

LAKE LOUISE TOWNSITE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK

AE Project No. 20173084-00

ISSUED FOR TENDER
APRIL 09, 2018

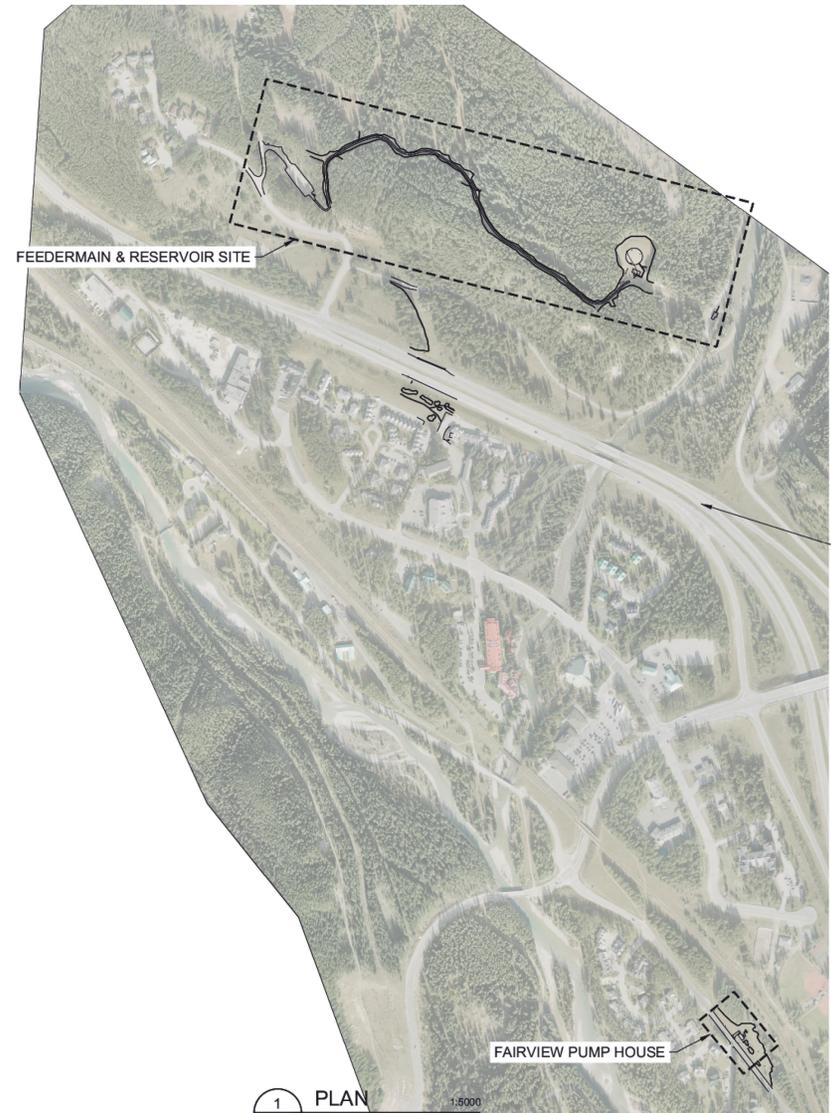
SHEET LIST TABLE					
SHEET	DRAWING NAME	REVISION	DRAWING TITLE		
GENERAL					
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CIVIL					
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3	3084-01-C-101	0	EXISTING GROUND SITE PLAN		
4	3084-01-C-102	0	RESERVOIR SITE PLAN/YARD PIPING		
5	3084-01-C-103	0	RESERVOIR SITE GRADING PLAN		
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19	3084-01-E-502	0	LEVEL TRANSMITTER PANEL	DETAILS	
20	3084-01-E-503	0	INSTALLATION DETAILS	PANEL ARRANGEMENT AND	UNDERGROUND CABLE / CONDUIT
21	3084-01-E-504	0	INSTALLATION DETAILS	SOLAR PANEL AND	LEVEL TRANSDUCER



Associated
Engineering



ASSOCIATED ENGINEERING QUALITY MANAGEMENT	QUALITY MANAGER ¹ DATE	PROJECT CAD LEAD ¹ DATE
	<i>A. Bawa</i> 2018-04-09	

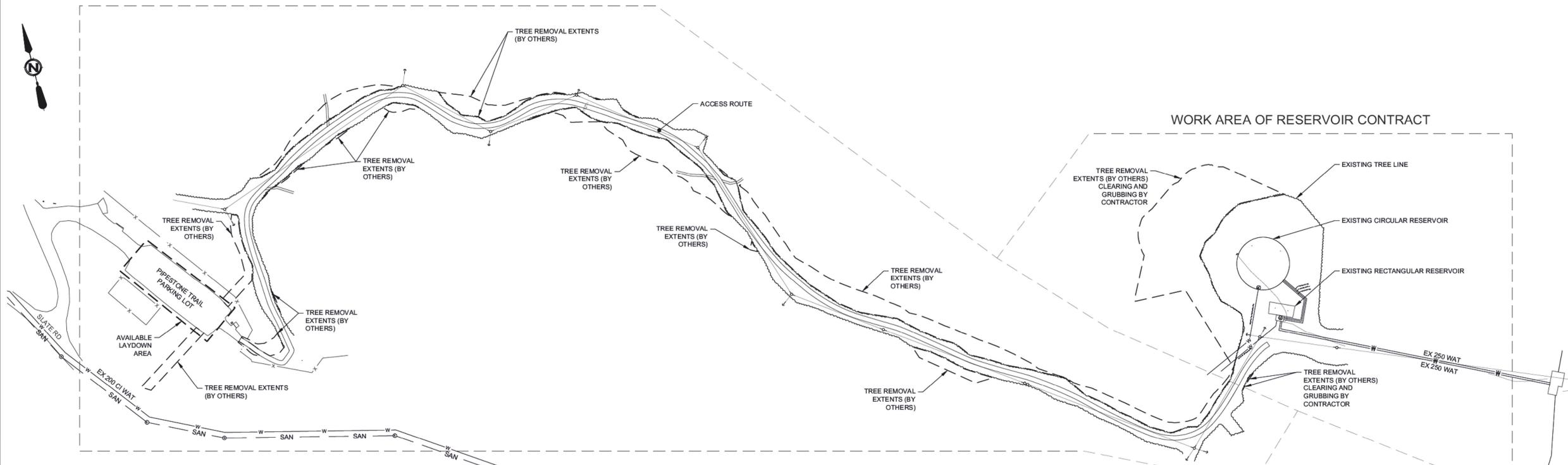


TRANSCANADA HIGHWAY

FAIRVIEW PUMP HOUSE

1 PLAN
LOCATION PLAN
1:5000

WORK AREA OF FEEDERMAIN (NOT IN CONTRACT)



WORK AREA OF RESERVOIR CONTRACT

2 PLAN
FEEDERMAIN & RESERVOIR SITE
1:1000

0	2018ARR03	ISSUED FOR TENDER	B.P.	J.C.
No.	Date/Date	Description/Description	Drawn by/Dessiné par	Approved/Approuvé

Revision / Révision	
A	A
B	B
C	C

Consultant's Name / Nom de l'expert-consultant: **Associated Engineering**

Eng. Status / Statut de l'ingénieur: **Professional Engineer**

APEGA Permit to Practice P 3979

Client/Client: Parks Canada Agency	L'Agence Parcs Canada
Western and Northern Region	Ouest et Nord du Canada

Project title/Titre du projet: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Drawing title/Titre du dessin: **LOCATION PLAN**

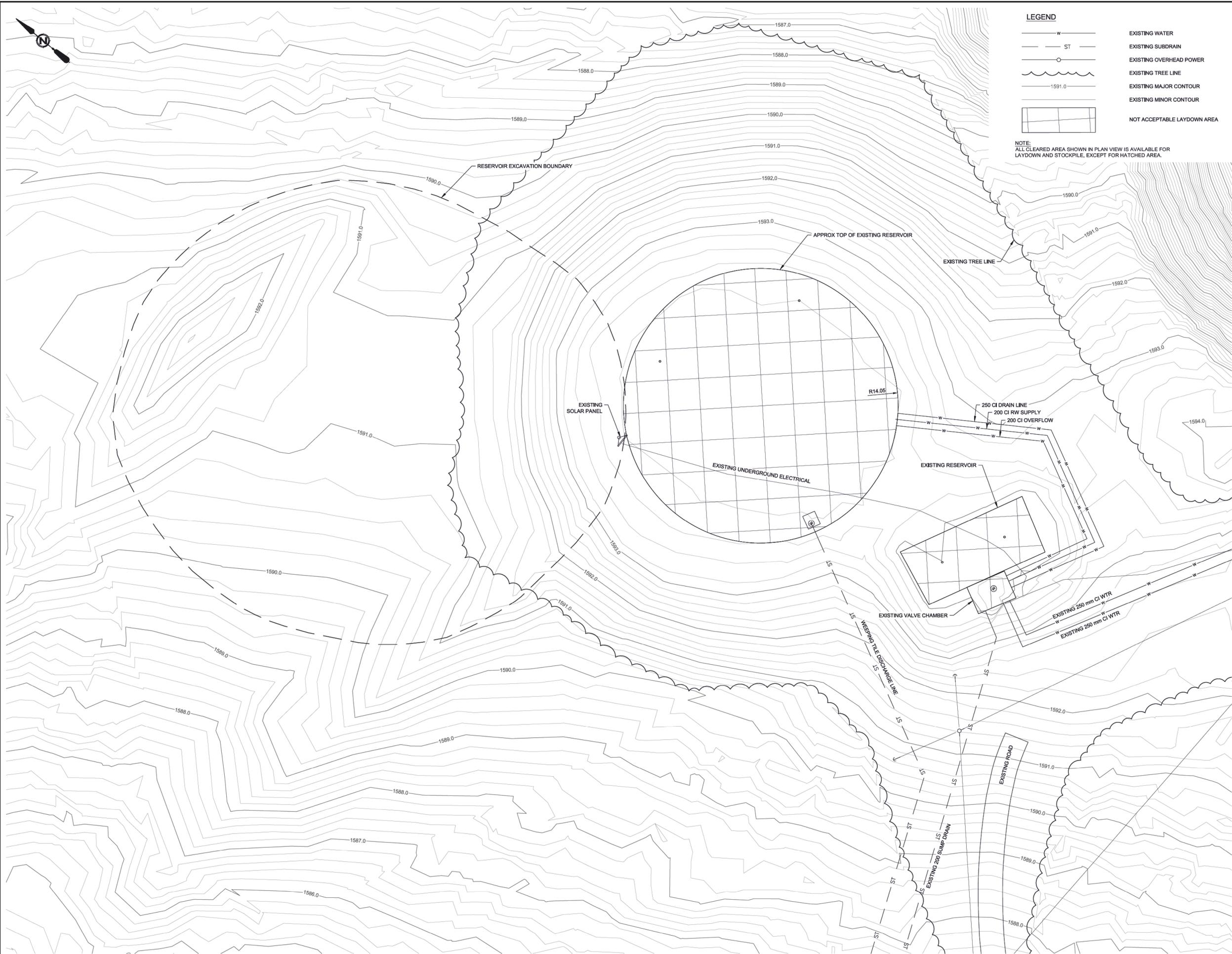
Surveyed by/Arpenté par: J. CHEN	Drawn by/Dessiné par: B. PRATT	Date/Date: 2018JAN11
Designed by/Conçu par: J. CHEN	Reviewed by/Révisé par: C. ARKELL	Scale/Echelle: AS SHOWN

Client Acceptance/Acceptation du client: J. GIBBONS

Approved by/Approuvé par: J. GIBBONS

Project No./No. du projet: 20173084-00	Asset No./No. de l'actif: 3084-01-C-100	Sheet No./No. de la feuille: 2
Drawing Reference No./No. de référence du dessin: 3084-01-C-100		21

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DATE: 2018-03-15, Barry Pratt



LEGEND

— W —	EXISTING WATER
— ST —	EXISTING SUBDRAIN
○	EXISTING OVERHEAD POWER
~~~~~	EXISTING TREE LINE
— 1591.0 —	EXISTING MAJOR CONTOUR
— 1591.0 —	EXISTING MINOR CONTOUR
[Hatched Area]	NOT ACCEPTABLE LAYDOWN AREA

NOTE:  
ALL CLEARED AREA SHOWN IN PLAN VIEW IS AVAILABLE FOR LAYDOWN AND STOCKPILE, EXCEPT FOR HATCHED AREA.

0	2018APR05	ISSUED FOR TENDER	B.P.	J.C.
No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approuvé

Revisions / Révisions

A	B	C	A	B	C
A: detail number / numéro de détail			B: source / source		
B: source / source			C: detail on drawing no. / détail sur dessin no.		

Consultant's Name / Nom de l'expert-consultant: **Associated Engineering**

Eng. Stamp / Sceau de l'ingénieur: **ASSOCIATED ENGINEERING**

	Parks Canada Agency Agence Western and Northern Region	L'Agence Parcs Canada Ouest et Nord du Canada
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Client/Client: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Project title/Titre du projet: **EXISTING GROUND SITE PLAN**

Surveyed by/Arpenté par: J. CHEN	Drawn by/Dessiné par: S. PRATT	Date/Date: 2018MAY07
Designed by/Conçu par: J. CHEN	Reviewed by/Révisé par: C. ARKELL	Scale/Échelle: AS SHOWN
PWSC Project Manager/Administrateur de Projets TPSC: J. GIBBONS		Client Acceptance/Acceptation du client: Approved by/Approuvé par:

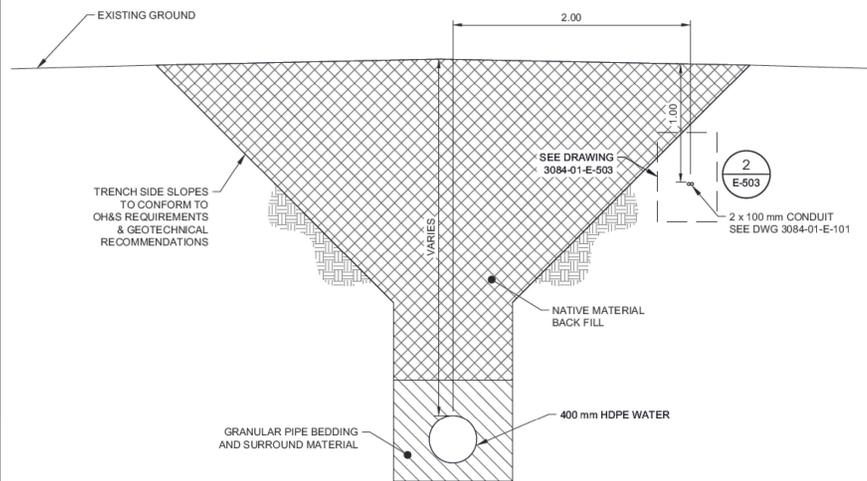
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Drawing Reference No./No. de référence du dessin: 3084-01-C-101	21

1 PLAN 1:150

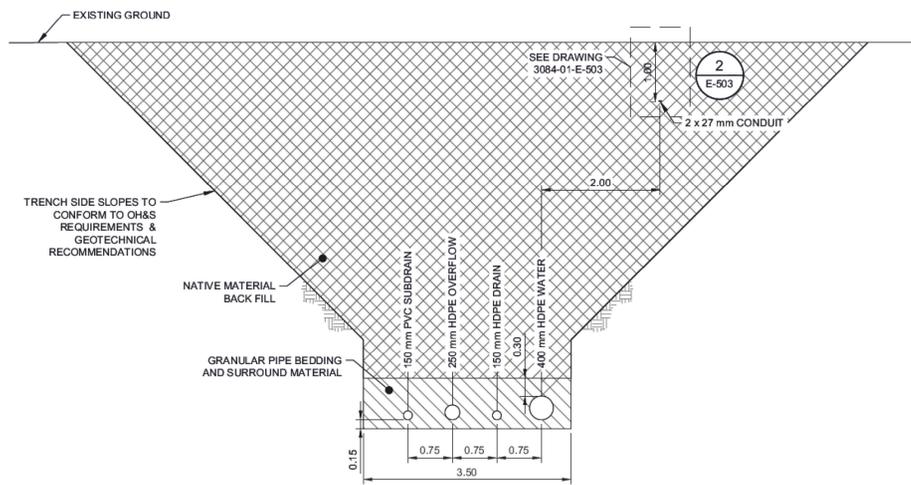
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DATE: 2018-03-16, Barry Pratt



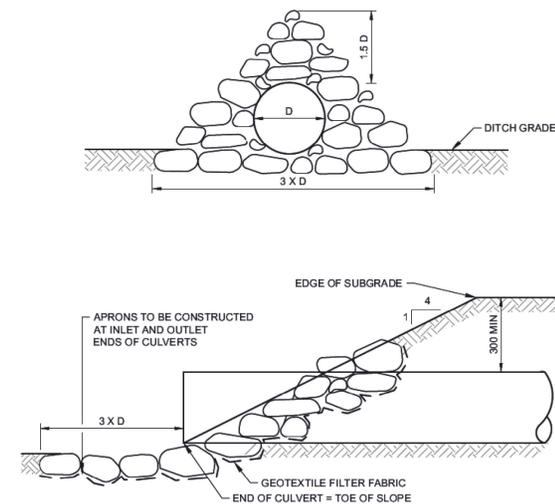




1 DETAIL  
C-102 TYPICAL SECTION FEEDERMAIN TO RESERVOIR NTS

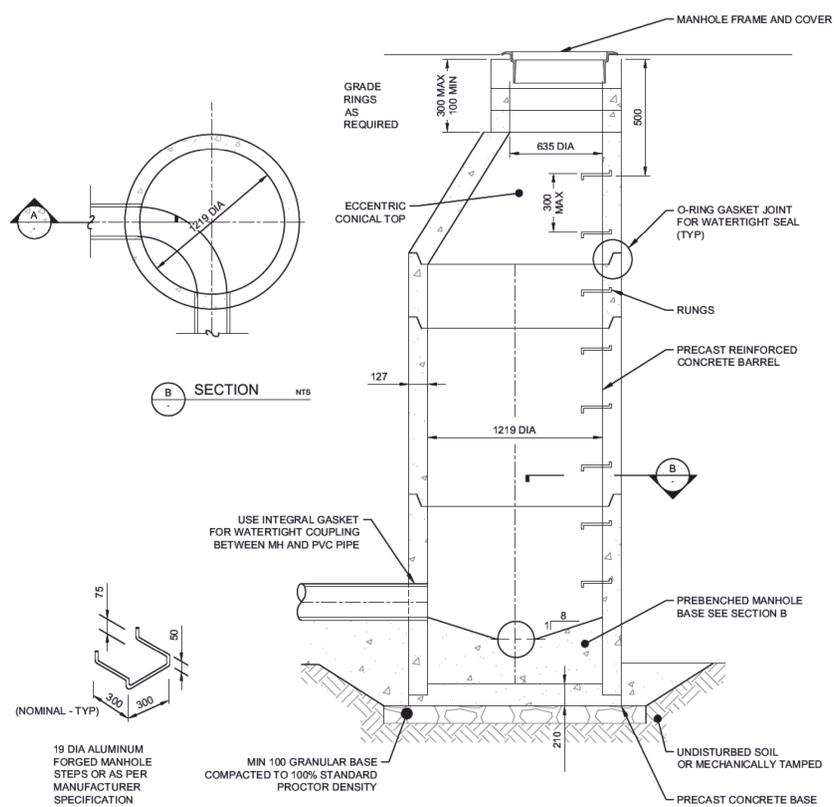


2 DETAIL  
C-102 COMMON TRENCH CONFIGURATION NTS

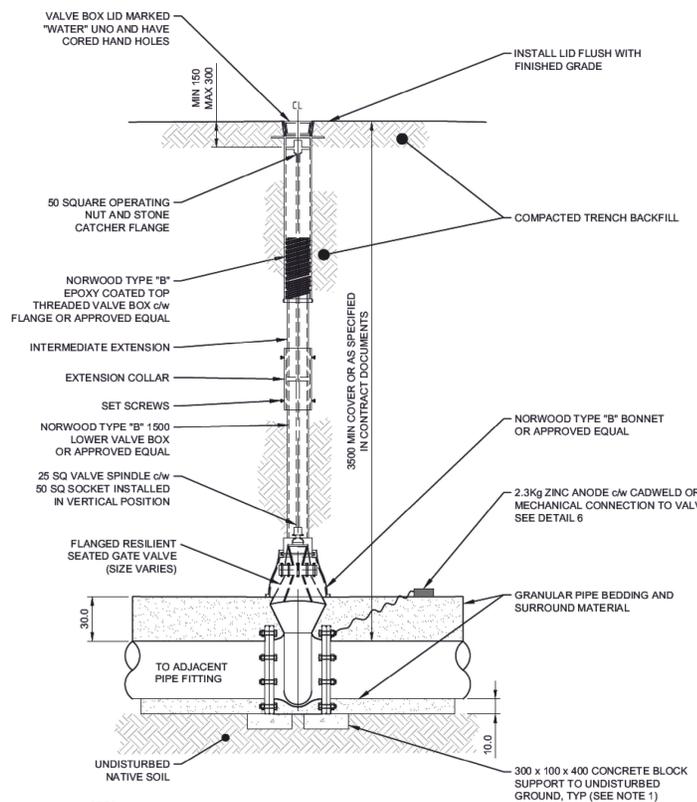


- NOTES:
- ROCKS AND BOULDERS SHALL BE SELECTED AS NEARLY CUBICAL IN FORM AS PRACTICAL AND OF A SIZE GREATER THAN 17 Kg.
  - THE STONES SHALL BE PLACED WITH THEIR BEDS AT RIGHT ANGLES TO THE SLOPE, THE LARGER STONES BEING USED IN THE BOTTOM COURSES AND THE SMALLER STONES AT TOP.
  - THEY SHALL BE LAID IN CLOSE CONTACT SO AS TO BREAK JOINTS AND IN SUCH MANNER THAT THE WEIGHT OF THE STONES IS CARRIED BY THE EARTH AND NOT BY THE ADJACENT STONES.
  - USE CLASS 1M RIPRAP.

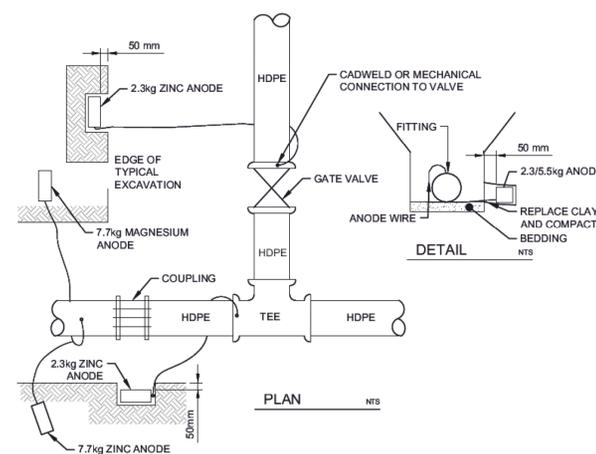
3 DETAIL  
C-102 RIP RAP NTS



4 DETAIL  
C-102 TYPE 5A MANHOLE NTS

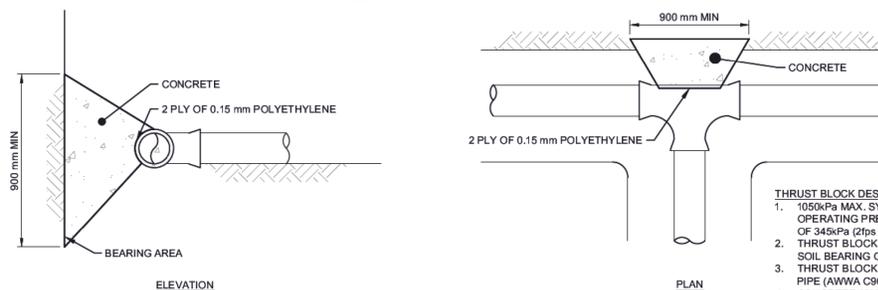


5 DETAIL  
C-102 WATER VALVE NTS

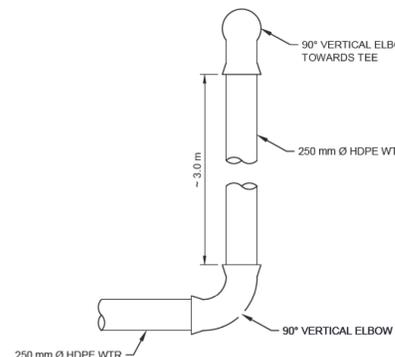


- NOTES:
- MINIMUM DISTANCE FROM ANODE TO PIPE, FITTING OR VALVE IS 150 mm.
  - INSTALL ANODE AT APPROX PIPE DEPTH IN NATIVE SOIL.
  - ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm OF NATIVE CLAY COMPLETELY SURROUNDING THE ANODE.
  - ANODES TO BE AT LEAST 300 mm CLEAR OF THRUST BLOCK.
  - ALL ZINC ANODES ON VALVES AND IRON FITTINGS ARE 2.3kg, 5.5kg ZINC ANODE TO BE PROVIDED FOR CORROSION STOP AND SERVICE PIPE 50 DIA AND SMALLER, AND FIRE HYDRANTS, 7.7kg MAGNESIUM ANODE TO BE PROVIDED ON CAST IRON WATERMANS.
  - NUMBER, SPACING, TYPE, AND WEIGHT OF ANODES IS BASED ON THE SITE SOIL CHARACTER AND NEEDS TO BE CONFIRMED BY THE ENGINEER.
  - ALL EXTERIOR BOLTS ON IRON FITTINGS, VALVES, FIRE HYDRANTS AND COUPLINGS TO BE STAINLESS STEEL NO. 304 OR APPROVED EQUAL, AND SHALL BE CLEANED, PRIMED, AND TAPE-WRAPPED WITH PETROLEUM TAPE AS PER AWWA C217.

6 DETAIL  
C-102 CATHODIC PROTECTION NTS



7 DETAIL  
C-102 THRUST BLOCK DETAIL NTS



8 DETAIL  
C-102 VERTICAL WATER LINE NTS

- NOTES:
- PRECAST RINGS, CONES AND BARRELS TO MEET CURRENT ASTM C478M STANDARDS.
  - FOR MANHOLES OVER 4.8 m DEPTH, THE CAST-IN-PLACE BASE SHALL BE REINFORCED WITH 15M REBAR @ 300 c/c EACH WAY. SPECIAL BASE DESIGN REQUIRED FOR DEPTHS OVER 9.0 m.
  - CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS, CONTINUE MAIN PIPE WHERE POSSIBLE.
  - CONICAL TOP TO BE USED WHERE DISTANCE FROM BENCH TO MH COVER EXCEEDS 2 m.
  - VERTICAL SIDE OF CONICAL MH ON UPSTREAM SIDE.
  - INSTALL SAFETY PLATFORMS FOR ALL MH OVER 6.0 m DEEP, LOCATED 2 m ABOVE PIPE.
  - MANHOLE FRAME AND COVER TO BE AS PER STANDARD DETAIL DRAWINGS STM-12 TO STM-19.
  - BENCHING CONCRETE SHALL BE A MINIMUM OF 30MPa COMPRESSIVE STRENGTH AT 28 DAYS, TYPE HS CEMENT.
  - SAFETY STEPS TO BE SPACED AT 300 c/c MAX DISTANCE. FIRST STEP TO BE 500 MAX BELOW FRAME AND COVER. LAST STEP TO BE 300 MAX ABOVE BENCHINGS.
  - COMPACT BACKFILL AROUND MANHOLES TO A MAXIMUM OF 97% STANDARD PROCTOR DENSITY.
  - ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.

4 DETAIL  
C-102 TYPE 5A MANHOLE NTS

No.	Date/Date	Description/Description	Drawn by/Dessiné par	Approved/Approuvé
0	2018/03/03	ISSUED FOR TENDER	B.P.	J.C.

Revisions / Révisions

A	B	C	A	B	C

Consultant's Name / Nom de l'expert-consultant: **Associated Engineering**

Eng. Status / Statut de l'ingénieur: **PROFESSIONAL ENGINEER**

Client/Client: **Parks Canada Agency**

L'Agence Parcs Canada

Western and Northern Region / Ouest et Nord du Canada

Project title/Titre du dessin: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Drawing title/Titre du dessin: **CIVIL DETAILS**

Surveyed by/Aspiré par: **J. CHEN**

Designed by/Conçu par: **J. CHEN**

Drawn by/Dessiné par: **B. PRATT**

Checked by/Vérifié par: **C. ARKELL**

Date/Date: **2018/MAY/12**

Scale/Echelle: **AS SHOWN**

FWSC Project Manager/Administrateur de Projets: **J. GIBBONS**

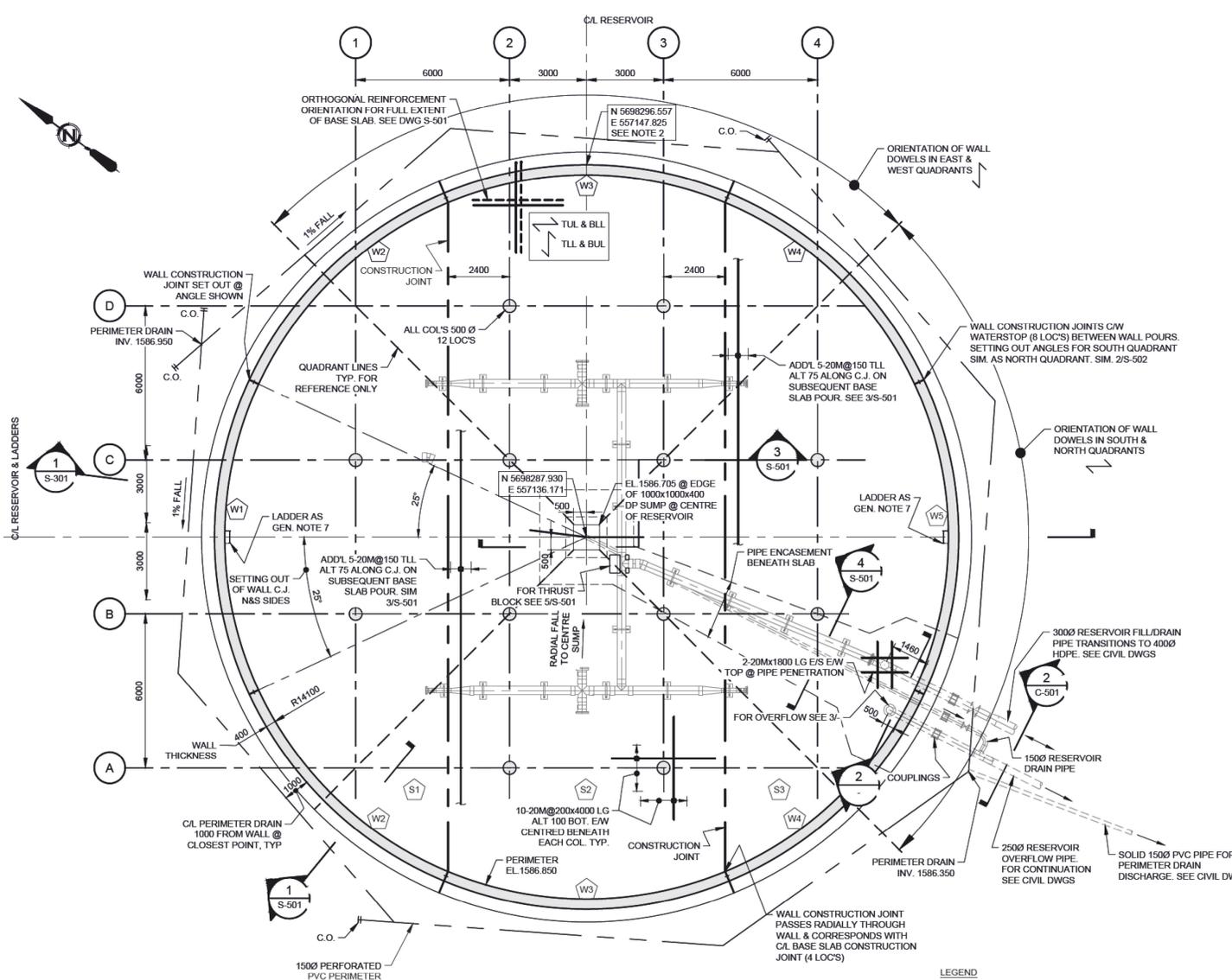
Client Acceptance/Acceptation du client: **Approved by/Approuvé par**

Project No./No. du projet: **20173084-00**

Asset No./No. de l'actif: **3084-01-C-501**

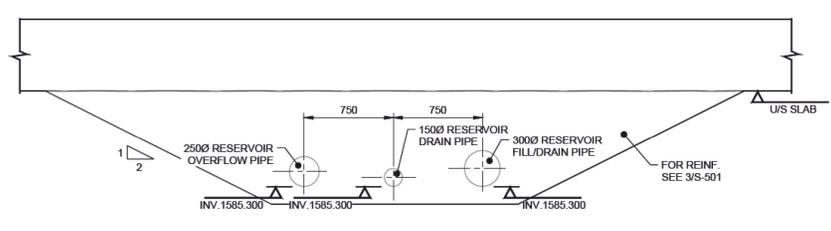
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DATE: 2018-04-09, Kite Fisher



1 PLAN 1:100 ON FOUNDATION SLAB

**LEGEND**  
 S3 BASE SLAB CONCRETE POUR SEQUENCE BETWEEN CONSTRUCTION JOINTS. AREA S1 CAST FIRST  
 W4 WALL CONCRETE POUR SEQUENCE BETWEEN VERTICAL CONSTRUCTION JOINTS  
 BLL - BOTTOM LOWER LAYER  
 BUL - BOTTOM UPPER LAYER  
 TLL - TOP LOWER LAYER  
 TUL - TOP UPPER LAYER  
 ——— CONSTRUCTION JOINT



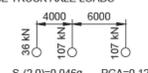
2 SECTION 1:25 SHOWING PIPE ENCASEMENT @ RESERVOIR WALL. SEE 1/- & 2/S-301

**GENERAL NOTES**

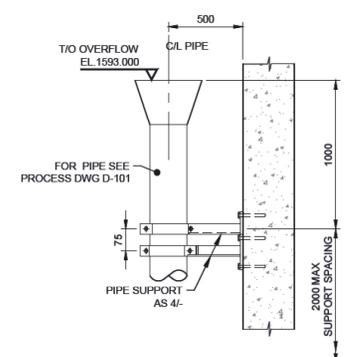
- ALL WORKMANSHIP, COMPONENT DESIGN & MATERIAL SHALL BE TO THE NATIONAL BUILDING CODE OF CANADA 2015.
- CHECK ALL DIMENSIONS, ELEVATIONS & DETAILS PRIOR TO CONSTRUCTION OR FABRICATION. REPORT ANY DISCREPANCIES OR DESIRED MODIFICATIONS TO THE ENGINEER. SETTING OUT COORDINATES ARE IN NAD83 UTM ZONE 11 COORDINATES & ARE GIVEN AT THE CENTER OF THE RESERVOIR & AT THE OUTSIDE FACE OF PERIMETER WALL BETWEEN GRIDS 2 & 3 AS SHOWN ON 1/-.
- BASE SLAB FOUNDATION SHALL BE FOUNDED ON UNDISTURBED NATIVE CLAY TILL AS NOTED IN THE GEOTECHNICAL REPORT BY THURBER ENGINEERING LTD FILE 20495 DATED 20 FEBRUARY 2018. UNDER NO CIRCUMSTANCES IS THE SOIL UNDER THE STRUCTURE TO BE ALLOWED TO FREEZE, DRY OUT OR BECOME SATURATED PRIOR, DURING OR SUBSEQUENT TO CONSTRUCTION. GEOTECHNICAL ENGINEER TO APPROVE SUBGRADE PREPARATION.
- REINFORCING STEEL: BILLET STEEL, GRADE 400W, DEFORMED BARS TO CAN/CSA G30.18. HOOK BARS AT OPPOSITE FACE AT DISCONTINUOUS ENDS. PROVIDE CLASS 'B' LAP SPLICES THROUGHOUT EXCEPT WHERE OTHER DIMENSIONS ARE SHOWN. TIE & SECURE IN PLACE PRIOR TO PLACING CONCRETE. WHERE REINFORCING IS SHOWN IN ONE DIRECTION ONLY, PROVIDE 15M @ 250 O/C EACH FACE & PERPENDICULAR TO THAT SHOWN.

BAR	TOP BARS*	OTHERS
10M	600	450
15M	900	700
20M	1200	900
25M	1800	1400

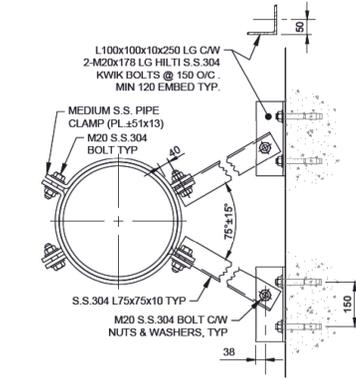
- * A TOP BAR IS DEFINED AS A BAR HAVING A MINIMUM OF 300mm OF CONCRETE BENEATH IT. CONCRETE COVER TO REINF. STEEL: 50mm UNLESS SPECIFICALLY NOTED.
- ENSURE ALL REINFORCING STEEL IS 50mm CLEAR OF ANY EMBEDDED ELECTRICAL CONDUIT.
- CONCRETE: THE CONCRETE HAS BEEN DESIGNED CSA A23.3-14, DESIGN OF CONCRETE STRUCTURES.
  - THE CONCRETE SHALL BE CONSTRUCTED & TESTED ACCORDING TO CSA A23.1/A23.2, CONCRETE MATERIALS & METHODS OF CONCRETE CONSTRUCTION. METHOD OF TEST & STANDARD PRACTICES FOR CONCRETE - SEE SPECIFICATIONS FROM VARIOUS CONCRETE TYPES & REQUIREMENTS. MAXIMUM SLUMP: 80mm
  - CONSOLIDATE ALL CONCRETE USING INTERNAL VIBRATORS
  - ALL CONCRETE EXPOSURE CLASS F-1 TO CSA A23.1. MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS: 35 MPa.
  - SANDBLAST CLEAN & ROUGHEN ALL CONSTRUCTION JOINTS TO A FULL 5mm AMPLITUDE.
  - PROVIDE 20mm CHAMFER AT ALL EXPOSED CONCRETE EDGES UNLESS NOTED OTHERWISE.
  - LADDERS: ALL LADDERS TO BE AISI S. S. 304 & CONFORM TO OH&S PIP STANDARD STF05501 FIXED LADDERS & CAGES FABRICATION DETAILS TECHNICAL CORRECTION JANUARY 2017. SEE 1/- & 1/S-301.
  - DESIGN CRITERIA:
    - RESERVOIR ROOF SLAB LIVE LOAD = 10 kPa SOIL C/W 4.8 kPa UNIFORM LIVE LOAD OR SERVICE TRUCK AXLE LOADS



- SNOW LOAD  $S_s = 5.5 \text{ kPa}$   $S_o = 0.1 \text{ kPa}$
- SEISMIC (POST DISASTER STRUCTURE):  $S_d(0.2) = 0.279g$   $S_d(0.5) = 0.185g$   $S_d(1.0) = 0.099g$   $S_d(2.0) = 0.046g$   $PGA = 0.128g$   $I_e = 1.5$
- SITE CLASS C  $R_e = 1.0$   $R_s = 3.0$
- FOUNDATION DESIGN BEARING PRESSURE = 250 kPa (FACTORED)

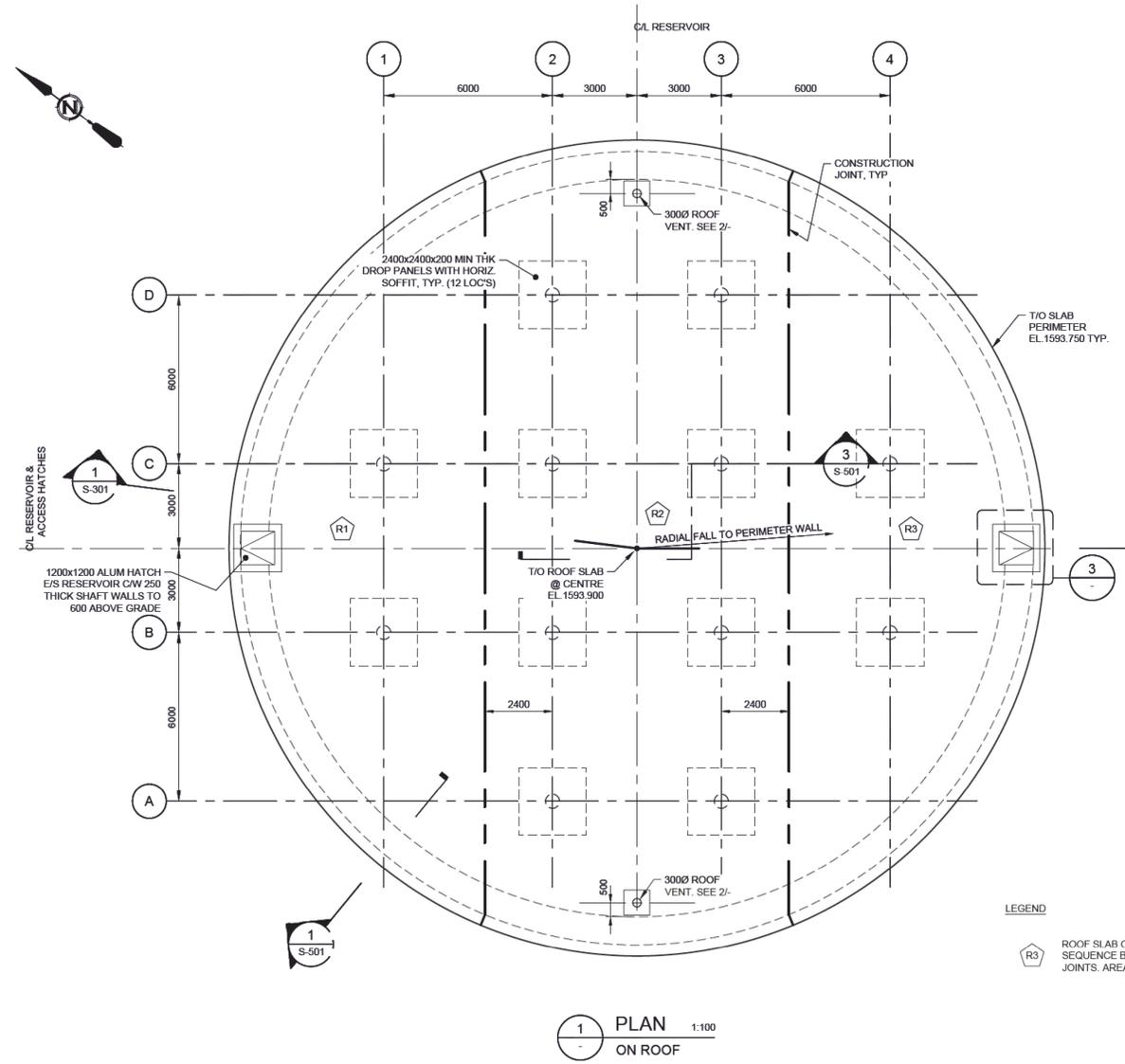


3 DETAIL 1:20 SHOWING OVERFLOW PIPE & SUPPORT. FOR LOCATION SEE 1/-



4 DETAIL 1:10 SHOWING OVERFLOW PIPE SUPPORT AS 3/-

2018MAR23		ISSUED FOR TENDER	M.C.	R.P.
No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approved
Revision / Revision				
A		A detail number	B	A
C		C detail on drawing no.	B	C
Consultant's Name Nom de l'expert-conseil		Eng. Services Ingénierie		
<b>Associated Engineering</b>		<b>Associated Engineering</b>		
APEGA Permit to Practice P 3979		2018-Mar-19		
Client/client	Parks Canada Agency	L'Agence Parcs Canada		
	Western and Northern Region	Ouest et Nord du Canada		
Project title/Titre du dessin <b>LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK</b>				
Drawing title/Titre du dessin <b>RESERVOIR FOUNDATION PLAN AND</b>				
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date		
	M. COOPER	2018FEB13		
Designed by/Conçut par	Reviewed by/Revisé par	Scale/Echelle		
R. PROTIC	J. LISSELLA	AS SHOWN		
PWSC Project Manager/Administrateur de Projets TPSC J. GIBBONS				
Client Acceptance/Acceptation du client Approved by/Approuvé par				
Park Reservoirs Officer/Agent Reservoirs PWSC Project Manager/Administrateur de Projets TPSC				
Project No./No. du projet	Asset No./No. de l'actif	Sheet No./No. de la feuille		
20173084-00		7		
Drawing Reference No./No. de référence du dessin				
3084-01-S-101				

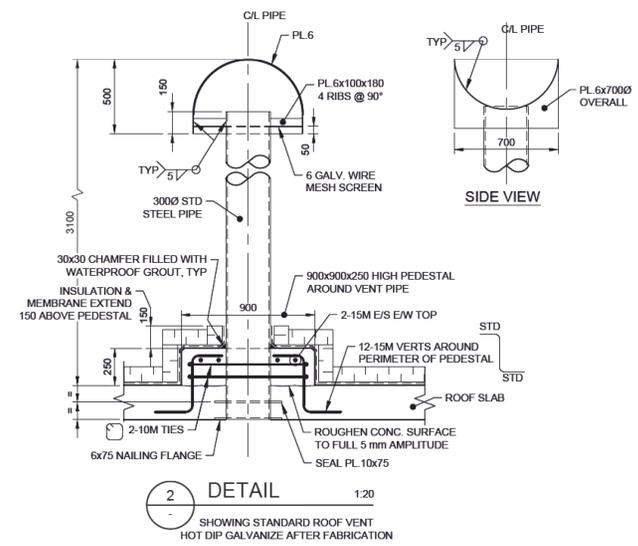


1 PLAN ON ROOF 1:100

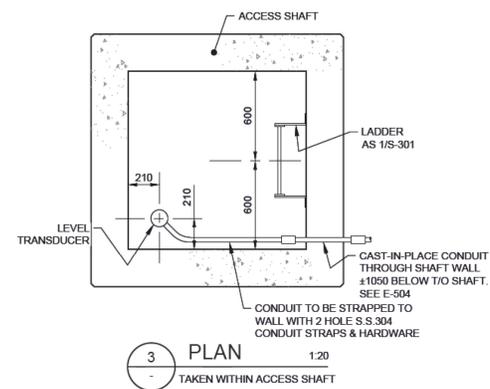
LEGEND  
 R3 ROOF SLAB CONCRETE POUR SEQUENCE BETWEEN CONSTRUCTION JOINTS. AREA R1 CAST FIRST

NOTES

- 1. ROOF SLAB IS SHOWN TO BE CONSTRUCTED IN STAGES. FORMWORK & SHORING TO REMAIN IN PLACE BETWEEN STAGED POURS. SEE SPECIFICATIONS FOR DETAILED REQUIREMENTS.



2 DETAIL 1:20  
 SHOWING STANDARD ROOF VENT HOT DIP GALVANIZE AFTER FABRICATION



3 PLAN 1:20  
 TAKEN WITHIN ACCESS SHAFT

No.	Date/Date	Description/Description	Drawn by/Dessiné par	Approved/Approuvé
1	2018MAR23	ISSUED FOR TENDER	M.C.	R.P.

Consultant's Name / Nom de l'expert-conseil: **Associated Engineering**  
 Eng. Services / Services d'ingénierie: **Associated Engineering**  
 APEGA Permit to Practice P 3979  
 2015-Mar-9

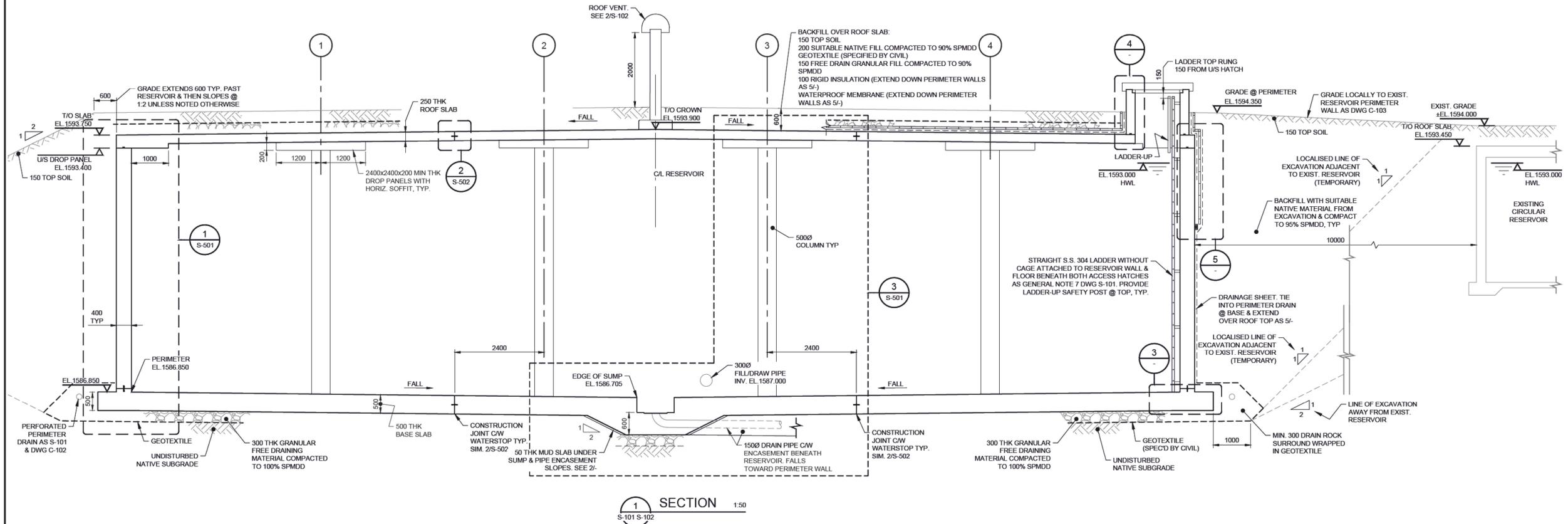
Client/Client: Parks Canada Agency / L'Agence Parcs Canada	Western and Northern Region / Ouest et Nord du Canada
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Project title/Titre du projet: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

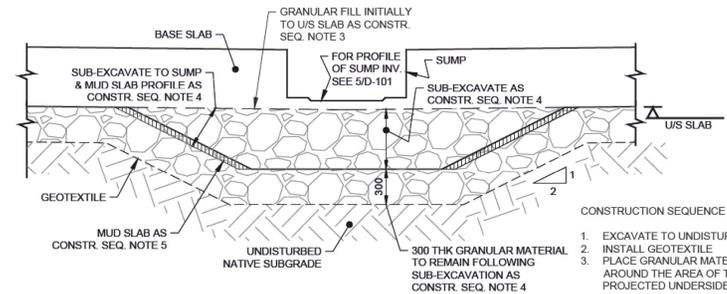
Drawing title/Titre du dessin: **RESERVOIR ROOF PLAN AND DETAILS**

Surveyed by/Arpenté par: M. COOPER	Drawn by/Dessiné par: M. COOPER	Date/Date: 2018FEB13
Designed by/Concepté par: R. PROTIC	Reviewed by/Revisé par: J. LISSELLA	Scale/Echelle: AS SHOWN

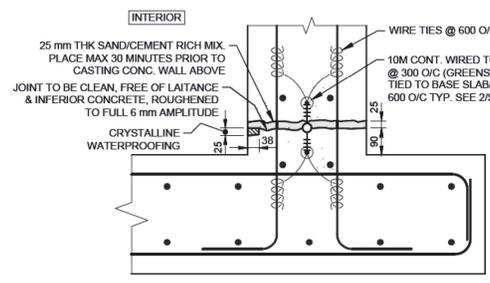
Client Acceptance/Acceptation du client	Approved by/Approuvé par
Project No./No. du projet: 20173084-00	Asset No./No. de l'actif: 20173084-00
Drawing Reference No./No. de référence du dessin: 3084-01-S-102	Sheet No./No. de la feuille: 8



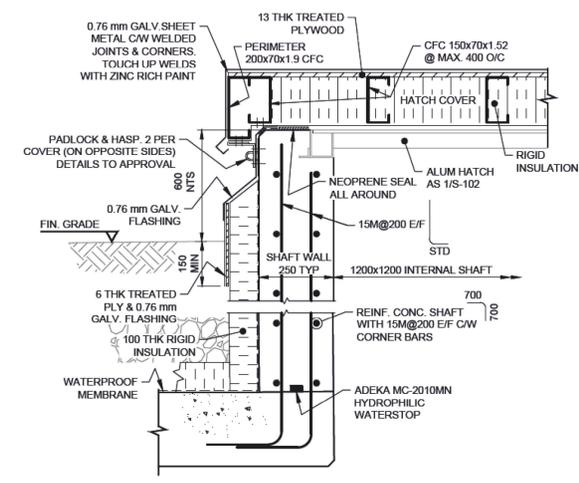
SECTION 1:50  
S-101 S-102



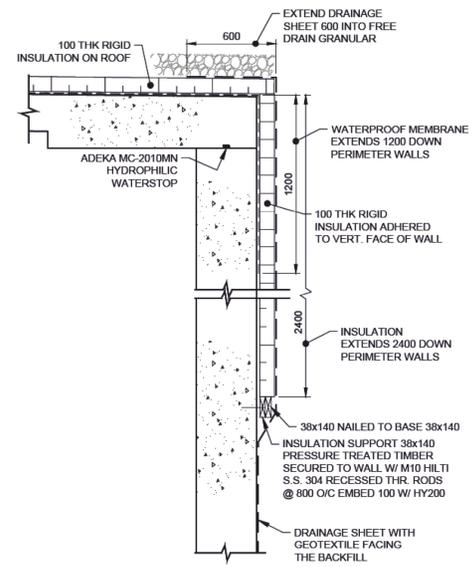
DETAIL 2:25  
SHOWING SUBGRADE ARRANGEMENT @ SUMP. SIMILAR FOR PIPE ENCASUREMENT UNDER SLAB



DETAIL 3:NTS  
TYP. SLAB/WALL CONSTRUCTION JOINT



DETAIL 4:1:10  
AROUND HATCH COVER 2 ALUM. HATCHES REQ'D



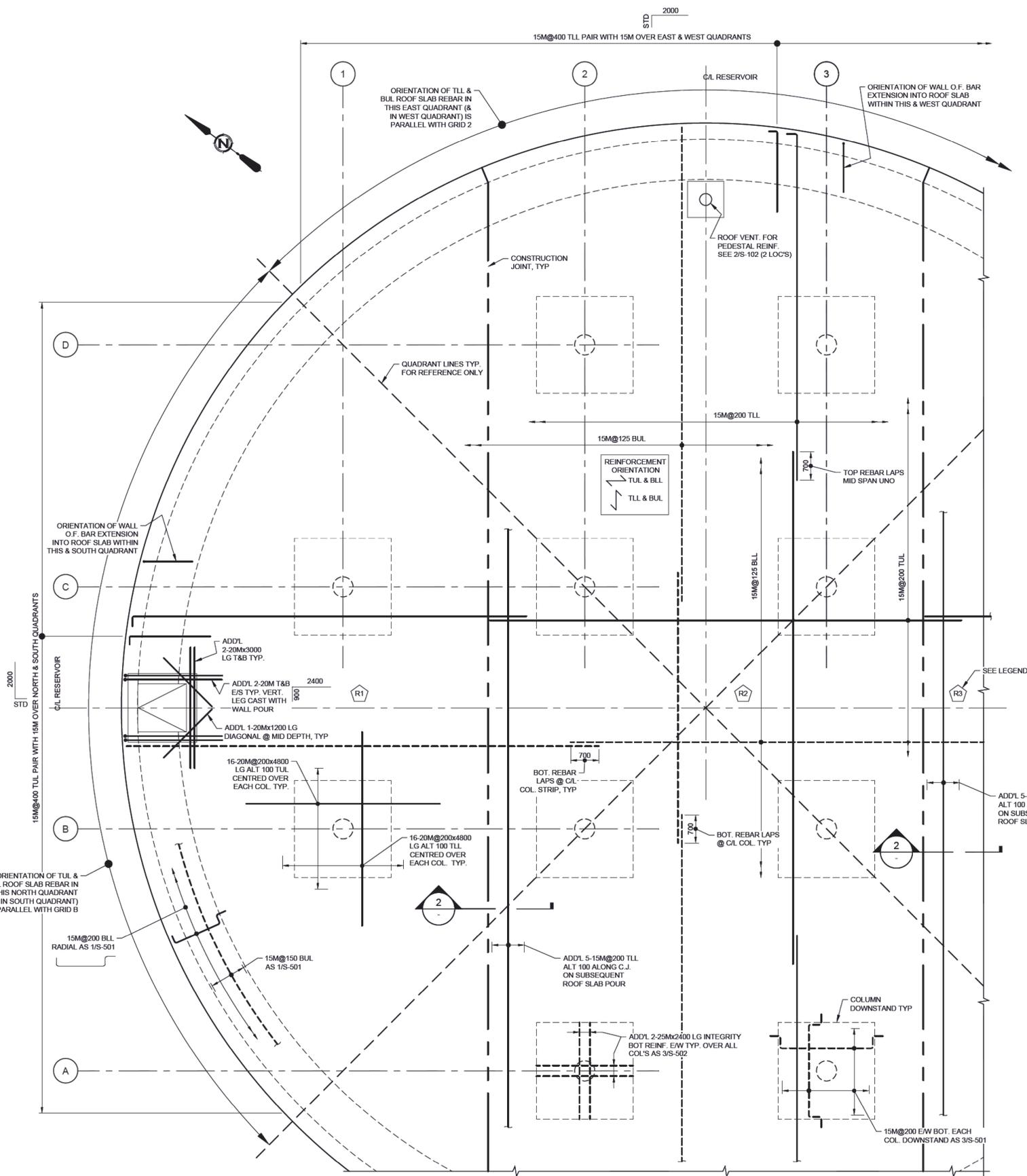
DETAIL 5:1:10  
SHOWING TYP. DETAILS OF INSULATION, WATERPROOFING & DRAINAGE SHEET @ PERIMETER OF RESERVOIR ROOF E/S OF ACCESS SHAFT

- CONSTRUCTION SEQUENCE FOR SUBGRADE @ SUMP
1. EXCAVATE TO UNDISTURBED NATIVE FILL.
  2. INSTALL GEOTEXTILE.
  3. PLACE GRANULAR MATERIAL SO TOP OF GRANULAR FILL AROUND THE AREA OF THE SUMP IS INITIALLY TO THE PROJECTED UNDERSIDE OF BASE SLAB.
  4. SUB-EXCAVATE TO THE PROFILE OF THE UNDERSIDE OF THE SUMP & MUD SLAB.
  5. POUR 50 THK MUD SLAB OVER SIDES OF SUMP EXCAVATION.

Revision / Revision		M.C.		R.P.	
0	2018MAR23	ISSUED FOR TENDER			
No.	Date/Date	Description/Description	Drawn by	Approved	
			Drawn per	Approved	
Consultant's Name Nom de l'expert-conseil		Eng. Stamp Stamps de l'ingénieur			
 Associated Engineering APEGA Permit to Practice P 3979		 2018-Mar-19			
Client/Client		L'Agence Parcs Canada		L'Agence Parcs Canada	
 Parcs Canada Agency Western and Northern Region		 L'Agence Parcs Canada Ouest et Nord du Canada			
Project title/Titre du projet					
LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK					
Drawing title/Titre du dessin					
RESERVOIR SECTION AND DETAILS					
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date			
	M. COOPER	2018FEB13			
Designed by/Conçu par	Reviewed by/Revisé par	Scale/Echelle			
R. PROTEC	J. LUSSELL	AS SHOWN			
PWSC Project Manager/Administrateur de Projets TPSC					
Client Acceptance/Acceptation du client Approved by/Approuvé par					
Park Realities Officer/Agent Réalités		PWSC Project Manager/Administrateur de Projets TPSC			
Project No./No. du projet	Asset No./No. de l'actif	Sheet No./No. de la feuille			
20173084-00		9			
Drawing Reference No./No. de référence du dessin					
3084-01-S-301					

P:\2017\3084\00_Reservoir_LSI\Working_Dwg\3084-01-S-301.dwg  
DATE: 2018-03-16, Malcolm Cooper

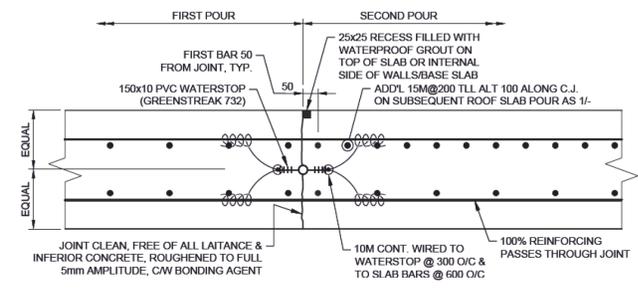




1 PLAN  
PARTIAL PLAN ON ROOF REINF. 1:50

LEGEND  
 BLL - BOTTOM LOWER LAYER  
 BUL - BOTTOM UPPER LAYER  
 TLL - TOP LOWER LAYER  
 TUL - TOP UPPER LAYER

R3 ROOF SLAB CONCRETE  
 POUR SEQUENCE BETWEEN  
 CONSTRUCTION JOINTS.  
 AREA R1 CAST FIRST



2 DETAIL NTS  
 S-301 TYP. ROOF CONSTRUCTION JOINT  
 SIM. FOR BASE SLAB & WALLS

No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approuvé
1	2018MAR23	ISSUED FOR TENDER	M.C.	R.P.

Consultant's Name  
Nom de l'expert-conseil

**Associated Engineering**

APEGA Permit to Practice P 3979

2018 Mar-19

Client/Client	Parks Canada Agency	L'Agence Parcs Canada
	Western and Northern Region	Ouest et Nord du Canada

Project title/Titre du projet  
**LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Drawing title/Titre du dessin  
**ROOF REINFORCING PARTIAL PLAN AND DETAILS**

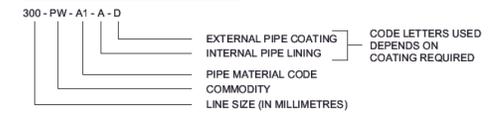
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date
	M. COOPER	2018FEB13
Designed by/Conçu par	Reviewed by/Revisé par	Scale/Echelle
R. PROTIC	J. LISSELLA	AS SHOWN

Client Acceptance/Acceptation du client Approved by/Approuvé par

Project No./No. du projet	Asset No./No. de l'actif	Sheet No./No. de la feuille
20173084-00		11
Drawing Reference No./No. de référence du dessin		
3084-01-S-502		

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 DATE: 2018-03-16, Malcolm Cooper

**LINE IDENTIFICATION**



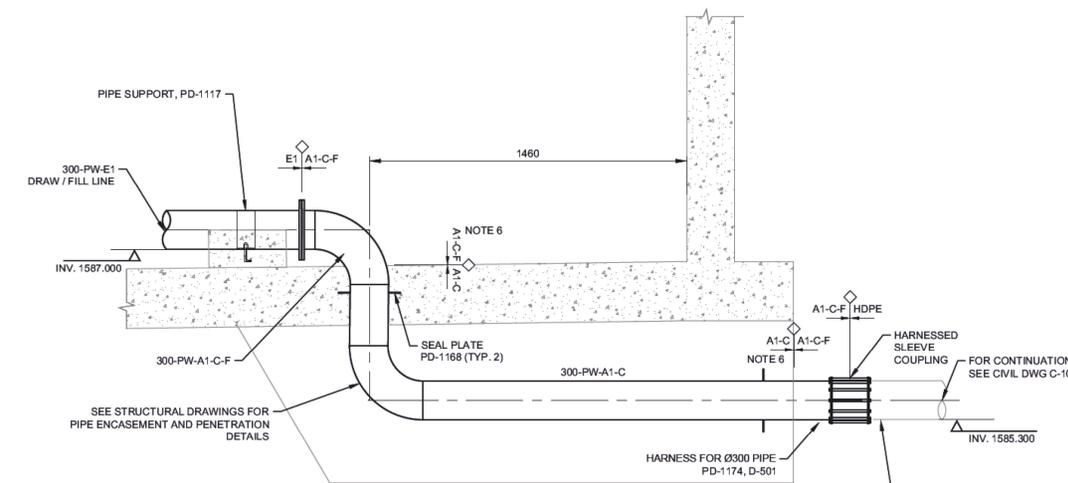
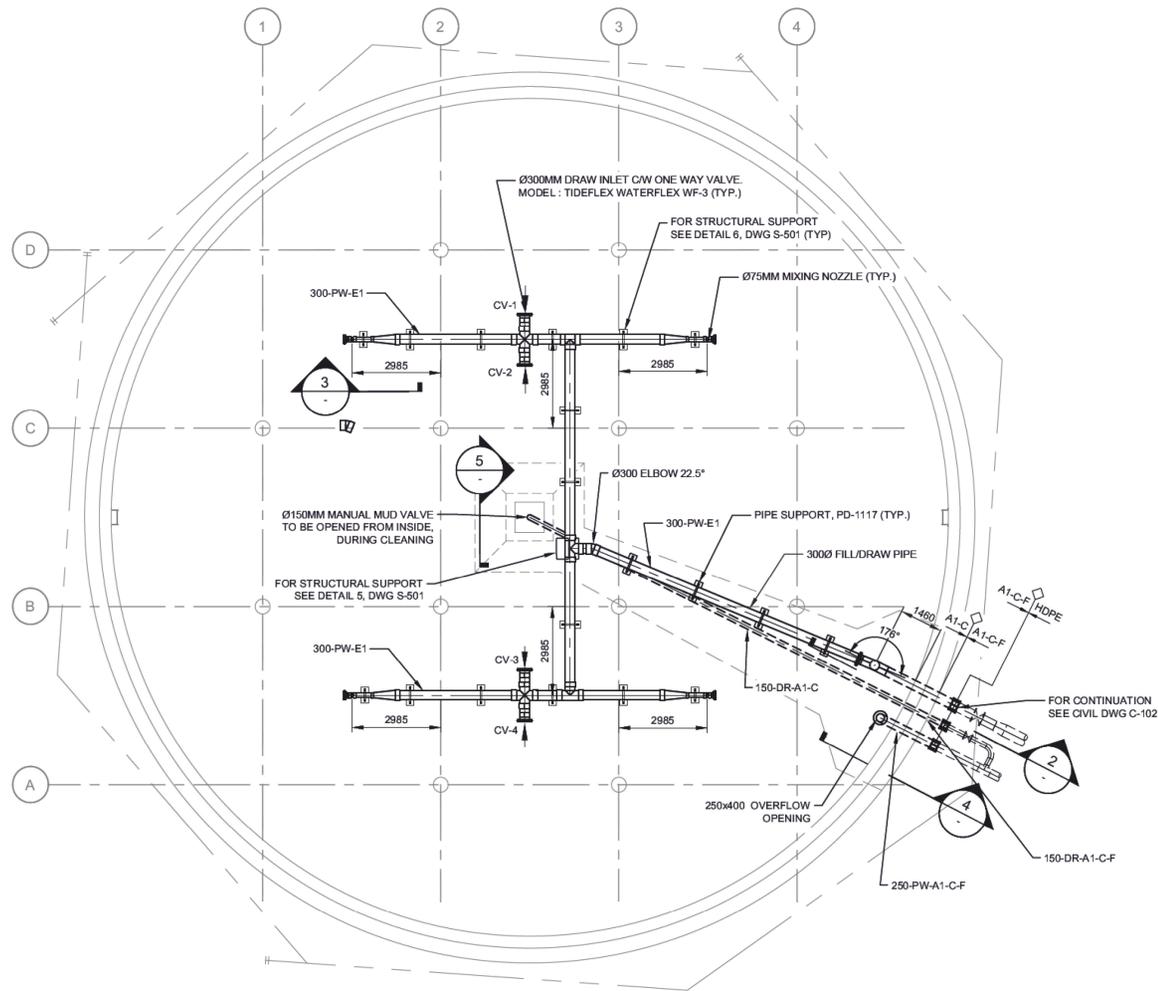
**PIPE MATERIAL CODES**

**CODE MATERIAL AND FLANGE RATING**

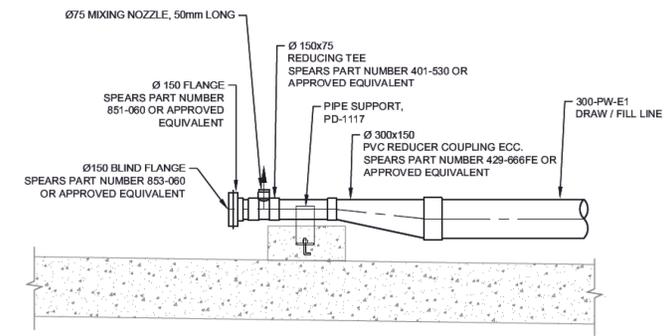
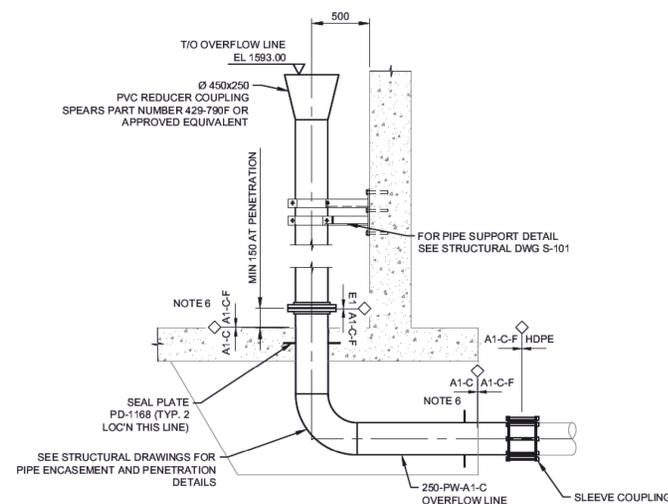
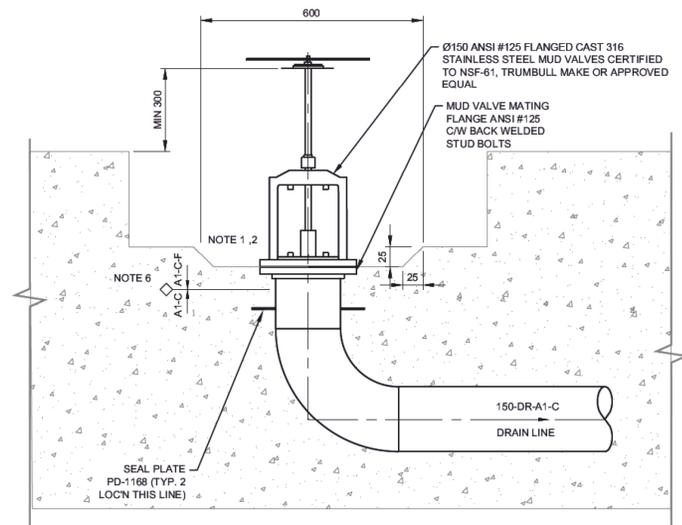
A1	STEEL PIPE 900mm Dia AND SMALLER 150 POUND FLANGE RATING
E1	PVC PIPE (PRESSURE PIPE)

**NOTES:**

- TEMPORARY SPACER FLANGE PROUD OF CONCRETE LEVEL TO PROTECT STUD THREADS AND MAKE AREA FOR MUD VALVE FLANGES AND YOKE
- MUD VALVE IS 335mm AT WIDEST PART, CONTRACTOR TO FORM OUT MINIMUM 600mm DIAMETER.
- COORDINATE PIPING INSTALLATION WITH STRUCTURAL SLAB REINFORCEMENT INSTALLATION.
- NO FLANGED OR GROOVED COUPLING PERMISSIBLE IN CONCRETE ENCASEMENT.
- FIELD WELDING AND COATING MUST BE APPROVED BY THE DEPARTMENTAL REPRESENTATIVE PRIOR TO PIPE SHOP FABRICATION.
- CONCRETE ENCASED PIPING HAS BARE STEEL EXTERIOR, NO EPOXY COATING. TERMINATE EPOXY COATING 50mm INSIDE CONCRETE.
- FOR STANDARD DETAIL, EXAMPLE PD-XXXX, REFER TO DWG D-501.



RESTRAINT FOR HDPE, EBAA OR APPROVED EQUIVALENT  
COORDINATE THE ROD QUANTITY LOCATION WITH STEEL PIPE HARNESS, REFER TO CIVIL SPECIFICATIONS FOR BURIED COUPLING/HARNESS REQUIREMENTS.



0	2018APR09	ISSUED FOR TENDER	SHF	JW
No.	Date/Date	Description	Drawn by	Approved

Revisions / Révisions

A	1	As per drawing no. 3084-01-D-101	A
B	2	As per drawing no. 3084-01-D-101	B
C	3	As per drawing no. 3084-01-D-101	C

Client's Name / Nom de l'expert-consult: **Associated Engineering**

Eng. Status / Statut de l'ingénieur: **Professional Engineer**

APEGA Permit to Practice P 3979

Client/Client: **Parks Canada Agency** / **L'Agence Parcs Canada**

Western and Northern Region / Ouest et Nord du Canada

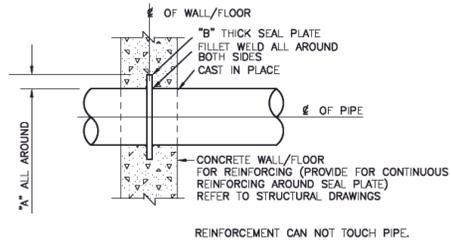
Project title/Titre du projet: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Drawing title/Titre du dessin: **RESERVOIR MIXING PIPING**

Designed by/Conçu par: J.WHITE	Drawn by/Dessiné par: SH.FARAJI	Date/Date: 2018FEB23
Reviewed by/Revisé par: J.HUBER	Checked by/Vérifié par: ASHWIN	

Client: <b>Associated Engineering</b>	Approved by/Approuvé par: <b>J.GIBBONS</b>
Project No./No. du projet: 20173004-00	Asset No./No. de l'actif: 3084-01-D-101
Sheet No./No. de la feuille: 12	

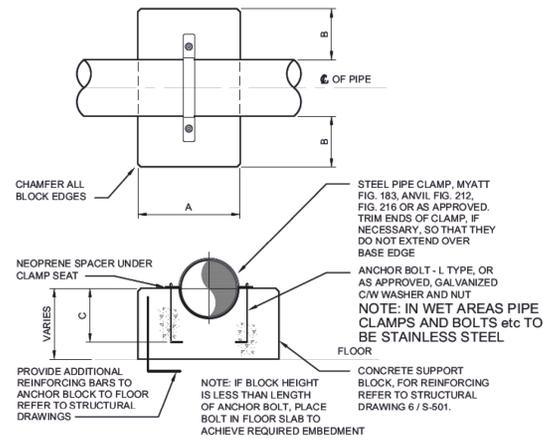
03/17/2018 09:00:00 - Research_Library - C:\Users\jwhite\OneDrive\Documents\3084-01-D-101.dwg  
 PLOT: 2018-04-05, 8:58:11 AM, 1/1



PIPE SIZE	40 TO 100	125 TO 200	250 TO 400	450 TO 600	750 & LARGER
A	75	75	75	100	100
B	6	6	6	6	6

FOR PIPES 50mm DIA. & LARGER

1168 DETAIL SEAL PLATE (PD-1168) NTS

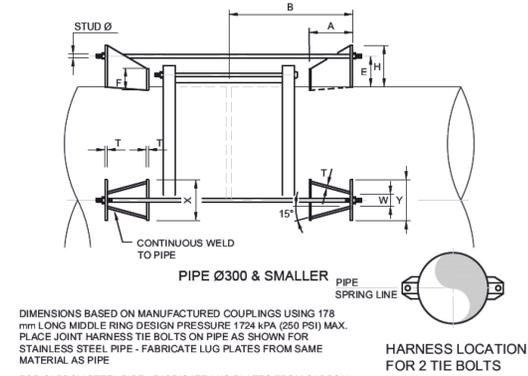


NOTE: ANCHOR BOLTS MAY BE REPLACED WITH HIT HI HSL OR HIT HY 200 OR AS APPROVED

PIPE SIZE	50 & 65	80 & 100	125 & 150	200 & 250	300 TO 400	450 TO 600	750 & 900	1050 & LARGER
A	100	100	150	200	250	300	400	CUSTOM DESIGN FOR EACH APPLICATION
B	50	75	100	150	200	200	300	

BOLT Ø x C  
 M8 x 90 (MIN) M12 x 110 (MIN) M16 x 130 (MIN) M19 x 170 (MIN) M22 x 210 (MIN) M25 x 210 (MIN) M38 x 305 (MIN)

1117 DETAIL CONCRETE SUPPORT BLOCK WITH STRAP HORIZONTAL PIPE (PD-1117) NTS



DIMENSIONS BASED ON MANUFACTURED COUPLINGS USING 178 mm LONG MIDDLE RING DESIGN PRESSURE 1724 kPa (250 PSI) MAX. PLACE JOINT HARNESS TIE BOLTS ON PIPE AS SHOWN FOR STAINLESS STEEL PIPE - FABRICATE LUG PLATES FROM SAME MATERIAL AS PIPE

FOR CARBON STEEL PIPE - FABRICATE LUG PLATES FROM CARBON STEEL PIPE ASTM A283, GRADE B, OR ASTM A285, GRADE C OR EQUAL STUD DIAMETER DETERMINED ASSUMING 52000 PSI ALLOWABLE STRESS BOLTS AND NUTS TO BE STAINLESS STEEL

NOTE: HARNESS CHART INFORMATION BASED ON MAX. PRESSURE AND LARGEST BOLT SIZE FOR THAT PARTICULAR PIPE SIZE. FOR OTHER BOLT SIZES REFER TO AWWA M-11 TABLES 13-4, 13-5, 13-5A AND HARNESS LUG DETAIL FIGURE 13-20

NOMINAL PIPE SIZE MILLIMETRES	CPLG OD (MAX)	MAX STUD DIA	MAX HOLE DIA	LUG DIMENSIONS (MILLIMETRES)											TIE BOLT
				A	W	T	H	E	F	Y	X	B			
150	266	16	19	127	35	10	98	76	51	127	127	300	2		
200	316	16	19	127	35	10	98	76	51	127	127	305	2		
250	386	19	22	127	38	10	108	79	51	127	127	310	2		
300	428	22	25	140	41	13	108	79	51	127	127	310	2		

1174 DETAIL PIPE HARNESS - AWWA TYPE P HARNESS LUG (PD-1174) NTS

0	2018APR09	ISSUED FOR TENDER	SHF	JW
No.	Date/Date	Description/Description	Drawn by/Dessiné par	Approved/Approuvé
Revisions / Révisions				
A				
B				
C				
Designer's Name Nom de l'expert-consultant		Eng. Status Statut de l'ingénieur		
APEGA Permit to Practice P 3979		2018 Feb 02		
Client/Client 		L'Agence Parcs Canada Western and Northern Region / Ouest et Nord du Canada		
Project title/Titre du projet LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK				
Drawing title/Titre du dessin PROCESS STANDARD DETAIL				
Surveyed by/Arpenté par SH PARAJI	Drawn by/Dessiné par SH PARAJI	Date/Date 2018 FEB 02		
Designed by/Conçu par J WHITE	Reviewed by/Revisé par J HEBER	Scale/Echelle AS SHOWN		
PWSC Project Manager/Administrateur de Projets TPSC J GIBBONS				
Client Approvals/Approbations du client Approved by/Approuvé par				
Project No./No. du projet 20173004-00		Asset No./No. de l'actif 20173004-00	Sheet No./No. de la feuille 13	Drawing Reference No./No. de référence du dessin 3084-01-D-501

LAYOUT SYMBOLS

SINGLE LINE DIAGRAM / SCHEMATIC SYMBOLS

- CABLE, CONDUIT & WIRE**
- CONDUIT RUN ON SURFACE (WALL OR CEILING)
  - CONDUIT RUN IN SLAB (OR BELOW GRADE)
  - CONDUIT CAPPED
  - CONDUIT GOING UP
  - CONDUIT GOING DOWN
  - FLEXIBLE CONDUIT
  - CONDUIT HOME RUN c/w NUMBER OF WIRES
  - CONDUIT SEAL WP-WEATHERPROOF, EP-EXPLOSION PROOF
  - CONDUIT UNION
  - CONDUIT EXPANSION JOINT
  - CONDUIT BEND
  - BARE GROUND WIRE
  - OVERHEAD POWER SERVICE ENTRANCE
  - OVERHEAD TELEPHONE SERVICE ENTRANCE
  - JUNCTION BOX - CEILING SPACE
  - JUNCTION BOX - FLUSH MOUNTED
  - JUNCTION BOX - WALL MOUNTED
  - JUNCTION BOX - MOTOR / EQUIPMENT
  - MULTI-CABLE TRANSIT (MCT)
  - SPARE WIRE LOOP
  - CABLE OR CONDUIT DESIGNATION PC-POWER TC-TELEPHONE HC-HEATING IC-INSTRUMENTATION
  - PANEL "A", CIRCUIT "10", SWITCH "D"
- POWER**
- XFMR POWER TRANSFORMER
  - PNL "A" MAIN DISTRIBUTION PANEL "A"
  - PNL "A" LIGHTING OR BRANCH PANEL "A"
  - SPLTR SPLITTER
  - MUA2D MOTOR AND/OR EQUIPMENT TAG c/w NAME, PLANT AREA & NUMBER
  - MOTOR
  - MOTORIZED DAMPER
  - MOTOR OPERATED VALVE
  - SOLENOID OPERATED VALVE
  - ELECTRIC HEATER
  - SINGLE RECEPTACLE
  - DUPLEX RECEPTACLE
  - SPLIT DUPLEX RECEPTACLE
  - ISOLATED GROUND RECEPTACLE
  - GROUND FAULT (GFI) RECEPTACLE
  - ABOVE COUNTER DUPLEX RECEPTACLE
  - ABOVE COUNTER SPLIT DUPLEX RECEPTACLE
  - ABOVE COUNTER GROUND FAULT (GFI) RECEPTACLE
  - FLOOR MOUNTED SINGLE RECEPTACLE
  - FLOOR MOUNTED DUPLEX RECEPTACLE
  - EXPLOSION PROOF SINGLE RECEPTACLE
  - EXPLOSION PROOF DUPLEX RECEPTACLE
  - SPECIAL SINGLE PHASE RECEPTACLE
  - SPECIAL THREE PHASE RECEPTACLE
  - OVERHEAD REEL DUPLEX RECEPTACLE
  - SINGLE PHASE POWER CONNECTION
  - THREE PHASE POWER CONNECTION
  - WELDING RECEPTACLE
- INDICATING LIGHTS**
- ROTATING BEACON (RED) / INDICATING LIGHT (SOLID GREEN)
  - INDICATING LIGHT (SOLID RED) / INDICATING LIGHT (SOLID GREEN)
  - ROTATING BEACON (RED) / ROTATING BEACON (GREEN)
  - INDICATING LIGHT (SOLID AMBER)

- LIGHTING**
- FIXTURE TYPE "A" SURFACE MOUNTED OR SUSPENDED LED FIXTURE
  - RECESSED LED FIXTURE
  - SURFACE MOUNTED OR SUSPENDED 610 x 610 LED FIXTURE
  - RECESSED 610 x 610 LED FIXTURE
  - LED STRIP FIXTURE
  - WALL MOUNTED LED FIXTURE
  - SURFACE MOUNTED OR SUSPENDED UNSWITCHED LED FIXTURE
  - RECESSED UNSWITCHED LED FIXTURE
  - AREA LIGHTING FIXTURE
  - SURFACE MOUNTED OR SUSPENDED LUMINAIRE
  - LUMINAIRE ON EMERGENCY POWER
  - RECESSED LUMINAIRE
  - RECESSED LUMINAIRE ON EMERGENCY POWER
  - WALL MOUNTED LUMINAIRE
  - POLE MOUNTED LUMINAIRE
  - CEILING MOUNTED EXIT SIGN c/w DIRECTION ARROW
  - WALL MOUNTED EXIT SIGN c/w DIRECTION ARROW
  - TENON MOUNTED LUMINAIRE
  - EMERGENCY LIGHTING UNIT c/w BATTERY PACK, CHARGER AND TWO HEADS
  - WALL MOUNTED SINGLE EMERGENCY LIGHTING HEAD c/w JUNCTION BOX
  - WALL MOUNTED DOUBLE EMERGENCY LIGHTING HEAD c/w JUNCTION BOX
  - 1 LAMP BALLAST (REMOTE MOUNTED)
  - 2 LAMP BALLAST (REMOTE MOUNTED)
  - PHOTOELECTRIC CELL
  - FIRE ALARM**
  - FIRE ALARM PANEL AND/OR ANNUNCIATOR
  - BREAK GLASS STATION
  - FIRE ALARM BELL
  - FIRE ALARM HORN AND STROBE c/w CANDELA LEVEL
  - FIRE ALARM PHONE
  - FIRE ALARM SPEAKER
  - SMOKE DETECTOR
  - SMOKE DETECTOR - DUCT MOUNTED
  - COMBINATION HEAT DETECTOR
  - HEAT DETECTOR - FIXED TEMPERATURE
  - HEAT DETECTOR - RATE-OF-RISE
  - FIRE ALARM STROBE LIGHT c/w CANDELA LEVEL
  - END-OF-LINE RESISTOR
  - FLOW SWITCH
  - PRESSURE SWITCH
  - TAMPER SWITCH
  - GAS DETECTOR
  - INFRARED DETECTOR
  - ULTRAVIOLET DETECTOR
  - MAGNETIC DOOR RELEASE
  - ELECTRIC DOOR LOCK
  - PRE-SIGNAL BUZZER
  - CONTROL RELAY MODULE
  - ISOLATOR BASE MODULE
  - ADDRESSABLE ALARM RELAY MODULE
- SECURITY**
- SINGLE DOOR ALARM CONTACT
  - DOUBLE DOOR ALARM CONTACT
  - CARD READER
  - DOOR STRIKE
  - MOTION DETECTOR

- COMMUNICATIONS**
- TELEPHONE TERMINAL BOARD
  - TELEPHONE OUTLET - WALL MOUNTED
  - TELEPHONE OUTLET - FLOOR MOUNTED
  - INTERCOM HANDSET OUTLET - WALL MOUNTED
  - ITS LAN DATA OUTLET
  - SPEAKER - CEILING MOUNTED
  - SPEAKER - WALL MOUNTED
  - GAS ALARM SOUNDER
- GROUNDING**
- GROUND BUS
  - GROUND COMPRESSION CONNECTION
  - EQUIPMENT GROUND CONNECTION
  - THERMIT WELD GROUND CONNECTION
  - GROUND ROD
  - GROUND WELL & ROD
  - GROUND GRID w/ RODS ONLY
  - GROUND GRID w/ WELLS & RODS
- CONTROL**
- SINGLE POLE SWITCH (SWITCH "a")
  - PANEL "A" CIRCUIT "X"
  - 2 SWITCHES IN 2 GANG BOX
  - 3 SWITCHES IN 3 GANG BOX
  - 4 SWITCHES IN 4 GANG BOX
  - TWO POLE SWITCH
  - THREE WAY SWITCH
  - FOUR WAY SWITCH
  - SWITCH c/w PILOT LIGHT
  - MANUAL MOTOR SWITCH
  - MANUAL MOTOR SWITCH c/w PILOT LIGHT
  - KEY OPERATED SWITCH
  - EXPLOSION PROOF SWITCH
  - WEATHERPROOF SWITCH
  - LOW VOLTAGE SWITCH (CIRCUIT "a")
  - LOW VOLTAGE SWITCH (KEY OPERATED, P-PILOT LIGHT)
  - DIMMER SWITCH
  - SPECIAL LOW VOLTAGE SWITCH UNIT (SEE SPECIFICATIONS)
  - LOW VOLTAGE SWITCHING RELAY CABINET
  - MOTION SENSOR SWITCH
  - PHOTOELECTRIC CELL
  - DISCONNECT SWITCH - FUSED
  - DISCONNECT SWITCH - UNFUSED
  - MANUAL MOTOR STARTER
  - MAGNETIC MOTOR STARTER
  - COMBINATION MAGNETIC STARTER
  - LOW VOLTAGE THERMOSTAT
  - LINE VOLTAGE THERMOSTAT
  - HUMIDSTAT
  - ON-OFF CONTROL STATION
  - HAND-OFF-AUTO SELECTOR SWITCH
  - LOCKOUT STOP CONTROL STATION
  - LOCAL-OFF-REMOTE CONTROL STATION
  - SELECTOR SWITCH (HOA, LOR, LO or OA)
  - START-STOP PUSHBUTTON AND SELECTOR SWITCH (HOA, LOR, LO or OA)
  - LOCKOUT STOP PUSHBUTTON
  - START-STOP PUSHBUTTON
  - START-STOP PUSHBUTTON c/w PILOT LIGHT & LOCKOUT STOP
  - START-JOG-STOP PUSHBUTTON
  - EMERGENCY SHUTDOWN PUSHBUTTON
  - THERMISTOR CONTROL TRIPPING UNIT
  - TIME SWITCH
  - LOW VOLTAGE TRANSFORMER (XX-TRANSFORMER NUMBER)

- EQUIPMENT BUS**
- BUS EXTENSION / CONNECTION
  - POWER CIRCUIT BREAKER
  - DRAWOUT POWER CIRCUIT BREAKER
  - AMMETER SWITCH
  - VOLTMETER
  - TRANSUDER
  - CURRENT TRANSFORMER c/w RATIO & QUANTITY
  - ZERO SEQUENCING CURRENT TRANSFORMER c/w RATIO & QUANTITY
  - BUSHING TYPE CURRENT TRANSFORMER c/w RATIO & QUANTITY
  - POTENTIAL TRANSFORMER c/w VOLTAGE RATING & QUANTITY
  - KEY OPERATED INTERLOCK
  - MOTOR OPERATED SWITCH
  - DIGITAL METERING SYSTEM
  - UTILITY POWER METER
  - LIGHTNING ARRESTER w/ GROUNDING GAP
  - LIGHTNING ARRESTER w/ GROUNDING GAP AND SURGE CAPACITOR
  - DRAWOUT FUSED CURRENT TRANSFORMER
  - DELTA-DELTA TRANSFORMER
  - DELTA-WYE GROUND TRANSFORMER
  - DELTA-WYE RESISTOR GROUND TRANSFORMER
  - OPEN DELTA
  - CLOSED DELTA
  - THREE PHASE WYE
  - THREE PHASE WYE TO GROUND
  - THREE PHASE ZIGZAG TO GROUND
  - THREE PHASE WYE w/ RESISTOR TO GROUND
  - MALE & FEMALE DISCONNECT DEVICE
  - CIRCUIT BREAKER
  - DRAWOUT CIRCUIT BREAKER
  - NON-FUSED DISCONNECT SWITCH
  - FUSED DISCONNECT SWITCH
  - FUSED HRC DISCONNECT SWITCH
  - LOAD BREAK DISCONNECT SWITCH
  - FUSED LOAD BREAK DISCONNECT SWITCH
  - HORN GAP SWITCH
  - INTERRUPTER SWITCH
  - FUSED INTERRUPTER SWITCH
  - GROUND SWITCH
  - MAGNETIC ELEMENT
  - CAPACITOR FOR PF CORRECTION c/w KVAR RATING
  - NORMALLY OPEN CONTACT
  - NORMALLY CLOSED CONTACT
  - PROGRAMMABLE LOGIC CONTROLLER
  - REACTOR
  - HARMONIC FILTER
  - TRANSFER SWITCH
  - FLEX CONNECTOR
  - JUNCTION BOX MOUNTED NEAR MOTOR

- RESISTANCE TEMPERATURE DETECTOR
- FVNR MAGNETIC STARTER c/w SIZE
- FVR (REVERSING) STARTER c/w SIZE
- TWO SPEED STARTER c/w SIZE
- THERMAL OVERLOAD RELAY
- ELECTRONIC OVERLOAD c/w RATIO & QUANTITY
- VARIABLE SPEED DRIVE
- SOFT START REDUCED VOLTAGE
- GENERATOR
- SQUIRREL CAGE MOTOR
- MOTORIZED VALVE
- LIGHTING OR POWER PANEL
- VALVE TRAVEL LIMIT SWITCH-NORMALLY OPEN
- VALVE TRAVEL LIMIT SWITCH-NORMALLY CLOSED
- SPECIAL SINGLE PHASE RECEPTACLE
- SPECIAL THREE PHASE RECEPTACLE
- WELDING RECEPTACLE
- MOTOR SPACE HEATER
- SOLID STATE SURGE ARRESTER
- TRANSIENT VOLTAGE SURGE SUPPRESSION
- CURRENT TRANSFORMER SHORTING BLOCK
- PT-CT TEST BLOCK
- TEST BLOCK
- GROUND TO EARTH
- BATTERY
- PROTECTIVE RELAY c/w QUANTITY (1 LINE)
- PROTECTIVE RELAY c/w QUANTITY (2 LINE)
- RELAY SHUNT
- CONTROL POWER TRANSFORMER
- SINGLE or THREE PHASE MOTOR
- MOTOR OPERATED VALVE
- RELAY COIL (1 LINE)
- RELAY COIL (2 LINE)
- RELAY COIL (3 LINE)
- TIMING RELAY COIL w/ TDE -TIME DELAY ENERGIZED, TDD -TIME DELAY DE-ENERGIZED & TIME RANGE
- LIGHTING CONTACTOR COIL
- MOTOR STARTER COIL
- CONTROL RELAY
- AUXILIARY RELAY
- POWER FAILURE RELAY
- OVERLOAD TRIP RELAY

- CLOSING COIL
- HOLDING COIL
- INDICATING PILOT LIGHT c/w LENS COLOR R-RED, G-GREEN, A-AMBER, Y-YELLOW, W-WHITE
- ELAPSED TIME METER
- MOTOR OVERLOAD CONTACT
- TEST SUPPLY PLUG
- FUSE c/w FUSE No. or AMP RATING
- DUMMY FUSE
- ELECTRIC HEATER c/w KILOWATT RATING
- MOTOR SPACE HEATER c/w KILOWATT RATING
- RESISTOR c/w RESISTANCE RATING
- SERIES COIL OR SOLENOID VALVE
- TEMPERATURE CONTROLLER
- SURGE SUPPRESSOR
- MOTOR SURGE SUPPRESSOR
- FUSE ASSEMBLY w/ INDICATING LIGHT c/w FUSE NUMBER AND CURRENT RATING
- INDICATING LIGHT PUSH TO TEST c/w COLOR TYPE
- SEMICONDUCTOR DIODE
- WIRE WITH WIRE NUMBERS
- MECHANICAL CONNECTION
- WIRES CROSSOVER
- WIRES CONNECTED
- FIELD CONNECTION
- NORMALLY CLOSED MUSHROOM HEAD PUSHBUTTON - MOMENTARY
- NORMALLY OPEN PUSHBUTTON - MOMENTARY
- NORMALLY CLOSED PUSHBUTTON - MOMENTARY
- THREE POLE CIRCUIT BREAKER (CONTROL SCHEMATIC ONLY)
- THREE POLE DISCONNECT SWITCH (CONTROL SCHEMATIC ONLY)
- SINGLE POLE SINGLE THROW DISCONNECT SWITCH
- SINGLE POLE DOUBLE THROW DISCONNECT SWITCH
- TWO (2) POSITION SELECTOR SWITCH (ON-OFF SWITCH SHOWN IN ON POSITION)
- THREE (3) POSITION SELECTOR SWITCH (HAND-OFF-AUTO SHOWN IN HAND POSITION)
- DUAL TRANSFER SWITCH
- FLOW SWITCH NORMALLY OPEN OR CLOSED
- LEVEL SWITCH NORMALLY OPEN OR CLOSED
- LIMIT SWITCH NORMALLY OPEN OR CLOSED
- PRESSURE SWITCH NORMALLY OPEN OR CLOSED
- TEMPERATURE SWITCH NORMALLY OPEN OR CLOSED
- TERMINALS - TYPE AND LOCATION ASSIGNMENT DESIGNATED BY PROJECT DESIGN

2018MAR20		ISSUED FOR TENDER		J.D.	J.C.
No.	Date/Date	Description/Description	Drawn by	Approved	
Revision / Revision					
A		B		C	
C		B/C			
Consultant's Name <b>Associated Engineering</b>			Eng. Status 2018-03-29		
Client/Client Parks Canada Agency			L'Agence Parcs Canada		
Western and Northern Region			Ouest et Nord du Canada		
Project title/Titre du projet <b>LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK</b>					
Drawing title/Titre du dessin <b>ELECTRICAL LEGEND</b>					
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date			
	J. DOING	2018FEB16			
Designed by/Conçu par	Reviewed by/Revisé par	Scale/Echelle			
H. MARIANO	D. STABLEFORD	AS SHOWN			
PWSC Project Manager/Administrateur de Projets TPSC J. GIBBONS					
Client Acceptance/Acceptation du client Approved by/Approuvé par					
Project No./No. du projet 20173084-00		Asset No./No. de l'actif 3084-01-E-001		Sheet No./No. de la feuille 14	
Drawing Reference No./No. de référence du dessin 3084-01-E-001					

**GENERAL NOTES:**

- ALL EQUIPMENT TO BE CSA APPROVED. ALL EQUIPMENT INSTALLED TO CSA C22.2, CANADIAN ELECTRICAL CODE AND TO MANUFACTURERS RECOMMENDATIONS. WHERE WIRING SIZE OR CONDUIT SIZE IS NOT SHOWN, SIZE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE.
- ALL ELECTRICAL WORK TO BE CARRIED OUT BY QUALIFIED, LICENSED ELECTRICIANS OR APPRENTICES AS PER THE CONDITIONS OF THE PROVINCIAL ACT RESPECTING MANPOWER VOCATIONAL TRAINING AND QUALIFICATION. EMPLOYEES REGISTERED IN A PROVINCIAL APPRENTICES PROGRAM SHALL BE PERMITTED, UNDER THE DIRECT SUPERVISION OF A QUALIFIED LICENSED ELECTRICIAN, TO PERFORM SPECIFIC TASKS - THE ACTIVITIES PERMITTED SHALL BE DETERMINED BASED ON THE LEVEL OF TRAINING ATTAINED AND THE DEMONSTRATION OF ABILITY TO PERFORM SPECIFIC DUTIES.
- THE WORK OF THIS DIVISION TO BE CARRIED OUT BY A CERTIFIED MASTER ELECTRICIAN WHO HOLDS A VALID MASTER ELECTRICAL CONTRACTOR LICENSE AS ISSUED BY THE PROVINCE THAT THE WORK IS BEING CONSTRUCTED.
- IF THIS SPECIFICATION OR THE REFERENCED DRAWINGS CONFLICT IN ANY WAY WITH THE REQUIREMENTS OF THE APPLICABLE CODES AND/OR STANDARDS, THE MORE RIGOROUS REQUIREMENT SHALL PREVAIL. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLIANCE WITH APPLICABLE CODES AND/OR STANDARDS.
- THE CONTRACTOR SHALL PROVIDE ALL MATERIAL, LABOUR, EQUIPMENT AND TRANSPORTATION AS NECESSARY TO COMPLETE THE PROJECT IN CONFORMITY WITH THE CONTRACT DOCUMENTS. IN GENERAL, THIS WORK INCLUDES EVERYTHING ESSENTIAL FOR A COMPLETE ELECTRICAL SYSTEM IN OPERATING ORDER AS SHOWN OR IMPLIED ON THE DRAWINGS OR HEREINAFTER SPECIFIED.
- SUBMIT TO ELECTRICAL INSPECTION DEPARTMENT AND UTILITY, THE NECESSARY NUMBER OF DRAWINGS AND SPECIFICATIONS FOR EXAMINATION AND APPROVAL PRIOR TO COMMENCEMENT OF WORK. FURNISH CERTIFICATES OF ACCEPTANCE FROM ELECTRICAL INSPECTION DEPARTMENT AND OTHER AUTHORITIES HAVING JURISDICTION ON COMPLETION OF WORK TO ENGINEER. CONTRACTOR IS RESPONSIBLE FOR APPLICATION AND PAYMENT OF ELECTRICAL PERMIT INCLUDING COORDINATION OF SAFETY INSPECTIONS THROUGH SUPERIOR SAFETY CODES INC. OR SIMILAR OUTFIT.
- CONTRACTOR SHALL FURNISH ALL SCAFFOLDING, RIGGING, HOISTING AND SERVICES NECESSARY FOR DELIVERY, ERECTION AND INSTALLATION OF ALL EQUIPMENT AND APPARATUS REQUIRED TO BE INSTALLED BY THE CONTRACTOR. ALL EQUIPMENT SHALL BE REMOVED BY THE CONTRACTOR UPON COMPLETION OF THE PROJECT.
- THE DRAWINGS DEPICTING ELECTRIC WORK ARE DIAGRAMMATIC AND SHOW, IN THEIR APPROXIMATE LOCATION, SYMBOLS REPRESENTING ELECTRICAL EQUIPMENT AND DEVICES. THE EXACT LOCATION OF SUCH EQUIPMENT AND DEVICES SHALL BE ESTABLISHED IN THE FIELD.
- CONTRACTOR SHALL FURNISH AND INSTALL ALL SUCH WORK, PIPING, STRUCTURAL SUPPORTS, ELECTRICAL WIRING AND CONDUIT AND ANY OTHER ADDITIONAL EQUIPMENT FOR A COMPLETE OPERATIONAL SYSTEM.
- UNLESS SPECIFICALLY STATED TO THE CONTRARY, NO MEASUREMENT OF AN ELECTRICAL DRAWING BY SCALE SHALL BE USED AS A DIMENSION. DIMENSIONS NOTED ON THE ELECTRICAL DRAWINGS ARE SUBJECT, IN EACH CASE, TO MEASUREMENTS OF ADJACENT OR PREVIOUSLY COMPLETED WORK AND ALL SUCH MEASUREMENTS NECESSARY SHALL BE TAKEN BEFORE UNDERTAKING ANY WORK DEPENDENT UPON THEM.
- IN THE EVENT OF A CONFLICT BETWEEN THE DRAWINGS AND SPECIFICATIONS THIS CONTRACTOR SHALL BASE HIS BID ON THE GREATER QUANTITY, COST OR QUALITY OF THE ITEM IN QUESTION, UNLESS SUCH CONFLICT IS RESOLVED BY AN ADDENDUM.
- COORDINATE INSTALLATION WITH STRUCTURAL AND MECHANICAL TRADES.
- PROVIDE SHOP DRAWINGS FOR ENGINEERS TO REVIEW.
- PROVIDE ONE (1) SOFT COPY AND TWO (2) HARD COPIES OF OPERATION AND MAINTENANCE MANUALS INCLUDING:
  - RED LINE RECORD DRAWINGS
  - EQUIPMENT AND CABLING TEST AND COMMISSIONING INFORMATION
  - MAINTENANCE PROCEDURES
  - EQUIPMENT CUT SHEET AND MANUALS
  - SHOP DRAWINGS
- CLEAN AND TOUCH UP SURFACES OF SHOP PAINTED EQUIPMENT SCRATCHED OR MARRED DURING SHIPMENT OR INSTALLATION, TO MATCH ORIGINAL PAINT. EQUIPMENT WITH SCRATCHES, DENTS OR OTHER DAMAGE THAT CANNOT BE COMPLETELY RESTORED BY PAINTING SHALL BE REPLACED.
- PROVIDE WARNING SIGNS TO MEET REQUIREMENTS OF ELECTRICAL INSPECTION DEPARTMENT AND ENGINEER.
- CONTRACTOR TO ARRANGE INSTALLATION OF UTILITY SUPPLY AND PROVIDE REQUIRED DOCUMENTATION IN A TIMELY MANNER TO PROVIDE POWER. CONTRACTOR TO WIRE FROM UTILITY SUPPLY POINT TO POWER DISTRIBUTION PANEL.

**PRODUCTS:**

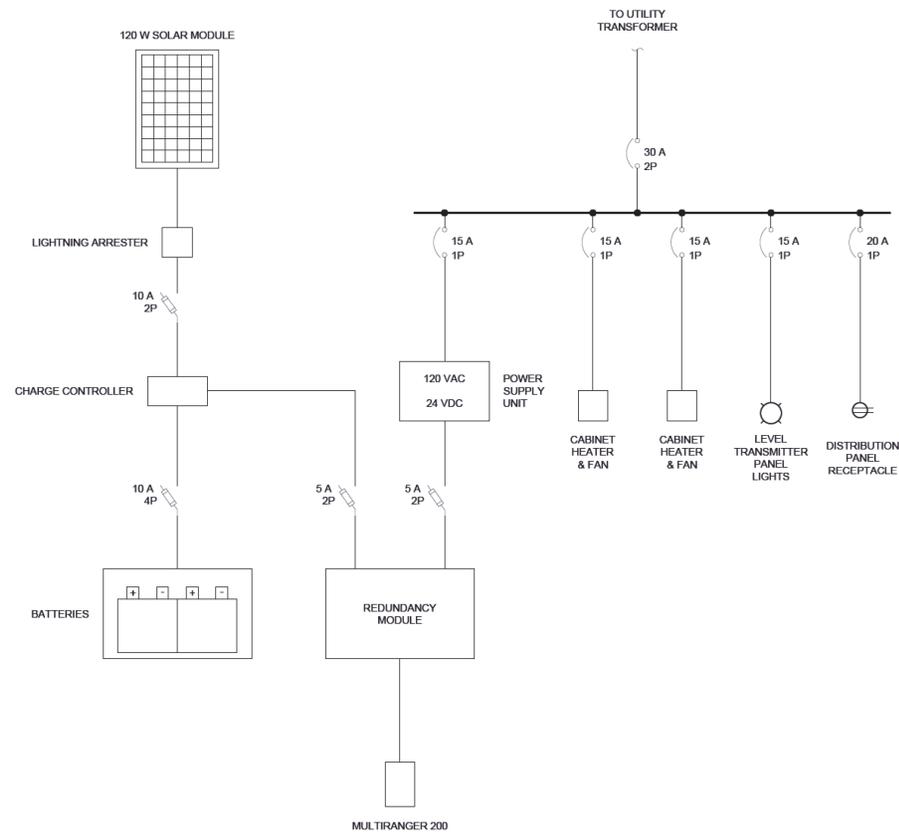
- POWER DISTRIBUTION PANEL AND LEVEL TRANSMITTER PANEL AS PER DRAWINGS.
- CONDUIT:
  - 21mm MINIMUM SIZE CONDUIT.
  - RIGID METAL CONDUIT TO CSA C22.2 NO. 45, GALVANIZED STEEL, THREADED.
  - ELECTRICAL METALLIC TUBING TO CSA C22.2 NO. 83, WITH WEATHERPROOF COUPLING.
  - RIGID PVC BUILDING TO CSA C22.2 NO. 211.1
  - FLEXIBLE PVC CONDUIT TO CAN/CSA 22.2 NO. 227.3.
  - ALL CONDUITS WITH INSULATED GROUND BUSHING.
- WIRING AND CABLES:
  - POWER CABLE: TECK 90 CABLE TO CAN/CSA C22.2 NO. 131, RATED 600 V, WITH RW90 XLPE INSULATION, THERMOPLASTIC POLYVINYL CHLORIDE MATERIAL, ALUMINUM ARMOUR AND OVERALL PVC JACKET RATED FT4. BUILDING WIRE TO BE RATED 600V RW90 XLPE, STRANDED FOR NO. 10 AWG AND LARGER. POWER AND CONTROLS TO BE RUN IN SEPARATE CONDUITS. TECK CABLE FITTING TO BE WEATHERPROOF.
  - PHOTOVOLTAIC WIRE: RPV90 TO CSA22.2 NO. 271 AND 38 RATED 600 V, WITH CROSS-LINKED POLYETHYLENE (XLPE) INSULATION, RATED 90° FOR WET OR DRY LOCATION, UV AND SUNLIGHT RESISTANT, MEETS COLD BEND AND COLD IMPACT TEST AT -40°C.
  - INTERNAL CONTROL PANEL WIRING: RATED NO. 14 AWG, 600 V PVC TYPE INSULATION RATED FOR -40°C TO +105°C, CSA RATING TR-32, UL STYLE 1015, TINNED, STRANDED COPPER CONDUCTOR.
  - INSTRUMENT CABLE NO. 16 AWG, 300 V, INDIVIDUAL SHIELDED TWISTED PAIR, MULTIPAIR CABLE TO BE PROVIDED WITH OVERALL SHIELD, MANUFACTURER TO BE BELDEN.
  - ULTRASONIC LEVEL TRANSMITTER: FACTORY SUPPLIED CABLE, ULTRASONIC LEVEL TRANSDUCER BRACKET TO BE STAINLESS STEEL.
- GROUNDING TO BE COPPER GROUND PLATE. GROUNDING CONNECTORS TO BE NON CORRODING, NECESSARY FOR COMPLETE GROUNDING SYSTEM. ALL GROUNDING CONNECTIONS TO BE COATED WITH COATED WITH CORROSION INHIBITOR SUCH AS DE-OX OR SIMILAR. MANUFACTURER - BURNDY, TYPE AS REQUIRED. GROUND CONDUCTOR SIZE AND GROUND BUS AS SHOWN ON DRAWINGS. PERFORM GROUND CONTINUITY AND RESISTANCE TESTS USING METHOD SUITABLE FOR THE SITE CONDITIONS. PROVIDE TEST RESULTS TO ENGINEER FOR REVIEW. GROUND RESISTANCE OF 5 OHMS OR LESS.
- UG PULL BOX TO BE HUBBELL QUARZITE CATALOG #PG3050BA36, 1622mmL x 911mmW x 914mmH, POLYMER CONCRETE MATERIAL, TIER 22, OPEN BOTTOM COMPLETE WITH TAMPER PROOF LID. SLOPE GROUND AWAY FROM JUNCTION BOX LID. INSTALL ON 150MM DEEP COMPACTED CRUSHED GRAVEL. GRAVEL TO EXTEND 150MM OUT FROM SIDE OF PULL BOX.
- STRUT TO BE GALVANIZED STEEL. REPAIR CUT AND DRILLED SECTION WITH GALVANIZING COMPOUND. ALL CUT EDGES TO BE DEBURRED.

**EXECUTION:**

- RACEWAY:
  - RIGID PVC AND PVC JUNCTION BOXES, RIGID PVC BELOW GRADE, RIGID GALVANIZED STEEL FOR INCOMING SERVICE ABOVE GRADE AND LIQUID TIGHT FLEX FOR CONNECTION TO INSTRUMENTATION AND CONTROL EQUIPMENT. INSTALL FULL STRINGS IN EMPTY CONDUITS. INSTALL EXPANSION JOINTS WHERE CONDUITS ENTER CONTROL PANELS AND PER MANUFACTURER'S RECOMMENDATIONS.
  - BURIED CONDUITS INSTALLED 1000mm BELOW GRADE, 100mm FROM EACH SIDE OF THE TRENCH ON SAND BEDDING (75mm ABOVE AND BELOW CONDUIT) WITH YELLOW MARKER TAPE 300mm ABOVE THE CABLE. BACKFILL AND COMPACT WITH NATIVE BACKFILL.
  - INSTALL CONDUIT AND SLEEVES PRIOR TO POURING OF CONCRETE. SLEEVES THROUGH CONCRETE: SCHEDULE 40 STEEL PIPES, SIZED FOR FREE PASSAGE OF CONDUIT OR CABLE, AND PROTRUDING 50mm.
  - SEAL ALL CONDUITS ENTERING PANELS.
- WIRING:
  - POWER CIRCUITS TO BE RUN IN SEPARATE CONDUITS FROM CONTROL AND INSTRUMENTATION CIRCUIT.
  - ALL WIRING TERMINATIONS MADE ON TERMINALS.
- CONFIGURATION AND CALIBRATION OF INSTRUMENTS TO BE DONE BY SUPPLIER.
- BONDING CONDUCTOR SIZE AS SHOWN OR AS REQUIRED BY THE CEC. RUN A GROUND CONDUCTOR IN EACH CONDUIT.
- TAG WIRING, CABLES AND CONDUITS PER PLANT STANDARDS. TAG CABLE AND CONDUITS WHERE THEY ENTER CONTROL PANELS, LARGE JUNCTION BOXES, MOTOR CONTROL CENTRES, OR WHERE THE CABLE OR CONDUIT PASSES THROUGH WALLS AND AT END DEVICES.
- TAG EQUIPMENT AND JUNCTION BOXES IN ACCORDANCE WITH PLANT STANDARDS.
- TESTING AND COMMISSIONING:
  - ASSIST THE OWNER WITH CONFIRMING INSTRUMENTATION AND CONTROL WIRING LOOP CHECKS BETWEEN THE FIELD DEVICE AND THE PUMP HOUSE PLC. PROVIDE ALL NECESSARY POWER SUPPLY AND INSTRUMENTS FOR TESTING ANALOG AND DIGITAL SIGNALS.
  - TEST ANALOG INPUT SIGNALS BY NOTING THE READING ON THE FIELD DEVICE AND MEASURE THE mA SIGNAL INTO THE PLC. CHECK THAT THE mA READING IS APPROPRIATE FOR THE PROCESS VARIABLE AND THE SPAN OF THE INSTRUMENT.
  - THE OPERATION OF THE EQUIPMENT AND ELECTRICAL SYSTEMS DOES NOT CONSTITUTE AN ACCEPTANCE OF THE WORK BY THE OWNER. THE FINAL REVIEW IS TO BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT AND DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND THE SPECIFICATIONS.
- QUALITY CONTROL:
  - ALL CABLE CONNECTIONS MUST PASS VISUAL INSPECTION FOR WORKMANSHIP AND CONFORMANCE WITH STANDARD PRACTICE.
  - CONTROL WIRING SHALL BE CHECKED FOR PROPER CONNECTION IN ACCORDANCE WITH INTERCONNECTION DIAGRAMS OR TABLES AND FOR TIGHTNESS OF TERMINAL CONTACTS AND CONTINUITY THROUGH EACH "RUN" OF CONTROL CIRCUITING.
  - COMPLETE AND ACCURATE RECORDS OF ALL CABLE TESTS AND INSPECTION SHALL BE MADE.
  - ALL BREAKERS, SWITCHES AND CONTACTORS SHALL BE GIVEN COMPLETE OPERATIONAL TESTS TO DETERMINE THAT ALL DESIGN FUNCTIONS ARE SATISFACTORILY PERFORMED.
  - ALL SWITCHES (CONTROL, INSTRUMENT, DISCONNECT, SAFETY, ETC.) SHALL BE INSPECTED AND TESTED AS TO CLEANLINESS AND OPERATION.
  - FUSES SHALL BE INSPECTED FOR CORRECT RATING.
  - COORDINATE ALL TESTING OF INSTRUMENTS AND EQUIPMENT WITH THE SUPPLIER OR CONTRACTOR OF THOSE DEVICES.
  - ALL WIRE AND CABLE SHALL BE TESTED FOR CONTINUITY.
  - WIRE AND CABLE SHALL BE MEGGERED ONLY AFTER INSTALLATION. EACH PHASE SHALL BE TESTED BETWEEN CONDUCTOR AND GROUND BETWEEN PHASES.
  - MEGGER POWER CIRCUITS AND FEEDERS TO 350 V WITH A 500 V INSTRUMENT. INSULATION RESISTANCE LEVEL SHALL NOT BE LESS THAN 25 MEGOHM AS DETERMINED WITH ALL SWITCHBOARDS, PANELBOARDS, FUSE HOLDERS, SWITCHES AND OVERCURRENT DEVICES IN PLACE.
  - PERFORM CONTINUITY AND RESISTANCE TESTS ON INSTRUMENTATION AND CONTROL WIRING.
  - PERFORM GROUND CONTINUITY AND RESISTANCE TESTS USING METHOD SUITABLE FOR THE SITE CONDITIONS. CARRY OUT TESTS IN THE PRESENCE OF AN OWNER'S REPRESENTATIVE.
  - PROVIDE ALL TEST RESULTS TO ENGINEER FOR REVIEW.
  - SHOULD IT BE FOUND BY THE ENGINEER THAT ANY EQUIPMENT OR ANY PORTION OF THE ELECTRICAL SYSTEM INSTALLED UNDER THIS CONTRACT FAILS TO COMPLY WITH THE CONTRACT DOCUMENTS WITH RESPECT TO QUALITY OF WORKMANSHIP OR MATERIALS, SUCH SHALL BE REPLACED BY THE CONTRACTOR AND ALL OTHER WORK DISTURBED BY CORRECTION OF DEFECTS OR IMPERFECTIONS SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
  - UPON COMPLETION OF THE INSTALLATION, THE CONTRACTOR SHALL FURNISH CERTIFICATES OF APPROVAL FROM ALL AUTHORITIES HAVING JURISDICTION. DEMONSTRATE THAT ALL WORK IS COMPLETE AND IN IDEAL OPERATING CONDITION, WITH RACEWAY AND CONDUIT SYSTEM PROPERLY GROUNDED, ALL WIRING FREE FROM GROUNDS, SHORTS, AND THAT THE ENTIRE INSTALLATION IS FREE FROM PHYSICAL DEFECTS. IN THE PRESENCE OF THE ENGINEER AND THE OWNER, THE CONTRACTOR SHALL DEMONSTRATE THE PROPER OPERATION OF ALL MISCELLANEOUS SYSTEMS.

**PROGRAMMING:**

- PROGRAMMING OF THE NEW LEVEL TRANSMITTER TO PUMP HOUSE CONTROLLER WILL BE DONE BY CONTRACTOR PRIOR TO HANDING OVER TO PARKS CANADA AGENCY.

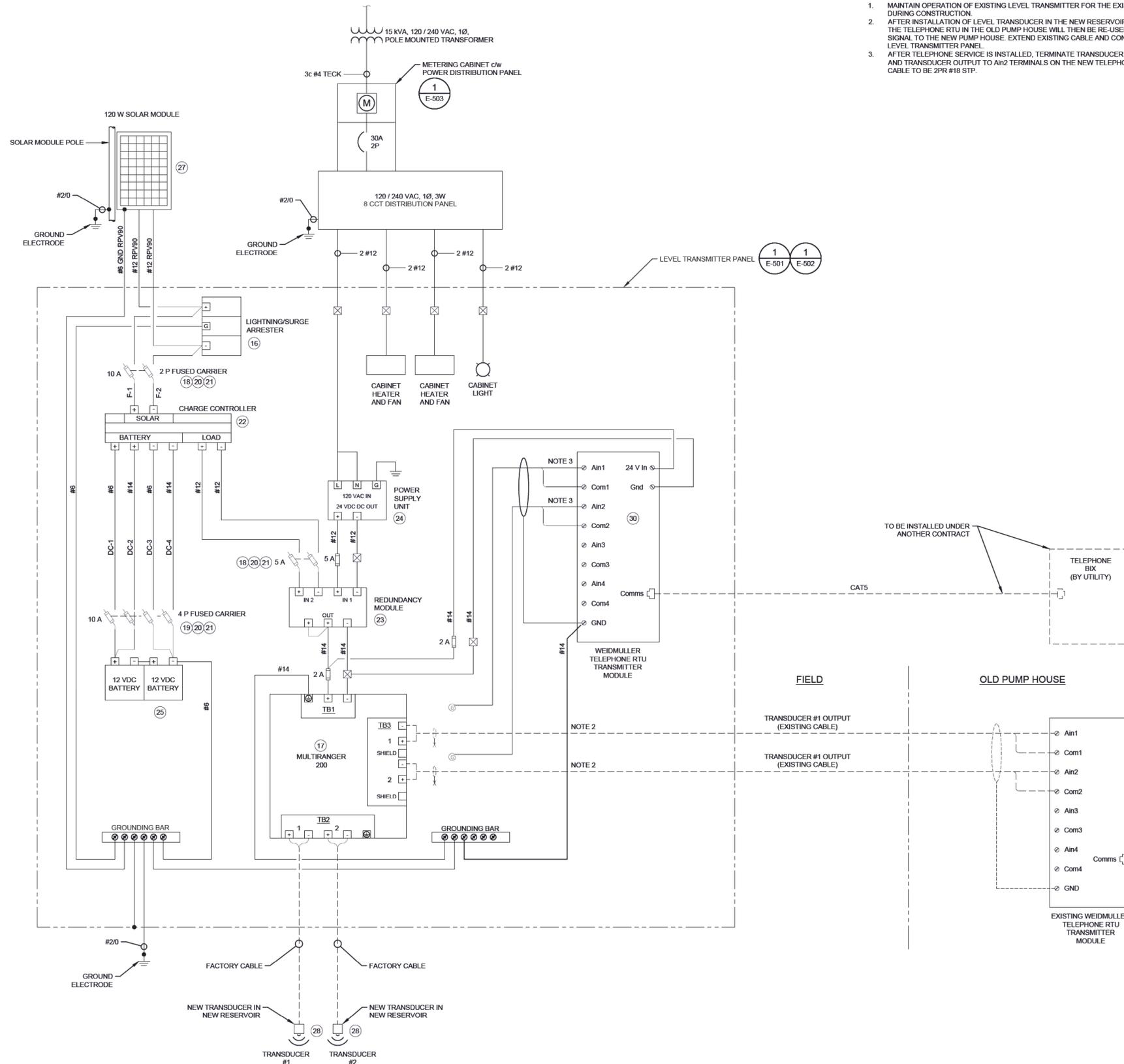


**NOTES:**

- SINGLE LINE DIAGRAM TO BE ENGRAVED ON A 225 mm WIDTH x 250 mm HEIGHT LAMACOID. BACKGROUND COLOR TO BE BLACK AND SINGLE LINE DIAGRAM TO BE WHITE. ELECTRONIC AUTOCAD FILE WILL BE MADE AVAILABLE UPON REQUEST.
- LAMACOID WILL BE INSTALLED ON THE FRONT SIDE OF DISTRIBUTION PANEL.

**1** DIAGRAM N.T.S.  
SOLAR SYSTEM AND CUSTOMER DISTRIBUTION SINGLE LINE

<p>2018MARCH3 ISSUED FOR TENDER J.D. J.C.</p>																												
No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approuvé																								
<p>Revision / Révision</p> <table border="1"> <tr> <td>A</td> <td>B</td> <td>C</td> <td>A</td> <td>B</td> <td>C</td> </tr> <tr> <td colspan="3">A detail number, number de détail</td> <td colspan="3">A</td> </tr> <tr> <td colspan="3">B source drawing no. or client's no.</td> <td colspan="3">B</td> </tr> <tr> <td colspan="3">C detail on drawing no. detail sur dessin no.</td> <td colspan="3">C</td> </tr> </table>					A	B	C	A	B	C	A detail number, number de détail			A			B source drawing no. or client's no.			B			C detail on drawing no. detail sur dessin no.			C		
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<p>Consultant's Name Nom de l'expert-consultant</p> <p><b>Associated Engineering</b></p> <p>APEGA Permit to Practice P 3979</p>		<p>Eng. Status Statut de l'ingénieur</p> <p><b>PROFESSIONAL ENGINEER</b></p> <p>2018-03-29</p>																										
<p>Client/Client</p> <p><b>Parks Canada Agency</b></p> <p>Western and Northern Region</p>		<p>L'Agence Parcs Canada</p> <p>Ouest et Nord du Canada</p>																										
<p>Project title/Titre du projet</p> <p><b>LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK</b></p>																												
<p>Drawing title/Titre du dessin</p> <p><b>ELECTRICAL SPECIFICATIONS AND SINGLE LINE DIAGRAM</b></p>																												
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date																										
	J. DONG	2018FEB28																										
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H. MARIANO	D. STABLEFORD	AS SHOWN																										
<p>FWSC Project Manager/Administrateur de Projets TPSC</p> <p>J. GIBBONS</p>																												
<p>Client Acceptance/Acceptation du client Approved by/Approuvé par</p>																												
<p>Project No./No. du projet</p> <p>20173084-00</p>		<p>FWSC Project Manager/Administrateur de Projets TPSC</p> <p>Asset No./No. de l'actif</p> <p>20173084-00</p>		<p>Sheet No./No. de la feuille</p> <p><b>15</b></p>																								
<p>Drawing Reference No./No. de référence du dessin</p> <p><b>3084-01-E-002</b></p>																												



- NOTES:**
1. MAINTAIN OPERATION OF EXISTING LEVEL TRANSMITTER FOR THE EXISTING RESERVOIR DURING CONSTRUCTION.
  2. AFTER INSTALLATION OF LEVEL TRANSDUCER IN THE NEW RESERVOIR, EXISTING SIGNAL CABLE TO THE TELEPHONE RTU IN THE OLD PUMP HOUSE WILL THEN BE RE-USED TEMPORARILY TO TRANSMIT SIGNAL TO THE NEW PUMP HOUSE. EXTEND EXISTING CABLE AND CONDUIT TO THE NEW LEVEL TRANSMITTER PANEL.
  3. AFTER TELEPHONE SERVICE IS INSTALLED, TERMINATE TRANSDUCER OUTPUT # 1 TO Ain1 AND TRANSDUCER OUTPUT # 2 TO Ain2 TERMINALS ON THE NEW TELEPHONE RTU MODULE. CABLE TO BE 2PR #18 STP.

1 SCHEMATIC  
LEVEL TRANSMITTER PANEL WIRING N.T.S.

No.	Date/Date	Description/Description	Drawn by/Dessiné par	Approved/Approuvé
0	2018MAR23	ISSUED FOR TENDER	J.D.	J.C.

Revisions / Révisions

A	B	C

Consultant's Name / Nom de l'expert-consultant: **Associated Engineering**

Eng. Status / Statut de l'ingénieur: **PROFESSIONAL ENGINEER MEMBER**

APEGA Permit to Practice P 3979

2018-03-29

Client/Client: <b>Parks Canada Agency</b>	L'Agence Parcs Canada
Western and Northern Region	Ouest et Nord du Canada

Project title/Titre du projet: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

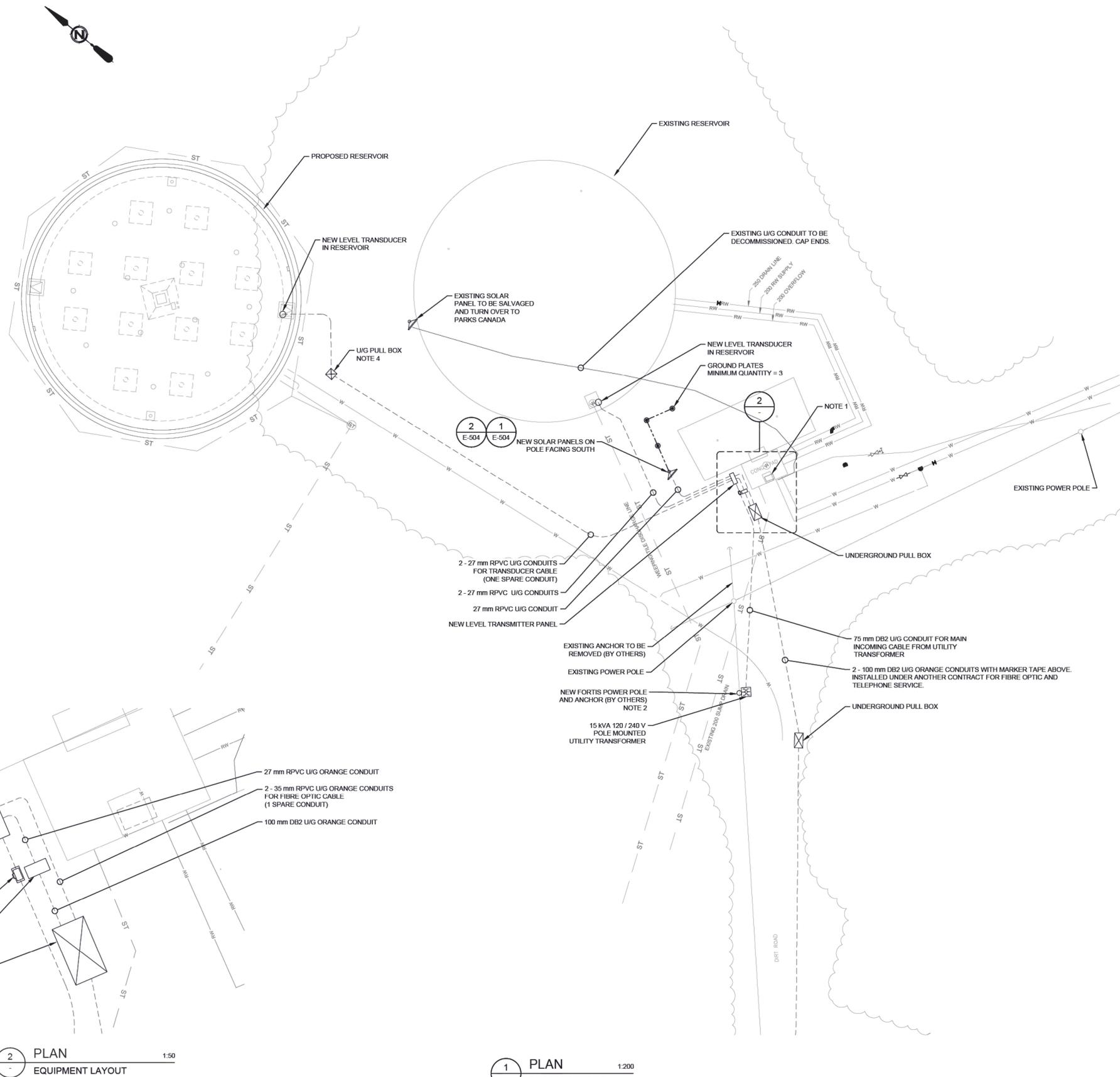
Drawing title/Titre du dessin: **LEVEL TRANSMITTER PANEL WIRING SCHEMATIC**

Surveyed by/Arpenté par: J. DONG	Drawn by/Dessiné par: J. DONG	Date/Date: 2018FEB23
Designed by/Concepté par: H. MARIANO	Reviewed by/Revisé par: D. STABLEFORD	Scale/Echelle: AS SHOWN
PWSC Project Manager/Administrateur de Projets TPSC: J. GIBBONS		
Client Acceptance/Acceptation du client: Approved by/Approuvé par: [Signature]		
Project No./No. du projet: 20173084-00	Asset No./No. de l'actif: 20173084-00	Sheet No./No. de la feuille: 16
Drawing Reference No./No. de référence du dessin: 3084-01-E-003		21

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DATE: 2018-03-18, Howard Mariano

**NOTES:**

1. MAINTAIN OPERATION OF EXISTING RESERVOIR LEVEL TRANSMITTER DURING CONSTRUCTION OF THIS CONTRACT.
2. SUPPLY AND INSTALL GALVANIZED STEEL CABLE GUARD (100mmØ, 2400mm LONG) SECURED ON POLE.
3. PROVIDE PULL CORD IN ALL SPARE UNDERGROUND CONDUITS.
4. U/G PULL BOX TO BE HUBBELL QUARZITE PG STYLE, TIER 8, OPEN BOTTOM, 450mm DEEP, 610mm x 330mm, TAMPER PROOF LID. SLOPE GROUND AWAY FROM JUNCTION BOX LID. INSTALL ON 150mm DEEP COMPACTED CRUSHED GRAVEL. GRAVEL TO EXTEND 150mm OUTSIDE FROM SIDE OF PULL BOX.



2 PLAN  
EQUIPMENT LAYOUT 1:50

1 PLAN  
RESERVOIR SITE 1:200

0	2018MAR23	ISSUED FOR TENDER	J.D.	J.C.
No.	Date/Date	Description/Description	Drawn by/Dessiné par	Approved/Approuvé

Revision / Révision	
A	A
B	B
C	C

Consultant's Name / Nom de l'expert-consultant: **Associated Engineering**

Eng. Status / Statut de l'ingénieur: **PROFESSIONAL ENGINEER / INGÉNIEUR**

2018-03-29

Client/Client: <b>Parks Canada Agency</b>	L'Agence Parcs Canada
Western and Northern Region	Ouest et Nord du Canada

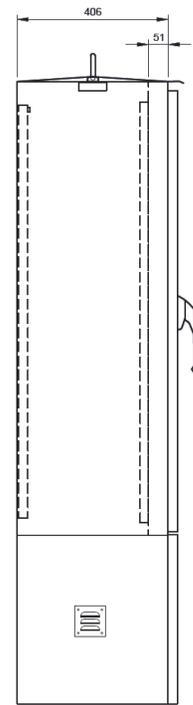
Project title/Titre du projet: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Drawing title/Titre du dessin: **ELECTRICAL SITE PLAN**

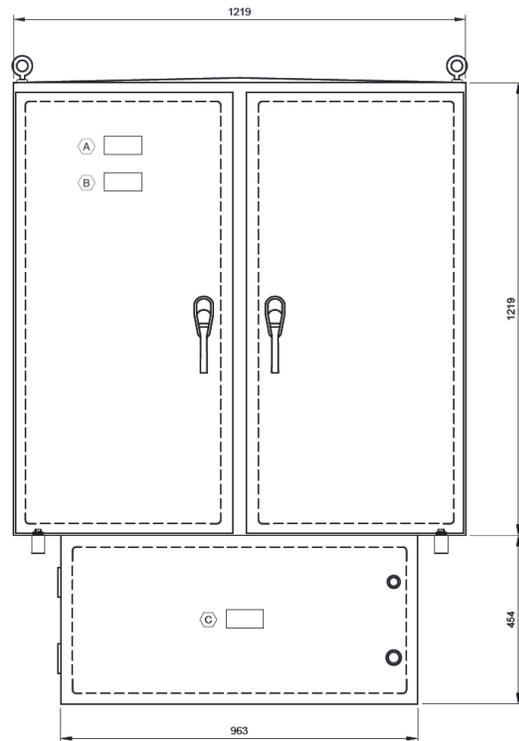
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Designed by/Concepté par: H. MARIANO	Reviewed by/Révisé par: D. STABLEFORD	Scale/Echelle: AS SHOWN
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Drawing Reference No./No. de référence du dessin: 3084-01-E-101		21

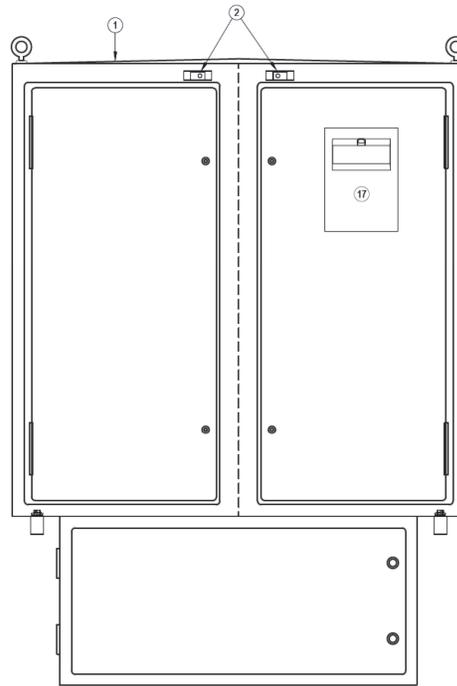
BILL OF MATERIAL				
ITEM No.	QTY	DESCRIPTION	MANUFACTURER	MODEL
1	1	CSA TYPE 4X 48"H X 60"W X 16"D FREEDOM 2 ENCLOSURE C/W BACK PANELS, SIDE PANEL, PADLOCKING KITS & INNER DOORS. PANEL INTERIOR TO BE INSULATED WITH 12.5 mm (1/2") THICK FOAM BOARD FOIL WITH TAPED EDGES	ACE	M3676-0217
2	2	DOOR SWITCH	HOFFMAN	ALFSWD
3	2	ENCLOSURE LED LIGHT	HOFFMAN	LEDA1M35
4	2	ENCLOSURE FAN & FILTER	HOFFMAN	HF0416414
5	2	STAINLESS STEEL LOUVERS C/W FILTER	HOFFMAN	AVK33SS6 c/w AFLT33
6	2	CABINET HEATER, 100 W, 120 V	HOFFMAN	DAH1001A
7	2	THERMOSTAT	HOFFMAN	ATEMNO
8	2	GROUND BAR c/w ISOLATION STAND-OFF	PANDUIT	UGB2/0-414-12 & UGB-IN-SO
9	AS REQ'D	25 mmW x 50 mmW PANDUIT	PANDUIT	F1X2WH6
10	AS REQ'D	50 mmW x 50 mmW PANDUIT	PANDUIT	F2X2WH6
11	AS REQ'D	SAK 4/EN TERMINAL BLOCKS	WEIDMULLER	0467460000
12	AS REQ'D	ASK 1/EN FUSE TERMINAL BLOCKS	WEIDMULLER	0474560000
13	AS REQ'D	EK 4/35 GROUND TERMINAL BLOCKS	WEIDMULLER	0661160000
14	AS REQ'D	EW35 END STOPS	WEIDMULLER	383560000
15	AS REQ'D	DIN RAIL	WEIDMULLER	514510000
16	1	LIGHTNING / SURGE ARRESTER	PHOENIX CONTACT	VAL-MS-T1/T2 1000DC-PV/2+V - 2801160
17	1	LEVEL TRANSMITTER	SIEMENS MULTIRANGER 200	7ML5033-2CB101A + 7ML1830-2AK
18	2	2 POLE DIN-RAIL FUSE HOLDER	EATON BUSSMANN	CHPV2U
19	1	4 POLE DIN-RAIL FUSE HOLDER	EATON BUSSMANN	CHM4DU
20	AS REQ'D	FAST ACTING PHOTOVOLTAIC FUSE, 10A, 5A	EATON BUSSMANN	PVM-10, PVM-5
21	AS REQ'D	PROTECTIVE COVER	EATON BUSSMANN	FSCVR
22	1	CHARGE CONTROLLER	MORNINGSTAR	PS-15
23	1	REDUNDANCY MODULE WITH PROTECTIVE COATING	PHOENIX CONTACT	QUINT - ORING/24DC/2X20/1X40 - 2320186
24	1	DC POWER SUPPLY	PHOENIX CONTACT	QUINT - PS/1AC/24VDC/5
25	2	BATTERY	STARK ENERGY	AGM-12121-C1
26	2	BATTERY INSULATION KIT	DEI	010480
27	1	120 W (24 V) PHOTOVOLTAIC MODULE	AMERESCO SOLAR	120J-B (24V)
28	2	LEVEL TRANSDUCER c/w FACTORY CABLE	MILLTRONICS	XPS-15
29	2	STAINLESS STEEL VENT DRAIN, TYPE 4X.	HOFFMAN H2OMIT	AVDR4SS4
30	1	TELEPHONE RTU TRANSMITTER	WEIDMULLER	991652
31	1	FIBRE OPTIC PATCH PANEL	DINSPACE	SNAP-12SC-SM



LEFT SIDE VIEW



FRONT VIEW



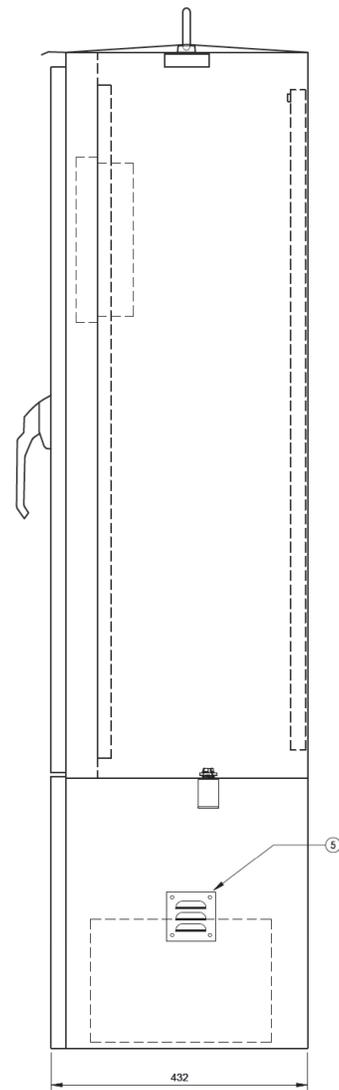
FRONT VIEW (DOORS REMOVED)

LAMACOID NAMEPLATE SCHEDULE						
ITEM	QTY	LINE 1	LINE 2	TEXT COLOR	LAMACOID COLOR	
(A)	1	CAUTION:	MULTIPLE SOURCES OF POWER	WHITE	RED	50 x 100
(B)	1	LEVEL TRANSMITTER	PANEL	BLACK	WHITE	50 x 100
(C)	1	BATTERY SECTION		BLACK	WHITE	50 x 100

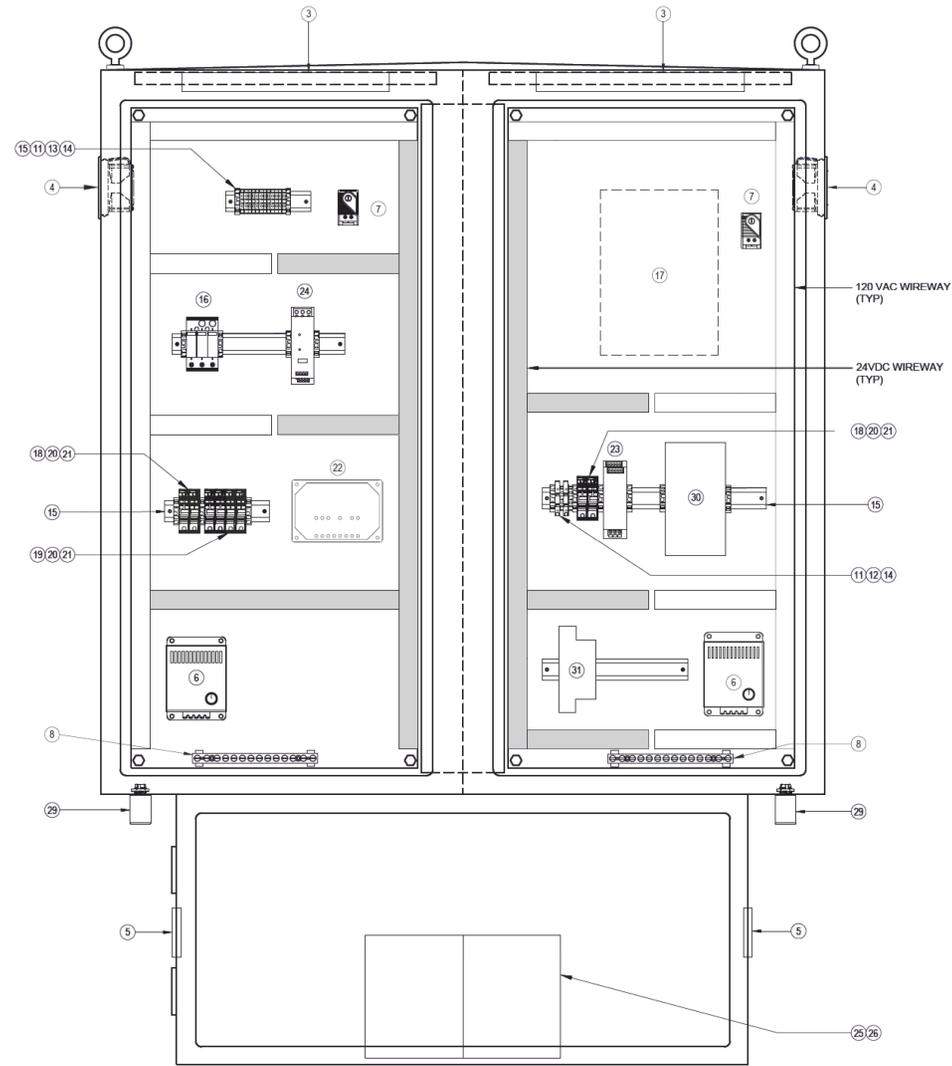


P:\2017\3084\00_mechanical\working_dwg\3084-01-E-5018-502.dwg  
DATE: 2018-03-19, Howard Marino

2018MAR20		ISSUED FOR TENDER	J.D.	J.C.
No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approved
Revision / Revision				
(A)		(B)		(C)
A detail number numero de detail		B source drawing no. no. de dessin		C detail on drawing no. detail sur dessin no.
Consultant's Name Nom de l'expert-consultant			Eng. Stamp Sceau de l'ingénieur	
 Associated Engineering APEGA Permit to Practice P 3979			 PROFESSIONAL ENGINEER INGÉNIEUR PROFESSIONNEL LOTO MONTREAL 2018-03-29	
Client/Client		L'Agence Parcs Canada		
Parks Canada Agency Western and Northern Region		L'Agence Parcs Canada Ouest et Nord du Canada		
Project title/Titre du projet <b>LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK</b>				
Drawing title/Titre du dessin <b>LEVEL TRANSMITTER PANEL DETAILS AND</b>				
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date		
	J. DONG	2018FEB16		
Designed by/Concepté par	Reviewed by/Revisé par	Scale/Echelle		
H. MARIANO	D. STABLEFORD	AS SHOWN		
PWSC Project Manager/Administrateur de Projets TPSC J. GIBBONS				
Client Acceptance/Acceptation du client		Approved by/Approuvé par		
Park Resources Officer/Agent Ressources				
Project No./No. du projet		Asset No./No. de l'actif		Sheet No./No. de la feuille
20173084-00				18
Drawing Reference No./No. de référence du dessin				21
3084-01-E-501				

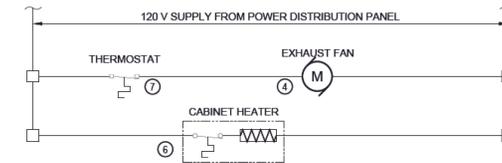


RIGHT SIDE VIEW



FRONT VIEW  
(INNER DOORS REMOVED)

1 DETAIL  
LEVEL TRANSMITTER PANEL 1:5



2 DIAGRAM  
CABINET EXHAUST FAN WIRING N.T.S.

No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approuvé
0	2018MAR23	ISSUED FOR TENDER	J.D.	J.C.

Revision / Révision

A	B	C
A detail number numéro de détail	A source drawing no. no. de dessin	A detail on drawing no. détail sur dessin no.

Consultant's Name  
Nom de l'expert-consultant

Eng. Status  
Statut de l'ingénieur

**Associated Engineering**  
APEGA Permit to Practice P 3979

PROFESSIONAL ENGINEER  
INGÉNIEUR PROFESSIONNEL  
LOYD W. HARRIS  
2018-02-29

Client/Client	Parks Canada Agency Agence des Parcs Canada	L'Agence Parcs Canada
	Western and Northern Region	Ouest et Nord du Canada

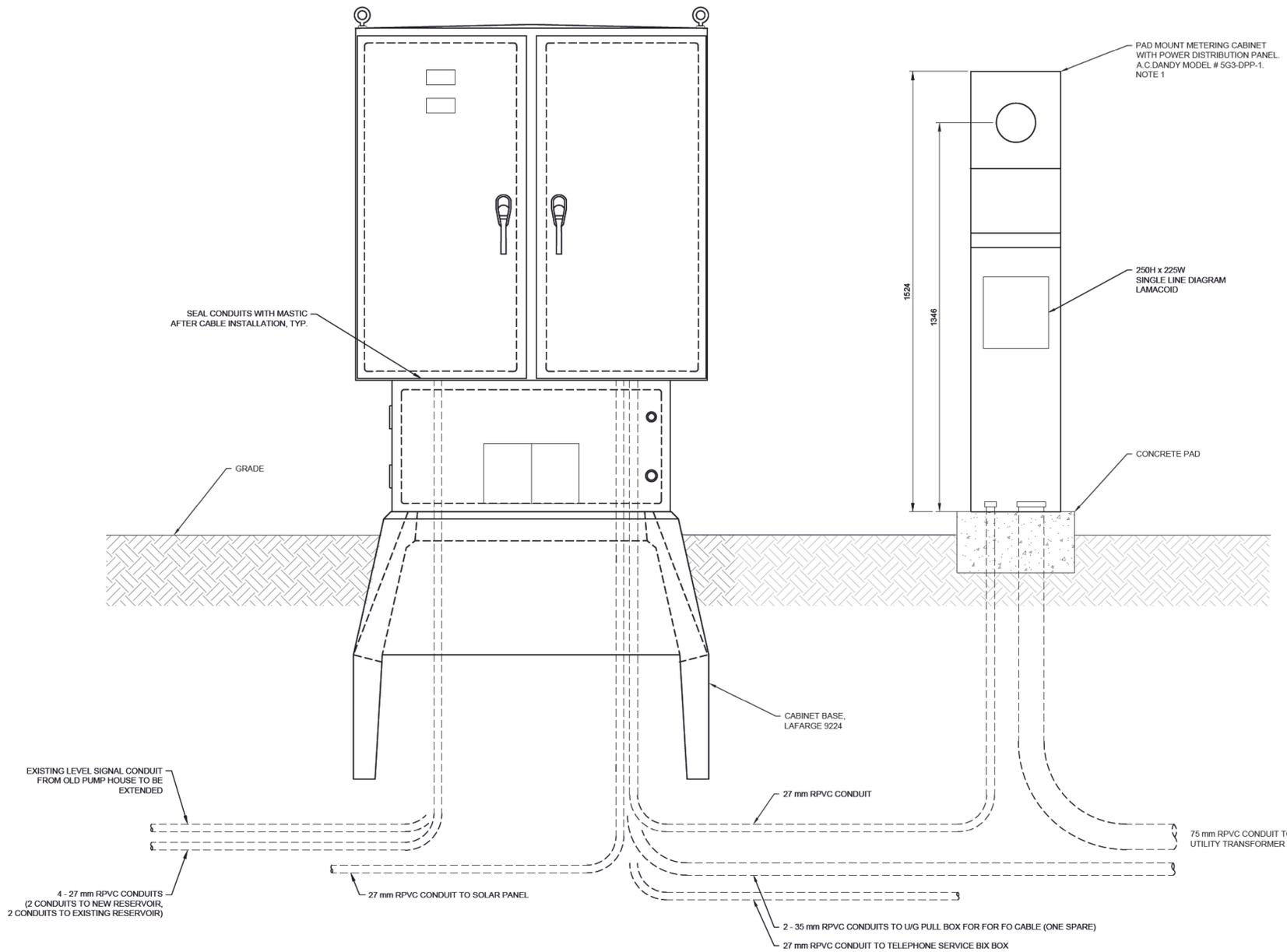
Project title/Titre du projet  
**LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

Drawing title/Titre du dessin  
**LEVEL TRANSMITTER PANEL DETAILS**

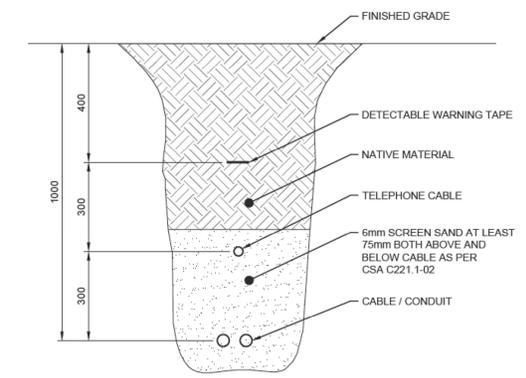
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	J. DONG	2018FEB16
Designed by/Concepté par	Reviewed by/Révisé par	Scale/Echelle
H. MARIANO	D. STABLEFORD	AS SHOWN
PWSC Project Manager/Administrateur de Projets TPSC J. GIBBONS		
Client Acceptance/Acceptation du client Approved by/Approuvé par		
Park Resource Officer/Agent Ressources		
Project No./No. du projet	Asset No./No. du bien	Sheet No./No. de la feuille
2017304-00		19
Drawing Reference No./No. de référence du dessin		
3084-01-E-502		21

**NOTES:**

1. PAD MOUNTED METERING CABINET WITH POWER DISTRIBUTION PANEL TO BE A.C. DANDY MODEL # 5G3-DPP-1, 1524mmH x 311.2mmW x 165.1mmD.
  - 1.1. EEMAC 3R ENCLOSURE.
  - 1.2. RAIN PROOF & STEEL RESISTANT FOR OUTDOOR USE.
  - 1.3. BUILT IN METER SOCKET IN ACCORDANCE WITH FORTIS ALBERTA REQUIREMENTS.
  - 1.4. MAIN BREAKER AND 8 CIRCUIT PANEL.
  - 1.5. SERVICE ENTRANCE RATED 120/240 V 10 KAIC.
  - 1.6. GALVANIZED STEEL CW ASA 61 GREY POWDER COAT FINISH.
  - 1.7. CONCRETE BASE MOUNT STYLE PEDESTAL CW BOTTOM OPENING.
  - 1.8. MAIN BREAKER COVER IS HINGED UP, PADLOCKABLE & SEALABLE. SAFETY SOFT MACHINE FORMED CORNERS ON ROOF & DOORS.
  - 1.9. 2" PVC UTILITY SUPPLY RISER CONDUIT IS ON THE LEFT SIDE & LEVEL TO BOTTOM OF THE CABINET FROM METER SOCKET.
- 1.10. 20 A DUPLEX 5 mA GFCI RECEPTACLE #5-20R & 1P 20A CB. FULLY CSA APPROVED ASSEMBLY. SERVICE ENTRANCE RATED. LUGS ARE CU/AL RATED.
- 1.11. BRANCH CIRCUIT BREAKERS TO BE 15 A 1 P.



1 DETAIL 1:8  
- PANEL ARRANGEMENT



2 DETAIL N.T.S.  
- TYPICAL UNDERGROUND DIRECT BURIED CABLE AND CONDUIT INSTALLATION

No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Apprové
0	2018MAR23	ISSUED FOR TENDER	J.D.	J.C.

Consultant's Name / Nom de l'expert-conseil: **Associated Engineering**

Eng. Status / Statut de l'ingénieur: **PROFESSIONAL ENGINEER MEMBER**

APEGA Permit to Practice P 3979

2018-03-29

Client/Client: <b>Parks Canada Agency</b>	L'Agence Parcs Canada
Western and Northern Region	Ouest et Nord du Canada

Project title/Titre du projet: **LAKE LOUISE 2018 WATER SYSTEM UPGRADES RESERVOIR CONTRACT BANFF NATIONAL PARK**

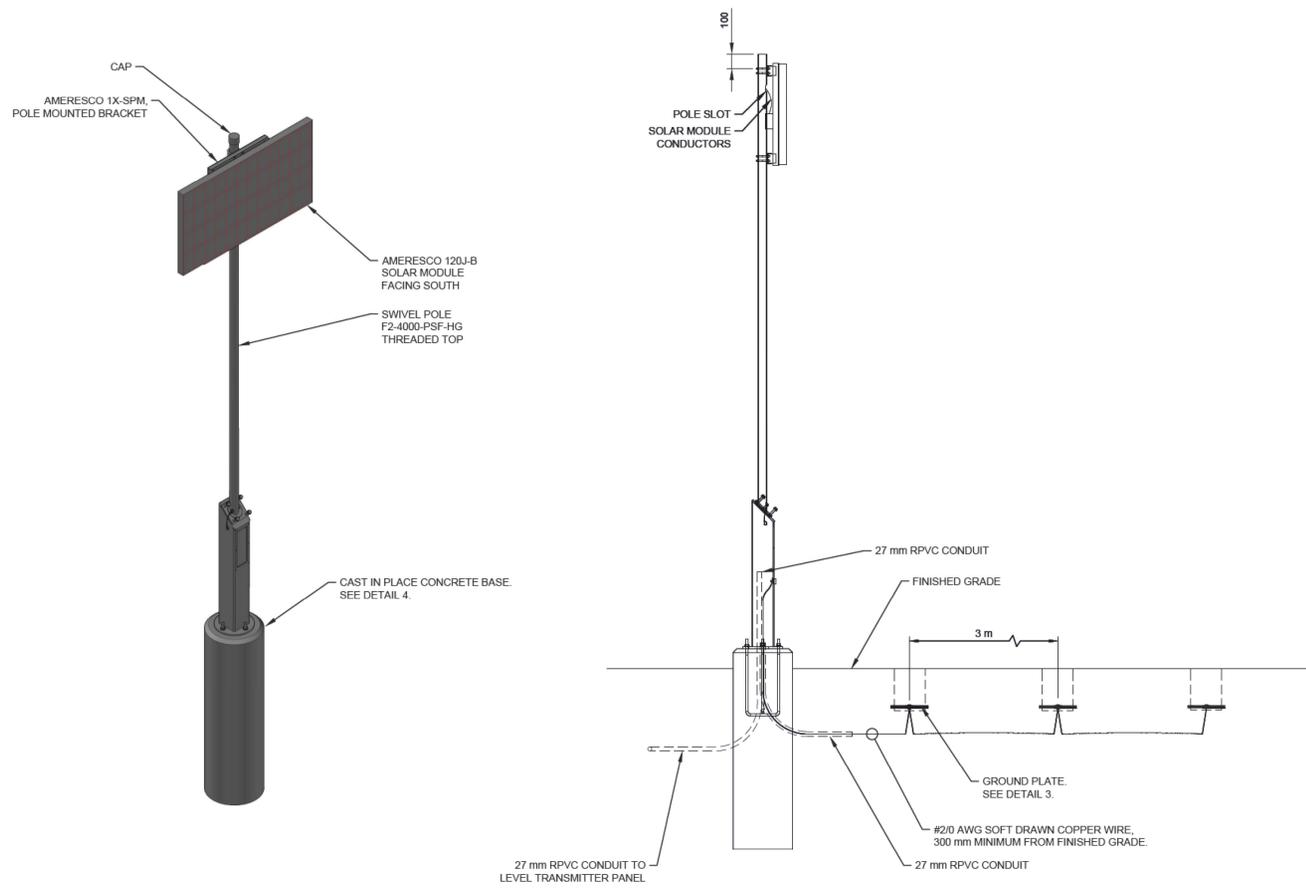
Drawing title/Titre du dessin: **INSTALLATION DETAILS PANEL ARRANGEMENT AND**

Surveyed by/Arpenté par: J. DONG	Drawn by/Dessiné par: J. DONG	Date/Date: 2018FEB23
Designed by/Concepté par: H. MARIANO	Reviewed by/Revisé par: D. STABLEFORD	Scale/Echelle: AS SHOWN

Client Acceptance/Acceptation du client: J. GIBBONS

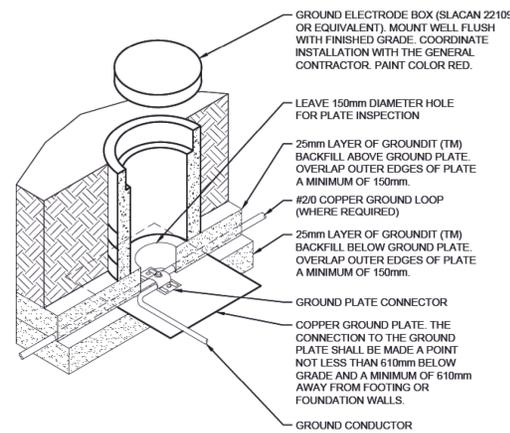
Approved by/Approuvé par: J. GIBBONS

Project No./No. du projet: 20173084-00	Sheet No./No. de la feuille: 20
Drawing Reference No./No. de référence du dessin: 3084-01-E-503	



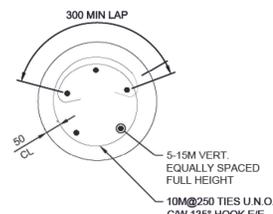
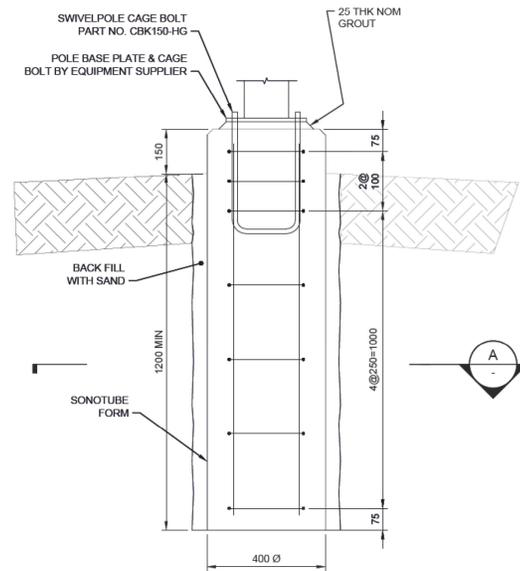
1 VIEW 1:20  
SOLAR PANEL INSTALLATION

2 DETAIL 1:20  
SOLAR PANEL INSTALLATION

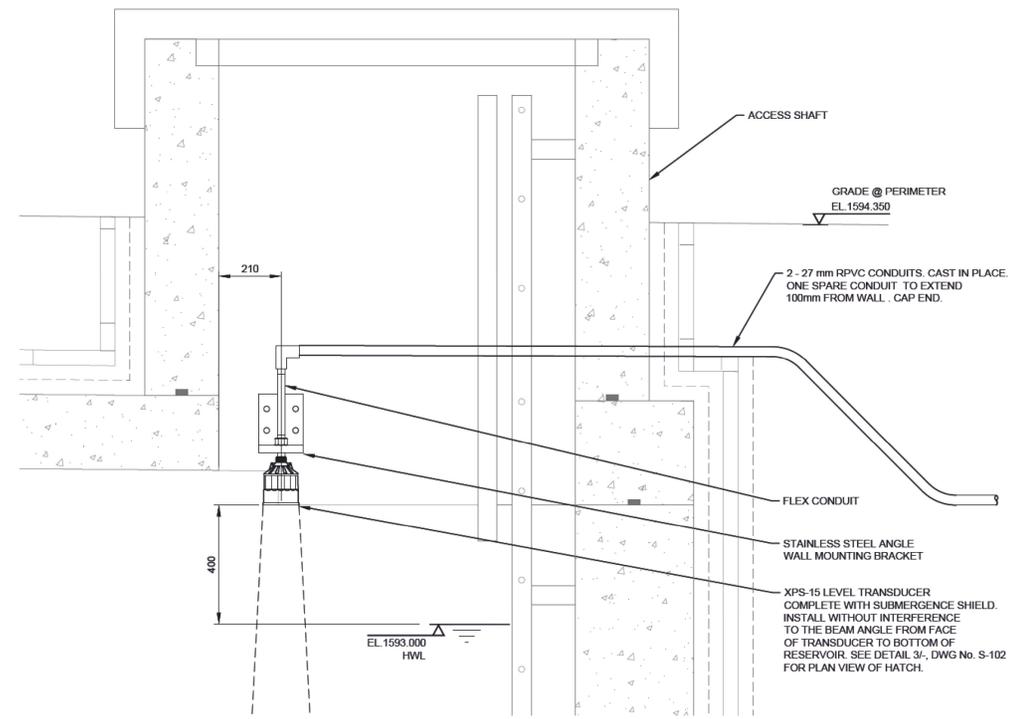


NOTES:  
1. GROUND CONDUCTORS SHALL NOT COME INTO DIRECT CONTACT WITH EARTH.  
2. THE GENERAL CONTRACTOR SHALL CLEARLY MARK ALL OTHER SYSTEMS BELOW GRADE PRIOR TO THE COMMENCEMENT OF THE GROUND SYSTEM INSTALLATION.

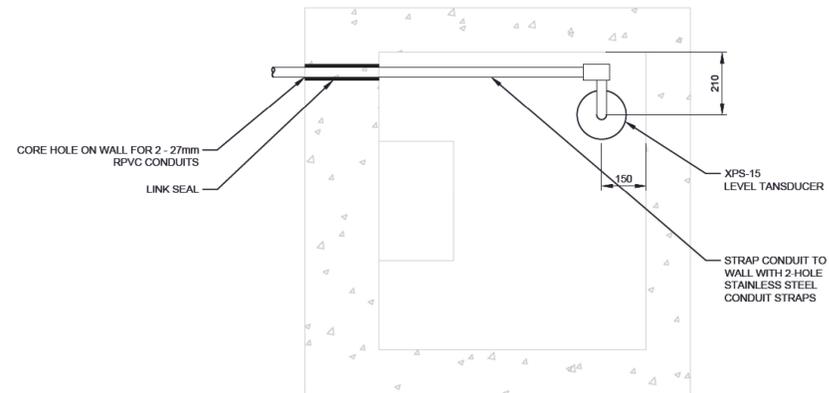
3 DETAIL NTS  
GROUND PLATE INSTALLATION



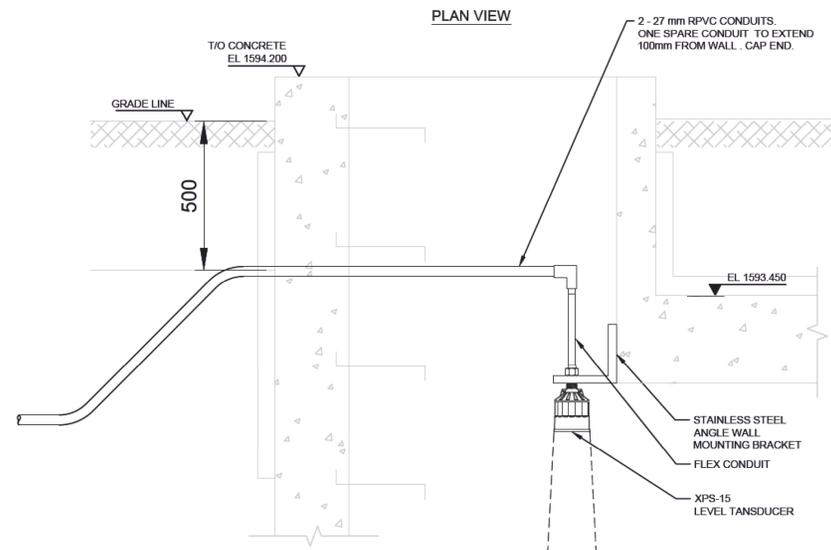
4 DETAIL 1:10  
POLE BASE INSTALLATION



5 DETAIL NTS  
LEVEL TRANSDUCER INSTALLATION IN NEW RESERVOIR



PLAN VIEW



6 DETAIL NTS  
LEVEL TRANSDUCER INSTALLATION IN EXISTING RESERVOIR

0	2018MAR23	ISSUED FOR TENDER	J.D.	J.C.
No.	Date/Date	Description/Description	Drawn by	Approved

Revision / Revision	
A	B
C	C
A detail number B source drawing no. C detail on drawing no.	

Consultant's Name  
Nom de l'expert-consultant

Eng. Shomo  
Sobou de l'ingénieur

**Associated Engineering**

APEGA Permit to Practice P 3979

2018-03-29

Client/Client	Parcs Canada Agency	L'Agence Parcs Canada
	Western and Northern Region	Ouest et Nord du Canada

Project title/Titre du projet  
**LAKE LOUISE 2018  
WATER SYSTEM UPGRADES  
RESERVOIR CONTRACT  
BANFF NATIONAL PARK**

Drawing title/Titre du dessin  
**INSTALLATION DETAILS  
SOLAR PANEL AND  
LEVEL TRANSDUCER**

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date/Date
	J. DONG	2018MAR21
Designed by/Concepté par	Reviewed by/Revisé par	Scale/Echelle
H. MARIANO	D. STABLEFORD	AS SHOWN

Client Acceptance/Acceptation du client	Approved by/Approuvé par

Project No./No. du projet	Asset No./No. de l'actif	Sheet No./No. de la feuille
20173084-00		21
Drawing Reference No./No. de référence du dessin	3084-01-E-504	