- Weldolet, 1 1/2" to 3/4" stainless steel, class 3	12	EA
	- Weldolet, 2" to 3/4" stainless steel, class 3	1	EA
	-Orifice, 1 1/2" ø-12.75 mm , stainless steel, class 3	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Downgraded D2O System (Cont'd)**		
03.03	West annex downgraded pump suction / discharge piping (cont'd)		
	-Orifice, 1 1/2" ø-40.9 mm , stainless steel, class 3	2	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Ball valve, 1/2" ø, stainless steel, class 6	5	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	12	EA
	- Ball valve, 1" ø, stainless steel, class 3	4	EA
	- Ball valve, 1" ø, stainless steel, class 6	1	EA
	- Relief valve, 3/4" ø, stainless steel, class 6	2	EA
	- Relief valve, 1 1/2" ø, stainless steel, class 3	3	EA
	- Check valve, 1" ø, stainless steel, class 3	2	EA
	- Check valve, 1 1/2" ø, stainless steel, class 3	8	EA
	- Diaphragm valve, 1" ø, stainless steel, class 3	4	EA
	- Diaphragm valve, 1 1 /2" ø, stainless steel, class 3	7	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel, class 3, pneumatic	3	EA
	- Diaphragm valve, 3/4" ø, stainless steel, class 6	2	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3, pneumatic	3	EA
	- Diaphragm valve, 2" ø, stainless steel, class 3	3	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	3	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	6	EA
	- flow indicating meter, 3/4" ø, stainless steel, class 6	1	EA
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	2	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø stainless steel pipe, schedule 40, class 3	6	m
	- 1" ø stainless steel pipe, schedule 40, class 3	106	m
	- 1 1/2" ø stainless steel pipe, schedule 40, class 3	28	m
	- 2" ø stainless steel pipe, schedule 40, class 3	55	m
	- 3" ø, stainless steel pipe, schedule 40, class 3	138	m
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	4	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	7	EA
	- Elbow, 1" ø stainless steel, 45 deg., class 3	4	EA
	- Elbow, 1" ø stainless steel, 90 deg., class 3	20	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	6	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg., class 3	11	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Downgraded D2O System (Cont'd)**		
03.03	West annex downgraded pump suction / discharge piping (cont'd)		
	- Elbow, 2" ø stainless steel, 45 deg., class 3	2	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	18	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	6	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	32	EA
	- Tee, 1 1/2" ø stainless steel, class 3	2	EA
	- Tee, 2" X 1" ø stainless steel, class 3	1	EA
	- Tee, 2" ø stainless steel, class 3	7	EA
	- Tee, 3" ø stainless steel, class 3	2	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	3	EA
	- Flange c/w gasket & studs, 3" ø stainless steel, weld neck, class 3	2	EA
	- Weldolet, 2" to 1/2" ø stainless steel, class 3	1	EA
	- Weldolet, 3" to 1" ø stainless steel, class 3	3	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Check valve, 1" ø, stainless steel, class 3	2	EA
	- Check valve, 3" ø, stainless steel, class 3	1	EA
	- Relief valve, 2" ø, stainless steel, class 3	1	EA
	- Vacuum relief valve, 2" ø, stainless steel, class 3	2	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel, class 3	3	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	1	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
04	**D2O Clean-up System**		
04.01	Equipment, tanks and pumps		
	- P5/9, Downgraded pump, 3.8 l/s @ 25 m head	2	EA
	- Tank skid TK-7/8/9, Downgraded tanks, D2O storage, 25 m3, CS/SS stee, class 3l	3	EA
04.02	Pipe Supports		
	- Pipe supports	28	EA
04.03	West annex Clean-up pump suction / discharge piping		
	- 1/2" ø stainless steel, schedule 80, up to 5 m spool, class 6	2	EA
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	3	EA
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	56	m
	- 1" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 1" ø, stainless steel pipe, schedule 40, class 3	85	m
	- 1" ø, stainless steel pipe, schedule 40, class 6	7	m
	- 1 1/2" ø, stainless steel pipe, schedule 40, class 3	14	m
	- 1 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 2" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3" ø, stainless steel pipe, schedule 40, class 3	25	m
	- Cap, 1/2" ø stainless steel, class 6	1	EA
	- Cap, 3/4" ø stainless steel, class 6	5	EA
	- Cap, 2" ø stainless steel, class 6	1	EA
	- Coupler, quick connect, 3/4" ø stainless steel, class 6	2	EA
	- Coupler, quick connect, 1" ø stainless steel, class 3	1	EA
	- Elbow, 1/2" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow, 3/4" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	59	EA
	- Elbow,1" ø stainless steel, 45 deg., class 3	2	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	33	EA
	- Elbow,1" ø stainless steel, 90 deg., class 6	5	EA
	- Elbow, 1 1/2" ø stainless steel, 45 deg., class 3	1	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 3	11	EA
	- Elbow, 3" ø stainless steel, 45 deg., class 3	1	EA
	- Elbow, 3" ø stainless steel, 90 deg., class 3	12	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
04	**D2O Clean-up System (Cont'd)**		
04.03	West annex Clean-up pump suction / discharge piping (cont'd)		
	- Flange c/w gasket & studs, 3/4" stainless steel, weld neck, class 6	2	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 3	4	EA
	- Flange c/w gasket & studs, 1 1/2" stainless steel, weld neck, class 3	7	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 3	2	EA
	- Flange c/w gasket & studs, 3" stainless steel, weld neck, class 3	1	EA
	- Reducer, 3/4 " to 1/2" stainless steel, concentric, class 6	6	EA
	- Reducer, 1" to 1/2" stainless steel, concentric, class 3	1	EA
	- Reducer, 1 " to 3/4" stainless steel, concentric, class 6	2	EA
	- Reducer, 1 1/2 " to 3/4" stainless steel, concentric, class 3	1	EA
	- Reducer, 1 1/2 " to 1" stainless steel, concentric, class 3	2	EA
	- Reducer, 2 " to 1" stainless steel, concentric, class 6	2	EA
	- Reducer, 2 " to 1 1/2" stainless steel, concentric, class 3	2	EA
	- Reducer, 3" to 1" stainless steel, concentric, class 3	1	EA
	- Reducer, 3" to 1 1/2" stainless steel, concentric, class 3	3	EA
	- strainer 1 1/2" stainless steel, class 6 (replace existing with flange section pipe)	1	EA
	- Tee,3/4" x1/2" ø stainless steel, class 6	4	EA
	- Tee,3/4" ø stainless steel, class 6	3	EA
	- Tee,1" ø stainless steel, class 3	5	EA
	- Tee,1" ø stainless steel, class 6	2	EA
	- Tee, 1x 3/4" ø stainless steel, class 6	1	EA
	- Tee, 1 1/2" ø stainless steel, class 3	3	EA
	- Tee, 2 x 3/4" ø stainless steel, class 6	1	EA
	- Tee, 2" ø stainless steel, class 6	2	EA
	- Tee, 3" ø stainless steel, class 3	1	EA
	- Weldolet, 1" to 3/4" ø stainless steel	1	EA
	- Weldolet, 1 1/2" to 3/4" ø stainless steel, class 3	1	EA
	- Weldolet, 3" to 1/2" ø stainless steel, class 3	1	EA
	- Weldolet, 3" to 3/4" ø stainless steel, class 3	1	EA
	- Ball valve, 1/2" ø, stainless steel, class 6	4	EA
	- Ball valve, 3/4" ø, stainless steel, class 6	10	EA
	- Ball valve, 1" ø, stainless steel, class 3	3	EA
	- Relief valve, 3/4" ø, stainless steel, class 6	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
04	**D2O Clean-up System (Cont'd)**		
04.03	West annex Clean-up pump suction / discharge piping (cont'd)		
	- Relief valve, 1 1/2" ø, stainless steel, class 3	1	EA
	- Check valve, 1" ø, stainless steel, class 3	2	EA
	- Check valve, 1 1/2" ø, stainless steel, class 3	1	EA
	- Diaphragm valve, 3/4" ø, stainless steel, class 6	2	EA
	- Diaphragm valve, 1" ø, stainless steel, class 3	4	EA
	- Diaphragm valve, 1" ø, stainless steel, class 3, pneumatic	2	EA
	- Diaphragm valve, 3/4" ø, stainless steel, class 6	1	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel, class 3	5	EA
	- Globe valve, 1/2" ø, stainless steel, class 6	2	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	5	EA
	- flow indicating meter, 3/4" ø, stainless steel, class 6	1	EA
04.04	West annex clean-up tank inlet and vent piping		
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 6	2	EA
	- 1" ø stainless steel pipe, schedule 40, class 3	60	m
	- 2" ø stainless steel pipe, schedule 40, class 3	18	m
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	3	EA
	- Elbow, 1" ø stainless steel, 45 deg., class 3	4	EA
	- Elbow, 1" ø stainless steel, 90 deg., class 3	26	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg., class 3	2	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 3	2	EA
	- Reducer, 1 1/2 " to 1" stainless steel, concentric, class 3	3	EA
	- Tee, 1" ø stainless steel, class 3	7	EA
	- Tee, 2" ø stainless steel, class 3	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Diaphragm valve, 1" ø, stainless steel, class 3	3	EA
	- Diaphragm valve, 1" ø, stainless steel, class 3, pneumatic	3	EA
	- Globe valve, 3/4" ø, stainless steel, class 6	3	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
04	**D2O Clean-up System (Cont'd)**		
04.05	Supply of demineralized water to the west annex including tie in to the existing station demineralized water		
	- 1/2" dia stainless steel pipe, schedule 40	70	m
	- 3/4" dia stainless steel pipe, schedule 40	80	m
	- 1" dia stainless steel pipe, schedule 40	85	m
	- 2" dia aluminum pipe, schedule 80, up to 5 m spool	1	EA
	- 2" dia stainless steel pipe, schedule 40	110	m
	- Cap, 3/4" dia stainless steel	5	EA
	- Cap, 1" dia stainless steel	4	EA
	- Cap, 2" dia stainless steel	4	EA
	- Elbow, 1/2" dia stainless steel, 45 deg	5	EA
	- Elbow, 3/4" dia stainless steel, 45 deg	5	EA
	- Elbow, 3/4" dia stainless steel, 90 deg	18	EA
	- Elbow, 1" dia stainless steel, 45 deg	5	EA
	- Elbow, 1" dia stainless steel, 90 deg	46	EA
	- Elbow, 1 1/2" dia stainless steel, 90 deg	15	EA
	- Elbow, 2" dia stainless steel, 45 deg	8	EA
	- Elbow, 2" dia stainless steel, 90 deg	20	EA
	- Elbow, 2" dia aluminum, 90 deg	1	EA
	- Flange c/w gasket & studs, 1" ø stainless steel, weld neck	1	EA
	- Flange c/w gasket & studs, 2" ø stainless steel, weld neck	3	EA
	- Flange c/w gasket & studs, 2" ø aluminum, socket weld	1	EA
	- Sockolet, 3" to 2" ø aluminum	1	EA
	- Tee, 3/4" ø stainless steel	2	EA
	- Tee, 1 1/2" ø stainless steel	3	EA
	- Tee, 1"X1"X 3/4" ø stainless steel	1	EA
	- Tee, 2"X2"X 3/4" ø stainless steel	1	EA
	- Tee, 2" ø stainless steel	4	EA
	- Tee, 3" X 3" X 2" ø, aluminum	1	EA
	- Nipple, 2" ø stainless steel	1	EA
	- Blank, 2" ø stainless steel	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Ball valve, 3/4" ø, stainless steel	5	EA
	- Diaphragm valve, 3/4" ø, stainless steel	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
04	**D2O Clean-up System (Cont'd)**		
04.05	Supply of demineralized water to the west annex including tie in to the existing station demineralized water (cont'd)		
	- Diaphragm valve, 1" ø, stainless steel	3	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel	1	EA
	- Diaphragm valve, 2" ø, stainless steel	4	EA
	- Flexible metal hose, 3/4" ø stainless steel, 6 ft	1	EA
	- Flexible metal hose, 3/4" ø stainless steel, 25 ft	7	EA
	- Insulation, 2" ø X 1" th	100	EA
	- Insulation, 1 1/2" ø X 1" th	70	EA
	- Insulation, 1" ø X 1" th	90	EA
	- Insulation, 3/4" ø X 1" th	70	EA
04.06	D2O cleanup system to increase flexibility for HWMB		
	- 1 1/2" ø stainless steel pipe, schedule 40, plain ends, class 3	20	m
	- Pressure boundary, pipe, 3” ø carbon steel spool piece up to 5 m, class 6	1	EA
	- Elbow, pipe, 1/12" ø, buttweld, stainless steel 304l, 90 deg. schedule 40, class 3	4	EA
	- Elbow, pipe, 1/12" ø, buttweld, stainless steel 304l, 45 deg. schedule 40, class 3	3	EA
	- Tee,1/2" ø stainless steel, class 6	4	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel	3	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Active Drain System**		
05.01	Equipment, tanks and pumps		
	- P5/6, Pump, 85 GPM @140ft head	2	EA
	- Tank skid TK1, Tank, 3.8 m3, stainless steel	1	EA
	- P4, Pump, 083 l/s @23 m head	1	EA
05.02	Mechanical modifications to the loading bay		
	- 1" ø, piping, carbon steel, sch 80 c/w support	28	m
	- 1 1/2" ø, piping, carbon steel, sch 80	1	m
	- Coupling, 1-1/2" x 1" ø, socket weld, carbon steel	1	EA
	- Union, pipe, 1" ø, socket weld carbon steel.	2	EA
	- Elbow, 1" ø, socket weld, carbon steel, 90 deg.	4	EA
	- Elbow, 1" ø, socket weld, carbon steel, 45 deg.	1	EA
	- Elbow, 1-1/2" ø, threaded, carbon steel	1	EA
	- Cap, 1" ø, socket weld, carbon	2	EA
	- Trap, steam, thermostatic, 1" ø, 125 psi, bronze/semi-steel	1	EA
	- Strainer, y, 1" ø, stainless steel	1	EA
	- Gate valve, 1" ø, carbon steel	1	EA
	- Hi temperature insulation for up to 1 1/2" ø condensate pipe	29	m
05.03	Active plant drainage system and D2O liquid recovery tie-in		
	- 1 1/4" ø, piping, carbon steel, sch 40 c/w support & fitting	18	m
	-2" ø pipe, carbon steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
05.04	West Annex Active Plant Drainage discharge and vent line piping		
	- 1/2" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 3/4" ø pipe, stainless steel, c/w support & fittings	12	m
	- 1 1/2" ø pipe, stainless steel, c/w support & fittings	10	m
	- 2" ø pipe, stainless steel c/w support	312	m
	- 2" ø pipe, carbon steel c/w support	65	m
	- 2 1/2" ø pipe, carbon steel, spool piece. Up to 5 m length c/w support, sch 80	1	EA
	-3" ø pipe, carbon steel, spool piece. Up to 5 m length c/w support, sch 80	1	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Active Drain System (Cont'd)**		
05.04	West Annex Active Plant Drainage discharge and vent line piping (cont'd)		
	- 3" ø pipe, stainless steel c/w support	8	m
	- Elbow, 1/2" ø, carbon steel, 90 deg.	4	EA
	- Elbow, 3/4" ø, stainless steel, 90 deg.	9	EA
	- Elbow, 1 1/2" ø, stainless steel, 90 deg.	5	EA
	- Elbow, 2" ø, stainless steel, 45 deg.	15	EA
	- Elbow, 2" ø, carbon steel, 90 deg.	18	EA
	- Elbow, 2" ø, stainless steel, 90 deg.	90	EA
	- Elbow, 3" ø, stainless steel, 90 deg.	5	EA
	- Elbow, 3" ø, stainless steel, 90 deg., short radius	1	EA
	- Flange c/w gasket & studs, 3/4" ø, stainless steel	3	EA
	- Flange c/w gasket & studs, 1" ø, stainless steel	1	EA
	- Flange c/w gasket & studs, 1 1/2" ø, stainless steel	3	EA
	- Flange c/w gasket & studs, 2" ø, stainless steel	4	EA
	- Flange c/w gasket & studs, 3" ø, stainless steel	7	EA
	- Flange c/w gasket & studs, 3" ø, stainless steel, slipon	1	EA
	- Reducer, 2"X1/2" ø, stainless steel	2	EA
	- Tee, 1 1/2"X1 1/2"X1/2" ø, stainless steel	1	EA
	- Tee, 2"X2"X1/2" ø, stainless steel	3	EA
	- Tee, 2"X2"X1 1/2" ø, stainless steel	2	EA
	- Tee, 2" ø, stainless steel	10	EA
	- Tee, 3" ø, stainless steel	1	EA
	- Weldolet, 2"X1/2" ø, stainless steel	2	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Ball valve, 1/2" ø, stainless steel	5	EA
	- Check valve, 2" ø, stainless steel	3	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel	2	EA
	- Diaphragm valve, 2" ø, stainless steel	7	EA
	- Diaphragm valve, 3" ø, stainless steel	3	EA
	- Globe valve, 1/2" ø, stainless steel	3	EA
	- Globe valve, 3/4" ø, stainless steel, class 150	3	EA
	- Globe valve, 1 1/2" ø, stainless steel	2	EA
	- Needle valve, 1/2" ø, stainless steel	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Active Drain System (Cont'd)**		
05.04	West Annex Active Plant Drainage discharge and vent line piping (cont'd)		
	- Strainer valve, 3" ø, stainless steel	1	EA
	- Flexible metal hose, 1/2" ø stainless steel, 4 m long c/w quick coupling in both end	1	EA
05.05	D2O management building- D2O liquid recovery discharge piping		
	- 1/2" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 3/4" ø pipe, stainless steel, c/w support & fittings	50	m
	- 1" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 1" ø pipe, stainless steel c/w support	30	m
	- 1 1/2" ø pipe, stainless steel, c/w support & fittings	42	m
	- Cap, 1/2" ø, stainless steel	1	EA
	- Elbow, 3/4" ø, stainless steel, 45 deg.	4	EA
	- Elbow, 3/4" ø, stainless steel, 90 deg.	32	EA
	- Elbow, 1" ø, stainless steel, 90 deg.	13	EA
	- Elbow, 1 1/2" ø, stainless steel, 45 deg.	2	EA
	- Elbow, 1 1/2" ø, stainless steel, 90 deg.	13	EA
	- Flange c/w gasket & studs, 1" ø, stainless steel	1	EA
	- Flange c/w gasket & studs, 1 1/2" ø, stainless steel	1	EA
	- Orifice assey, 3/4" ø, stainless steel, Class 6	1	EA
	- Reducer, 1 1/2"X1" ø, stainless steel	1	EA
	- Reducer, 1"X1/2" ø, stainless steel	1	EA
	- Tee, 3/4" ø, stainless steel	4	EA
	- Tee, 1"X1"X1/2" ø, stainless steel	1	EA
	- Tee, 1"X1"X3/4" ø, stainless steel	2	EA
	- Tee, 1" ø, stainless steel	2	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Ball valve, 3/4" ø, stainless steel	1	EA
	- Check valve, 1" ø, stainless steel, class 150#	2	EA
	- Diaphragm valve, 3/4" ø, stainless steel	3	EA
	- Diaphragm valve, 1" ø, stainless steel	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Active Drain System (Cont'd)**		
05.05	D2O management building- D2O liquid recovery discharge piping (cont'd)		
	- Globe valve, 1/2" ø, stainless steel	2	EA
	- Globe valve, 3/4" ø, stainless steel, class 150	4	EA
05.06	D2O Management building- West annex fl. el. 100.0 active drainage piping		
	- 1/2" ø pipe, stainless steel, c/w support & fittings	10	m
	- 1" ø pipe, stainless steel c/w support	15	m
	- 2" ø pipe, carbon steel c/w support	70	m
	- 3" ø pipe, stainless steel c/w support	35	m
	- 4" ø pipe, stainless steel c/w support	17	m
	- Cap, 1" ø, stainless steel	1	EA
	- Elbow, 1/2" ø, stainless steel, 90 deg.	3	EA
	- Elbow, 1" ø, stainless steel, 90 deg.	2	EA
	- Elbow, 2" ø, stainless steel, 45 deg.	17	EA
	- Elbow, 2" ø, stainless steel, 90 deg.	19	EA
	- Elbow, 3" ø, stainless steel, 45 deg	3	EA
	- Elbow, 3" ø, stainless steel, 90 deg.	4	EA
	- Elbow, 4" ø, stainless steel, 45 deg	3	EA
	- Elbow, 4" ø, stainless steel, 90 deg.	1	EA
	- Flange c/w gasket & studs, 4" ø, stainless steel	1	EA
	- Reducer, 2"X1/2" ø, stainless steel	1	EA
	- Reducer, 3"X2" ø, stainless steel	2	EA
	- Reducer, 4"X3" ø, stainless steel	1	EA
	- Tee, 2"X1" ø, stainless steel	1	EA
	- Tee, 2" ø, stainless steel	1	EA
	- Tee, 3"X2" ø, stainless steel	1	EA
	- Tee, 3" ø, stainless steel	1	EA
	- Tee, 4" ø, stainless steel	1	EA
	- Tee, 4"X3" ø, stainless steel	1	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Inhibitor koppers, Tar	5	USG
	- Floor drain, 3" ø, cast stainless steel.	2	EA
	- Floor drain, stainless steel.	10	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Active Drain System (Cont'd)**		
05.07	D2O Management building- West annex fl. el. 107.8 active drainage piping		
	- 2" ø pipe, stainless steel c/w support	13	m
	- 3" ø pipe, stainless steel c/w support	50	m
	- 4" ø pipe, stainless steel c/w support	8	m
	- Cap, 2" ø, stainless steel	1	EA
	- Elbow, 2" ø, stainless steel, 45 deg.	3	EA
	- Elbow, 2" ø, stainless steel, 90 deg.	1	EA
	- Elbow, 3" ø, stainless steel, 45 deg	5	EA
	- Elbow, 3" ø, stainless steel, 90 deg.	4	EA
	- Elbow, 4" ø, stainless steel, 90 deg.	1	EA
	- Reducer, 4"X3" ø, stainless steel	1	EA
	- Floor drain, 3" ø, cast stainless steel.	3	EA
	- Floor drain, stainless steel.	1	EA
05.08	D2O Management building fl.el.86.700 active plant drainage act. drainage discharge piping		
	- 2 " ø pipe, carbon steel, spool piece. Up to 5 m length c/w support, sch 40	1	EA
	- Cap, 1/2" ø, stainless steel, class 6	2	EA
	- Cap, 2" ø, stainless steel	2	EA
	- Elbow, 2" ø, stainless steel, 90 deg.	4	EA
	- Tee, 2" ø, stainless steel	1	EA
	- Weldolet, 2"X1/2" ø, stainless steel, class 6	2	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Diaphragm valve, 2" ø, stainless steel	3	EA
05.09	D2O management building - fl. el. 87.00 D2O liquid recovery piping		
	- 1/2" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 3/4" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 1" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 2" ø pipe, stainless steel c/w support	230	m

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Active Drain System (Cont'd)**		
05.09	D2O management building - fl. el. 87.00 D2O liquid recovery piping (cont'd)		
	- Cap, 3/4" ø, stainless steel	3	EA
	- Elbow, 2" ø, stainless steel, 45 deg.	40	EA
	- Elbow, 2" ø, stainless steel, 90 deg.	16	EA
	- Flange c/w gasket & studs, 2" ø, stainless steel	2	EA
	- Reducer, 2"X1/2" ø, stainless steel	1	EA
	- Reducer, 2"X1" ø, stainless steel	8	EA
	- Tee, 2" ø, stainless steel	8	EA
	- Weldolet, 2"X3/4" ø, stainless steel	2	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Gate valve, 1/2" ø, stainless steel	2	EA
	- Gate valve, 1" ø, stainless steel	9	EA
	- Plug valve, 2" ø, stainless steel	3	EA
	- Floor drain, stainless steel.	20	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
06	**Inactive Drain System**		
06.01	Equipment, tanks and pumps		
	- P62/63, Pump, 85 GPM @140ft head	2	EA
	- Tank skid TK3, Tank, 3.8 m3, stainless steel	1	EA
06.02	Tie-in to inactive plant drainage (roof/condensate)		
	- 2" ø pipe, carbon steel, spool piece.-5 m length c/w support & fittings	1	EA
	- Gate valve, 2", carbon steel	1	EA
	- Cap, 2" ø, carbon steel	1	EA
	- Elbow, 2" ø, carbon steel	3	EA
	- Tie into existing	1	LS
06.03	Pipe supports		
	- Pipe supports	5	EA
06.04	HWMB West annex in-active plant drainage		
	- 1/2" ø pipe, carbon steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 3/4" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings	1	EA
	- 3/4" ø pipe, carbon steel, c/w support & fittings	14	m
	- 1 1/2" ø pipe, carbon steel, c/w support & fittings	12	m
	- 2" ø pipe, carbon steel c/w support	185	m
	- 2 1/2" ø pipe, carbon steel, spool piece. Up to 5 m length c/w support, sch 80	1	EA
	- 3" ø pipe, carbon steel, spool piece. Up to 5 m length c/w support & fittings, sch 80	1	EA
	- 3" ø pipe, carbon steel c/w support	12	m
	- Cap, 2" ø, carbon steel	47	EA
	- Elbow, 3/4" ø, stainless steel, 90 deg.	3	EA
	- Elbow, 2" ø, carbon steel, 45 deg.	5	EA
	- Flange c/w gasket & studs, 3/4" ø, stainless steel	2	EA
	- Flange c/w gasket & studs, 2" ø, carbon steel	4	EA
	- Flange c/w gasket & studs, 3" ø, carbon steel	7	EA
	- Flange c/w gasket & studs, 6" ø, carbon steel	1	EA
	- Adopter, 3/8" ø, stainless steel, Class 1	2	EA
	- Tee, 2"X2"X1/2" ø, carbon steel	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
06	**Inactive Drain System (Cont'd)**		
06.04	HWMB West annex in-active plant drainage (cont'd)		
	- Tee, 2"X2"X1 1/2" ø, carbon steel	1	EA
	- Tee, 2" ø, carbon steel	2	EA
	- Tee, 3" ø, carbon steel	1	EA
	- Elbow, 3" ø, carbon steel, 90 deg.	9	EA
	- Check valve, 2" ø, carbon steel	1	EA
	- Gate valve, 2" ø, carbon steel	4	EA
	- Gate valve, 3" ø, carbon steel	2	EA
	- Globe valve, 1/2" ø, carbon steel	2	EA
	- Globe valve, 3/4" ø, stainless steel, class 150	2	EA
	- Globe valve, 3/4" ø, carbon steel, class 800	3	EA
	- Globe valve, 1 1/2" ø, carbon steel	1	EA
	- Needle valve, 3/4" ø, carbon steel	1	EA
	- Strainer valve, 3" ø, carbon steel	2	EA
	- Flexible metal hose, 1/2" stainless steel, 4 m long c/w quick coupling in both end	1	EA
	- Flexible metal hose, 1/2" stainless steel, 7 m long c/w quick coupling in both end	1	EA
	- Painting, compound, sealing, etc. allow	1	LS
	- Insulation on flanges	1	LS
06.05	HWMB West annex inactive floor drainage piping		
	- Floor drain, 3" ø, cast iron.	4	EA
	- Utility drain, 3" ø, cast iron.	1	EA
	- 2" ø pipe, carbon steel sch 80 c/w support	26	m
	- 3" ø pipe, carbon steel c/w support	16	m
	- 4" ø pipe, carbon steel c/w support	70	m
	- 6" ø pipe, carbon steel c/w support	12	m
	- Coupling, 3" ø, stainless steel	4	EA
	- Elbow, 2" ø, carbon steel, 45 deg.	4	EA
	- Elbow, 2" ø, carbon steel, 90 deg.	3	EA
	- Elbow, 3" ø, carbon steel, 45 deg.	2	EA
	- Elbow, 3" ø, carbon steel, 90 deg.	3	EA
	- Elbow, 4" ø, carbon steel, 45 deg.	6	EA
	- Elbow, 4" ø, carbon steel, 90 deg.	11	EA
	- Elbow, 6" ø, carbon steel, 90 deg.	2	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
06	**Inactive Drain System (Cont'd)**		
06.05	HWMB West annex inactive floor drainage piping (cont'd)		
	- Plug, 2" ø, carbon steel	4	EA
	- Reducer, 4"X2" ø, carbon steel	3	EA
	- Reducer, 6"X4" ø, carbon steel	1	EA
	- Tee, 2"X2"X1 1/4" ø, carbon steel	3	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
07	**Drum Handling and Cleaning Systems**		
07.01	HWMB West annex D2O drum handling emptying and cleaning isometric piping, filling and pressure testing		
	- 3/8" ø copper, type L up to 5 m spool, class 6	1	EA
	- 1/2" ø stainless steel, schedule 40, class 6	7	m
	- 1/2" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 3/4" ø stainless steel, schedule 40, up to 5 m spool, class 3	1	EA
	- 3/4" ø, stainless steel pipe, schedule 40, class 6	15	m
	- 1" ø copper, type L up to 5 m spool, class 6	1	EA
	- 1" ø, stainless steel pipe, schedule 40, class 3	55	m
	- 1" ø, stainless steel pipe, schedule 40, class 6	50	m
	- 2" ø stainless steel, schedule 40, up to 5 m spool, class 6	1	EA
	- 2" ø, stainless steel pipe, schedule 40, class 6	35	m
	- Cap,1" ø stainless steel, class 6	6	EA
	- Elbow, 1/2" ø stainless steel, 90 deg., class 6	8	EA
	- Elbow, 3/4" ø stainless steel, 90 deg., class 6	10	EA
	- Elbow,1" ø stainless steel, 45 deg., class 6	1	EA
	- Elbow,1" ø stainless steel, 90 deg., class 3	28	EA
	- Elbow,1" ø stainless steel, 90 deg., class 6	47	EA
	- Elbow, 1 1/2" ø stainless steel, 90 deg. class 6	15	EA
	- Elbow, 2" ø stainless steel, 90 deg., class 6	18	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 3	18	EA
	- Flange c/w gasket & studs, 1" stainless steel, weld neck, class 6	28	EA
	- Flange c/w gasket & studs, 1 1/2" stainless steel, weld neck, class 6	12	EA
	- Flange c/w gasket & studs, 2" stainless steel, weld neck, class 6	2	EA
	- Reducer, 3/4 " to 1/2" stainless steel, concentric, class 6	4	EA
	- Reducer, 1" to 1/2" stainless steel, concentric, class 6	8	EA
	- Reducer, 1 " to 3/4" stainless steel, concentric, class 3	2	EA
	- Reducer, 1 " to 3/4" stainless steel, concentric, class 6	19	EA
	- Reducer, 1 1/2 " to 1/2" ø stainless steel, concentric, class 6	1	EA
	- Reducer, 2 " to 1" ø stainless steel, concentric, class 6	2	EA
	- Reducer, 2 " to 1 1/2" ø stainless steel, concentric, class 6	1	EA
	- strainer 1" ø stainless steel, class 6 (replace existing with flange section pipe)	1	EA
	- Tee,1/2" ø stainless steel, class 6	5	EA
	- Tee,3/4" ø stainless steel, class 6	4	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
07	**Drum Handling and Cleaning Systems (Cont'd)**		
07.01	HWMB West annex D2O drum handling emptying and cleaning isometric piping, filling and pressure testing (cont'd)		
	- Tee,1" ø stainless steel, class 3	11	EA
	- Tee,1" ø stainless steel, class 6	20	EA
	- Tee, 1x 1/2" ø stainless steel, class 6	4	EA
	- Tee, 1x 3/4" ø stainless steel, class 6	3	EA
	- Tee, 1 1/2" ø stainless steel, class 6	1	EA
	- Tee, 2"x1" ø stainless steel, class 6	1	EA
	- Tee, 2"x1 1/2" ø stainless steel, class 6	10	EA
	- Ball valve, 1/2" ø, stainless steel, class 300#	5	EA
	- Ball valve, 3/4" ø, stainless steel, class 300#	4	EA
	- Ball valve, 1" ø, stainless steel, class 150#	7	EA
	- Air release valve, 1" ø, stainless steel, class 150	1	EA
	- Relief valve, 1" ø, stainless steel, class 150	2	EA
	- Relief valve, 1 1/2" ø, stainless steel, class 150#	1	EA
	- Check valve, 1" ø, stainless steel, class 150	7	EA
	- Diaphragm valve, 1" ø, stainless steel, class 150	14	EA
	- Globe valve, 1/2" ø, stainless steel, class 150#	6	EA
	- Globe valve, 3/4" ø, stainless steel, class 150#	4	EA
	- PRV valve, 1/2" ø, stainless steel, class 150#	1	EA
	- PRV valve, 1" ø, stainless steel, class 150#	12	EA
	- flow indicating meter, 3/4" ø, stainless steel, class 3	1	EA
	- flow indicating meter, 1" ø, stainless steel	1	EA
	- Gauge, flow, 2" ø, straight through bullseye	1	EA
	- Gauge, pressure, 4" øl, Class 6	4	EA
	- Electric heater, 2" inlet and outlet, 75 kW	1	EA
	- Flexible metal hose, 1/2" stainless steel, 4 m long	16	EA
	- Flexible metal hose, 3/4" stainless steel, 4 m long	19	EA
	- TRF pumping tool	3	EA
	- Tool balancer, 360 deg., stroke 1.3 m	2	EA
	Digital scale, 300 kg capacity	2	EA
07.02	HWMB west annex D2O drum handling - drum filling transfer tool	6	EA

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
07	**Drum Handling and Cleaning Systems (Cont'd)**		
07.03	HWMB west annex D2O drum handling - drum emptying transfer tool	3	EA
07.04	HWMB west annex D2O drum drying tool	3	EA
07.05	HWMB west annex D2O drum handling - misc. tooling - Pump, Vacuum, 1/8 HP, 1.1CFM (duplex)@ 60 psi c/w Accessories such as steel drum, 55 Gal, filter housing, etc.	1	LS

PROCESS SYSTEMS

Item Ref.	Item Description	Quantity	Unit
08	**Controls**		
08.01	Controls & software , refer D_EC_DSGN-124819, 137109, 137115, 137116, 137109, 137115 & 137116)	1	LS

E - Process Support Systems

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

Report Date: Oct 25, 2019
Page No.: E - 1

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**Chilled Water Supply System**		
01.01	Chilled water equipment		
	- Chilled water system, packaged unit with a cooling capacity of 1,080,000 BTU/HR	1	EA
	- Fluid cooler, air cooled, vertical airflow, direct drive propellers, and independent fan motors. (capacity, no detail)	2	No.
	- ACU9, ACU10, Air conditioning unit, 52.3MBH/ 15.3kw cooling capacity, inline horizontal coils, stainless steel tubes, aluminum fins.	2	EA
	- ACU11, ACU12, Air conditioning unit, 115MBH/ 33.9kW cooling capacity, inline horizontal coils, stainless steel tubes, aluminum fins.	2	EA
	- ACU13, ACU14, Air conditioning unit, 52.6MBH/ 15.5kw cooling capacity, inline horizontal coils, stainless steel tubes, aluminum fins.	2	EA
01.02	Chilled water piping and fittings		
	- 4" ø pipe, stainless steel, schedule 40s, butt weld	95	m
	- 1 1/2" ø pipe, stainless steel, schedule 40s, butt weld	165	m
	- 1" ø pipe, stainless steel, NPS 1	300	m
	- 1" ø pipe, stainless steel, NPS 2	10	m
	- Ball valve, 1”, stainless steel, socket weld ends, manual operated	18	EA
	- Ball valve, 1 1/2”, stainless steel, socket weld ends, manual operated	16	EA
	- Ball valve (temperature control), 1-1/2”, stainless steel, socket weld ends	2	EA
	- Ball valve, 4”, stainless steel, butt weld ends, manual operated	2	EA
	- Valve, pressure control, ball, 4”, stainless steel	1	EA
	- Flange assembly, 150#, 304L SS, for 2” sched 40s pipe, incl. non-metallic compressed gasket, flat ring	4	EA
	- Flange assembly, 150#, 304L SS, for 1” sched 40s pipe, incl. non-metallic compressed gasket, flat ring	4	EA
	- Flange assembly, 150#, 304L SS, for 1 ½” sched 40s pipe, incl. non-metallic compressed gasket, flat ring	12	EA
	- Flange assembly, 300#, 304L SS, for 1 ½” sched 40s pipe, incl. non-metallic compressed gasket, flat ring	4	EA
	- Flange assembly, 150#, 304L SS, for 1 ¼” sched 40s pipe, incl. non-metallic compressed gasket, flat ring	4	EA
	- Portable venturi meter, linear δp, 0-50” wg, w/standard fitting kit: including 2 quick disconnect fittings, hose, shutoff valves	1	EA
	- Insulation, fiberglass, 1.5” thick, with stucco embossed aluminum jacketing for NPS4,	90	m
	- Elbow, 90 deg, long radius, 4” nps, buttweld	11	EA

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**Chilled Water Supply System (Cont'd)**		
01.02	Chilled water piping and fittings (cont'd)		
	- Sock-o-let, 4” x 1” nps, socket weld, schedule 40	12	EA
	- Reducing tee, 4”x1 1/2” nps, buttweld, schedule 40s, ss 304L	16	EA
	- Elbow, 90 deg, short radius, 4” nps, buttweld, schedule 40s	2	EA
	- Insulation, fiberglass, 1” with stucco embossed aluminum jacketing, for 1” nps	180	m
	- Insulation, fiberglass, 1” with stucco embossed aluminum jacketing, for 3/4” NPS	10	m
	- Insulation, fiberglass, 1” with stucco embossed aluminum jacketing, for 1 1/2” NPS	165	m
	- Valve, ball, 3/4”, stainless steel, socket weld ends, manual operated	33	EA
	- Air release valve, 3/4" NPT inlet x 3/8" NPT outlet, stainless steel internals, brass body option	18	EA
	- Venturi flow element, 1” NPT, brass body, c/w brass valves and quick connect fittings	6	EA
	- Venturi flow element, 1 1/2” NPT, brass body, c/w brass valves and quick connect fittings	8	EA
	- Thermowell, ½” mNPT external thread, ½” fNPT	2	EA
	- Plate, metal, 48” x 96” x ½” (1200 mm x 2400 mm x 12 mm) steel, hot rolled	2	EA

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**D2O Vapour Recovery System**		
02.01	Equipment		
	- DR12/13, Twin tower desiccant dryer, class 6, assembly	1	EA
	- Blower, regenerative, 229 SCFM,	1	EA
	- DR1, Desiccant wheel dryer, class exempt, assembly	1	EA
	- FUH1 to 5, Fume hood, 1520X3496X500 mm, stainless steel	5	EA
02.02	Piping and fittings		
	- 3/4" ø pipe, stainless steel, c/w support & fittings, class 6, allow for field run & D2O collection to PHT on drg. NK38-DRAW-38309-10001/10002, class 6	1	LS
	- 1" ø pipe, stainless steel, c/w support & fittings, class 6, allow for field run & D2O collection to PHT on drg. NK38-DRAW-38309-10001, class 6	1	LS
	- 1 1/2" ø pipe, stainless steel, c/w support & fittings, class 6, allow for field run & D2O collection to PHT on drg. NK38-DRAW-38309-10001, class 6	1	LS
	- Elbow, 1/2" ø, stainless steel, 90 deg. Class 6	10	EA
	- Elbow, 3/4" ø, stainless steel, 45 deg., class 6	4	EA
	- Elbow, 3/4" ø, stainless steel, 90 deg., class 6, allow as required	1	LS
	- Elbow, 1" ø, stainless steel, 90 deg., class 6, allow as required	1	LS
	- Elbow, 1 1/2" ø, stainless steel, 45 deg., class 6	1	EA
	- Elbow, 1 1/2" ø, stainless steel, 90 deg., class 6, allow as required	1	LS
	- Elbow, 2" ø, stainless steel, 45 deg., class 6	2	EA
	- Elbow, 2" ø, stainless steel, 90 deg., class 6, allow as required	1	LS
	- Flange c/w gasket & studs, 3/4" ø, stainless steel, class 6	11	EA
	- Flange c/w gasket & studs, 1" ø, stainless steel, class 6	1	EA
	- Flange c/w gasket & studs, 1 1/2" ø, stainless steel, class 6	6	EA
	- Flange c/w gasket & studs, 2" ø, stainless steel, class 6	16	EA
	- Quick connect adopter, 3/4" ø, stainless steel, Class 6	1	EA
	- Nipple, 3"X1/2" ø, stainless steel, class 6	2	EA
	- Reducer, 1"X3/4" ø, stainless steel, class 6	1	EA
	- Reducer, 1 1/2"X3/4" ø, stainless steel, class 6	1	EA
	- Reducer, 2"X1 1/2" ø, stainless steel, class 6	1	EA
	- Reducer insert, 2"X3/4" ø, stainless steel, class 6	2	EA
	- Tee, 1/2" ø, stainless steel, class 6	1	EA
	- Tee, 1 1/2"X1" ø, stainless steel, class 6	2	EA

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**D2O Vapour Recovery System (Cont'd)**		
02.02	Piping and fittings (cont'd)		
	- Tee, 1 1/2"X1/2" ø, stainless steel, class 6	4	EA
	- Tee, 2"X1 1/2" ø, stainless steel, class 6	2	EA
	- Tee, 2" ø, stainless steel, class 6	7	EA
	- Weldolet, 2"X1/2" ø, stainless steel, class 6	3	EA
	- Adopters, unions, nipples, orifices etc. up to 1 1/2" ø, allow for additional as required	1	LS
	- Ball valve, 3/4" ø, stainless steel, class 300#	1	EA
	- Check valve, 3/4" ø, stainless steel, class 6, class 150#	1	EA
	- Check valve, 2" ø, stainless steel, class 150#	3	EA
	- Diaphragm valve, 1 1/2" ø, stainless steel, class 6	1	EA
	- Diaphragm valve, 2" ø, stainless steel, class 6	5	EA
	- Globe valve, 1/2" ø, stainless steel, class 150#	1	EA
	- Relief valve, 1 1/2" X 2" inlet ø, Class 150#	1	EA
	- Relief valve, 1 1/2" X 2" inlet ø, Class 6	1	EA
	- Relief valve, 3/4" X 1 1/2" inlet ø	2	EA
	- Pressure regulating valve, 1/2" ø, stainless steel, class 6	1	EA
	- Pressure indicator, 20-34 kPa(g), Air	1	EA
	- DP, Manual damper, 10" ø, stainless steel	11	EA
	- DP, Manual damper, 14" ø, stainless steel	1	EA
	- FD, Fire damper, 14" ø, stainless steel	2	EA
	- Tooling cabinet, 1X1X2 m	1	EA
	- 3/4" ø pipe, stainless steel, c/w support & fittings, class 6, allow for field run	1	LS
	- 1" ø pipe, stainless steel, c/w support & fittings, class 6	1	LS
	- 1" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings, class 6	1	EA
	- 2" ø pipe, stainless steel c/w support, allow as required in field run	1	LS
	- 4" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings, class 6	1	EA
	- 6" ø pipe, stainless steel, spool piece. Up to 5 m length c/w support & fittings, class 6	1	EA
	- 10" ø pipe, stainless steel c/w support, class 6	60	m
	- 14" ø pipe, stainless steel c/w support, class 6	60	m
	- Coupling, 2" ø, stainless steel	1	EA
	- Union, 2" ø, stainless steel	4	EA

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**D2O Vapour Recovery System (Cont'd)**		
02.02	Piping and fittings (cont'd)		
	- Elbow, 3/4" ø, stainless steel, 90 deg., class exempt, allow as required for field run	1	LS
	- Elbow, 1" ø, stainless steel, 90 deg., class 6	12	LS
	- Elbow, 2" ø, stainless steel, 45 deg., class 6	2	EA
	- Elbow, 2" ø, stainless steel, 90 deg., class 6, allow as required	1	LS
	- Elbow, 10" ø, long radius, stainless steel, 90 deg., class 6	6	EA
	- Elbow, 14" ø, long radius, stainless steel, 45 deg., class exempt	2	EA
	- Elbow, 14" ø, long radius, stainless steel, 90 deg., class 6	10	EA
	- Elbow, 14" ø, short radius, stainless steel, 90 deg., class 6	1	EA
	- Flange c/w gasket & studs, 3/4" ø, stainless steel, class 6	2	EA
	- Flange c/w gasket & studs, 1" ø, stainless steel, class 6	2	EA
	- Flange c/w gasket & studs, 14" ø, stainless steel, class exempted	6	EA
	- Flange c/w gasket & studs, blind, 14" ø, stainless steel, class exempted	1	EA
	- Quick connect socket, 2" ø, stainless steel, Class 6	8	EA
	- Nipple, 2" ø, 6" long stainless steel, class exempt	2	EA
	- Reducer, 1 1/2"X1" ø, stainless steel, class 6	2	EA
	- Reducer, eccentric, 2"X1" ø, stainless steel, class exempt	2	EA
	- Reducer, 14"X10" ø, stainless steel, class exempt	1	EA
	- Tee, 2" X2" ø, stainless steel, class 6	1	EA
	- Tee, 2" X2" ø, stainless steel, class exempt	2	EA
	- Tee, 10"X14"X14" ø, stainless steel, class exempt	11	EA
	- Tee, 14"X14"X14" ø, stainless steel, class exempt	2	EA
	- Threadolet, 2"X1/4" ø, stainless steel, class exempt	1	EA
	- Weldolet, 2"X2"X1/2" ø, stainless steel, class exempt	8	EA
	- Weldolet, 14"X14"X2" ø, stainless steel, class exempt	2	EA
	- Diaphragm valve, 1" ø, stainless steel, class exempt	1	EA
	- Relief valve, 2" inlet ø	1	EA
	- Pressure gauge, 0-40 kPa(g), Air, exempt	1	EA

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Instrument & Service Air Systems**		
03.01	Heavy water management building west annex instrument and service air supply		
	- 2" ø pipe , type L copper c/w fitting	37	m
	- 1 1/2" ø pipe , type L copper c/w fitting	22	m
	- 1" ø pipe , type L copper c/w fitting	128	m
	- 3/4" ø pipe , type L copper c/w fitting	8	m
	- 1/2" ø Pipe, seamless type K, copper. Spool piece	1	LS
	- Tee, solder joint, 2 ", solder connection, copper	3	EA
	- Trap, liquid drain, 3/4" npt, 4.6" wide x 6.2" long x 3.3" deep, cast iron body, st. steel internals	2	EA
	- Diaphragm valve, 1/2" ø, 1034kpa(g), manual	2	EA
	- Diaphragm valve, 3/4" ø, 1034kpa(g), manual	2	EA
	- Diaphragm valve, 1" ø, 1034kpa(g), manual	8	EA
	- Diaphragm valve, 1 1/2" ø, 1034kpa(g), manual	5	EA
	- Valve, angle port(30 degrees) , 1" inlet 3/4" outlet, manual	16	EA
03.02	Instrument air for new D2O west annex building		
	- Air compressor, rotary screw, 108.8 l/s @ 1035kpa(g)	2	EA
	- Air dryer, heatless, Atlas copco CD 100+	2	EA
	- Receiver, 757 liter	2	EA
	- Receiver, 1508 liter	2	EA
	- Filter pre, 117.7 l/s@8 bar	2	EA
	- Filter after, 117.7 l/s@8 bar	2	EA
	- 2" ø pipe, type L copper c/w fitting	55	m
	- 1 1/2" ø pipe , type L copper c/w fitting	90	m
	- 2 " ø pipe , type L copper c/w fitting	165	m
	- 3/4 " ø pipe , type L copper c/w fitting	7	m
	- 1/2 " ø pipe , type K copper c/w fitting	11	m
	- Tee, solder joint, 2 " ø, copper	6	EA
	- Trap, liquid drain, 3/4" ø, 4.6" wide x 6.2" long x 3.3" deep, cast iron body, st. steel internals	2	EA
	- Manifold, instrument air, stainless steel	8	EA
	- Globe valve, 1/2"	4	EA
	- Diaphragm valve, 1/4" ø	68	EA
	- Diaphragm valve, 1/2" ø	20	EA

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Instrument & Service Air Systems (Cont'd)**		
03.02	Instrument air for new D2O west annex building (cont'd)		
	- Diaphragm valve, 3/4" ø	9	EA
	- Diaphragm valve, 1" ø	8	EA
	- Diaphragm valve, 1 1/2" ø	14	EA
	- Diaphragm valve, 2" ø	5	EA
	- Relief valve, 1/2" ø	2	EA
	- Relief valve, 1" ø	4	EA
	- Nipple, pipe, 1/4", 2"	50	EA
	- Gauge, pressure, NC6, 0-400 p sig, 4" dial, 1/4" npt	4	EA
03.03	HWMB west annex D2O mgmt bldg breathing air piping		
	- 1/2" ø Pipe, seamless type L	1	EA
	- 1/2" ø Pipe, seamless type L, copper. Spool piece	1	LS
	- 1" ø pipe , type L copper c/w fitting, class 6	128	m
	- 1 1/2" ø pipe , type L copper c/w fitting, class 6	250	m
	- 2" ø pipe , type L copper c/w fitting, class 6	78	m
	- Tee, solder joint, 2 ", solder connection, copper, class 6	2	EA
	- Diaphragm valve, 2" ø, manual, class 6	2	EA
	- Diaphragm valve, 1" ø, manual, class 6	21	EA
	- Diaphragm valve, 1/2" ø, manual, class 6	21	EA
	- Breaching air station manifold assembly & hook up	21	EA
	- Tie into existing	1	LS
03.04	Relocation of the argon tank & line 7555Q-L9Q1-A1 1/2ATC		
	- 1/2" ø Pipe, seamless type L c/w fitting		EA
	- 1/2" ø Pipe, seamless type L, copper. Spool piece		LS
	- 1" ø pipe , type K copper c/w fitting & supports	19	m
	- 1 1/2" ø pipe , type K copper c/w fitting & supports	35	m
	- Cap, 1" ø, copper	4	EA
	- Cap, 1 1/2" ø, copper	4	EA
	- Ball valve, 1", manual, 600 PSI	4	EA
	- Ball valve lockout device	1	EA
	- Rubber hose, 1" ø, 50 ft long	6	EA
	- 6" ø pipe , steel for bollard	15	m

PROCESS SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Instrument & Service Air Systems (Cont'd)**		
03.04	Relocation of the argon tank & line 7555Q-L9Q1-A1 1/2ATC (cont'd)		
	- Tie into existing	1	EA
	- Tie into venders line	1	EA
	- Pipe supports, allow	11	EA
	- Fencing & bollards, included elsewhere	1	Nil
	- Tank, leased and relocated by Vender	1	Nil
03.05	Relocation of the oxygen tank & underground line 75510- L70 1-O_2ATC		
	- 1" ø pipe , type K copper c/w fitting & supports	75	m
	- Ball valve, 1", manual, 690 kPa	2	EA
	- Tie into existing	1	EA
	- Tie into venders line	1	EA
	- Pipe supports, allow	1	LS
	- Fencing & bollards, included elsewhere	1	Nil
	- Tank, leased and relocated by Vender	1	Nil
	- Trenching , Excavation and back fill as per detail D2 on drg NK38-DRAW-75519 -10001	50	m
	- Trenching , Excavation and back fill as per detail D3 on drg NK38-DRAW-75519 -10001	5	m
	- Trenching , Excavation and back fill as per detail D4 on drg NK38-DRAW-75519 -10001	5	m
03.06	Tritium removal facility helium supply system line relocation		
	- 1/2" ø Pipe, stainless steel c/w coupling & support	125	EA
	- Cap, 1/2" ø, stainless steel	3	EA
	- Elbow, 1/2" ø stainless steel, 90 deg	20	EA
	- Tie into existing	2	EA
	- Tie into venders line	1	EA
	- Pipe supports, allow	14	EA
	- Trenching , Excavation and back fill as per detail D2 on drg NK38-DRAW-75549 -10002	90	m

F - Building Support Systems tie-in (Mechanical)

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

Report Date: Oct 25, 2019
Page No.: F - 1

BUILDING SUPPORT SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
01	**Plumbing & Drainage**		
01.01	Supply of domestic water to the West annex including tie in to the existing station domestic water		
	- 2" ø copper pipe type l, 2" copper c/w fittings, support, etc.	75	m
	- Coupling, solder joint, 2", solder connection	18	EA
	- Elbow, solder joint, 2", solder, copper, 90 deg, long radius	16	EA
	- Elbow, solder joint, 2", solder, copper, 45 deg, long radius	4	EA
	- Tee, solder joint, 3" x 3" x 2", solder connection, copper	1	EA
	- Insulation, pipe anti-sweat, 2" pipe size, 1" thick, ap Armaflex	75	m
	- Coupling, 2" x 1/2"	1	EA
	- Connection to phase 1 capped pipe	1	EA
	- Valve, gate, 2", 125lb, solder	1	EA
	- Connection to existing pipe	1	EA
01.02	Construction water tie-in for HWMB West annex		
	- 2" ø copper pipe type l, 2" copper c/w fittings, support, etc.	10	m
	- Insulation, pipe, 2", 3" thick, calcium silicate for buried portion	2	m
	- Insulation, pipe, 2", 2" thick, calcium silicate for horizontal portion	8	m
	- Cap, solder joint, 2"	1	EA
	- Coupling, 2" x 1 1/4"	1	EA
	- Coupling, solder joint, 2", solder connection	1	EA
	- Elbow, solder joint, 2", solder, copper, 90 deg, long radius	1	EA
	- Tee, solder joint, 2" x2" x 3/4", solder connection, copper	1	EA
	- Valve, gate, 2", 125lb, solder	1	EA
	- Valve, globe, solid wedge, 3/4"	1	EA
	- Valve, globe, solid wedge, 1 1/4"	1	EA
	- Backflow preventer, 2"	1	EA
	- 8" ø, plastic pipe for drainage	5	m
	- Water entry c/w insulation, grouting, painting, etc.	1	LS
	- Jacket insulation for all valves	1	LS
	- Heat tracing	10	m
	- Tie into existing capped pipe	1	EA

BUILDING SUPPORT SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
02	**Heating Steam & Condensate System**		
02.01	D2O management building fl. el. 94.000 to 104.200 8 NPS header to PRV 30 heating steam piping		
	- Pipe 1" ø, carbon steel c/w fittings	1	EA
	- 6" ø pipe, class 6. carbon 98624-1 pipe steel	4	m
	- Branch, pipe, sockolet 6" to 10" run, 1" branch, carbon	1	EA
	- Insulation, pipe, 3" thick, 6" ø, fiberglass, ciw vapour barrier	4	m
	- Insulation, pipe elbow, 90 deg, lr, 3" thick. 6" ø, fiberglass	1	EA
	- Insulation. pipe. 3" thick	1	LS
	- Cap, pipe, 6" ø	1	EA
	- Elbow, pipe, 6" ø	1	EA
	- Nipple, pipe, 1",4" lg, threaded, carbon steel sch 80	1	EA
	- Tee reducer, 8"x8"x6"	1	EA
	- Gate valve, 6" ø	1	EA
	- Gate valve, 1" ø	1	EA
	- Tie-in to the existing TRF & D2O management building steam & condensate system	1	EA
	- Tie into existing steam header	1	LS
02.02	L505-W3B thru-tunnel return from 020 bldg. HGT. stm. condensate piping		
	- 2" ø pipe, carbon steel	2	m
	- Insulation, pipe, 1" thick, 2" ø fiberglass, c/vv vapour barrier	1	LS
	- Insulation, pipe, 1-1/2" thick, 3"ø, fiberglass, c/vv vapour barrier	1	LS
	- Cap, 2" ø.	1	EA
	- Tee, pipe reducer, 3" x 3" x 2",	1	EA
	- Gate valve, manual, socket weld, 2" ø.	1	EA
	- Tie into existing condensate header	1	LS
02.03	D2O Mgm't bldg fl. el. 87.000 & 94.00 P3 & P4 discharge to tk1 htg. steam cond. piping		
	- 2" ø pipe, carbon steel	2	m
	- Insulation, pipe, 1" thick, 2" ø fiberglass, c/vv vapour barrier	1	LS
	- Insulation, pipe, 1-1/2" thick, 3" ø, fiberglass, c/vv vapour barrier	1	LS
	- Tee, pipe reducer,2-1/2 x 2-1/2 x 2,	1	EA
	- Gate valve, 2" ø, manual, 2" ø.	1	EA
	- Cap, 2" ø.	1	EA

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

Report Date: Oct 25, 2019
Page No.: F - 3

BUILDING SUPPORT SYSTEMS TIE-IN

Item Ref.	Item Description	Quantity	Unit
03	**Fire Protection System**		
03.01	D2O management building west annex fire protection piping tie-in		
	- 6" ø, pipe, sch 40, seamless pipe, plain ends.	42	m
	- Elbow class 6, 6" ø, lr, 90 deg, carbon steel	9	EA
	- Elbow, class 6, 6" ø, lr, 45 deg, carbon steel	3	EA
	- Connection to existing	1	EA
	- Tee, class 6, reducing, 8" x 8" x 6" , butt weld	1	EA
	- Flange, Class 6, 6" ø, weldneck flat face, carbon steel	2	EA
	- Gate valve 6" ø	1	EA
	- Cap, class 6, 6" ø, butt weld, carbon steel	1	EA
03.02	Temporary foam fire suppression connection at standby generator fuel management building no.1		
	- 2 1/2" ø, Pipe , 1 m c/w support	1	LS
	- Union, 2" ø	1	EA
	- Nipple, 2" ø	1	EA
	- Coupling, 2-1/2" X 2",	1	EA
	- 10" ø, pipe 6.1 m long, DR-18	2	EA
	- Coupling, 10"	2	EA
	- Tie into existing	2	EA

G - Building Support Systems (Mechanical)

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**Plumbing & Drainage**		
01.01	Plumbing fixtures		
	- Emergency eye/face wash, floor mount, model # 7361-7461	3	EA
	- Emergency shower/eyewash combination unit, haws model 8300-8309, model 9001 Alarm, and model sp220 foot tradle, floor mounted	1	EA
	- Fixture rough in	4	EA
01.02	Domestic water		
	- Tanked water heater, 120 gallon, 9 kW X 3 elements	1	EA
	- Inline tankless water heater Hubbell Mod. # TX021-3T6 or equivalent	3	EA
	- 1/2" Pipe, type L copper c/w fittings, support, etc.	20	m
	- 1" Pipe, type L copper c/w fittings, support, etc.	10	m
	- 1 1/4" Pipe, type L copper c/w fittings, support, etc.	20	m
	- 1 1/2" Pipe, type L copper c/w fittings, support, etc.	10	m
	- 2" Pipe, type L copper c/w support, etc.	100	m
	- 1 1/2" hi temperature pipe	10	m
	- 1/2' pipe insulation	20	m
	- 1" pipe insulation	10	m
	- 1 1/4" pipe insulation	20	m
	- 1 1/2' pipe insulation	10	m
	- 2" pipe insulation	100	m
	- Cap, 2" ø, type L copper	1	EA
	- Coupling, 2", type L copper	20	EA
	- Elbow, 2", 90° type L copper	22	EA
	- Elbow, 2", 45° type L copper	12	EA
	- Tee, 2", type L copper	4	EA
	- Reducer, 2" x 1-1/4" type L copper	1	EA
	- Reducing tee, 2" x 1 1/2", type L copper	1	EA
	- Reducer, 2" to 3/4" ø, class 6	1	EA
	- Double check valve, 2"	1	EA
	- Reducer, 2" x 1" type L copper,	1	EA
	- Reducing tee, 2" x 1 1/4" ø, type L	1	EA
	- Reducing tee, 2" x 1/2" ø, type L	3	EA
	- Gate valve, 2" , bronze body	1	EA
	- Gate valve, 1-1/2", bronze body	1	EA
	- Gate valve, 3/4", bronze body	1	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
01	**Plumbing & Drainage (Cont'd)**		
01.02	Domestic water (cont'd)		
	- Gate valve, 1/2"	3	EA
	- RP, Back flow preventer, 1/2" ø	5	EA
	- RP, Back flow preventer, 3/4" ø	7	EA
	- RP, Back flow preventer, 1" ø	2	EA
	- Valve, gate, pressure boundary	1	EA
	- Valve, relief, pressure boundary	1	EA
	- Valve, thermostatic mixing	1	EA
01.03	Sanitary drainage & vent Carried with active and inactive drainage under process support system		
01.04	Storm drainage		
	- 8" pipe, cast iron, no hub c/w ss coupling	81	m
	- 6" pipe, cast iron, no hub c/w ss coupling	40	m
	- 4" pipe, cast iron, no hub c/w ss coupling	70	m
	- Reducer, 6" x 4" ø, cast iron	4	EA
	- Wye, 4" ø, class 4000 cast iron	11	EA
	- Wye, 6" ø, class 4000 cast iron	3	EA
	- Wye, 6"x4" ø, class 4000 cast iron	4	EA
	- Wye, 8" ø, class 4000 cast iron	6	EA
	- Wye, 8"x6" ø, class 4000 cast iron	3	EA
	- Wye, 8" ø , 90 deg combination	4	EA
	- Elbow, 8" 45 deg., class 4000 cast iron	16	EA
	- Elbow, 6" 45 deg., class 4000 cast iron	8	EA
	- Elbow, 4" 45 deg., class 4000 cast iron	10	EA
	- Roof drain, 4" ø	6	EA
	- Cleanout, 6" ø, cast iron, no hub,	2	EA
	- Cleanout, 4" ø, cast iron, no hub,	10	EA
	- Cleanout, 8" ø, cast iron, no hub,	6	EA
	- Cleanout, 8" ø, deck plate, cast iron	2	EA
	- Elbow, 4" ø, 90 deg., class 4000 cast iron	6	EA
	- Elbow, 6" ø, 90 deg., class 4000 cast iron	2	EA
	- Elbow, 8" ø, 90 deg., class 4000 cast iron	5	EA
	- Flexible coupling, 8" ø	1	EA

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**Heating Steam & Condensate System**		
02.01	Equipment		
	- Heat exchanger, vertical flooded type packaged unit. the steam reqmts are 5,409 lb/hr @75psig to provide 230gpm hot water at 58.6 ft head. c/w Heat exchanger, pumps, control valves, etc.	1	EA
	- HX29 to 31, Radiator, 2" ø, steel tube, steel fins, total heat load of 10,447 btu/hr,	3	EA
02.02	Piping & fittings		
	- 3/8" ø pipe, sch 80 Spool piece	1	EA
	- 1/2' ø, pipe, sch 80 c/w fittings	5	m
	- 3/4" ø, pipe, sch 80 c/w fittings	4	m
	- 2" ø, pipe, class 6, carbon steel c/w fittings	77	m
	- 4" ø, pipe, class 6, carbon steel	96	m
	- Concentric reducer, 6" x 4" ø, buttweld, schedule 40	1	EA
	- Elbow, 90 deg, long radius, 4" ø, butiweld, schedule 40	20	EA
	- Elbow, 90 deg, long radius, 2" ø	27	EA
	- Elbow, 45 deg, long radius, 4" ø, butweld,· schedule 40	3	EA
	- Flange, 4" ø, buttweld	3	EA
	- Tee, 2" ø, socket weld	6	EA
	- Insulation, pipe, 3" thickx36" long for 4" pipe	96	m
	- Insulation, pipe, 3" thickx36" long for 2" pipe	77	m
	- Insulation, pipe, 2" thickx36" long for 3/4" pipe	4	m
	- Insulation, pipe, 2" thickx36" long for 1/2" pipe	7	m
	- Pvc jacketing for insulation, for 4" pipe with	96	m
	- Pvc jacketing for insulation, for 2" pipe with	77	m
	- Cap, 1" ø, threaded	4	EA
	- Ball valve, 2" ø, carbon steel	1	EA
	- Check valve, 2" ø, carbon steel	2	EA
	- Gate valve, 1/2" ø	3	EA
	- Gate valve, 1", 600 lb, socket weld, carbon steel	4	EA
	- Gate valve, 2" ø, class 6	2	EA
	- Gate valve, 2" ø	4	EA
	- Gate valve, 3/4" ø, , class 2999	4	EA
	- Globe valve, 3/4" ø, , class 3000	2	EA
	- Strainer, 3/4", 3/8" blowdown, carbon steel	2	EA
	- Steam trap, thermodynamic,1/2", carbon steel	2	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
02	**Heating Steam & Condensate System (Cont'd)**		
02.02	Piping & fittings (cont'd)		
	- 2" ø, 3-way manual ball valve, flanged, cs, class 150.	1	EA
	- Flow indicator, 2" flanged asme class 150, stainless steel 316L	1	EA
	- Air vent,3/4", fnpt thermostatic, stainless steel	1	EA
	- Air vent,1", fnpt thermostatic, stainless steel	2	EA
02.03	Hot water piping, valves and supports		
	- 1" ø, pipe, carbon steel c/w fittings	2	m
	- 2" ø, pipe, carbon steel c/w fittings	20	m
	- 3" ø, pipe, carbon steel	15	m
	- 4" ø, pipe, carbon steel	3	m
	- Insulation, pipe, 2" thickx36" long for 1/2" pipe	7	m
	- Flange, 2" ø, socket weld	8	EA
	- Flange, 3" ø	8	EA
	- Elbow, 3" ø, 90 deg	8	EA
	- Elbow, 3" ø, 45 deg	4	EA
	- Reducer, concentric 3" x 2", butt weld schedule 40	8	EA
	- Union, di-electric, 3" ø, 30001b, stainless	8	EA
	- Gate valve, 2" ø	8	EA
	- Gate valve,1" ø	8	EA
	- Flexible hose, 0.525 m lg, single braided, 3 ø, 150# rf weldneck flanged	4	EA
	- Flexible hose, 1.2 m face to face, single braided, 3" ø, 150# rf weldneck flanged	2	EA
	- Flexible hose, 4 m face to face, single braided, 3 ø, 150# rf weldneck flanged	2	EA
	- Automatic air release valve float type, 1" ø, class 150 spirax sarco 13ws air eliminator	4	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Ventilation System**		
03.01	HVAC Equipment		
	- HVU5, Heating ventilation unit, packaged unit c/w 2 supply fans each air flow 59,000 CFM @5.22" w. g., electric snow arresting system, filters, hot water heating coils with integral face bypass dampers, VFD's , plenum, flow switches and sensors. Based on York D2O Custom unit model TC or Equivalent	1	EA
	- F26 & F27, Exhaust fan, class4, centrifugal, 71,536 CFM @ 9.2" w. g. c/w 125 hp motor fan to include suction and discharge isolation dampers, variable frequency drive motors. flow switches, etc. Based on Twin city fan & blower BAE-SW Efficient Airfoil centrifugal fan, SWSI or approved	2	EA
	- FR21 & FR22, Filter unit, design airflow of 71,536 CFM @7.05" wg, c/w housing, isolation dampers, prefilters, HEPA filters & carbon filters	2	EA
	- Cabinet heater, electric, 600v, 3ph, rated for 2000 watts, surface mount with tamper proof thermostat.	6	EA
	- Fan, centrifugal, ceiling type, 2650 cfm	2	EA
	- Exhaust Stack, 1.450 m dia, 15.5 m height + extending 2.07m below top face of stack c/w support, etc.	1	Sum
	- Stack control monitoring	1	Sum
03.02	Ventilation & exhaust ductwork & devices		
	- Air register, exhaust, 24"x12", 304 SS, surface mount	3	EA
	- Air register, exhaust, 30"x8", 304 SS, surface mount	24	EA
	- Air register, exhaust, 20"x8", 304 SS, surface mount	20	EA
	- Air register, exhaust, 8"x6", 304 SS, surface mount	1	EA
	- Air register, exhaust, 22"x22", 304 SS, surface mount	7	EA
	- Air register, exhaust, 14"x6", 304 SS, surface mount	5	EA
	- Air register, supply, 30"x8", 304 SS, surface mount	23	EA
	- Air register, supply, 18"x6", 304 SS, surface mount	10	EA
	- Air register, supply, 22"x8", 304 SS, surface mount	18	EA
	- Air register, supply, 8"x6", 304 SS, surface mount	2	EA
	- Air register, supply, 36"x12", 304 SS, surface mount	27	EA
	- Air register, 31.5" x 31.5", 304 SS	4	EA
	- Air register, 43 1/4" x 14 5/8", 304 SS	2	EA
	- Air register, 30" x 18", 304 SS	2	EA
	- Air register, 30" x 15", 304 SS	2	EA
	- Diffuser, supply, 12"x12", 304 SS, surface mount	3	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Ventilation System (Cont'd)**		
03.02	Ventilation & exhaust ductwork & devices (cont'd)		
	- Fire damper for exhaust, 54"x30"	1	EA
	- Fire damper for exhaust, 76"x45"	1	EA
	- Fire damper for exhaust, 56"x38"	1	EA
	- Fire damper for exhaust, 14" round	3	EA
	- Fire damper for exhaust, 24"x18"	3	EA
	- Fire damper for exhaust, 16"x14"	3	EA
	- Fire damper for exhaust, 24"x20"	1	EA
	- Fire damper for exhaust, 13"x6"	1	EA
	- Fire damper, for exhaust 36"x20"	1	EA
	- Fire damper, for exhaust 38"x20"	1	EA
	- fire damper, for exhaust, 41"x17"	1	EA
	- Fire damper, 31.5"x31.5"	2	EA
	- Fire / smoke damper for supply, 24"x20",airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 68"x48", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 30"x15", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 44"x29", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 48"x40", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 24"x12", airfoil type, galvanized steel, factory mounted electric actuator	2	EA
	- Fire/smoke damper, for supply 39"x16", airfoil type, galvanized steel, factory mounted electric actuator	2	EA
	- Fire/smoke damper, for supply 12"x8", airfoil type, galvanized steel, factory mounted electric actuator	2	EA
	- Fire/smoke damper, for supply 8"x6", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 28"x14", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Fire/smoke damper, for supply 9"x13", airfoil type, galvanized steel, factory mounted electric actuator	1	EA
	- Damper, for balancing, manual 39"x16", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 24"x12", opposed blade, galvanized steel	2	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Ventilation System (Cont'd)**		
03.02	Ventilation & exhaust ductwork & devices (cont'd)		
	- Damper, for balancing, manual 12"x8", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 14"x18", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 22"x15", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 36"x24", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 30"x15", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 44"x29", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 18"x16", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 34"x14", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 34"x26", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 34"x22", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 42"x40", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 25"x15", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 32"x19", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 10"x6", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 44"x32", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 24"x16", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 21"x8", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 48"x24", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 34"x16", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 42"x28", opposed blade, galvanized steel	1	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
03	**Ventilation System (Cont'd)**		
03.02	Ventilation & exhaust ductwork & devices (cont'd)		
	- Damper, for balancing, manual 54"x31", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 10"x8", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 10"x8", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 44"x26", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 18"x14", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 27"x21", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 27"x16", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 28"x39", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 27"x17", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 34"x24", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 25"x8", opposed blade, galvanized steel	1	EA
	- Damper, for balancing, manual 41"x17", opposed blade, galvanized steel	1	EA
	- Damper, control, motorized 24"x20", opposed blade, 304 SS	1	EA
	- Damper, control, motorized 18"x15", opposed blade, 304 SS	1	EA
	- Damper, control, motorized 14" round, opposed blade, 304 SS	1	EA
	- Damper, control, motorized 26"x17", opposed blade, 304 SS	1	EA
	- Damper, control, motorized 28"x14", opposed blade, 304 SS	1	EA
	- Damper, control, motorized 25"x11", opposed blade, 304 SS	1	EA
	- Damper, control, motorized 30"x18", opposed blade, 304 SS	2	EA
	- Sheet metal, galvanized, 10 gage, welded for filtration unit to stack	12,700	KG
	- Sheet metal, 304 SS, 16 gage	10,000	KG
	- Sheet metal, 20 gage, non-welded.	25,500	KG
	- Insulation, for ductwork, 2" thick	6,300	m2
	- Aluminum jacket, 0.02" thick for all duct	3,680	m2
	- Intake louvre, 240"x216"	1	EA
	- Pipe, 2" ø, stainless steel	1	m
	- Pipe, 3" ø, stainless steel	1	m
	- Damper, backdraft, 31.5"x31.5"	2	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
04	**D2O Leak Detection System**		
04.01	Allow for D2O leak detection system c/w 36 No. points	1	Sum

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
05	**Fixed Gaseous Effluent Radioactivity Monitoring**		
05.01	Carried under Electrical		

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
06	**Fixed Area Alarming Gamma and Tritium Monitors**		
06.01	Carried under Electrical		

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
07	**Fire Protection System**		
07.01	West annex fire protection standpipe system		
	- 1/2" ø, pipe, sch 80	10	m
	- 2" ø, pipe, sch 80, plain ends c/w fittings	70	m
	- 4" ø, pipe, sch 40, plain ends.	150	m
	- 6" ø, pipe, sch 40, plain ends.	50	m
	- 1-1/2" ø, pipe, sch 80, seamless c/w fittings	10	m
	- Elbow, 4" ø, 45 deg.	7	EA
	- Elbow, 4" ø, 90 deg.	22	EA
	- Elbow, 6" ø, 90 deg.	5	EA
	- Reducing Tee, 6" x6"x 4" ø	2	EA
	- Tee, 6" ø	1	EA
	- Tee, 4" ø	8	EA
	- Reducer, 6" x 4" ø , concentric	3	EA
	- Reducer, 4" x 2" ø , concentric	12	EA
	- Elbow, 1 1/2" ø, 90 degree	10	EA
	- Elbow, 2" ø, 90 deg, long radius, threaded	36	EA
	- Reducer, 2" x 1-1/2", fnpt, carbon steel	11	EA
	- Reducer, 4" x 1-1/2", victaulic grooved	2	EA
	- Tee, 2"x2"x2"	4	EA
	- Ball valve, 1/2" ø	6	EA
	- Gate valve, 4" ø	3	EA
	- Gate valve, 6" ø	1	EA
	- Check valve, 6" ø	2	EA
	- Automatic ball drip, 1/2" ø	1	EA
	- Victaulic coupling, 4" ø	150	EA
	- Victaulic coupling, 6" ø	100	EA
	- Victaulic firelock flange adaptor, 4" ø	6	EA
	- Victaulic firelock flange adaptor, 6" ø	10	EA
	- 2.5"x2.5" x6" fire department Siamese connection	1	EA
	- Pressure gauge, 4" dial	6	EA
	- Cabinet, 100' firehose, 22" x 30" x 6", preassembled, right hand	1	EA
	- Cabinet, 100' firehose, 22" x 30" x 6", preassembled, left hand	9	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
07	**Fire Protection System (Cont'd)**		
07.02	Fire protection sprinkler system		
	- 1/2" ø, pipe, sch 80 c/w fittings	2	m
	- 1 1/4" ø, pipe, sch 80 c/w fittings	130	m
	- 1 1/2" ø, pipe, sch 80 c/w fittings	20	m
	- 1" ø, pipe, sch 80 c/w fittings	750	m
	- 2 1/2" ø, pipe, sch 40	75	m
	- 2" ø, pipe, sch 80 c/w fittings	55	m
	- 3" ø, pipe, sch 40	50	m
	- 4" ø, pipe, sch 40	200	m
	- Tee, 4"ø	22	EA
	- Elbow, 4"ø, 90 degree	35	EA
	- 3"ø, 90 degree elbow	14	EA
	- Reducer, 3"x2.5", concentric	15	EA
	- Reducer, 4"x1.25", concentric	8	EA
	- Reducer, 2.5"x1", concentric	14	EA
	- Reducer, 3"x1 1/4", concentric	6	EA
	- Reducer, 3"x2", concentric	15	EA
	- Reducer, 2.5"x2", concentric	8	EA
	- Reducer, 2.5"x1.25", concentric	8	EA
	- Reducer 2"x1 .5", concentric	8	EA
	- Reducer, 4"x3", concentric	8	EA
	- Reducer, 4"x2", concentric	1	EA
	- Tee, 3"ø	18	EA
	- Tee, 2"ø	8	EA
	- Reducing tee, 3"x1.25" ø	20	EA
	- 3"x1 ", reducing tee	2	EA
	- 2.5"x1.5", reducing tee	4	EA
	- 2.5"x1.25", reducing tee	20	EA
	- 2.5"x1", reducing tee	12	EA
	- 2"x1", reducing tee	8	EA
	- 2"x1.25", reducing tee	10	EA
	- 2.5"ø , straight tee	22	EA
	- 2.5"ø, 90 degree elbow	4	EA
	- 4" gate valve	6	EA
	- 4" check valve, swing	2	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
07	**Fire Protection System (Cont'd)**		
07.02	Fire protection sprinkler system (cont'd)		
	- 4" victaulic firelock flange adapter	16	EA
	- 1/2" automatic ball drip	1	EA
	- 3/4" gate valve	1	EA
	- 1" ball valve	14	EA
	- 4" victaulic coupling	120	EA
	- 3" victaulic coupling,	72	EA
	- 2.5" victaulic coupling	80	EA
	- 2.5"x2.5"x4" fire department Siamese connection	1	EA
	- Upright sprinkler head	271	EA
	- 1" site glass w/threaded npmt	5	EA
	- pressure gauge, 5-1/2" dial	5	EA
	- 3"x2", reducing tee	2	EA
	- 4"ø , 45 degree elbow	6	EA
	- 2 1/2"ø, 45 degree elbow	4	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
08	**Miscellaneous**		
	Setting out & sleeving		
	Crane Hire		
	Testing & disinfecting for plumbing		
	Testing, adjusting & balancing for HVAC		
	Tagging & identification		

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
09	**Building control system**		
09.01	Building control system		
	- Package HVAC unit c/w VFD motors	1	EA
	Exhaust fan c/w VFD motor Auto / Manual mode	2	EA
	- Packaged Filter system (HEPA) c/w dampers	1	SET
	- Electric heater	6	EA
	- Fire / smoke damper	14	EA
	- Control damper	8	EA
	- Fan, ceiling	2	EA
	- Heat exchanger / duplex pump package	1	EA
	- Radiator	3	EA
	- HVAC Snow stop heater (c/w 3 heater)	1	EA
	- Refrigerant leak detection system	1	LS
	- FD (open / close monitoring)	36	EA
09.02	Control System as per Spec D_SPEC_TS_NK38-TS-67369-10001_003	1	EA
	- HVAC supervisory control and monitoring PLC panel PL14001 (Appendix A, Fig-1)	1	EA
	- HVAC ventilation supply Air Control PLC panel PL14002 (Appendix A, Fig-2)	1	EA
	- Snow stop heater control panel with sensors PL14012 (Appendix A, Fig-9)	1	EA
	- Heating steam and condensate control panel PL5996 (Appendix A, Fig-10)	1	EA
	- Heating steam and condensate control panel PL5997 (Appendix A, Fig-10)	1	EA
	- Supply fan F24 and F25 VFD panels PL14006A, PL14007A (Appendix A, Fig-2)	2	EA
	- Supply fan F24 disconnect panels PL14006, PL14006B (Appendix A, Fig-2)	2	EA
	- Supply fan F25 disconnect panels PL14007, PL14007B (Appendix A, Fig-2)	2	EA
	- Hot water pumps P5 and P6 VFD panels PL5998, PL5999 (Appendix A, Fig-01)	2	EA
	- Snow stop heater electrical panel PL14010 (Appendix A, Fig-9)	1	EA
	- HVAC ventilation exhaust air control PLC panel PL14003 (Appendix A, Fig-11)	1	EA
	- Exhaust fan F26 and F27 VFD panels PL14008, PL14009 (Appendix A, Fig-11)	1	EA

BUILDING SUPPORT SYSTEMS

Item Ref.	Item Description	Quantity	Unit
09	**Building control system (Cont'd)**		
09.02	Control System as per Spec D_SPEC_TS_NK38-TS-67369-10001_003 (cont'd)	1	EA
	- Exhaust Fan F26 disconnect panels PL14008, PL14008B (Appendix A, Fig-11)	2	EA
	- Exhaust Fan F27 disconnect panels PL14009, PL14009B (Appendix A, Fig-11)	2	EA
	- Refrigerant leak detection control panel PL6000 with sensors (Appendix A, Fig-17)	1	EA
	- Drum handling room Box Up logic control PLC panel PL14004 (Appendix A, Fig-18)	1	EA
	- Drum handling Room box up local monitoring panel PL14014 (appendix A, Fig-18)	1	EA
	- Drum handling room box up remote panel PL14015 (appendix A, Fig-18)	1	EA
	- Building zone and space monitoring PLC panel PL14005 (appendix A, Fig-21)	1	EA
	- HWMB WA instrument room and electrical Room ACU panels PL14016, PL14017 (Appendix A, Fig-23)	2	EA
	- HWMB WA UPS Room ACU Control Panel PL14018 (Appendix A, Fig-22)	1	EA
	- HVAC Fire Damper Panel PL14119 (Appendix A, Fig-24)	1	EA
	- Staircase Heaters Panels PL14122, PL14123 (Appendix A, Fig-01)	2	EA
	- Transmitters, alarm units, indications, printer, alarm annunciators, allow	1	LS

H - Electrical

ONTARIO POWER GENERATION
HEAVY WATER MANAGEMENT BLDG. WEST ANNEX
DARLINGTON, ONTARIO

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
01	**Service & Distribution**		
01.01	13.8KV Distribution		
	- 13.8KV Switchgear Assembly - metal clad indoor unit	1	EA
	- 2.5MVA Transformer 13.8KV to 600/347V, dry type indoor	1	EA
01.02	600V Normal Power Distribution		
	- 3000A 600V Switchgear Assembly c/w 5-1200A draw out breakers	1	EA
	- Relay / Control Panel	4	EA
	- Multifunction Metering	1	EA
	- 600V/AC-125V/DC Rectifier	2	EA
	- 1200A 600V MCC66	1	EA
	- 1200A 600V MCC67	1	EA
01.03	600V Emergency Power Distribution		
	- 1250kVA 600V Standby Generator set	1	EA
	- 600V Generator Distribution Panel	1	EA
	- 1200A Test Load Bank	1	EA
	- 1200A 600V Manual Transfer Switch mechanical interlock	2	EA
	- 1200A 600V MCC68 & MCC69	2	EA
01.04	Transformers and 208V Power Distribution		
	- 45kVA 600V to 347/600V Lighting transformer	3	EA
	- 15kVA 600V to 347/600V Emergency Lighting transformer	2	EA
	- 125A 347/600V Lighting Panel	3	EA
	- 60A 347/600V Emergency Lighting Panel	3	EA
	- 45kVA 600V to 120/208V Lighting transformer	2	EA
	- 30kVA 600V to 120/208V Distribution transformer	4	EA
	- 15kVA 600V to 120/208V receptacle transformer	4	EA
	- 120/208V Lighting Panel, 42 ccts	2	EA
	- 120/208V Lighting Panel, 30 ccts	2	EA
	- 100A 120/208V Receptacle Panel, 18 ccts	4	EA
01.05	600V UPS Power Distribution		
	- 200kVA 600V 3Ph UPS c/w maintenance by-pass & batteries	1	EA
	- 600V UPS Power Distribution Panel	1	EA
	- 60A 600V Manual Transfer Switch	1	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
01	**Service & Distribution (Cont'd)**		
01.05	600V UPS Power Distribution (cont'd)		
	- 15kVA 600V to 120/208V Transformer	4	EA
	- 120/208V UPS Power panel, 30 circuits	4	EA
01.06	Feeders - Normal, Emergency & UPS Power		
	- 15KV Teck 90 cable 3x1/C #250MCM direct buried and in duct bank (duct bank included below)	210	m
	- Teck cable termination kit	8	EA
	- Teck cable connectors c/w fittings	3	EA
	- 3C #500MCM in 103mm C - normal power	382	m
	- 3C #500MCM in below plc. conduit & duct bank - emergency power	576	m
	- Concrete encased duct bank - 15 x 103mm plc. duct	16	m
	- Direct buried conduits SCH 40 - 12 x 103mm plc. duct c/w excavation and backfill	40	m
	- Rigid Galvanized Conduit GRC - 78mm	180	m
	- 2 runs 3C #250MCM in 78mm C	90	m
	- 3 #2/0 + gnd in 78mm C	15	m
	- 3 #4 + gnd in 41mm C	140	m
	- 4 #2 + gnd in 53mm C	25	m
	- 4 #2 + gnd in 41mm C	80	m
	- 3 #2 + gnd in 41mm C	170	m
	- 3 #2 Teck 90 cable	190	m
	- 4 #6 + gnd in 41mm C	6	m
	- 3 #6 + gnd in 41mm C	120	m
	- 3 #8 + gnd in 41mm C	170	m
	- 3 #10 + gnd in 27mm C	56	m
	- #500MCM cable termination	92	EA
	- #250MCM cable termination	26	EA
	- #2/0 cable termination	38	EA
	- #1/0 cable termination	10	EA
	- #2 cable termination	130	EA
	- #2 Teck cable termination	8	EA
	- #3 cable termination	3	EA
	- #4 cable termination	26	EA
	- #6 cable termination	82	EA
	- #8 cable termination	35	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
01	**Service & Distribution (Cont'd)**		
01.06	Feeders - Normal, Emergency & UPS Power (cont'd)		
	- #10 cable termination	26	EA
	- #12 cable termination	10	EA
01.07	Temporary Relocation of SG Fuel Power & Controls		
	- Direct buried conduits - 6 x 53mm plc. duct c/w excavation and backfill	20	m
	- 3 #10 Teck 90 Power cable	400	m
	- 3/C #16 AWG Control cable	1,200	m
	- Teck cable connectors c/w fittings	20	EA
	- 1-5/8", SQ Unistrut channel	36	m
01.08	Temporary Power Distribution		
	- Portable Power cart #1 c/w 60A 600V main fused switch, 70A splitter box, 1-60A, 1-30A fused disconnect switches & WP enclosure	1	EA
	- Portable Power cart #2 c/w 60A 600V main fused switch, 70A splitter box, 1-60A, 1-30A fused disconnect switches, 30kVA 600-120/208V transf. 120/208V panel, 15A/3P motor starter & WP enclosure	1	EA
	- 3 #4 Teck 90 Power cable	140	m
	- 3 #12 Teck 90 Power cable	8	m
	- 3 #10 Teck 90 Power cable	25	m
	- Teck cable #4 connectors c/w fittings	8	EA
	- Teck cable #12 & #10 connectors c/w fittings	18	EA
	- 1-5/8", SQ Unistrut channel	36	m
	- Power connection to Sump Pump 5HP	1	EA
	- #12 cable termination	35	EA
	- #14 cable termination	18	EA
01.09	Grounding		
	- Ground bus bar	102	EA
	- Grounding rod, 3m long, 19mm dia.	36	EA
	- Grounding steel bollard	18	EA
	- Grounding plate, surface mounted	23	EA
	- Grounding plate, flush mounted	32	EA
	- Cadweld connection	480	EA
	- Exposed t-connection	15	EA
	- Exothermic weld connection	8	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
01	**Service & Distribution (Cont'd)**		
01.09	Grounding (cont'd)		
	- Grounding grid connection	80	EA
	- Grounding bolted connection	65	EA
	- Mechanical connection	42	EA
	- Bonding connection to equipment	12	EA
	- Pigtail grounding #2/0 AWG	60	EA
	- Cable riser #4/0 AWG	24	EA
	- Cadweld cross 500MCM to 500MCM	10	EA
	- Cadweld horizontal tee mold 500MCM to #4/0 AWG	8	EA
	- Ground cable #500MCM u/g conductor	210	m
	- Ground cable #4/0	460	m
	- Ground cable #4/0, surface run	185	m
	- Ground cable #4/0, buried conductor	10	m
	- Ground cable #4/0 CU, bonding conductor	20	m
	- Embedded ground cable #4/0	1,600	m
	- Ground cable #2/0, platform	260	m
	- Ground cable #2/0, buried conductor	6	m
	- Ground cable #2/0 above ground conductor	25	m
	- Ground cable #4 above ground conductor	8	m
	- Ground testing	1	Sum
01.10	Generator Grounding		
	- Copper clad grounding rod	4	EA
	- Ground conductor connection to ground terminal	4	EA
	- Ground conductor connection to staircase structural steel	4	EA
	- Cadweld connection	16	EA
	- Ground cable #4/0	42	m
	- Ground cable #500MCM	55	m
	- Ground testing	1	Sum

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
01	**Service & Distribution (Cont'd)**		
01.11	Lightning Protection		
	- Air terminal rod, height 457.2mm	33	EA
	- Bolted connection	4	EA
	- Bolted tee connection	24	EA
	- Down conductor to grounding electrode	6	EA
	- Grounding conductor 4/0 AWG	400	m
	- Lightning protection testing	1	Sum
01.12	Short Circuit / Coordination Study	1	Sum

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
02	**Lighting, Devices etc.**		
02.01	Light fixtures - supply, install & wiring		
	- Type FHE 52" Suspended mount LED luminaire, normal power	182	EA
	- Type FHE 52" Suspended mount LED luminaire, UPS power	96	EA
	- Type IBL 45" Suspended mount LED luminaire, normal power	52	EA
	- Type IBL 45" Suspended mount LED luminaire, UPS power	33	EA
	- Exterior flood light c/w 250W HPS	1	EA
	- Exterior wall mounted light c/w 100W HPS	7	EA
	- Junction box for power supply to light fixtures	387	EA
	- Light fixture wiring - Teck 90 cable	2,200	m
	- Teck 90 cable connector	810	EA
02.02	Exit and Emergency light		
	- Exit light, single face	51	EA
	- Exit light, double face	2	EA
	- Emergency battery unit c/w double remote heads	83	EA
	- 15A 120V duplex receptacle for emergency battery	83	EA
	- Exit light wiring	420	m
02.03	Power Outlets and connections		
	- 15A 120V duplex receptacle	18	EA
	- 15A 120V duplex receptacle, GFI, WP	47	EA
	- 20A 120V Single T-lock receptacle, GFI	11	EA
	- 20A 120V Single T-lock receptacle, GFI, WP	12	EA
	- Power outlets wiring - Teck 90 cable	1,800	m
	- Teck 90 cable connector	210	EA
	- 60A 600V Welding receptacles	6	EA
	- Junction box for 600V Welding receptacles	2	EA
	- Conduit & cabling for 600V welding receptacle junction box from MCC, 3 #2/0 in 53mm C	56	m
	- #2/0 cable termination	12	EA
	- #3 cable termination	4	EA
	- Conduit & cabling for 600V welding receptacle, 3 #4 + gnd in 53 mm C	150	m
	- #4 cable termination	40	EA
	- #8 cable termination	13	EA
	- 60A 600V Inlet receptacle c/w wiring	1	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
02	**Lighting, Devices etc. (Cont'd)**		
02.03	Power Outlets and connections (cont'd)		
	- Power connection to motor operated door c/w sensors & controls	4	EA
	- Power connection to 1HP Hoist/Trolley c/w 600V disconnect switch	4	EA
	- Hoist power connection conduit & cabling, 3 #12 + gnd in 27mm C	150	m
	- #12 cable termination	35	EA
	- #14 cable termination	18	EA
	- Power connection to weight scale, water tight	4	No
	- Weight scale power connection 2 #14 Tech 90 cable	210	m
	- Teck cable connector for weight scale	8	No
	- Pull box for power supply 8"x8"	44	EA
	- Pull box for power supply 12"x12"	5	EA
02.04	Mechanical motor connections		
	- Power connection to Transfer Pump up to 15HP	3	EA
	- Feeder to Transfer Pump up to 15HP - 3 #8 in 41mm C	120	m
	- Feeder to Transfer Pump up to 15HP - 3 #10 in 27mm C	50	m
	- Power connection to Transfer Pump up to 7.5HP	2	EA
	- Feeder to Transfer Pump up to 7.5HP - 3 #10 in 27mm C	120	m
	- Power connection to active/inactivate drainage pump 10HP	4	EA
	- Feeder to active/inactivate drainage pump 10HP - 3 #10 in 27mm C	170	m
	- Power connection to heating steam condensate pump 7.5HP	2	EA
	- Feeder to heating steam condensate pump 7.5HP - 3 #10 in 27mm C	48	m
	- Power connection to VRS dryer heater and pump 75kVA	2	EA
	- Feeder to VRS dryer heater and pump 75kVA - 3 #3/0 in 63mm C	112	m
	- Power connection to drum washing station heater 75kw	1	EA
	- Feeder to drum washing station heater 75kw - 3 #3/0 in 63mm C	30	m
	- Power connection to vent. supply fan 50HP	2	EA
	- Feeder to vent. supply fan 50HP - 3 #2/0 in 53mm C	90	m
	- Power connection to contamination control dryer	1	EA
	- Feeder to contamination control dryer - 3 #2/0 in 53mm C	48	m
	- Power connection to inst. air compressor 55kW	2	EA
	- Feeder to inst. air compressor 55kW - 3 #250MCM in 78mm C	140	m
	- Power connection to vent. exhaust fan 125HP	2	EA
	- Feeder to vent. exhaust fan 125HP - 3 #350MCM in 78mm C	112	m
	- Power connection to chiller unit	2	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
02	**Lighting, Devices etc. (Cont'd)**		
02.04	Mechanical motor connections (cont'd)		
	- Feeder to chiller unit - 2 runs 3 #500MCM in 78mm C	150	m
	- Power connection to sump pump 5HP	1	EA
	- Feeder to sump pump 5HP - 3 #12 in 27mm C	55	m
	- Power connection to vapour recirculation fan 3.7kW	1	EA
	- Feeder to vapour recirculation fan 3.7kW - 3 #12 in 27mm C	58	m
	- Power connection to snow stop heater 67.5kVA	1	EA
	- Feeder to snow stop heater 67.5kVA - 3 #3/0 in 63mm C	18	m
	- Power connection to moderator supply pump 30HP	2	EA
	- Feeder to moderator supply pump 30HP - 3 #4 in 41mm C	165	m
	- Power connection to clean up transfer pump 5HP	2	EA
	- Feeder to clean up transfer pump 5HP - 3 #12 in 27mm C	94	m
	- Power connection to clean up transfer pump 10HP	1	EA
	- Feeder to clean up transfer pump 10HP - 3 #10 in 27mm C	65	m
	- Power connection to PHT supply pump 75HP	2	EA
	- Feeder to PHT supply pump 75HP - 3 #3/0 in 63mm C	160	m
	- Power connection to unit heaters control panel 6kW	2	EA
	- Feeder to unit heaters control panel 6kW - 3 #12 in 27mm C	100	m
	- Power connection to EW+ES/inline water heater up to 20kW	4	EA
	- Feeder to EW+ES/inline water heater 20kW - 3 #8 in 41mm C	210	m
	- #500MCM cable termination	26	EA
	- #350MCM cable termination	14	EA
	- #250MCM cable termination	14	EA
	- #3/0 cable termination	40	EA
	- #2/0 cable termination	29	EA
	- #1/0 cable termination	10	EA
	- #2 cable termination	14	EA
	- #3 cable termination	8	EA
	- #4 cable termination	14	EA
	- #8 cable termination	44	EA
	- #10 cable termination	80	EA
	- #12 cable termination	62	EA
	- #14 cable termination	14	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
02	**Lighting, Devices etc. (Cont'd)**		
02.05	Heat Tracing		
	- Heat tracing self regulating cable 8 W/FT	60	m
	- Heat tracing self regulating cable 5 W/FT	20	m
	- Heat tracing thermostat	2	EA
	- Heat tracing light indicator	2	EA
	- Heat trace junction box c/w grounding terminal	2	EA
	- Heat tracing power connection & 120V GFI receptacle	2	EA
	- Heat tracing power cable 2/C #12 Teck 90 cable	40	m
	- Heat tracing power cable 3/C #12 Teck 90 cable	50	m
	- Heat tracing grounding cable #4 bare AWG	20	m
	- #12 Teck cable termination	12	EA
	- Grounding cable connection	6	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
03	**Systems & Ancillaries**		
03.01	Fire Detection System		
	- Main Fire Alarm Control Panel FACP	1	EA
	- Remote Zone Annunciator Panel	1	EA
	- Manual pull station	18	EA
	- Smoke detector	33	EA
	- Beam smoke detector	6	EA
	- Duct smoke detector	1	EA
	- Heat detector	50	EA
	- Remote indicator	3	EA
	- Fire alarm module	3	EA
	- Isolation module	29	EA
	- Tamper switch	4	EA
	- Fire alarm connection to electric powered door	4	EA
	- Fire alarm devices wiring - 2/C #14 AWG, 2 hour fire rated	2,100	m
	- Fire Alarm cable 2/C #16 AWG, 2 hour fire rated	300	m
	- Fire Alarm cable 3/C #12 AWG, stranded	150	m
	- Fire Alarm cable termination	340	EA
	- Control cable 1 pair #16 AWG	600	m
	- Control cable 2 pair #14 AWG	150	m
	- 1" EMT Conduit	1,800	m
	- 1" EMT Conduit connector	125	EA
	- Teck connector 1/2" size	75	EA
	- 103mm rigid PVC	20	m
	- Fire alarm devices testing	151	EA
03.02	Telephone System		
	- Telephone outlet c/w conduit	18	EA
	- Telephone/Lan outlet c/w conduit	2	EA
	- Telephone cabling Cat.6	2,750	m
	- Communication Panduit	74	EA
	- Telecommunication rack c/w power bar, 750VA UPS, Surge protection SPD and grounding	1	EA
	- LAN switch	1	EA
	- 24 Port Patch Panel	3	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
03	**Systems & Ancillaries (Cont'd)**		
03.02	Telephone System (cont'd)		
	- 25 Port Patch BIX Panel	2	EA
	- Horizontal cable manager	5	EA
	- Trunk cable - 50 pair #16 AWG	1,120	m
	- 3" Conduit riser	20	m
03.03	Cable Tray		
	- Cable tray 300mm wide c/w fittings	20	m
	- Cable tray 450mm wide c/w fittings	18	m
	- Cable tray 530mm wide c/w fittings	440	m
	- Cable tray wall penetration	16	EA
03.04	Public Address System		
	- PA Speaker wall mounted uni-directional	31	EA
	- PA Speaker wall mounted bi-directional	2	EA
	- PA Speaker wall mounted uni-directional, exterior	1	EA
	- Junction box panel 12"x10"x5" NEMA 4 for power supply	4	EA
	- Pull box for power supply to speakers	18	EA
	- PA Speaker wiring - 2pr #14, 2 hours fire rated	1,470	m
	- PA cable termination	75	EA
	- 1-5/8" Unistrut channel	220	m
	- Public Address rack c/w amplifier, voice activated relay, terminal strip, failure detector/relay	1	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls**		
04.01	Normal Power Supply Control Cabling		
	- Control cable 2/C #1 + gnd Teck 90	20	m
	- Control cable 2/C #8 + gnd Teck 90	150	m
	- Control cable 2/C #10 + gnd Teck 90	1,500	m
	- Control cable 6/C #12 + gnd Teck 90	350	m
	- Control cable 2/C #12 + gnd Teck 90	250	m
	- Control cable 30/C #14 + gnd Teck 90	50	m
	- Control cable 20/C #14 + gnd Teck 90	200	m
	- Control cable 4/C #14 + gnd Teck 90	50	m
	- Control cable 2/C #14 + gnd Teck 90	150	m
	- Control cable 2 pair #16 AWG	150	m
	- Teck cable connector watertight 1" size	10	EA
	- Teck cable connector watertight 3/4" size	30	EA
	- Teck cable connector watertight 1/2" size	86	EA
04.02	Generator Power Control Cabling		
	- Control cable 4/C #16 AWG	90	m
	- Control cable 25/C #14 AWG	180	m
	- Control cable 2 pair #14 AWG	90	m
	- Control cable 2 pair #16 AWG	190	m
	- Control cable 2 pair #24 AWG	180	m
	- Control cable 1 pair #16 AWG	190	m
	- 1-5/8", SQ Unistrut channel c/w fittings	3	m
04.03	UPS Power Control Cabling		
	- Control cable 1 pair #16 AWG	78	m
	- Control cable 2/C #6 AWG + gnd	120	m
	- Control cable 2/C #14 AWG + gnd	60	m
	- 1-5/8", SQ Unistrut channel c/w fittings	12	m
	- Rigid galvanized steel Conduit 1/2"	6	m
04.04	Shower and Eyewash Alarm Power and Control Cabling		
	- Emergency shower & eyewash Alarm Panel c/w 16"x12"x10" NEMA 4 enclosure and grounding	1	No
	- Flow Switch 120V for emergency shower & eyewash	4	No
	- Power connection to emergency shower & eyewash, water tight	4	No

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.04	Shower and Eyewash Alarm Power and Control Cabling (cont'd)		
	- Cable, electrical, 4 #16AWG for emergency shower & eyewash	310	m
	- Cable, Teck 90, 2 #12 AWG for emergency shower & eyewash	80	m
	- Control cable 1 pair #16 AWG	20	m
	- Ground wire #4 bare Cu	10	m
	- Rigid galvanized steel Conduit 1"	310	m
	- Cable connector for emergency shower & eyewash	8	No
	- Flow switch 120V for emergency shower & eyewash	4	No
	- Head-end equipment, programming, software, commissioning	1	Sum
04.05	Personnel Surface Contamination Monitoring		
	- Hand and foot monitor	1	EA
	- Whole body monitor	1	EA
	- Proportional counter	1	EA
	- 20A 125V 2Pole 3 Wire Receptacle T-lock c/w single gang box & cover	3	EA
	- Monitoring panel PC-6 c/w 120V UPS power supply	1	EA
	- Teck cable 2/C #12	250	m
	- Teck cable connectors	6	EA
	- Head-end equipment, programming, software, commissioning	1	Sum
04.06	Breathing Air System BAS Controls		
	- Breathing air station	21	EA
	- Control Panel - supplied by vendor	2	EA
	- 16'x12'x6' Junction box c/w terminal block and NEMA 4 enclosure	2	EA
	- Control cable 25pr #22 AWG	180	m
	- Control cable 2pr #16 AWG	900	m
	- Power cable 3 #12 AWG	70	m
	- 1" Rigid conduit c/w fittings	550	m
	- 1-1/4" Rigid conduit c/w fittings	92	m
	- 1-5/8", SQ Unistrut channel	75	m
	- Head-end equipment, programming, software, commissioning	1	Sum
04.07	Relocation of Gas Services Control & Cabling		
	- Control cable 2/C #16 AWG + gnd	190	m
	- Direct buried conduits - 2 x 53mm plc. duct c/w excavation and backfill	20	m

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.07	Relocation of Gas Services Control & Cabling (cont'd)		
	- Direct buried conduits - 1 x 53mm plc. duct c/w excavation and backfill	28	m
	- 8"x8"x4" Pull box, NEMA 3-3R enclosure	2	EA
	- 1-5/8", SQ Unistrut channel c/w fittings	12	m
	- Ground cable #4 bare Cu c/w lugs	15	m
	- Ground terminal connector	3	EA
	- 2" Rigid conduit c/w fittings	3	m
	- 16"x12"8" Pull box, NEMA 4 enclosure	1	EA
	- Control cable 1pr #16 AWG	100	m
	- Connector / splice / sleeve	12	EA
04.08	Leak Detection System		
	- Instrument rack assembly c/w 2 moisture alarm units MIA, indicator lamp, wiring & grounding	1	EA
	- 16x16x8 Junction c/w NEMA 4 enclosure, terminal blocks, wiring & grounding	2	EA
	- 12x10x5 Junction c/w NEMA 4 enclosure, terminal blocks, wiring & grounding	3	
	- Moisture / Leakage detection point c/w tubing & wiring	34	EA
	- Power cable 2/C #14 AWG	700	m
	- Control cable 1 pair #16 AWG	1,000	m
	- Control cable 7 pair #16 AWG	700	m
	- Control cable 10 pair #16 AWG	180	m
	- Control cable 20 pair #16 AWG	150	m
	- Ground cable #4 bare Cu c/w lugs	70	m
	- 3/4" Rigid galvanized conduit c/w fittings	600	m
	- 3/4" Flexible conduit c/w fittings	60	m
	- 1-1/2" Rigid galvanized conduit c/w fittings	110	m
	- 2" Rigid galvanized conduit c/w fittings	60	m
	- 1-5/8", SQ Unistrut channel c/w fittings	50	m
	- Head-end equipment, programming, software, commissioning	1	Sum
04.09	Mod./Transfer from HWMB to West Annex Storage Tanks Control Cabling		
	- 3/8" Stainless steel tubing c/w fittings	14	m
	- Pressure gauge	10	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.09	Mod./Transfer from HWMB to West Annex Storage Tanks Control Cabling (cont'd)		
	- Stainless steel swagelok fitting 3/8" tube	2	EA
	- Stainless steel plug & tee 3/8"	16	EA
	- Stainless steel convulted hose	16	EA
	- 1-5/8", Unistrut channel c/w fittings	6	m
	- Control Panel c/w 6 leak alarm control units, strobe/horn, terminal blocks, wiring, grounding & NEMA 4 encl.	1	EA
	- Post base and junction box for leak system	6	EA
	- Power cable 2/C #14 Teck	20	m
	- Control cable 2/C #16 AWG	500	m
	- Leak sensor	6	EA
	- Portable FAATM	2	EA
	- Portable FAAGM	1	EA
	- Head-end equipment, programming, software, commissioning	1	Sum
04.10	FAATM & FAAGM System Control & Cabling		
	- Gamma monitor	3	EA
	- Alarm horn	3	EA
	- Alarm indicator	3	EA
	- Control cable 7/C #14 AWG	500	m
	- Control cable 2 pair #16 AWG	2,000	m
	- Control cable 4 pair #16 AWG	100	m
	- Control cable 2/C #14 AWG, armoured	2,500	m
	- 1" Flex conduit c/w fittings	30	m
	- 3/4" Flex conduit c/w fittings	900	m
	- Connector for Flex conduit	25	EA
	- 1" Rigid galvanized conduit c/w fittings	150	m
	- 1-5/8", Unistrut channel c/w fittings	60	m
	- Ground cable #4 bare Cu c/w lugs	100	m
	- Power cable 1/C #14 AWG	100	m
	- FAAGM Control Panel c/w 3 relay control units, rail mounting, terminal blocks, wiring, grounding & NEMA 4 encl.	1	EA
	- FAATM monitor	13	EA
	- Alarm horn	10	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.10	FAATM & FAAGM System Control & Cabling (cont'd)		
	- Alarm indicator	7	EA
	- FAATM remote annunciator	1	EA
	- FAATM Control Panel c/w rail mounting, terminal blocks, wiring, grounding & NEMA 4 encl.	1	EA
	- Control cable 2/C #14 AWG, armoured	2,550	m
	- Control cable 7/C #14 AWG	1,000	m
	- Control cable 30/C #14 AWG	250	m
	- Control cable 2 pair #16 AWG	2,000	m
	- Control cable 4 pair #16 AWG	100	m
	- Control cable 7 pair #16 AWG	250	m
	- Control cable 20 pair #16 AWG	350	m
	- Cable connector	107	EA
	- 1" Rigid galvanized conduit c/w fittings	380	m
	- 1" Flex conduit c/w fittings	60	m
	- 1-1/4" Rigid galvanized conduit c/w fittings	60	m
	- 1-1/4" Flex conduit c/w fittings	15	m
	- 1-5/8", Unistrut channel c/w fittings	150	m
	- Ground cable #4 bare Cu c/w lugs	300	m
	- Ground connection	5	EA
	- Teck Cable connector	30	EA
	- Power cable 1/C #8 AWG	1,000	m
	- Main Control Panel c/w 39 relay control units, rail mounting, terminal blocks, wiring, grounding & NEMA 4 encl.	1	EA
	- Power cable 1/C #14 AWG	150	m
	- Head-end equipment, programming, software, commissioning	1	Sum
04.11	Drainage and Liquid Recovery Pump Controls		
	- Pump control assembly c/w hand switch, control relays, indicating lamps, terminal blocks, wiring & grounding	1	EA
	- Control cable 10/C #14 Teck 90	10	m
	- Control cable 14/C #16 AWG	100	m
	- Control cable 2pr #16 AWG	100	m
	- Teck cable connector	2	EA
	- Float level switch	1	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.11	Drainage and Liquid Recovery Pump Controls (cont'd)		
	- Pressure indicator	3	EA
	- 1" Rigid conduit c/w fittings	30	m
	- 1-5/8", SQ Unistrut channel c/w fittings	6	m
	- 3/8" Seamless Stainless steel tubing c/w fittings	24	m
	- Stainless steel fitting 3/8" tube	8	EA
	- Transmitter / shut-off valve	4	EA
	- Inactive/Active Drainage control assembly c/w hand switch, control relays, indicating lamps, terminal blocks, wiring & grounding	2	EA
	- 36"x24"x10" NEMA 4 Steel enclosure	2	EA
	- Pressure / level indicator	4	EA
	- Control cable 2pr #16 AWG	80	m
	- Control cable 1pr #16 AWG	20	m
	- Control cable 2/C #12 + gnd Teck 90	80	m
	- Control cable 14/C #16 AWG	160	m
	- Teck cable connector	2	EA
	- 1" Rigid conduit c/w fittings	60	m
	- Ground cable #4 bare Cu c/w lugs	15	m
	- Head-end equipment, programming, software, commissioning	1	Sum
04.12	Chilled Water System Control and Cabling		
	- Power cable 2/C #10 AWG	240	m
	- Power cable 3/C #14 AWG	50	m
	- Control cable 1pr #16 AWG	340	m
	- 3/4" Rigid galvanized conduit c/w fittings	460	m
	- 1" Rigid galvanized conduit c/w fittings	400	m
	- 1-1/2" Rigid galvanized conduit c/w fittings	180	m
	- Ground cable #4 bare Cu c/w lugs	25	m
	- 1-5/8", SQ Unistrut channel c/w fittings	30	m
	- 3/4" Flexible galvanized conduit, liquid tight c/w fittings	180	m
	- 1" Flexible galvanized conduit, liquid tight c/w fittings	150	m
	- Chiller Control System Panel c/w enclosure - by vendor	8	EA
	- Transmitter / level pressure control - by vendor	2	EA
	- Refrigerant leak detector - by vendor	1	EA
	- Pressure/flow switch control - supplied by vendor, install only	2	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.12	Chilled Water System Control and Cabling (cont'd)		
	- Programmable controller for chilled water - supplied by vendor, install only	4	EA
	- Soft starter controller - supplied by vendor, install only	2	EA
	- Evaporator controller - supplied by vendor, install only	2	EA
	- Ethernet switch - supplied by vendor, install only	4	EA
	- Detector leak for condenser & chilled water - supplied by vendor, install only	2	EA
	- Power cable 1/C #14 AWG - supplied by vendor, install only	1,110	m
	- Power cable 1/C #1/0 AWG - supplied by vendor, install only	224	m
	- Power cable 1/C #6 AWG - supplied by vendor, install only	150	m
	- Power cable 1/C #4 AWG - supplied by vendor, install only	61	m
	- Power cable 1/C #250MCM - supplied by vendor, install only	184	m
	- Power cable 1/C #8 AWG - supplied by vendor, install only	24	m
	- Ethernet cable 4 pr Cat.5- supplied by vendor, install only	4	EA
	- 120" Unistrut telestrut c/w fittings	2	EA
	- 144" Unistrut telestrut c/w fittings	2	EA
	- 1-5/8", SQ Unistrut channel c/w fittings	2	m
	- 102x76x6.4 carbon steel c/w post base	2	m
	- Rooftop concrete support 152mm high x 914mm long	11	EA
	- Head-end equipment, programming, software, commissioning	1	Sum
04.13	HVAC Control and Cabling		
	- Control cable 2/C #10 + gnd Teck 90	165	m
	- Control cable Cat.6	100	m
	- 3/4" Rigid conduit c/w fittings	25	m
	- Ground cable #4 bare Cu	40	m
	- Teck cable connector	4	EA
	- Cat.6 cable connector	6	EA
	- 1-5/8", SQ Unistrut channel c/w fittings	25	m
	- HVAC Control Panel - by vendor	2	EA
	- Pump Control Panel / VFD - by vendor	2	EA
	- Flow switch - by vendor	2	EA
	- Transmitter / pressure control - by vendor	4	EA
	- Transmitter / temperature control - by vendor	6	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.14	Vapour Recovery System Control and Cabling		
	- Power cable 2/C #6 AWG + gnd	90	m
	- Control cable 4/C #16 AWG	115	m
	- Control cable 1/C #16 AWG	30	m
	- 1" Rigid galvanized conduit c/w fittings	75	m
	- 3/4" Rigid galvanized conduit c/w fittings	60	m
	- Ground cable #4 bare Cu c/w lugs	8	m
	- Vapour Recovery control assembly c/w control relays, terminal blocks, wiring & grounding 3 modules - by vendor	1	EA
	- Marshalling box for vapour recovery - by vendor	2	EA
	- Differential pressure gauge	19	EA
	- Float level switch	6	EA
	- Level gauge, sight glass	3	EA
	- Transmitter pressure / temperature	8	EA
	- 3/16" dia. Thermocouple	5	EA
	- Temperature / resistance detector	16	EA
	- Thermometer	7	EA
	- Gas meter flow 1" conduit connection	2	EA
	- Drum Handling Panel control assembly c/w control relays, terminal blocks, wiring & grounding - by vendor	1	EA
	- Control cable 2/C #16 AWG	150	m
	- Control cable 3/C #14 AWG	160	m
	- Control cable 7/C #14 AWG	55	m
	- 3/4" Rigid galvanized conduit c/w fittings	72	m
	- Ground cable #4 bare Cu c/w lugs	4	m
	- 1-5/8", SQ Unistrut channel c/w fittings	32	m
	- Float level switch	2	EA
	- Temperature sensor indicator	6	EA
	- Pressure sensor indicator	4	EA
	- Transmitter pressure / temperature	2	EA
	- Differential pressure gauge	3	EA
	- Fan Control Panel assembly c/w hand switches, control relays, indicating lamps, alarms, terminal blocks, wiring & grounding	1	EA
	- Head-end equipment, programming, software, commissioning	1	Sum

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.15	Air Compressor System Control & Cabling		
	- Power cable 2/C #6 AWG + gnd	220	m
	- Control cable 2 pair #16 AWG	275	m
	- ATLAS Digital control panel c/w 6 control relays, terminal blocks, wiring & grounding - by vendor	1	EA
	- Transmitter pressure	1	EA
	- 1-5/8", Framing channel c/w fittings	150	m
	- 1-1/4" Rigid galvanized conduit c/w fittings	90	m
	- 1" Rigid galvanized conduit c/w fittings	370	m
	- 3/4" Rigid galvanized conduit c/w fittings	45	m
	- Ground cable #4 bare Cu c/w lugs	25	m
	- Ground connection	25	EA
	- Control cable 1 pair #22 AWG - by vendor	140	m
	- 3/4" Flex conduit c/w fittings	30	m
	- Power cable 2/C #12 AWG + gnd	60	m
	- Service / normal can connector - supplied by vendor, install	3	EA
	- Pressure valve - supplied by vendor, install only	2	EA
	- Control cable 7/C #14 AWG	100	m
	- Control cable 2/C #14 AWG	60	m
	- Relay Control Panel c/w 2 relays, rail mounting, terminal blocks, wiring, grounding & NEMA 4/4X encl.	1	EA
	- Head-end equipment, programming, software, commissioning	1	Sum
04.16	Fixed Gaseous Monitoring and Exhaust Stack Control		
	- Power cable 3/C #8 AWG	100	m
	- Control cable 3/C #10 + gnd Teck 90	200	m
	- Control cable 3/C #14 + gnd Teck 90	80	m
	- Control cable 7/C #16 AWG	250	m
	- Control cable 4/C #16 AWG	100	m
	- Control cable 2/C #16 AWG	125	m
	- Control cable 1/C #16 AWG	152	m
	- Cable tray, 24" width c/w fittings	60	m
	- 1" Stainless steel tubing c/w fittings	125	m
	- 1/2" Stainless steel tubing c/w fittings	4	m
	- 1/4" Stainless steel tubing c/w fittings	65	m

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.16	Fixed Gaseous Monitoring and Exhaust Stack Control (cont'd)		
	- 3" Galvanised steel liquid tight conduit c/w fittings	16	m
	- 1-1/4" Galvanised steel liquid tight conduit c/w fittings	6	m
	- 3/4" Galvanised steel liquid tight conduit c/w fittings	30	m
	- Ground cable #4 bare Cu c/w lugs	155	m
	- Teck cable connector	20	EA
	- Teck cable connector, watertight	60	EA
	- 1-5/8", SQ Unistrut channel c/w fittings	2	m
	- Plug c/w NEMA 4X enclosure	1	EA
	- 15A 125V heavy duty receptacle c/w WP cover	1	EA
	- 15A 125V toggle switch c/w WP cover	1	EA
	- Stainless steel swagelok fitting 1" tube	25	EA
	- Temperature controller - by vendor	1	EA
	- Heat tracing cable controller - by vendor	2	EA
	- Heat tracing cable c/w insulation	110	m
	- Temperature detector - by vendor	2	EA
	- Transmitter / mass flow control - by vendor	3	EA
	- Sampler gas & probe for stack monitoring - by vendor	1	EA
	- NO/NC detector & alarm - by vendor	1	EA
	- CO detector & alarm - by vendor	1	EA
	- Stack monitoring relay panel & transmitter - by vendor	1	EA
	- Leak detection & moisture transmitter - by vendor	1	EA
	- Head-end equipment, programming, software, commissioning	1	Sum
04.17	Supply and TRF Feed & Product System Control & Cabling		
	- Intermediate Control Panel assembly PL10116 c/w hand switches, control relays, indicating lamps, level indicator, terminal blocks, wiring & grounding - 4 (four) modules	1	EA
	- Annunciator Alarm Panel	1	EA
	- Transmitter / isolating valve	54	EA
	- Shut-off valve	44	EA
	- Metal plate 48"x96"x1/4" and mounting support	9	EA
	- Level Transmitter	19	EA
	- Pressure Transmitter	1	EA
	- Pressure indicator	13	EA
	- 3/4" Stainless steel tubing c/w fittings	675	m

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.17	Supply and TRF Feed & Product System Control & Cabling (cont'd)		
	- Mounting pipe c/w fittings for floor mounted panels	56	m
	- 1-5/8", SQ Unistrut channel c/w fittings	304	m
	- Unistrut / telestrut carbon steel c/w fittings	5	m
	- Ground cable #4 bare Cu c/w lugs	110	m
	- Control cable 100/C #14 AWG	400	m
	- Control cable 30/C #14 AWG	100	m
	- Control cable 25/C #14 AWG	720	m
	- Control cable 7/C #14 AWG	1,110	m
	- Control cable 50pr #16 AWG	500	m
	- Control cable 25pr #16 AWG	20	m
	- Control cable 10pr #16 AWG	100	m
	- Control cable 2pr #16 AWG	100	m
	- Control cable 1pr #16 AWG	1,000	m
	- 1-1/2" Rigid galvanized conduit c/w fittings	30	m
	- 3" Rigid galvanized conduit c/w fittings	60	m
	- 1" Rigid galvanized conduit c/w fittings	630	m
	- 1/2" Rigid galvanized conduit c/w fittings	500	m
	- 6"x6"x4" Pull box	1	EA
	- 36"x24"x6" Junction box c/w mounting rail, terminal blocks, marking, grounding & NEMA 4/4X encl	2	EA
	- 1/2" Flex conduit c/w fittings for LT/PT	30	m
	- TRF Product Minor Control Panel assembly PL10128 c/w hand switches, indicating lamps, level indicator, terminal blocks, wiring, grounding and NEMA 4 enclosure	1	EA
	- Power cable 1/C #18 AWG	35	m
	- Head-end equipment, programming, software, commissioning	1	Sum
04.18	Cleanup & Downgraded Tank System Control and Cabling		
	- Intermediate Control Panel assembly PL10117 c/w hand switches, control relays, indicating lamps, alarms, terminal blocks, wiring & grounding - 4 (four) modules	1	EA
	- 20A 125V TL heavy duty receptacle c/w cover	1	EA
	- Annunciator Alarm Panel	1	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.18	Cleanup & Downgraded Tank System Control and Cabling (cont'd)		
	- Instrument Control Panel assembly for cleanup tank c/w level transmitter, isolation / control valves	3	EA
	- 3/4" Stainless steel tubing c/w fittings	40	m
	- Transmitter / pressure valve	6	EA
	- Shut-off valve	6	EA
	- Level Transmitter	3	EA
	- Control cable 25/C #14 AWG	500	m
	- Control cable 7/C #14 AWG	500	m
	- Control cable 1pr #16 AWG	500	m
	- 1" Rigid galvanized conduit c/w fittings	240	m
	- 1/2" Rigid galvanized conduit c/w fittings	70	m
	- 1-1/2" Rigid galvanized conduit c/w fittings	12	m
	- 1/2" Flex conduit c/w fittings	30	m
	- Instrumentation cable 10pr #16 armoured	15	m
	- Instrumentation cable 50pr #16 AWG	250	m
	- Control cable 100/C #14 AWG	200	m
	- Junction box 30"x24"x6" NEMA 4 c/w mounting rail, terminal block, marking & grounding	1	EA
	- Ground cable #4 bare Cu c/w lugs	75	m
	- Control cable 1/C #16 AWG	30	m
	- 3" Conduit c/w fittings	250	m
	- Terminal blocks and marking inside PL1815	7	EA
04.19	Clean-up System		
	- 3/8" Stainless steel tubing c/w fittings	350	m
	- Transmitter / pressure valve	2	EA
	- Pressure indicator	2	EA
	- Metal plate 48"x96"x1/4" and mounting support	3	EA
	- Transmitter / isolating valve	15	EA
	- Shut-off valve	16	EA
	- Level Transmitter	3	EA
	- Stainless steel Plug for drain & vent valve	6	EA
	- Level / Pressure Transmitter	2	EA

ELECTRICAL

Item Ref.	Item Description	Quantity	Unit
04	**Instrumentation and Controls (Cont'd)**		
04.20	Downgraded Transfer System		
	- Control cable 7 strand copper #16 AWG	100	m
	- Control cable 2pr #16 AWG	100	m
	- Control cable 7/C #14 AWG	250	m
	- 1" Rigid galvanized conduit c/w fittings	200	m
	- 6"x6"x4" Pull box c/w enclosure	2	EA
	- 3/8" Stainless steel tubing c/w fittings	140	m
	- Transmitter / isolating valve	4	EA
	- Pressure indicator	4	EA
	- Metal plate 48"x96"x1/4" and mounting support	4	EA
	- Head-end equipment, programming, software, commissioning	1	Sum