GENERAL

The following changes / clarifications in the tender documents are effective immediately. This Addendum will form part of the Contract Documents.

SPECIFICATIONS

1. Section 00 00 01 – Index to Plans and Specifications

   Replace with the **attached** Index to Plans and Specifications.

   Changes: Add the following Appendices:

   B *Rogers Pass Water Treatment Plant – Original As-Built Drawings (May 1995)* – **Attached**

   These drawings relate to the initial construction of the plant and are provided for informational purposes only. The Contractor is to make themself aware of the modifications made to the plant since these were developed and constructed. Included in this set is drawings is the plan identified in Appendix A – Process System Layout Details (Drawing G95R1P2, dated 95-03-03).

   C *Rogers Pass Water Treatment Plant – Well Head Supply Lines As-Built Sketch* – **Attached**

   This sketch shows as-built information for the installed water line and duct work outside the treatment plant.

2. Section – 11 02 27 – Package Sodium Hypochlorite System

   Part 2.2 – Add the following:

   .7 Supply and install the following signage:

   .1 one (1) "Danger Sodium Hypochlorite" sign, installed prominently on the exterior of the chlorine room door.

   .2 Sign shall be vinyl or polyethylene plastic material.

3. Section – 22 42 01.01 – Appurtenances

   Part 3.2 – Add the following:

   .4 Install the flow switch in-line between the thermostatic mixing valve and emergency shower/eyewash unit, as per the manufacturer's instructions. The assumed location for the switch, as shown on Drawing E03, is to be confirmed by the Contractor.

DRAWINGS

1. Existing Water Treatment System on Sheet P03 is adapted from UMA Piping & Instrumentation Diagram. Project #77146, Drawing Reference No. G95R1, Sheet No. P1.
2. Section 2 on Drawing M101 – below is a supplemental sketch of the tie-in point to existing piping, supplied for information purposes:

TIE INTO EXISTING PIPING

CLARIFICATIONS

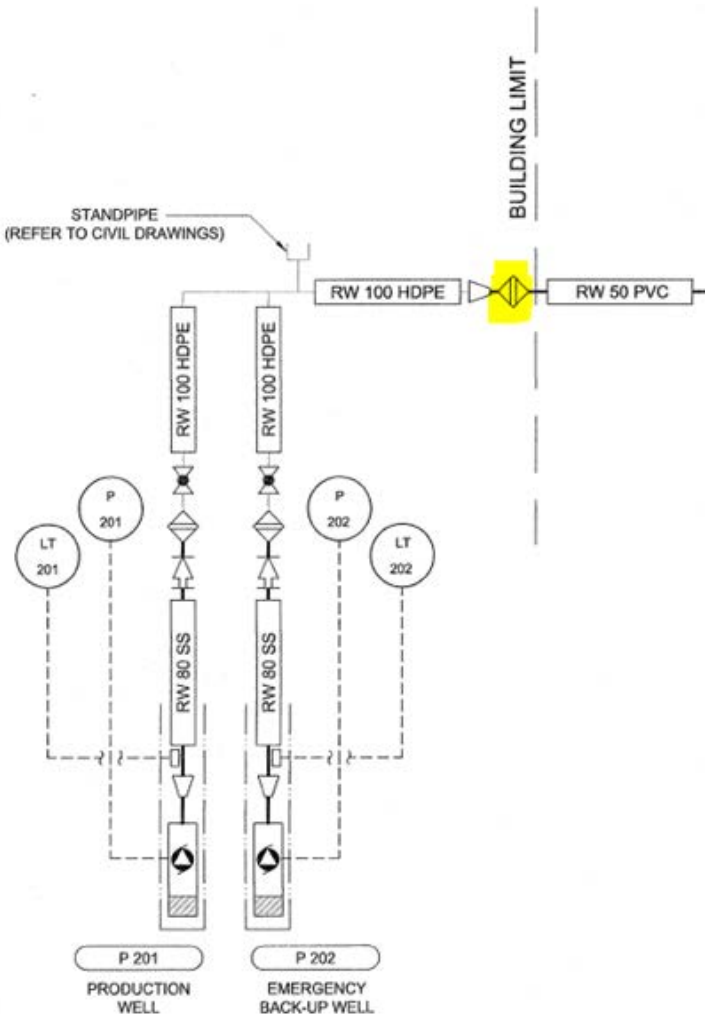
Questions Received by PWGSC to July 28, 2016

1. *Is any loose material to be supplied by the owner (i.e. pumps pipe, etc) for this project?*

   Contractor is to supply all materials necessary for the completion of the work.

2. *Where is item 15 on the Bill of Materials on Drawing M101?*

   Item 15 is a socket x grooved coupling that is located outside the building in the utilidor, shown on P04 (highlighted below) and specified in Section 22 11 16.02.



3. *Clarification on Note 10 on Drawing M101. What is an existing pressure gauge assembly?*

   Contractor to familiarize themselves with the existing assembly and connections of pressure gauge on-site, and install new pressure gauges with similar assemblies. No further information will be provided on these.

4. *Note 1 on Drawing M100 says "Contractor to provide adequate water supply for shower". Where is water to come from?*

   Contractor is responsible for determining and providing adequate water supply to for the shower, to the satisfaction of the departmental representative, as per Section 22 42 01.01 - Appurtenances. The contract includes water supply to the shower and contractor to include the cost of this in their bid.

5. *Is there a floor drain for the emergency shower?*

   A 150mm filter backwash drain exists as shown on Drawing M100 however, Contractor is responsible for determining and providing adequate drainage for the shower, to the satisfaction of the Departmental Representative, as per Section 22 42 01.01 - Appurtenances. The contract includes shower drainage and the contractor is to include the cost of this in their bid.

6. *Is there a need to have the contractor hire an engineer for a small footing like the one detailed on Drawing A01 Section?*

   Shop drawings are required for the footing, due to the changes referenced in Clarification 14, however, they do not need to be sealed by a professional engineer.

7. *Do you anticipate any large rocks on excavation for the well heads?*

   It is not expected that large rocks will be encountered during excavation. No blasting or rock breaking is anticipated. Removal of in situ boulders over 1 m^3 in volume will be addressed by CO on a case-by-case basis.

8. *Is a qualified pump installer registered with the Minister of Environment required to install well pumps and components as dictated by Provincial Regulations in BC?*

   Yes, the well pump installer is to also be listed on the Register of Well Pump Installers in the Province of British Columbia.

9. *The programming of the RTU, HMI and SCADA are to be programmed by others and the VFD and flow meters programmed by the Departmental Representative. Is the successful contractor obligated to stay during this programming? If so, how long?*

   The successful contractor shall be present during the engineer's inspection and testing of the hardware and wiring connections for the RTU, HMI, SCADA, VFDs and flow transmitters, and to correct any deficiencies found. The contractor is not required to be present during the programming of this equipment, however, if any additional hardware or wiring deficiencies are identified during programming, the contractor will be required to subsequently return to site to correct them.

10. *I am not familiar with the "mesh vent" referred to in detail 2 on A01. Can you please find out what this is for me? What are the "openings at base of wall" on the same detail? There doesn't seem to be a way to see what they are or where they go.*

    The mesh vent is to prevent insects and small animals from accessing the space/opening between strapping. This is heavier duty than an insect screen, to keep squirrels out.

11. *Drawing A01 indicates the requirement to have a Professional Engineer design a Pressure Treated Wood Footing for an insulated enclosure – is this required?*

    Shop drawings are required for the footing, due to the changes referenced in Clarification 14, however, they do not need to be sealed by a professional engineer.

12. *Are shop drawings required for the enclosure?*

    Shop drawings for the utilidor enclosure do not need to be provided.

13. *Structural fill is not indicated – is its design required to be sealed by a professional engineer?*

    Yes, the well pump installer is to also be listed on the Register of Well Pump Installers in the Province of British Columbia.

14. *Have you considered a frost wall foundation instead, to provide frost protection on the water main below grade?*

    The utilidor foundation is to be changed to a wall with grade beam complete with 38 mm Type 4 EPS insulation to min 1200 mm below grade with full bind adhesive. Wall to be minimum 1400 mm below grade. Grade beam to be sized per building code requirements. Shop drawings are required for the wall with grade beam structure.

15. *In order to determine the cost for the excavation necessary to get into the building with the watermain, I need to know what the foundation is for the building. Is it a slab on grade, or a 4' frost wall with a footing?*

    The contractor is to make themself aware of the existing conditions on-site. Available information is attached Appendix B - Rogers Pass Water Treatment Plant – Original As-Built Drawings.

END OF ADDENDUM #1

SPECIFICATIONS

00 00 01	Index to Plans and Specifications	5 pages
Division 01	**General Requirements**	
01 01 07	Seals Page	2 pages
01 11 05	General Instructions	6 pages
01 33 00	Submittal Procedures	7 pages
01 35 33	Health and Safety Requirements	9 pages
01 35 43	Environmental Procedures	2 pages
01 45 00	Quality Control	3 pages
01 51 00	Temporary Utilities	2 pages
01 61 10	Product Requirements	5 pages
01 71 00	Examination and Preparation	2 pages
01 74 21	Construction/Demolition Waste Management and Disposal	8 pages
01 77 00	Closeout Procedures	2 pages
01 78 00	Closeout Submittals	8 pages
01 79 00	Demonstration and Training	3 pages
01 91 00	General Commissioning Requirements	6 pages
01 91 01	Equipment and System Performance and Operational Testing	9 pages
Division 03	**Concrete**	
03 30 00	Cast-in-Place Concrete	7 pages
Division 5	**Metals**	
05 50 00	Metal Fabrications	4 pages
Division 6	**Wood and Plastic**	
06 10 00	Rough Carpentry	5 pages
Division 7	**Thermal and Moisture Protection**	
07 21 00	Building Insulation	8 pages

07 26 00	Vapour Barriers	3 pages
07 27 00	Air Barriers	3 pages
07 46 13	Preformed Metal Siding	4 pages
07 50 00	Roof Construction	6 pages
07 61 00	Sheet Metal Roofing	4 pages
07 62 00	Sheet Metal Flashing and Trim	5 pages
07 92 00	Joint Sealing	7 pages
Division 8	**Doors, Windows and Glazing**	
08 11 00	Metal Doors and Frames	9 pages
08 71 00	Door Hardware	6 pages
Division 9	**Finishes**	
09 21 00	Gypsum Board Assemblies	11 pages
09 65 00	Resilient Flooring	6 pages
09 91 00	Painting	18 pages
Division 10	**Specialties**	
10 44 16	Fire Extinguishers	3 pages
Division 11	**Process Equipment**	
11 02 26	UV System	11 pages
11 02 27	Package Sodium Hypochlorite System	5 pages
11 09 25	Analytical Monitoring	3 pages
Division 22	**Plumbing**	
22 05 00.01	Mechanical General Requirements	3 pages
22 10 10.01	Submersible Well Pumps	6 pages
22 11 16.01	Piping Systems	9 pages
22 11 16.02	Piping Joints	5 pages
22 11 16.03	Piping Identification	1 page

22 11 16.04	Check Valves	2 pages
22 11 16.05	Isolating Valves	2 pages
22 42 01.01	Appurtenances	5 pages
22 42 01.02	Seismic Restraints	2 pages
22 42 01.03	Anchor Bolts	4 pages
Division 23	**Heating, Ventilation , and Air Conditioning (HVAC)**	
23 05 53	Identification	4 pages
23 33 00	Duct Accessories	4 pages
23 34 00	Fans	3 pages
23 37 20.01	Louvres	2 pages
Division 26	**Electrical**	
26 05 00	Common Work Results – Electrical	9 pages
26 05 20	Wire and Box Connectors – 0-1000 V	1 page
26 05 21	Wires and Cables (0-1000 V)	7 pages
26 05 28	Grounding – Secondary	3 pages
26 05 29	Hangers and Supports for Electrical Systems	2 pages
26 05 31	Splitters, Junctions, Pull Boxes, and Cabinets	2 pages
26 05 32	Outlet Boxes, Conduit Boxes, and Fittings	2 pages
26 05 34	Conduits, Conduit Fastenings, and Conduit Fittings	4 pages
26 05 43.01	Installation of Cables in Trenches and in Ducts	3 pages
26 09 33	Electronic and Electronic Control System for HVAC	3 pages
26 27 26	Wiring Devices	3 pages
26 28 16.02	Moulded Case Circuit Breakers	2 pages
26 28 23	Disconnect Switches – Fused and Non-Fused	2 pages
26 29 03	Control Devices	12 pages
26 50 00	Lighting	2 pages

Division 31	**Earthworks**	
31 00 99	Earthworks for Minor Works	6 pages
Division 33	**Utilities**	
33 11 16	Site Water Utility Distribution Piping	17 pages

APPENDICES

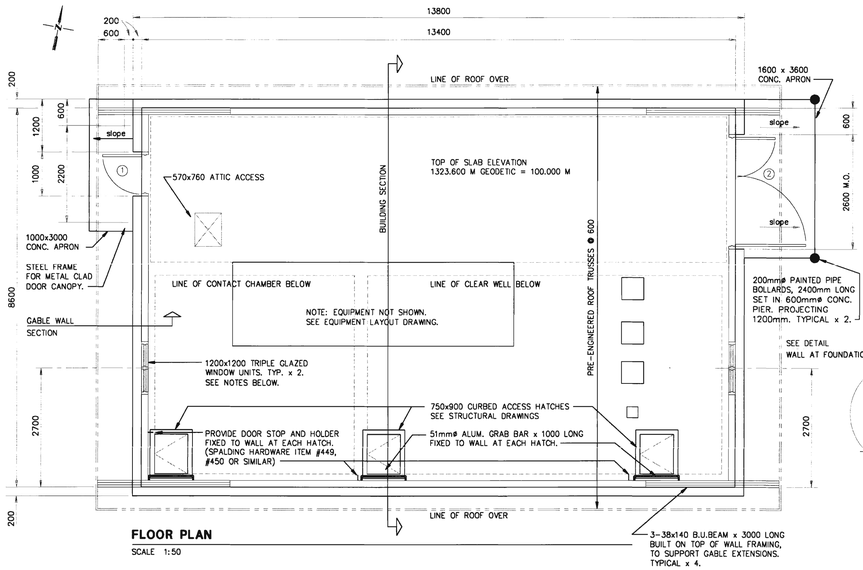
A	Rogers Pass Water Treatment Plant - Process System Layout Details (Drawing G95R1P2, Dated 95-03-03)	2 pages
B	Rogers Pass Water Treatment Plant - Original As-Built Drawings (May 1995)	13 pages
C	Rogers Pass Water Treatment Plant - Well Head Supply Lines As-Built Sketch	2 pages

DRAWINGS	**Bound Separately**
General	
C00	Cover Sheet / Location Plan & Drawing Index
C01	Key Plan, Site Plan and Legend
Civil	
C02	Typical Details
Architectural	
A01	Floor Plan and Details
A02	Schedules and Details
Mechanical	
M01	Existing Water Treatment System – Floor Plan
M100	New Water Treatment System – Main Floor Plan

M101	New Water Treatment System – Mechanical Section
M102	New Water Treatment System – Mechanical Section
Process	
P01	P&ID Standard Tags and Abbreviations
P02	P&ID Standard Symbols, Equipment, Valves and Instrumentation
P03	Existing Water Treatment System
P04	New Water Treatment System
Electrical	
E01	Electrical - Site Plan & Single Line Diagram
E02	Electrical – Block Diagrams & Control Panel Layout
E03	Electrical – Building Plan
E04	Electrical – Schematic Diagram
E05	Electrical – Schematic Diagram

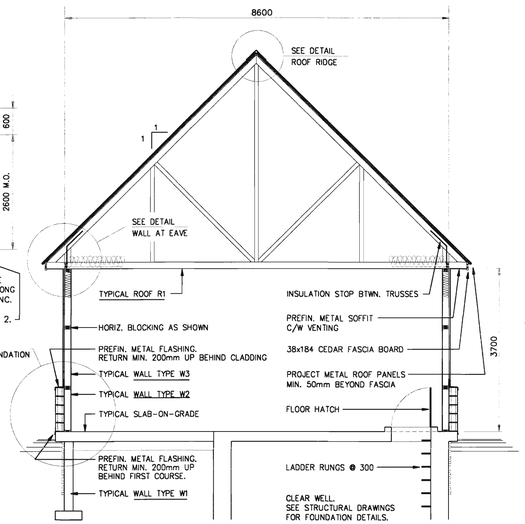
END OF INDEX

Appendix B **Rogers Pass Water Treatment Plant - Original As-Built Drawings (May 1995)**



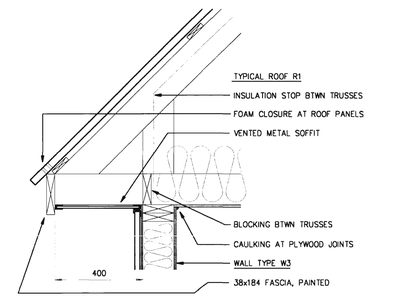
FLOOR PLAN

SCALE 1:50



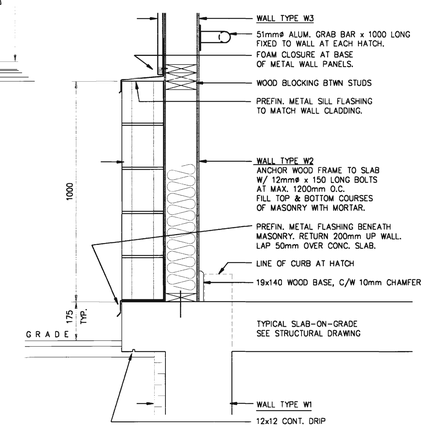
BUILDING SECTION

SCALE 1:50



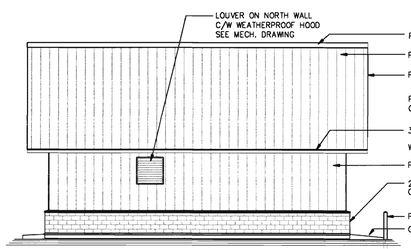
DETAIL - WALL AT EAVE

SCALE 1:10



DETAIL - WALL AT FOUNDATION

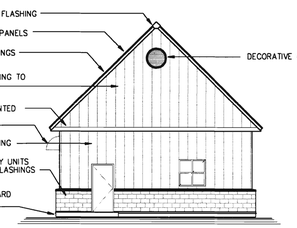
SCALE 1:10



SOUTH ELEVATION

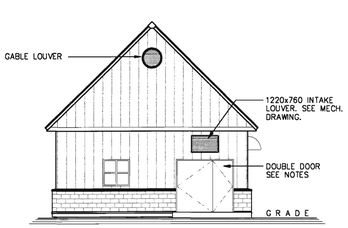
NORTH ELEVATION SIMILAR

SCALE 1:100



WEST ELEVATION

SCALE 1:100



EAST ELEVATION

BOLLARDS NOT SHOWN

SCALE 1:100

GENERAL NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS.

2. WALL TYPE W1
   38mm TYPE 4 EPS INSULATION TO MIN. 1200 BELOW GRADE WITH
   FULL BOND ADHESIVE. (TO TOP PORTION OF FOUNDATION WALLS ONLY)
   REINFORCED CONCRETE FOUNDATION WALLS - AT CLEARWELL OR FDN. WALL

3. WALL TYPE W2
   20cm "EXPO 200" CONCRETE MASONRY UNITS, RUNNING BOND
   LOOSE FILL INSULATION
   AIR SPACE
   BUILDING PAPER
   7.5mm EXTERIOR GRADE PLYWOOD SHEATHING TO N.B.C. 9.23.16
   38x140 WALL STUDS @ 600mm O.C. , WITH HORIZ. BLOCKING AS SHOWN.
   RSI 3.52 FIBERGLASS BATT INSULATION
   0.150mm POLYETHYLENE VAPOUR BARRIER
   12.5mm G1S FIR PLYWOOD, WITH 6mm CHAMFER ALL EDGES. PAINTED.

4. WALL TYPE W3
   PREFINISHED METAL CLADDING AS SPECIFIED
   7.5mm EXTERIOR GRADE PLYWOOD SHEATHING TO N.B.C. 9.23.16
   38x140 WALL STUDS @ 600mm O.C., WITH HORIZ. BLOCKING AS SHOWN.
   RSI 3.52 FIBERGLASS BATT INSULATION
   0.150mm POLYETHYLENE VAPOUR BARRIER
   12.5mm G1S FIR PLYWOOD, WITH 6mm CHAMFER ALL EDGES. PAINTED.

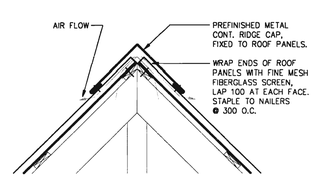
5. TYPICAL ROOF R1
   PREFINISHED METAL ROOF PANELS, PROFILE SIMILAR TO ROBERTSON
   "PANEL-RIB", FIXED TO...
   19x89 NAILERS @ 300mm O.C., PERPENDICULAR TO ROOF TRUSSES
   PRE-ENGINEERED ROOF TRUSSES @ 600mm O.C. WITH 1:1 ROOF SLOPE
   RSI 7.04 FIBERGLASS BATT/BLANKET INSULATION
   0.150mm POLYETHYLENE VAPOUR BARRIER
   12.5mm G1S PLYWOOD, WITH 6mm CHAMFER ALL EDGES. PAINTED.

6. TYPICAL FLOOR SLAB-ON-GRADE
   REINFORCED CONCRETE SLAB, WITH CLEAR SEALER AS SPECIFIED
   200mm COMPACTED GRAVEL BASE

7. MAN DOORS:
   1. DOORS SHALL BE INSULATED STEEL DOORS TO SIZES SPECIFIED.
   2. SEE SPECIFICATIONS FOR HARDWARE AND KEYING SCHEDULE.
   3. NO HARDWARE TO EXTERIOR SIDE OF DOUBLE DOORS

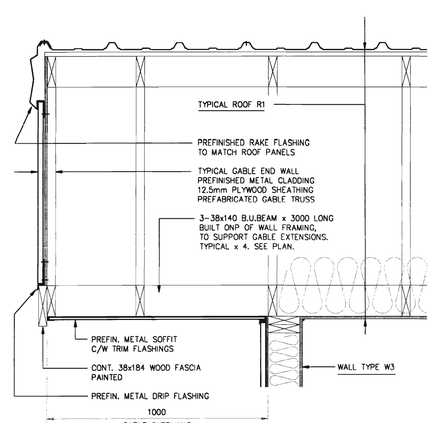
8. PREFINISHED METAL FLASHINGS SHALL BE INSTALLED AROUND DOORS, LOUVERS, FANS, AND AROUND ALL OPENINGS THROUGH WALLS FOR PIPING AND OTHER PROJECTIONS. ENSURE WEATHER TIGHTNESS. FLASHINGS TO MATCH MATERIAL OF ADJACENT PANELS. ISOLATE FROM ALL DISSIMILAR MATERIALS.

9. WINDOW UNITS TO BE 1200x1200 PRESSED STEEL FRAMES, WITH MULLIONS AS SHOWN. GLAZING IN EACH PANE TO BE 6mm CLEAR WIRED GLASS OUTER PANE, AND SEALED UNIT INNER PANE OF 6mm CLEAR TEMPERED GLASS WITH 6mm FROSTED TRANSLUCENT GLASS TO INTERIOR. CAULK ALL JOINTS WEATHERTIGHT. FRAME TO BE PAINTED TO MATCH DOOR FRAMES.



DETAIL - ROOF RIDGE

SCALE 1:10



SECTION - GABLE WALL

SCALE 1:10

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95/03/22	FOR TENDER & CONSTRUCTION	LVM	CWP

Revision / Revision

A/B Detail number / Detail A Numéro de detail; Sheet number / B Numéro de la feuille

Linear dimensions in millimetres / Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners

Eng. Stamp / Sceau de l'ingénieur: C.W. Pagel 4/95

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

Architecture and Engineering / Architecture et genie

Canada

Client/client: Canadian Heritage / Patrimoine Canadien

Parks Canada / Parcs Canada

Western Region / Région de l'Ouest

Project title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin: ARCHITECTURAL PLAN, SECTION, DETAILS & NOTES

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	LVM/CPHAIL	95-03-21
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
LVM/CPHAIL	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client: PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE Date

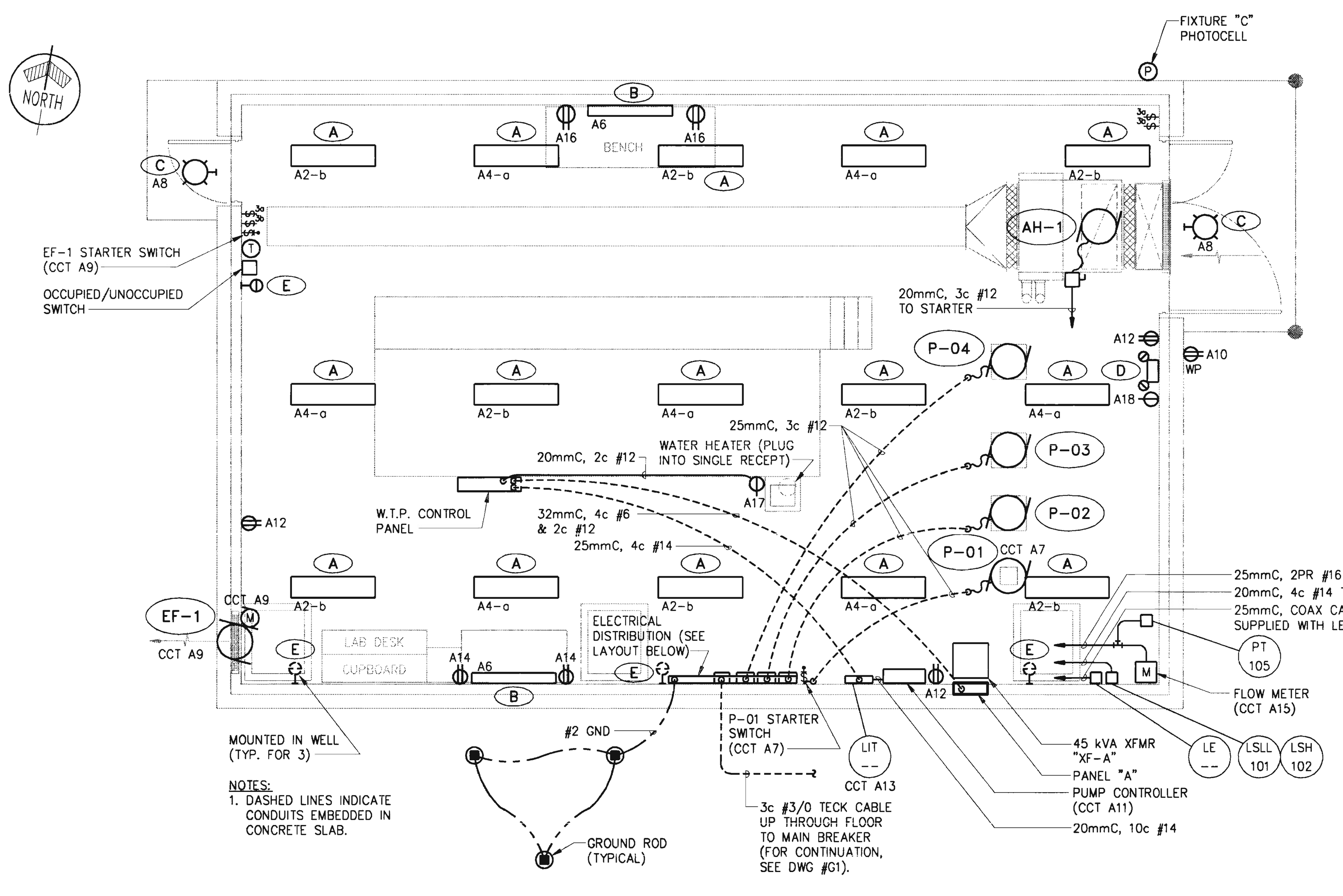
Approved by/Approuvé par: A & E SERVICES/GÉNIE ET ARCHITECTURE Date

Project No./Nº du projet	Asset No./Nº du-bien	Sheet No./Nº de la feuille
#77146	974003604	A1

Drawing Reference No./Nº de référence du dessin: G95R1

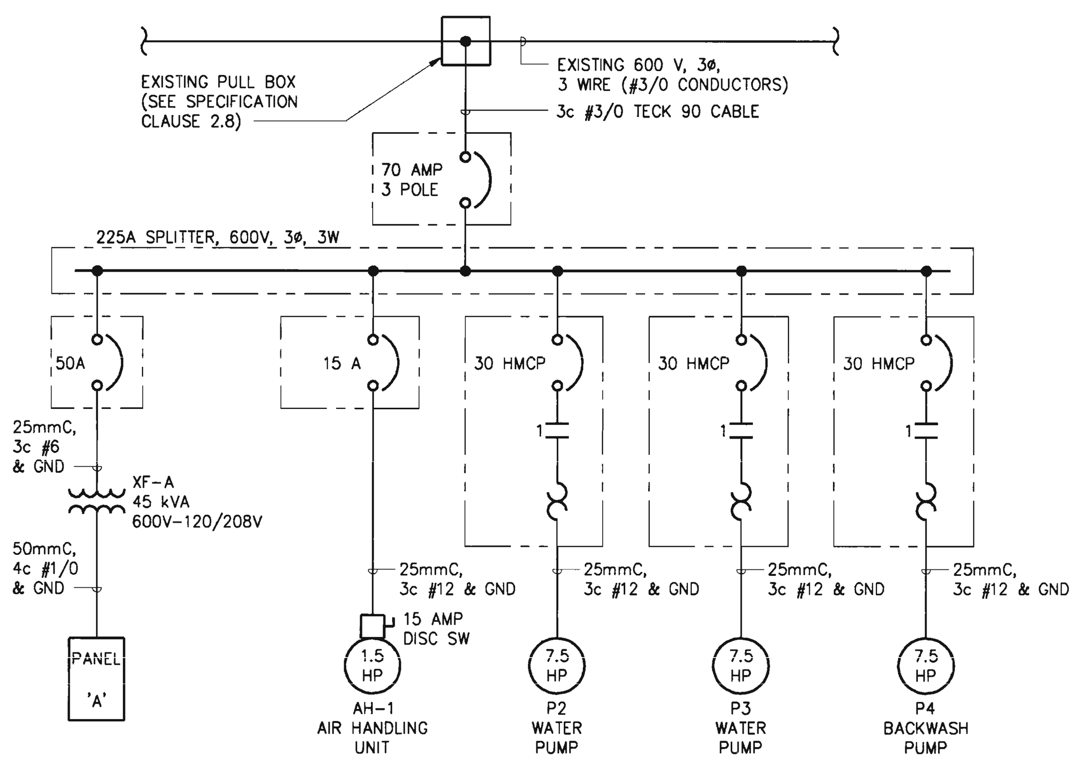
File No. 20773541

B1 SIZE 1000 x 707 mm

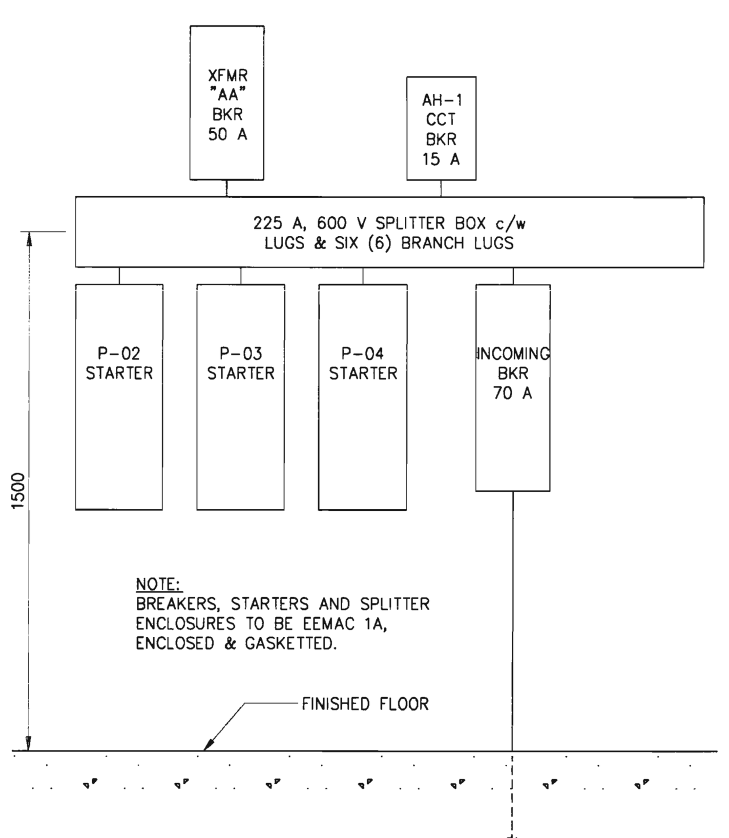


LIGHTING, POWER & GROUNDING LAYOUT

SCALE 1:50

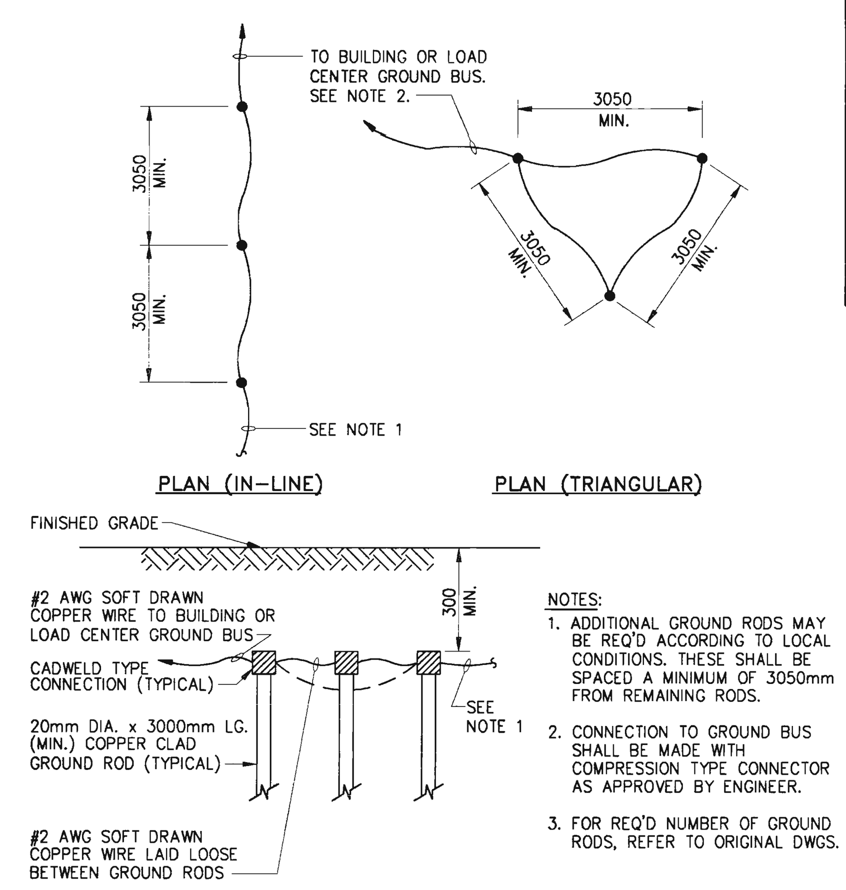


SINGLE LINE DIAGRAM



ELECTRICAL DISTRIBUTION LAYOUT

NOT TO SCALE



GROUNDING CLUSTER DETAILS

NOT TO SCALE

GENERAL ELECTRICAL LEGEND

- SINGLE POLE SWITCH, FIXTURE(S) a
- THREE WAY SWITCH
- MANUAL THERMAL MOTOR SWITCH c/w PILOT LIGHT
- SURFACE/SUSPENDED (300x1200) FLUORESCENT FIXTURE
- WALL MOUNTED FIXTURE
- PHOTOCELL
- EMERGENCY LIGHTING BATTERY SYSTEM
- REMOTE EMERGENCY LIGHTING HEAD
- A6–a PANEL "A", CIRCUIT "6", SWITCH "a"
- (B) FIXTURE TYPE "B"
- MOTOR (EXHAUST FANS, SUPPLY FANS, UNIT HEATERS, MAKEUP AIR UNITS ETC.)
- ELECTRICAL PANEL
- SINGLE RECEPTACLE
- DUPLEX RECEPTACLE
- WP DUPLEX RECEPTACLE (WEATHERPROOF)
- (EF–5) EQUIPMENT NUMBER "EF-5"
- CONDUIT OR CABLE RUN ON SURFACE OR IN CEILING
- CONDUIT OR CABLE RUN IN FLOOR SLAB OR U/G
- GROUND WIRE
- FLEXIBLE CONDUIT/CABLE
- CONDUIT UP
- CONDUIT DOWN
- (T) THERMOSTAT
- DISCONNECT SWITCH

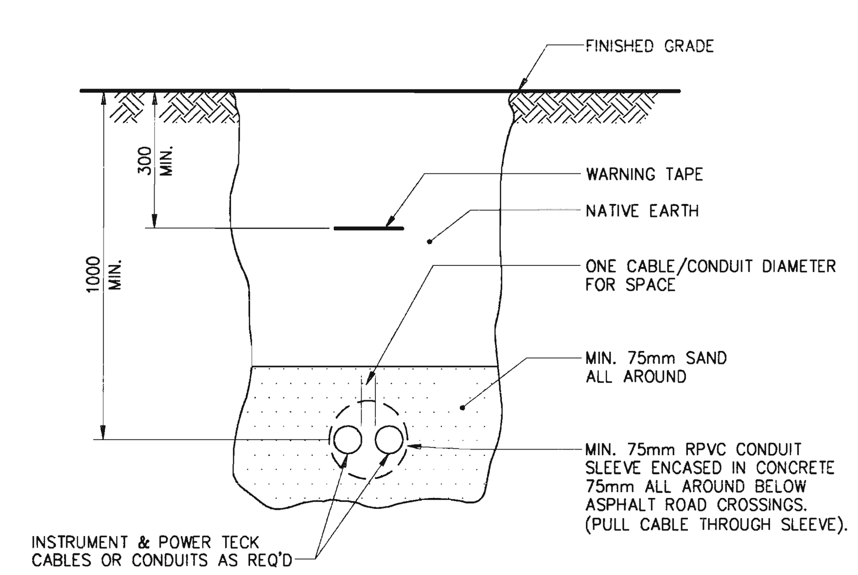
PANEL "A" SCHEDULE

LOCATION: W.T.P. — CABINET ENTRY: TOP — VOLTAGE: 208/120 V — PHASE: 3
FEEDER: 50mmC, 4#1/0 RW90 XLPE — MOUNTING: FLUSH — BUS SIZE: 225 A — WIRE: 4
REFERENCE DRAWING: — MAIN BREAKER: NOT REQUIRED

CCT NO	DESCRIPTION	LOAD WATTS	TRIP AMPS	BUS A B C	TRIP AMPS	LOAD WATTS	DESCRIPTION	CCT NO
1	WATER TREATMENT PLANT LOAD CENTER	12000	40 / 3P		15	800	BUILDING LIGHTING	2
3					15	700	BUILDING LIGHTING	4
5					15	300	TASK LIGHTING	6
7	JOCKEY PUMP P-01	855	15		15	200	EXTERIOR LIGHTING	8
9	EXHAUST FAN EF-1	660	15		15	500	OUTDOOR RECEPTACLE	10
11	PUMP CONTROL PLC	500	15		15	450	BUILDING RECEPTACLES	12
13	LIT (LEVEL INDICATOR)	200	15		15	450	BUILDING RECEPTACLES	14
15	FLOW METER	100	15		15	450	BUILDING RECEPTACLES	16
17	WATER HEATER	1440	15		15	300	EMERGENCY LIGHTING SYSTEM	18
19	SPARE		15		15		SPARE	20
21	SPARE		15		15		SPARE	22
23	SPACE						SPACE	24
25	SPACE						SPACE	26
27	SPACE						SPACE	28
29	SPACE						SPACE	30
31	SPACE						SPACE	32
33	SPACE						SPACE	34
35	SPACE						SPACE	36
37	SPACE						SPACE	38
39	SPACE						SPACE	40
41	SPACE						SPACE	42

LIGHTING FIXTURE SCHEDULE

FIXT. TYPE	DESCRIPTION	MOUNTING	VOLTS	SIZE	DIFFUSER	LAMPS NO.	LAMPS TYPE	FINISH	REMARKS
A	CFI FLUORESCENT CAT. #VT-248-1E	150mm PENDANT	120	194/1320	ACRYLIC	2	40W R.S.	WHITE	MOUNTING HT. (B.O.F.) 3500mm AFF
B	CFI FLUORESCENT CAT. #CWB-248-1LE-PS	WALL	120	194/1220	ACRYLIC	2	40W R.S.	BLACK	MOUNTING HT. (B.O.F.) 2000mm AFF c/w PULL SWITCH
C	NORTRON-KENALL CAT. #3737	WALL	120	150/210	POLYCARB LENS	1	100W INCAND.		c/w TAMPER PROOF SCREWS & DRIVER
D	LUMACELL CAT. #RGB72/2MT	WALL	120			2	9W TUNGSTEN	WHITE	c/w 2 MICRO HEADS, MTD @ 2400mm
E	LUMACELL CAT. #MT1	WALL	6			1	9W TUNGSTEN	WHITE	MTD @ 2400mm OR IN WELL SPACES



CABLE OR CONDUIT TRENCH DETAIL

NOT TO SCALE

ELECTRICAL SPECIFICATIONS

1.0 GENERAL REQUIREMENTS

.1 Unless a higher standard or larger size is called for, the work shall comply with the requirements of the current edition of the Canadian Electrical Code (CSA 22.1) and amendments thereto and the regulations of the Electrical Inspection Authorities, Electricity Utility, and Municipality as at the date of tender.

.2 Obtain necessary permits, pay all applicable fees. On completion obtain a Certificate of Approval from the Local Inspection Department, turn over certificates to Engineer.

.3 Supply all necessary labour, material, and equipment for complete electrical installation per drawings and specifications.

.4 Examine the site and local conditions affecting trade before submitting tender.

.5 All materials to be new, best quality, and bear CSA approval.

.6 Substitution of materials, equivalent to those specified, may be made only after written approval has been obtained from the Engineer before closing of tenders.

.7 Guarantee all work and equipment installed for twelve (12) months after completion. Replace, without charge, any defective items provided that failure is not due to improper usage.

.8 Shop Drawings: five (5) copies required to show details of main equipment items.

.9 Maintenance Manuals: three (3) required, 3-ring binders, indexed, include equipment brochures, shop drawings, names, and addresses of suppliers.

.10 Mark on a set of white prints, all changes from drawings and submit to Engineer on completion.

2.0 MATERIALS AND EQUIPMENT

.1 Raceways: electrical metallic tubing (EMT) for indoor surface runs as indicated on drawings. Rigid Schedule 40 PVC duct for underground and embedded in concrete use only. Rigid galvanized steel conduit for outdoor above grade and indoor non-surface runs. Use AC-90 armoured cable for end runs only. Sized: per Canadian Electrical Code. Motor connections: minimum 600 to 900 mm of PVC jacketed steel flexible conduits with liquid tight fittings.

.2 Conductors: copper, minimum #12, R90 X-link insulation. Control wires: minimum #14 for 120 volts. Service conductors: RW90 insulation for -40°C.

.3 Receptacles and Switches: parallel blade receptacles: rated 15 amps, 125 volts, specification grade. SPST toggle switch: rated 15 amps, 125 volts, specification grade. Isolated ground receptacles as indicated.

.4 Outlet Boxes: for lighting fixtures: formed metal boxes 100 mm round or square boxes. For surface mounted switches and/or receptacles: formed metal boxes, rectangular or square. For flush mounted switches and/or receptacles: formed square boxes complete with plaster rings or sectional device boxes. Outdoor outlet boxes where indicated WP: recessed boxes weatherproofed. Do not use sectional boxes for surface mounted applications.

.5 Cover plates: for surface mounted interior outlets: rectangular or square formed metal. Recessed outlets: stainless steel or ivory coloured nylon. For outdoor outlets: painted steel WP cover plates complete with gasket and full spring return covers.

.6 Branch Circuit Panels: 120/208 volts, 3 phase, 4 wire branch panel, complete with bolted full size breakers as per drawing. Typewritten directory inside door.

.7 Motor Starter: minimum EEMAC size 1, 3 phase combination starters: magnetic as shown, complete with control transformer and auxiliary contacts as required, Hand-Off-Auto selector switches, red running light, manual reset type thermal overload relay and reset button. Single phase starters: single or double pole, complete with pilot light and suitable "heaters".

.8 Main Service and Distribution: main service: 70 amps, 600 volts, 3 phase, 3 wire, distribution comprised of components as shown on the drawing. Service feeder to tie-in to existing pull box at location as shown on drawing. Contractor to intercept existing conductors, cut, and then terminate to contractor supplied lugs in existing pull box. Contractor to connect new service feeder to these lugs and direct bury cable at 1,000 mm below ground to W.T.P. building, routing as shown on drawing #G1.

.9 Grounding: supply and install three (3) 19 mm x 3,000 mm copperclad steel ground rods as shown. Main ground connections to be Cadwell.

.10 Lighting Fixtures: complete with energy efficient lamps and all necessary accessories for complete and proper installation. CSA approved, minimum 20 gauge steel unless otherwise indicated. Ballasts to be HPF energy efficient type. Plastic lenses: 100% virgin acrylic, minimum 3 mm thick configuration as per schedule. Description: the fixtures to be supplied and installed as per fixture schedule.

.11 Disconnect Switches: provide the disconnect switches as indicated on the drawing.

.12 Nameplates: lamicoid nameplates black face, white core for all electrical equipment including, but not necessary limited to, panels, starters, motors, breakers, etc. Lettering to include equipment number and description.

.13 Level Control: 1) Ultrasonic type: Equal to Milltronics type Multiranger Plus.
2) Liquid level regulators: Equal to Flygt #ENM-10.

.14 Pressure Transmitter: Equal to Rosemount Model #2088G2A22A1B4, calibrated 0-100 psig.

.15 Programmable Logic Control (PLC): Refer to drawing #E2 for PLC Bill of Materials and details.

3.0 INSTALLATION

.1 All work to be performed by competent tradesmen, in a workmanlike manner. Clean up all debris from electrical portion of the project. The installation to meet the latest requirements of the Canadian Electrical Code, Provincial, Municipal, Local Codes, and Local Inspection Department.

.2 Conduit and wiring run embedded in slab as shown on drawing. All other conduit and wiring runs to be surface mounted.

.3 All receptacles, switches, boxes installed flush in all areas except where surface mounting is only option.

.4 Grounding: connect neutral and non-current carrying parts of service entrance equipment via a single copper conductor to at least three 19 mm x 3,000 mm copperclad steel ground rods, or as required by the Inspection Authority. Use solderless type ground connectors. Maintain continuity of ground to all outlets, switches, controllers, motors, etc.

.5 Wiring of Mechanical Equipment: supply and install necessary electrical equipment, power and control wiring for mechanical equipment. This includes breakers, disconnects, starters, conduit, wiring and complete connection.

.6 Main Service and Distribution: install equipment on the 12mm thick plywood wall and installation to the satisfaction of the Inspection Authority.

.7 Lighting System: install all fixtures as noted in the schedule, conduit system, wiring, hangers, and all necessary items required for a complete system. Cooperate with personnel of other divisions to determine the proper location of lights, switches, etc., to avoid confliction between the electrical installation and the mechanical ducts, pipes, ceiling layout, etc. Ensure that fixtures suit the type of ceiling of which they are to be installed.

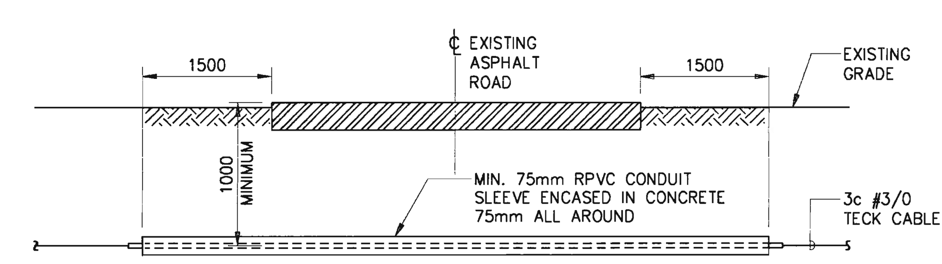
.8 Mounting Heights: all mounting heights noted below are above finished floor to centre of box, unless overwise shown:

Exterior Receptacles	1,000 mm
Receptacles in Treatment Plant Bldg.	1,000 mm
Receptacles (above desk or benches)	200 mm
Switches and Manual Motor Starters	1,400 mm
Panelboards (to top)	2,300 mm

.9 Control Devices: Contractor to install level control as per detail on drawing #E2.

.10 Contractor to provide programming for PLC based on drawings, control philosophy and coordinated with Engineer.

.11 The contractor shall locate and protect all existing utilities including telephone, cable, water, sewer, power, and gas.



ASPHALT ROAD CROSSING DETAIL

NOT TO SCALE

No.	Date	Description	Drawn by / Dessiné par	Approved / Approuvé
0	95/05/03	ISSUED FOR TENDER/CONSTRUCTION	GBM	PDB

Revision / Revision

Detail number — A Numéro de detail
Sheet number — B Numéro de la feuille

Linear dimensions in millimetres — Dimensions linéaires en millimétres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners

Eng. Stamp / Sceau de l'ingénieur: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, G. L. HEDBERG, 95/05/02

Public Works and Government Services Canada — Travaux publics et Services gouvernementaux Canada
Architecture and Engineering — Architecture et genie´
Canadä

Client/client: Canadian Heritage — Patrimoine Canadien
Parks Canada — Parcs Canada
Western Region — Région de l'Ouest

Project title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT
GLACIER NATIONAL PARK

Drawing title/Titre du dessin: BUILDING ELECTRICAL LAYOUT, DETAILS AND SPECIFICATIONS

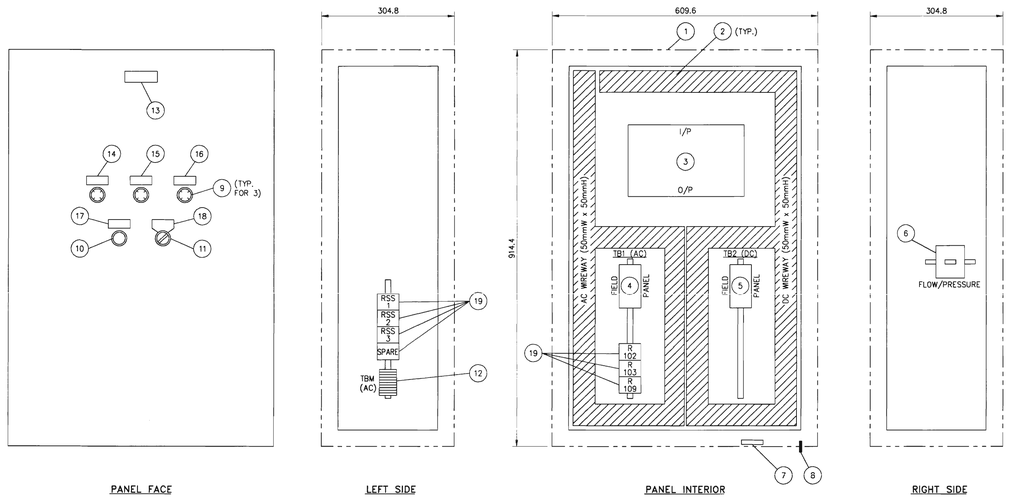
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	G. MARCIAL	95-03-24
Designed by/Concept par	**Reviewed by/Revisé par**	**Scale/Échelle**
P. BAKKER	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client — PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE Date
Approved by/Approuvé par — A & E SERVICES/GÉNIE ET ARCHITECTURE Date

Project No./Nº du projet: #77146
Asset No./Nº du-bien: 974003604
Sheet No./Nºde la feuille: E1
Drawing Reference No./Nº de réference du dessin: G95R1

File No. EL5C13A1

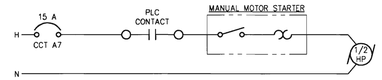
B1 SIZE 1000 x 707 mm



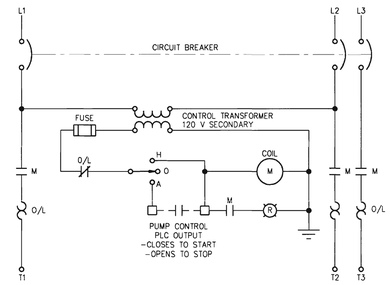
CONTROL PANEL LAYOUT
SCALE: 1:5

BILL OF MATERIALS

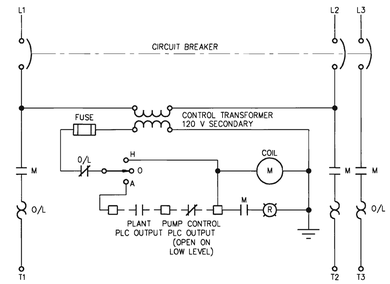
ITEM	DESCRIPTION
1	EEMAC TYPE 12 ENCLOSURE, HAMMOND Cat. No. 1418L12 914mmh x 610mm x 305mmD
2	WIRING DUCT, PANDUIT OR EQUAL (SIZE AS SHOWN & LENGTH AS REQUIRED)
3	PLC, GE FANUC 90-20 c/w Cat. No. IC692CPU211 CPU, IC692MDR541 BASEPLATE (16 pt 24VDC I/P, 11 pt RELAY O/P, 120 VAC POWER) AND IC693PRG300 HAND HELD PROGRAMMER & CABLE
4	TERMINALS, QTY 16, WEIDMULLER SAKC4 c/w TS32 RAIL & END SECTIONS
5	TERMINALS, QTY 16, WEIDMULLER SAKC4 c/w TS32 RAIL & END SECTIONS
6	DC CURRENT ALARM RELAY, QTY 2, DUAL HIGH/LOW ALARM RELAY, MOORE INDUSTRIES MODEL No. DDA/4-20mA/DH1L1/24VDC/-AD-EU(0-1000)
7	INSTRUMENTATION (SHIELD) GROUND BUS
8	GROUNDING POST (SUITABLE FOR #2 AWG GROUNDING WIRE)
9	ALARM LIGHTS
10	RESET BUTTON
11	SELECTOR SWITCH
12	TERMINALS, QTY 10, WEIDMULLER SAKC4 c/w TS32 RAIL & END SECTIONS
13	LAMICOID: PUMP CONTROL PANEL
14	LAMICOID: PUMP EMERGENCY STOP LALL-101
15	LAMICOID: CLEARWELL LOW LEVEL LAL-103
16	LAMICOID: CLEARWELL HIGH LEVEL LAH-102
17	LAMICOID: ALARM RESET
18	LAMICOID: DUTY PUMP SELECTOR P-02 P-03
19	120 VAC RELAYS, 4PDT, OMRON



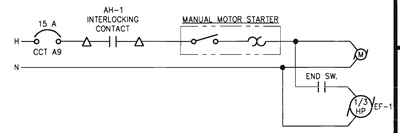
JOCKEY PUMP P-01 MOTOR CONTROL SCHEMATIC



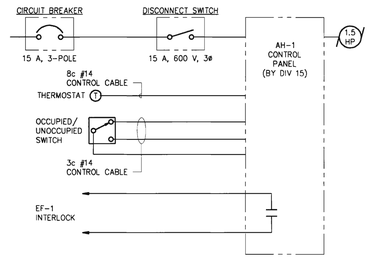
STANDARD COMBINATION MAGNETIC STARTER WITH H.O.A. SELECTOR SWITCH FOR PUMPS P-02 & P-03



STANDARD COMBINATION MAGNETIC STARTER WITH H.O.A. SELECTOR SWITCH FOR BACKWASH PUMP P-04

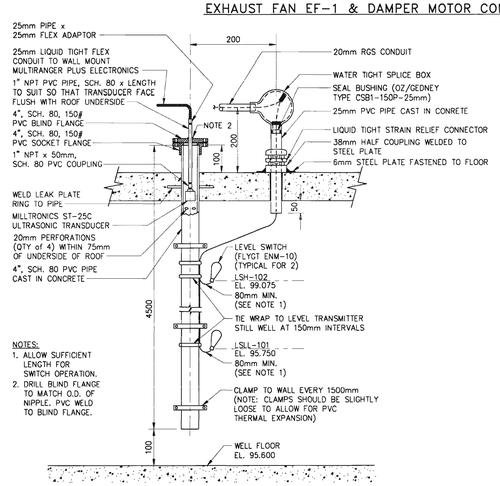


EXHAUST FAN EF-1 & DAMPER MOTOR CONTROL SCHEMATIC



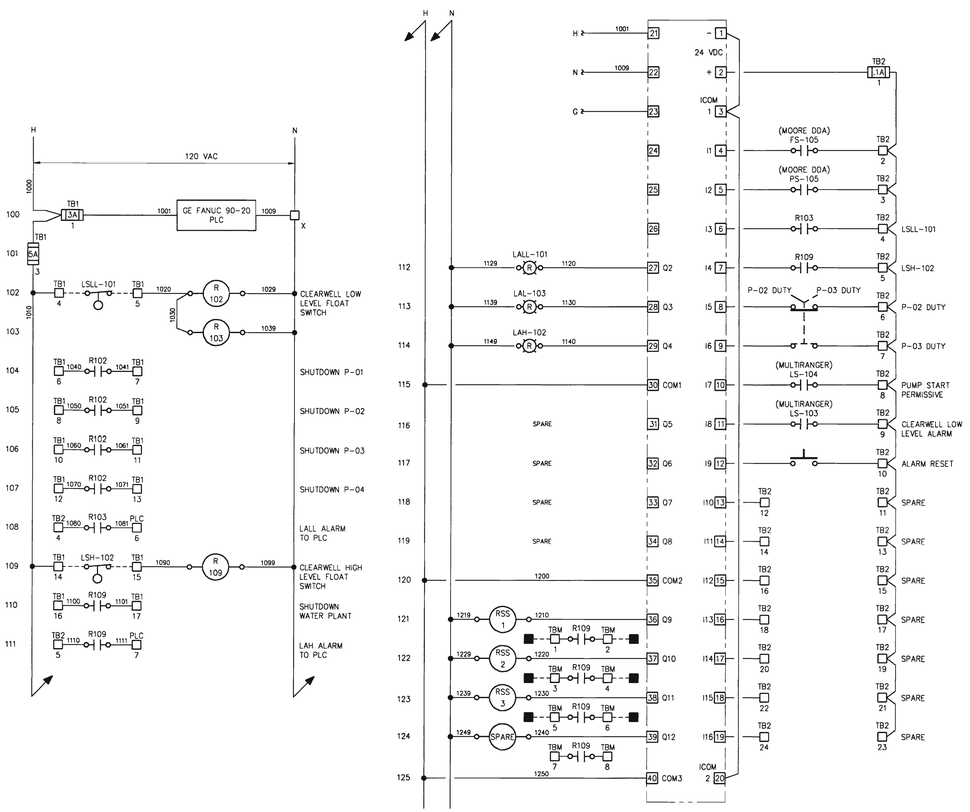
NOTE:
ELECTRICAL CONTRACTOR TO PROVIDE CIRCUIT BREAKER, DISCONNECT SWITCH AND ALL INTERCONNECTION WIRING. DIV. 15 SUPPLIES AND ALL OTHER DEVICES.

AIR HANDLING UNIT AH-1 CONTROL WIRING SCHEMATIC



NOTES:
1. ALLOW SUFFICIENT LENGTH FOR SWITCH OPERATION.
2. DRILL BLIND FLANGE TO MATCH O.D. OF NIPPLE. PVC WELD TO BLIND FLANGE.

ULTRASONIC LIQUID LEVEL SENSING ELEMENT & LIQUID LEVEL REGULATORS
NOT TO SCALE



90-20 PLC I/O WIRING & RELAY DIAGRAM

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95/05/03	ISSUED FOR TENDER/CONSTRUCTION	GBM	AWN/PDB

Revision / Revision

Detail number / Sheet number — A Numéro de detail / B Numéro de la feuille

Linear dimensions in millimetres / Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners

Eng. Stamp / Sceau de l'ingénieur

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

Architecture and Engineering / Architecture et genie

Canada

Client/client: Canadian Heritage / Patrimoine Canadien

Parks Canada / Parcs Canada

Western Region / Région de l'Ouest

Project title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin: MISCELLANEOUS ELECTRICAL/ INSTRUMENTATION DETAILS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	G. MARCIAL	95-03-24
Designed by/Concept par: A.W.N./P.D.B.	Reviewed by/Revisé par: R. SILLITTO	Scale/Echelle: AS SHOWN

Client Acceptance/Acceptation du client — Approved by/Approuvé par

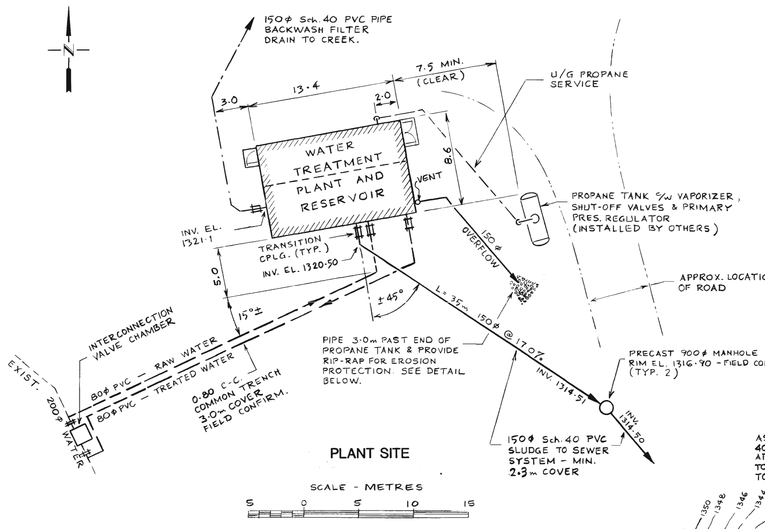
PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE — Date — A & E SERVICES/GÉNIE ET ARCHITECTURE — Date

Project No./Nº du projet	Asset No./Nº du-bien	Sheet No./ Nº de la feuille
#77146	974003604	E2

Drawing Reference No./Nº de référence du dessin: G95R1

File No. EG5C18A1

B1 SIZE 1000 x 707 mm

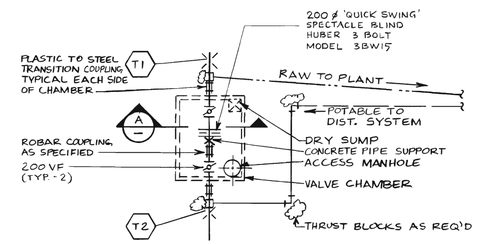


PLANT SITE

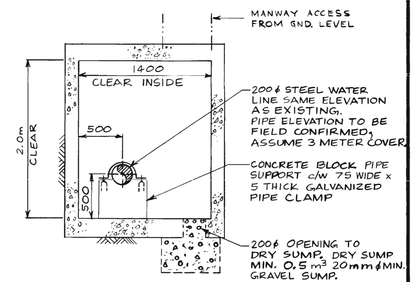
SCALE - METRES

5 0 5 10 15

NOTE:
PLANT ELEVATION 100.0 IS EQUAL TO SITE CONTOUR ELEVATION 1323.30, ASSUMED GEODETIC, TO BE FIELD CONFIRMED.



PLAN VIEW

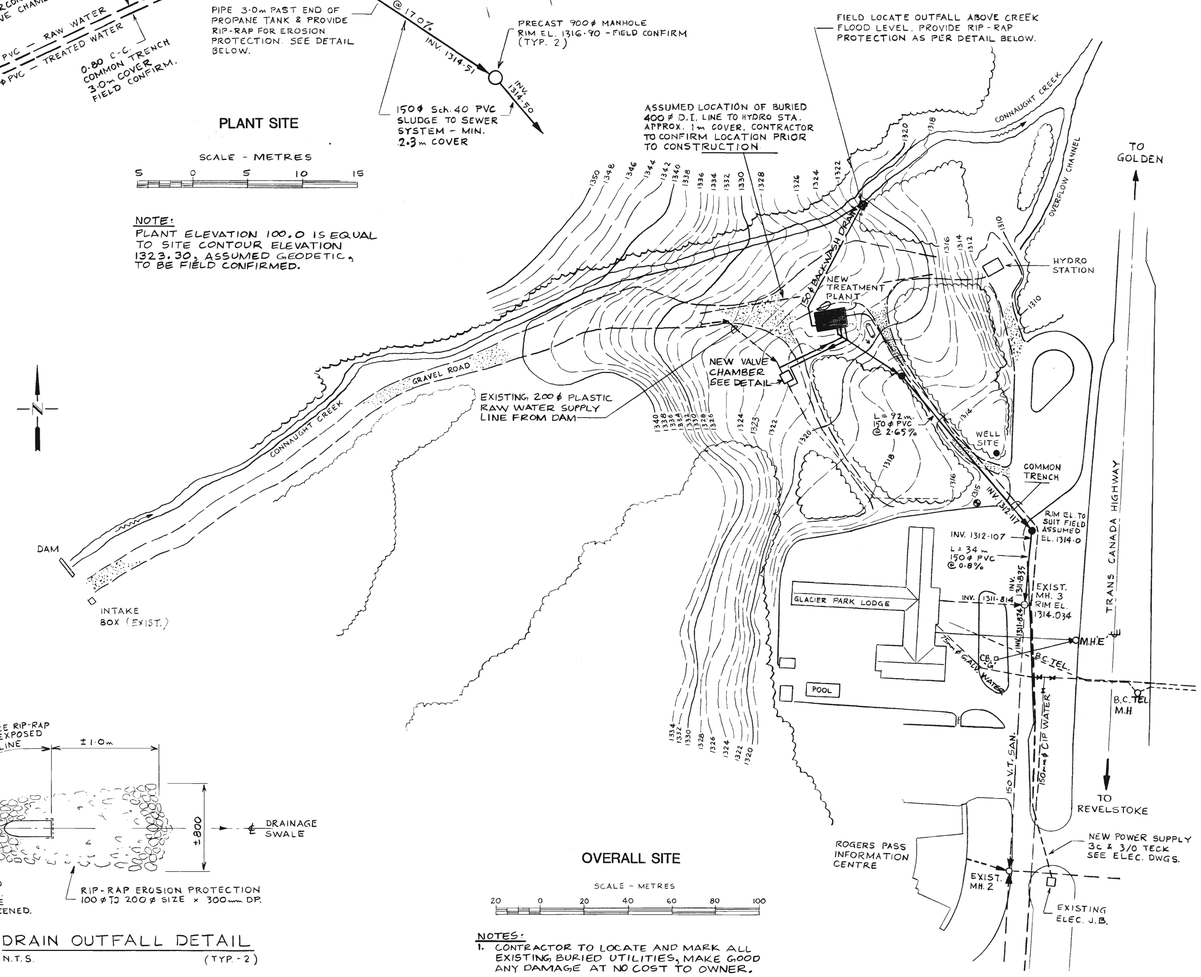


SECTION 'A'

VALVE CHAMBER DETAIL

NTS

NOTE:
VALVE CHAMBER ~ PRECAST CONCRETE VAULT, MIN. SIZE 1.4m x 2.1m x 2.0m HIGH, c/w LADDER RUNGS, STANDARD MANHOLE COVER, ADJUSTMENT RINGS AND 750ϕ BARRELS TO EXISTING GRADE.
ACCEPTABLE SUPPLIERS - PRECON PRODUCTS
- LAFARGE CONSTRUCTION MATERIALS

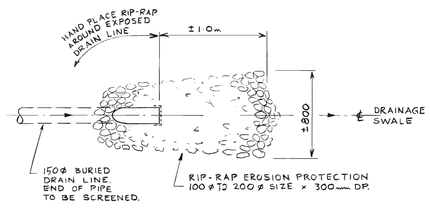


OVERALL SITE

SCALE - METRES

20 0 20 40 60 80 100

NOTES:
1. CONTRACTOR TO LOCATE AND MARK ALL EXISTING BURIED UTILITIES, MAKE GOOD ANY DAMAGE AT NO COST TO OWNER.
2. CONFIRM ALL PIPE ROUTING WITH FIELD ENGINEER TO ENSURE MINIMAL INTERFERENCE WITH EXISTING VEGETATION.
3. PIPE ELEVATIONS TO BE CONFIRMED IN FIELD.



DRAIN OUTFALL DETAIL

N.T.S. (TYP - 2)

No.	Date	Description	Drawn by / Dessiné par	Approved / Approuvé
0	95-05-17	TENDER & CONSTRUCTION	S.R.	G.P.

Revision / Revision

Detail number / Numero de detail — A Numero de detail
Sheet number / Numero de la feuille — B Numero de la feuille

Linear dimensions in millimetres / Dimensions linéaires en millimètres

Consultant / Conseiller: UMA Engineering Ltd. Engineers & Planners 2977-135-00

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada — Architecture and Engineering / Architecture et génie — Canada

Client/Client: Parks Canada / Parcs Canada — Western Region / Région de l'Ouest

Project Title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT — GLACIER NATIONAL PARK

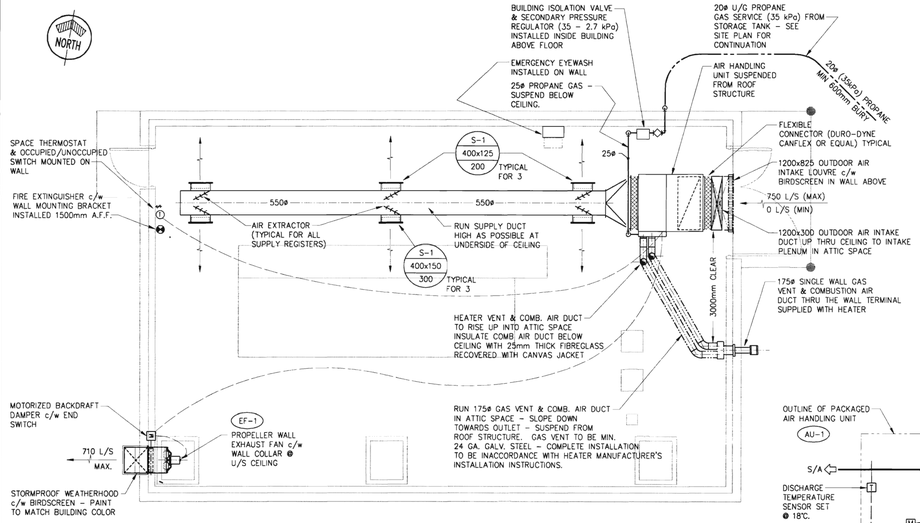
Drawing Title/Titre du dessin: SITE SERVICES PLAN

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	S. Robertson	95-05-17
Designed by/Concept par	Reviewed by/Revue par	Scale/Échelle
G. Pfeifer	R. S. Tro	AS SHOWN

Client Acceptance/Acceptation du client — Parks Canada Officer/Agent responsable — Date
Approved by/Approuvé par — A & E Services/Génie et architecture — Date

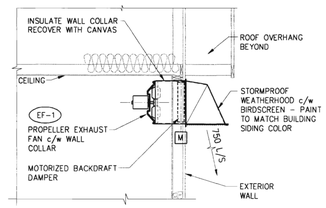
Project No./No du projet: #77146
Asset No./No du bien: 97400360
Drawing Reference No./No de référence du dessin: G95R1
Sheet No./No de la feuille: G1

File No. PCSC15A1

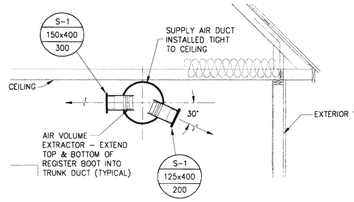


NOTE:
PROPANE STORAGE TANK c/w VAPORIZER & PRIMARY PRESSURE REGULATOR ARE SUPPLIED & INSTALLED BY THE OWNER. THIS CONTRACTOR SHALL CONNECT UNDERGROUND SERVICE PIPING TO THE DOWNSTREAM SIDE OF THE PRIMARY REGULATOR.

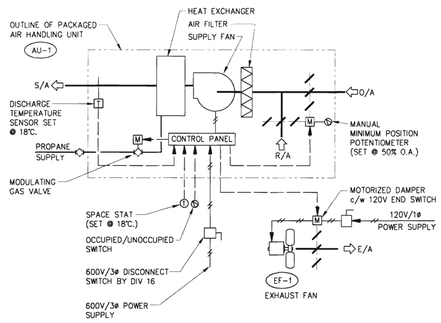
GROUND FLOOR PLAN
SCALE 1 : 50



1 M-1 SECTION @ EXHAUST FAN EF-1
SCALE 1 : 30

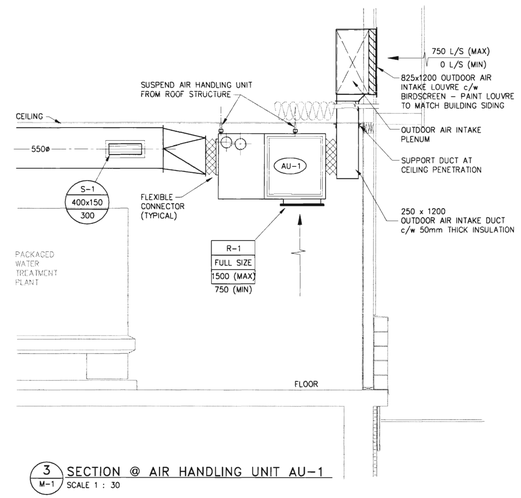


2 M-1 TYPICAL SUPPLY REGISTER SECTION
SCALE 1 : 30



NOTE:
SUBMIT COMPLETE WIRING DIAGRAM FOR APPROVAL WITH AIR HANDLING UNIT SHOP DRAWINGS.

AIR HANDLING UNIT CONTROL SCHEMATIC
NOT TO SCALE



3 M-1 SECTION @ AIR HANDLING UNIT AU-1
SCALE 1 : 30

MECHANICAL SPECIFICATIONS

1. GENERAL

1.1 GENERAL REQUIREMENTS

.1 THE GENERAL CONDITIONS AND CONTRACT DOCUMENTS SHALL APPLY TO AND FORM AN INTEGRAL PART OF THIS DIVISION OF THE SPECIFICATIONS.

.2 ALL WORK SHALL BE IN ACCORDANCE WITH ALL LOCAL, PROVINCIAL AND FEDERAL CODES AND REGULATIONS. ALL WORK SHALL BE PERFORMED BY QUALIFIED TRADESMEN, TESTED AND UNDER WARRANTY FOR A PERIOD OF ONE YEAR FROM ACCEPTANCE DATE OF MECHANICAL EQUIPMENT AND WORK.

.3 FILE ALL PLANS, OBTAIN ALL PERMITS AND PAY ALL FEES AND ARRANGE FOR ALL INSPECTIONS BY GOVERNING AUTHORITIES AND PROVIDE OWNER WITH A CERTIFICATE OF ALL SUCH INSPECTIONS PRIOR TO FINAL PAYMENT.

.4 AT NO ADDITIONAL COST TO THE OWNER, LOCATE EXISTING SERVICE LINES PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ENSURE NO CONFLICTS WILL OCCUR.

.5 ALL WORK TO BE CARRIED OUT UNDER THE DIRECTION OF A COMPETENT FOREMAN AND IN FULL COOPERATION WITH ALL OTHER TRADES AND CONTRACTORS ON SITE.

.6 WHERE DISCREPANCIES OCCUR BETWEEN DRAWINGS AND SPECIFICATIONS, THEY SHALL BE CLARIFIED BY THE ENGINEER. IF FAILURE TO DO SO RESULTS IN WORK DONE INCORRECTLY, ALL CORRECTIONS SHALL BE MADE AS DIRECTED BY THE ENGINEER AT NO COST TO THE OWNER.

.7 ALL MATERIAL AND EQUIPMENT SHALL BE NEW AND BEAR THE LABELLING OF THE GOVERNING AUTHORITIES SUCH AS CSA, ULC AND OTHERS, AS REQUIRED BY GOVERNING CODES, REGULATIONS AND BYLAWS.

.8 FURNISH A WRITTEN GUARANTEE TO THE OWNER FOR ALL WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE OF THE MECHANICAL SYSTEMS TO REPAIR AT NO COST TO THE OWNER, ALL DEFECTIVE WORKMANSHIP AND MATERIAL.

.9 CLEAN UP AND LUBRICATE ALL EQUIPMENT TO MANUFACTURER'S RECOMMENDATIONS PRIOR TO START-UP.

.11 MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE WORK, SHALL BE INCLUDED IN THE WORK AS IF HEREIN SPECIFIED OR SHOWN.

.12 ALL DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT. DO NOT SCALE THE DRAWINGS.

.13 FOLLOW DRAWINGS AS CLOSELY AS POSSIBLE IN LAYING OUT WORK AND CHECK BUILDING TO VERIFY SPACES IN WHICH WORK WILL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS.

.14 IF DIRECTED BY THE ENGINEER, MAKE WITHOUT EXTRA COST, REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICTS WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK. THIS SHALL INCLUDE BUT NOT NECESSARILY BE CONFINED TO, OFFSETS IN PIPING OR DUCTS, TRANSFORMATION IN DUCTWORK AND RELOCATION OF DUCTS OR PIPING AS REQUIRED TO SUIT ON SITE JOB CONDITIONS.

2. PRODUCTS

2.1 DUCTWORK

.1 FABRICATE AND INSTALL DUCTWORK IN ACCORDANCE WITH ASHRAE STANDARDS AND SMACNA DUCT MANUALS.

.2 FABRICATE PLENUMS TO CONFIGURATIONS INDICATED ON THE DRAWINGS. CONSTRUCT PLENUMS OF HEAVY GAUGE GALVANIZED STEEL PANELS JOINED BY STANDING SEAMS. REINFORCE WITH ANGLES AND PROVIDE BRACING AND STIFFENING TO ENSURE RIGIDITY.

2.2 PROPANE GAS PIPE AND PIPE FITTINGS

.1 ALL MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE B.C. BUILDING CODE, CAN/CGA B149.2, & ALL OTHER GOVERNING AUTHORITIES HAVING JURISDICTION.

.2 ABOVEGROUND PROPANE GAS PIPING SHALL BE SCHEDULE 40 BLACK STEEL TO ASTM A53 GR. B. WITH 150# MALLEABLE IRON THREADED FITTINGS. UNDERGROUND PROPANE GAS PIPING FROM THE STORAGE TANK TO THE BUILDING SHALL BE PLASTIC CONFORMING TO CSA B137.4 "POLYETHYLENE PIPING SYSTEMS FOR GAS SERVICE". INSTALLATION OF ALL PIPE AND FITTINGS SHALL BE IN ACCORDANCE WITH CAN/CGA B149.2. ALL PROPANE PIPING IN BUILDING SHALL BE PAINTED YELLOW.

2.3 PIPE HANGERS

.1 ALL PIPING SHALL BE PROPERLY SUPPORTED USING APPROVED ROD HANGERS AND CLEVIS-TYPE SUPPORT OR FABRICATED ANGLE IRON SUPPORTS. MAXIMUM SPACING OF SUPPORTS - 1.8 M FOR 15 MM PIPE; 2.5 M FOR 20 MM. 3.0 M FOR UP TO 50 MM. 3.7 M FOR ABOVE 50 MM. STRAP HANGERS SHALL NOT BE USED.

2.4 VENTILATION SPECIALTIES

.1 PROVIDE AS SHOWN ON THE DRAWINGS AND AS REQUIRED FOR PROPER SYSTEM OPERATION OR AS REQUIRED TO MEET REQUIREMENTS OF THE BRITISH COLUMBIA BUILDING CODE.

.1 BALANCING DAMPERS: E.H. PRICE VCS3
.2 DUCT ACCESS DOORS: NAILOR HART 0810-00
.3 TYPE "S-1" SUPPLY REGISTER: E.H. PRICE 152D/F/L/A/B15.
.4 TYPE "R-1" RETURN REGISTER: E.H. PRICE 80/F/A/B15.
.5 AIR EXTRACTORS: E.H. PRICE AE-2S C/W NO. 1 ADJUSTING LEVER.

2.5 AIR HANDLING UNIT AH-1

.1 INSTALL INDOOR, HORIZONTAL, SEPARATED COMBUSTION, PROPANE FIRED VENTILATION UNIT CONSISTING OF PROPANE INDIRECT FIRED BURNER, BLOWER, FILTER SECTION, MIXING BOX WITH DAMPERS, CONTROLS, ETC. COMPLETELY PREWIRED AND TESTED READY FOR CONNECTION TO DUCTWORK AND REMOTE ELECTRICAL DEVICES AS SPECIFIED HEREIN AND AS INDICATED ON THE DRAWINGS.

.2 CAPACITY: SUPPLY FAN CAPABLE OF DELIVERING 1500 L/SEC @ 250 PA EXTERNAL STATIC PRESSURE WHEN DRIVEN BY A 1.5 HP MOTOR. MINIMUM HIGH ALTITUDE HEATING OUTPUT CAPACITY SHALL BE 81.2 KW.

.3 ACCESSORIES: STAINLESS STEEL HEAT EXCHANGER, PROPANE GAS PRESSURE REGULATOR, MODULATING GAS BURNER WITH ELECTRONIC SPARK IGNITION SYSTEM AND DISCHARGE TEMPERATURE CONTROL WITH OVERRIDING SPACE TEMPERATURE CONTROL AND SAFETY CONTROLS, SPACE THERMOSTAT, MANUAL OCCUPIED-UNOCCUPIED SWITCH, TEFC MOTOR, FILTER RACK C/W 25 MM THICK DISPOSAL FILTERS, MOTORIZED OUTDOOR AND RETURN AIR DAMPERS WITH MODULATING MOTOR AND MINIMUM POSITION POTENTIOMETER, HORIZONTAL VENT/COMBUSTION AIR TERMINAL ASSEMBLY, ETC. HEATER SHALL BE COMPLETELY PREWIRED WITH SUPPLY FAN MOTOR STARTER, CONTROL TRANSFORMER, ETC. REQUIRING ONLY FIELD CONNECTION OF REMOTE WIRING TO A NUMBERED TERMINAL STRIP, LOCATED IN THE HEATER CONTROL PANEL.

.4 PROVIDE TERMINALS NECESSARY FOR INTERLOCKING EXHAUST FAN EF-1 120V/1ø MOTORIZED DAMPER. NOTE THAT THE FAN IS POWERED THROUGH AN END SWITCH IN THE EXHAUST AIR MOTORIZED DAMPER.

.5 PROVIDE A PREWIRED CONTROL SYSTEM TO ALLOW OPERATION AS DESCRIBED HEREIN. A REMOTE WALL MOUNTED SWITCH ALLOWS EITHER OCCUPIED OR UNOCCUPIED MODES OF OPERATION.

A) IN "OCCUPIED" MODE THE HEATER FAN RUNS CONTINUOUSLY WHILE THE BURNER IS MODULATED BY AN ADJUSTABLE DISCHARGE CONTROLLER SET TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 18°C. AN OVERRIDING SPACE THERMOSTAT, ALSO SET AT 18°C., WILL OPEN THE GAS VALVE FULLY UPON SENSING A TEMPERATURE BELOW ITS SET POINT. THE OUTDOOR AND RETURN AIR DAMPERS ARE POSITIONED BY A UNIT MOUNTED MINIMUM POSITION POTENTIOMETER INITIALLY SET FOR 750 L/SEC OF OUTDOOR AIR. EXHAUST FAN EF-1 IS STARTED BY AN END SWITCH AND BEGINS RUNNING CONTINUOUSLY AFTER THE EXHAUST AIR MOTORIZED DAMPER IS POSITIONED FULLY OPEN.

B) IN "UNOCCUPIED" MODE THE HEATER FAN CYCLES ON TEMPERATURE IN RESPONSE TO DEMAND FROM THE SPACE THERMOSTAT. THE OUTDOOR AND RETURN AIR DAMPERS ARE POSITIONED FOR 100 PERCENT RECIRCULATION. EF-1 IS OFF WITH ITS MOTORIZED DAMPER FULLY CLOSED.

.6 MODEL: REZNOR MODEL SCE-400.

2.6 FANS

.1 PROPELLER WALL EXHAUST FANS: DIRECT DRIVEN, AXIAL TYPE SUITABLE FOR WALL MOUNTING.

.2 CONSTRUCTED WITH GALVANIZED STEEL VENTURI PANEL, WELDED WIRE GUARD/ SUPPORT STRUCTURE, ALUMINUM BLADE PROPELLER WITH STEEL HUB, HEAVY DUTY PERMANENTLY LUBRICATED BALL BEARING MOTOR. COMPLETE WITH WALL COLLAR, GALVANIZED STEEL STORMPROOF WEATHERHOOD PAINTED TO MATCH BUILDING SIDING, BIROSCREEN, FACTORY MOUNTED HEAVY DUTY MOTORIZED BACKDRAFT DAMPER WITH 120 VOLT OPERATOR AND 1/4 HP RATED, 120 VOLT END SWITCH.

.3 CAPACITY/MANUFACTURER/MODEL: GREENHECK MODEL SE1-18-429-B4, CAPABLE OF EXHAUSTING 710 L/SEC AT 65 PA EXTERNAL STATIC PRESSURE WHEN OPERATING AT 1140 RPM AND POWERED BY A 1/4 HP, 120 VOLT SINGLE PHASE MOTOR.

2.7 LOUVRES AND GRILLES

.1 LOUVRES SHALL BE WESTVENT MODEL XC-445W CONTINUOUS BLADE LOUVRE, EXTRUDED ALUMINUM, ALL WELDED CONSTRUCTION COMPLETE WITH 15 MM SQUARE WIRE MESH BIROSCREEN. FINISH, BAKED ENAMEL, COLOUR TO MATCH BUILDING SIDING. SIZE AS INDICATED ON THE PLANS.

2.8 FIRE EXTINGUISHERS

.1 NATIONAL FIRE EQUIPMENT MULTI PURPOSE DRY CHEMICAL TYPE COMPLETE WITH WALL MOUNTING BRACKETS. ULC RATED. EXTINGUISHERS SHALL BE MODEL ABC-10F WITH A RATING OF 4A 60-BC.

2.9 EYEWASH STATION

.1 PORTABLE TYPE SUITABLE FOR WALL MOUNTING COMPLETE WITH BRACKETS. CONSTRUCTED WITH 53 LITRE HIGH DENSITY POLYETHYLENE TANK WITH PINCH VALVE, RETRACTABLE TRAY, ABS EYEWASH HEADS, ETC.

.2 EYEWASH SHALL BE ENCON MODEL 01104050.

.3 MOUNT EYEWASH ON WALL BRACKET WITH HEADS LOCATED 1050 MM ABOVE THE FINISHED FLOOR.

2.10 INSULATION

.1 50mm FIBREGLAS AF-530 RIGID VAPOUR SEAL INSULATION FOR DUCTWORK WITHIN 3 METERS OF EXHAUST OUTLETS OR OUTDOOR AIR INTAKE LOUVRES. COVER EXPOSED INSULATION WITH 186 G/M^{2}CANVAS. FINISH CANVAS SUITABLE FOR PAINTING.

3. EXECUTION

3.1 INSTALLATION

.1 INSTALL ALL EQUIPMENT AND MATERIALS IN STRICT ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.

3.2 WARRANTY

.1 SERVICE ALL EQUIPMENT AND SYSTEMS FOR ONE YEAR FROM COMPLETION DATE.

3.3 RECORD DRAWINGS, MAINTENANCE MANUALS

.1 PROVIDE ONE SET OF AS-BUILT DRAWINGS WITH CHANGES NEATLY MARKED WITH RED PENCIL.

.2 PROVIDE THREE COPIES OF MAINTENANCE MANUALS. INCLUDE TECHNICAL, OPERATING AND MAINTENANCE INSTRUCTIONS ON ALL EQUIPMENT.

.3 INSTRUCT OPERATORS IN OPERATION OF ALL EQUIPMENT.

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — R. A. HARNETT — 95-05-04

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95.05.03	TENDER & CONSTRUCTION	RAO	GAB

Revision / Revision

A Detail number — A Numéro de detail
B Sheet number — B Numéro de la feuille

Linear dimensions in millimetres — Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners

Eng. Stamp / Sceau de l'ingénieur

Public Works and Government Services Canada — Travaux publics et Services gouvernementaux Canada
Architecture and Engineering — Architecture et genie
Canada

Client/client: Canadian Heritage — Patrimoine Canadien
Parks Canada — Parcs Canada
Western Region — Région de l'Ouest

Project title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin: HEATING & VENTILATING LAYOUT & DETAILS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	R.A. Olsen	95-03-03
Designed by/Concept par	Reviewed by/Revise par	Scale/Echelle
R.A. Olsen	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client — Approved by/Approuvé par
PWN RESPONSIBLE OFFICER/AGENT RESPONSIBLE — Date — A & E SERVICES/GÉNIE ET ARCHITECTURE — Date

Project No./N° du projet: #77146
Asset No./N° du-bien: 974003604
Sheet No./N°de la feuille: M1
Drawing Reference No./N° de référence du dessin: G95R1

File No. HB5C17A1

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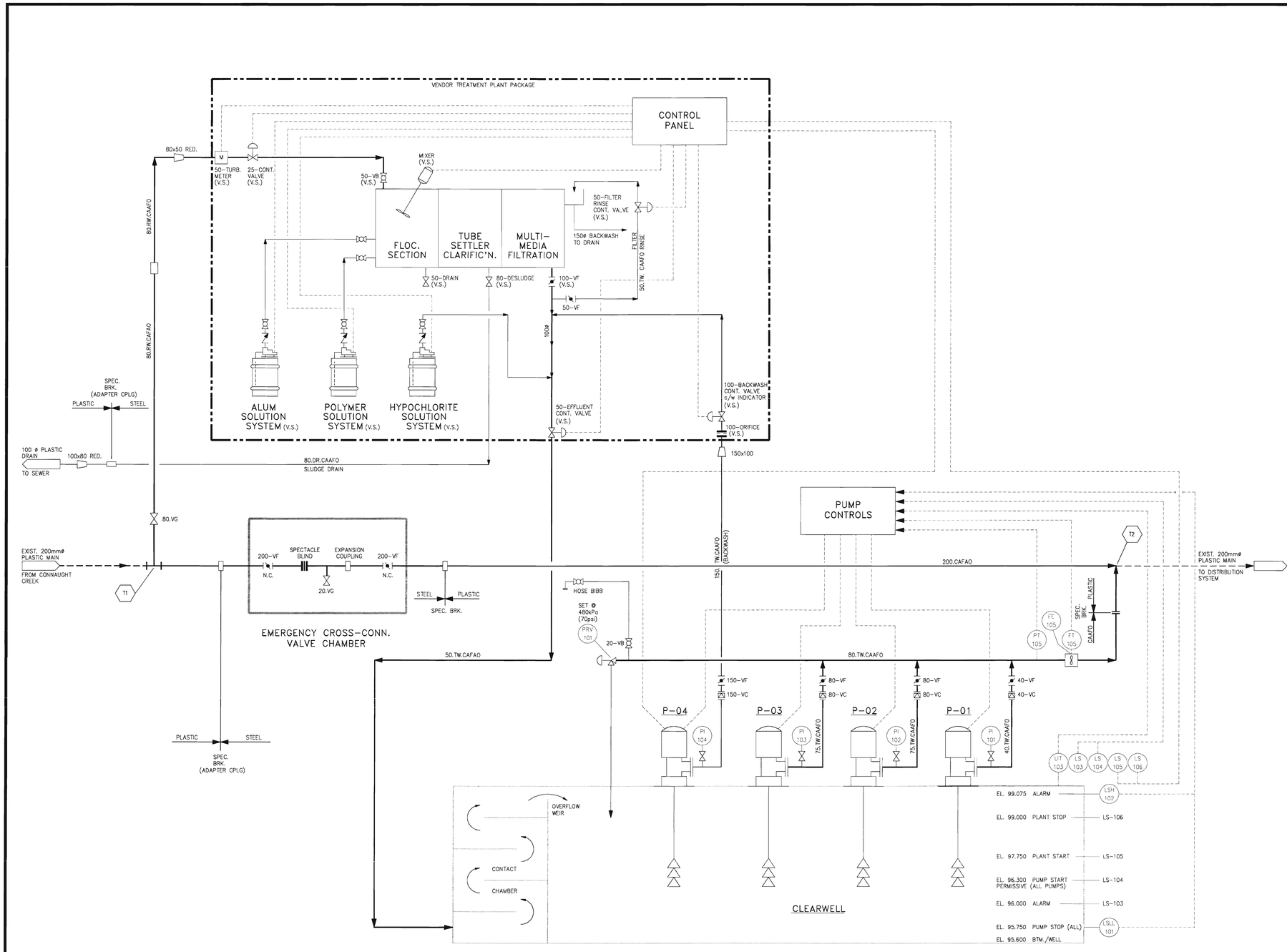

PUMP P-04
FILTER BACKWASH PUMP
CAP'TY : 22.0 l/s (285 USGPM)
@ 18m (60') TDH

PUMP P-03
DUTY PUMP
CAP'TY : 5.0 l/s (65 USGPM)
@ 46m (150') TDH

PUMP P-02
DUTY PUMP
CAP'TY : 5.0 l/s (65 USGPM)
@ 46m (150') TDH

PUMP P-01
JOCKEY PUMP
CAP'TY : 0.8 l/s (10 USGPM)
@ 46m (150') TDH

NOTES :

1. (V.S.) = VENDOR SUPPLIED.

G. Bennett
95-05-04

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95-05-03	FOR TENDER & CONSTRUCTION	D.M.	G.P.

Revision / Revision

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Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners 2977-135-00

Eng. Stamp / Sceau de l'ingénieur

Public Works and Government Services Canada — Travaux publics et Services gouvernementaux Canada
Architecture and Engineering — Architecture et genie'
Canada

Client/client: Canadian Heritage — Patrimoine Canadien
Parks Canada — Parcs Canada
Western Region — Région de l'Ouest

Project title/Titre du projet:
ROGERS PASS
WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin:
PIPING & INSTRUMENTATION DIAGRAM

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	S. Robertson	95-03-13
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
G. Pfeifer	R. SILLITTO	N.T.S.

Client Acceptance/Acceptation du client — Approved by/Approuvé par
PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE Date — A & E SERVICES/GÉNIE ET ARCHITECTURE Date

Project No./Nº du projet	Asset No./Nº du-bien	Sheet No./Nº de la feuille
#77146	974003604	P1

Drawing Reference No./Nº de référence du dessin: G95R1

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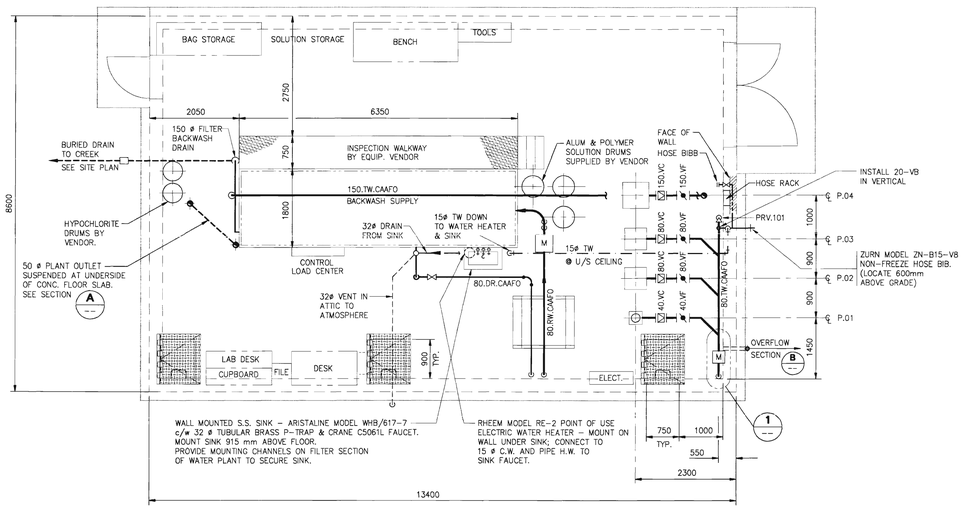
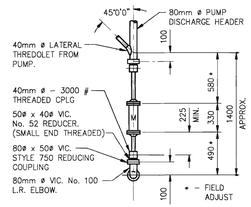


MAIN FLOOR PLAN

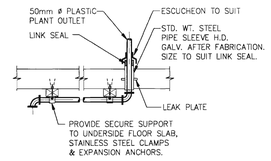
SCALE 1 : 50

NOTE : SMALL DIAMETER TUBING, CHEMICAL FEED SYSTEMS, SUPPLIED AS VENDOR PACKAGE NOT SHOWN. COMPLETE SYSTEMS TO BE PROVIDED BY CONTRACTOR AS SPECIFIED.



METER PIPING DETAIL

SCALE 1 : 25



SECTION

SCALE 1 : 25

PLANT OPERATION:

Water plant will normally run between clearwell elevations 97.750 and 99.00. At rate of 16.35 m^3/hr (60 USgpm) and no usage, the treatment plant will run for 2.75 hours.

Pump will have an "enable start" at elevation 96.300 with pump stop at elevation 95.750 (i.e. 150 depth left in clearwell) Pump rate 16.35 m^3/hr (60 USgpm), the pump(s) can run for 19.8 (calc'd storage)/16.35 = 1.2 hours with no plant influent.

A low level alarm will trigger at elevation 96.000, 250 mm above pump stop or 0.55 hours before low level pump stop (33 minutes).

At high level, an alarm will be triggered by a level elevation 99.075 (75 mm or 3" above normal maximum W.L.).

This equates to 10 minutes run time at normal plant throughput and no usage.

At a further increase in level of 50 mm to elevation 99.125 the invert of the overflow pipe will be reached and the clearwell will begin to spill water.

Contact chamber overflow weir is set at elevation 99.275 which is approximately 150 mm above clearwell overflow pipe invert. This ensure no chance of "backflow" from clearwell into contact chamber area.

CONTROL PHILOSOPHY:

A. Water Treatment Package Plant will run between levels indicated.

B. To maintain distribution pressure, following operation will be provided:

1) Jockey pump P-01 will operate during low demand conditions, running continuously to maintain system pressure. Relief valve PRV-101 will relieve excess pressure to clearwell, set at 1,515 kPa (75 psi). pumps selection based on operation pressure of 450 kPa (65 psi).

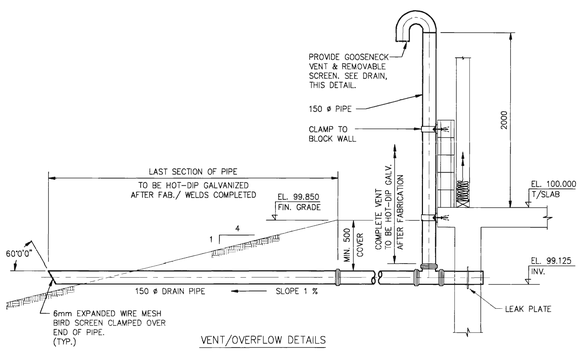
2) When header pressure drops to 380 kPa (55 psi) indicating jockey pump can't keep up with system demand, pre-selected duty pump (P-02 or P-03) will start. After delay (preset) of up to 120 seconds (set at 10 seconds initially) jockey pump will drop out.

3) When flow meter reads flow has dropped back to 0.8 l/sec., a timer will commence run (present adjustable timers) and after 2 minutes, below this setpoint, will cause the jockey pump to start. After a brief time delay, set for 5 seconds, the duty pump will stop.

System will repeat.

C. The backwash pump P-04 is utilized solely to backwash the filters. Therefore, its control is tied to water plant package control, with low – level protection common to the other pumps.

D. Start permissive at noted elevations will allow any pump to start (manual override can allow operator to run pump dry, will need operator training and cautions posted).



VENT/OVERFLOW DETAILS

SECTION

SCALE 1 : 25

A. Bonnett
95-05-04

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Revision / Revision

A Detail number — A Numéro de detail
B Sheet number — B Numéro de la feuille

Linear dimensions in millimetres — Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners 2977-135-00

Eng. Stamp / Sceau de l'ingénieur

Public Works and Government Services Canada — Travaux publics et Services gouvernementaux Canada
Architecture and Engineering — Architecture et genie'
Canada

Client/client: Canadian Heritage — Patrimoine Canadien
Parks Canada — Parcs Canada
Western Region — Région de l'Ouest

Project title/Titre du projet:
ROGERS PASS
WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin:
PROCESS SYSTEM
LAYOUT DETAILS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	D. MZIK	95-03-03
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
G. PFEIFER	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client — Approved by/Approuvé par

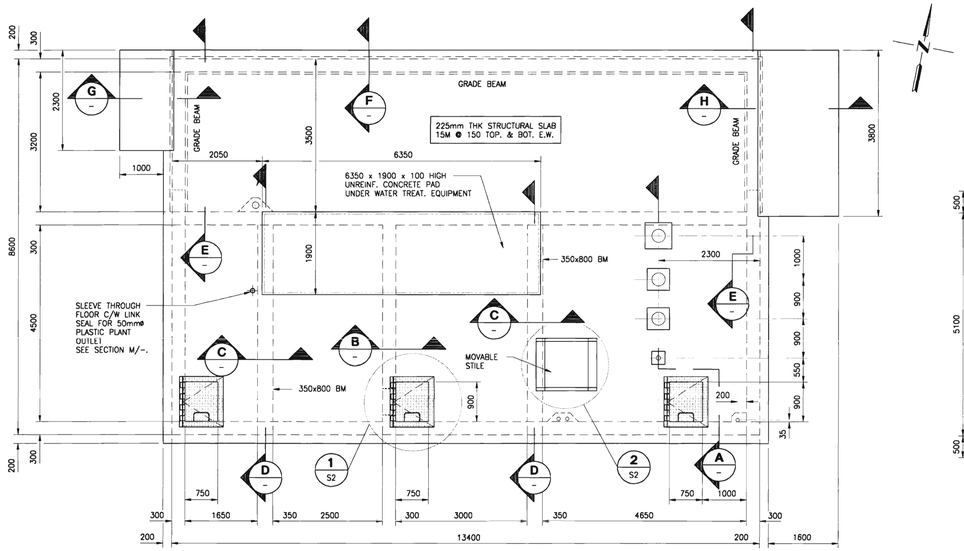
PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE Date — A & E SERVICES/GÉNIE ET ARCHITECTURE Date

Project No./Nº du projet: #77146 — Asset No./Nº du-bien: 974003604 — Sheet No./Nº de la feuille: P2

Drawing Reference No./Nº de référence du dessin: G95R1

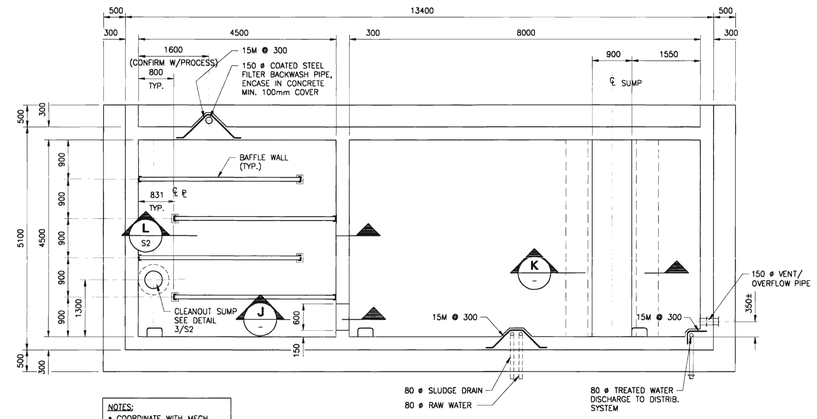
B1 SIZE 1000 x 707 mm

File No. SG5E03A1



MAIN FLOOR PLAN

SCALE 1 : 50

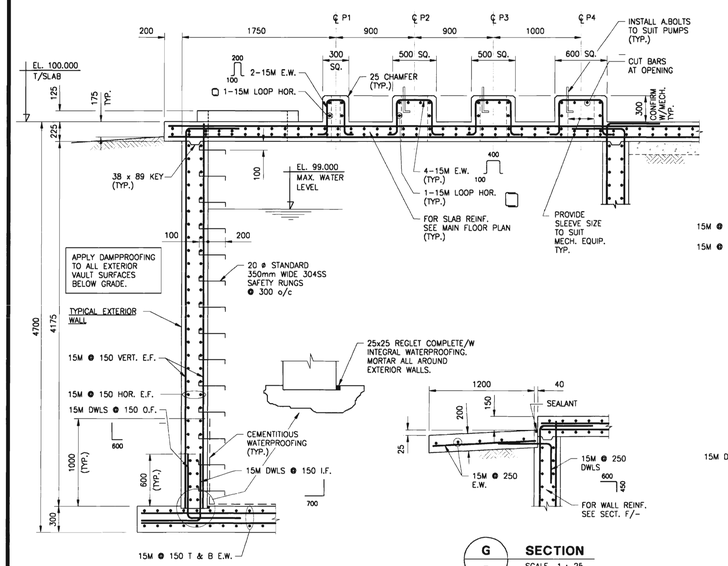


NOTES:
- COORDINATE WITH MECH. CONTRACTOR FOR PIPING EMBEDDED IN CONCRETE.
- MIN. 100mm CONCRETE COVER ON COATED STEEL PIPES, TYPICAL.
- PROVIDE LEAN CONCRETE SUPPORT BEAMS TO UNDISTURBED TRENCH BOTTOMS FOR ALL PIPING LEAVING STRUCTURE.

RESERVOIR PLAN

SCALE 1 : 50

NOTE:
REFER TO PROCESS & ELECT./INSTR. FOR EXACT LOCATION AND SIZE OF SLEEVES, ENCASED PIPING AND CONDUITS.



A SECTION

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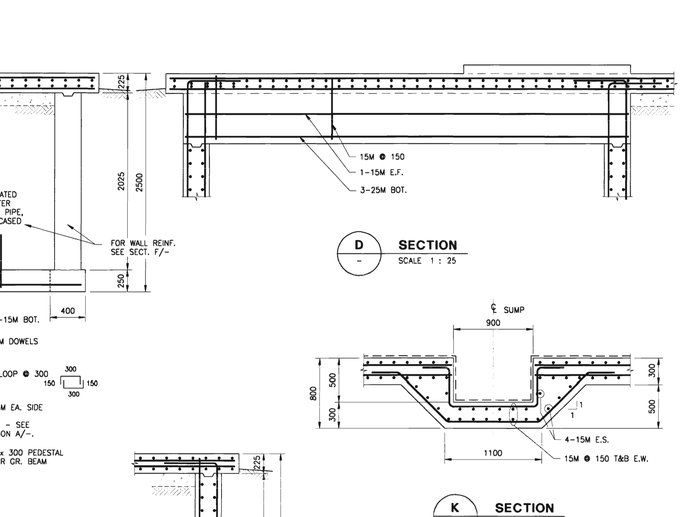


B SECTION

SCALE 1 : 25

E SECTION

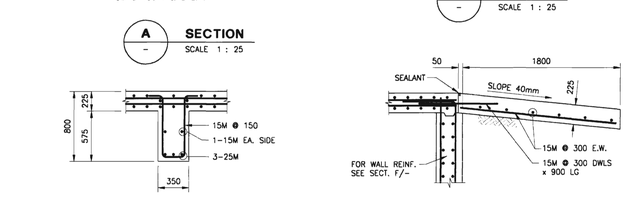
SCALE 1 : 25

D SECTION

SCALE 1 : 25

K SECTION

SCALE 1 : 25

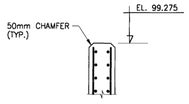


C SECTION

SCALE 1 : 25

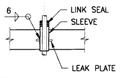
H SECTION

SCALE 1 : 25



J SECTION

SCALE 1 : 25



M SECTION

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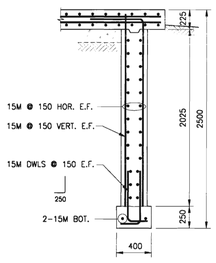

F SECTION

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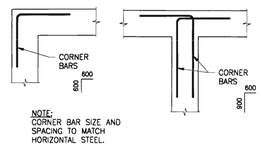

NOTE:
CORNER BAR SIZE AND SPACING TO MATCH HORIZONTAL STEEL.

CORNER & INTERSECTION BAR DETAILS

SCALE 1 : 25

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95-05-03	FOR TENDER & CONSTRUCTION	Z.S.	J.H.

Revision / Revision

A Detail number — A Numéro de detail
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Eng. Stamp / Sceau de l'ingénieur: May 4/95

Public Works and Government Services Canada — Travaux publics et Services gouvernementaux Canada
Architecture and Engineering — Architecture et genie'
Canada

Client/client: Canadian Heritage — Patrimoine Canadien; Parks Canada — Parcs Canada; Western Region — Région de l'Ouest

Project title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin: STRUCTURAL PLAN & DETAILS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	Z. Spokowski	95-03-03
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
B. Shaw	R. SILLITTO	AS SHOWN

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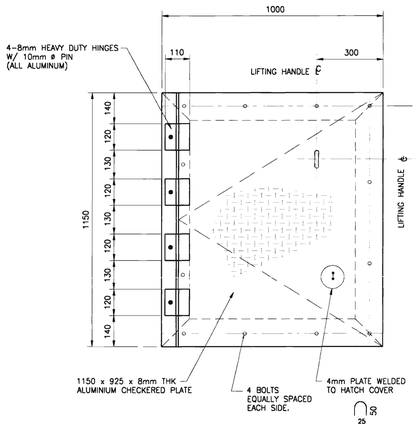
#77146	974003604	S1

Drawing Reference No./Nº de référence du dessin: G95R1

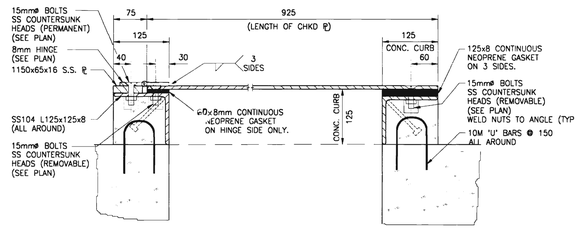
Plot Scale 1:1 File No. 297735S1

BT SIZE 1000 x 707 mm



1 / S1 SEALED HATCH COVER PLAN

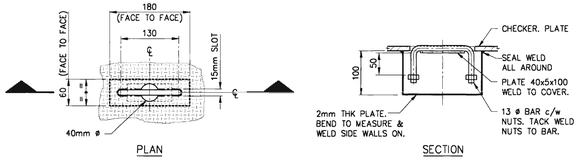
SCALE 1 : 10



HATCH COVER

FRAME & HINGE SECTION

SCALE 1:5



PLAN

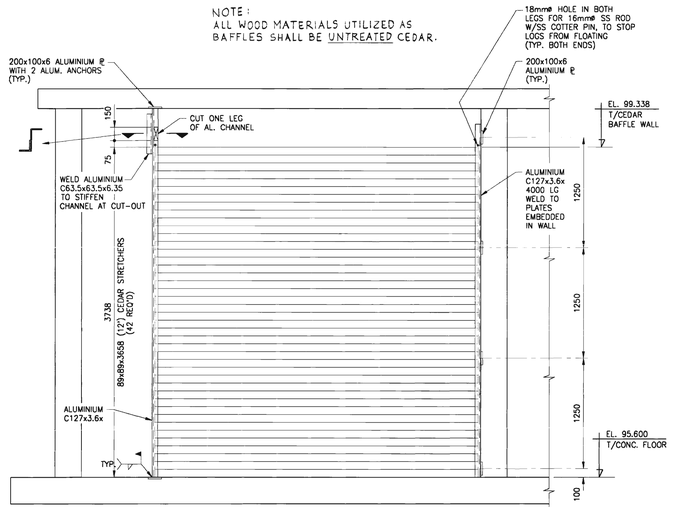
SECTION

ALUMINUM LIFTING HANDLE

TYP. DETAIL

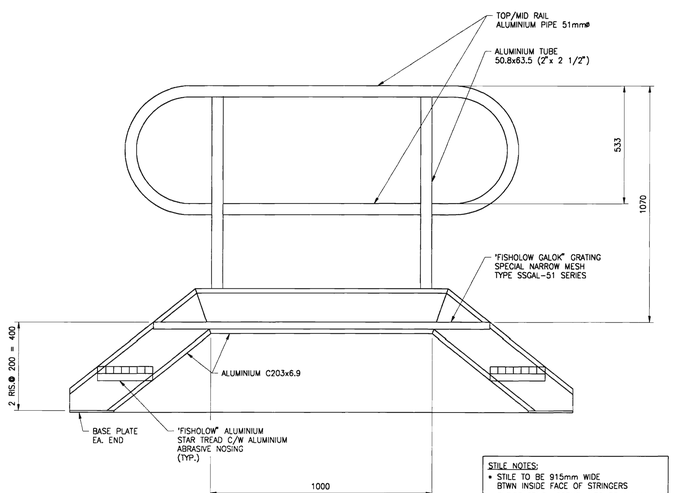
SCALE 1:5

NOTE:
ALL WOOD MATERIALS UTILIZED AS BAFFLES SHALL BE UNTREATED CEDAR.



L / S1 BAFFLE WALL TYPICAL ELEVATION

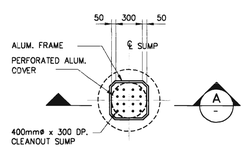
SCALE 1 : 25



STILE NOTES:
- STILE TO BE 915mm WIDE BTWN INSIDE FACE OF STRINGERS
- ENTIRE STAIR ASSEMBLY TO BE ALUMINIUM EXCEPT BOLTS, NUTS AND WASHERS
- HANDRAIL TO BE PREFABRICATED ALUMINIUM COMPONENTS TO MATCH EXISTING HANDRAIL SYSTEM. (DOMINION ALUMINIUM FABRICATORS) HANDRAIL REQUIRED ON ONE SIDE ONLY.

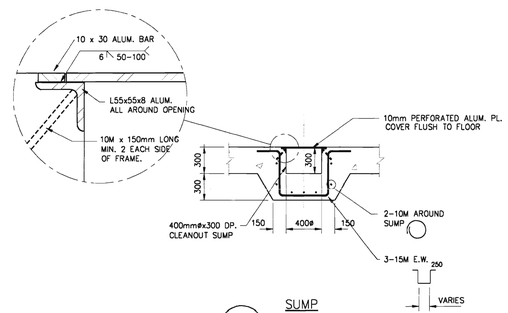
2 / S1 STILE DETAIL

SCALE 1 : 10



3 / S1 SUMP PLAN

SCALE 1:25



A / - SUMP SECTION

SCALE 1:25

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95-05-03	FOR TENDER & CONSTRUCTION	Z.S.	J.H.

Revision / Revision

A/B Detail number / Sheet number — A Numéro de detail / B Numéro de la feuille

Linear dimensions in millimetres / Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners 2977-135-00

Eng. Stamp / Sceau de l'ingénieur: May 4/95

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

Architecture and Engineering / Architecture et genie'

Canada

Client/client: Canadian Heritage / Patrimoine Canadien

Parks Canada / Parcs Canada

Western Region / Région de l'Ouest

Project title/Titre du projet

ROGERS PASS
WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin

STRUCTURAL
MISCELLANEOUS DETAILS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	Z. Spakowski	95-03-03
Designed by/Concept par	**Reviewed by/Revisé par**	**Scale/Echelle**
B. Shaw	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client — PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE — Date

Approved by/Approuvé par — A & E SERVICES/GÉNIE ET ARCHITECTURE — Date

Project No./Nº du projet	Asset No./Nº du-bien	Sheet No./Nºde la feuille
#77146	974003604	S2

Drawing Reference No./Nº de référence du dessin: G95R1

ISO A1 841 x 1000 x 707 mm

DIVISION 1 - GENERAL

.1 The General Conditions of the Contract and General Requirements form an integral part of the requirements of the following sections.

.2 The complete installation shall be to the approval of all local and provincial codes, regulations, local inspection, and as follows:

B.C. Building Code	BCBC 1990
Concrete Materials and Methods of Concrete Construction	CSA CAN3-A23.1
Methods of Test for Concrete	CSA CAN3-A23.2
Design of Concrete Structures for Buildings (Limit States Design)	CSA CAN3-A23.3
Cold Formed Steel Structural	CSA CAN3-S135
Engineering Design in Wood (Limit States Design)	CSA CAN3-086.1
National Building Code and Supplements	NBC 1990

.3 Manufacturer's requirements over and above those shown or specified shall be adhered to.

.4 General intent of this contract is that a complete operating facility be provided in accordance with the detailed drawings and specifications.

.5 Submit five (5) copies of shop drawings for manufactured items and/or equipment, including but not necessarily limited to the following:

.1 Architectural/structural components as indicated.
.2 Mechanical items such as unit heaters and exhaust fans.
.3 Process systems components such as pumps, package water treatment plant, valves, etc.
.4 Electrical equipment.
.5 Other items as specifically identified herein.

.6 Submit three (3) copies of maintenance manuals at project completion.

.7 Temporary utilities (power, water, sanitary facilities, etc.) which are required for construction shall be arranged, maintained, and paid for by the Contractor in accordance with governing regulations and ordinances.

.8 When the work has been completed and warrants testing, the Contractor shall notify the Engineer of his intention to test and shall outline his plans for testing procedure and timing. The Contractor, however, must make his own plans and preparations for testing and he agrees that the granting of permission to test by Engineer does not in any way relieve him from final responsibility for all aspects of operating the equipment and damage arising out of the operation of the equipment.

.9 Contractor may quote on products accepted by the Engineer as equivalent material and equipment in accordance with Part III, Instructions to Tenderers.

.10 Design Loads

.1 LIVE (Service):

Ground Snow Load (include drift conditions as required)	Ss = 8.5 kPa SR = 0.2 kPa
Wind (1/30 hourly pressure) (include uplift conditions as required)	0.29 kPa
Seismic Data	Za = 1 Zv = 1 Zonal Velocity Ratio = 0.05

.2 DEAD (Service):
Sloped Roof; (Truss Section)

Roofing system	0.90 kPa
Mech. and Elec. allowance (suspended)	0.20 kPa

.3 SOIL (Service):

Assumed allowable bearing pressure on bedrock	900 kPa

DIVISION 2

.1 Visit the site and note all characteristics and irregularities affecting the work.

.2 Provide adequate equipment and labour to keep excavated areas dry.

.3 Strip all topsoil from all areas affected by the work of this contract. Stockpile on site where directed by Owner. Redistribute topsoil after completion of work, ready to receive landscaping.

.4 Buried pipe installation:

.1 Pipe shall be bedded on a 100 mm layer of sand, which shall be carried up to a level of 100 mm above the crown of the pipe. Sand shall extend full width of the trench, and be placed in 150 mm layers, well tamped throughout.
.2 Initial backfilling, after sand bedding, shall consist of selected excavated material or sand, carefully hand-placed in 150 mm layers for full trench width, from top bedding material to a point at least 300 mm above the crown of the pipe, and each layer compacted to a density of 95% Standard Proctor.
.3 Suitable reaction blocking shall be placed to prevent shifting at bends, valves, tees, etc., as directed by the Engineer.

.5 Fill Materials:

.1 Type 1: Crushed gravel of sound, hard particles, free from flaky particles, soft shale, organic matter or foreign material, to meet the following requirements:

Sieve Size (mm)	Percent Passing (by weight)	
20.0	100	
10.0	35 -	77
5.0	15 -	55
1.250	0 -	30
0.080	1 -	12

.2 Type 2: Pit-run gravel of sound hard particles, free from flaky particles, soft shale, organic matter or foreign material, to meet the following requirements:

Sieve Size (mm)	Percent Passing (by weight)	
80.0	100	
50.0	55 -	100
25.0	38 -	100
16.0	32 -	85
5.0	20 -	65
0.315	6 -	30
0.080	2 -	10

.3 Type 3: Sub-soil, approved by the Engineer, free from roots, rocks larger than 75 mm, deleterious materials, and building debris.
.4 Type 4: Sand, clean, free running, sound, hard pea gravel, free from deliterious materials, to meet the following requirements:

Sieve Size (mm)	Percent Passing (by weight)	
10.00	100	
5.00	90 -	100
0.630	25 -	60
0.080	0 -	3

.6 Placing Requirements

.1 Place Type 1 FILL compacted to 95% under slabs on grade.
.2 Place Type 2 FILL compacted to 95% at underside of Type 1 FILL to build up grade as required.
.3 Place Type 3 FILL compacted to 90% around building to form berm to subgrade elevations shown on the drawings.
.4 Compaction densities are percentages of Standard Proctor Maximum Dry Density obtainable from ASTM D 698.
.5 Place and compact fill materials in continuous horizontal layers not exceeding 200 mm loose depth or 150 mm compacted depth.

.7 The subgrade beneath the foundation elements should be protected from potential frost penetration during construction. Footing and floor slab subgrade shall not be placed on frozen soils, and the foundation soils shall be protected from frost action at all times.

.8 All foundation excavation and bearing surfaces should be protected from rain, snow and the ingress of free water at all times.

.9 Backfill for remainder of trenches, berms, etc., with full material noted or as approved by the Engineer. Rough grade site generally to slopes indicated on the drawings and as directed by the Engineer. Blend new grades into existing.

.10 No rocks in excess of 150 mm dimensions shall be permitted in the backfill. The entire cost of supplying, hauling, and placing suitable backfill shall be borne by the Contractor.

DIVISION 3 - CONCRETE

.1 Concrete: to CSA CAN3-A23.1.

.1 Base Slab, Walls and Building Foundations

Concrete strength (@ 28 days)	25 MPa
Cement type (sulphate resistant)	50
Air Content	4-6%
Water/Cement Ratio (maximum)	0.45
Aggregate Size (maximum)	20 mm
Slump	60 +/- 20 mm

.2 Interior Slabs on Grade and Reservoir Top Slab

Concrete strength (@ 28 days)	30 MPa
Cement type (normal)	10
Water/Cement Ratio (maximum)	0.45
Aggregate Size (maximum)	20 mm
Slump	60 +/- 20 mm

.3 Mud Slabs: Sulphate resistant cement to achieve a 28 day compressive strength of 15 MPa.

.2 Reinforcing Steel: to CSA G30.12, Grade 400
.1 Clear cover to reinforcement:

Case against and permanently exposed to earth	75 mm
Formed surfaces exposed to earth or weather:	
20M and greater	50 mm
15M and smaller	40 mm
Formed on free surfaces exposed to water (reservoir walls, base and sump):	
All bars	50 mm
Slabs, walls and joists (35M and smaller)	20 mm
Beams, girders and columns	40 mm

.2 Welding of reinforcing is NOT PERMITTED.
.3 Grout: non-shrink type with 50 MPa compressive strength at 28 days.
.4 Cast in Place Concrete
.1 Place and cure concrete in accordance with CSA CAN3-A23.1.
.2 Use of calcium chloride is NOT permitted.
.3 Concrete must be placed within 60 minutes of being batched at the plant.
.4 To control shrinkage cracking, allow a minimum of 7 days before placing new slab concrete against slabs in place.
.5 Steel trowel concrete slabs to a smooth and level surface. Follow a smooth burnished surface to within 6 mm tolerance when measured in any direction using a 10 m straight edge.
.6 Set anchor bolts to ensure accurate alignment of base plates.
.7 Install 0.15 mm polyethylene sheet vapour barrier below slab on grade.
.8 Immediately after finishing main floor slab, apply a curing, sealing compound (Sternson Ritecure or approved equivalent) in accordance with the manufacturer's instructions.

DIVISION 4 - MASONRY

.1 Protect masonry and other work from marking and damage. Protect completed work from mortar droppings.

.2 Remove chipped, cracked or damaged units, and replace with new units.

.3 Portland Cement to CAN/CSA A5-M, Type 10.

.4 Masonry Cement: to CAN/CSA A8-M, Type H.

.5 Aggregates: to CSA A82.56M, clean and dry, protected from freezing.

.6 Water: clean, potable water.

.7 Mortar: Type "S".

.8 Loose Fill insulation: vermiculite or perlite granular fill, "Zonolite" as manufactured by W.R. Grace or approved equivalent.

.9 Anchor straps to be corrugated steel wall straps.

.10 Flexible flashings: plain, 1.0 m thick polyethylene film bonded to asphalt treated crapped kraft, "Rodoply", "Nervostral" or equivalent.

.11 Weep hole plugs: premoulded PVC insect proof weep holes, placed at maximum 800 mm o.c. at bottom of wall.

.12 Horizontal ladder type masonry reinforcing: to ASTM A82, galvanized, 3.65 mm side, and cross rods. Place above bottom course and below top course of masonry. Install to manufacturers typical details for single wythe walls. Lap splices minimum 400 mm.

.13 Concrete Unit Masonry: to CAN3-A371 and CAN2-S304. Units to be classification H/20/C/D, metric standard size 200 x 400 x 200 thick, colour grey, Type "EXPO 200" or approved equivalent.

.14 Lay in common bond, one course plus one joint to equal 200 mm.

.15 Tool joints concave. Strike flush all concealed joints.

.16 Build masonry square, true-to-line, plumb, with vertical joints aligned.

.17 Lay masonry in full bed of mortar, properly joined with other work.

DIVISION 5 - STRUCTURAL STEEL AND MISCELLANEOUS METALS

.1 Structural Steel: to CSA G40.21

Structural Shapes	Grade 300W
Miscellaneous Bars and Plates	Grade 260W

.2 Anchor Bolts with Nuts and Washers: to ASTM A36 (cadmium plated).

.3 Welding Materials:

.1 Steel	CSA W59
.2 Aluminum	CSA S244

.4 Aluminum

.1 Extruded Shapes	6063-T5
.2 Plates and Sheets	3033-H16

.5 Galvanizing: to CSA G164.
Hot dip minimum coating 600 g/m^2

.6 Grating: "Fishalow" Aluminum Grating special narrow mesh Type 18-S1M - with 51x4.8 bearing bars

.7 Stair Treads: "Fishalow" Aluminum stair treads, Type A, 278 mm width.

.8 Steel Fabrication

.1 Do structural steel work in accordance with CSA CAN3-S16.1.
.2 Design connections not detailed on the Drawings for not less than 50% of the resistance of the member.
.3 Submit Shop Drawings and Erection Drawings prior to fabrication. Shop Drawings for work designed by the fabricator shall bear the seal and signature of a professional engineer registered in the Province of British Columbia.
.4 Examine Drawings and Specifications and furnish all miscellaneous metalwork items required for the proper execution of the work.
.5 Coat all surfaces of aluminum in contract with concrete with a bituminous paint.
.6 Touch up bolts, welds, and abrasions with primer at completion of erection.
.7 Make provisions for erection procedure, temporary bracing, and loads during construction.

DIVISION 6 - WOOD

.1 All lumber to have grade stamp clearly visible of an agency certified by the Canadian Lumber Standards Administration Board.

.2 Dimension lumber: to CSA O141, and to National Lumber Grades Authority, Standard grading Rules, Moisture content maximum 19% for exterior and 12% or less for interior work of the following grades and species:

Rafters & Trusses	#1 Spruce-Pine-Fir
Plywood	Exterior Grade Douglas Fir (GIS to the interior)
General Framing	#1 Spruce-Pine-Fir

.3 Wood Fabrication

.1 Do rough carpentry in accordance with BCBC 1990 and CSA CAN3-0896.1.
.2 All lumber to have grade stamp clearly visible.
.3 Pre-Engineered Roof Trusses:
.1 Design Criteria: design roof trusses to the dead and live loads identified on the Drawings and Specifications. Limit live load deflection to 1/240 of span. Contractor shall be responsible for the design of the pre-engineered roof trusses.
.2 Shop Drawings: shall bear the seal and signature of a professional engineer registered in the Province of British Columbia.
.3 Erection: erect and laterally brace pre-engineered roof trusses in accordance with fabricators recommendations. Make provisions for erection procedure, temporary bracing, and loads during construction.

.4 Wood Preservatives

.1 Wood preservative: pentachlorophenol base water repellant wood preservative.
.2 Brush-apply two coats of preservative on all wood in contact with cementitious materials, roofing, and related metal flashings. Apply preservative in strict accordance with manufacturer's recommendations. Ensure site-sawn ends are similarly treated. Allow preservative to cure prior to erecting members. Apply preservative to fascia boards, trim, and soffits.
.3 Construct members of continuous pieces of longest practical lengths.
.4 Place plywood sheathing with end joints staggered. Secure sheet edges over solid bearing.
.5 Establish all areas where anchors are to be set into concrete and coordinate placement with other trades.

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

.1 PVC Waterstops: Polyvinylchloride, 150 mm x 6.3 mm, centre bulb type. All mitres, tees, crosses, and L's to be shop welded.

.2 Cementitious Waterproofing Permaquick Super 200 and Permaquick Mortar 300.

.3 Joint and Crack Filler: Vandex Premix or Permaquick Mortar 300.

.4 Application:

.1 Waterproofing, joint and crack filler to be applied in accordance with manufacturer's instructions.
.2 Install Vandex Premix or Permaquick Mortar 300 for coves, at all construction joints, and junction of walls, and slab within the reservoir.
.3 Protect the freshly treated surfaces from rain for a minimum of 24 hours.

.5 Batt insulation: friction fit unfaced fibreglass batts, to RSI 3.52 for walls, and RSI 7.04 for ceiling space (optional "Weathershield" cellulose fibre insulation to RSI 7.04 acceptable for ceiling space).

.6 Perimeter insulation, 38 mm thick, extruded polystyrene to CGSB 41-GP14a, Type 4, Styrofoam SM as manufactured by Dow Chemical Ltd. Bond insulation to concrete with Flintkote/Bakelite 220-28, applied in full coverage of substrate to manufacturer's recommendations.

.7 Sheet air vapour barrier: polyethylene film to CAN2-51.33, Type 1, 0.150 mm thick. Lap and seal joints over solid bearing only. Patch all tears and punctures before concealing. Protect polyethylene film from punctures during placement of concrete slab.

.8 Install insulation and vapour barrier to maintain continuity of thermal and moisture protection to building elements, fit insulation closely around electrical boxes, plumbing, and process pipes, louvres, etc. Seal vapour barrier to maintain vapour tight seal.

.9 Metal flashings to be a minimum 24 gal. (0.61 mm), galvanized, 2,400 mm length, rolled edges, backpainted with bituminous paint. Shop fabricate corners, mitred, braced, and sealed. Flash at eave edge and rake edge of roof, top of openings through wall and roof, process, and vent pipes, roof ridge, and at base of wall.

.10 Exterior Cladding: factory preformed prefinished metal to standard profile, Robertson "Panel Rib" or approved equivalent. Install vertically, with side laps screwed at 150 o.c. and screws at mid height of panels into solid wood blocking. Screws to be Stainless Steel to CSA B35.3, with head colour same as sheet, with dished neoprene washers. Colour to be selected by Owner from manufacturers standard range of available colours, to match adjacent existing buildings.

.11 Roofing Panels: factory preformed prefinished metal to standard profile, Robertson "Panel Rib" or approved equivalent. Install to roof with side laps at 150 mm o.c., through metal into wood stripping, sleepers and trusses. Apply continuous mastic caulking bends at each side lap. Roof panels to be one piece from ridge to core. Screws to be stainless steel to CSA B35.3, with head colour same as panels, with dished neoprene washers. Colour to be selected by Owner from the manufacturers standard range of available colours, to match adjacent existing buildings.

.12 Sealants: apply appropriate sealant types for surfaces indicated with primer, joint fillers, and bond breakers as recommended by sealant manufacturer. Apply sealants which will not leak, crack, crumble, melt, shrink, run, lose adhesion, or stain adjacent surfaces, for three years.

.13 Apply sealants, primers, joint, fillers, and bond breakers to manufacturer's written instructions. Apply sealants using a gun with proper size nozzle, using sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable. Form surface of sealant with full bead, free from ridges, wrinkles, sags, air pockets, and embedded impurities, neatly tooled to a slight concave joint.

DIVISION 8 - DOORS AND FRAMES

.1 Hollow metal doors: commercial grade cold rolled sheet steel with wipe-coated zinc finish to ASTM A-525-75, semi-rigid fibreglass core insulation, primer to CBSB 1-GP-181a, 1.6 mm thick welded for exterior doors. Provide and install vinyl cap in each door panel.

.2 Pressed steel frames: 1.6 mm commercial grade hot rolled sheet steel with wipe-coated zinc finish to ASTM A525-75 complete with floor anchors, channel spreaders, wall anchors, reinforcing channel, guard boxes, door bumpers and primer to CGSB 1-GP-181b.

.3 Fabricate steel doors and frames as detailed to Canadian Manufacturing Standards for Metal Doors and Frames, 1976, unless noted otherwise.

.4 Door frames are to be blanked, reinforced, drilled and tapped to receive templated hinges and lockset strikes and reinforced for overhead closers where required. Install three bumpers on strike jamb for each single door and two bumpers at head for double doors.

.5 Install doors and hardware in accordance with hardware templates and manufacturer's instructions. Adjust operable parts for correct functions.

.6 Finishing hardware shall be manufactured by one of the following specialist firms.

Schlage	LCN
Corbin	Norton
Rixon	Hagen
Stanley	Best

.7 All new doors to be keyed alike. Provide two (2) keys for each lockset.

.8 Doors to be equipped with the following hardware:

Door 1 - 900 x 2150 x 45 insulated metal door in P.S.F.

1-1/2 pr	114 x 101 butts NRP
1 only	Door stop
1 only	Panic exit device with door pull
1 only	Door sweep
1 set	Weatherstripping - vinyl in aluminum
1 only	Thumblatch to exterior
1 only	Aluminum threshold
1 only	Closer
1 only	Cylinder lock

Door 2 - 2 leafs (900+1600) x 2350 x 45 insulated metal door in P.S.F.

4 pr	114 x 101 butts NRP
2 only	Door stops
1 set	Weatherstripping - vinyl aluminum
1 only	Aluminum threshold
2 only	Door holds, door mounted
1 pr	Flush bolts to 1600 wide leaf
1 only	Panic exit device to 900 wide leaf (no hardware to exterior)

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95-05-03	FOR TENDER & CONSTRUCTION	D.M.	R.S.

Revision / Revision

A/B Detail number / Sheet number — A Numéro de detail / B Numéro de la feuille

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Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners 2977-135-00

Eng. Stamp / Sceau de l'ingénieur: May 4/95

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada
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Project title/Titre du projet:
ROGERS PASS
WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin:
TECHNICAL
SPECIFICATIONS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	D. MZIK	95-03-03
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
R. SHAW	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client — Approved by/Approuvé par

PWR RESPONSIBLE OFFICER/AGENT RESPONSABLE — Date — A & E SERVICES/GENE ET ARCHITECTURE — Date

Project No./Nº du projet	Asset No./Nº du-bien	Sheet No./Nº de la feuille
#77146	974003604	SP-1

Drawing Reference No./Nº de référence du dessin: G95R1

81 SIZE 1000 x 707 mm

DIVISION 9 - PAINTING AND FINISHING

.1 General

.1 Acceptable manufacturers, materials, workmanship, and all items affecting the work shall be in accordance with Canadian General Standards Board, Painting Manual, CAN2-85.100.
.2 Paint materials and manufacturers are listed in Chapter 5 of the Manual.
.3 Colour schedule shall be determined by the Owner, except where noted. Paint colours shall be selected from standard colour chips submitted by the Contractor.
.4 Deliver paint materials in sealed original labelled containers, bearing manufacturer's name, type of paint, brand name, colour designation, and instructions for mixing and/or reducing.
.5 Paints, varnishes, lacquers, and filters shall be of type and blend designed for the specified use, and of the highest quality product of the approved manufacturer.
.6 Paints shall be applied only by skilled workmen.

.2 Products

.1 Paint products to be of a type and brand listed under "Materials List" described in the Manual.
.2 Submit within 30 days of contract award, a schedule of paint types, manufacturers, and printed technical sheets describing same.
.3 Solvents throughout to be odour-free type.
.4 Paints shall be ready-mixed except for field-catalyzed coating types.
.5 Store paints in protected area at minimum 10°C.

.3 Execution

.1 Prepare surfaces and perform work as recommended by the Manual, ensuring moisture content of substrate/surfaces and ambient temperatures are as recommended by the paint manufacturer.
.2 Ensure sufficient drying time is provided between coats. Provide ventilation, heating and adequate light to do the work.
.3 Commencement of work shall imply acceptance of surfaces to be painted.
.4 Remove all electrical plates, surface hardware, fittings and fastenings, prior to painting operations. These items shall be stored, and replaced on completion of work.
.5 Place cotton waste, cloths, and material which may constitute a fire hazard in metal containers and remove daily from site.
.6 Application:
 .1 Cover surfaces satisfactorily with an even colour tone, sheen, and texture.
 .2 Prime top and bottom edges of metal doors with enamel undercoater.
 .3 Provide protective covering to prevent paint spray or droppings from fouling other surfaces.
 .4 Apply paint at a temperature of not less than 10°C. Do not apply under dusty, windy, rainy, or freezing weather, or when conditions are unsuitable.
 .5 Apply paint using brush, roller or spray, as recommended by paint manufacturer.
 .6 Upon completion of this section, thoroughly clean all surfaces.
.7 Do not paint electrical plates, surface finish hardware, anodized or mill finish aluminum, chromium, stainless steel, precoloured plastics, lead, shop finished equipment, or items or equipment finished by others.
.8 Colour coding for piping:
 .1 Colour code mechanical piping systems.
 .2 Paint uninsulated valves, integral equipment bases, and equipment not shop finished.
 .3 Apply body colour to piping systems along with the abbreviation of product carried and direction-of-flow arrow markers (Brady All-Temperature or equal).
 .4 Pipe Colour Code: from CGSB 1-GP-12c, as specified below unless otherwise directed:

Service	Colour	SGSB 1-GP-12C Code
Raw Water	Green	503-107
Potable water	Light Blue	502-106
Relief Lines	Dark Red	509-102
Natural Gas	Bright Yellow	505-110
Compressed Air	White	512-101
Backwash (Drain)	Aluminum	515-101
Sodium (Calcium) Hypochlorite	Purple	511-101
Alum	Purple	511-101

 .5 All shop pre-painted equipment supplied with finish paint coatings to remain as factory finished.
.9 Paint exposed conduit and prime painted electrical equipment occurring in finished areas. Colour and texture to match adjacent surfaces.
.10 As the work proceeds and upon completion, remove all paint where spilled, splashed, or spattered.
.11 Schedules:
 .1 Interior - plywood walls and ceiling: IN.1-A alkyd enamel finish:
  - 1 coat primer
  - 1 coat undercoat
  - 1 coat alkyd enamel semi-gloss
 .2 Interior steel: IN.12A alkyd enamel finish (except doors and frames):
  - 1 coat alkyd primer for steel
  - 1 coat alkyd machinery enamel gloss
  - 1 coat interior machinery enamel gloss
 .3 Metal doors and frames: IN.14-C alkyd enamel finish, gloss.
 .4 Exterior wood trim: EX.4-A alkyd primer with two finish coats high gloss alkyd enamel.
 .5 Exterior steel: EX.12-A high gloss enamel finish:
  - 1 coat alkyd primer for steel
  - 2 coats high gloss enamel

DIVISION 15 - MECHANICAL

See Dwg. M1

DIVISION 16 - ELECTRICAL

See Drawing E-1.

DIVISION 20 - PROCESSES

.1 General

.1 General Requirements:
 .1 The complete installation shall be installed to the approval of all local and provincial coding regulations and local inspection.
 .2 Metallic piping fabrication, installation and welding shall be in accordance with CSA Standard Z183 - latest edition, and PFI Standards ET-3, Fabrication Tolerances.
 .3 Non-metallic pipe shall be in accordance with CSA Standard B137.3, fittings to ASTM D2564.
  . Buried water distribution main to be AWWA C900 Class 150 with Class 250 C.I or plastic to match the specified pipe.
  . Sizes smaller than 100 mm diameter to be Series 160, gasketted joint pressure pipe to AWWA C905 with molded fittings rated for 200 psi.
 .4 Provide shop drawings for review and acceptance for:
  . Package Water Plant
  . Pumps
  . Valves
  Schedule shall allow minimum ten working days for Owner evaluation/acceptance. No extra time will be allowed for components installed which are not acceptable.

.2 Products

.1 Package Water Treatment Plant
 .1 General
  Provide a complete factory built, modular water treatment plant including all necessary components for automatic treatment of the water from Connaught Creek. The plant shall be similar and equal to the Model ST.60.E with 90 minutes total detention manufactured by BCA Industrial Controls Limited, Surrey, B.C.
  The plant design shall include provisions for chemical addition, mixing, flocculation, settling and filtration, all in a modular assembly. All pumps, valves, and necessary controls for completely automating the plant shall be provided by one supplier. The plant shall have a capacity rating of 60 USgpm.
 .2 Operation
  The plant shall be fully automatic in operation and shall require the operator's attention only for routine replacement of chemicals, setting of chemical feed rates and normal maintenance. Operation shall be on an "ON-OFF" basis. The control system of the plant shall be basically as simple as possible.
 .3 Equipment Required
  In general, the equipment shall provide for a treatment process as follows:
  .1 Injection of coagulation chemicals and a solution for pH correction if required.
  .2 Passage through a flocculation, coagulation, and sedimentation arrangement.
  .3 Clarification chamber with V-hopper bottom and 60 degree tube settlers.
  .4 Filtration with dual or tri media, or mono-media.
  .5 Chlorination for distribution residual of 0.5ppm.
 .4 Materials of Construction
  The reactor, settler, filter bay and flumeway shall be constructed on Marine Grade Aluminum Alloy No. 5086, Type H116, in accordance with Canadian specifications of the Aluminum Association of America. Plate thickness and structural reinforcements shall be designed in accordance with accepted engineering practices for material specified. All exposed surfaces are to be chemical etched or otherwise finished to present a uniform, pleasing appearance. Welding shall be performed by fully qualified operators, using an inert gas shielded arc or resistance welding process, producing welds equal or greater in corrosion resistance than the parent material. The manufacturer shall be responsible for adequate insulation against electrolysis wherever metals incompatible to aluminum are attached.
 .5 Flocculator
  A hydraulic mass-mixing flocculator shall be furnished with an open top and designed for flocculation formation by mixing through hydraulic nozzles or baffles, and consisting of at least 5 compartments, 4 stages, in series, having a minimum of a total of 20 minutes detention.
 .6 Settler
  .1 The tube settler structure shall be designed by the equipment manufacturer.
  .2 The settling system shall be equipped with tubes at 60 degrees to the horizontal in tube bundles constructed of plastic that is strong, rigid, resistant to chemical water and approved by the FDA for use with potable drinking water. The tube bundles shall be sized so that the flow rate to their receiving faces will not exceed 2.2 USgpm/sq. ft. and the tubes shall have a hydraulic diameter of approximately two inches or less and shall be at least two feet in length.
  .3 The flow to the receiving face of the tube bundles must be evenly distributed by means of perforated headers, so as to avoid creation of eddies. Similarly, the flow from the discharge face of the tube bundles must be collected by either perforated headers or collection troughs. At no point in the settler unit may the flow velocity exceed 0.9 fps.
  .4 Provision must be made for complete flush-removal of sludge from the settler on an automatic, periodic basis to function at least once each backwash cycle. Flushing manifold is provided if V-bottom shape is less than 60 degrees.
 .7 Filter
  .1 The integrally built filter shall be designed for a maximum filtration rate of 15 USgpm/sq. ft. which must be automatically controlled.
  .2 The filter shall be provided with a corrosion resistant header and lateral underdrain system, with a backwash collection trough, with level control. Loss-of-head sensing device shall automatically initiate the backwash. Backwash initiation manually shall be available.
  .3 At the end of the backwash cycle, a rinse-to-waste cycle shall be provided to flush and settle filter media, prior to returning the plant to the normal filter cycle.
  .4 The filter bed shall be of the dual or tri media, inverted bed type, including at least 18 inches of anthracite of 1.0 to 1.2 mm effective sizes, 12 inches of sand, graded with at least 6 inches of 0.45 to 0.55 mm E.S. and a supporting bed of gravel, graded in at least three sizes. All media must strictly conform to current AWWA standards for hardness, uniformity and quality.
  .5 Each filter shall be equipped with fixed surface wash, designed for 1.0 USgpm/sq. ft.
 .8 Chemical Feed System
  Provide, as part of vendor supplied equipment, chemical pumps and solution tanks with chemical mixers as required, for following chemicals injections. All wetted parts shall be corrosion resistant injectors, solution tubing, and accessories shall be included.
  . hypochlorite solution
  . polymer solution
  . alum solution
 .9 Controls and Instruments
  One plant level control system, one filter loss-of-head control system, one control panel containing all selector switches, indicating lights, relays, timers, running time meters, as required for automatic filter and backwash operation.
  In general the controls shall accomplish the following:
  .1 Provision shall be made for influent control valve to open and close on command from system components, based on level in clearwell.
  .2 Filter effluent valve shall open and close on command from clearwell level.
  .3 Chemical feeders and chlorinator will be controlled on "ON-OFF" basis from appropriate signals. Feed rates of chemical feeders will be manually adjustable.
  .4 The backwash cycle shall normally be initiated by loss of head through the filters. A loss-of-head gauge and pressure switch shall be provided for each filter. A manual starting system shall also be provided.
  .5 The control system shall include a backwash frequency alarm with an adjustable timer which will show an alarm light on the plant control panel should a backwash cycle be initiated within a preset time limit. All necessary relays, timers, alarm reset switches shall be included.
  .6 The backwash cycle is to be initiated by loss-of-head signal, or manually. Once a cycle has started, it shall automatically backwash the filter and shall proceed to completion and automatically restore the plant to service. Adequate controls shall be provided to assure against false starts or improper repetition of the backwash cycle. A counter shall be provided to keep a record of backwash cycles.
 .10 Electrical
  The equipment supplier shall include all electrical equipment necessary for the operation of the control components and chemical feed equipment, including necessary selector switches for the equipment.
  The filter plant control panel shall be mounted on the filter plant, pre-wired to terminals identified for field connection. All recorders, indicators, selector switches, etc., necessary for operation of filter plant components covered by this section of the specification, including equipment to be purchased by others, shall be incorporated in the panel. The supplier shall provide necessary drawings for field wiring by others, including point-to-point wiring diagrams. Panel and all electrical equipment shall be first quality subject to code requirements and approval of the Owner.
 .11 Plant manufacturer shall also supply for installation by Contractor, the following items:
  . Influent and backwash flowmeter
  . Influent and backwash turbidity meter
  . Streaming current coagulation monitor
  . Backwash and effluent turbidity monitors
 .12 Plant Start-up and Operator Training
  The contractor shall include in his cost provision for two trips to the site, by the plant manufacturer representative; one trip shall be allocated for plant start-up and the second trip for operator training, at a time to be coordinated with the Owner.

.2 Piping
 .1 Identification code for piping is as follows:

150 - RW - CAAFD
Pipe Size — Service — Pipe Material Code

 .2 Pipe Materials Specifications
  .1 Code CAAFD

ANSI RATING: 150 R.F. Table 2-150 B16.5 — Temperature Limits: -29 to 260° C, Corrosion Allowance: 0 — CLASS: CAAFD

SERVICE: Closed and open drains, process and utility air, treated water, process and utility, water, cooling water, starting air

ITEM	SIZE NPS	GENERAL DESCRIPTION	CODE	NOTE
Valves, Gate	40 & down	1380 kPa screwed, bronze or 800 screwed, F.S. 800 socket weld, F.S.		3 4 5
	50 & up	150 flanged, R.F. steel body		
Globe	40 & down	1380 kPa screwed, bronze or 800 screwed, F.S. 800 socket weld, F.S.		3 5
	50 to 100	150 flanged, R.F. steel body		
	150 & up	Use gate valves		
Check	40 & down	1380 kPa SWP screwed, swing type, bronze or 800 screwed, F.S. ball type (or piston) 800 socket weld, F.S. ball type or piston		1
	50 & up	150 flanged, R.F., swing type, steel body		6
Pipe	40 & down	Seamless, A53, Gr. B, Sch. 40, plain ends		1,9
		Seamless, A53, Gr. B, Sch. 80, threaded ends		2
	50 to 150	Seamless, A53, Gr. B, Sch. 40		7
	200 to 600	Seamless, A53, Gr. B, calc. W.T.		8
Fittings	40 & down	3000, screwed, A105 3000 socket weld, A105		
	50 to 150	Butt weld, A234 WPB, Sch. 40		8
	200 to 600	Butt weld, A234 WPB,calc. W.T.		9
Flanges	40 & down	150 R.F.W.N., Sch. 80 bore, A105		
	50 to 150	150 R.F.W.N., Sch. 40 bore, A105		
	200 to 600	150 R.F.W.N., Specify bore, A105		
Orifice Flanges	40 & down	300, R.F.W.N., Sch. 80 bore, A105		
	50 to 150	300, R.F.W.N., Sch. 40 bore, A105		
	200 to 600	300, R.F.W.N., Specify bore, A105		
Bolts	All	Stud bolts, A193 gr. B7 Nuts A 195 gr. 2H		
Gaskets	All	Durabla, Durlon 8400, Flat Ring Type, 1.5 mm thick		

A. Barnett
95-05-04

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95-05-03	FOR TENDER & CONSTRUCTION	D.M.	G.P.

Revision / Revision

A/B Detail number / Sheet number — A Numéro de detail / B Numéro de la feuille

Linear dimensions in millimetres — Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil: UMA Engineering Ltd. Engineers & Planners 2977-135-00

Eng. Stamp / Sceau de l'ingénieur

Public Works and Government Services Canada — Travaux publics et Services gouvernementaux Canada
Architecture and Engineering — Architecture et genie'
Canada

Client/client: Canadian Heritage — Patrimoine Canadien
Parks Canada — Parcs Canada
Western Region — Région de l'Ouest

Project title/Titre du projet: ROGERS PASS WATER TREATMENT PLANT, GLACIER NATIONAL PARK

Drawing title/Titre du dessin: TECHNICAL SPECIFICATIONS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	D. MZIK	95-03-03
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
G. PFEIFER	R. SILLITTO	AS SHOWN

Client Acceptance/Acceptation du client — Approved by/Approuvé par
PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE — Date — A & E SERVICES/GÉNIE ET ARCHITECTURE — Date

Project No./Nº du projet	Asset No./Nº du-bien	Sheet No./Nº de la feuille
#77146	974003604	SP-2

Drawing Reference No./Nº de référence du dessin: G95R1

File No. SP-2

B1 SIZE 1000 x 707 mm

NOTES:

1. See also Class CAAJD.
2. Underground piping to be coated with extruded or wrapped polyethylene when metal temperature is below 65°C.
3. Valves installed below grade to be in valve boxes or be types with non-rising stem with handwheels extended above grade.
4. Valves 350 NPS and larger must be provided with factory installed bypass, and valves 400 NPS and larger must be gear operated.
5. Resilient seated butterfly valves are an alternate to globe or gate valves in water service with less than 1033 kPa (150 psi).
6. Wafer style non-slam check valves are an alternate to swing-check valves.
7. ERW A53-GR. B pipe may be used as an alternate for seamless pipe. Weld joint factor (E = 0.85) must be included in W.T. calculations. ERW pipe to be manufactured, inspected and tested in accordance with the requirements of CSA Standard Z245.
8. Grooved coupler systems acceptable for potable water applications; Victaulic, Couplex.
9. For potable water NPS 25 and smaller, Type L copper tubing with wrought copper or cst bronze fittings, 95/5 tin/antimony solder, may be used inside buildings.

HEADER SIZE \ BRANCH SIZE	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
600								T	T	T	T	T	T	T	T
500								T	T	T	T	T	T	T	
450	SOCKOLETS							T	T	T	T	T	T		
400				WELDOLETS			T	T	T	T	T	T			
350							T	T	T	T	T				
300	WT. PER SPEC						T	T	T	T					
250						T	T	T	T						
200					T	T	T	T							
150				T	T	T	T								
100				T	T	T									
80				T	T										
50				T											
40	T	T	T												
25	T	T													
20	T														

- T - straight or reducing tee.
- Stub-ins are an alternate for weldolets. They must be designed in accordance with ANSI B31.3. When branch angle is smaller than 45°, stub-ins must be supported by calculation.
- Threadolets are an alternate for sockolets.

.2 Code CAFAD:

ANSI RATING Table 2-150	150 R.F. B16.5	Temperature Limits: -29 to 140°C Corrosion Allowance: 0	CLASS:	CAFAD

SERVICE: Chemical drain, closed and open drain, glycol/water, salt water, utility water, produced water, treatment chemicals, raw water, sewage caustic, water-sour

ITEM	SIZE NPS	GENERAL DESCRIPTION	CODE	NOTE
Valves, Gate	40 & down	800 socket weld		1
		800 screwed		2
	50 to 300	150 Flanged, R.F.		
Globe	40 & down	800 socket weld		1
		800 screwed		2
	50 to 100	150 Flanged, R.F.		
	150 & up	Use gate valves		
Ball	40 & down	10.34 MPa, CWP socket weld		1
		10.34 MPa, screwed		
	50 & up	150 Flanged, R.F.		
Check	40 & down	800 socket weld		1
		800 screwed		2
	50 to 300	150 Flanged, R.F.		
Pipe	40 & down	PVC 1120, Sch. 40, plain ends		1
		PVC 1120, Sch. 120, tnd ends		
	50 to 300	PVC 1120, Calc. W.T.		
Fittings	40 & down	PVC, Sch. 80, socket type		1
		PVC, Sch. 120, threaded		3
	50 to 300	PVC, Socket type, Sch. 80		
Flanges	40 & down	150 socket type, PVC, for Sch. 40 pipe		1
		150 socket type, PVC, for Sch. 120 pipe		3
	50 to 300	150 socket type, PVC, specify bore		
Orifice Flanges	40 & down	300, R.F.W.N., A105 for Sch. 40 pipe		1
		300, R.F.W.N., A105 for Sch. 120 pipe		
	50 to 300	300, R.F.W.N., A105, specify bore		
Bolts	All	Stud bolt, A193 gr. B8 Nuts A 194 gr. 8		
Gaskets	All	Chemline Series AV, EPDM, with moulded double convex rings		4

NOTES:

1. For connection of plastic pipe to metallic fittings, valves and flanges use adapters.
2. PVC valves, if suitable for M.O.P., are preferred. For pressures higher than allowed or PVC valves, use steel valves.
3. If PVC fittings or flanges are not suitable for M.O.P., use metallic fittings, flanges and adapters.
   Temperature up to 150°F (66°C) maximum allowed, but hydrostatic design stress is lower and pipe W.T. must be checked.
4. Gaskets for sodium hypochlorite service to be CPE material (chlorinated Polyethylene).

.3 Valves
.1 Process valves are shown on drawings with a size followed by a two-digit code indicating type of valve as follows:

Code	Valve Type
VA	Angle Valve
VB	Ball Valve
VF	Butterfly Valve
VC	Check Valve
VG	Gate Valve
VD	Globe Valve

Refer to pipe materials specification sheets (preceding) for details.

.2 Pump discharge check valve to be non-slam, dual-disc, wafer type.

.3 Valve PRV-1010: pressure relief valve shall be a Singer Model 106-RPS with a 75 micron cartridge filter and pressure setting of 525 kPa (75 psig). Pilot valve body shall be stainless steel.
.4 Buried valves shall be resilient seat gate valves, AWWA C509, opening counter-clockwise. Valve casings to be McAvity 6193 or approved equal, with casing assemblies consisting of hood, top section and lid complete with extension stem to suit depth of bury.

.4 Corrosion protection:
.1 Interior of all steel pipe and fittings, and exterior of all steel pipe which is to be encased in concrete shall be shop coated after welding fabrication is completed.
- Clean piping spools (inside and out) to SSPC-SP10, white metal, to cleanliness per NAC #2.
- Ensure piping is prepared to coating manufacturer recommendations.
- Apply three coats, to total DFT of 15 mils, of Carboline 891, two component cross-linked epoxy in accordance with manufacturer's recommendation.
  Coatings shall be tested for thickness and holidays. Owner reserves the right to appoint a third party inspection firm to test for holidays. Any piece of piping with an imperfection shall be reprocessed. No "patch" shall be applied to the coating. No welding or heating shall be done on the pipe after it has been coated.
- Additional acceptable coatings suppliers:
  - International Paints (Canada) Limited
  - Sico Industrial Products

.2 Buried service valves to be factory epoxy-coated externally per AWWA C210.
.3 Exterior of buried metallic fittings, exterior and interior of valve boxes shall be factory coated with fusion-bond epoxy to AWWA C213-79.
.5 Couplings: All buried couplings shall be Robar Style 1506 or approved equal.
.6 Pressure Gauges: Ashcroft Model 45-1279 ASL or approved equal, 0 - 600 kPa, bronze element material, 12 mm diameter bottom connection, stainless steel movements.
.7 Flow meter: 40 mm (1 1/2") Neptune Trident 10 Water Meter, operating range 0.45 to 22.7 m3/hr (4 - 100 USgpm), rugged magnetic drive register (indicating totalizer); units of measure to be litres. Service Conditions: Filtered potable water, CS 40 mm (1 1/2") SCH. 80 pipe complete with Analog Output (4-20 mA).
.8 Jockey Pump P-01
.1 Design Conditions
Capacity: 0.6 l/s (10 USgpm)
TDH: 45.8 M (150 Ft.)
230 volt, single phase, 60 c.
.2 Standard of Acceptance:
Jacuzzi, 4" submersible, Model SS4 10BP-S2- 8 stage pipe sized to suit. Brass shell, molded Lexan impellers, stainless splined pump shaft and ferrules, polyethylene screen, plastic cable guard with stainless screws. Built-in bronze check valve. Submersible close-coupled stainless motor (1/2 hp, 3600 RPM) and control box.
.3 Acceptable Vendors:
- Jacuzzi, Red Jacket, Crane/Deming
- Vertical turbine models similar to P-02, 03, 04 also acceptable.

.9 Duty Pumps P-02 and P-03
.1 Design Conditions
Capacity: 4.2 l/s (65 USgpm)
TDH: 45.8 M (150 Ft.)
575 volt, three phase, 60 c.
.2 Standard of Acceptance:
Deming H5 x 14 ST, 4" column, s.s. shaft sleeves, rubber bowl bearings, encl. bronze bearing in suction bowl complete with sand cap and non-sol, grease lubricated. Bronze impellers with stainless steel stuffing box shafts. Driver to the 5 h.p., V.H.S., N.R.R., 1800 RPM, WPI 1.15 Service Factor, high efficiency.
.3 Discharge Size: 80 (3") Class 125 ANSI.
.3 Acceptable Vendors:
- Crane/Deming, Byron Jackson, Goulds.

.10 Backwash Pump P-04
.1 Design Conditions
Capacity: 18 l/s (285 USgpm)
TDH: 18.3 M (60 Ft.)
575 volt, three phase, 60 c.
.2 Standard of Acceptance:
Deming M8 x 3 ST, 6" column, s.s. shaft sleeves, rubber bowl bearings, encl. bronze bearing in suction bowl complete with sand cap and non-sol, grease lubricated. Bronze impellers and stainless steel stuffing box shafts. Driver to be 5 h.p., V.H.S., N.R.R., 1800 RPM, WPI 1.15 Service Factor, high efficiency.
.3 Discharge Size: 150 (6"), Class 125 ANSI.
.4 Air Relief:
Supply and install 25 (1") diameter air relief line off discharge complete with inverted swing check valve, as recommended by pump supplier to prevent air from being forced into discharge piping.
.5 Acceptable Vendors:
- Crane/Deming, Byron Jackson, Goulds.

.11 Hose Bibb:
.1 Hose bibb to consist of 20 mm dia. ball valve, Watts B-600 Series complete with vacuum breaker and garden hose thread. Supply also 15 metres of 20 mm dia. heavy duty rubber hose complete with couplers.

.3 Installation

.1 Fabrication and installation shall comply with current standards indicated and recognized industry practice.
.2 All work is to be carried out by competent tradesmen, skilled in their field of expertise.
.3 For buried pressure lines, provide concrete thrust blocks at tees, bends and as required elsewhere, to undisturbed material.

.4 Record Drawings

.1 Provide one set of as-built drawings with changes neatly marked in red pencil.

A. Barnes
95-05-04

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
0	95-05-03	FOR TENDER & CONSTRUCTION	D.M.	G.P.

Revision / Revision

Detail number / A Numéro de detail
Sheet number / B Numéro de la feuille
Linear dimensions in millimetres / Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil
UMA Engineering Ltd. Engineers & Planners
2877-135-00

Eng. Stamp / Sceau de l'ingénieur

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada
Architecture and Engineering / Architecture et genie
Canada

Client/client
Canadian Heritage / Patrimoine Canadien
Parks Canada / Parcs Canada
Western Region / Région de l'Ouest

Project title/Titre du projet
ROGERS PASS
WATER TREATMENT PLANT

GLACIER NATIONAL PARK

Drawing title/Titre du dessin
TECHNICAL
SPECIFICATIONS

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
N/A	D. MZIK	95-03-03
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
G. PFEIFER	R. SILLITTO	AS SHOWN

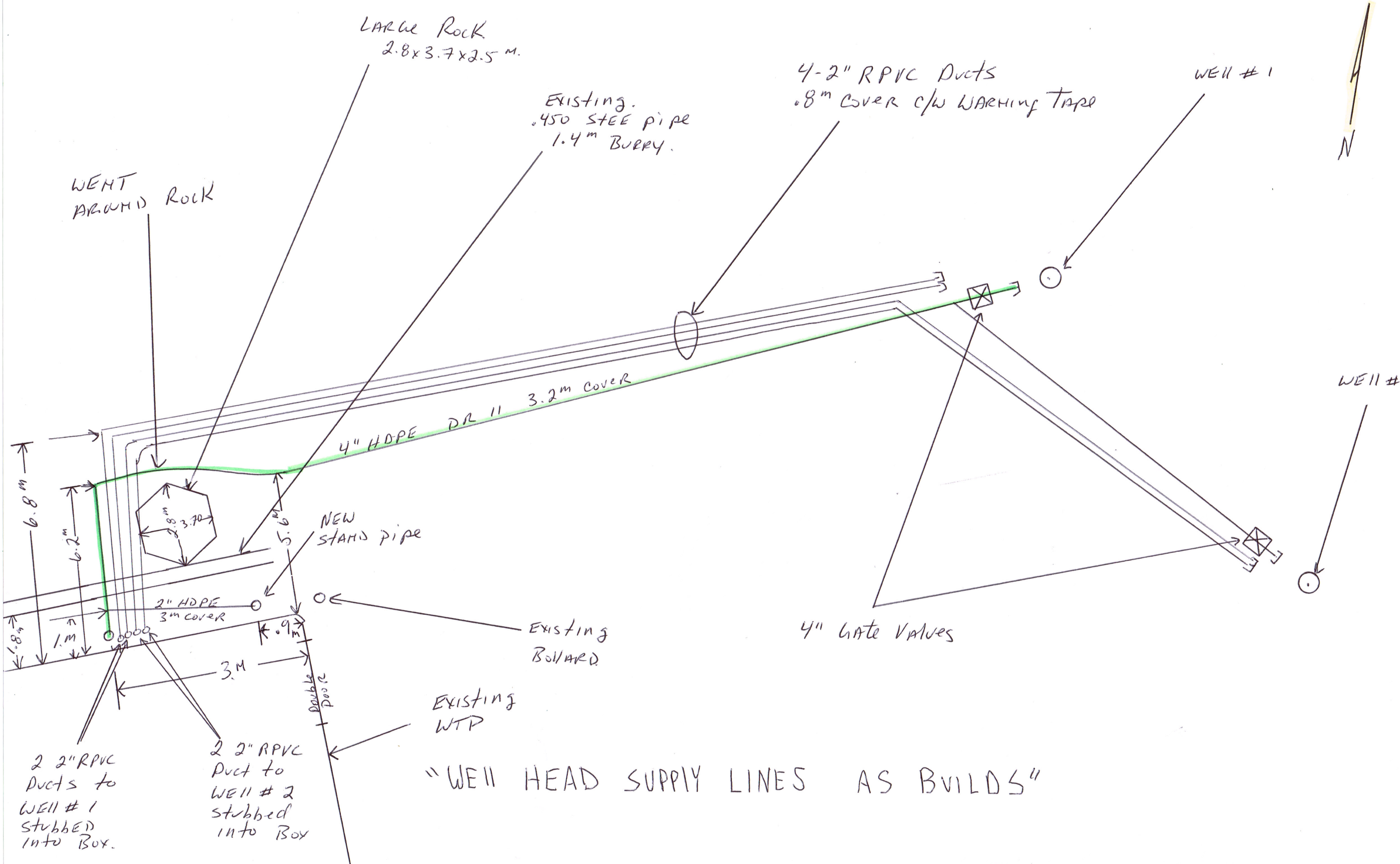
Client Acceptance/Acceptation du client — PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE — Date
Approved by/Approuvé par — A & E SERVICES/GÉNIE ET ARCHITECTURE — Date

Project No./№ du projet: #77146
Asset No./№ du-bien: 974003604
Drawing Reference No./№ de référence du dessin: G95R1
Sheet No./№de la feuille: SP-3

File No. SP-3

B1 SIZE 1000 x 707 mm

Appendix C **Rogers Pass Water Treatment Plant - Well Head Supply Lines As-Built Sketch**



"WELL HEAD SUPPLY LINES AS BUILDS"