

# **APPENDIX A**

## **DRAWINGS**





## GENERAL NOTES

- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE NATIONAL BUILDING CODE 2015, THE NATIONAL FIRE CODE 2015, THE OCCUPATIONAL HEALTH & SAFETY ACT, AND ANY OTHER AUTHORITIES HAVING JURISDICTION.
- THESE DRAWINGS & SPECIFICATIONS SHALL BE READ IN CONJUNCTION WITH THE NOTES ON THE DRAWINGS. ARCHITECTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH DRAWINGS BY ELECTRICAL, MECHANICAL, STRUCTURAL, CIVIL, LANDSCAPE ENGINEERING CONSULTANTS.
- REPORT ALL DISCREPANCIES BETWEEN MECHANICAL, ELECTRICAL, STRUCTURAL, CIVIL, LANDSCAPE AND THE ARCHITECTS DRAWINGS TO THE OWNER PRIOR TO PROCEEDING WITH WORK.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, EXISTING AND NEW CONDITIONS AND REPORT ALL NON - CONFORMANCE TO THE OWNER, PRIOR TO CONSTRUCTION.
- ALL SUBCONTRACTORS MUST FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS PRIOR TO SUBMITTING THEIR QUOTATION, AND OTHERWISE OBTAIN FOR THEMSELVES ANY INFORMATION REQUIRED TO SUBMIT A FIRM QUOTATION.
- THE GENERAL CONTRACTOR WILL BE RESPONSIBLE TO REGULATE AND ENFORCE LOCAL FIRE CODES AND BUILDING CODES AS SET FORTH BY LOCAL JURISDICTIONS FOR THE DURATION OF CONSTRUCTION.
- ALL ARCHITECTURAL COMPONENTS WILL BE ENGINEERED AND INSTALLED BY THE RESPECTIVE SUPPLIERS & TRADES SO AS TO CONFORM WITH REQUIRED ANCHORAGE AND SEISMIC RESTRAINT AS PER ALL LOCAL CODES.
- VERTICAL FACE OF HOUSEKEEPING PAD TO BE PAINTED YELLOW.
- ALL DIMENSIONS TO FACE OF STUD UNLESS NOTED OTHERWISE.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
- MAINTAIN DISTANCE OF 150mm FROM DOOR R.O. TO THE WALL PERPENDICULAR TO DOOR OPENING FOR ALL INTERIOR DOORS.
- ALL ITEMS INDICATED ON DRAWINGS ARE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND WHEREBY 'OTHERS' IS INDICATED IMPLIES THE GENERAL CONTRACTOR IS REQUIRED TO ENGAGE AND MANAGE THE RELEVANT TRADE.
- CONSTRUCTION NOT TO ENCRORACH INTO ADJACENT PROPERTIES. ALL DISTURBANCE ENCOUNTERED DURING EXCAVATION SHOULD BE RETURNED TO ITS ORIGINAL CONDITION.

## WALL ASSEMBLY

P1		DEMISING WALL 1 HR F.R.R. ULC DESIGN # W313 CONFIGURATION C, STC 57 NBCC 2015 APPENDIX 'A' TABLE 9.10.3.1.A, WALL ASSEMBLY W13a -16 mm TYPE 'X' GYPSUM BOARD -38X 89 mm WOOD STUD @ 400 mm O.C -ACOUSTIC BATT INSULATION IN CAVITY -25 mm AIR SPACE - ACOUSTIC BATT INSULATION IN CAVITY -38X89 mm WOOD STUD @ 400MM O.C -16 mm TYPE 'X' GYPSUM BOARD -REFER TO STRUCTURAL FOR SHEAR WALL
P1a		DEMISING WALL 1 HR F.R.R. ULC DESIGN # W313 CONFIGURATION C, STC 57 NBCC 2015 APPENDIX 'A' TABLE 9.10.3.1.A, WALL ASSEMBLY W13a -16 mm DENSGLASS GOLD -ROOF TRUSS -FILL VOID SPACES BETWEEN TRUSS SUB-MEMBERS W/ MINERAL FIBER BATT INSULATION IN CAVITY 600 mm HIGH -ROOF TRUSS -16 mm DENSGLASS GOLD
P2		PARTITION WALL -13 mm GYPSUM BOARD -38X89 mm WOOD STUDS @ 400 mm O.C. -13 mm GYPSUM BOARD
P3		PLUMBING WALL -13 mm GYPSUM BOARD -38X140 mm WOOD STUDS @ 400 mm O.C. -13 mm AQUA BOARD @ TILING HT. ONLY
P4		CONCRETE WALL 1.5 HR F.R.R. ULC DESIGN # U913 -190 mm CONCRETE FILLED BLOCK
P5		PARTITION WALL -13 mm GYPSUM BOARD -POLY VAPOUR BARRIER -38X140 mm WOOD STUDS @ 400 mm O.C. - FILL CAVITY W/ BATT INSULATION -16 mm GLASS MAT FACED GYPSUM BOARD
P6		CHAIN LINK -CHAIN LINK – SECURE TOP AND BOTTOM OF CHAIN LINK POSTS TO CONCRETE CEILING AND TO CONCRETE SLAB FLOOR
P7		CONCRETE WALL -200 mm CAST IN PLACE CONCRETE WALL REFER TO STRUCTURAL
P8		CONCRETE WALL -EIFS – COLOUR TO MATCH ADJACENT CONCRETE WALL -75 mm RIGID INSULATION -AIR/VAPOUR BARRIER -200 mm CAST IN PLACE CONCRETE WALL REFER TO STRUCTURAL
P9		CONCRETE WALL -150 mm THICK CAST IN PLACE CONCRETE WALL REFER TO STRUCTURAL
P10		38x140 PARTITION WALL -13 mm GYPSUM BOARD -38X140 mm WOOD STUDS @ 400 mm O.C. -13 mm GYPSUM BOARD
W1		FOUNDATION WALL 1.5 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -75 mm CONCRETE FACED INSULATED PERIMETER WALL PANEL TO BE EXTENDED 150 mm BELOW FINISH GRADE -75 mm RIGID INSULATION EXTEND TO TOP OF FOOTING -DRAINAGE BOARD -200 mm CAST IN PLACE CONCRETE WALL – REFER TO STRUCTURAL
W1a		DOGHOUSE WALL -75 mm CONCRETE FACED INSULATED PERIMETER WALL PANELS TO BE EXTENDED 150 mm BELOW GRADE -75 mm RIGID INSULATION TO COMPLETE DEPTH OF DOGHOUSE -DRAINAGE BOARD -WATERPROOF MEMBRANE -150 mm CAST IN PLACE CONCRETE WALL – REFER TO STRUCTURAL

## WALL ASSEMBLY

W2a		EXTERIOR WALL 1 HR F.R.R. NBCC 2015 TABLE 9.10.3.1.A, WALL ASSEMBLY EW1A (SIMILAR) -EXTERIOR FINISHES- HORIZONTAL CEMENTITIOUS BOARD, REFER TO ELEVATION FOR MATERIALS AND COLOUR -100 mm DEEP Z GRITS @ 800 mm O.C. -100 mm SEMI-RIGID MINERAL FIBRE INSULATION -SBS VAPOUR BARRIER MEMBRANE -INTUMESCENT COATING -13 mm PLYWOOD SHEATHING -38X140 mm WOOD STUDS – REFER TO STRUCTURAL -16 mm TYPE 'X' GYPSUM BOARD
W2b		EXTERIOR WALL 1 HR F.R.R. NBCC 2015 TABLE 9.10.3.1.A, WALL ASSEMBLY EW1A (SIMILAR) -EXTERIOR FINISHES- VERTICAL CEMENTITIOUS BOARD, REFER TO ELEVATION FOR MATERIALS AND COLOUR -100 mm DEEP Z GRITS @ 800 mm O.C. -100 mm SEMI-RIGID MINERAL FIBRE INSULATION -SBS VAPOUR BARRIER MEMBRANE -INTUMESCENT COATING -13 mm PLYWOOD SHEATHING -38X140 mm WOOD STUDS – REFER TO STRUCTURAL -16 mm TYPE 'X' GYPSUM BOARD
W3		EXTERIOR WALL 1 HR F.R.R. NBCC 2015 TABLE 9.10.3.1.A, WALL ASSEMBLY EW1A (SIMILAR) -EXTERIOR FINISHES- FULL BED STONE ( NATURAL), REFER TO ELEVATION -25 mm AIR SPACE -100 mm SEMI-RIGID MINERAL FIBRE INSULATION -SBS VAPOUR BARRIER MEMBRANE -INTUMESCENT COATING -13 mm PLYWOOD SHEATHING -38X140 mm WOOD STUDS – REFER TO STRUCTURAL -16 mm TYPE 'X' GYPSUM BOARD
W4		FOUNDATION WALL- CEMENTITIOUS FINISH 1.5 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -CEMENTITIOUS SIDING -75 mm RIGID INSULATION EXTEND TO TOP OF FOOTING -DRAINAGE MAT WATERPROOF MEMBRANE -200 mm CAST IN PLACE CONCRETE WALL – REFER TO STRUCTURAL
W5		UNIT 1 – PARAPET- CEMENTITIOUS SIDING 1.5 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -CEMENTITIOUS SIDING -VERTICAL STRAPPING -75 mm RIGID INSULATION W/ ADJUSTABLE Z GRITS @ 800 mm O.C. -SBS VAPOUR BARRIER MEMBRANE -INTUMESCENT COATING -13 mm PLYWOOD SHEATHING -38X140 mm WOOD STUD – REFER TO STRUCTURAL -CEMENTITIOUS SIDING
W5a		UNIT 1 – PARAPET - CEMENTITIOUS SIDING 1.5 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -CEMENTITIOUS SIDING -VERTICAL STRAPPING -75 mm RIGID INSULATION W/ ADJUSTABLE Z GRITS @ 800 mm O.C. -SBS VAPOUR BARRIER MEMBRANE -INTUMESCENT COATING -13 mm PLYWOOD SHEATHING -38X140 mm WOOD STUD – REFER TO STRUCTURAL -CEMENTITIOUS SIDING
W6		UNIT 1 – ABOVE THE GARAGE DOOR - CONCRETE WALL- CEMENTITIOUS SIDING 1.5 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -CEMENTITIOUS SIDING -150 mm HORIZONTAL Z-GIRTS @ 600 mm O.C. -75 mm RIGID INSULATION -SBS VAPOUR BARRIER MEMBRANE -200 mm CAST IN PLACE CONCRETE WALL – REFER TO STRUCTURAL
W6a		UNIT 1 – ABOVE THE GARAGE DOOR - CONCRETE WALL- CEMENTITIOUS SIDING 1.5 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -CEMENTITIOUS SIDING -150 mm HORIZONTAL Z-GIRTS @ 600 mm O.C. -75 mm RIGID INSULATION -SBS VAPOUR BARRIER MEMBRANE -200 mm CAST IN PLACE CONCRETE WALL – REFER TO STRUCTURAL
W7		CONCRETE WALL- NATURAL STONE - STONE c/w MORTAR AND SELF-FURRED HEAVY DUTY METAL LATH -200 mm CONCRETE WALL, REFER TO STRUCT. DWGS. - STONE c/w MORTAR AND SELF-FURRED HEAVY DUTY METAL LATH
W8		FOUNDATION WALL- GYPSUM FINISH 2 HR F.R.R. NBCC 2015 APPENDIX 'D', TABLE D-2.1.1. -INTERIOR FINISH -12.7 mm GYPSUM WALL BOARD -22 mm METAL HAT FURRING CHANNEL @ 600 mm O.C. HORIZONTAL -150 mm CAST IN PLACE CONCRETE WALL – REFER TO STRUCTURAL -FINISH AS REQUIRED
W9		EXIT RAMP - CONCRETE WALL -200 mm CAST IN PLACE CONCRETE WALL REFER TO STRUCTURAL
W9a		EXIT RAMP - CONCRETE WALL- CEMENTITIOUS FINISH -FINISH AS REQUIRED -13 mm CEMENT BOARD -60 mm ADJUSTABLE Z-GIRTS @ 600mm O.C. HORIZONTAL -200 mm CAST IN PLACE CONCRETE WALL REFER TO STRUCTURAL

## FLOOR ASSEMBLY

F1		SLAB ON GRADE -TRAFFIC COATING -100 mm STRUCTURAL CONCRETE SLAB ON GRADE- REFER TO STRUCTURAL -UNDER SLAB 10MIL POLY VAPOUR BARRIER -MIN 150 mm COMPACT GRANULAR SUB BASE – REFER TO PER STRUCTURAL) (SLOPE SLAB TOP TO TRENCHES / FLOOR DRAINS WHERE REQUIRED / INDICATED ALL FLOOR DRAIN COVERS TO FINISH SMOOTH TO ADJACENT FLOOR FINISHES)
----	--	--

## FLOOR ASSEMBLY

F2		MAIN FLOOR CONCRETE SLAB 1.5 HR F.R.R. NBCC 2015 APPENDIX D TABLE D.2.1.1 -FLOOR FINISH -STRUCTURAL CONCRETE SLAB - REFER TO STRUCTURAL
F3		WOOD FLOOR ASSEMBLY 1 HR F.R.R.-DESIGN WNR, WIJ 60-02, STC 67 NBCC 2015 APPENDIX 'A' TABLE A-9.10.3.1.B, FLOOR ASSEMBLY F21C. -50 mm CONCRETE TOPPING -19 mm T&G OSB SUB FLOOR – IN-FLOOR HEATING, SEE MECH. DWGS. -302 mm TJI JOISTS REFER TO STRUCTURAL -ACOUSTIC BATT INSULATION TO FILL JOISTS CAVITY -22 mm METAL RESILIENT CHANNELS SPACED @ 400 mm O.C. -2 LAYERS 16 mm GYPSUM BOARD
F4		BALCONY DECK ASSEMBLY -TONGUE AND GROOVE GEO-DECK -38X89 mm WOOD BLOCKING, SHAVE TOP TO FORM SLOPE -SBS CAP AND BASE SHEET -19 mm PLYWOOD SHEATHING- SLOPE OUTWARD. -SLEEPERS AS REQUIRED -38X184 mm SPF JOIST – REFER TO STRUCTURAL - T&G WOOD SOFFIT
F5		MAIN FLOOR SLAB/PARKADE ROOF 1.5 HR F.R.R. NBCC 2015 APPENDIX D TABLE D.2.1.1 -POURED IN-PLACE CONC. SLAB -GRAVEL -150 mm RIGID INSULATION -WATER PROOFING -CONC. SLAB PARKADE ROOF
F6		CONCRETE RAMP LEADING TO PARKADE -CONC. RAMP REFER TO STRUCTURAL DWGS, IN-FLOOR HEATHING SEE MECH. DWGS. -6 MIL POLY VAPOUR BARRIER -150 mm THICK WELL COMPACTED GRAVEL
F7		MAIN FLOOR SLAB WITH PEDESTALS/PARKADE ROOF 1.5 HR F.R.R. NBCC 2015 APPENDIX D TABLE D.2.1.1 -PAVERS -PEDESTALS -150 mm RIGID INSULATION -WATER PROOFING -CONC. SLAB PARKADE ROOF

## ROOF ASSEMBLY

R1		RUBBER SHINGLE ROOF -RUBBER SHINGLE ROOF -SBS ROOF MEMBRANE -13 mm PLYWOOD ROOF SHEATHING -PRE-MANUFACTURED ROOF TRUSSES, @ 600 mm O.C. -R-40 MINERAL WOOL BATT INSULATION -6 MIL POLY V.B. -FOR CEILING, REFER TO C2a
R2		ROOF ABOVE OVERHEAD DOOR 1.5 HR F.R.R. NBCC 2015 APPENDEX 'D', TABLE D-2.1.1. -2 PLY SBS ROOF MEMBRANE -EXTERIOR GRADE GYPSUM SHEATHING (13 mm) -150 mm THICK MIN. POLYISO INSULATION SLOPED INSULATION PACKAGE -SBS VAPOUR RETARDER MEMBRANE -CONCRETE SLAB PARKADE ROOF, REFER TO STRUCTURAL DWGS. -FINISH WITH PAINT
R3		CANOPY ROOF SBS CAP MEMBRANE SBS BASE MEMBRANE 19 mm EXTERIOR GRADE PLYWOOD SHEATHING SHIMS 19 mm EXTERIOR GRADE PLYWOOD SHEATHING 38 X 140 mm CANOPY WOOD FRAMING @ 400 mm O.C. 19 X 140 mm T&G WOOD SOFFIT, PROVIDE VENTING AS REQUIRED

## CEILING ASSEMBLY

C1		EXPOSED CONCRETE 1.5 HR F.R.R. NBCC 2015 APPENDIX D TABLE D.2.1.1 -STRUCTURAL CONCRETE SLAB - REFER TO STRUCTURAL
C2a		UNIT - TYPICAL CEILING -13 mm RESILIENT CHANNELS -16 mm TYPE 'X' GWB
C2b		UNIT - DROP CEILING -13 mm GYPSUM BOARD -38X89 mm WOOD FRAMING @ 600 mm O.C. -38X89 mm WOOD VERTICAL FRAMING SUPPORT
C3		UNIT - STORAGE CEILING -6 MIL POLY V.B. -R40 BATT INSULATION

## DRAWING SYMBOLS LEGEND:

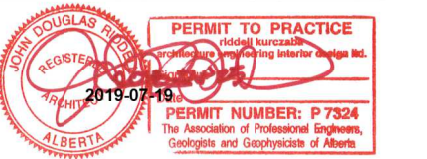
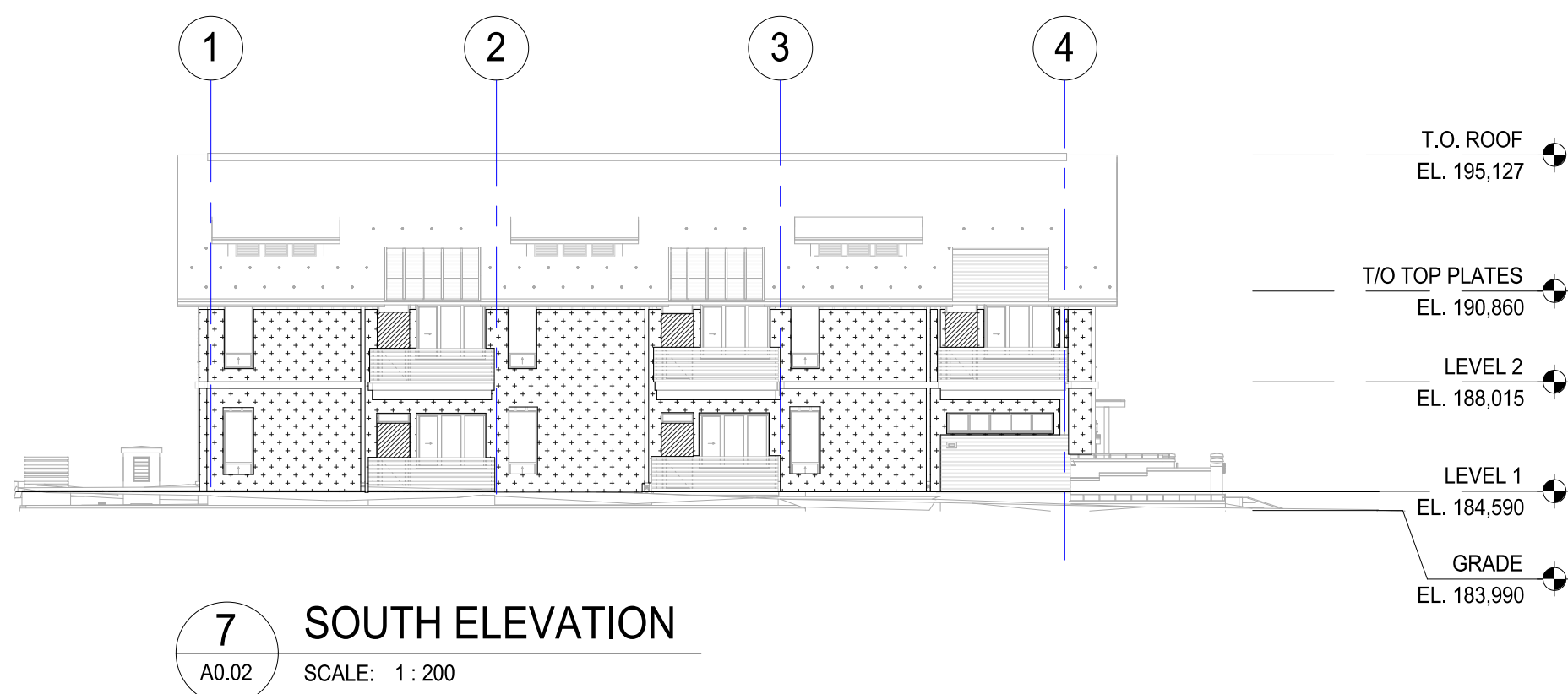
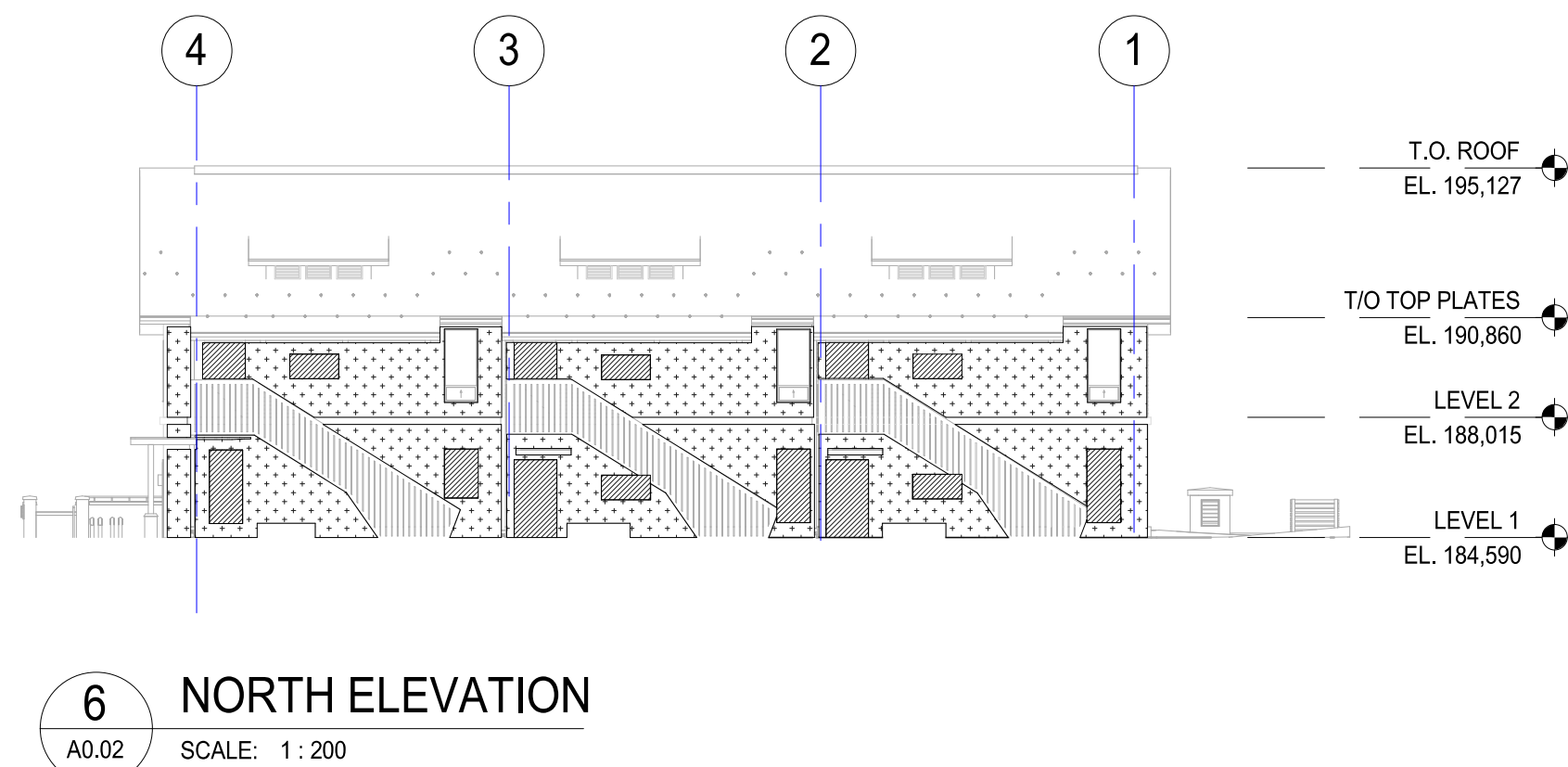
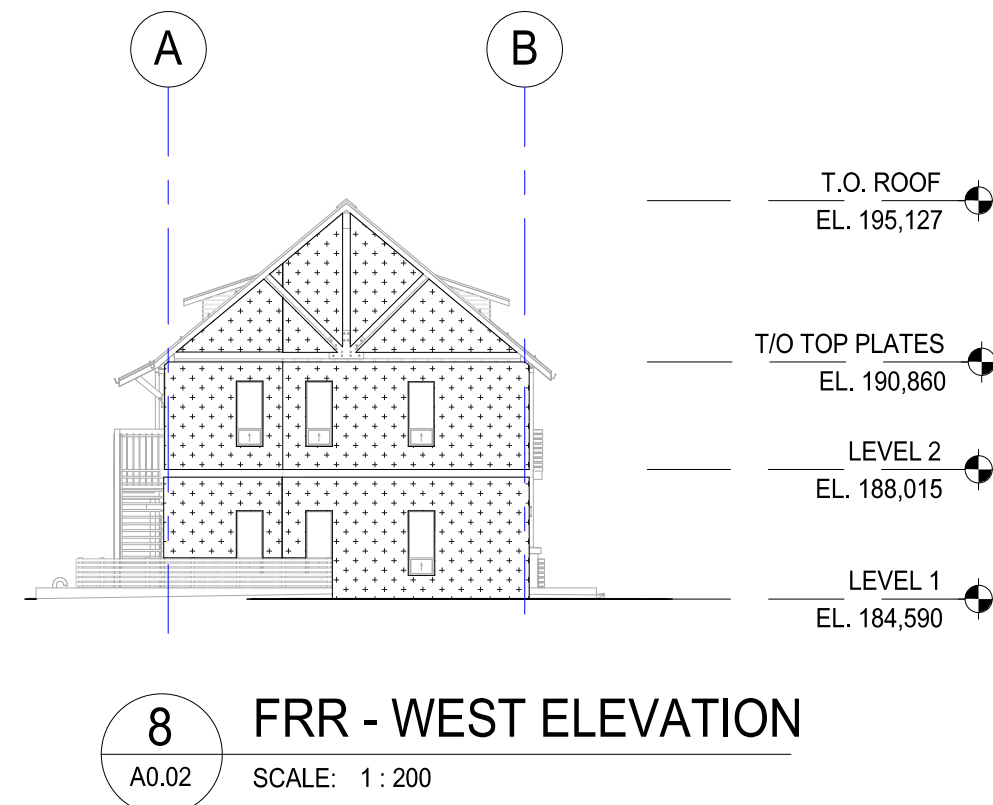
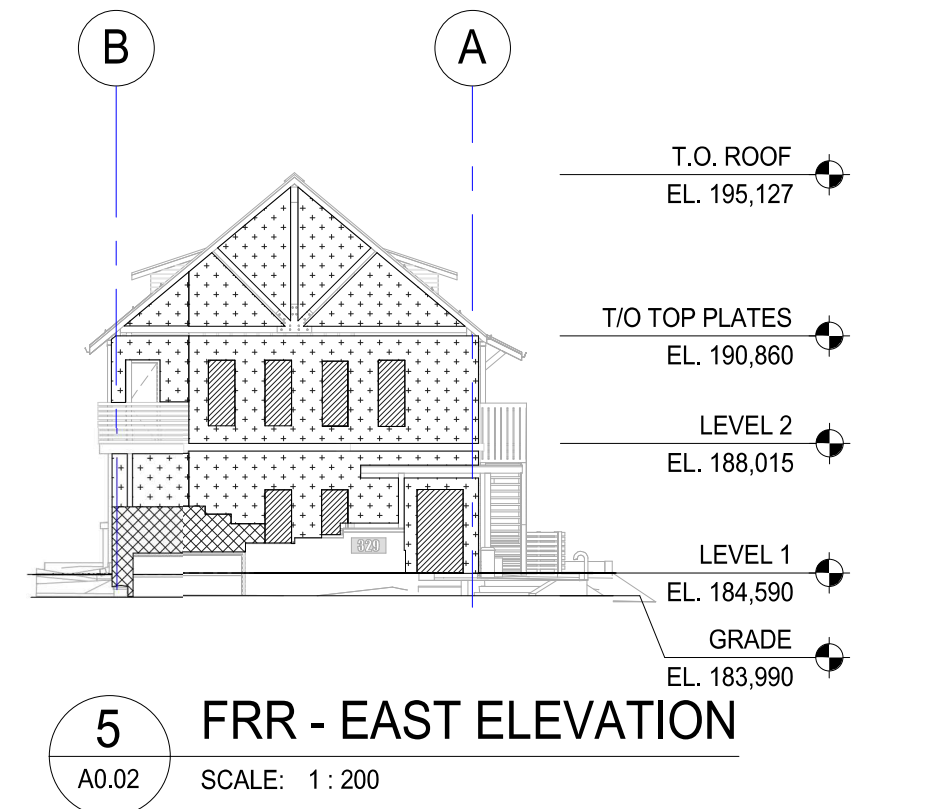
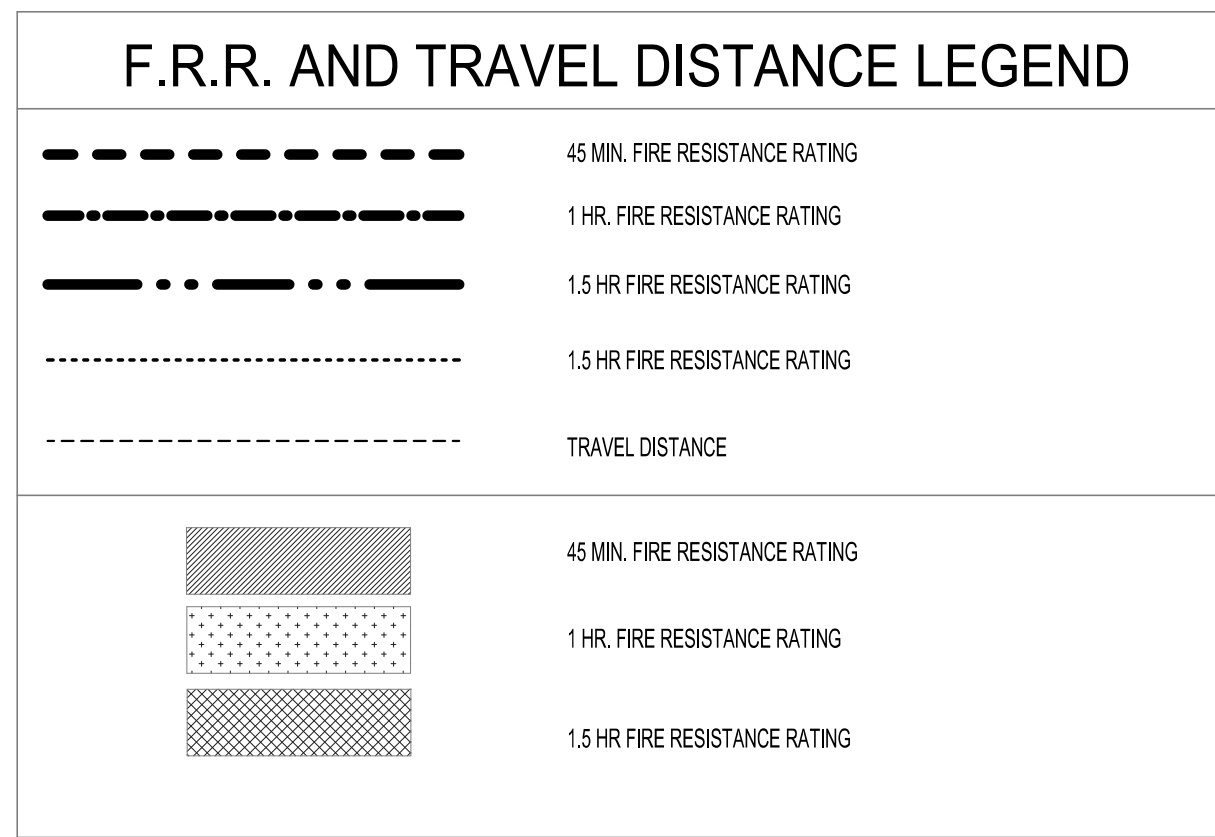
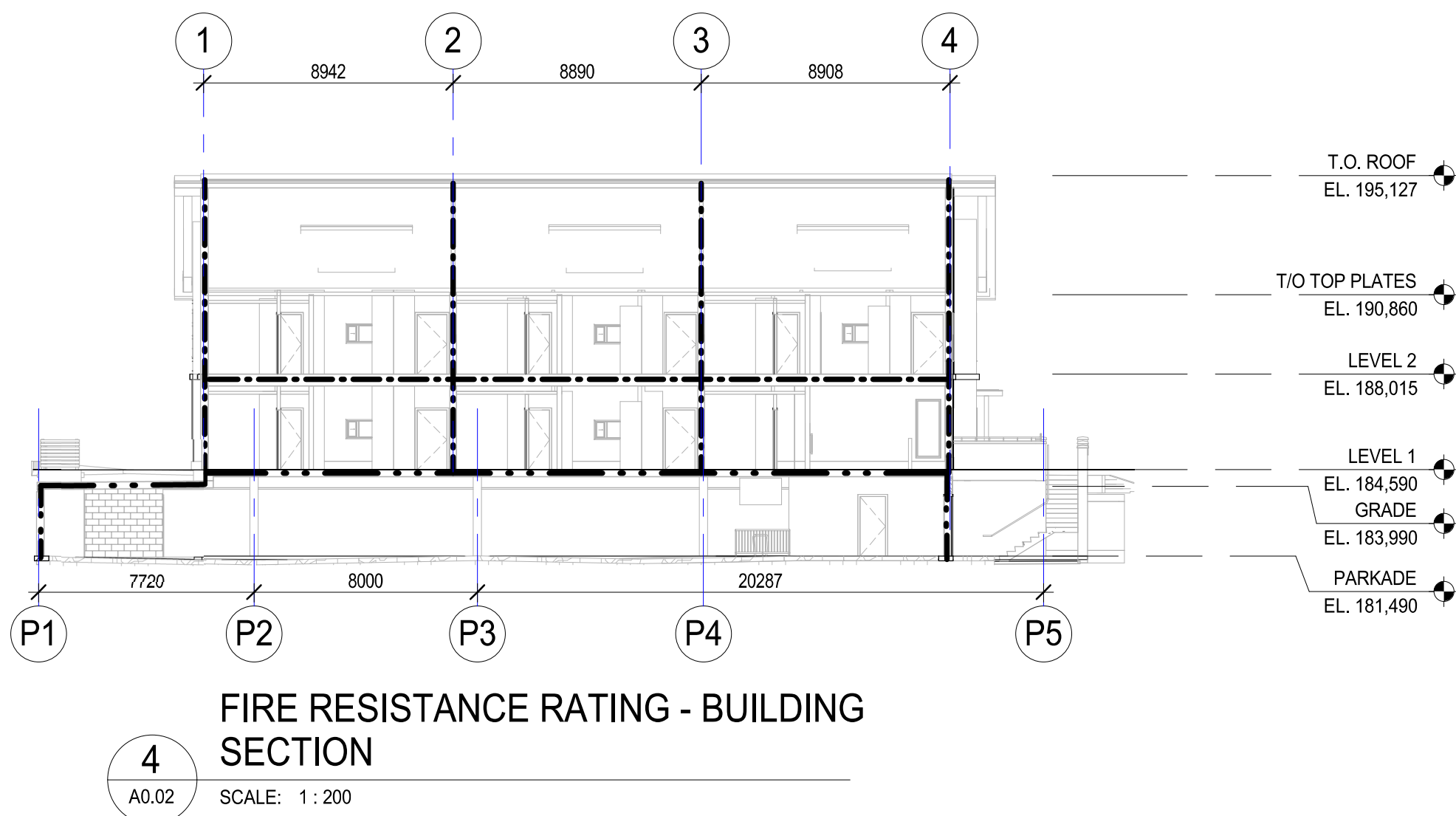
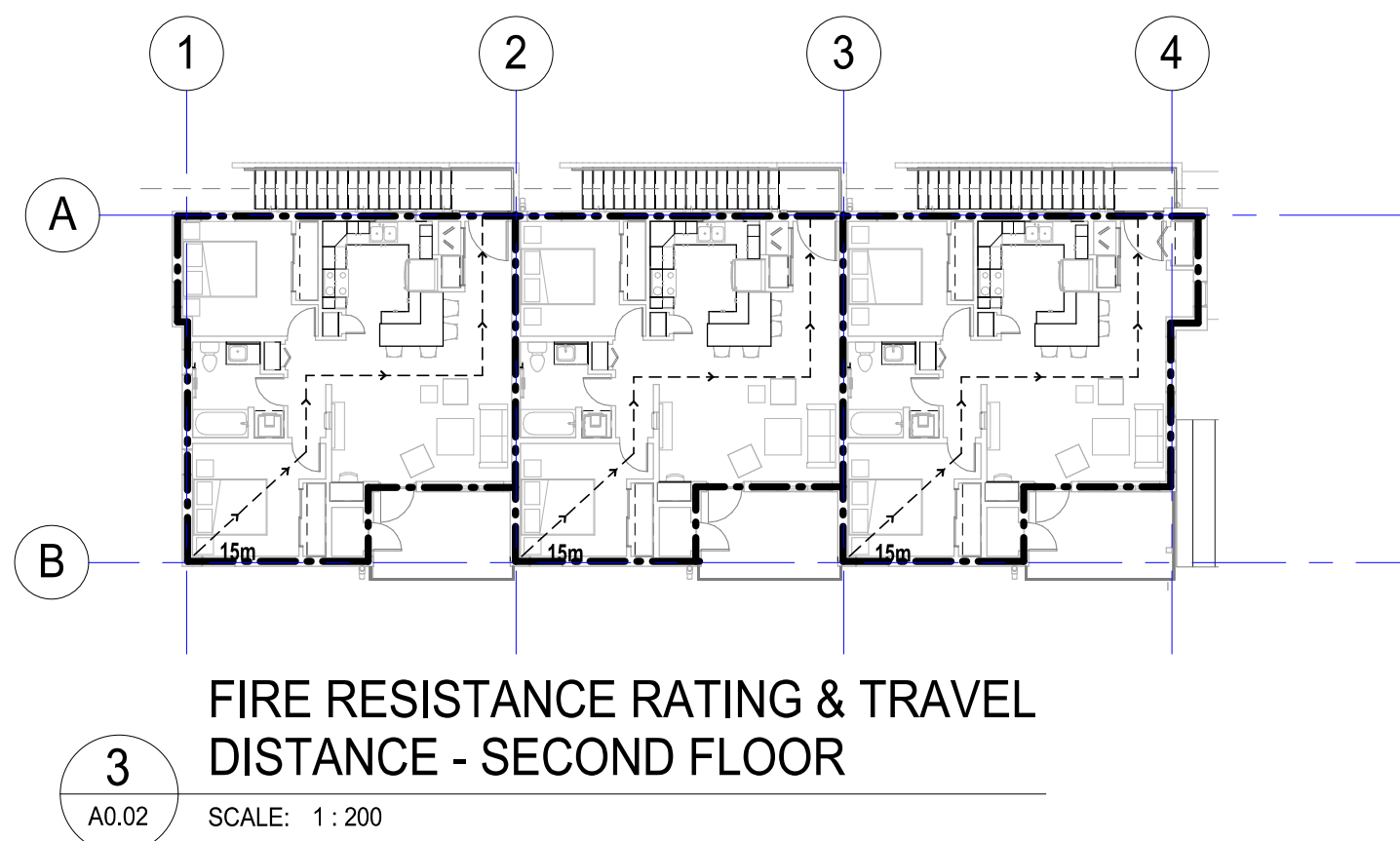
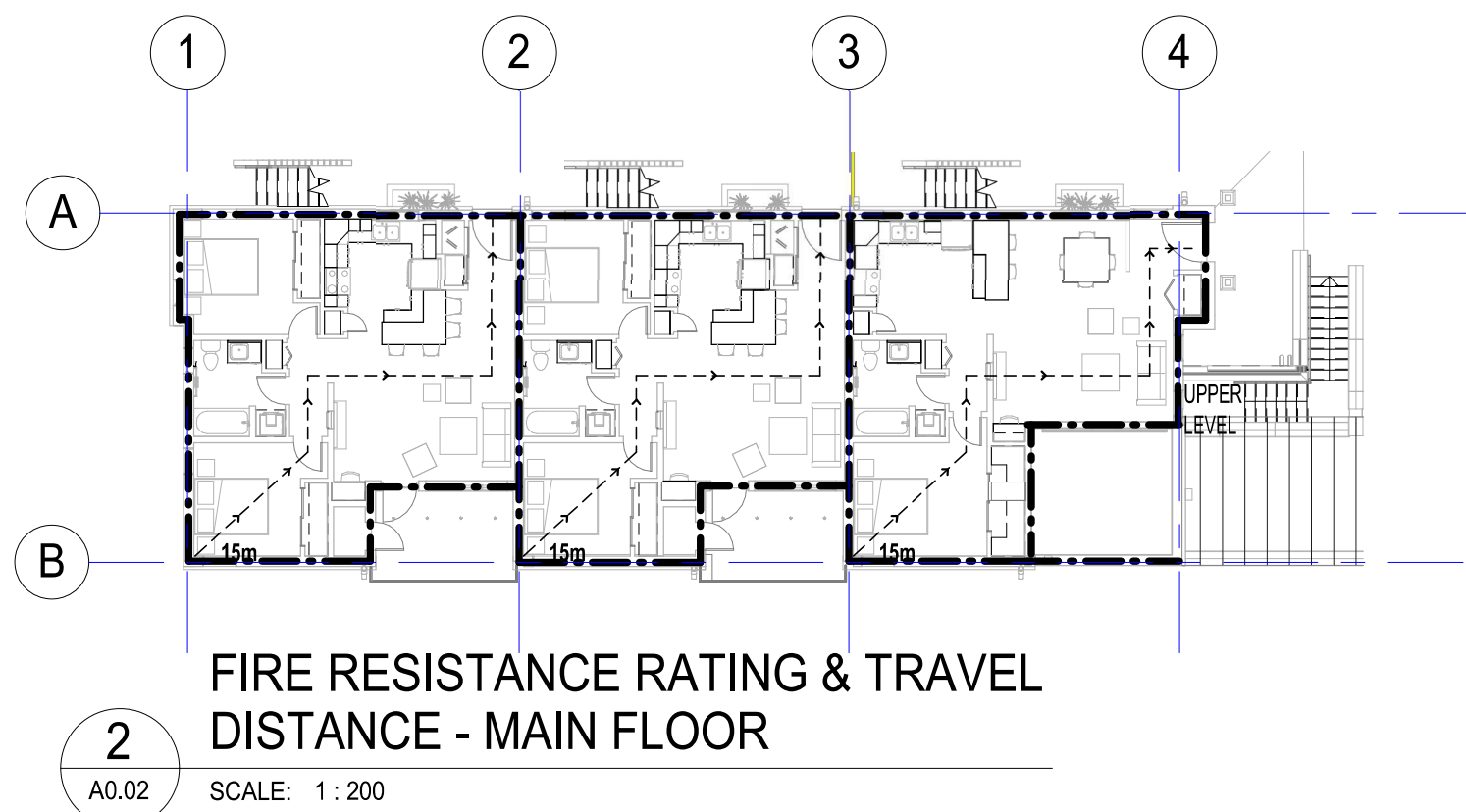
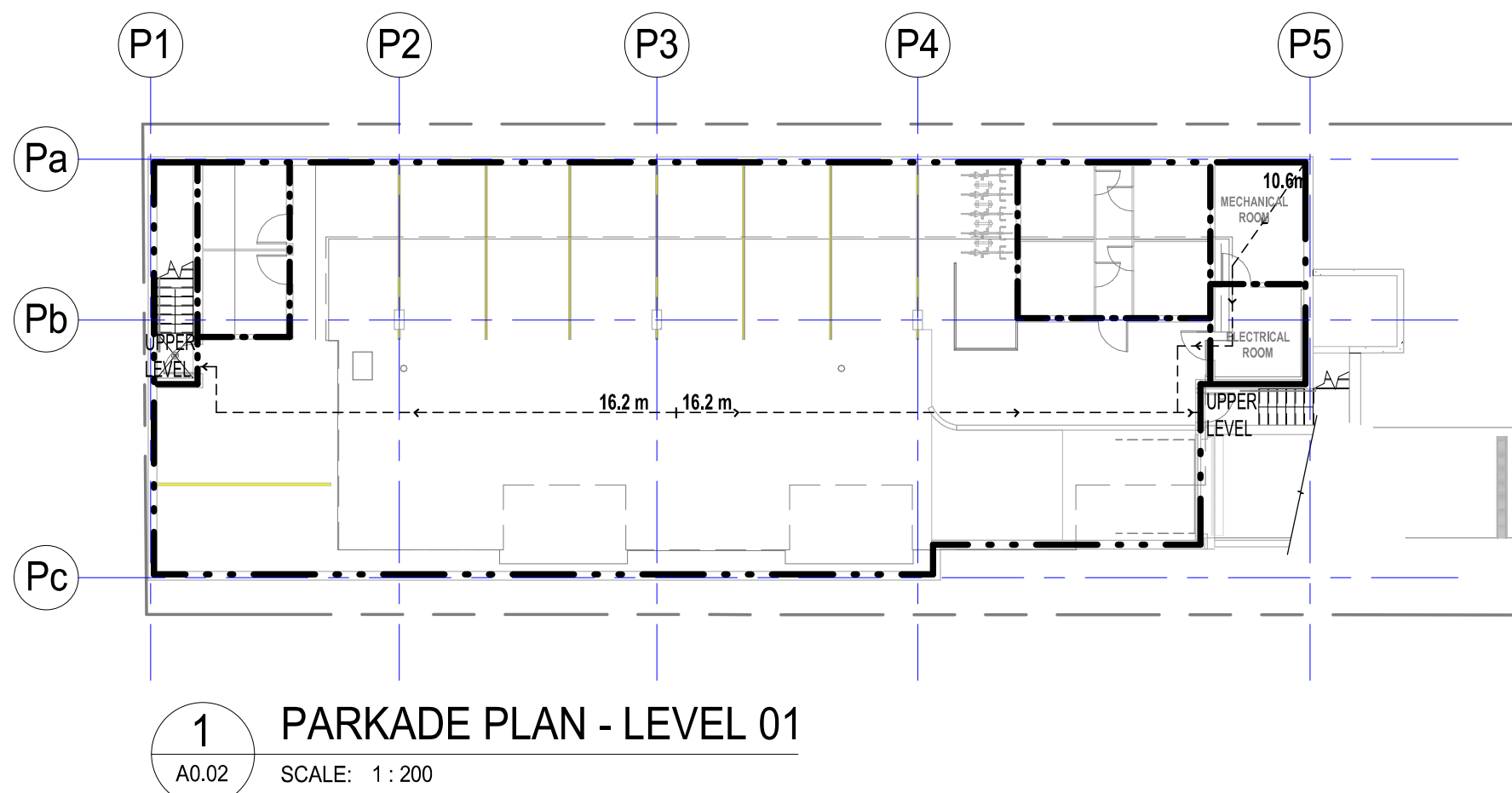
	SECTION SYMBOL: DETAIL NO. SHEET NO.		ROOF TYPE SYMBOL: ROOF TYPE		TITLES SYMBOL: DETAIL NO. SHEET NO.		FLOOR TYPE SYMBOL: FLOOR TYPE
	ELEVATION SYMBOL: DETAIL NO. SHEET NO.		CEILING TYPE SYMBOL: CEILING TYPE HEIGHT		STRUCTURAL GRID SYMBOL: GRID NO.		MATERIAL/FINISHES SYMBOL: FINISH TYPE
	DETAIL SYMBOL: DETAIL NO. SHEET NO.		WALL TYPE SYMBOL: WALL TYPE		ROOM NAME ROOM NO.		KEYNOTE SYMBOL: KEYNOTE NO.
			PARTITION TYPE SYMBOL: PARTITION TYPE		DOOR & FRAME DOOR NO.		REVISIONS SYMBOL: REVISION NO.
			WINDOW TYPE SYMBOL: WINDOW TYPE		DOOR & FRAME DOOR NO.		ACCESSORY SYMBOL: ACCESSORY TYPE

## 2015 NATIONAL BUILDING CODE OVERVIEW

GENERAL DESCRIPTION & REQUIREMENTS (9.10.2.1)		
MAJOR OCCUPANCIES	GROUP C (PART 9)	
OCCUPANCY CLASSIFICATIONS	RESIDENTIAL	
BUILDING AREA	APPROXIMATE:	531.3m²
NUMBER OF STOREYS	2 STOREYS	
BASEMENT	ONE LEVEL (PARKADE)	
GENERAL CONSTRUCTION REQUIREMENTS (TABLE 9.10.8.1)		
CONSTRUCTION TYPE	COMBUSTIBLE OR NONCOMBUSTIBLE PERMITTED. CONSTRUCTION WILL BE COMBUSTIBLE	
SPRINKLER SYSTEM	NO	
STANDPIPE SYSTEM	NOT REQUIRED	
FIRE ALARM SYSTEM	NOT REQUIRED (9.10.18.2.5)	
RESIDENTIAL FLOOR ASSEMBLIES	FIRE SEPARATIONS WITH 45 MIN FIRE-RESISTANCE RATINGS	
FLOOR ASSEMBLY ABOVE PARKADE	FIRE SEPARATION WITH 1.5 HOUR FIRE-RESISTANCE RATING	
ROOF	NO RATING REQUIRED	
LOADBEARING WALLS & COLUMNS	EQUAL TO SUPPORTED ASSEMBLY	
EGRESS AND EXITING		
NUMBER OF EXITS	EACH SUITE IS PERMITTED TO BE SERVED BY ONE EXIT (9.9.8.2.2)	
TRAVEL DISTANCE	MAXIMUM TRAVEL DISTANCE IS 15 m TO NEAREST EXIT (TABLE 9.9.7.4)	
PROTECTION OF OPENINGS	ALL OPENINGS ON THE NORTH WALL WILL HAVE A FIRE RATING OF 45 MIN (9.9.4.4)	
MINIMUM WIDTHS	STAIRS: 860 mm (9.8.2.1.2) DOORS: 810 mm (9.6.6.3.2)	
TREADS AND RISERS	STEPS REQUIRE A MINIMUM RISE OF 125 mm AND MAXIMUM RISE OF 200 mm. (TABLE 9.8.4.1) STEPS REQUIRE A MINIMUM RUN OF 255 mm AND MAXIMUM RUN OF 355 mm. (TABLE 9.8.4.2)	
LANDINGS	THE WIDTH AND LENGTH OF A LANDING IS REQUIRED TO BE AT LEAST AS WIDE AS AND AS LONG AS THE WIDTH AS THE STAIR. (9.8.6.3.1)	
OCCUPANT LOAD (9.9.1.3.2)		
MAIN FLOOR	4 PEOPLE PER UNIT - TOTAL 12	
2ND FLOOR	4 PEOPLE PER UNIT - TOTAL 12	
TOTAL OCCUPANT LOAD	24	
SPATIAL SEPERATION AND EXPOSURE - (Table 9.10.14.5-A, 9.10.14.4-A)		
NORTH	LIMITING DISTANCE: 3.65 m EXPOSING BUILDING FACE: PERMITTED UNPROTECTED OPENINGS: ACTUAL UNPROTECTED OPENINGS: EXTERIOR WALL CONSTRUCTION:	27.65 m² (PER SUITE) 39 % (10.7 m²) (PER SUITE) 0% (ALL OPENINGS ARE 45 MIN FIRE RATED) 1 HOUR FIRE RATING COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION PERMITTED. CLADDING IS REQUIRED TO BE NONCOMBUSTIBLE
SOUTH	MAIN FLOOR LIMITING DISTANCE: 2 m EXPOSING BUILDING FACE: PERMITTED UNPROTECTED OPENINGS: ACTUAL UNPROTECTED OPENINGS: LIMITING DISTANCE: 4 m EXPOSED RECESSED BUILDING FACE PERMITTED UNPROTECTED OPENINGS FOR RECESSED AREA: ACTUAL UNPROTECTED OPENINGS: EXTERIOR WALL CONSTRUCTION:	15.5 m² (PER SUITE) 12% (1.86 m²) (PER SUITE) 11 % ( 1.71 m²) (PER SUITE) 11.6 m² (PER SUITE) 39% (4.52 m²) (PER SUITE) 30.17% ( 3.5 m²) (PER SUITE) 45 MINS FIRE RATING - 1 HR PROVIDED COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION PERMITTED. CLADDING IS REQUIRED TO BE NONCOMBUSTIBLE
	SECOND FLOOR LIMITING DISTANCE: 2 m EXPOSING BUILDING FACE: PERMITTED UNPROTECTED OPENINGS: ACTUAL UNPROTECTED OPENINGS: LIMITING DISTANCE: 4 m EXPOSED RECESSED BUILDING FACE PERMITTED UNPROTECTED OPENINGS FOR RECESSED AREA: ACTUAL UNPROTECTED OPENINGS: EXTERIOR WALL CONSTRUCTION:	14.5 m² (PER SUITE) 12% (1.74 m²) (PER SUITE) 11.79 % ( 1.71 m²) (PER SUITE) 10.5 m² (PER SUITE) 39% (4.10 m²) (PER SUITE) 33.3% ( 3.5 m²) (PER SUITE) 45 MINS FIRE RATING - 1 HR PROVIDED COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION PERMITTED. CLADDING IS REQUIRED TO BE NONCOMBUSTIBLE
EAST	LIMITING DISTANCE: 9 m EXPOSING BUILDING FACE: PERMITTED UNPROTECTED OPENINGS: ACTUAL UNPROTECTED OPENINGS: LIMITING DISTANCE: 4 m EXPOSED RECESSED BUILDING FACE PERMITTED UNPROTECTED OPENINGS FOR RECESSED AREA: ACTUAL UNPROTECTED OPENINGS: EXTERIOR WALL CONSTRUCTION:	32.52 m² (PER SUITE) 100% (PER SUITE) 17% (5.52 m²) (PER SUITE) 45 MINS FIRE RATING - 1 HR PROVIDED COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION PERMITTED. CLADDING IS REQUIRED TO BE NONCOMBUSTIBLE
WEST	LIMITING DISTANCE: 5.8 m EXPOSING BUILDING FACE: PERMITTED UNPROTECTED OPENINGS: ACTUAL UNPROTECTED OPENINGS: EXTERIOR WALL CONSTRUCTION:	32.52 m² (PER SUITE) 69% (22.43 m²) (PER SUITE) 11% (3.6 m²) (PER SUITE) 45 MINS FIRE RATING - 1 HR PROVIDED COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION PERMITTED. CLADDING IS REQUIRED TO BE NONCOMBUSTIBLE
INTERIOR FIRE SEPARATIONS (9.10.9, 9.10.10, 9.10.9.13, 9.10.9.16, 9.10.10.3, 9.10.10.4)		
ROOM/ SPACE	FIRE-RESISTANCE RATING OF FIRE SEPARATION	FIRE-PROTECTION RATING OF CLOSURE
ROOMS CONTAINING FUEL-FIRED APPLIANCES (9.10.10.4)	1 HR	45 MIN
ELECTRICAL ROOMS (9.10.10.3)	1 HR	45 MIN
RESIDENTIAL SUITES (FROM ADJACENT SUITES/ SPACES) (9.10.9.13)	45 MIN	N/A
PARKADE (BETWEEN PARKADE AND REMAINDER OF BUILDING) (9.10.9.16)	1.5 HR	1 HR
TENANT STORAGE ROOM (IN PARKADE) (9.10.9.16)	1 HR	45 MIN



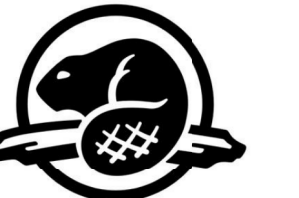




DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



**Banff National Park**  
Banff, Alberta

Project title / Titre du projet

**Banff National Park**  
Banff, Alberta

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by / Approuvé par  
AMINA OYAKHIOME

Designed by / Concepté par  
PETER SCHULZ

Drawn by / Dessiné par  
MARAL SAFARZADEH

Project Manager / Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager /  
Ressources Architecturale et de Directeur d'ingénierie

Client / client

**Parks Canada**

Drawing title / Titre du dessin

**FIRE RESISTANCE RATING & TRAVEL  
DISTANCE**

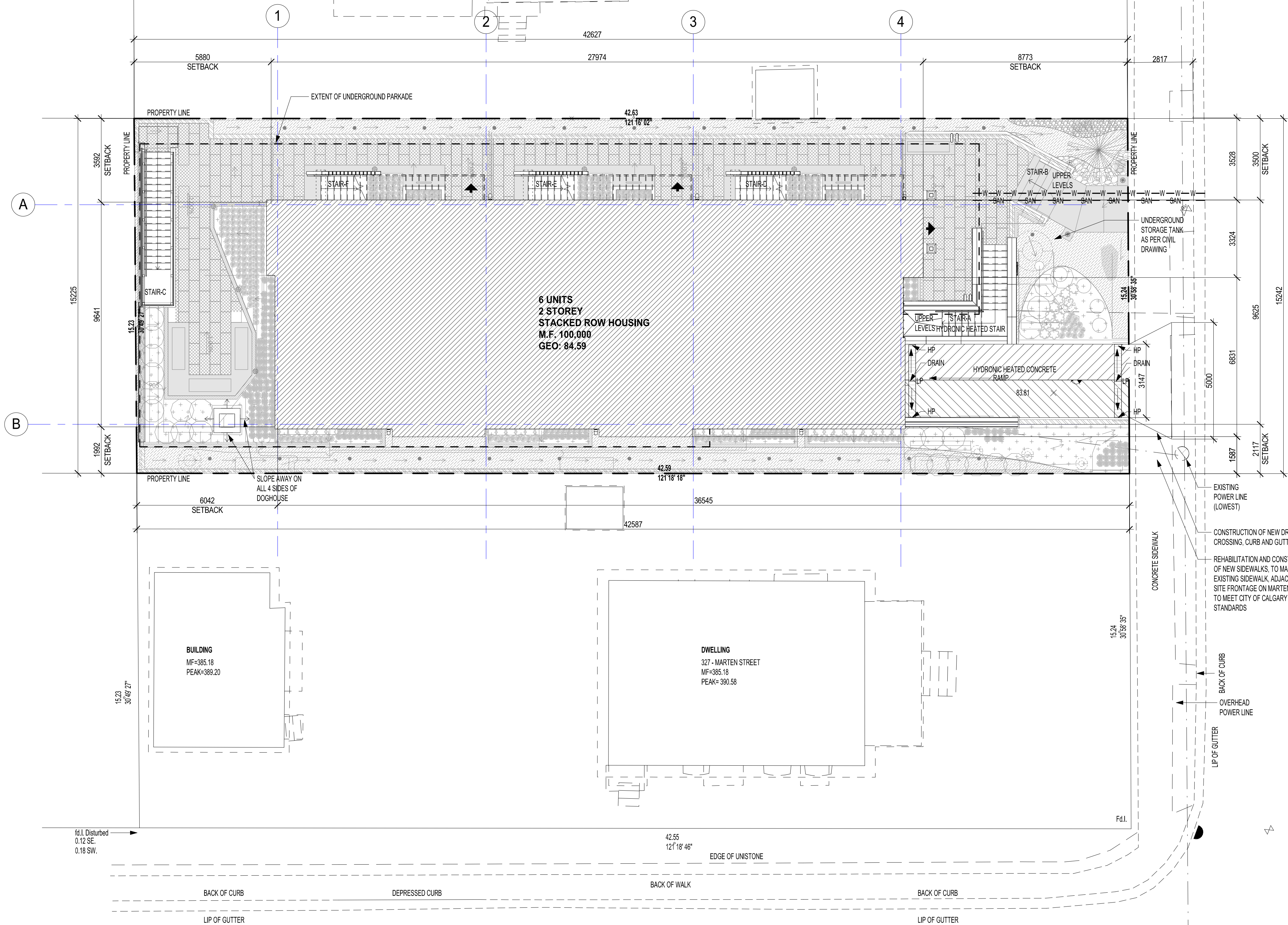
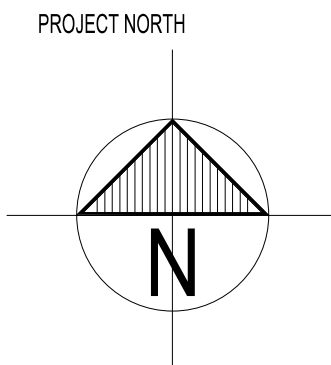
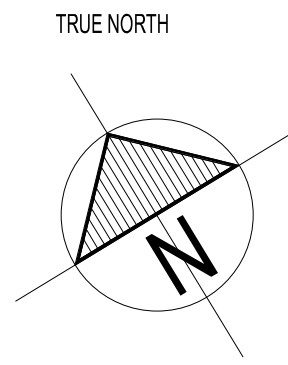
Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
------------------------------	-----------------	--------------------------------

A0.02

5







1 SITE PLAN  
A1.00 SCALE: 1 : 100

ELK STREET

MARTEN STREET

**PROJECT INFORMATION:**  
329 MARTEN STREET, BANFF, ALBERTA  
LOT: 2BLOCK: 12 PLAN: 6719BC  
TYPE OF DEVELOPMENT:  
STACKED ROW HOUSING  
NUMBER OF RESIDENTIAL UNITS: 6 UNITS  
SITE AREA: 649.28 m<sup>2</sup> (6988.79 sq.ft.)  
MAIN FLOOR GFA: 236.52 m<sup>2</sup>  
SECOND FLOOR GFA: 236.52 m<sup>2</sup>  
TOTAL GFA: 473.04 m<sup>2</sup>  
UNDERGROUND GFA: 447.56 m<sup>2</sup>  
BUILDING HEIGHT: 7.99 m  
FAR: 0.73  
PROPOSED MAIN FLOOR GRADE: 85.46  
PROPOSED ROOF PEAK: 95.84  
SITE COVERAGE: 36.43%  
PARKING REQUIRED: 9 STALLS  
PARKING PROVIDED: 9 STALLS

**LEGEND:**

C.L.S. STANDARD POST	⊗
ALBERTA STATUTORY IRON POST	⊙
CATCHBASIN MANHOLES	⊗
MANHOLES	⊗
GAS VALVES	⊗
FIRE HYDRANT	⊗
VALVES	⊗
BOREHOLE	⊗
POWER LINE	⊗
FENCE LINES	X X X
SANITARY SEWER LINES	SAN SAN
WATER LINES	W W
OVERHEAD POWER LINES	HP HP
HIGH POINTS	HP

**DO NOT SCALE**

Revision / Revisión	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet  
**Banff National Park  
Banff, Alberta  
PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par  
AMINA OYAKHLOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessine par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

SITE PLAN

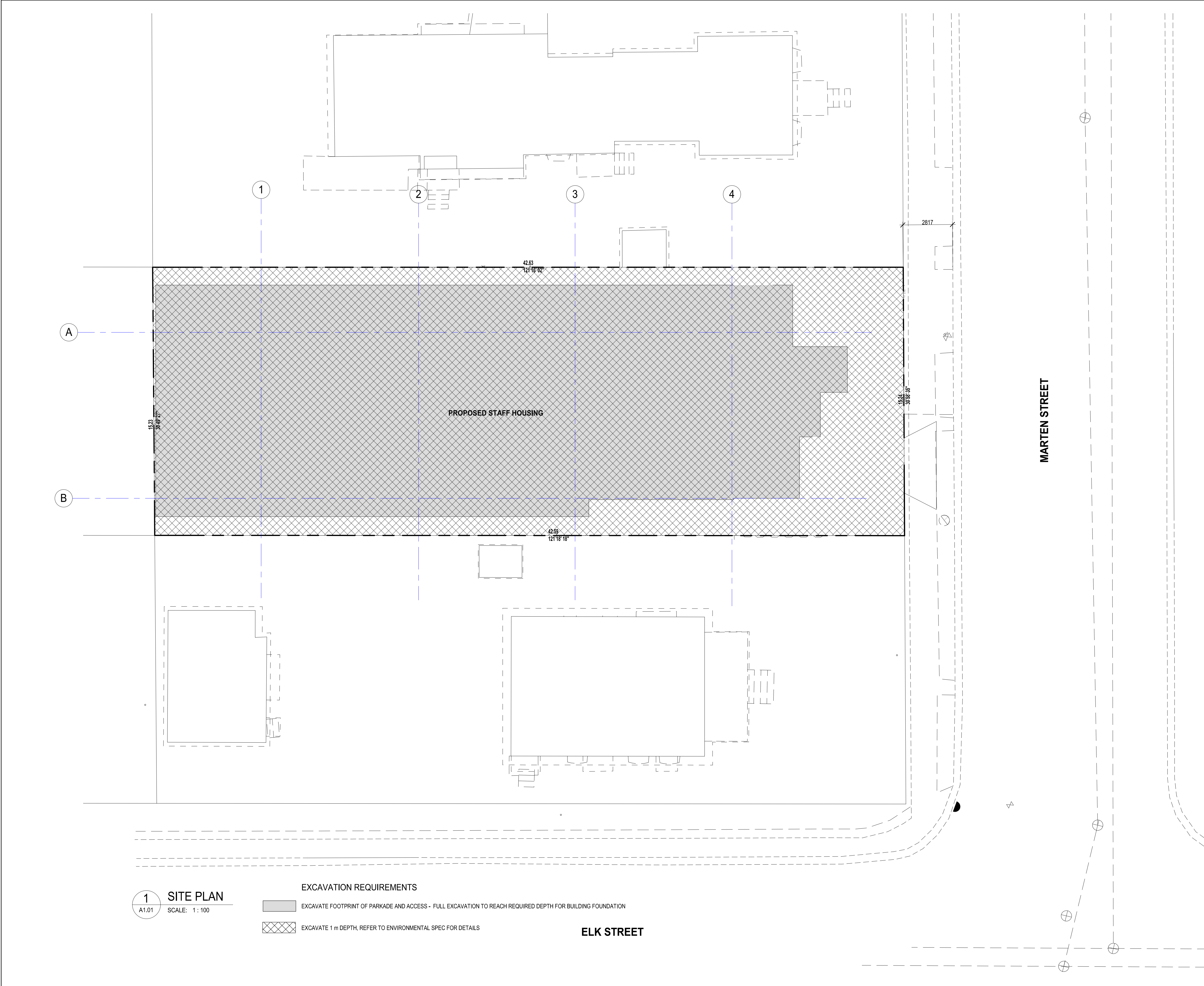
Project No. / No. du  
project

Sheet / Feuille  
**A1.00**

Revision no. /  
La Révision  
no.

**5**






1 SITE PLAN  
A1.01 SCALE: 1:100

- EXCAVATION REQUIREMENTS
- EXCAVATE FOOTPRINT OF PARKADE AND ACCESS - FULL EXCAVATION TO REACH REQUIRED DEPTH FOR BUILDING FOUNDATION
  - EXCAVATE 1 m DEPTH, REFER TO ENVIRONMENTAL SPEC FOR DETAILS

ELK STREET


MARTEN STREET



Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada


REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest




DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



Parks  
Canada



Parcs  
Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHIOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH

Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

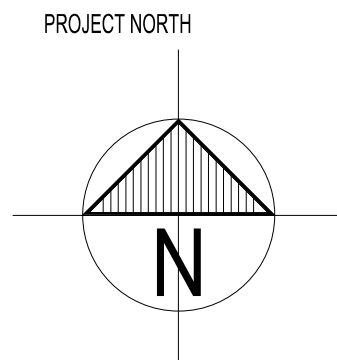
Drawing title / Titre du dessin




EXCAVATION PLAN

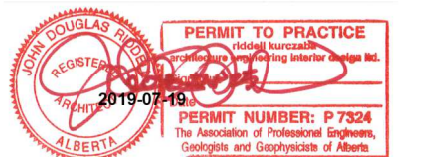
Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A1.01	1







	CONCRETE SLAB ELEVATION AS NOTED
	DROPPED CONCRETE SLAB ELEVATION AS NOTED
	CONCRETE WALL
	CONCRETE CURB



5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11
Revision / Revision	Description / Description	Date / Date



**Banff National Park**  
**Banff, Alberta**

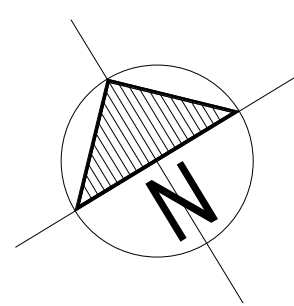
## Drawing title / Titre du dessin

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision
---------------------------------	-----------------	-------------------------------

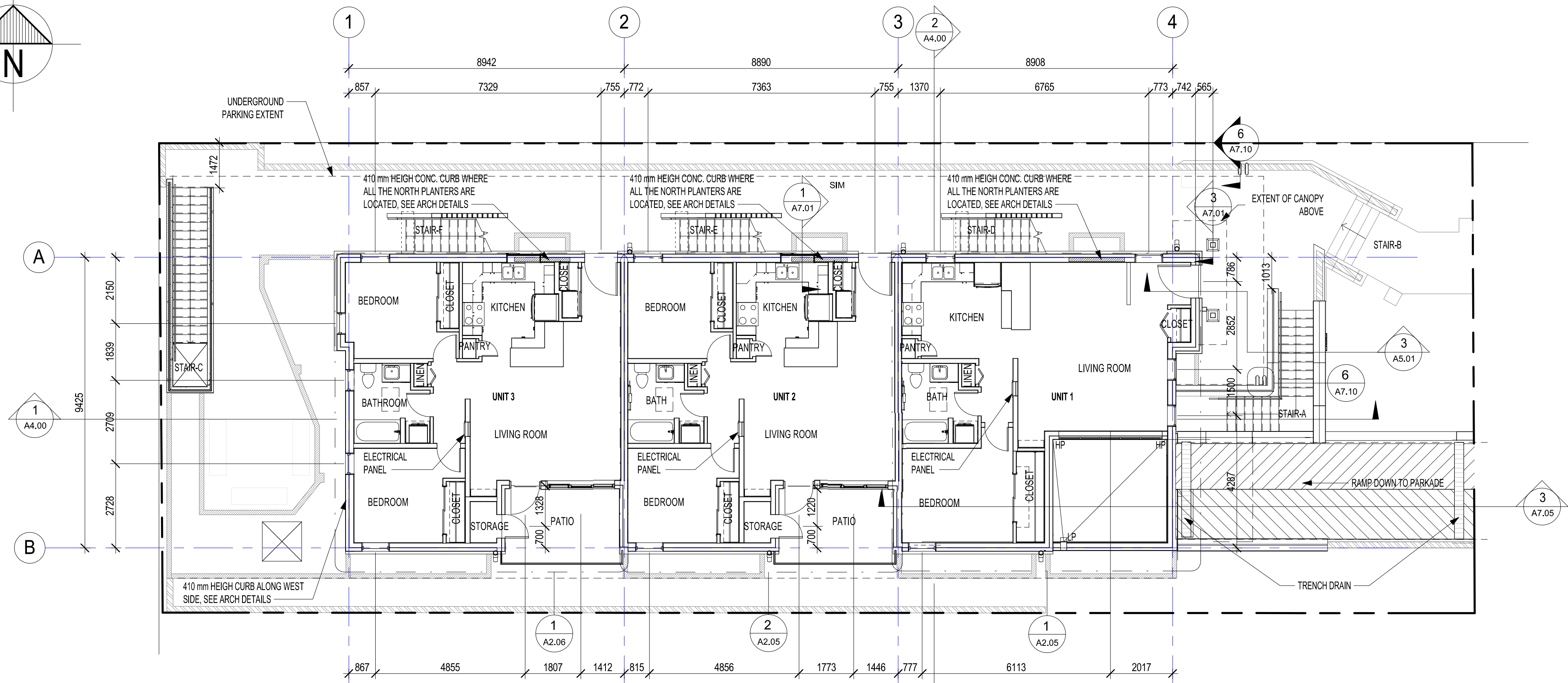
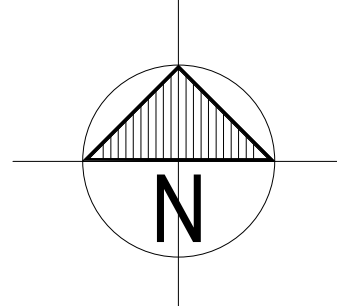




TRUE NORTH

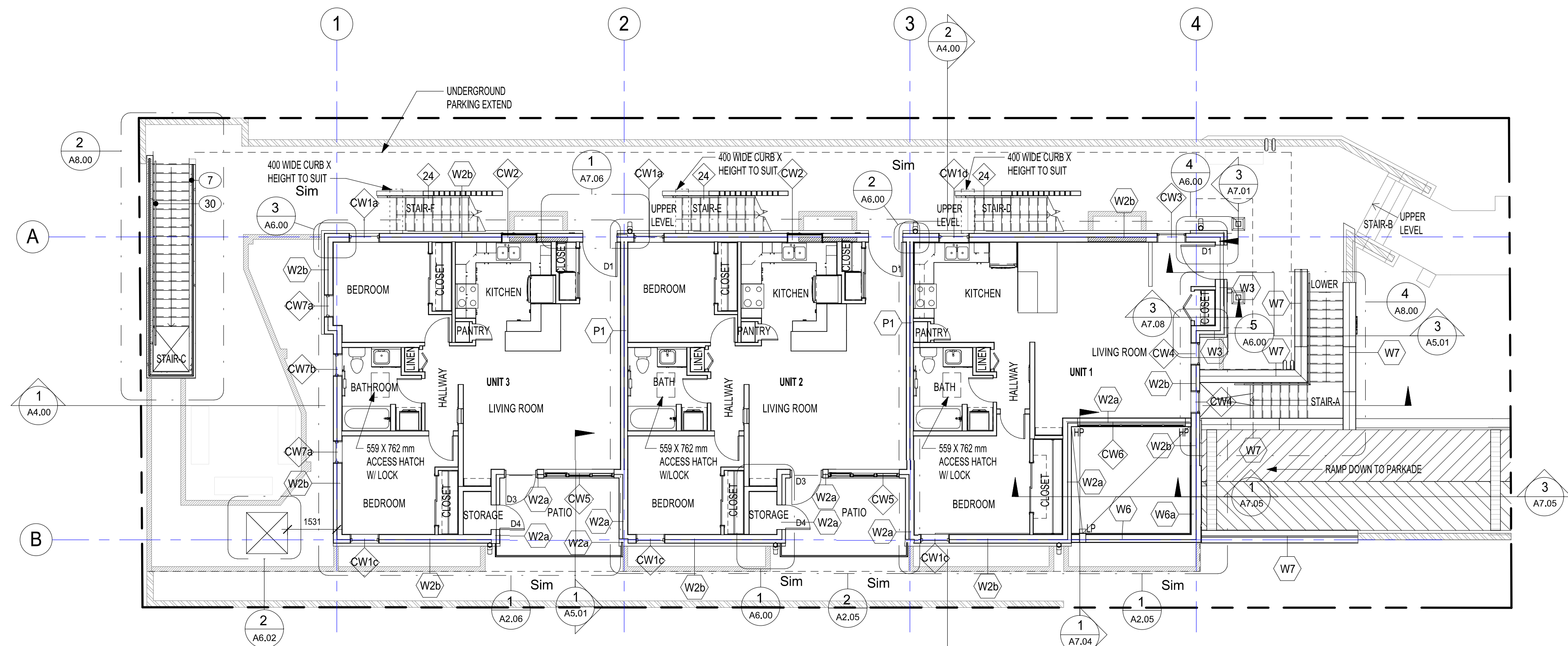


PROJECT NORTH



1 MAIN FLOOR DIMENSION PLAN

A2.02 SCALE: 1:100



2 MAIN FLOOR REFERENCE PLAN

A2.02 SCALE: 1:100



DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Parks Canada Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHIHOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

MAIN FLOOR DIMENSION AND REFERENCE  
PLANS

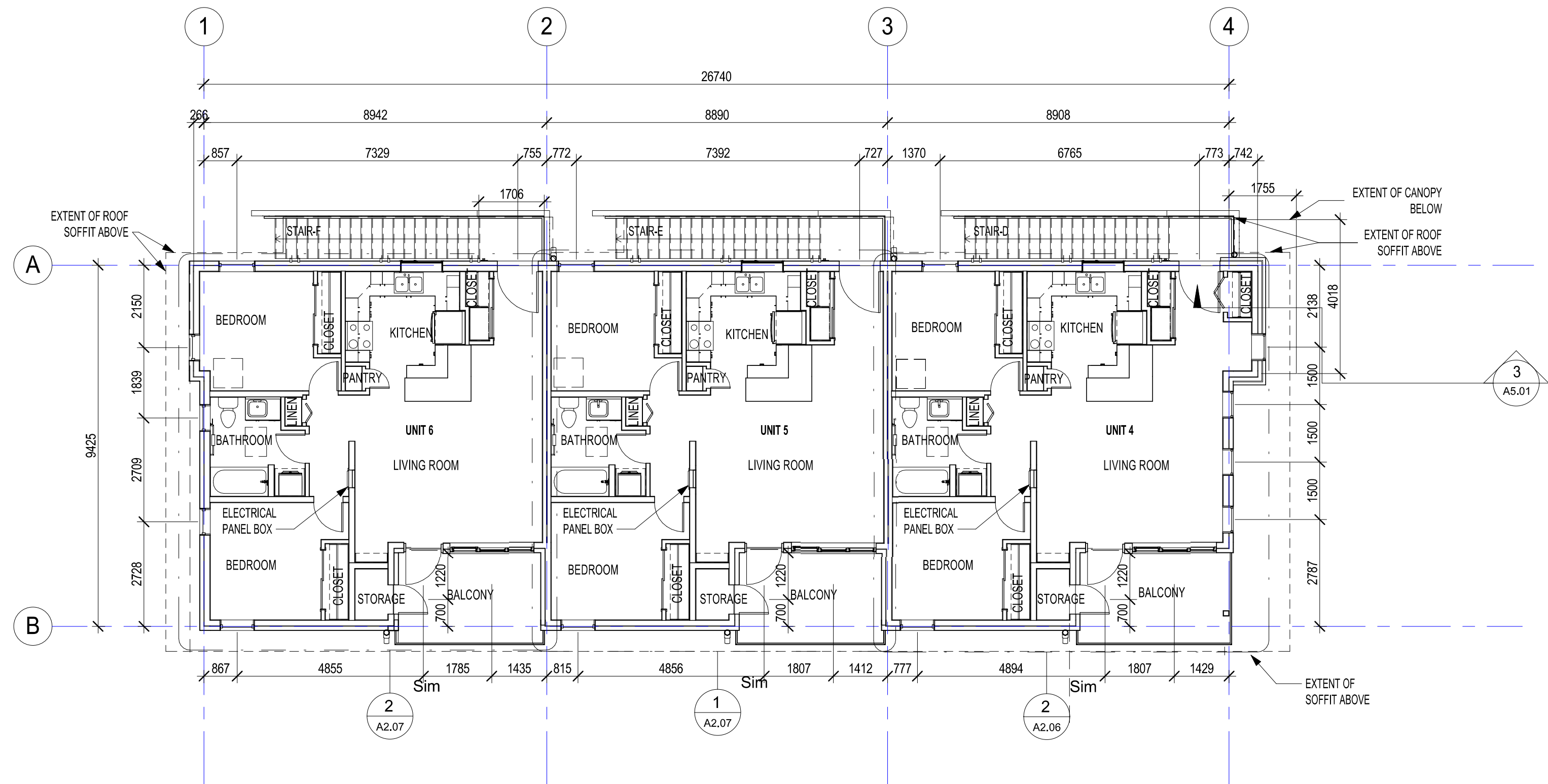
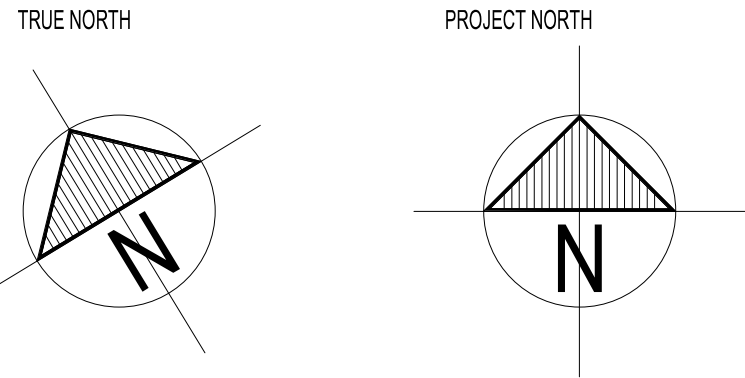
Project No. / No. du  
project

A2.02

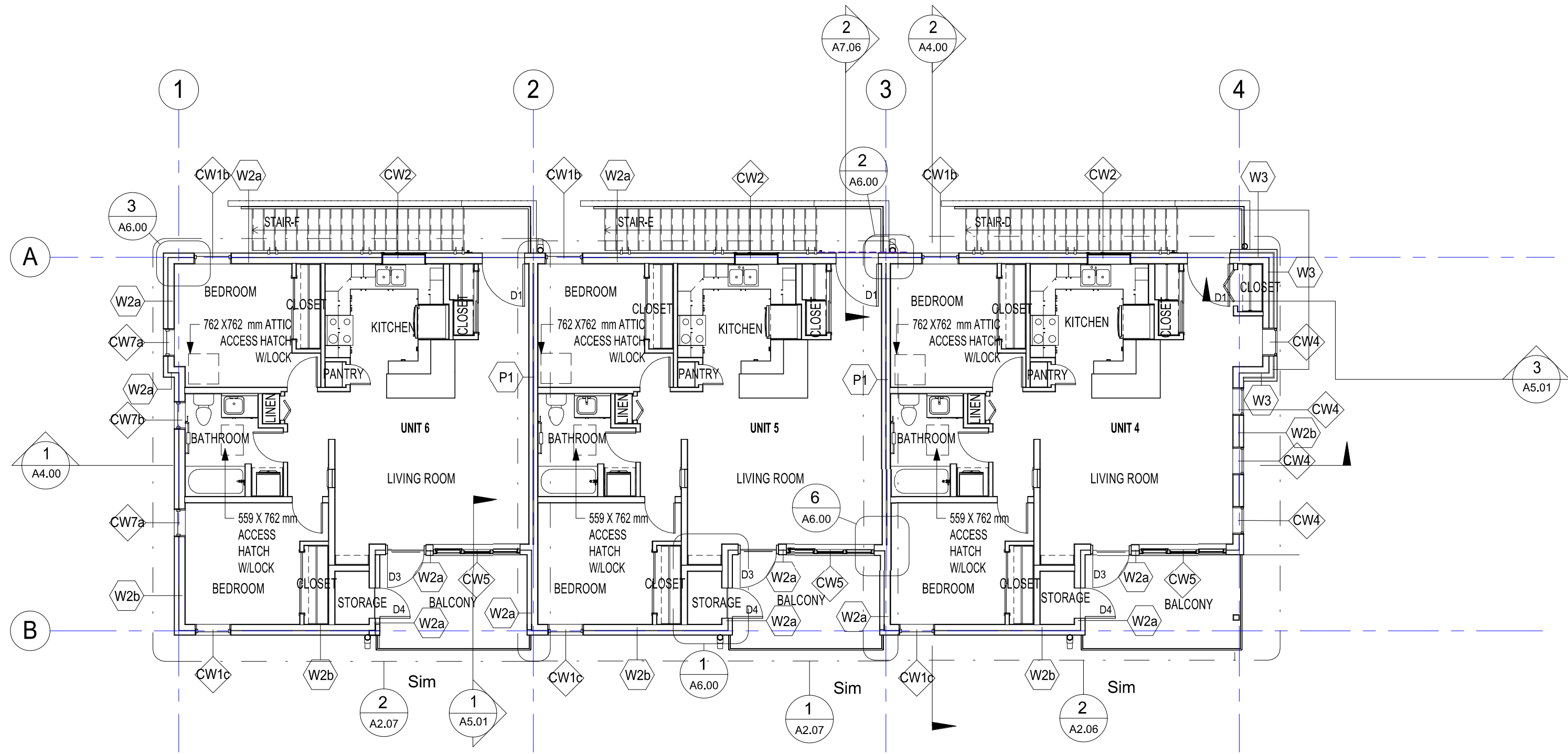
Revision no. /  
La Révision  
no.

5





1 SECOND FLOOR DIMENSION PLAN  
SCALE: 1 : 100



2 SECOND FLOOR REFERENCE PLAN  
SCALE: 1 : 100



DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta  
**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concepté par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH

Project Manager/Administrateur de Projets  
LAURIE MACDONALD

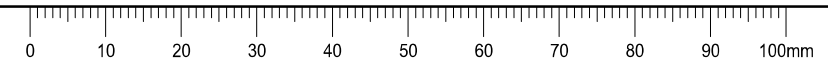
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

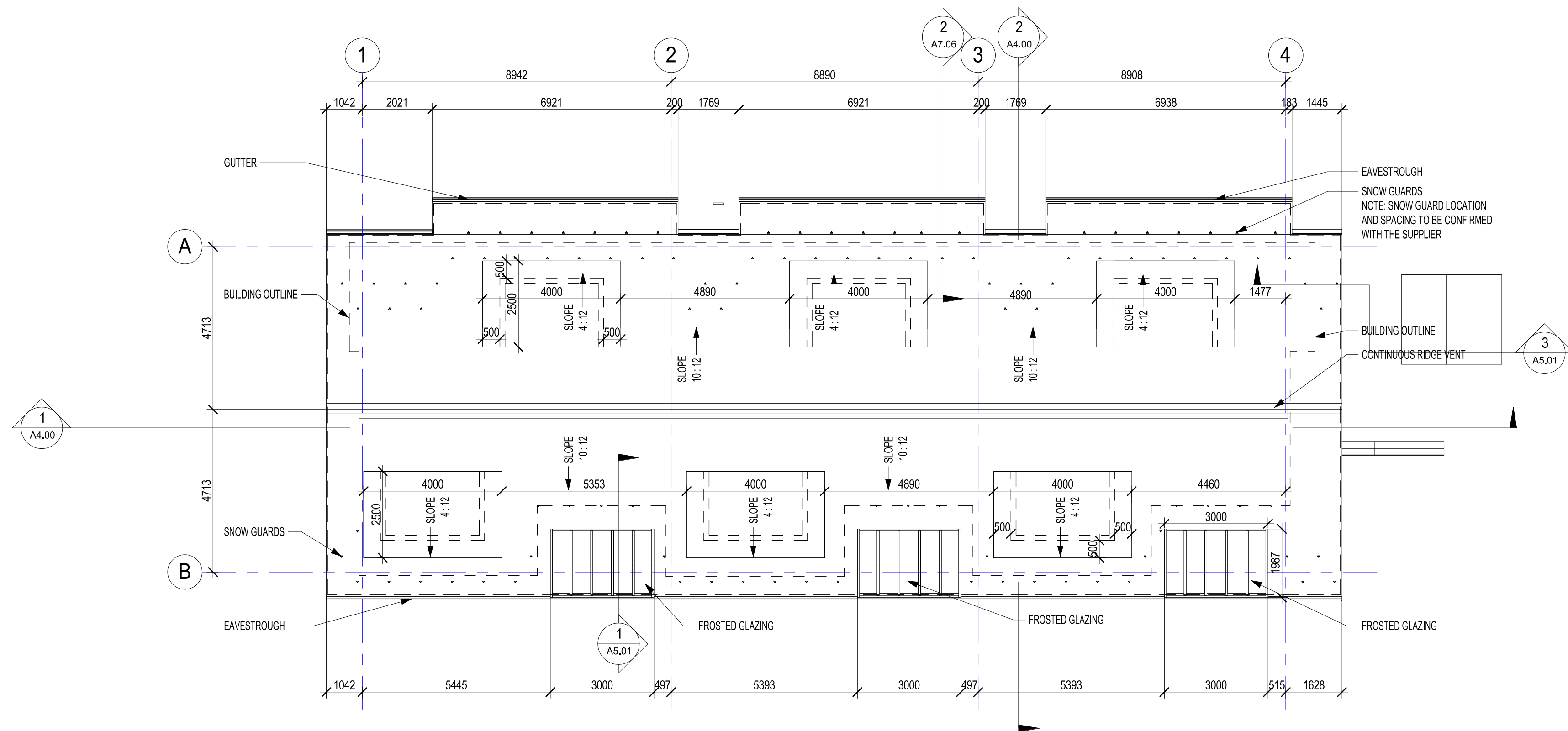
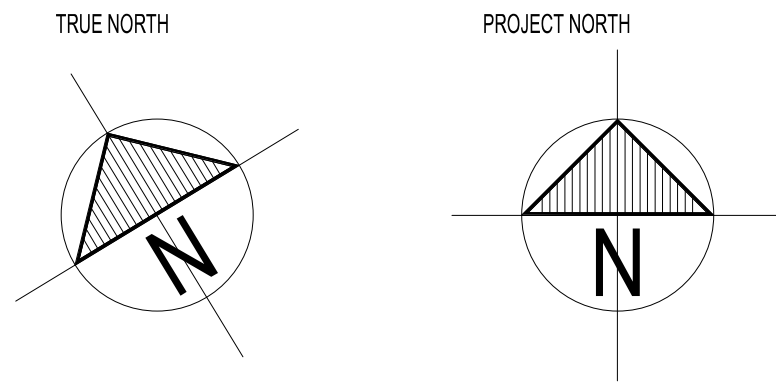
Client / client  
**Parks Canada**

Drawing title / Titre du dessin

SECOND FLOOR DIMENSION AND  
REFERENCE PLANS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A2.03	5





1 ROOF PLAN  
A2.04 SCALE: 1 : 100



DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHIROME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

ROOF PLAN

Project No. / No. du  
project

Sheet / Feuille  
**A2.04**

Revision no. /  
La Révision  
no.  
**5**

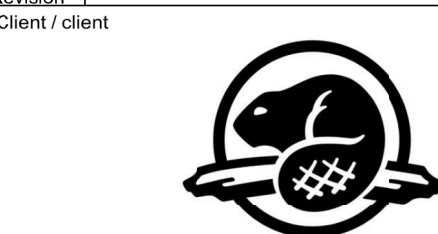






DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
4	ISSUED FOR TENDER / BP	19/07/19
3	99% IFC DRAWING	18/11/23
2	99% IFC DRAWING	18/03/18
1	60% IFC DRAWING	18/02/09



Parks Canada  
Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

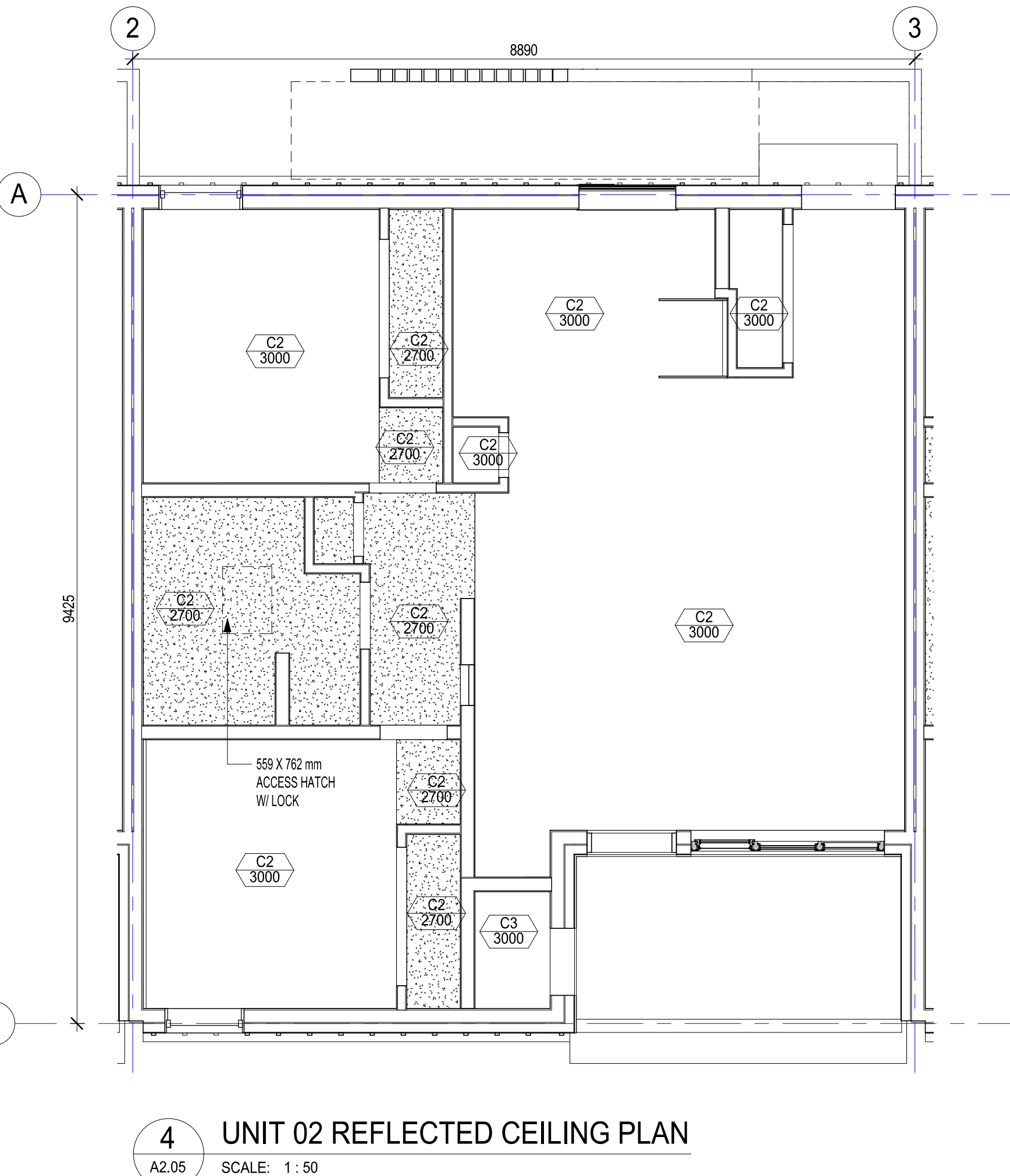
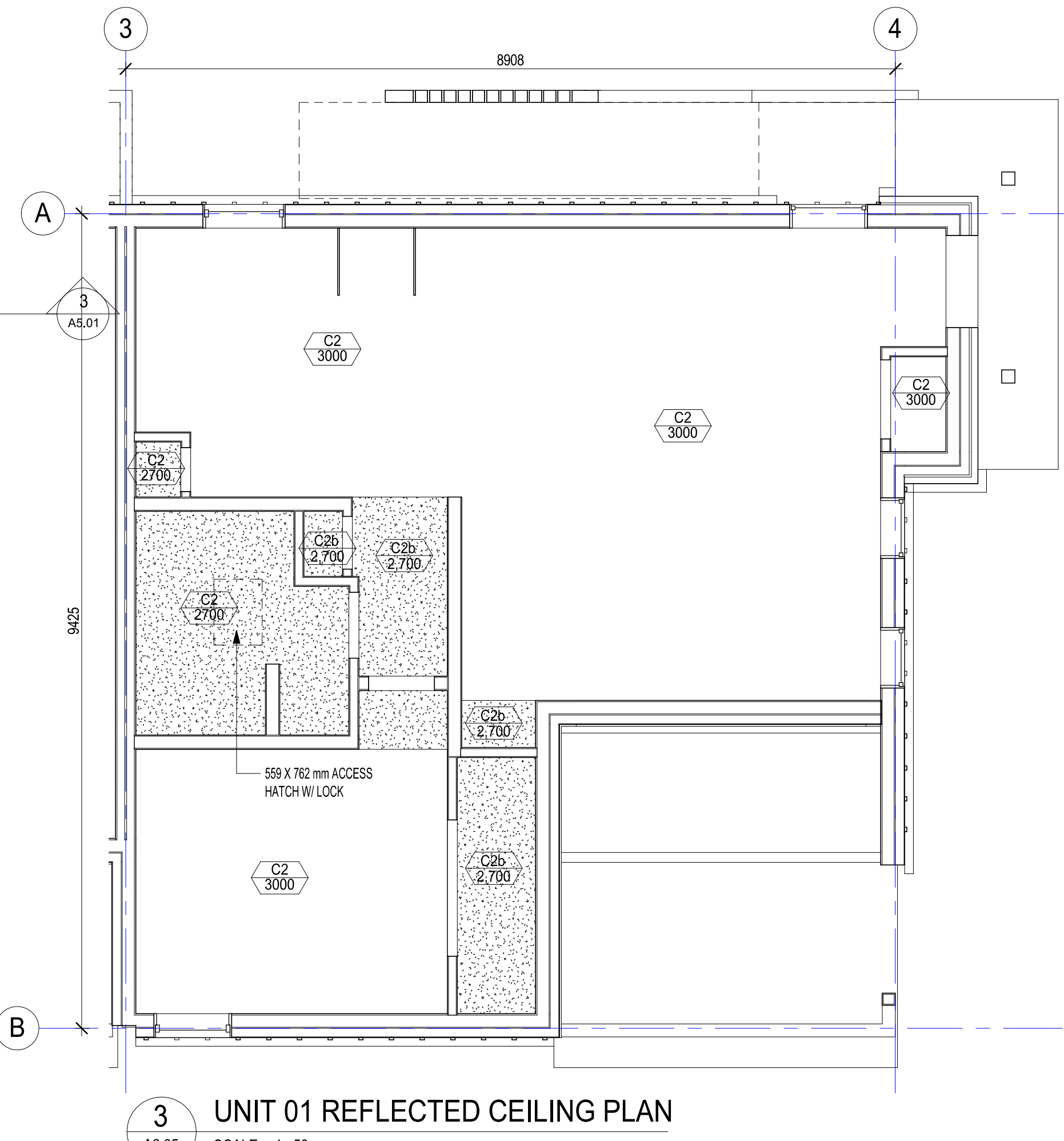
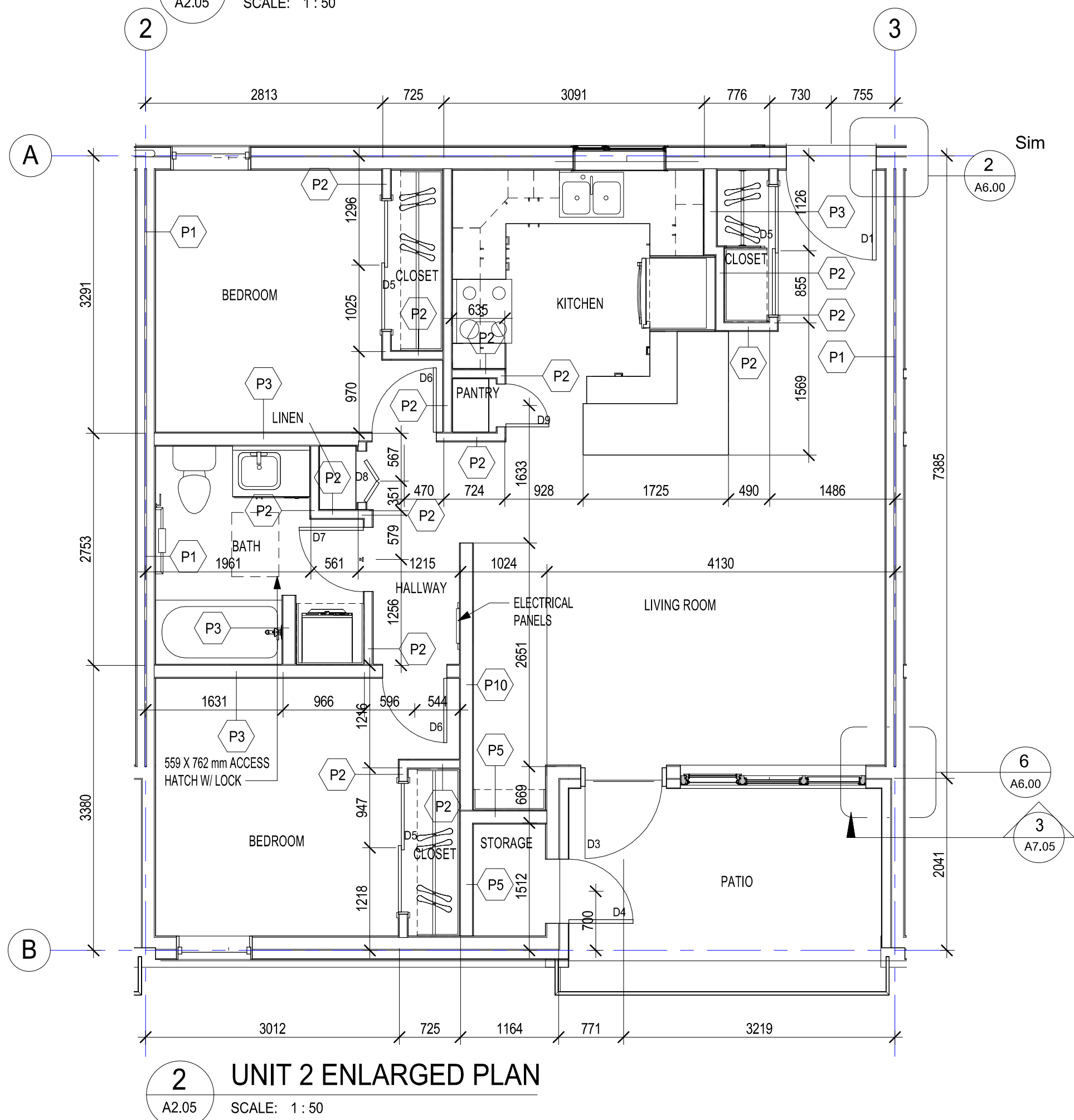
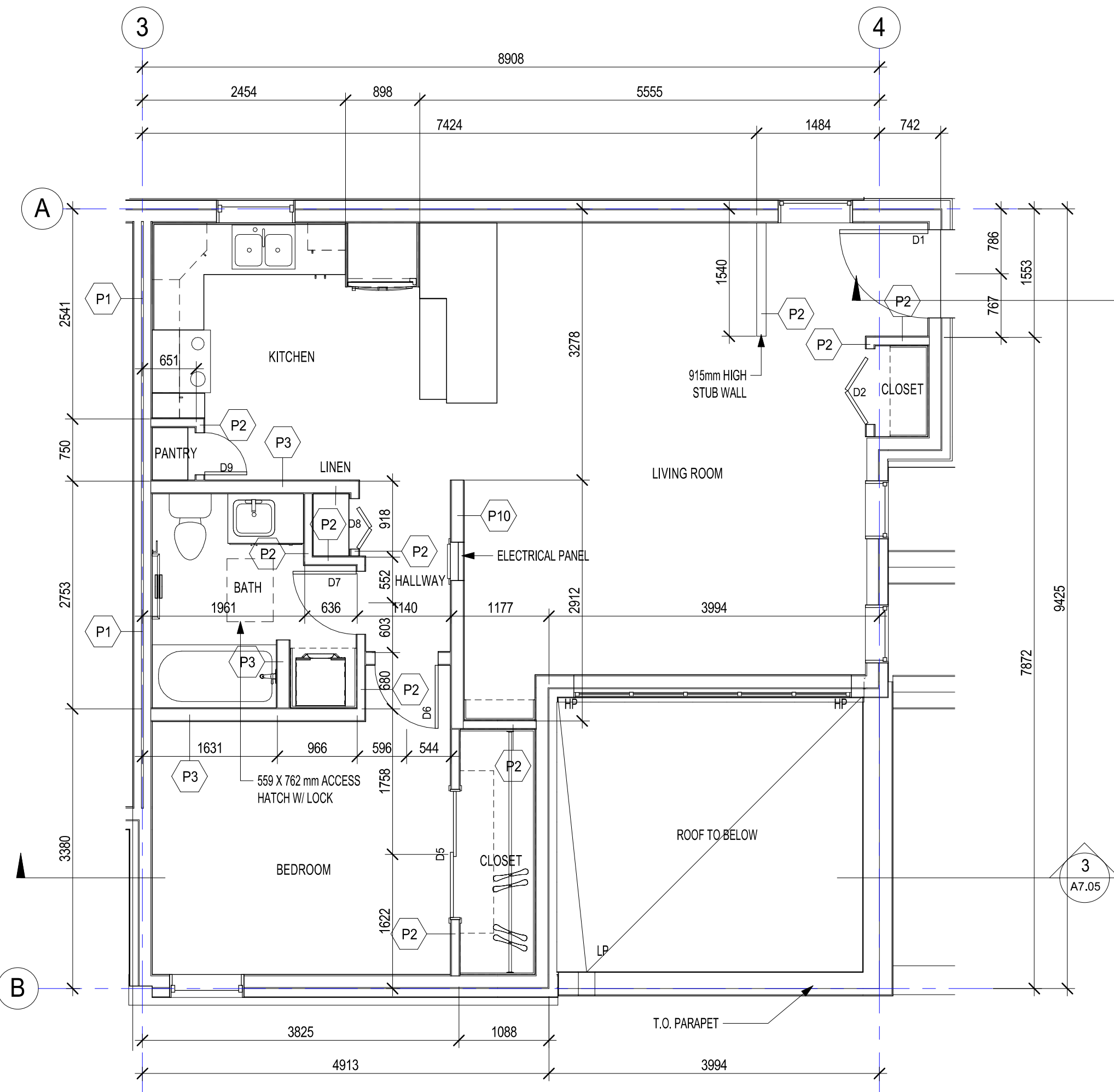
Client / client

Parks Canada

Drawing title / Titre du dessin

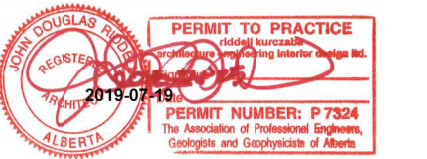
UNIT AND REFLECTED CEILING PLANS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A2.05	4



CEILING LEGEND	
C1	CEILING TYPE
-	CEILING HEIGHT
-	FINISH TAG
CEILING SCHEDULE	
C1	OPEN TO STRUCTURE ABOVE
C2	GYPSUM CEILING PAINTED PT4 UNLESS NOTED OTHERWISE
C3	GYPSUM CEILING PAINTED PT4 UNLESS NOTED OTHERWISE
-	TYPICAL CEILING ELEVATIONS AS NOTED ON THE PLAN
-	DROP CEILING ELEVATIONS AS NOTED ON THE PLAN





DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
4	ISSUED FOR TENDER / BP	19/07/19
3	99% IFC DRAWING	18/11/23
2	99% IFC DRAWING	18/03/18
1	60% IFC DRAWING	18/02/09

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

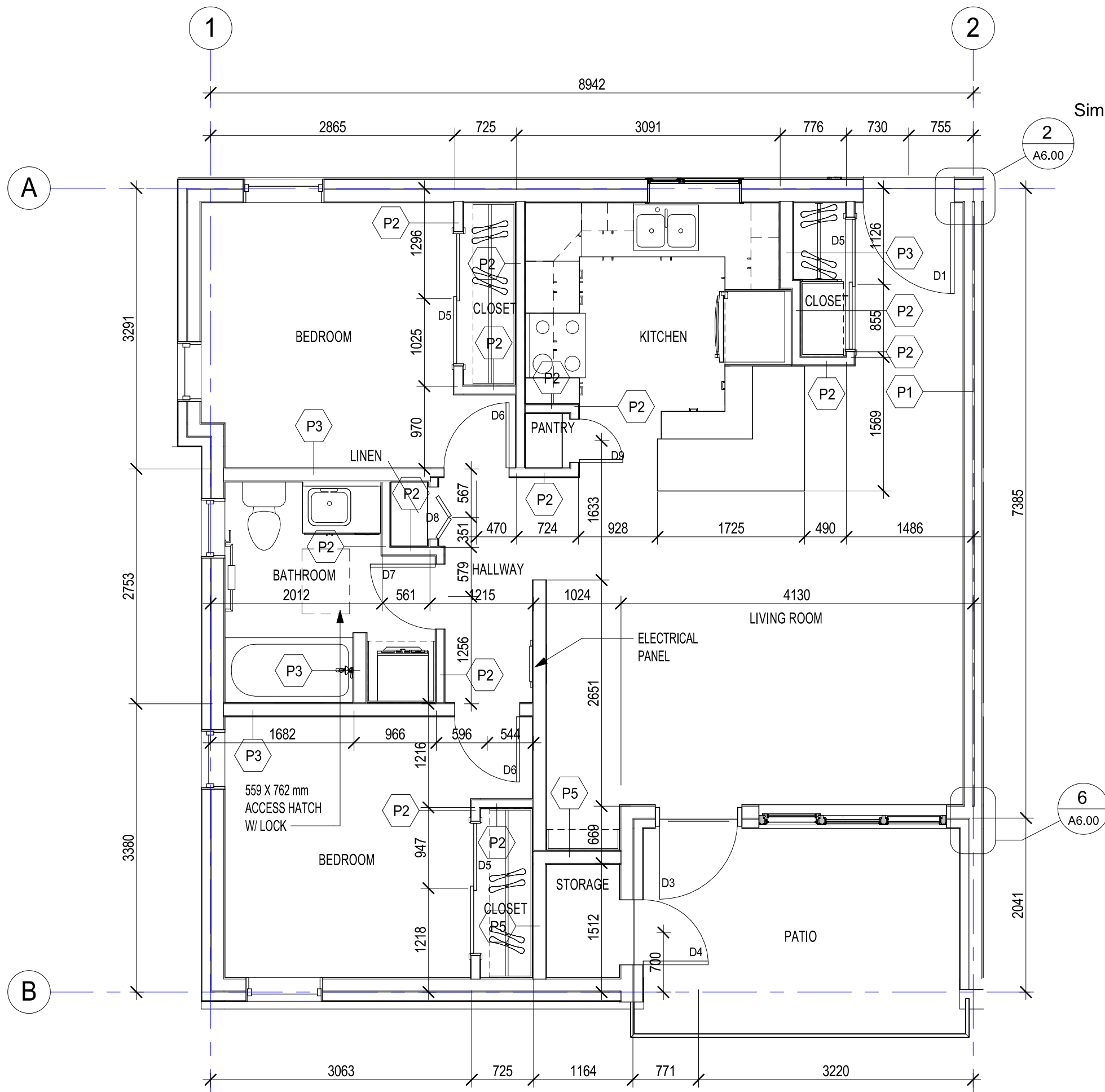
UNIT AND REFLECTED CEILING PLANS

Project No. / No. du  
project

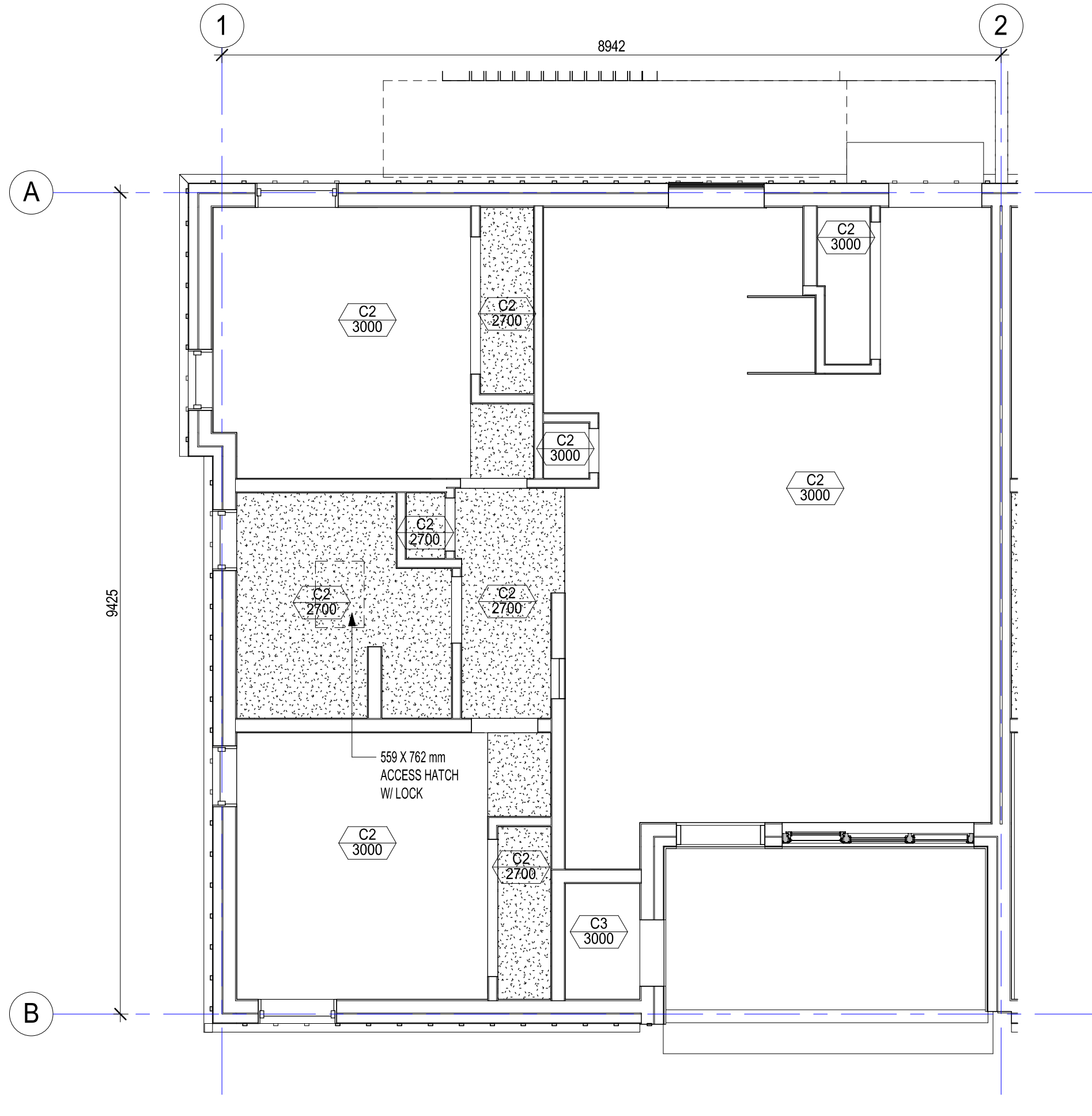
Sheet / Feuille  
A2.06

Revision no. /  
La Révision  
no.

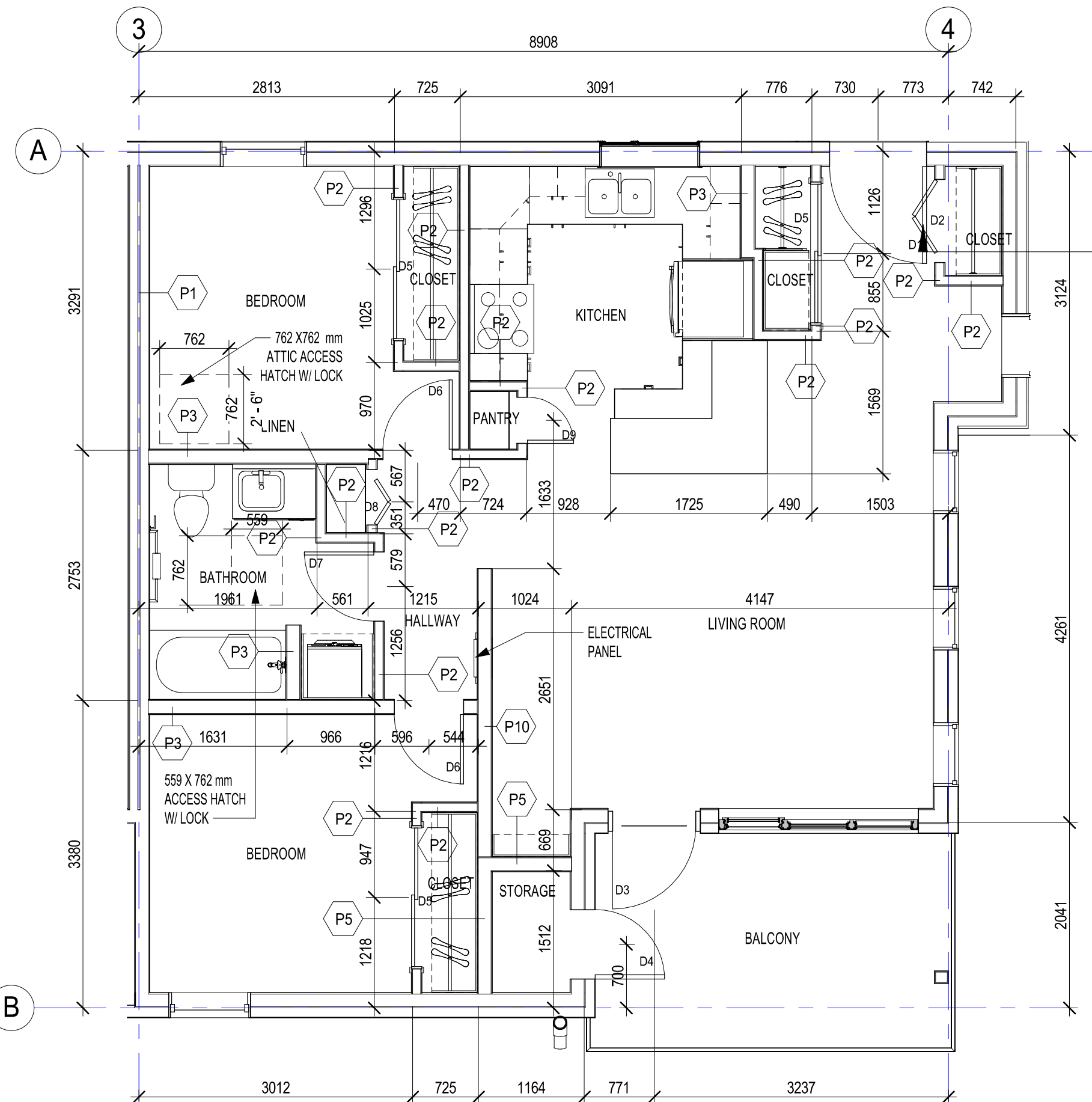
4



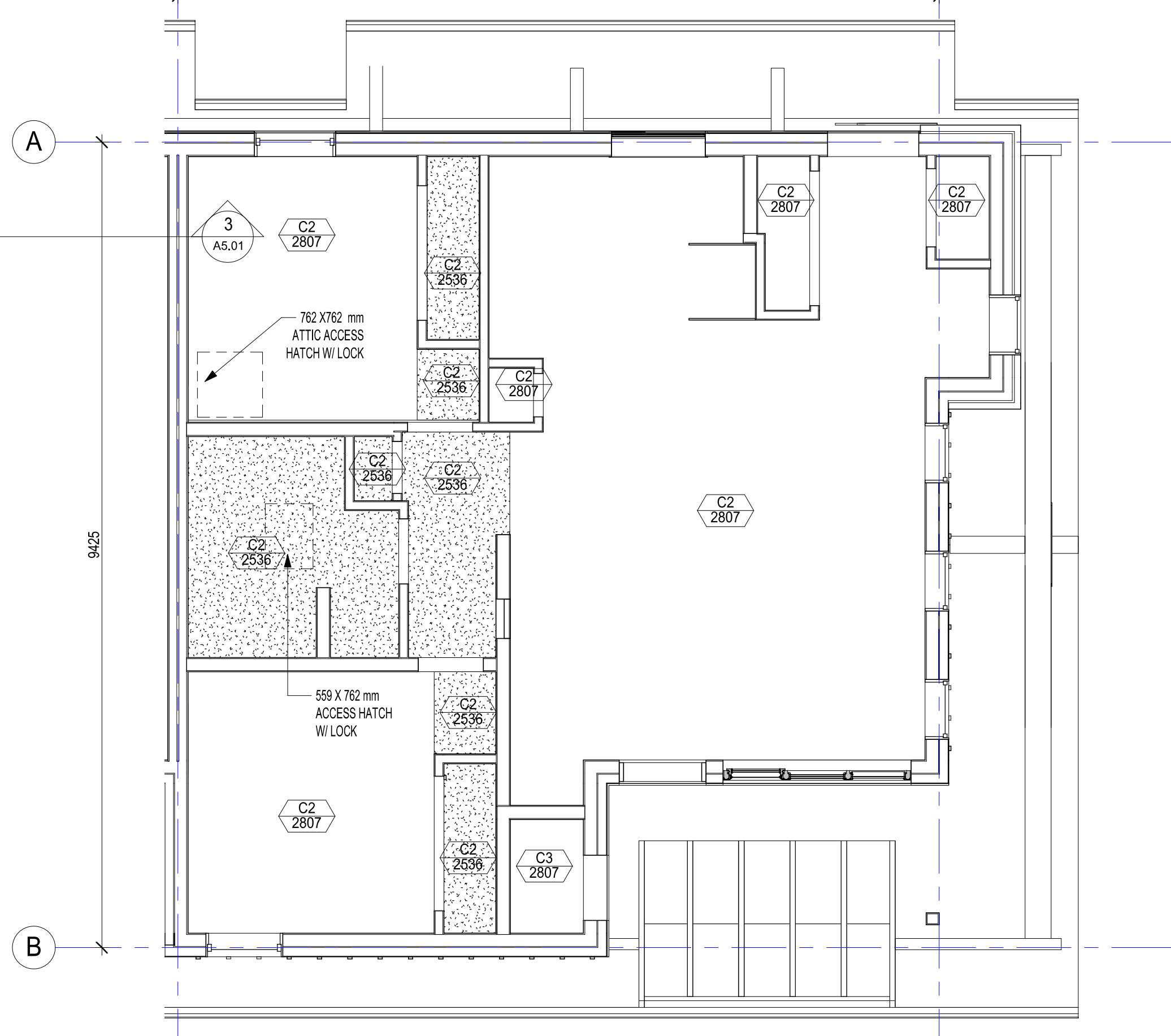
1 UNIT 3 ENLARGED PLAN  
A2.06 SCALE: 1 : 50



3 UNIT 03 REFLECTED CEILING PLAN  
A2.06 SCALE: 1 : 50



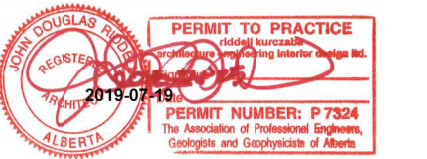
2 UNIT 4 ENLARGED PLAN  
A2.06 SCALE: 1 : 50



4 UNIT 4 REFLECTED CEILING PLAN  
A2.06 SCALE: 1 : 50

CEILING LEGEND	
	CEILING TYPE
	CEILING HEIGHT
	FINISH TAG
CEILING SCHEDULE	
	OPEN TO STRUCTURE ABOVE
	GYPSUM CEILING PAINTED PT4 UNLESS NOTED OTHERWISE
	GYPSUM CEILING PAINTED PT4 UNLESS NOTED OTHERWISE
	TYPICAL CEILING ELEVATIONS AS NOTED ON THE PLAN
	DROP CEILING ELEVATIONS AS NOTED ON THE PLAN

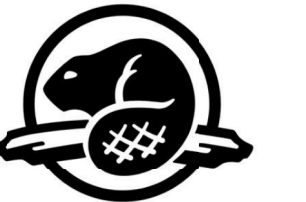




DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
4	ISSUED FOR TENDER / BP	19/07/19
3	99% IFC DRAWING	18/11/23
2	99% IFC DRAWING	18/03/18
1	60% IFC DRAWING	18/02/09

Client / client



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHIOME

Designed by/Concepté par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

**Parks Canada**

Drawing title / Titre du dessin

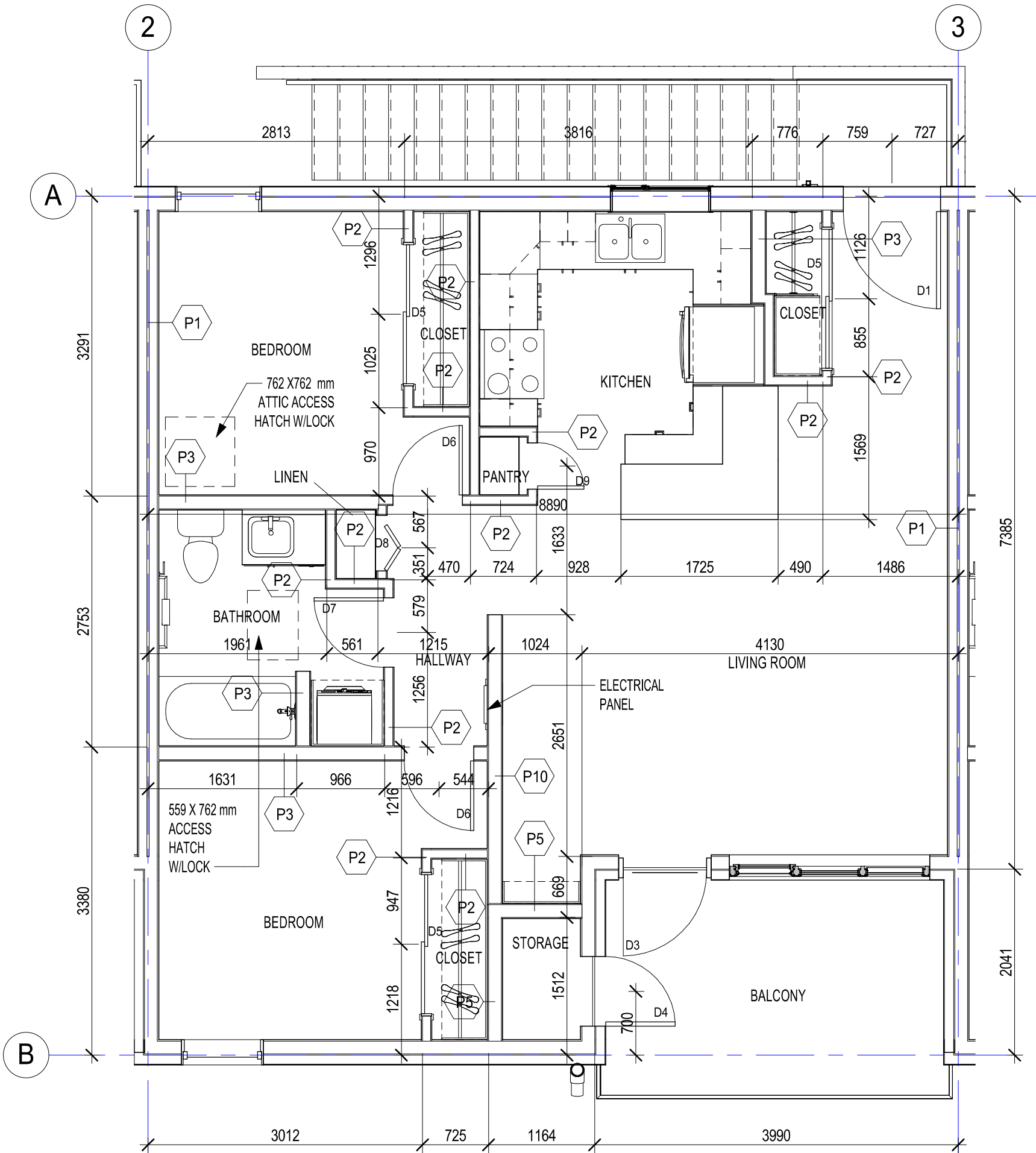
UNIT AND REFLECTED CEILING PLANS

Project No. / No. du  
project

Sheet / Feuille  
**A2.07**

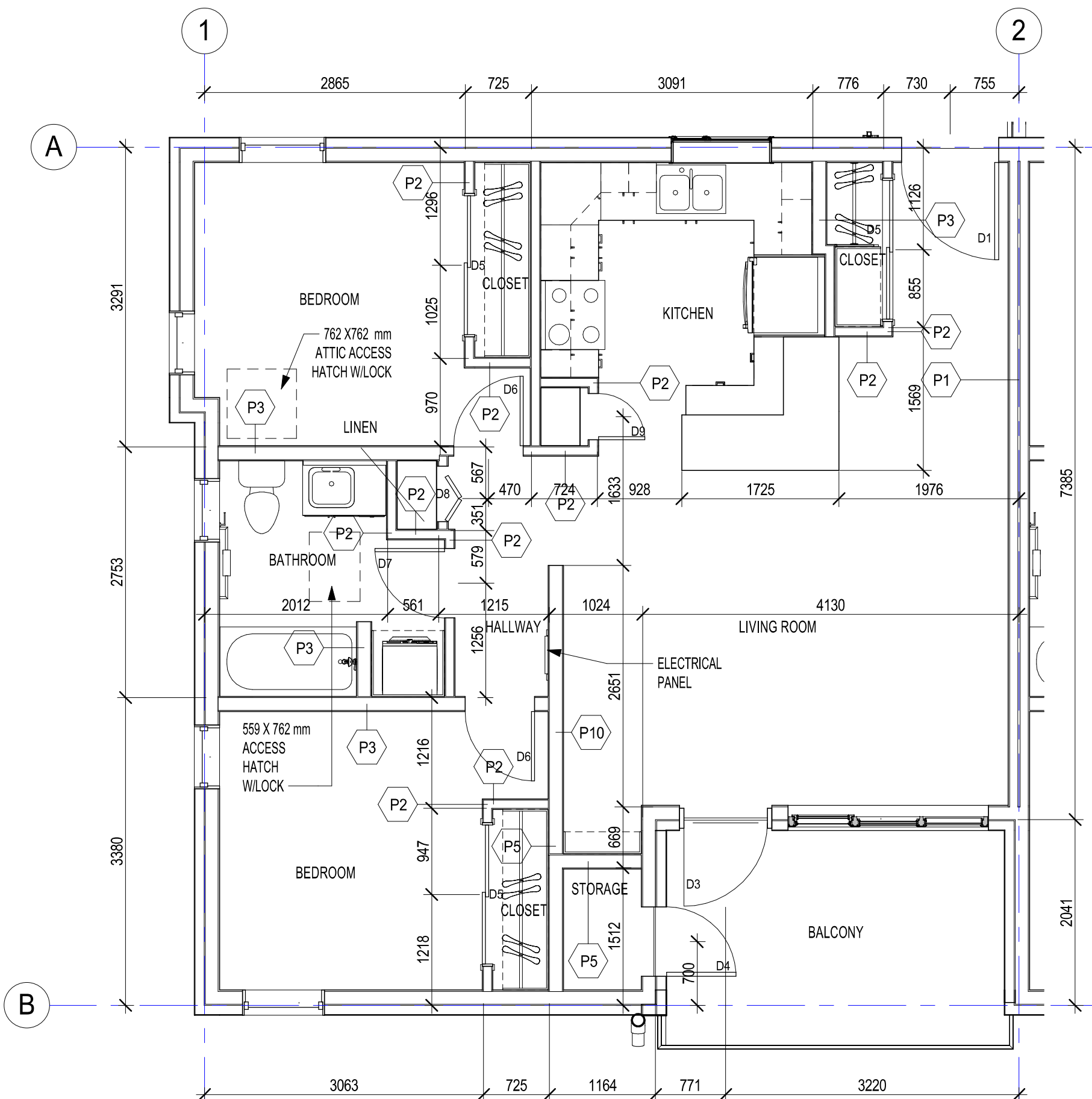
Revision no. /  
La Révision  
no.

**4**



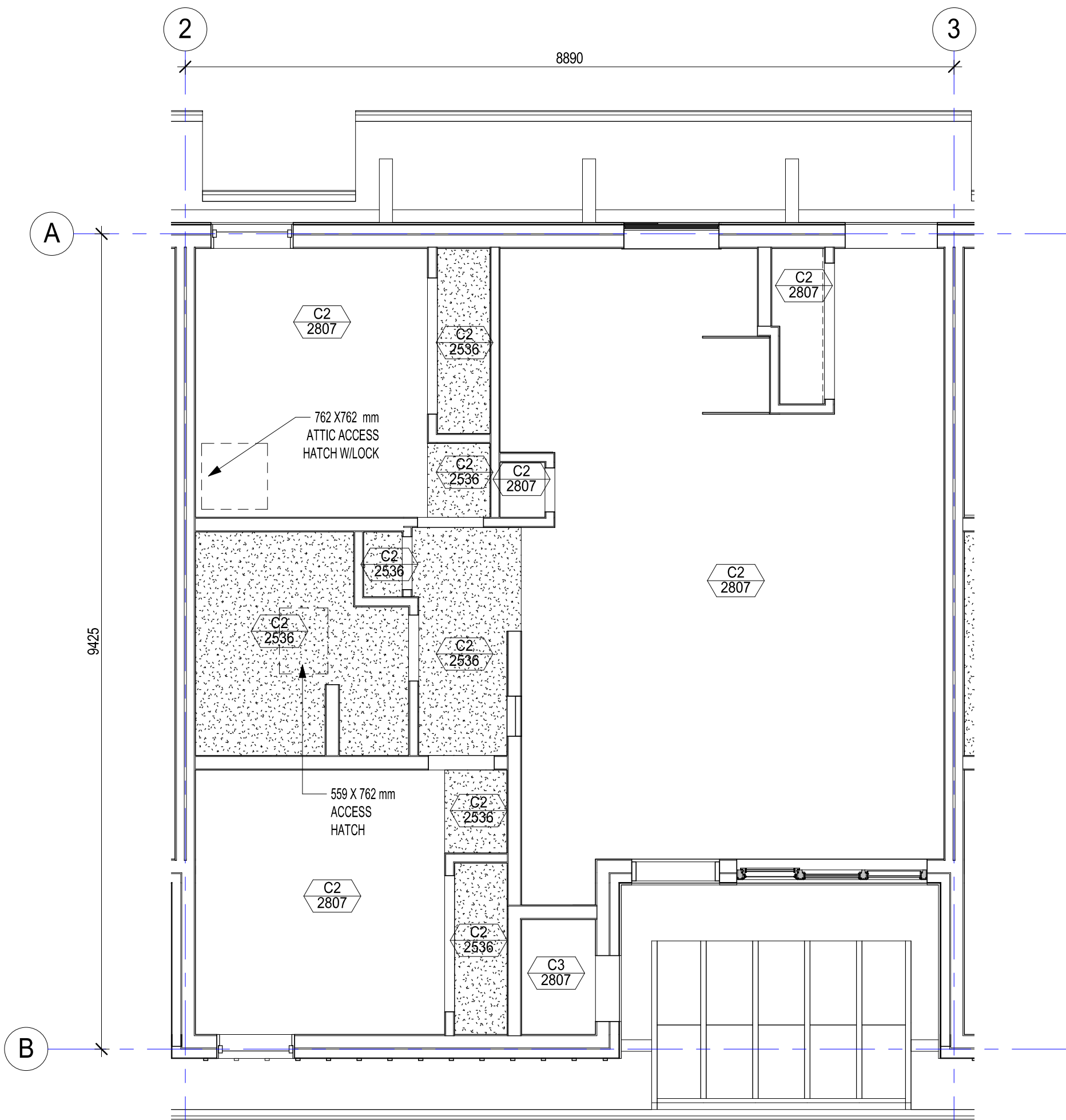
**1 UNIT 5 ENLARGED PLAN**

A2.07 SCALE: 1 : 50



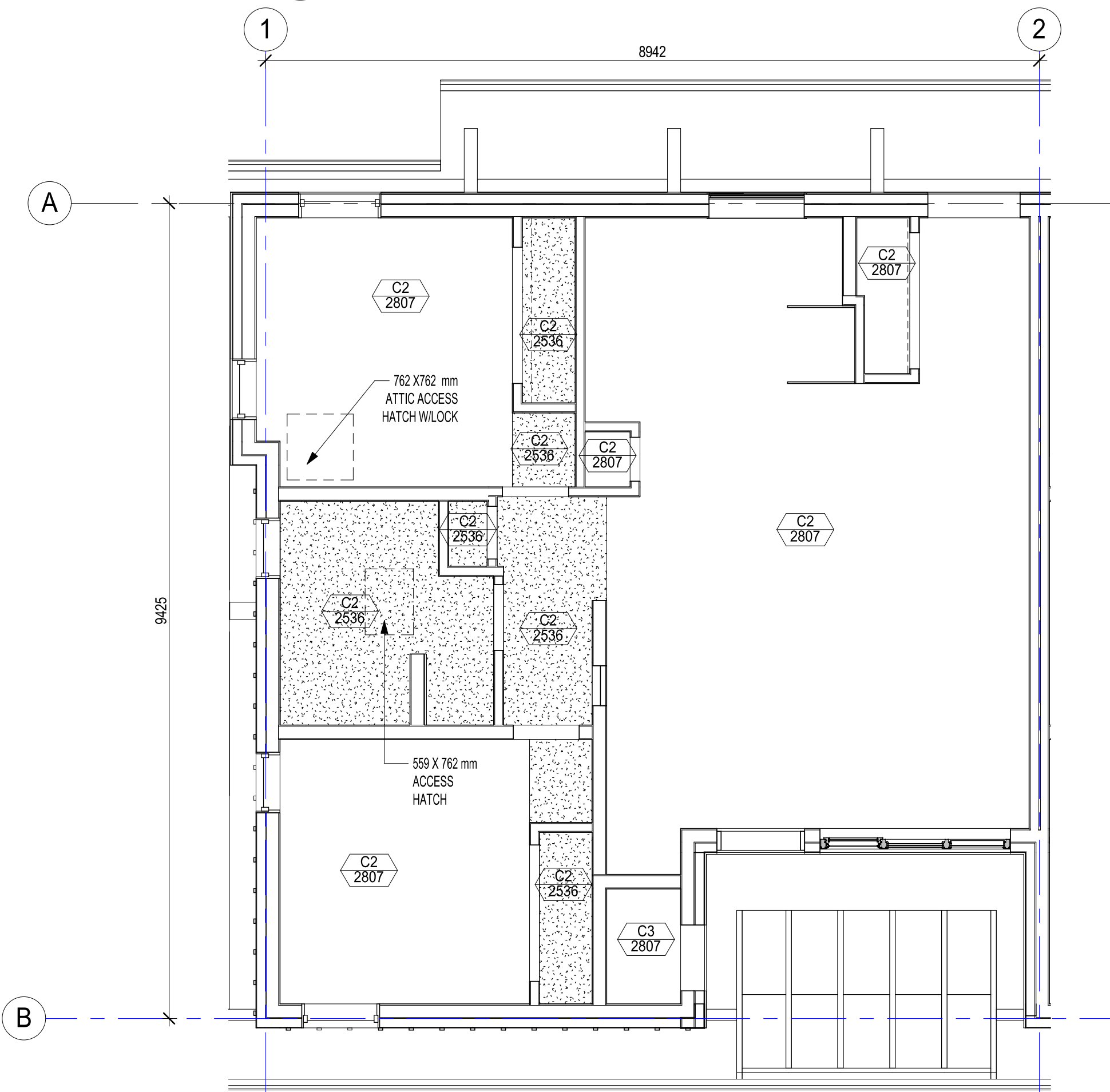
**2 UNIT 6 ENLARGED PLAN**

A2.07 SCALE: 1 : 50



**3 UNIT 05 REFLECTED CEILING PLAN**

A2.07 SCALE: 1 : 50

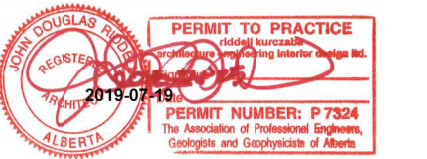


**4 UNIT 06 REFLECTED CEILING PLAN**

A2.07 SCALE: 1 : 50

CEILING LEGEND	
	CEILING TYPE
	CEILING HEIGHT
	FINISH TAG
CEILING SCHEDULE	
	OPEN TO STRUCTURE ABOVE
	GYPSUM CEILING PAINTED PT4 UNLESS NOTED OTHERWISE
	GYPSUM CEILING PAINTED PT4 UNLESS NOTED OTHERWISE
	TYPICAL CEILING ELEVATIONS AS NOTED ON THE PLAN
	DROP CEILING ELEVATIONS AS NOTED ON THE PLAN

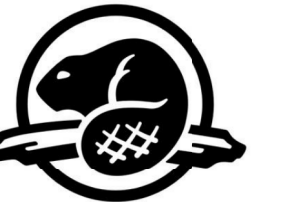




DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Parks  
Canada

Parcs  
Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par

AMINA OYAKHIHOME

Designed by/Concept par

PETER SCHULZ

Drawn by/Dessiné par

MARAL SAFARZADEH

Project Manager/Administrateur de Projets

LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

EXTERIOR ELEVATIONS

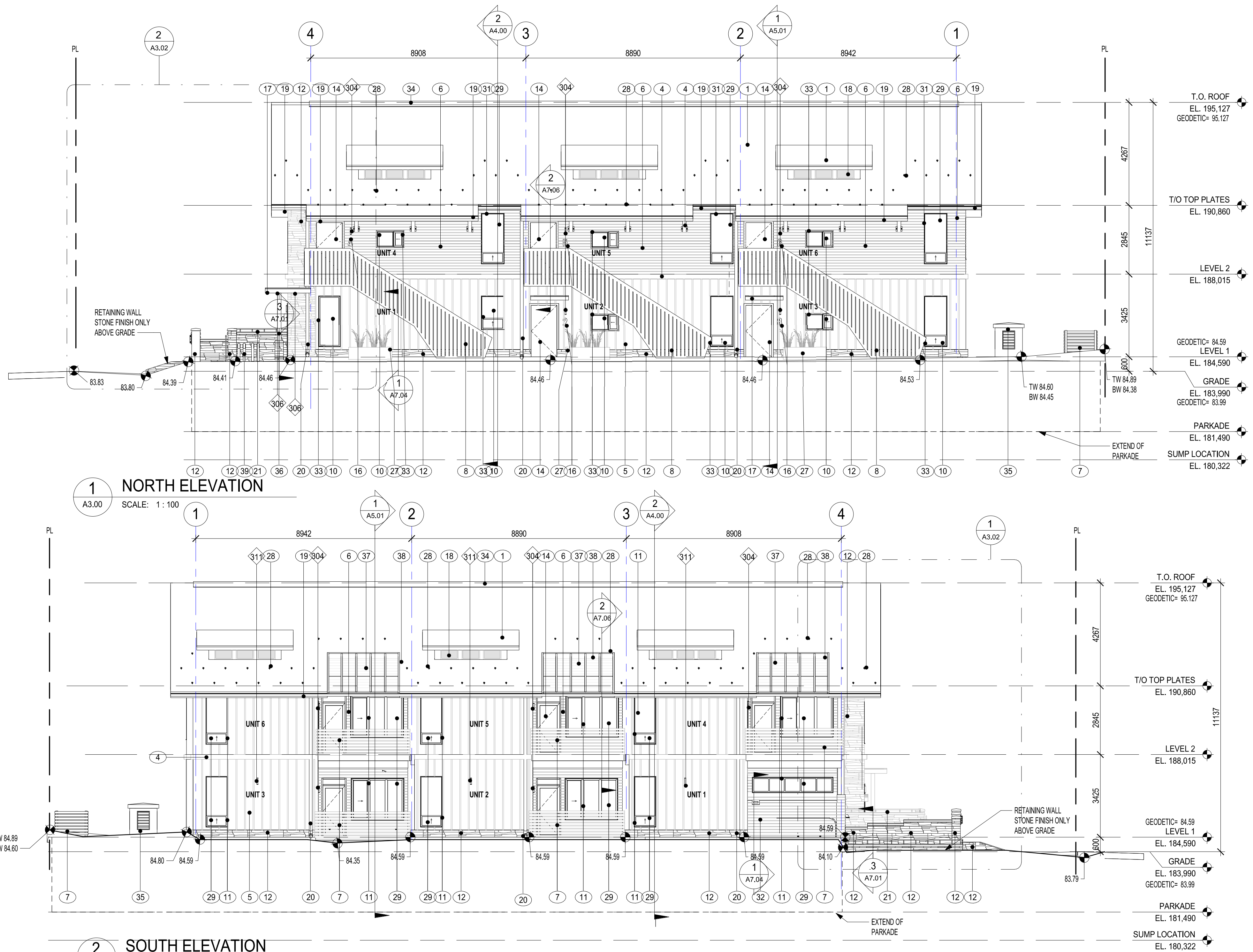
Project No. / No. du  
project

A3.00

Sheet / Feuille

Revision no. /  
La Révision  
no.

5



1 NORTH ELEVATION

SCALE: 1 : 100

2 SOUTH ELEVATION

SCALE: 1 : 100

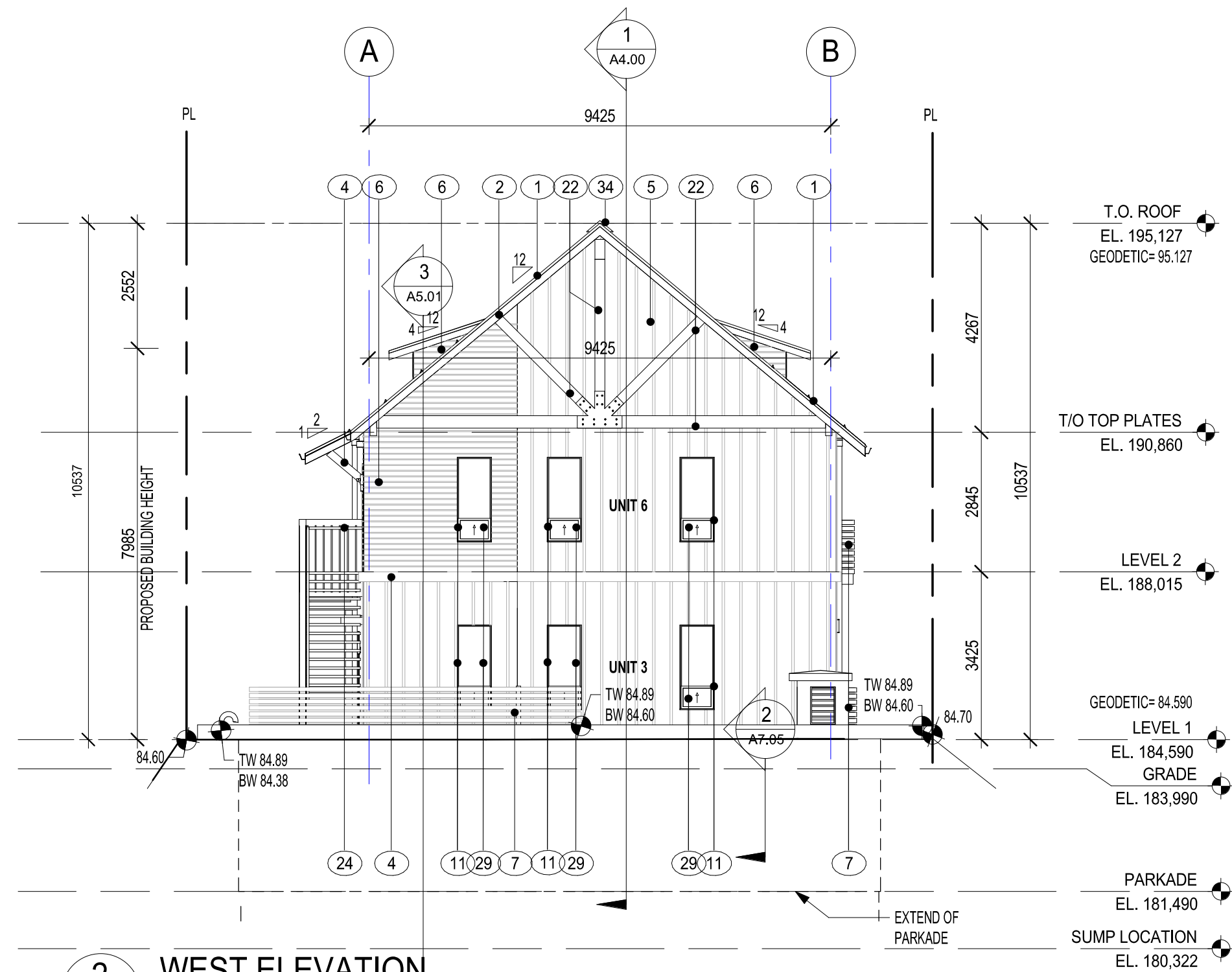
ELEVATION MATERIALS LEGEND

- RUBBER RECYCLED ENVIRONMENTALLY SAFE ROOF SHINGLES  
COLOUR: LIGHT GREY
- FIR WOOD BOARD - THERMALLY MODIFIED WOOD FASCIA  
COLOUR: HEMLOCK STAIN
- FIR WOOD BOARD - THERMALLY MODIFIED WOOD SOFFIT  
COLOUR: HEMLOCK STAIN
- EXPOSED TIMBER ELEMENTS  
(AS PER STRUCTURAL)  
COLOUR: HEMLOCK STAIN
- CEMENTITIOUS VERTICAL SIDING (BOARD AND BATTEN)  
SMOOTH WIDE HARDPLANK  
COLOUR: BONE WHITE
- CEMENTITIOUS HORIZONTAL SIDING  
(SMOOTH, WIDE BOARD)  
COLOUR: BONE WHITE
- HORIZONTAL - FIR WOOD BOARD - THERMALLY MODIFIED WOOD  
COLOUR: HEMLOCK STAIN
- VERTICAL FIRE RETARDANT TREATED WOOD - FIR COLOUR:  
HEMLOCK STAIN
- THERMALLY BROKEN INSULATED STEEL OVERHEAD DOOR  
SOUND PROOF - WOOD GRAIN  
COLOUR: HEMLOCK STAIN
- 45MIN FIRE RATED GLAZING  
COLOUR: CLEAR - LOW-E-COATING
- ALUMINIUM WOOD WINDOW FRAMES  
COLOUR: BROWN
- RUNDLE STONE - FULL BED STONE (NATURAL)  
LEDGERSTACK  
COLOUR: BLACK, LIGHT GREY TO GREY / PATTERNED
- SANDBLASTED EXPOSED AGGREGATE POURED CONCRETE  
STEPS  
COLOUR: LIGHT GREY
- 45MIN FIRE RATED INSULATED HOLLOW METAL DOOR  
COLOUR: PAINTED WHITE
- EXPOSED - SMOOTH CONCRETE  
COLOUR: LIGHT GREY
- MOUNTED LETTERING - BRUSHED ALUMINIUM  
COLOUR: WHITE
- METAL COMPOSITE PANEL FASCIA  
COLOUR: LIGHT GREY  
NOTE: (CANOPIES THERMALLY DISCONNECTED)
- METAL LOUVER WITH A SCREEN BEHIND IT  
COLOUR: DARK GREY / WOOD FRAME
- PREFINISHED METAL EAVESTROUGH  
COLOUR: LIGHT GREY
- PREFINISHED METAL DOWNSPOUT WITH INSECT SCREEN  
COLOUR: LIGHT GREY
- STAINLESS STEEL GUARD RAIL
- EXPOSED TIMBER RAFTERS  
COLOUR: HEMLOCK STAIN
- GALVANIZED STEEL STAIR METAL GRATE THREADS
- ILLUMINATED HAND RAIL  
STAINLESS STEEL (SEE REFERENCE PLAN)
- POWDERCOATED STEEL BRACKET  
(IRON MICA)
- RAKED CONCRETE RAMP  
COLOUR: LIGHT GREY
- CAST IN PLACE CONCRETE PLANTER BOXES  
COLOUR: LIGHT GREY / SMOOTH
- SNOW GUARD  
NOTE: SNOW GUARD LOCATION AND SPACING TO BE  
CONFIRMED WITH THE SUPPLIER
- DOUBLE GLAZED SEALED UNIT  
COLOUR: CLEAR - LOW-E-COATING
- HAND RAIL  
STAINLESS STEEL (SEE REFERENCE PLAN)
- CURTAIN WALL FRAMES
- CLAPBOARD HORIZONTAL SIDING  
(SMOOTH, WIDE BOARD)  
COLOUR: HEMLOCK STAIN
- FIRE RATED STEEL CURTAIN WALL FRAMES  
COLOUR: BROWN
- CONTINUOUS RIDGE VENT
- DOG HOUSE - CONCRETE LIGHT GREY
- 152 X 152 mm ROUGH SAWN DOUGLAS FIR TIMBER COLUMN
- FROSTED GLASS
- WOOD CLAD ALUMINIUM SKYLIGHT
- GOOSENECK EXHAUST AND AIR INTAKE
- WOOD CLAD ALUMINIUM

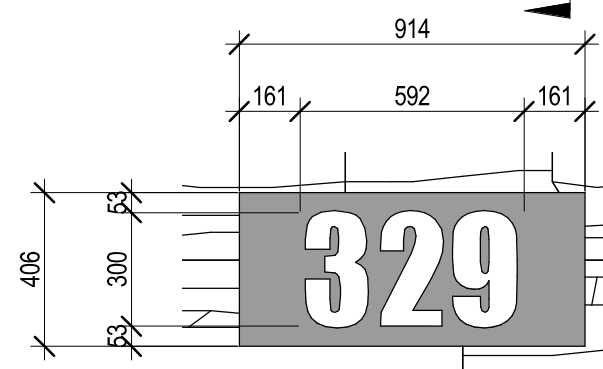
LIGHTING LEGEND

- PARKADE ENTRANCE LIGHT  
WALL MOUNT
- BOLLARD LIGHT
- EXTERIOR WALLWASH
- STROBE LIGHT  
PEDESTAL
- EXTERIOR DOWNLIGHT  
RECESSED
- ILLUMINATED HANDRAIL
- EXTERIOR WALLWASH

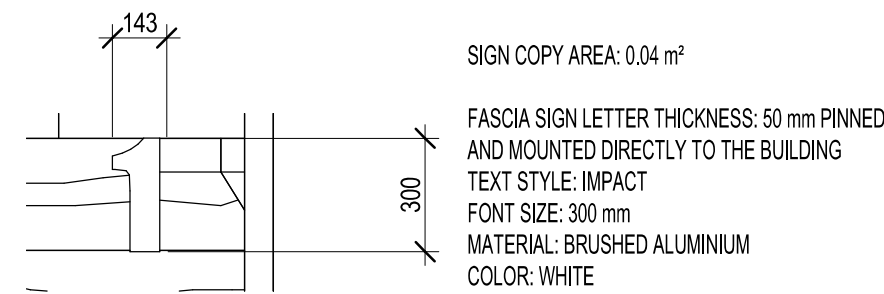




2 WEST ELEVATION  
A3.01 SCALE: 1 : 100

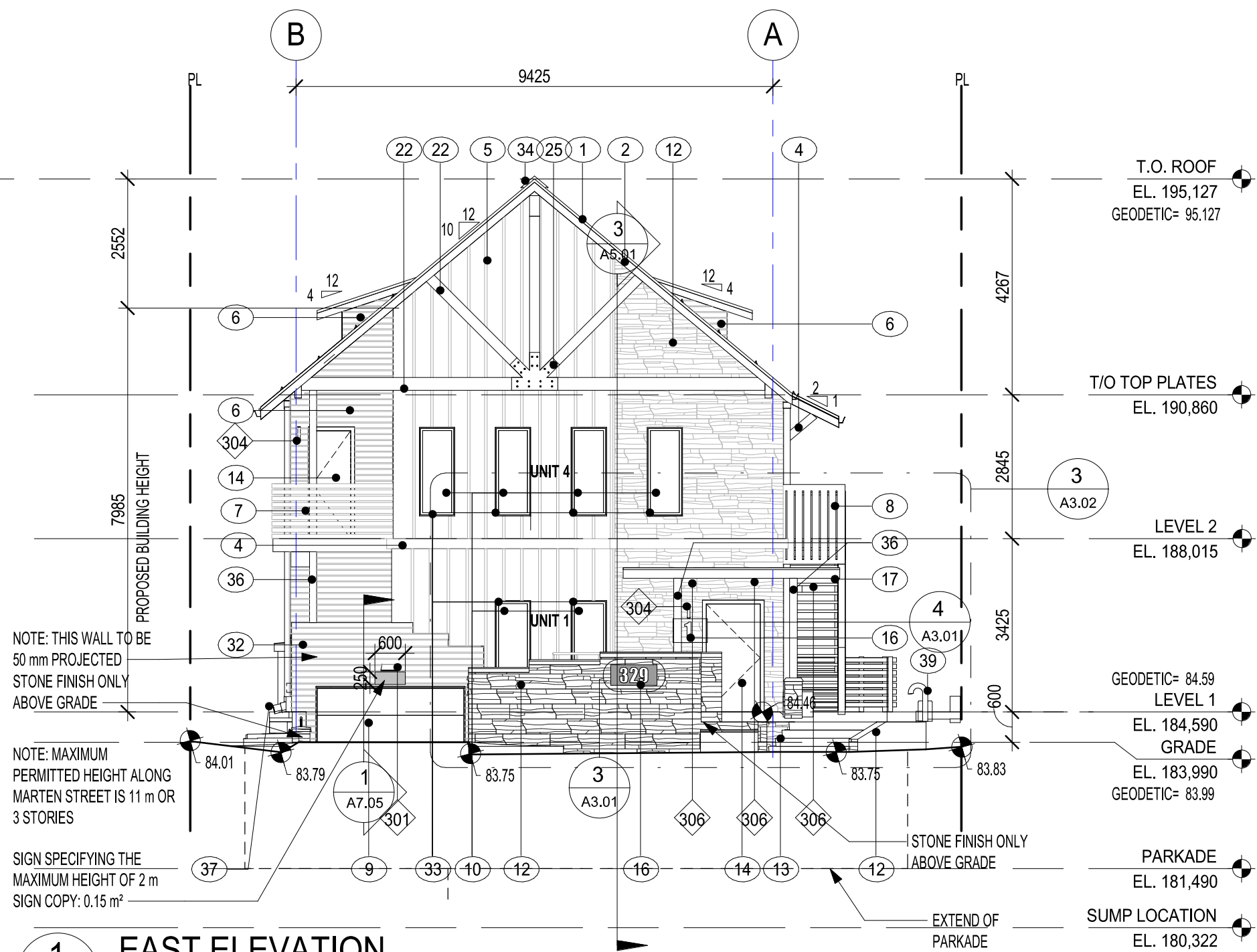


3 SIGNAGE  
A3.01 SCALE: 1 : 20

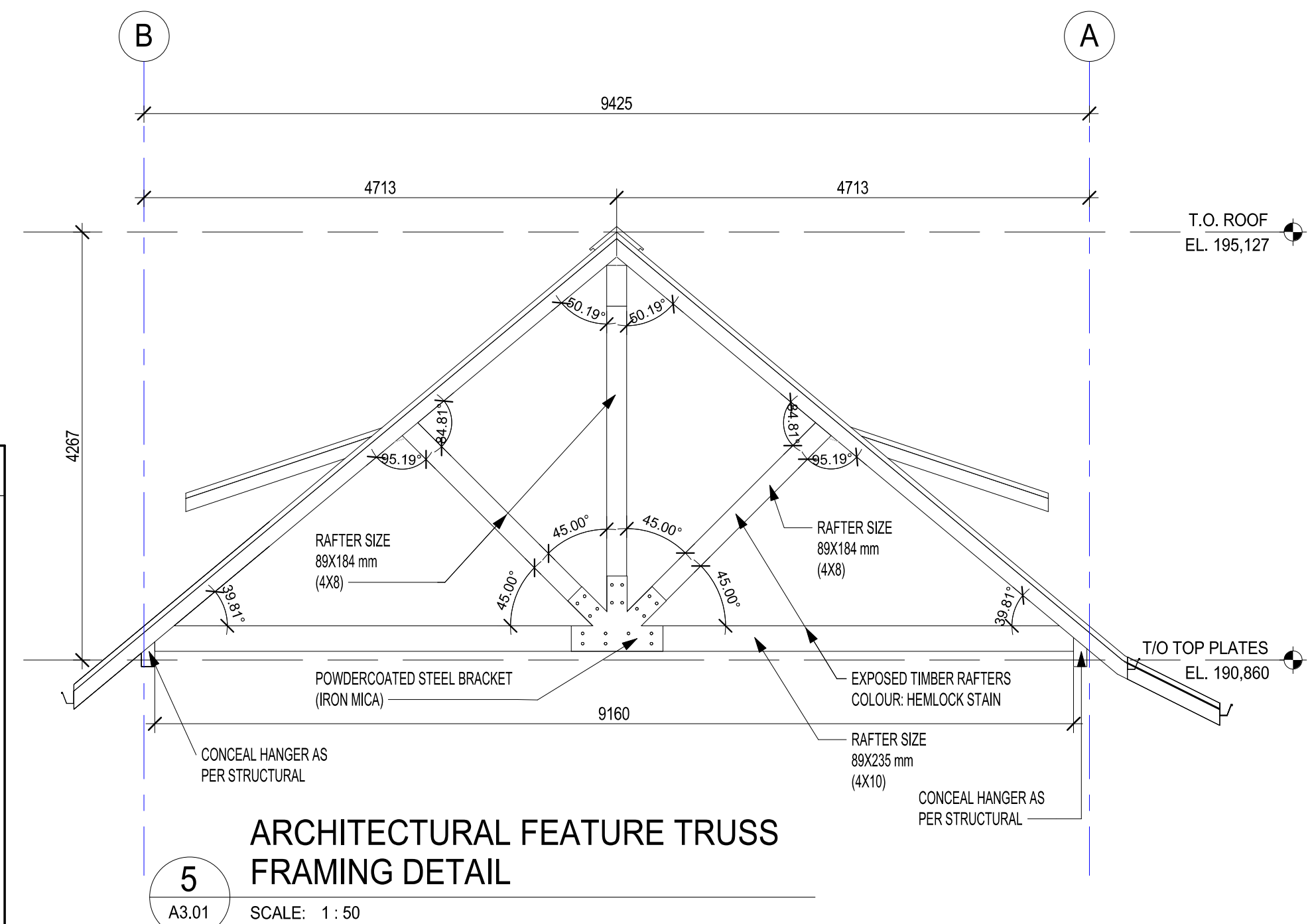


4 UNIT NUMBER  
A3.01 SCALE: 1 : 20

ELEVATION MATERIALS LEGEND			
1 RUBBER RECYCLED ENVIRONMENTALLY SAFE ROOF SHINGLES COLOUR: LIGHT GREY	9 THEMALLY BROKEN INSULATED STEEL OVERHEAD DOOR SOUND PROOF - WOOD GRAIN COLOUR: HEMLOCK STAIN	19 PREFINISHED METAL EAVESTROUGH COLOUR: LIGHT GREY	30 HAND RAIL STAINLESS STEEL (SEE REFERENCE PLAN)
2 FIR WOOD BOARD - THERMALLY MODIFIED WOOD FASCIA COLOUR: HEMLOCK STAIN	10 45MIN FIRE RATED GLAZING COLOUR: CLEAR - LOW-E-COATING	20 PREFINISHED METAL DOWNSPOUT WITH INSECT SCREEN COLOUR: LIGHT GREY	31 CURTAIN WALL FRAMES
3 FIR WOOD BOARD - THERMALLY MODIFIED WOOD SOFFIT COLOUR: HEMLOCK STAIN	11 ALUMINUM WOOD WINDOW FRAMES COLOUR: BROWN	21 STAINLESS STEEL GUARD RAIL	32 CLAPBOARD HORIZONTAL SIDING (SMOOTH, WIDE BOARD) COLOUR: HEMLOCK STAIN
4 EXPOSED TIMBER ELEMENTS (AS PER STRUCTURAL) COLOUR: HEMLOCK STAIN	12 RUNDLE STONE - FULL BED STONE (NATURAL) LEDGERSTACK COLOUR: BLACK, LIGHT GREY TO GREY / PATTERNED	22 EXPOSED TIMBER RAFTERS COLOUR: HEMLOCK STAIN	33 FIRE RATED STEEL CURTAIN WALL FRAMES COLOUR: BROWN
5 CEMENTITIOUS VERTICAL SIDING (BOARD AND BATTEN) SMOOTH WIDE HARDPLANK COLOUR: BONE WHITE	13 SANDBLASTED EXPOSED AGGREGATE POURED CONCRETE STEPS COLOUR: LIGHT GREY	23 GALVANIZED STEEL STAIR METAL GRATE THREADS	34 CONTINUOUS RIDGE VENT
6 CEMENTITIOUS HORIZONTAL SIDING (SMOOTH, WIDE BOARD) COLOUR: BONE WHITE	14 45MIN FIRE RATED INSULATED HOLLOW METAL DOOR COLOUR: PAINTED WHITE	24 ILLUMINATED HAND RAIL STAINLESS STEEL (SEE REFERENCE PLAN)	35 DOG HOUSE - CONCRETE LIGHT GREY
7 HORIZONTAL - FIR WOOD BOARD - THERMALLY MODIFIED WOOD COLOUR: HEMLOCK STAIN	15 EXPOSED - SMOOTH CONCRETE COLOUR: LIGHT GREY	25 POWDERCOATED STEEL BRACKET (IRON MICA)	36 152 X 152 mm ROUGH SAWN DOUGLAS FIR TIMBER COLUMN
8 VERTICAL FIRE RETARDANT TREATED WOOD - FIR COLOUR: HEMLOCK STAIN	16 MOUNTED LETTERING - BRUSHED ALUMINUM COLOUR: WHITE	26 RAKED CONCRETE RAMP COLOUR: LIGHT GREY	37 FROSTED GLASS
	17 METAL COMPOSITE PANEL FASCIA COLOUR: LIGHT GREY NOTE: (CANOPIES THERMALLY DISCONNECTED)	27 CAST IN PLACE CONCRETE PLANTER BOXES COLOUR: LIGHT GREY / SMOOTH	38 WOOD CLAD ALUMINUM SKYLIGHT
	18 METAL LOUVER WITH A SCREEN BEHIND IT COLOUR: DARK GREY / WOOD FRAME	28 SNOW GUARD NOTE: SNOW GUARD LOCATION AND SPACING TO BE CONFIRMED WITH THE SUPPLIER	39 GOOSENECK EXHAUST AND AIR INTAKE
		29 DOUBLE GLAZED SEALED UNIT COLOUR: CLEAR - LOW-E-COATING	40 WOOD CLAD ALUMINUM
			NOTE ALL COLORS TO BE DETERMINED BY DEPARTMENTAL REPRESENTATIVE

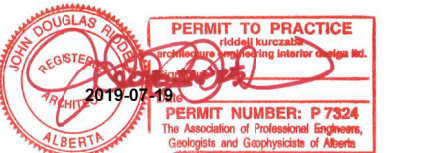


1 EAST ELEVATION  
A3.01 SCALE: 1 : 100



5 ARCHITECTURAL FEATURE TRUSS  
FRAMING DETAIL  
A3.01 SCALE: 1 : 50

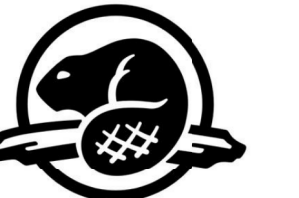
LIGHTING LEGEND	
301 PARKADE ENTRANCE LIGHT WALL MOUNT	306 EXTERIOR DOWNLIGHT RECESSED
303 BOLLARD LIGHT	307 ILLUMINATED HANDRAIL
304 EXTERIOR WALLWASH	311 EXTERIOR WALLWASH
305 STROBE LIGHT PEDESTAL	



DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par

AMINA OYAKHILOME

Designed by/Concept par

PETER SCHULZ

Drawn by/Dessiné par

MARAL SAFARZADEH

Project Manager/Administrateur de Projets

LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Parks Canada

Client / client

Parks Canada

Drawing title / Titre du dessin

EXTERIOR ELEVATIONS

Project No. / No. du  
project

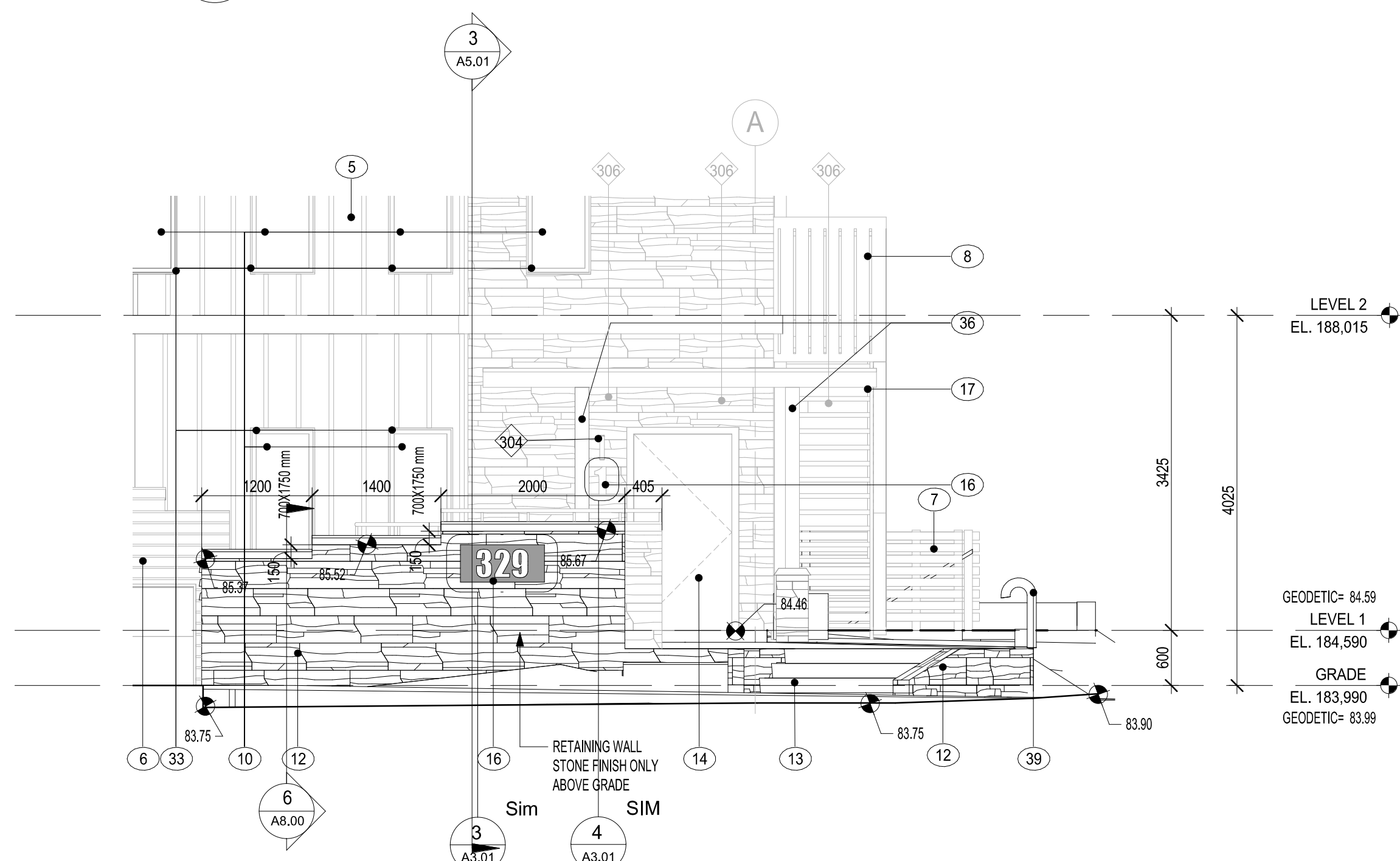
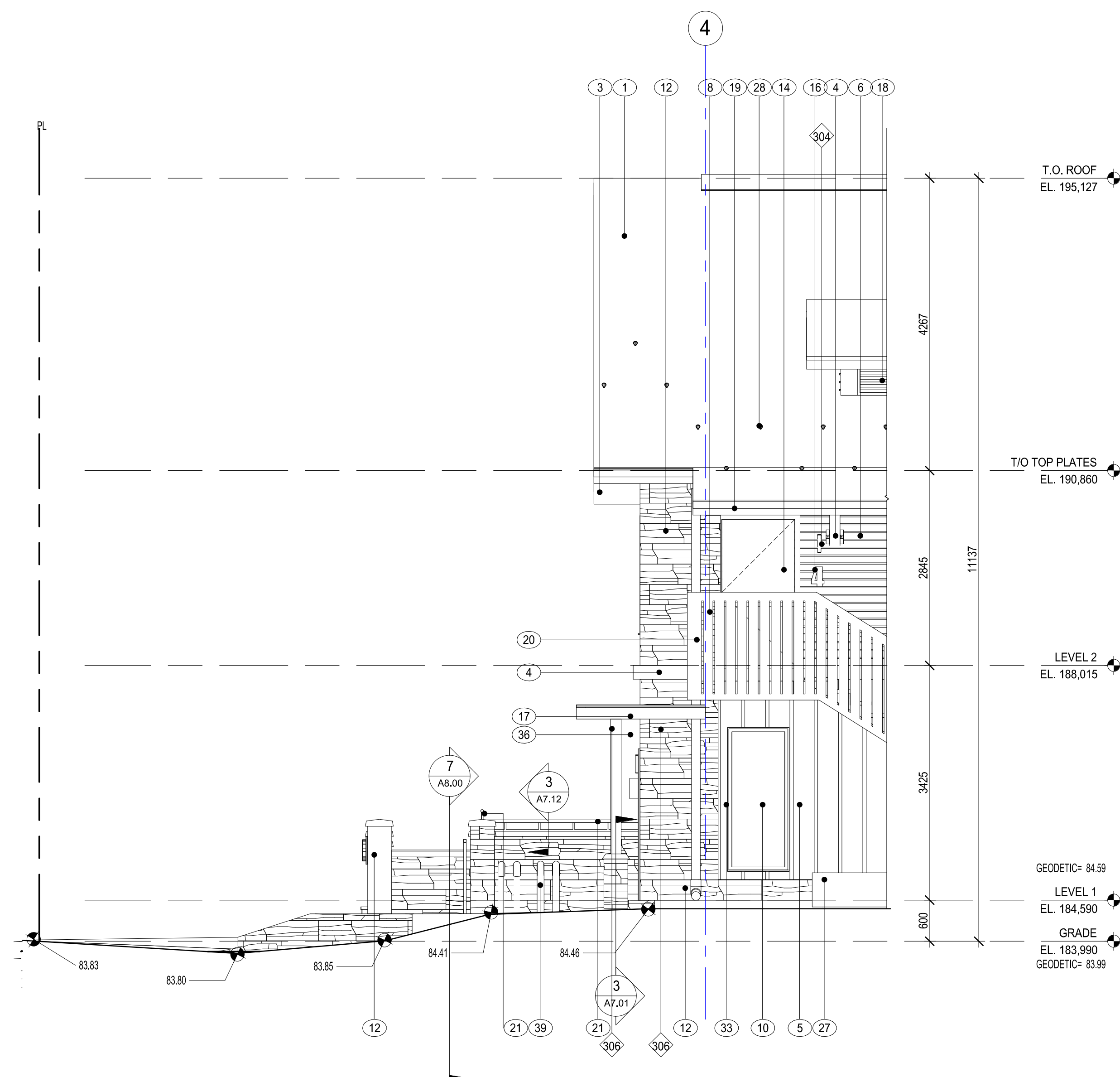
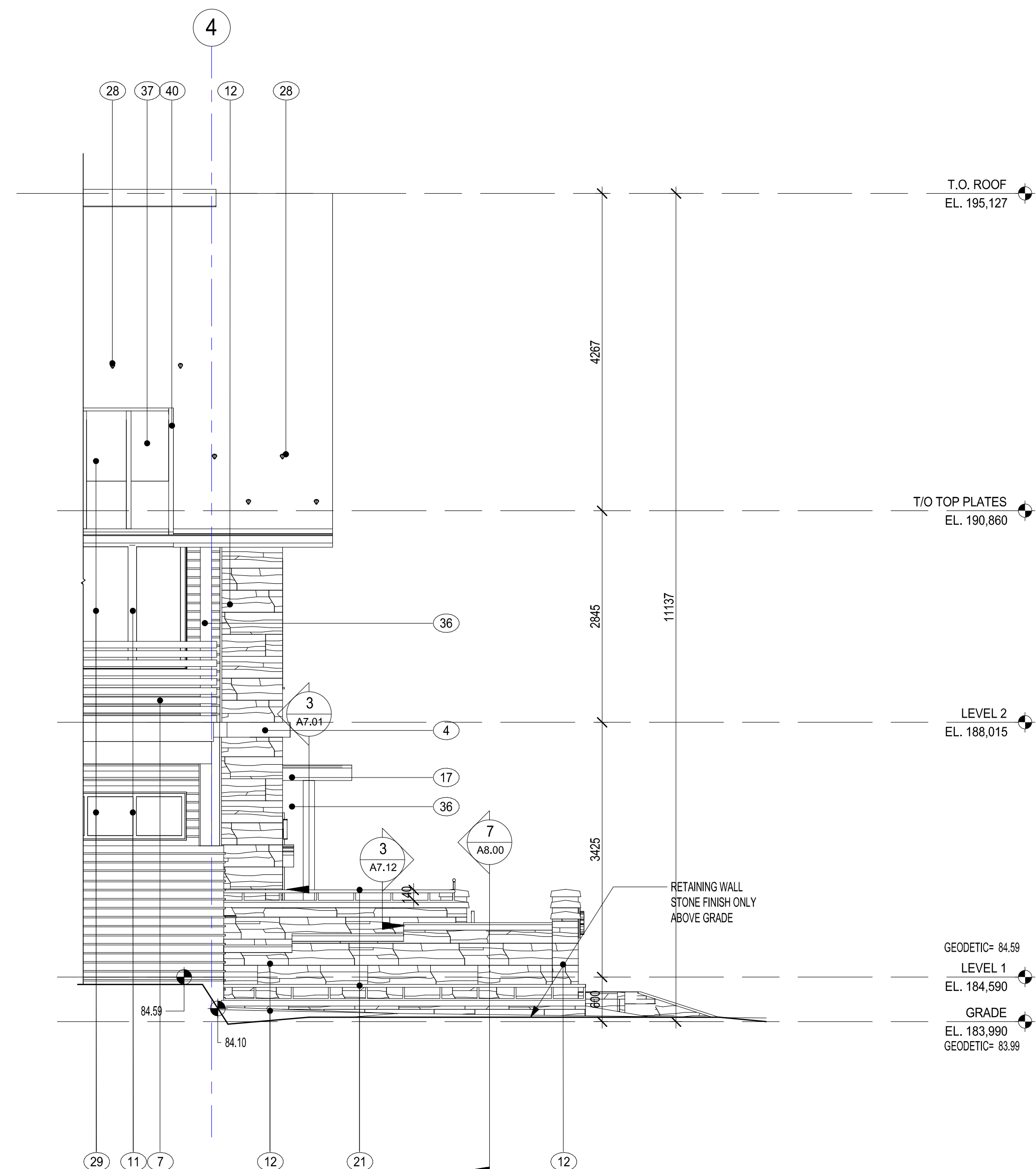
A3.01

Sheet / Feuille








5

Revision no. /  
La Révision  
no.

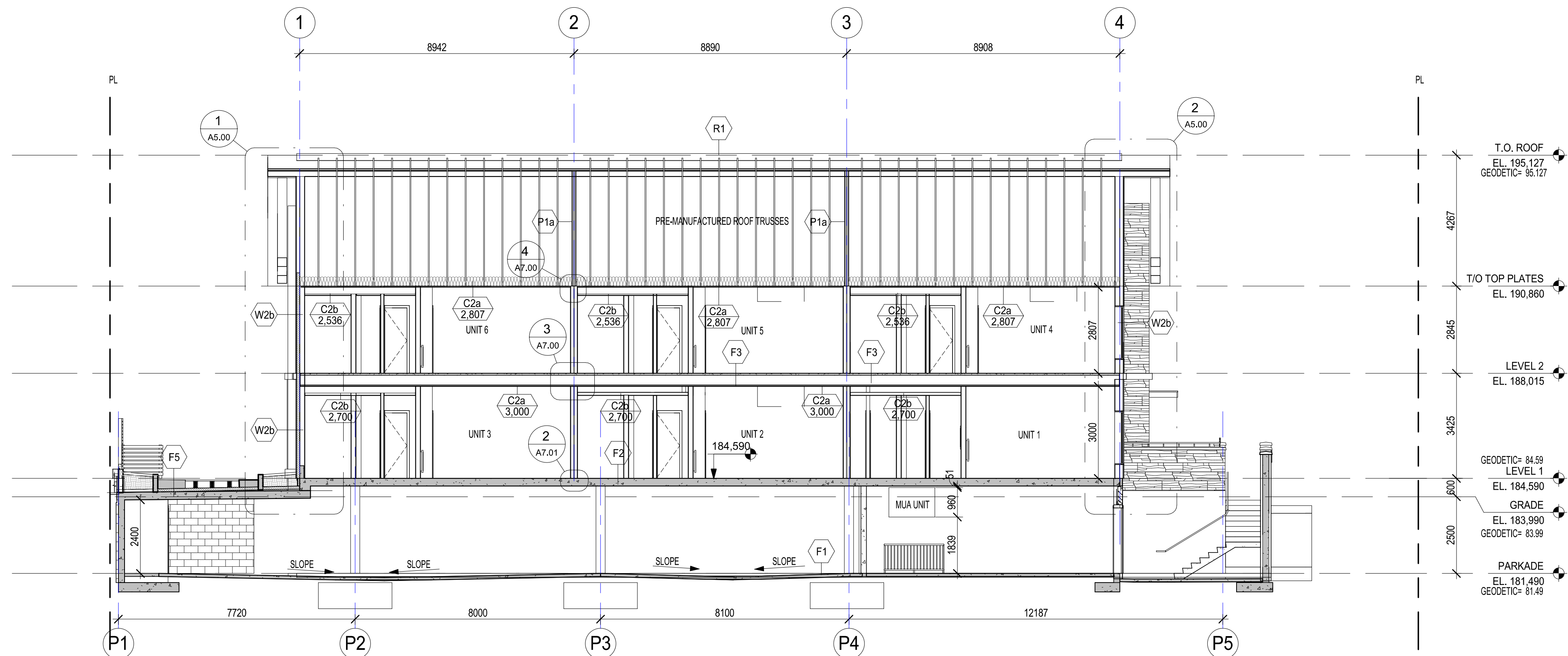




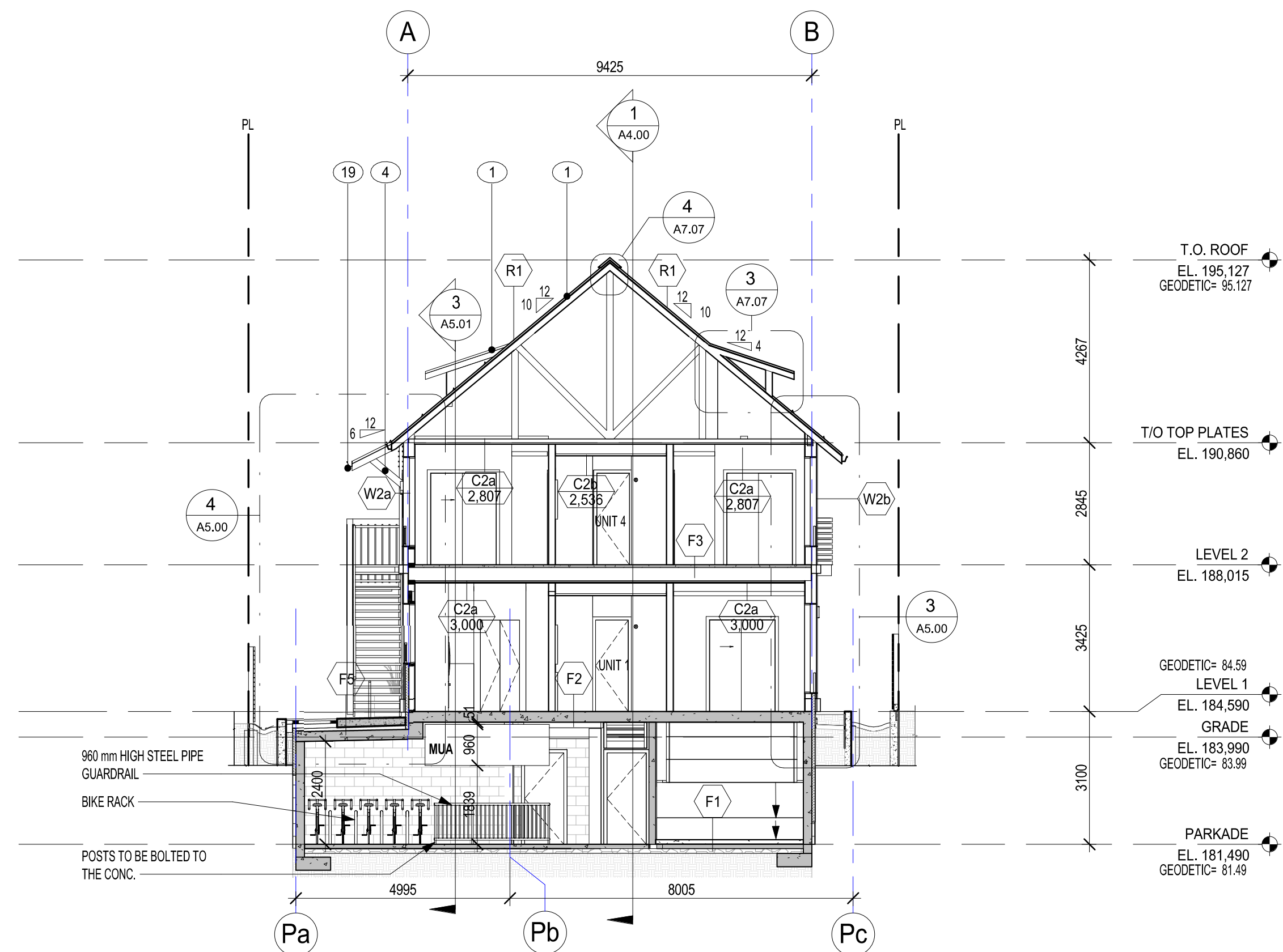
ELEVATION MATERIALS LEGEND			
1	RUBBER RECYCLED ENVIRONMENTALLY SAFE ROOF SHINGLES COLOUR: LIGHT GREY	9	THERMALLY BROKEN INSULATED STEEL OVERHEAD DOOR SOUND PROOF - WOOD GRAIN COLOUR: HEMLOCK STAIN
2	FIR WOOD BOARD - THERMALLY MODIFIED WOOD FASCIA COLOUR: HEMLOCK STAIN	10	45MIN FIRE RATED GLAZING COLOUR: CLEAR - LOW-E-COATING
3	FIR WOOD BOARD - THERMALLY MODIFIED WOOD SOFFIT COLOUR: HEMLOCK STAIN	11	ALUMINIUM WOOD WINDOW FRAMES COLOUR: BROWN
4	EXPOSED TIMBER ELEMENTS (AS PER STRUCTURAL) COLOUR: HEMLOCK STAIN	12	RUNDLE STONE - FULL BED STONE (NATURAL) LEDGERSTACK COLOUR: BLACK, LIGHT GREY TO GREY / PATTERNED
5	CEMENTITIOUS VERTICAL SIDING (BOARD AND BATTEN) SMOOTH WIDE HARDPLANK COLOUR: BONE WHITE	13	SANDBLASTED EXPOSED AGGREGATE POURED CONCRETE STEPS COLOUR: LIGHT GREY
6	CEMENTITIOUS HORIZONTAL SIDING (SMOOTH, WIDE BOARD) COLOUR: BONE WHITE	14	45MIN FIRE RATED INSULATED HOLLOW METAL DOOR COLOUR: PAINTED WHITE
7	HORIZONTAL - FIR WOOD BOARD - THERMALLY MODIFIED WOOD COLOUR: HEMLOCK STAIN	15	EXPOSED - SMOOTH CONCRETE COLOUR: LIGHT GREY
8	VERTICAL FIRE RETARDANT TREATED WOOD - FIR COLOUR: HEMLOCK STAIN	16	MOUNTED LETTERING - BRUSHED ALUMINIUM COLOUR: WHITE
		17	METAL COMPOSITE PANEL FASCIA COLOUR: LIGHT GREY NOTE: (CANOPIES THERMALLY DISCONNECTED)
		18	METAL LOUVER WITH A SCREEN BEHIND IT COLOUR: DARK GREY / WOOD FRAME
		19	PREFINISHED METAL EAVESTROUGH COLOUR: LIGHT GREY
		20	PREFINISHED METAL DOWNSPOUT WITH INSECT SCREEN COLOUR: LIGHT GREY
		21	STAINLESS STEEL GUARD RAIL
		22	EXPOSED TIMBER RAFTERS COLOUR: HEMLOCK STAIN
		23	GALVANIZED STEEL STAIR METAL GRATE THREADS
		24	ILLUMINATED HAND RAIL STAINLESS STEEL (SEE REFERENCE PLAN)
		25	POWDERCOATED STEEL BRACKET (IRON MICA)
		26	RAKED CONCRETE RAMP COLOUR: LIGHT GREY
		27	CAST IN PLACE CONCRETE PLANTER BOXES COLOUR: LIGHT GREY / SMOOTH
		28	SNOW GUARD NOTE: SNOW GUARD LOCATION AND SPACING TO BE CONFIRMED WITH THE SUPPLIER
		29	DOUBLE GLAZED SEALED UNIT COLOUR: CLEAR - LOW-E-COATING
		30	HAND RAIL STAINLESS STEEL (SEE REFERENCE PLAN)
		31	CURTAIN WALL FRAMES
		32	CLAPBOARD HORIZONTAL SIDING (SMOOTH, WIDE BOARD) COLOUR: HEMLOCK STAIN
		33	FIRE RATED STEEL CURTAIN WALL FRAMES COLOUR: BROWN
		34	CONTINUOUS RIDGE VENT
		35	DOG HOUSE - CONCRETE LIGHT GREY
		36	152 X 152 mm ROUGH SAWN DOUGLAS FIR TIMBER COLUMN
		37	FROSTED GLASS
		38	WOOD CLAD ALUMINIUM SKYLIGHT
		39	GOOSENECK EXHAUST AND AIR INTAKE
		40	WOOD CLAD ALUMINIUM
			NOTE ALL COLORS TO BE DETERMINED BY DEPARTMENTAL REPRESENTATIVE

LIGHTING LEGEND			
	PARKADE ENTRANCE LIGHT WALL MOUNT		EXTERIOR DOWNLIGHT RECESSED
	BOLLARD LIGHT		ILLUMINATED HANDRAIL
	EXTERIOR WALLWASH		EXTERIOR WALLWASH
	STROBE LIGHT PEDESTAL		

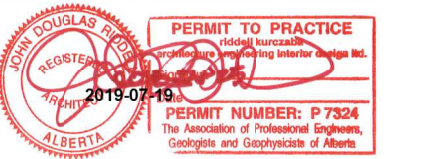




1 BUILDING LONGITUDINAL SECTION  
A4.00 SCALE: 1 : 100



2 BUILDING CROSS SECTION  
A4.00 SCALE: 1 : 100



DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Parks Canada Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHIOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

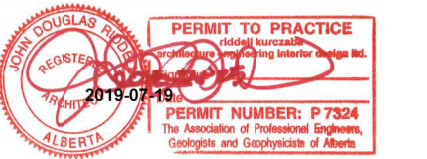
BUILDING SECTIONS

Project No. / No. du  
project

Sheet / Feuille  
A4.00

Revision no. /  
La Révision  
no.  
5





DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHIOME

Designed by/Concepté par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

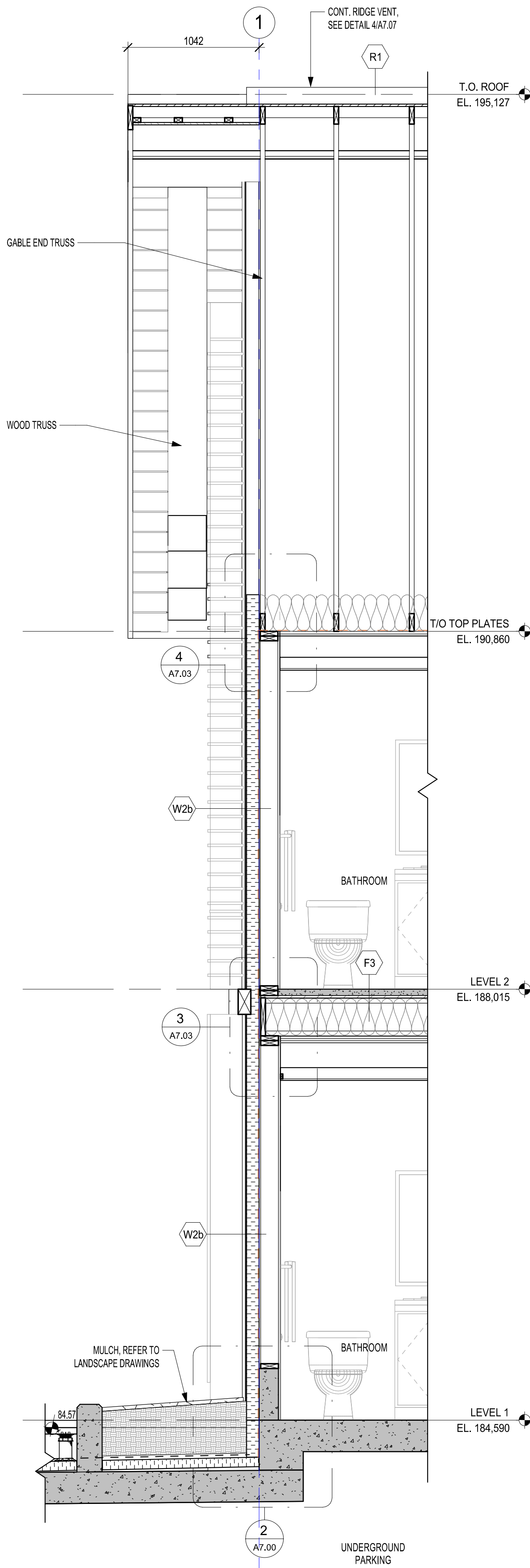
WALL SECTIONS

Project No. / No. du  
project

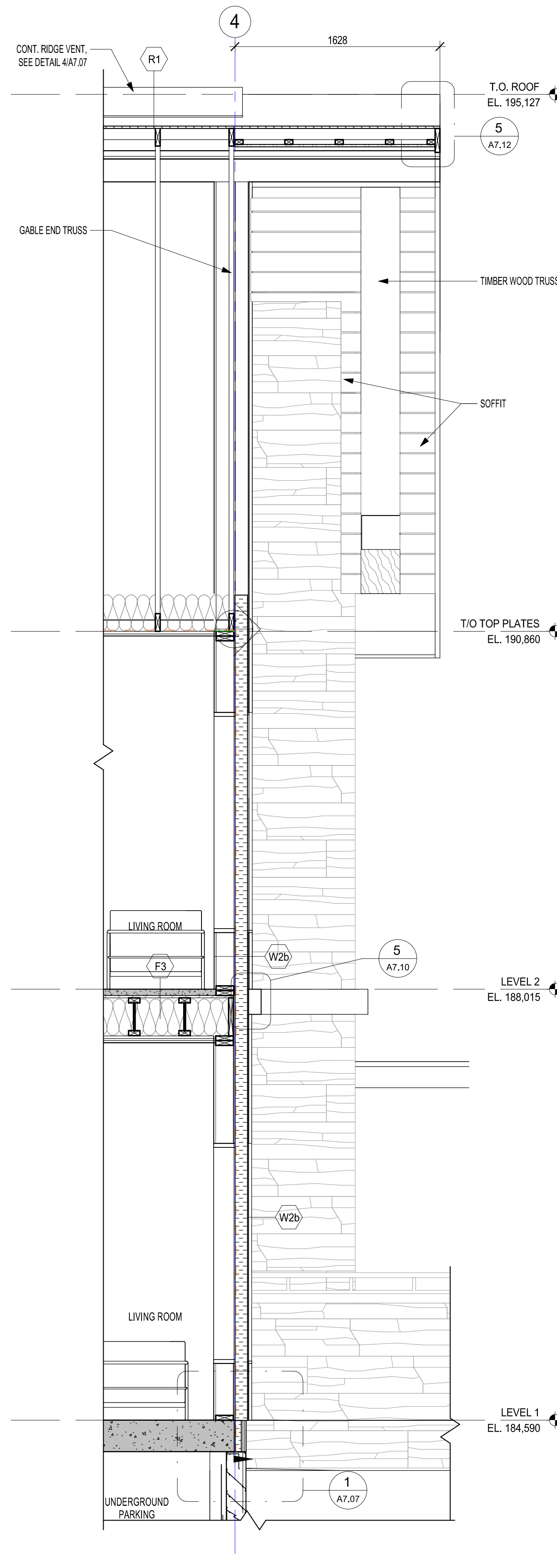
Sheet / Feuille  
A5.00

Revision no. /  
La Révision  
no.

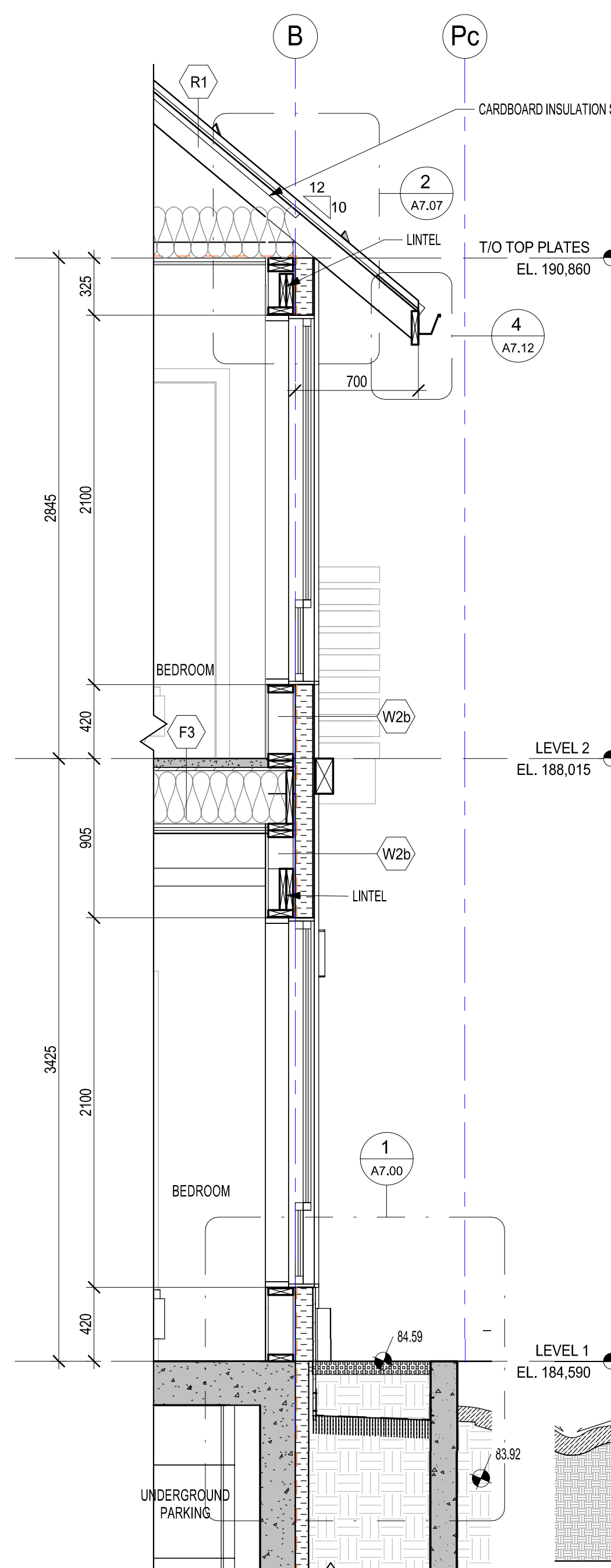
5



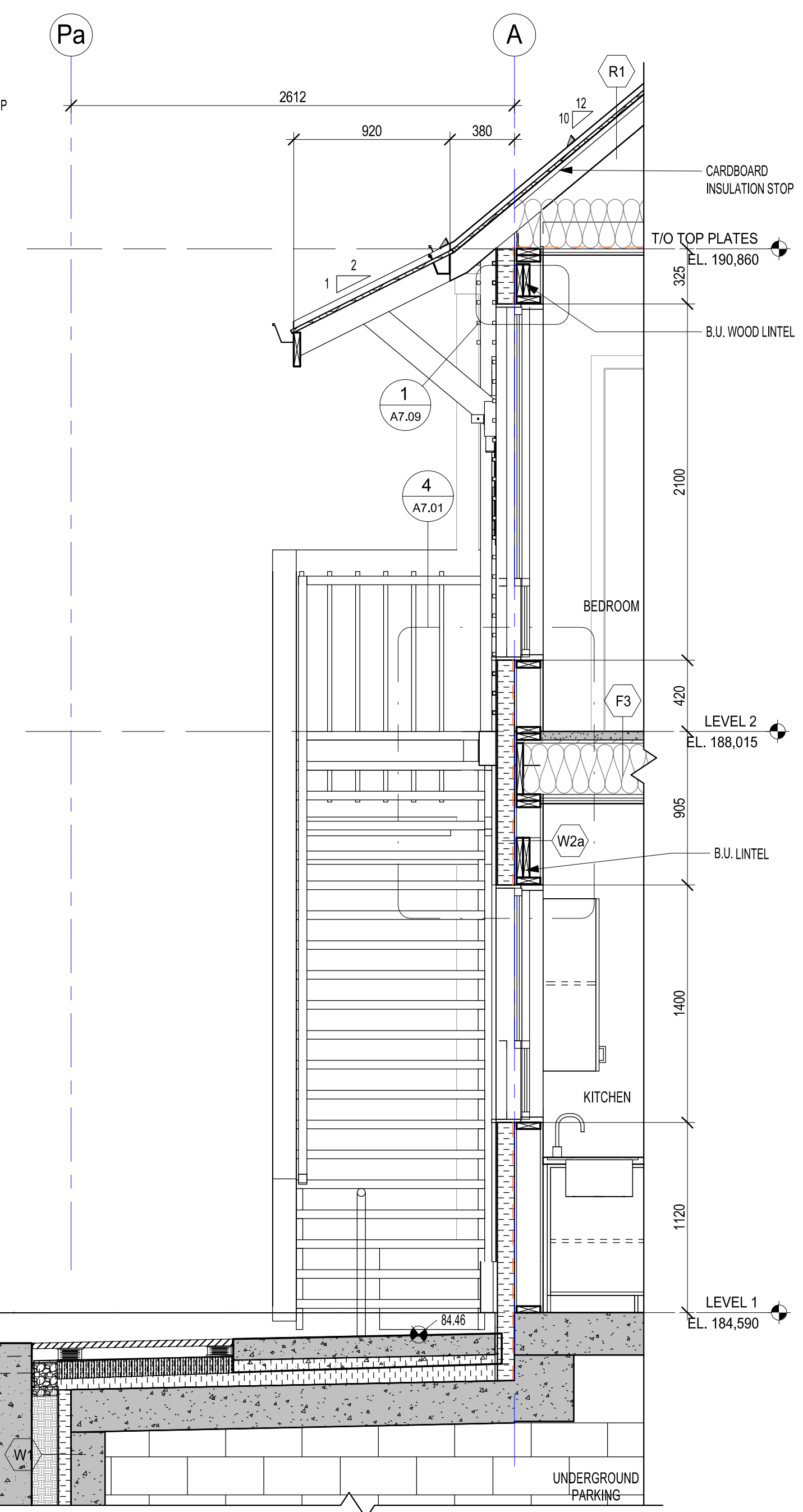
1 WALL SECTION @ WEST SIDE  
A5.00 SCALE: 1 : 25



2 WALL SECTION @ EAST SIDE  
A5.00 SCALE: 1 : 25



3 WALL SECTION @ NORTH SIDE  
A5.00 SCALE: 1 : 25



4 WALL SECTION @ SOUTH SIDE  
A5.00 SCALE: 1 : 25



Client / client

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Client / client	
<b>Parks Canada</b>	

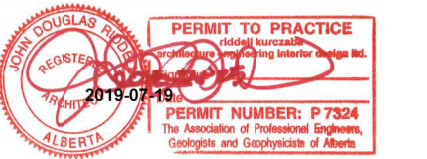
Drawing title / Titre du dessin

WALL SECTIONS

Project No. / No. du project	Sheet / Feuille  <b>A5.01</b>	Revision no. / La Révision no.  <b>5</b>
---------------------------------	-------------------------------------	--



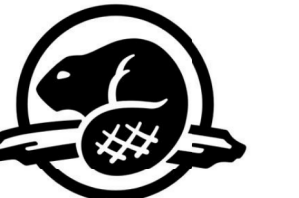




DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
3	ISSUED FOR TENDER / BP	19/07/19
2	99% IFC DRAWING	18/11/23
1	99% IFC DRAWING	18/03/16

Client / client



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

**Parks Canada**

Drawing title / Titre du dessin

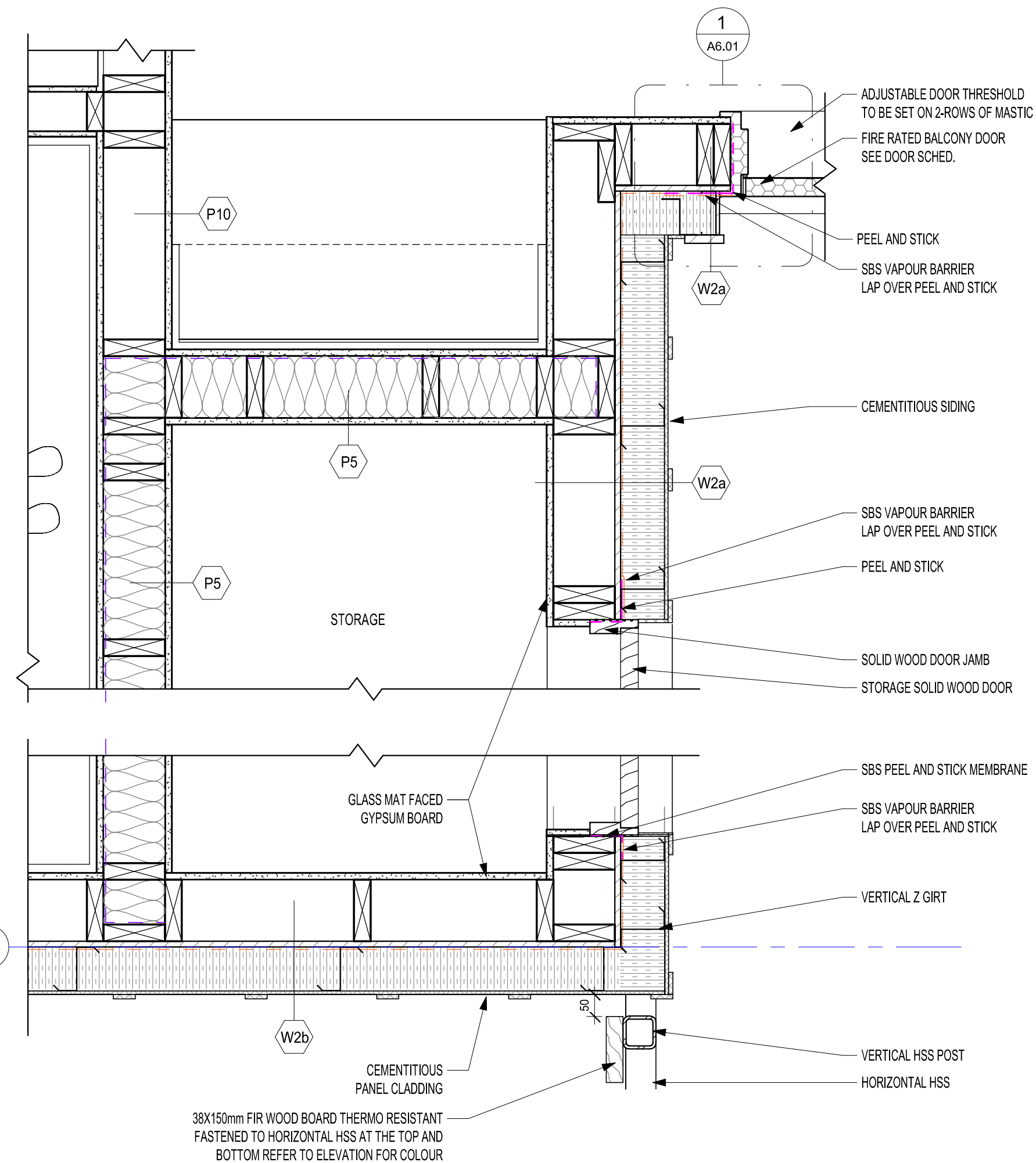
PLAN DETAILS

Project No. / No. du  
project

Sheet / Feuille  
**A6.00**

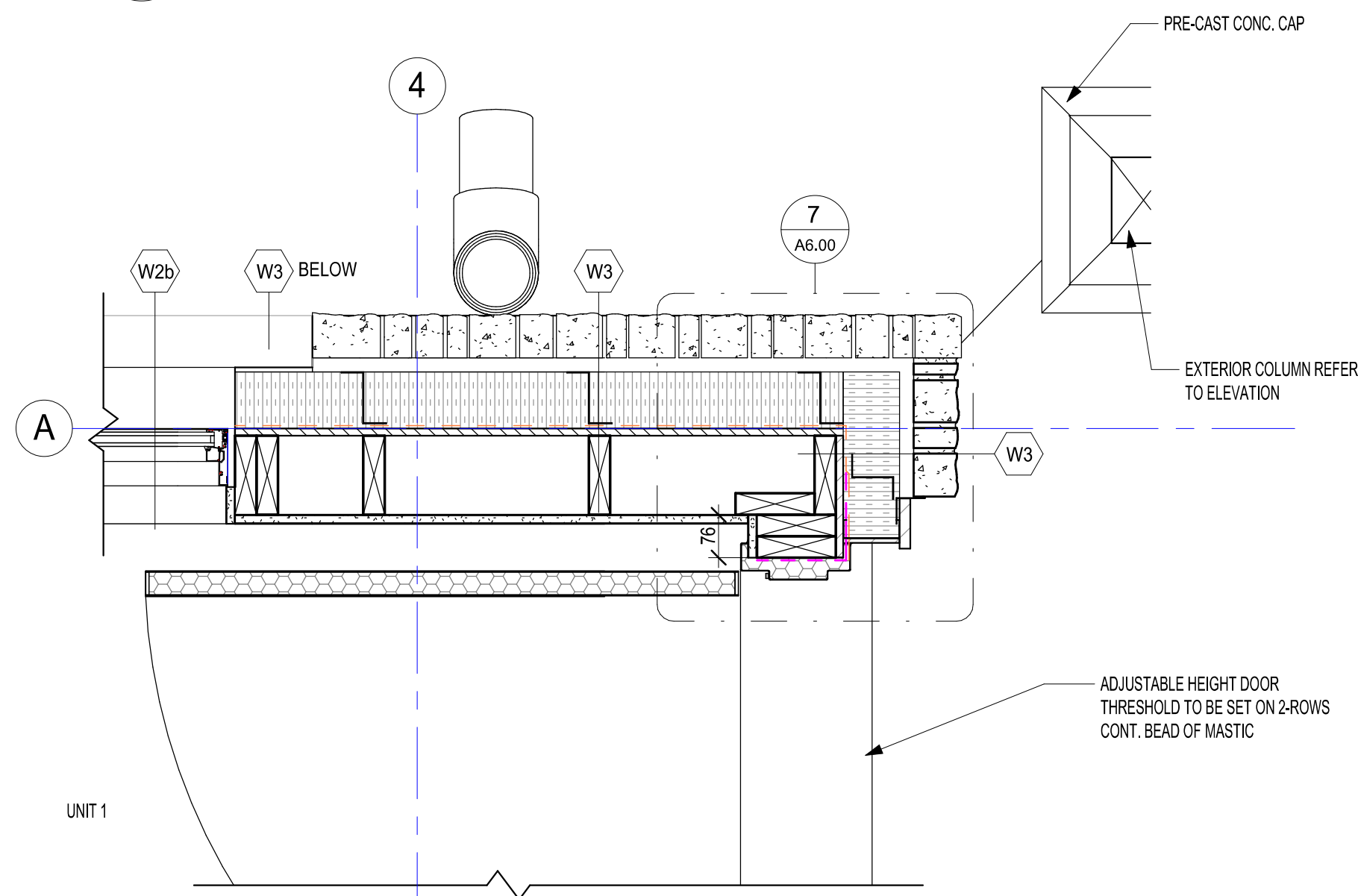
Revision no. /  
La Révision  
no.

**3**



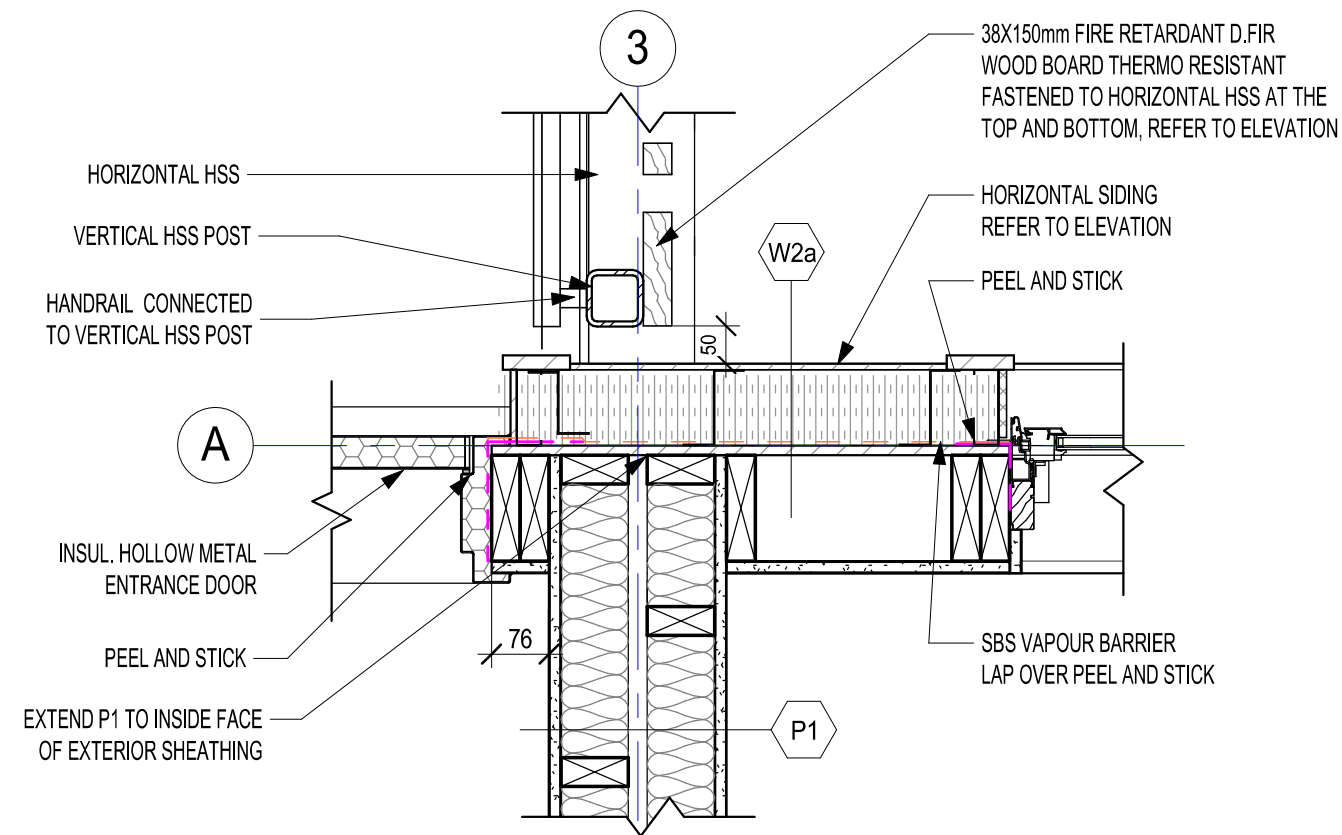
**PLAN DETAIL @ STORAGE AND  
EXTERIOR WALL**

1  
A6.00 SCALE: 1 : 10



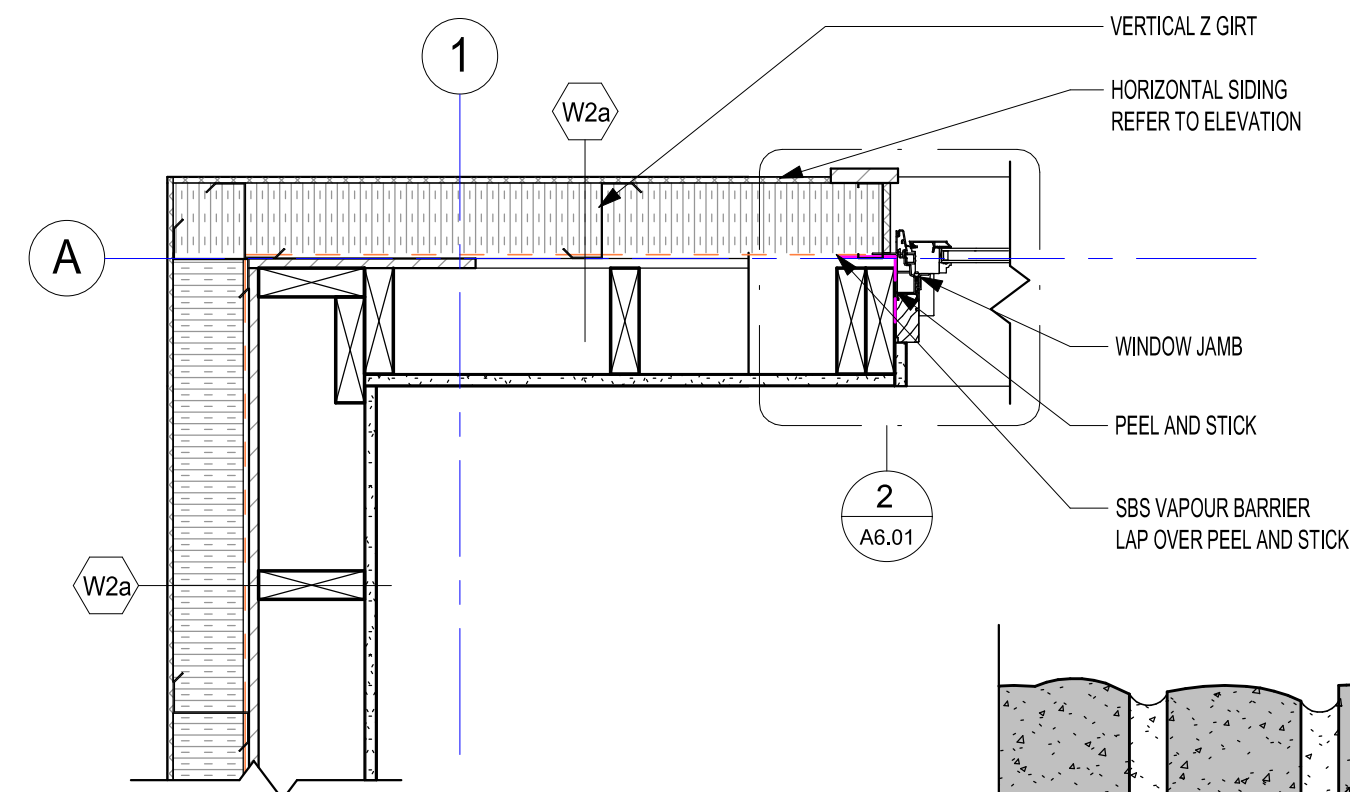
**PLAN DETAIL AT EXTERIOR WALL AND  
ENTRANCE DOOR TO UNIT 1**

4  
A6.00 SCALE: 1 : 10



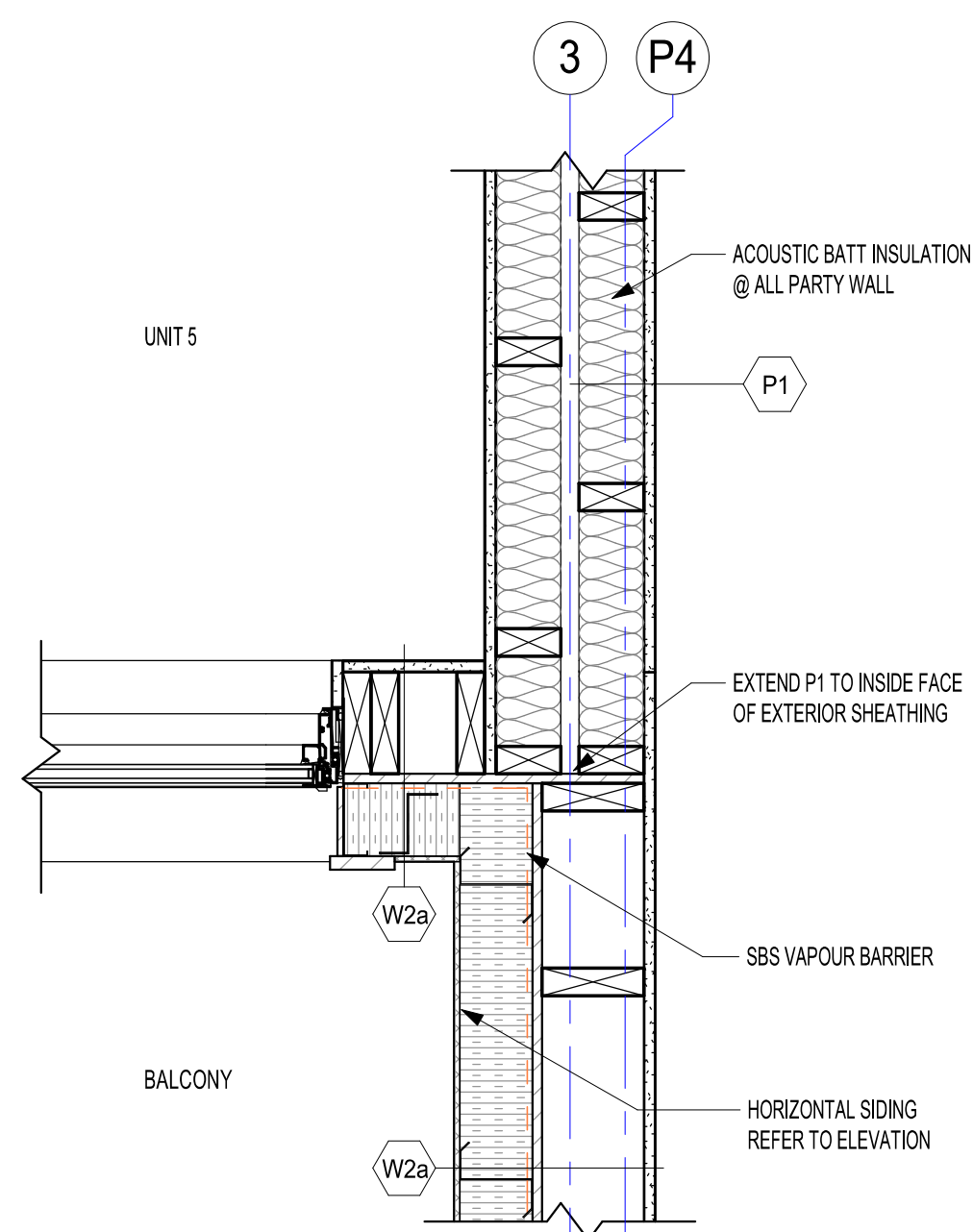
**PLAN DETAIL @ EXTERIOR WALL AND  
STAIR DOOR**

2  
A6.00 SCALE: 1 : 10



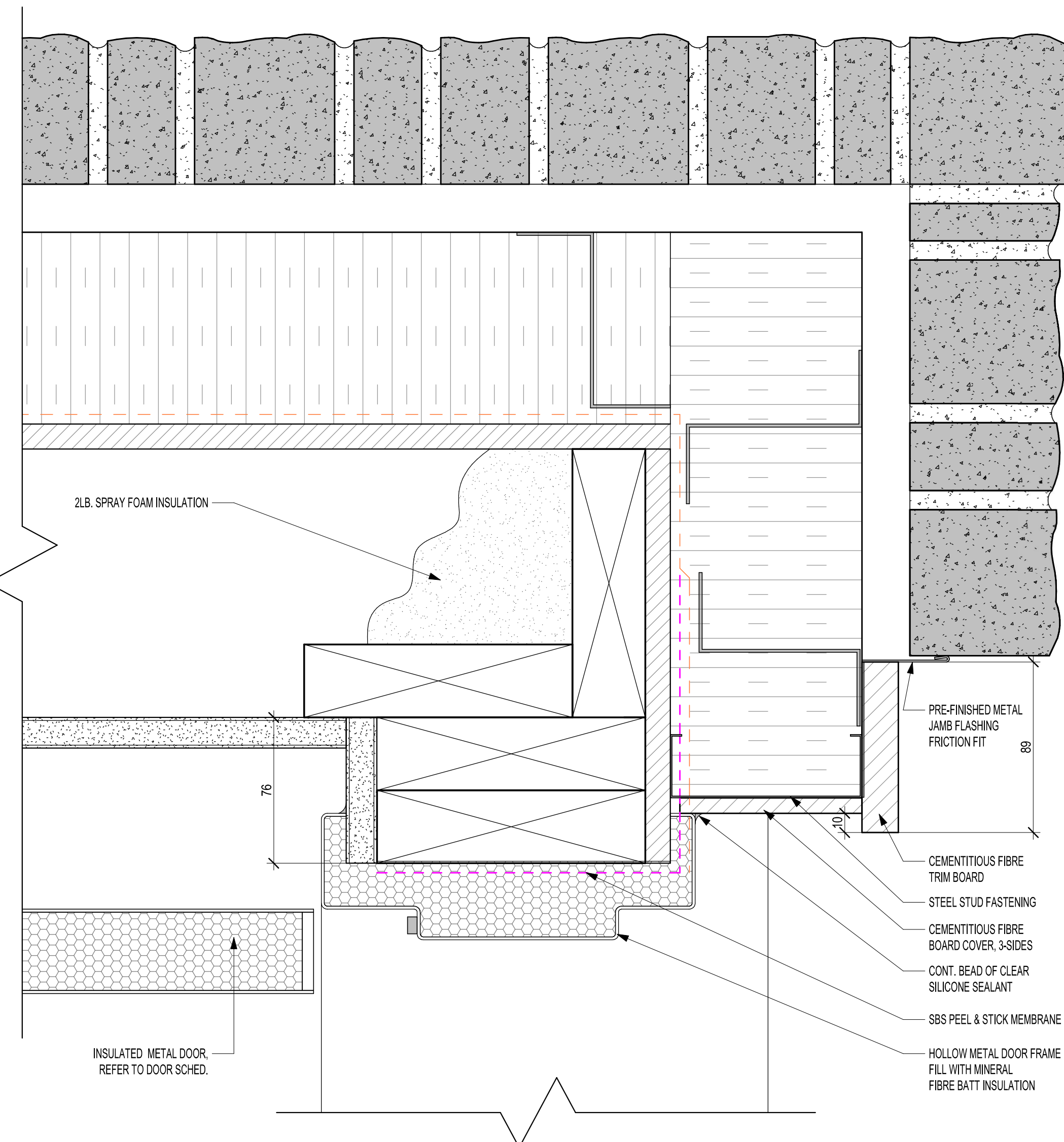
**PLAN DETAIL AT NORTH WEST CORNER**

3  
A6.00 SCALE: 1 : 10



**PLAN DETAIL @ DEMISING WALL AND  
PATIO/BALCONY WALL**

6  
A6.00 SCALE: 1 : 10



**FIRE RATED METAL JAMB PLAN DETAIL**

7  
A6.00 SCALE: 1 : 2





DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
------------------------	------------------------------	----------------

1 ISSUED FOR TENDER / BP 19/07/19

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

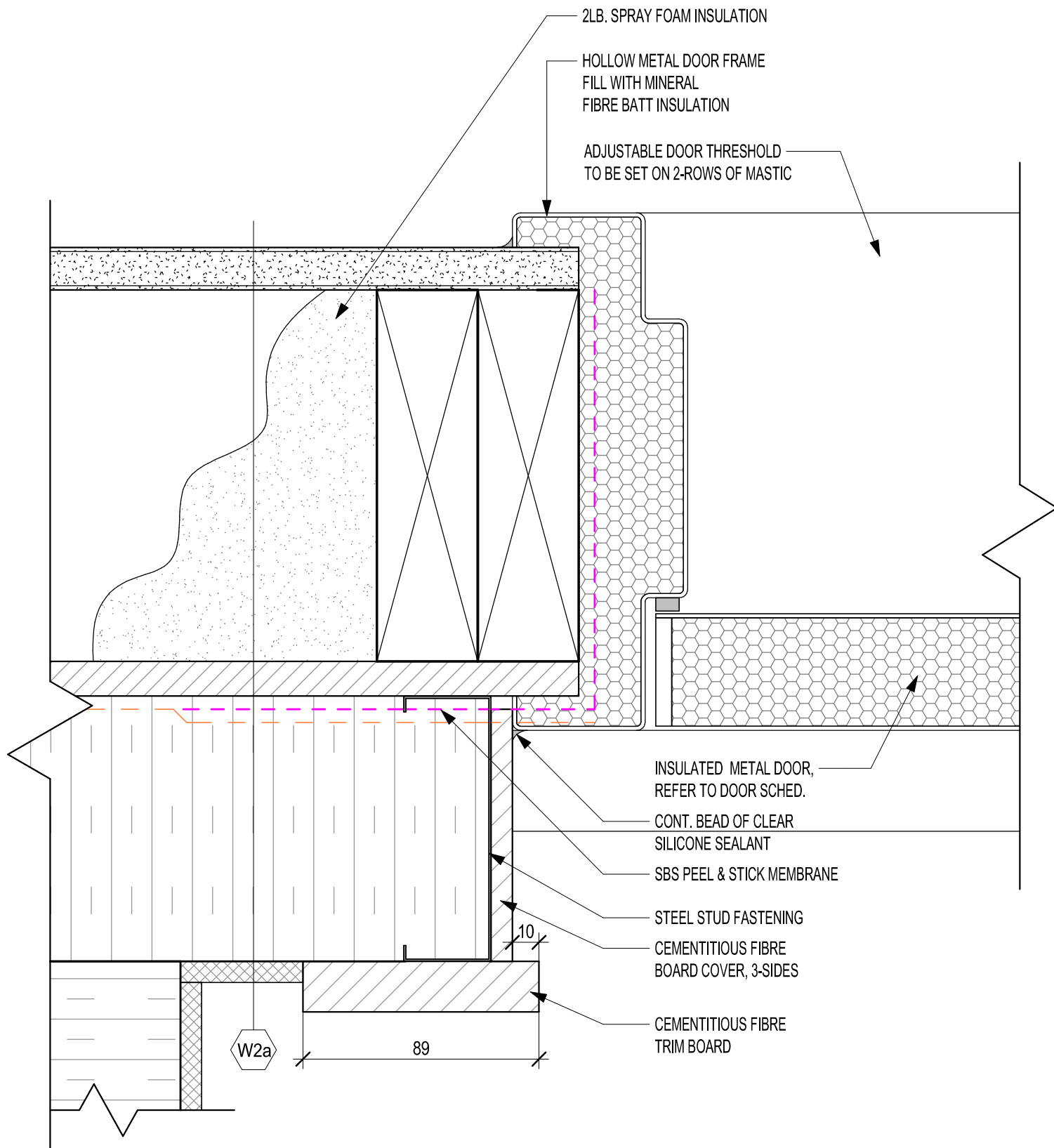
PLAN DETAILS

Project No. / No. du  
project

A6.01

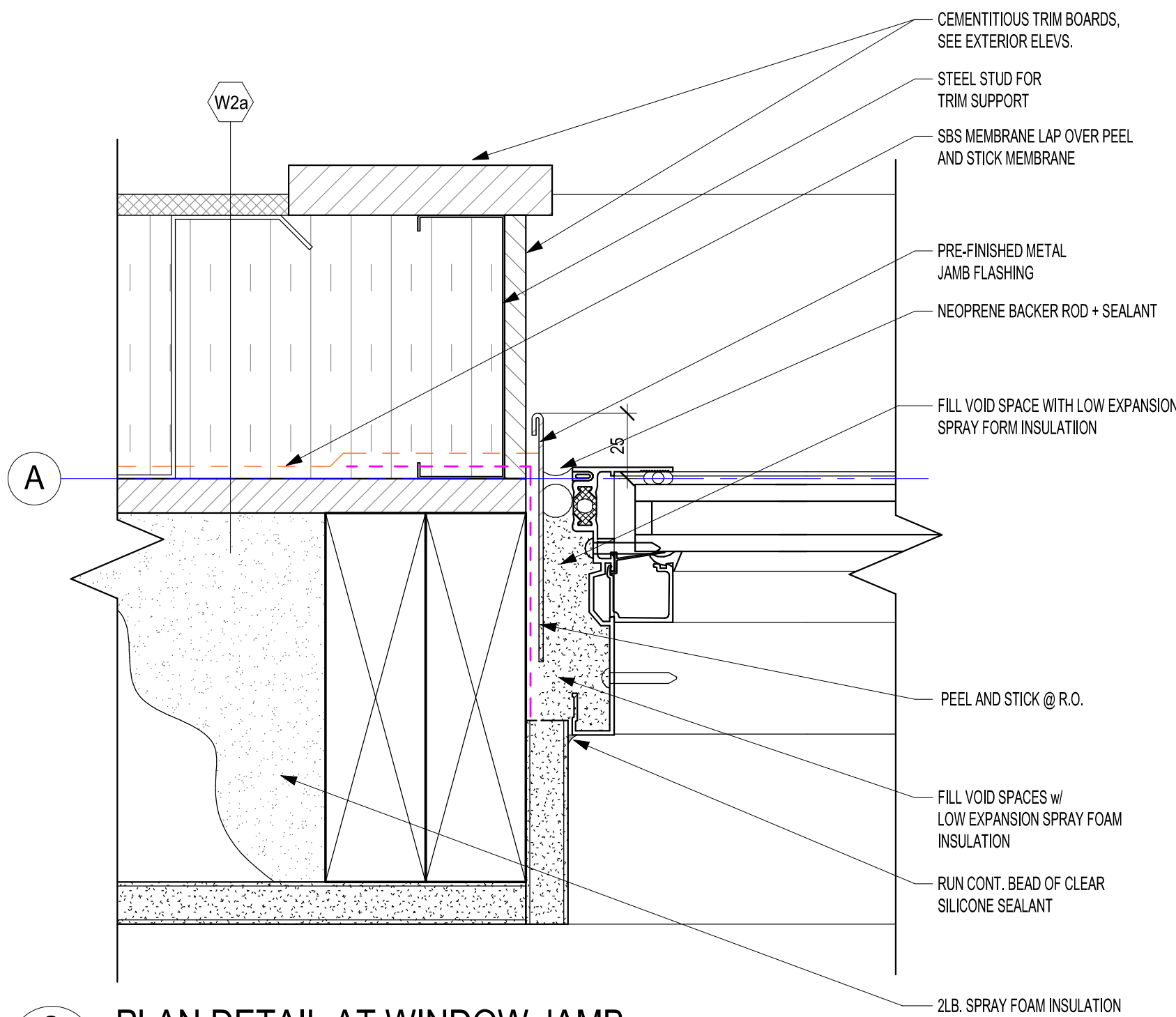
Revision no. /  
La Révision  
no.

1



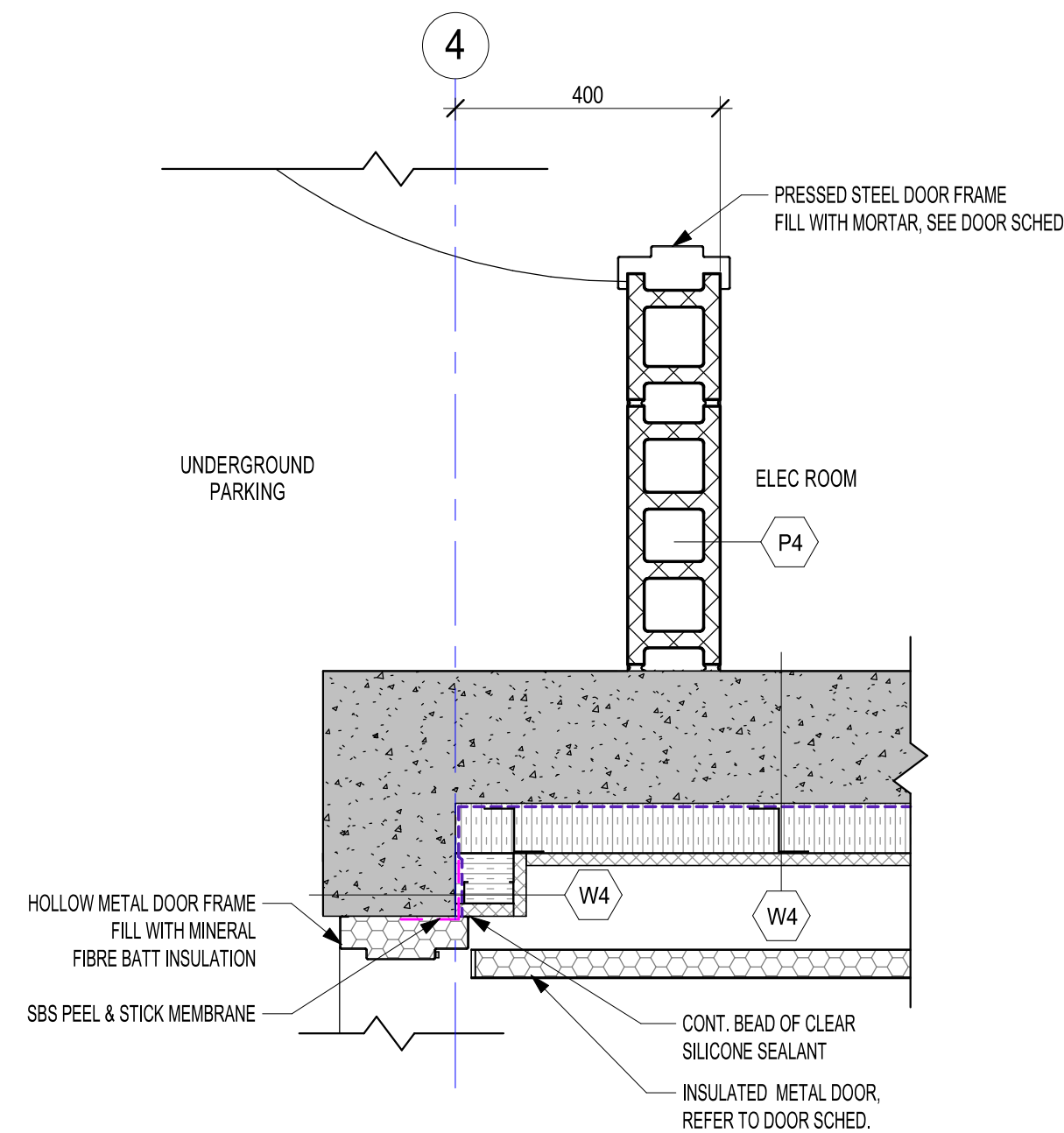
1 PLAN DETAIL @ DOOR JAMB

A6.01 SCALE: 1 : 2



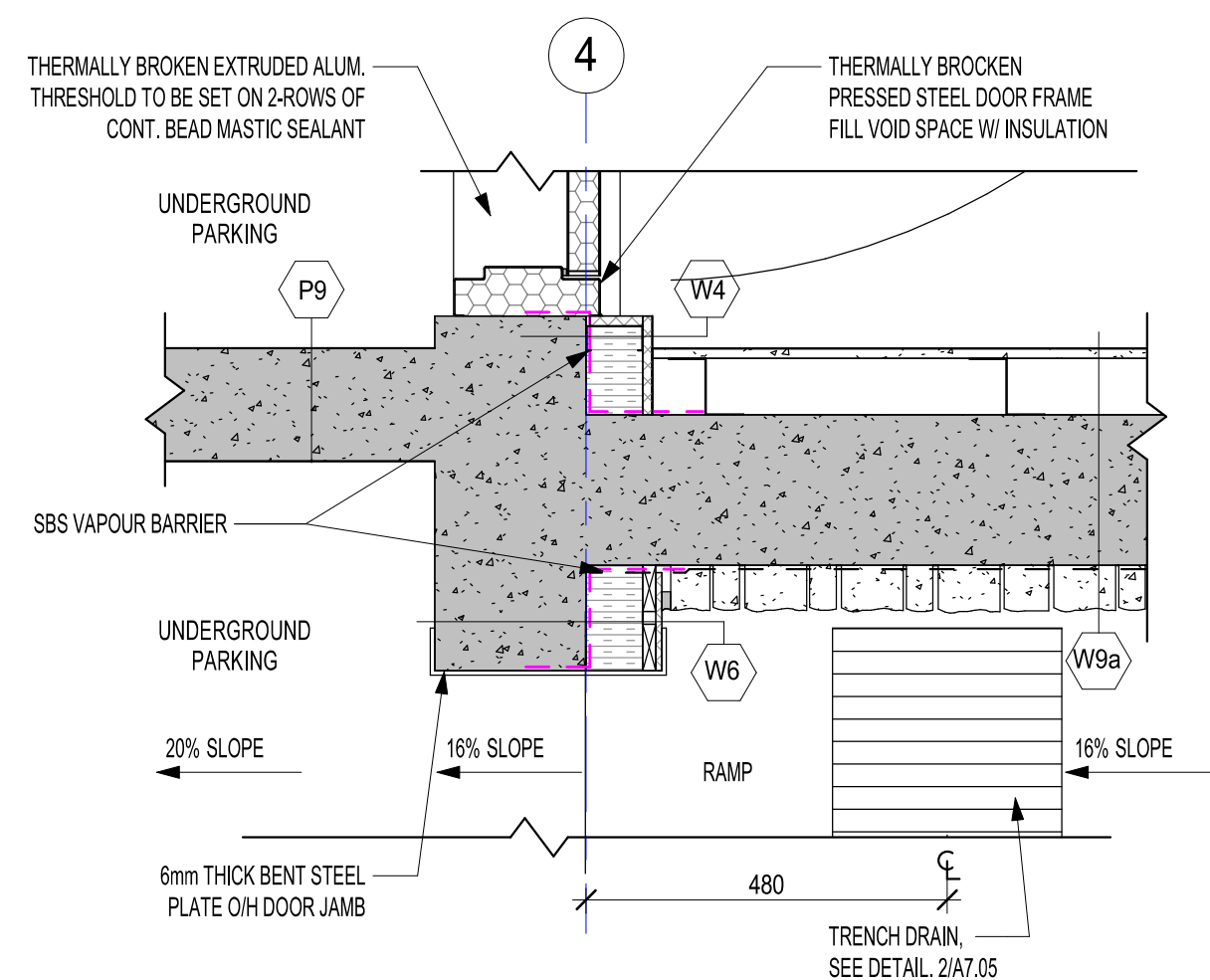
2 PLAN DETAIL AT WINDOW JAMB

A6.01 SCALE: 1 : 2



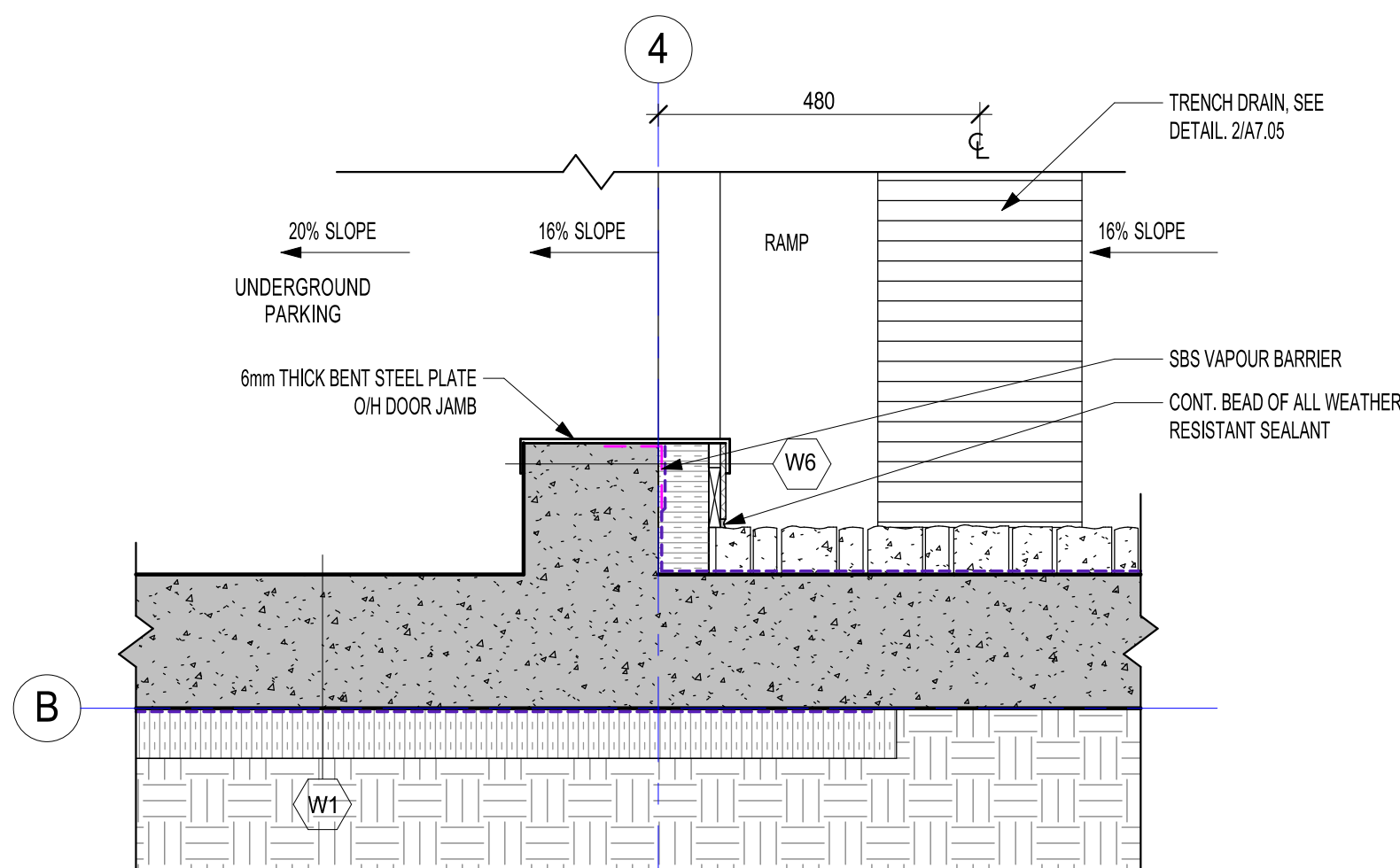
3 STAIR-a PLAN DETAIL 1

A6.01 SCALE: 1 : 10



4 STAIR-a / EXIT DOOR PLAN DETAIL 2

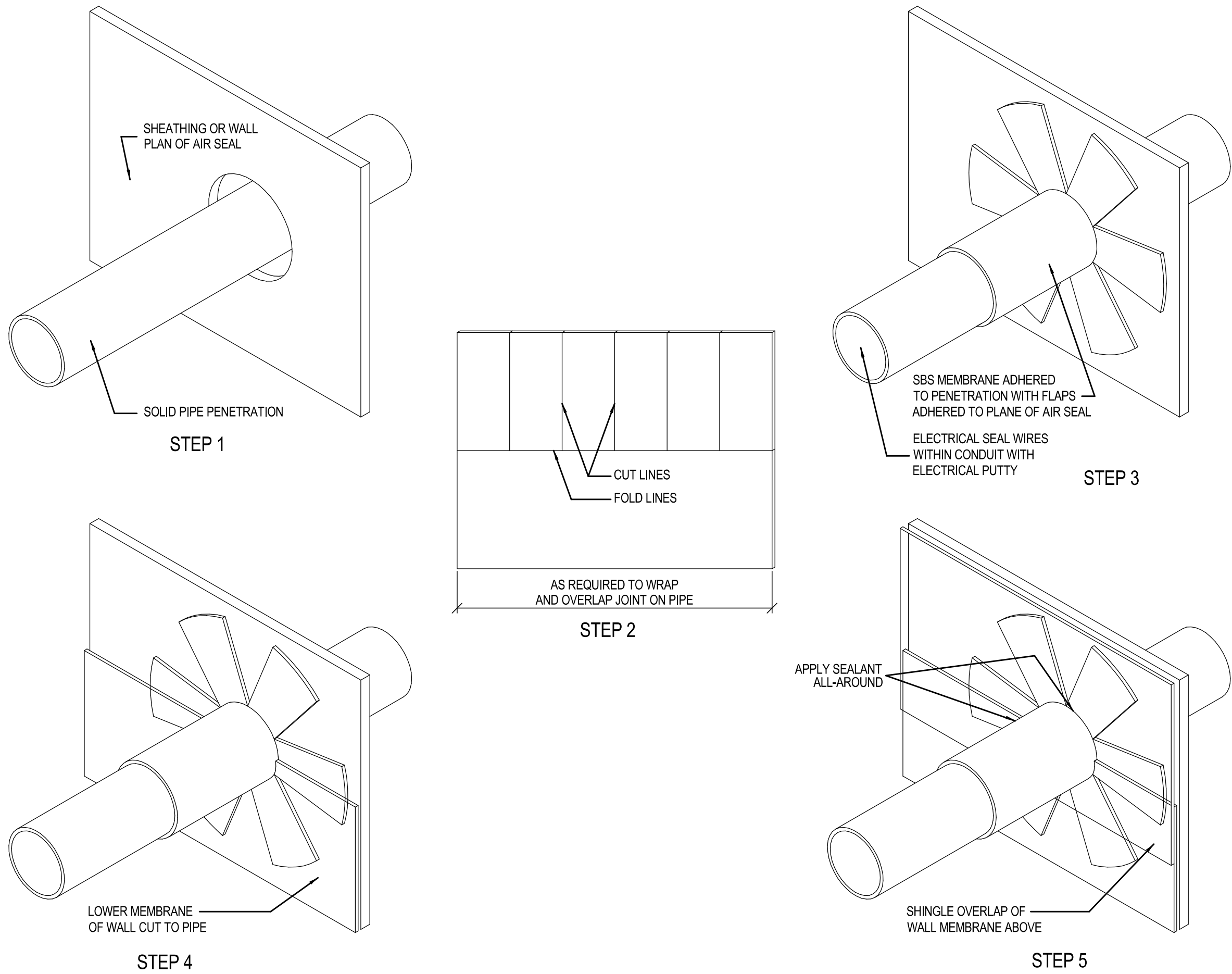
A6.01 SCALE: 1 : 10



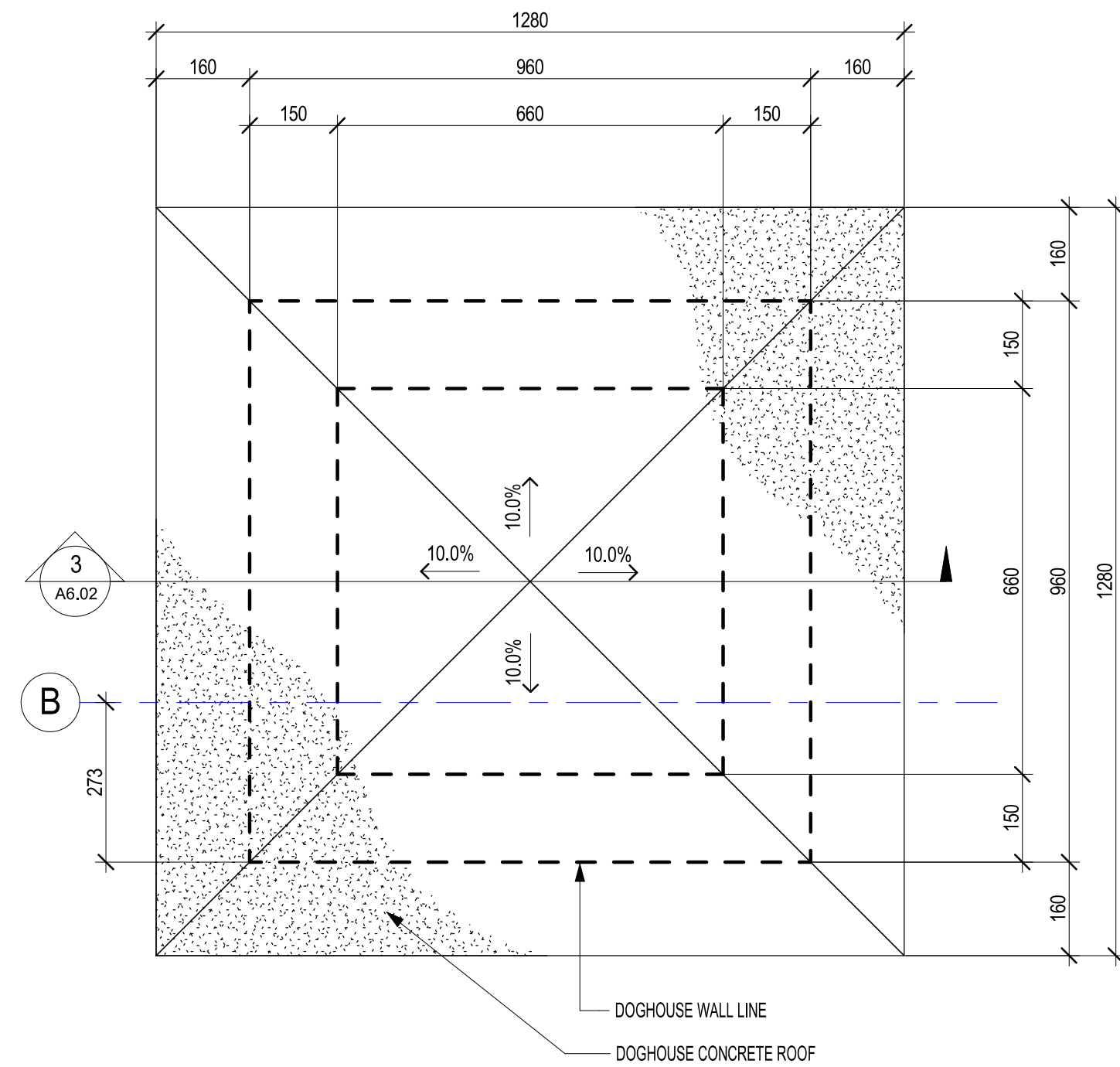
5 OVERHEAD DOOR PLAN DETAIL

A6.01 SCALE: 1 : 10

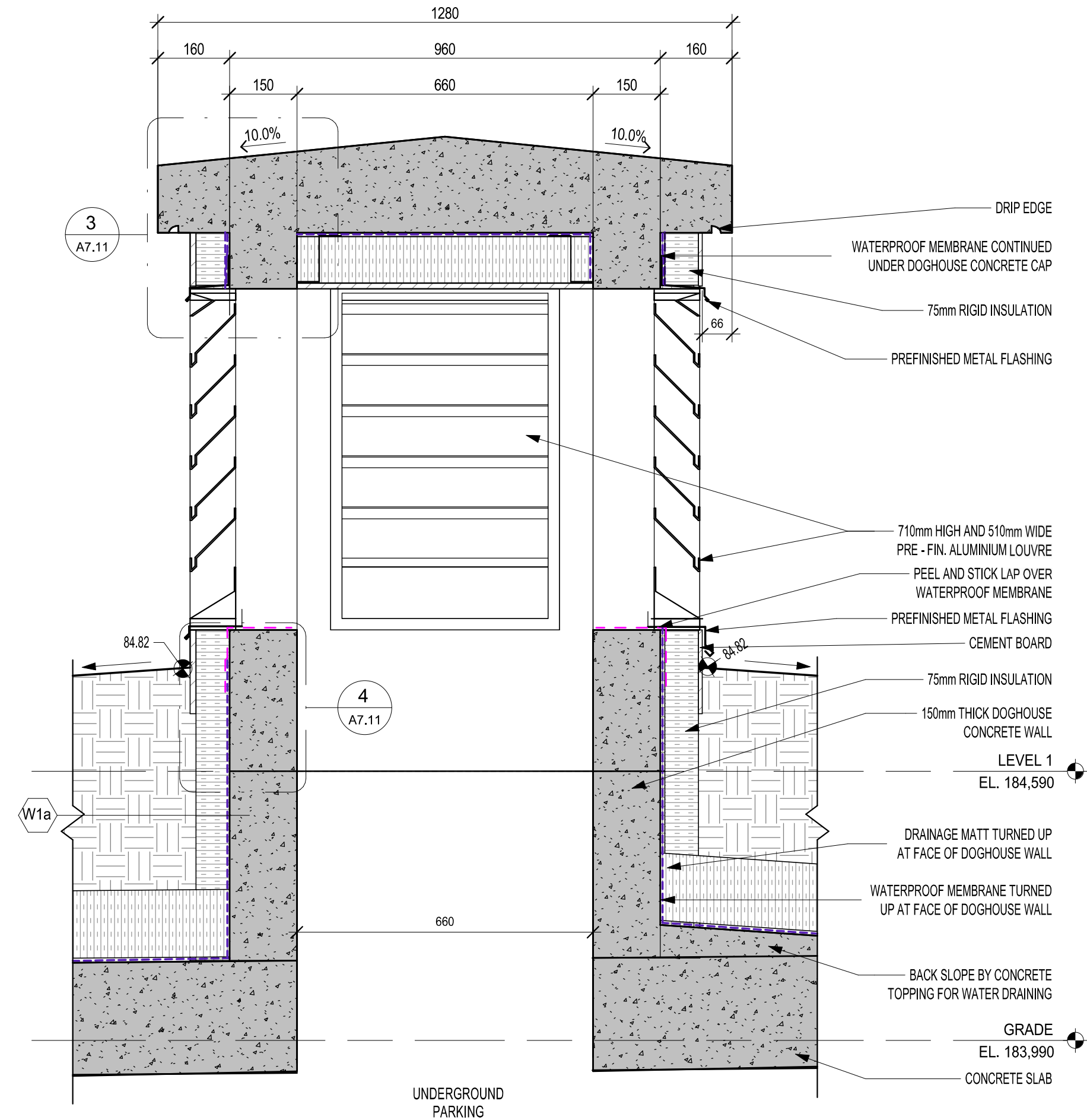




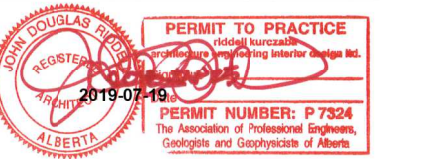
**1** TYPICAL PIPE PENETRATION DETAIL  
A6.02 SCALE: 1 : 5



**2** DOGHOUSE PLAN DETAIL  
A6.02 SCALE: 1 : 10



**3** SECTION DETAIL @ DOGHOUSE  
A6.02 SCALE: 1 : 10



DO NOT SCALE

Revision / Revisión	Description / Descripción	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par  
AMINA OYAKHILOME  
Designed by/Concept par  
PETER SCHULZ  
Drawn by/Dessine par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

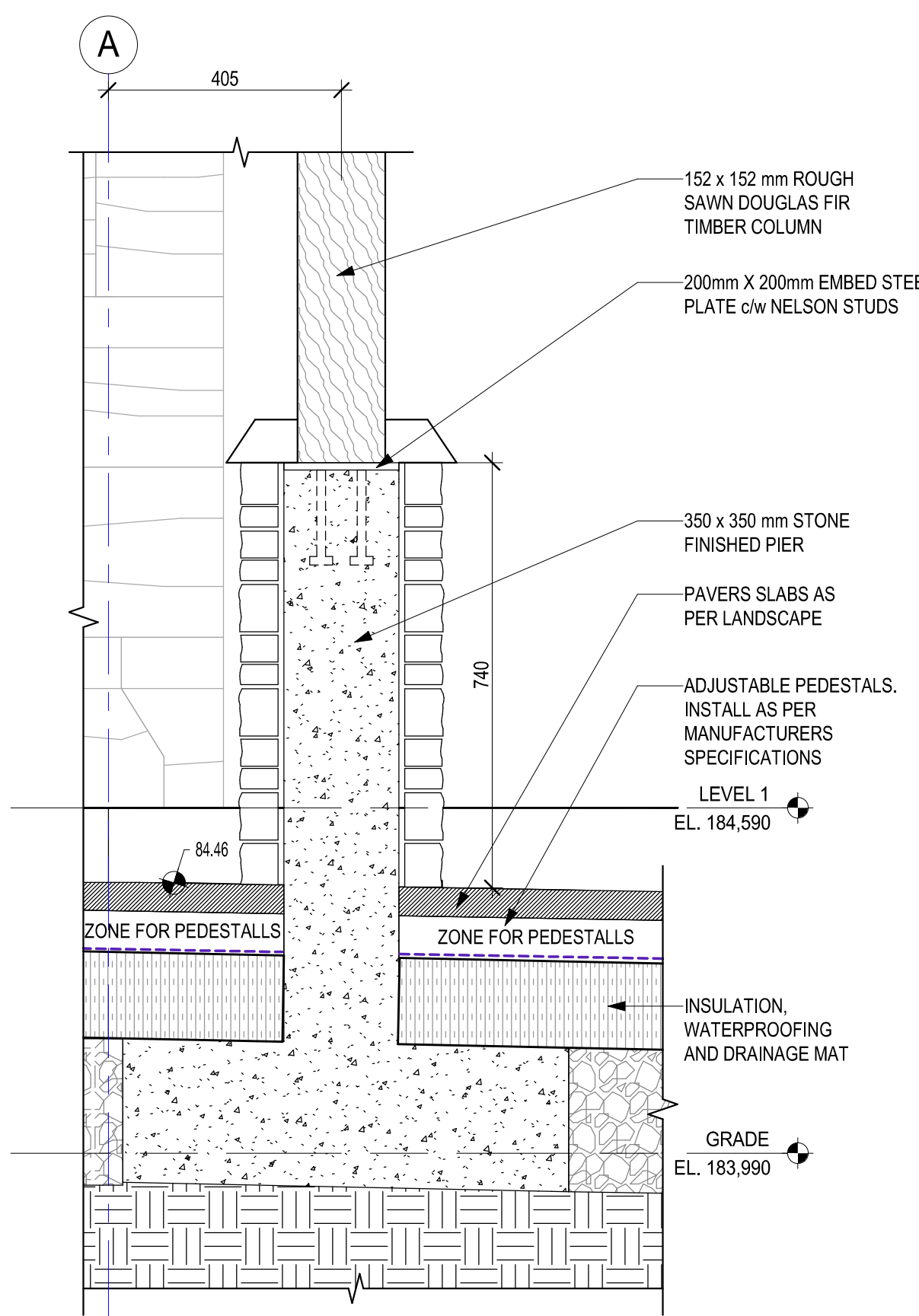
PLAN DETAILS AND SECTION

Project No. / No. du project	Sheet / Feuille A6.02	Revision no. / La Révision no. 1
---------------------------------	--------------------------	---



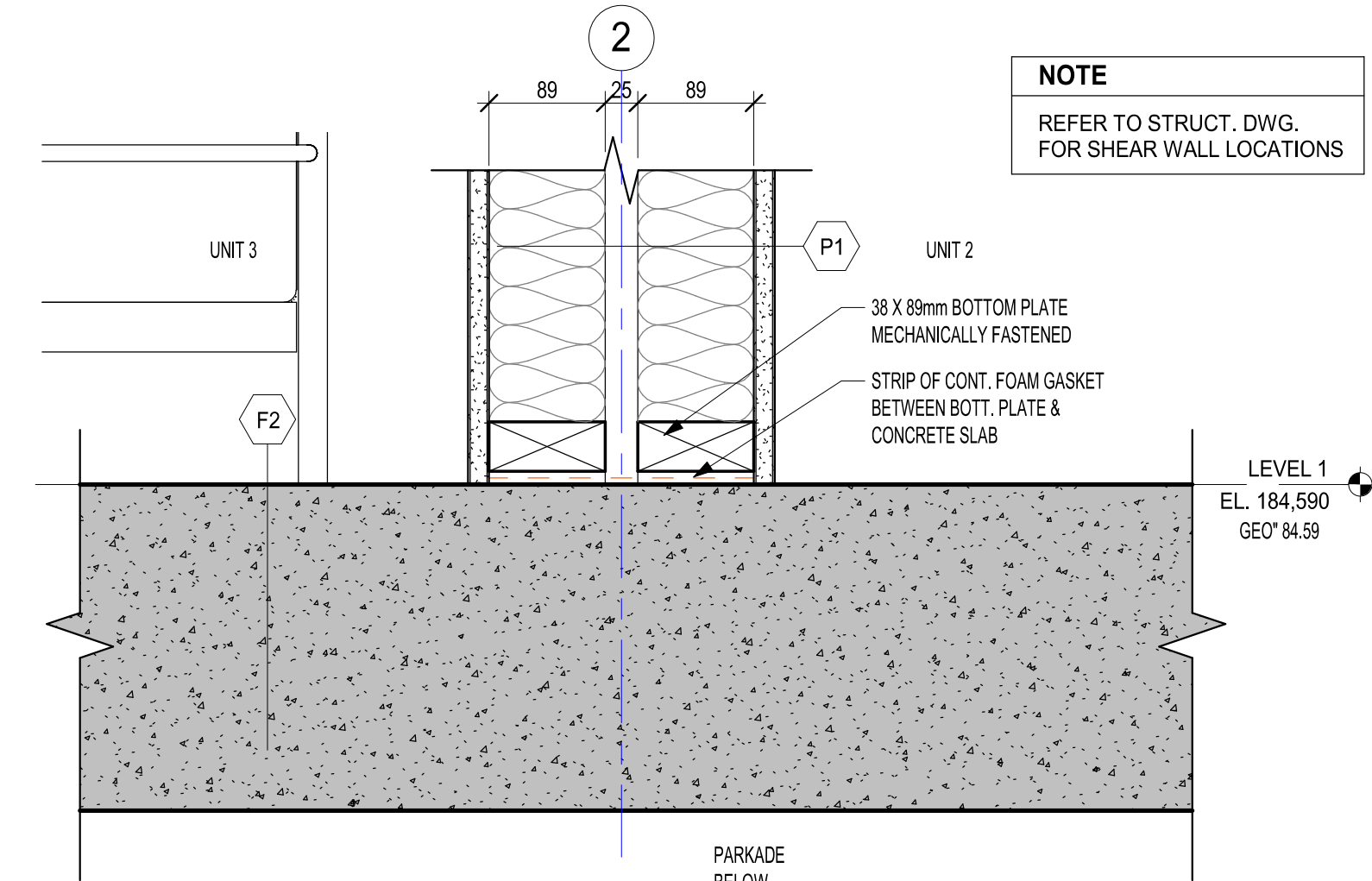






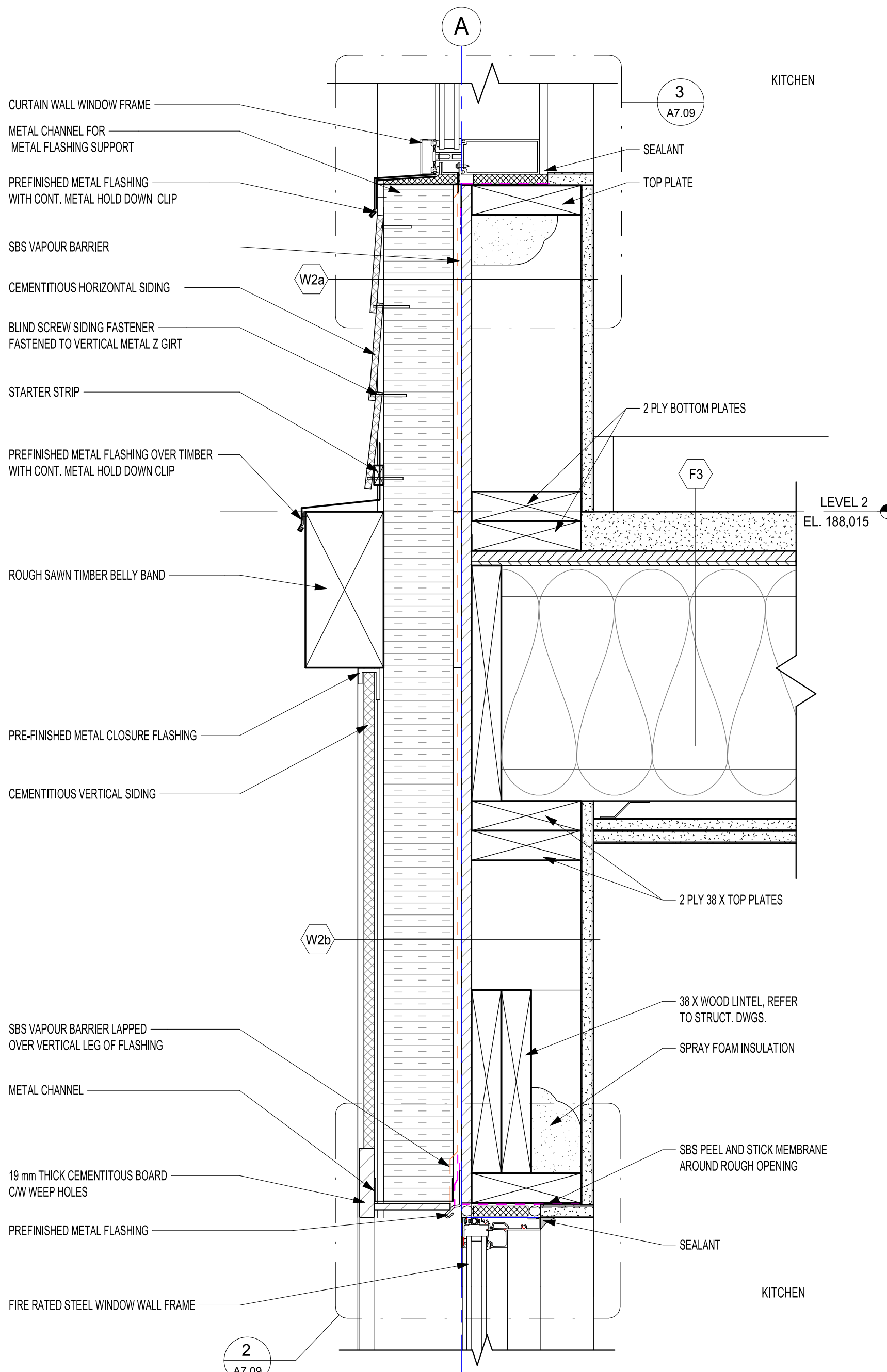
3 COLUMN DETAIL

SCALE: 1 : 10



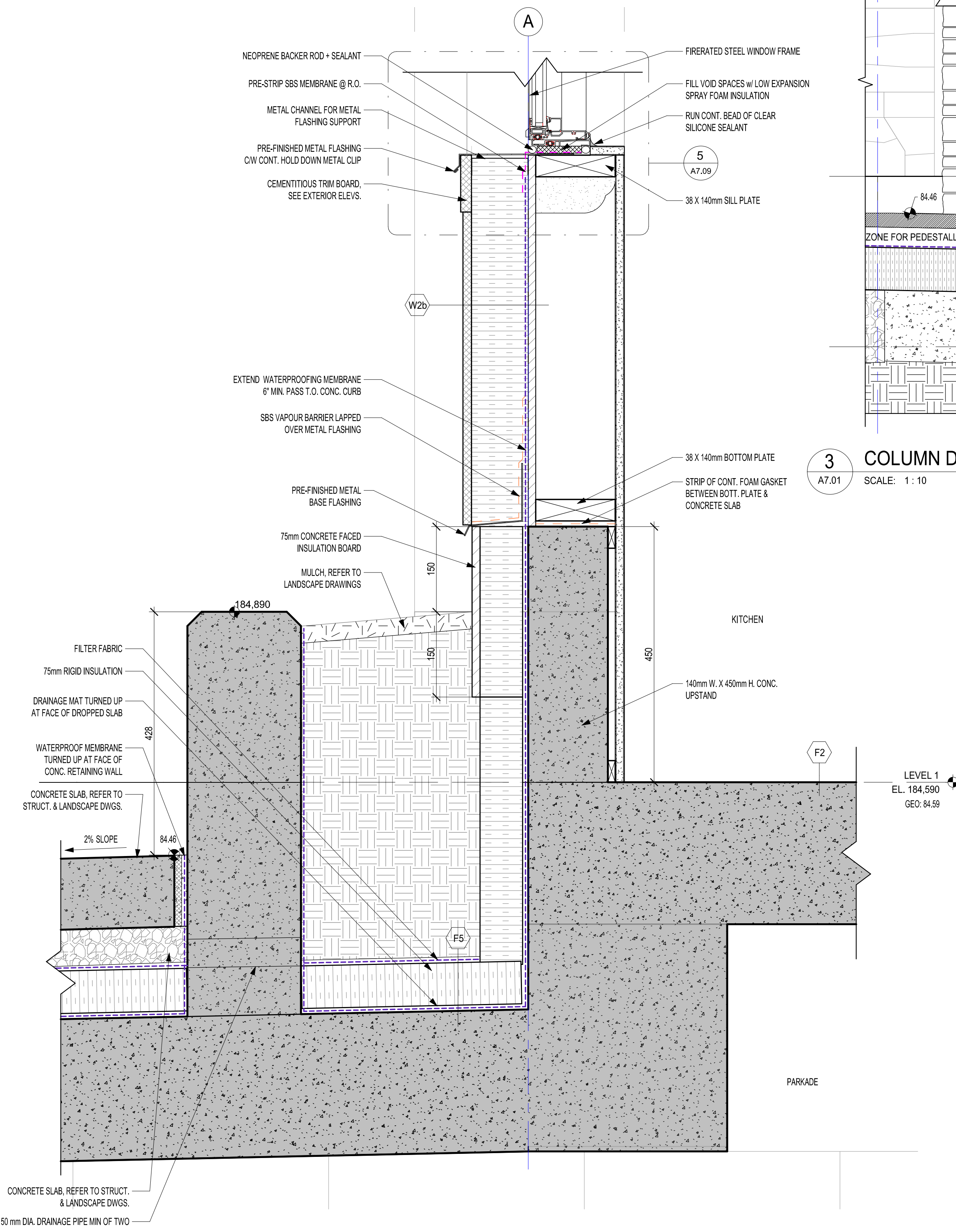
SECTION DETAIL @ DEMISING WALL & CONCRETE SLAB

SCALE: 1 : 5



SECTION DETAIL @ EXTERIOR WALL AND WINDOW SILL/HEAD

SCALE: 1 : 5



SECTION DETAIL @ DROPPED CONC. SLAB - NORTH SIDE

SCALE: 1 : 5



DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title / Titre du projet

**Banff National Park**  
**Banff, Alberta**  
**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by / Approuvé par  
AMINA OYAKHIOME  
Designed by / Conçue par  
PETER SCHULZ

Drawn by / Dessiné par  
BENNY MANCE / MARAL SAFARZADEH / SOPHIE SHOU  
Project Manager / Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager /  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

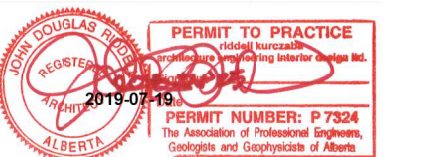
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du projet	Sheet / Feuille	Revision no. / La Revision no.
	A7.01	5







DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

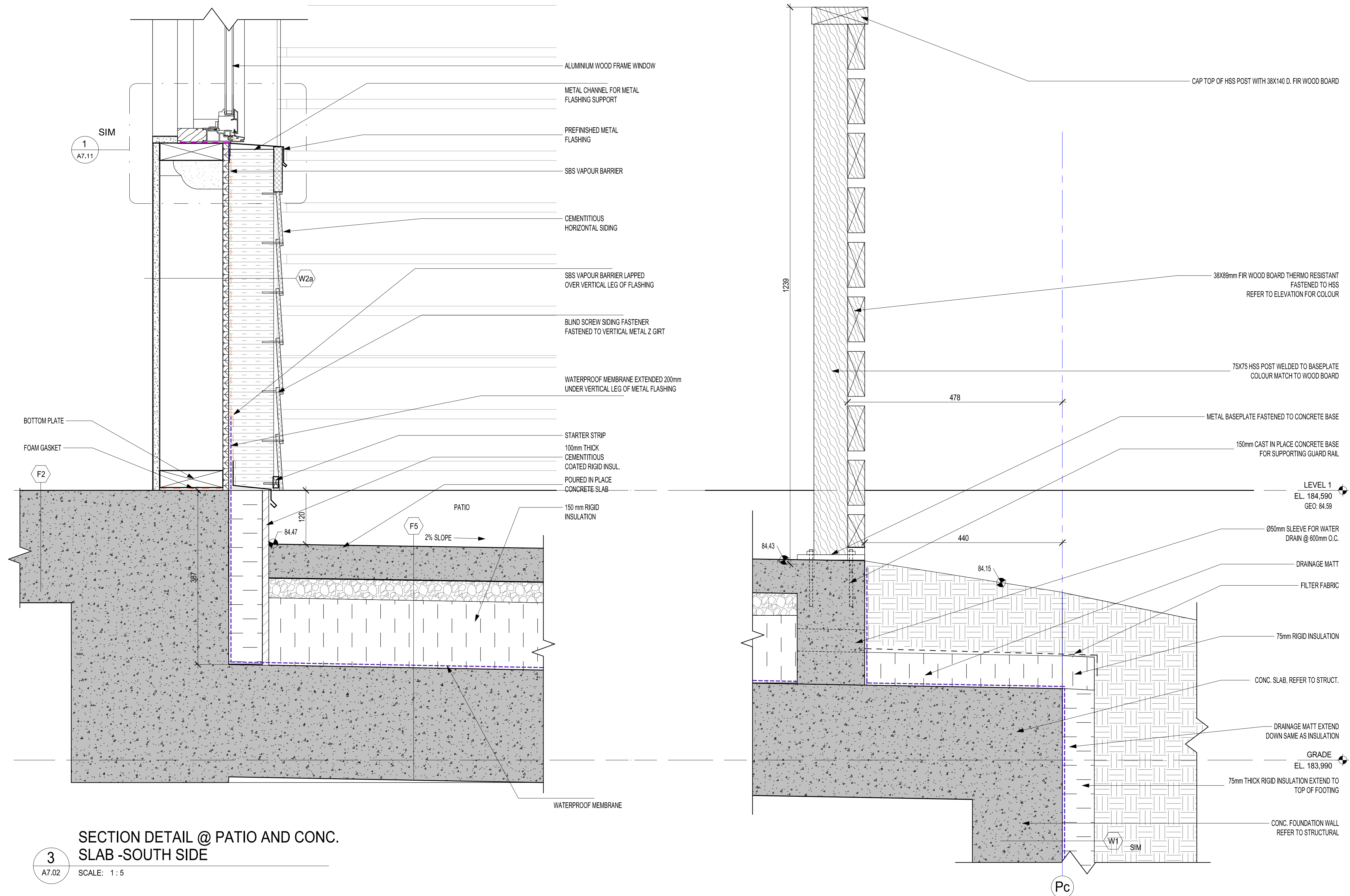
SECTION DETAILS

Project No. / No. du  
project

Sheet / Feuille  
A7.02

Revision no. /  
La Révision  
no.

5



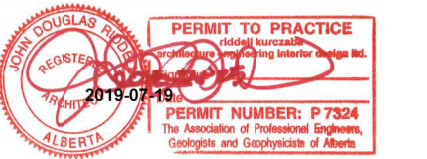
SECTION DETAIL @ PATIO AND CONC.  
SLAB - SOUTH SIDE

3

A7.02

SCALE: 1:5





DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHIOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

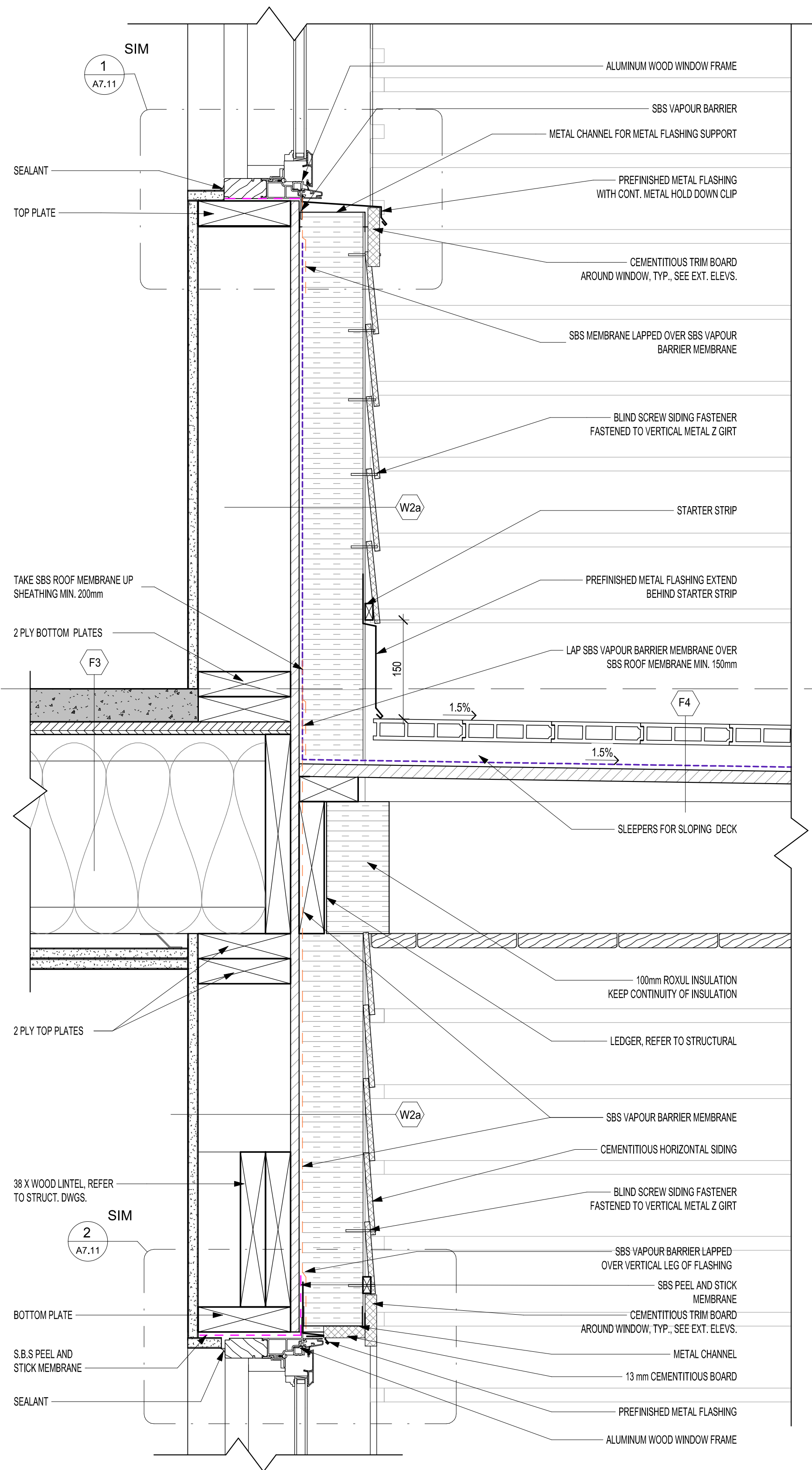
SECTION DETAILS

Project No. / No. du  
project

Sheet / Feuille  
A7.03

Revision no. /  
La Révision  
no.

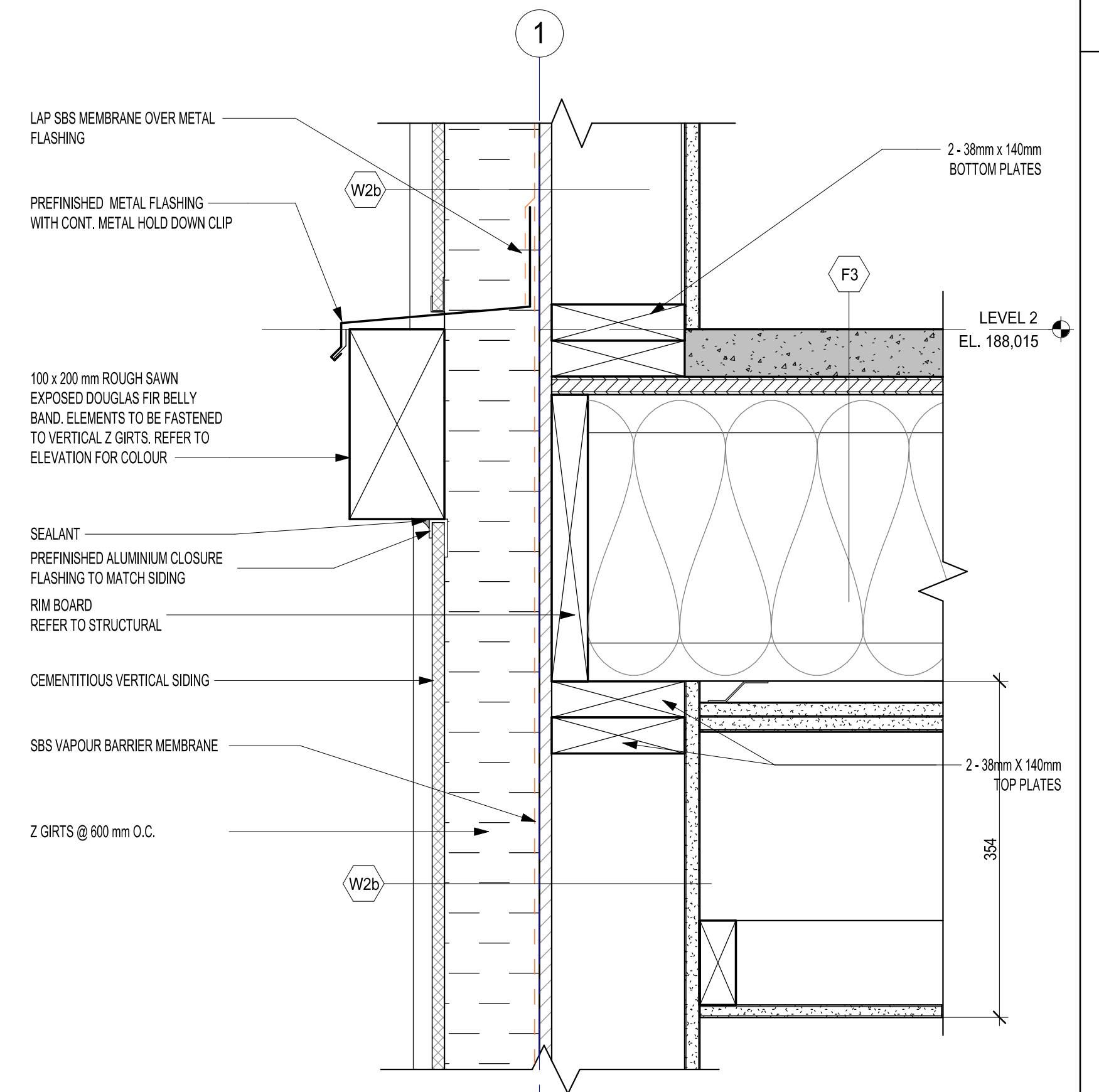
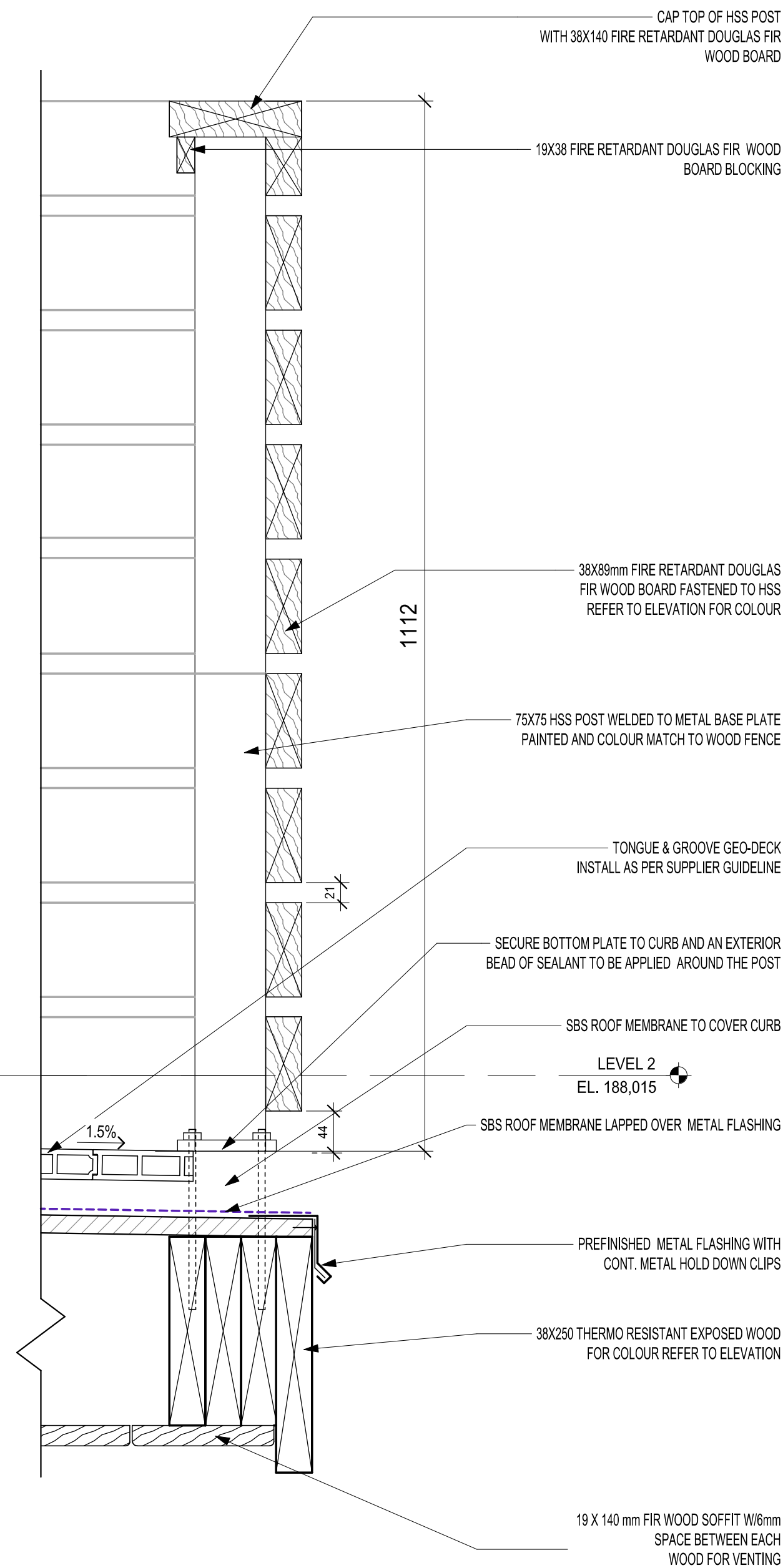
5



SECTION DETAIL @ BALCONY AND  
EXTERIOR WALL - SOUTH SIDE

1  
A7.03

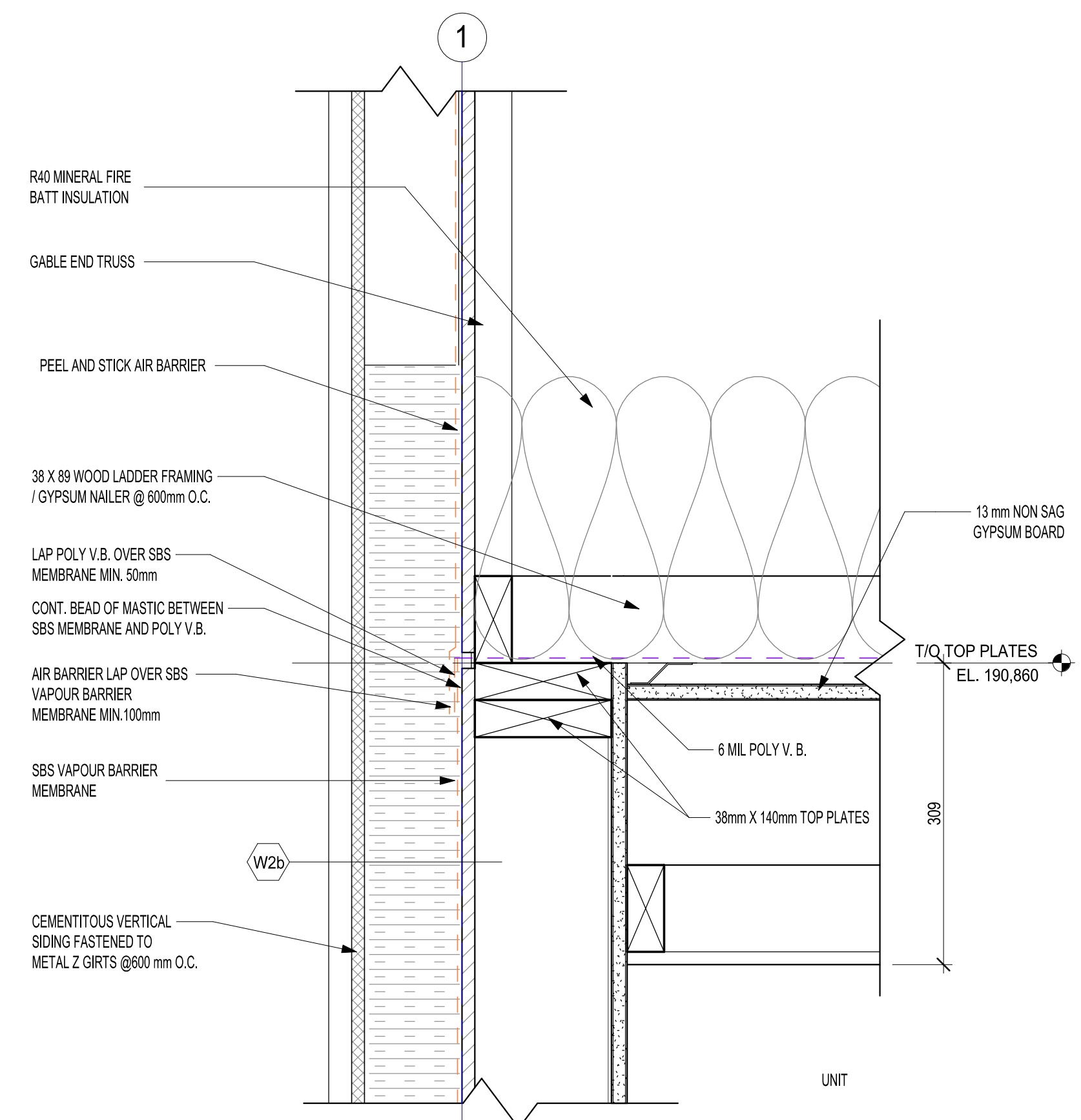
SCALE: 1 : 5



SECTION DETAIL @ EXTERIOR WALL AND  
FLOOR ASSEMBLY

3  
A7.03

SCALE: 1 : 5

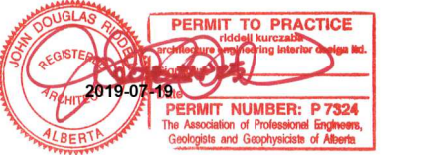


SECTION DETAIL @ ROOF AND EXTERIOR  
WALL ASSEMBLY - WEST SIDE

4  
A7.03

SCALE: 1 : 5





DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

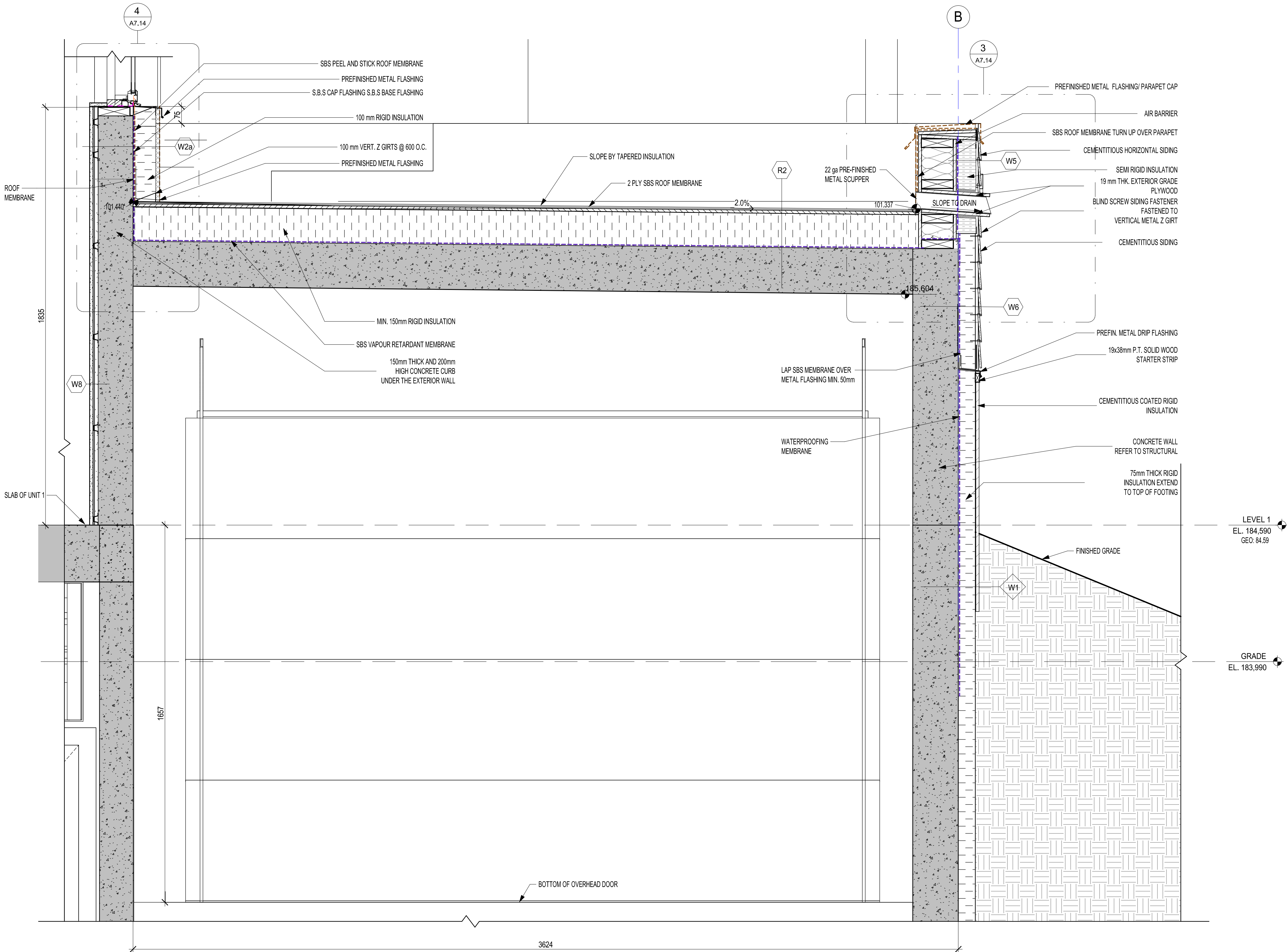
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du  
project

Sheet / Feuille  
**A7.04**

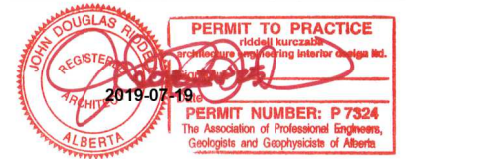
Revision no. /  
La Révision  
no.  
**5**



SECTION DETAIL @ UNIT 01, MAIN FLOOR  
SLAB & ROOF OVER THE PARKADE RAMP

1  
A7.04  
SCALE: 1 : 10





DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet  
**Banff National Park  
Banff, Alberta  
PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

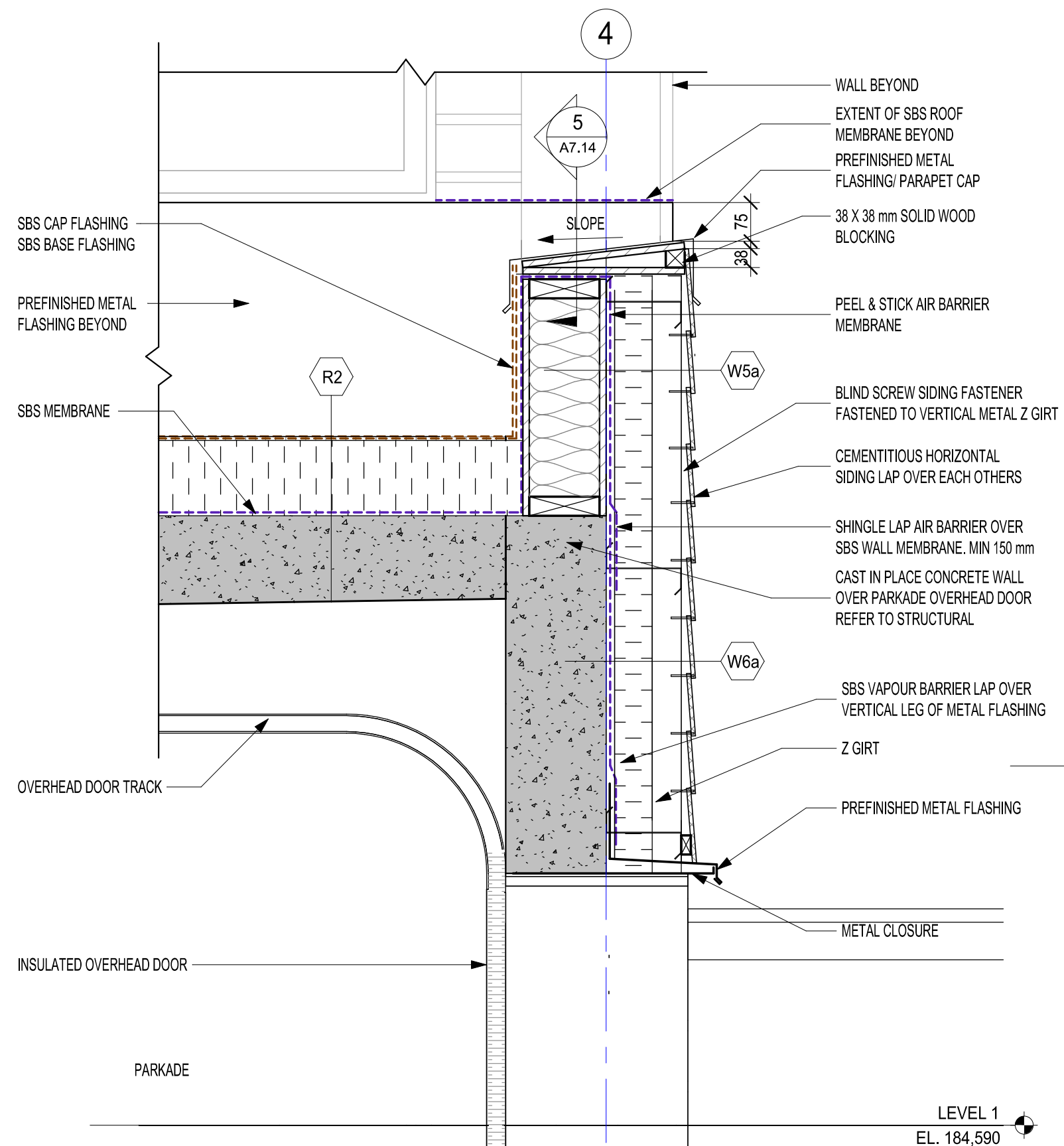
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du  
project

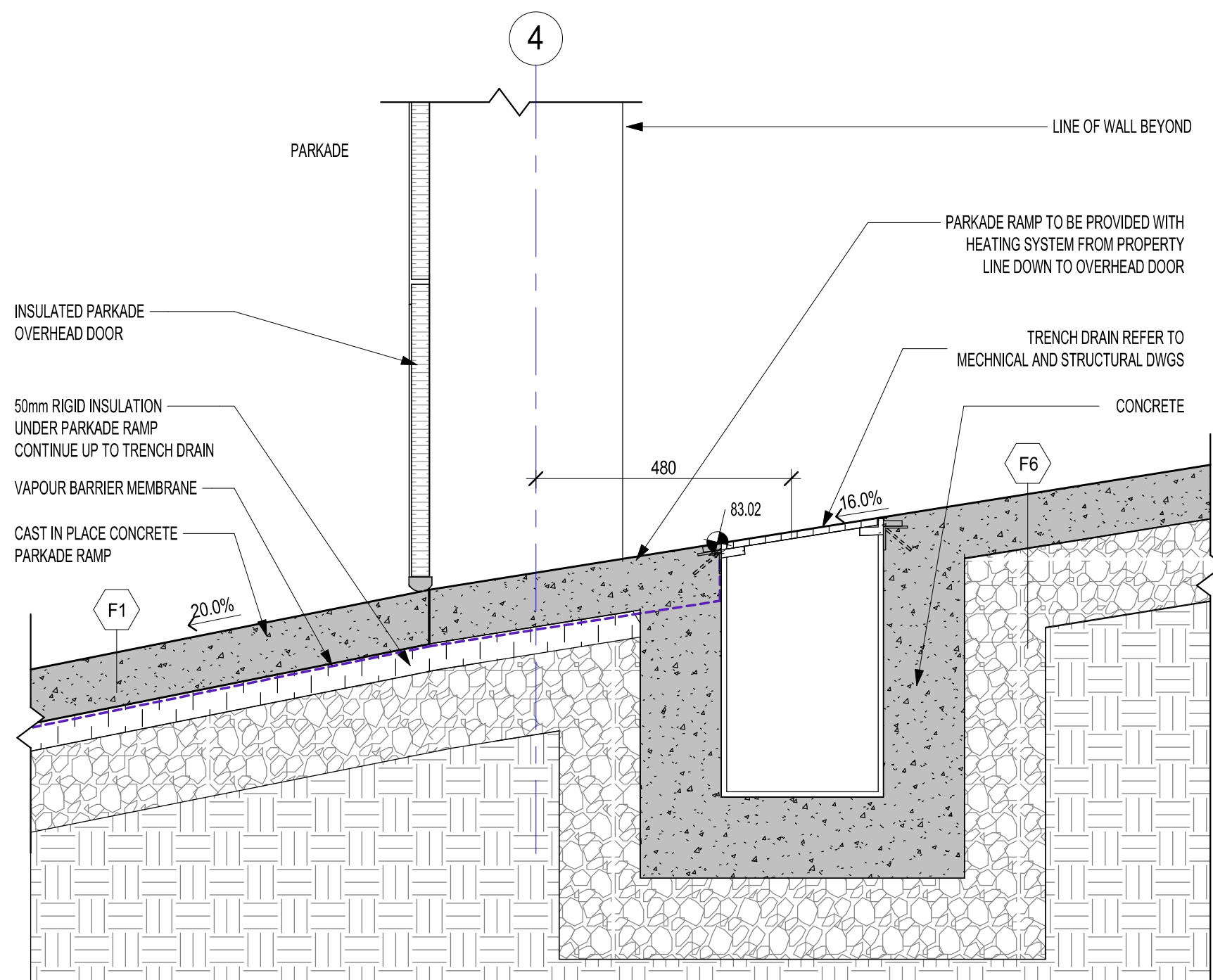
Sheet / Feuille  
**A7.05**

Revision no. /  
La Révision  
no.  
**5**



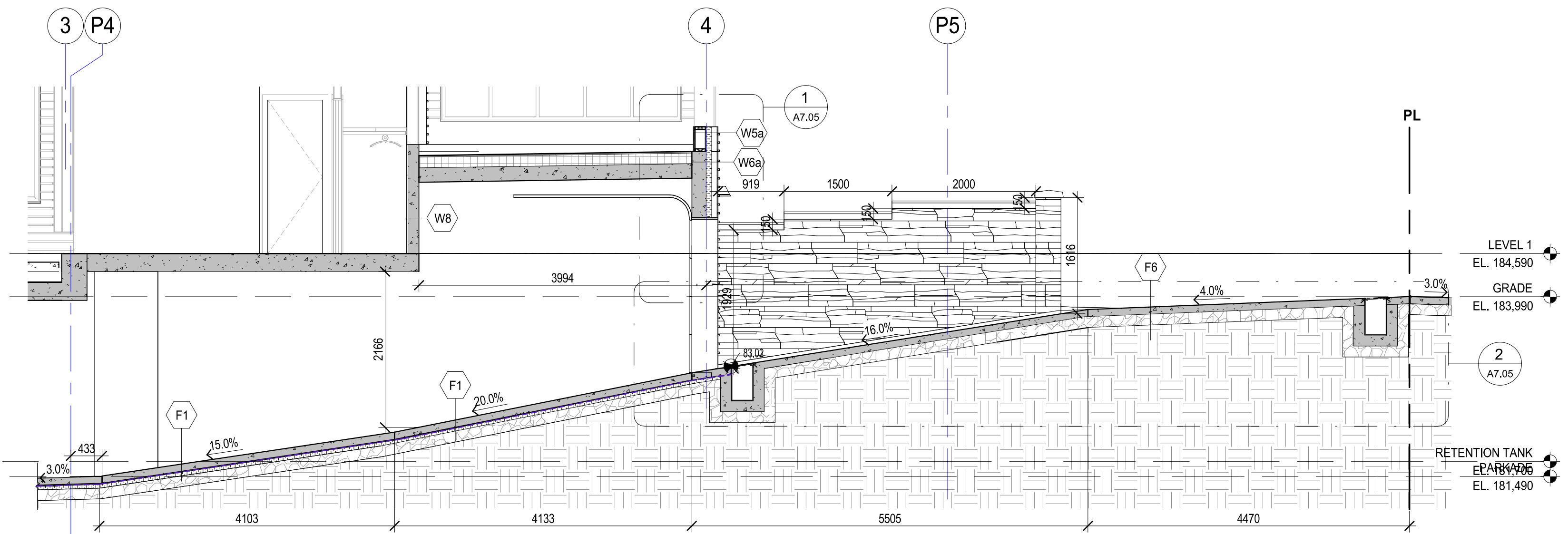
SECTION DETAIL @ TOP OF PARKADE  
OVERHEAD DOOR

SCALE: 1 : 10



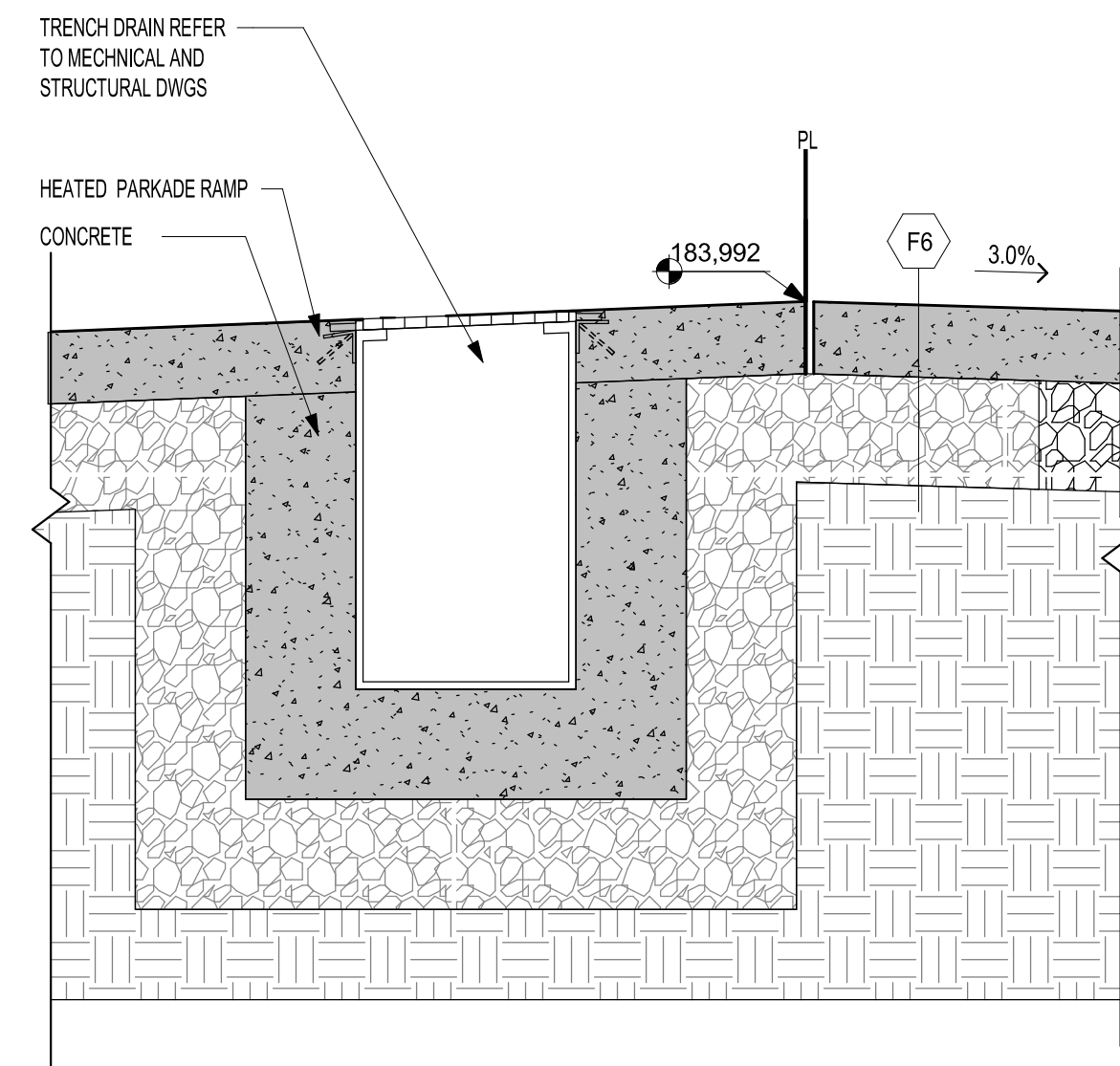
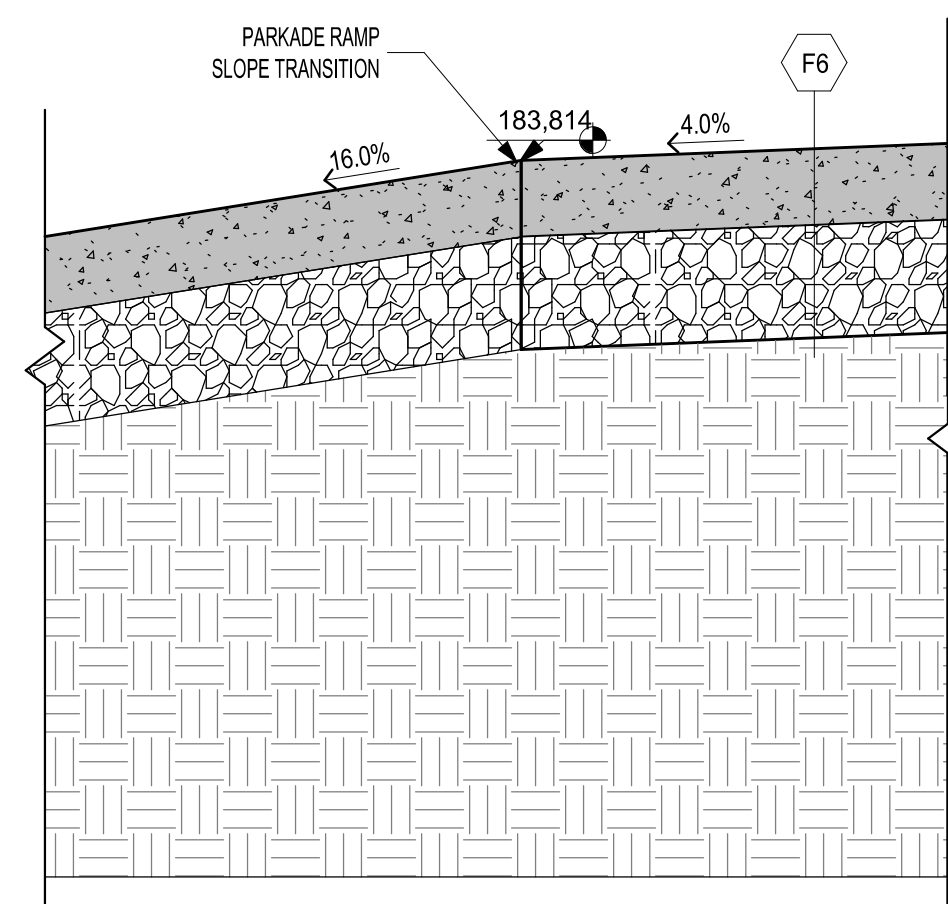
SECTION DETAIL @ PARKADE RAMP

SCALE: 1 : 10



PARKADE RAMP SECTION

SCALE: 1 : 50







**DO NOT SCALE**

4	ISSUED FOR TENDER / BP	19/07/19
3	99% IFC DRAWINGS	18/11/23
2	99% IFC DRAWING	18/03/16
1	60% IFC DRAWING	18/02/09
Revision / Revision	Description / Description	Date / Date

Client / client



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par

AMINA OYAKHILOME

Designed by/Concept par  
DETROIT COLLEGE

\_\_\_\_\_

BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOL

Project Manager/Administrateur de Projets

LAURIE MACDONALD

Architectural and Engineering Resources Manager  
Ressources Architectural et de Directeur d'Ingé

---

Parks Canada

Drawing title / Titre du dessin

PLAN AND SECTION DET

Project No. / No. du projet	Sheet / Feuille
-----------------------------	-----------------

## Abstract

A7.06

[illegible]

\_\_\_\_\_





DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
2	ISSUED FOR TENDER / BP	19/07/19
1	99% IFC DRAWINGS	18/11/28

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

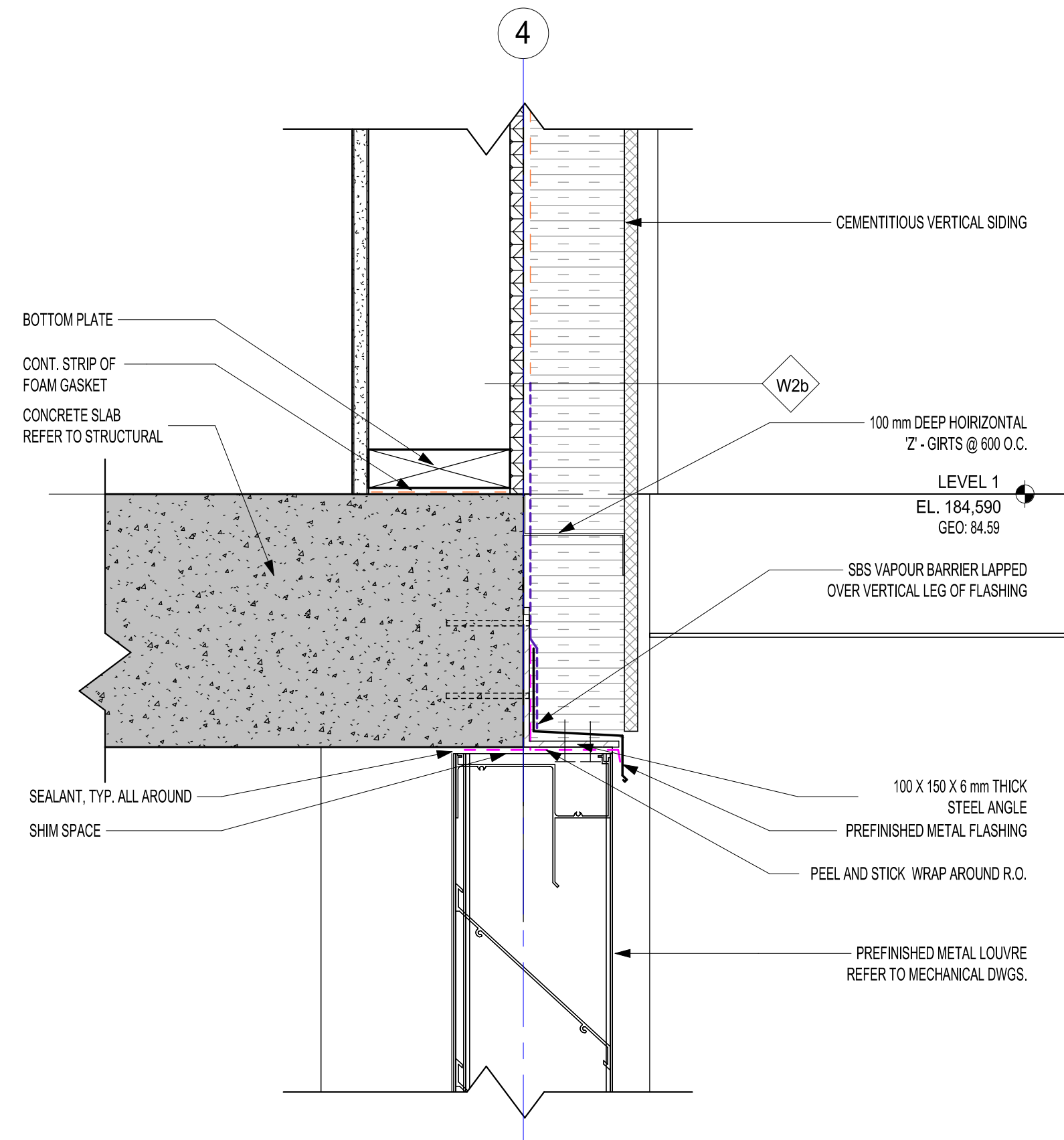
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du  
project

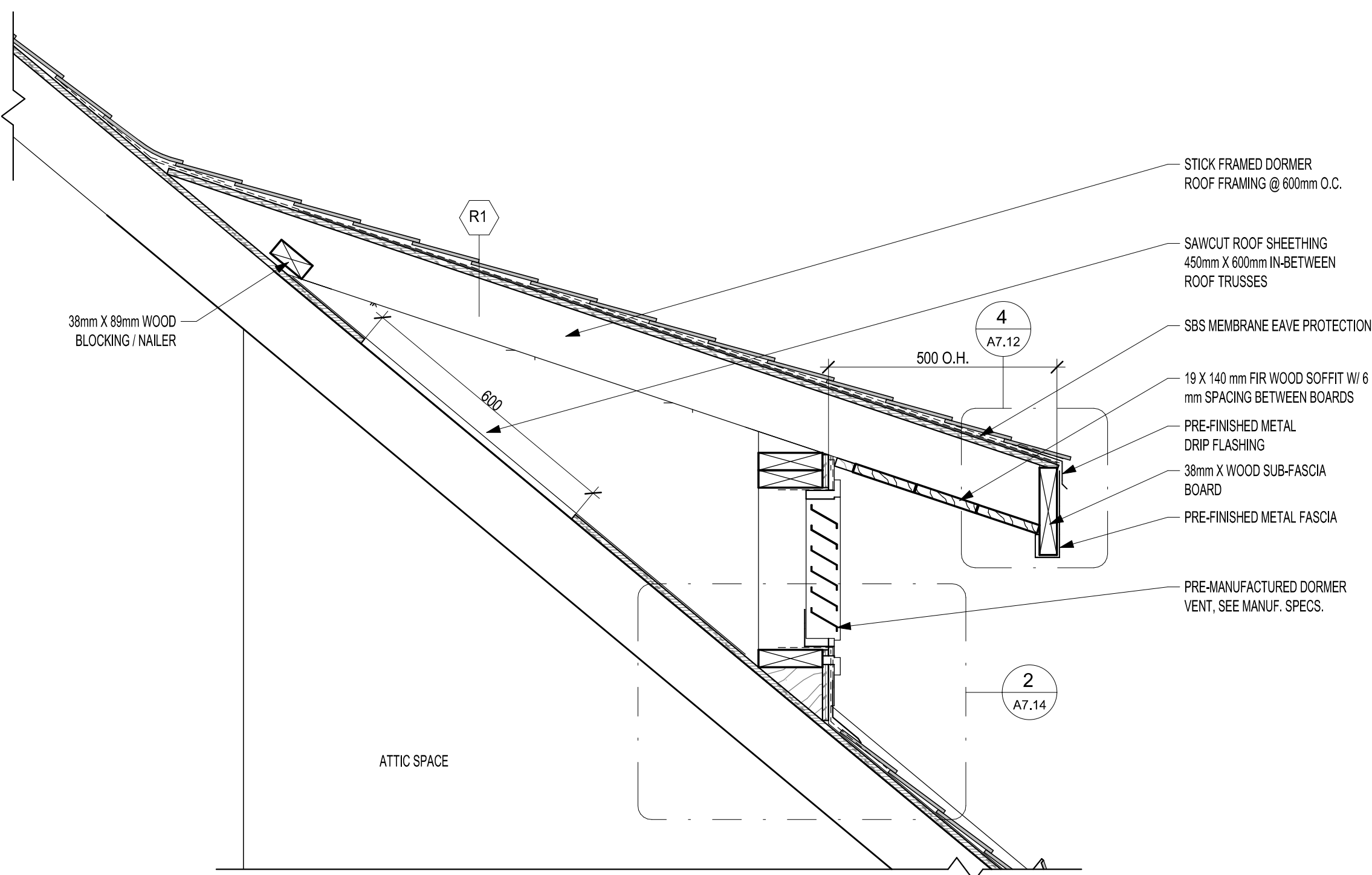
Sheet / Feuille  
A7.07

Revision no. /  
La Révision  
no.  
2



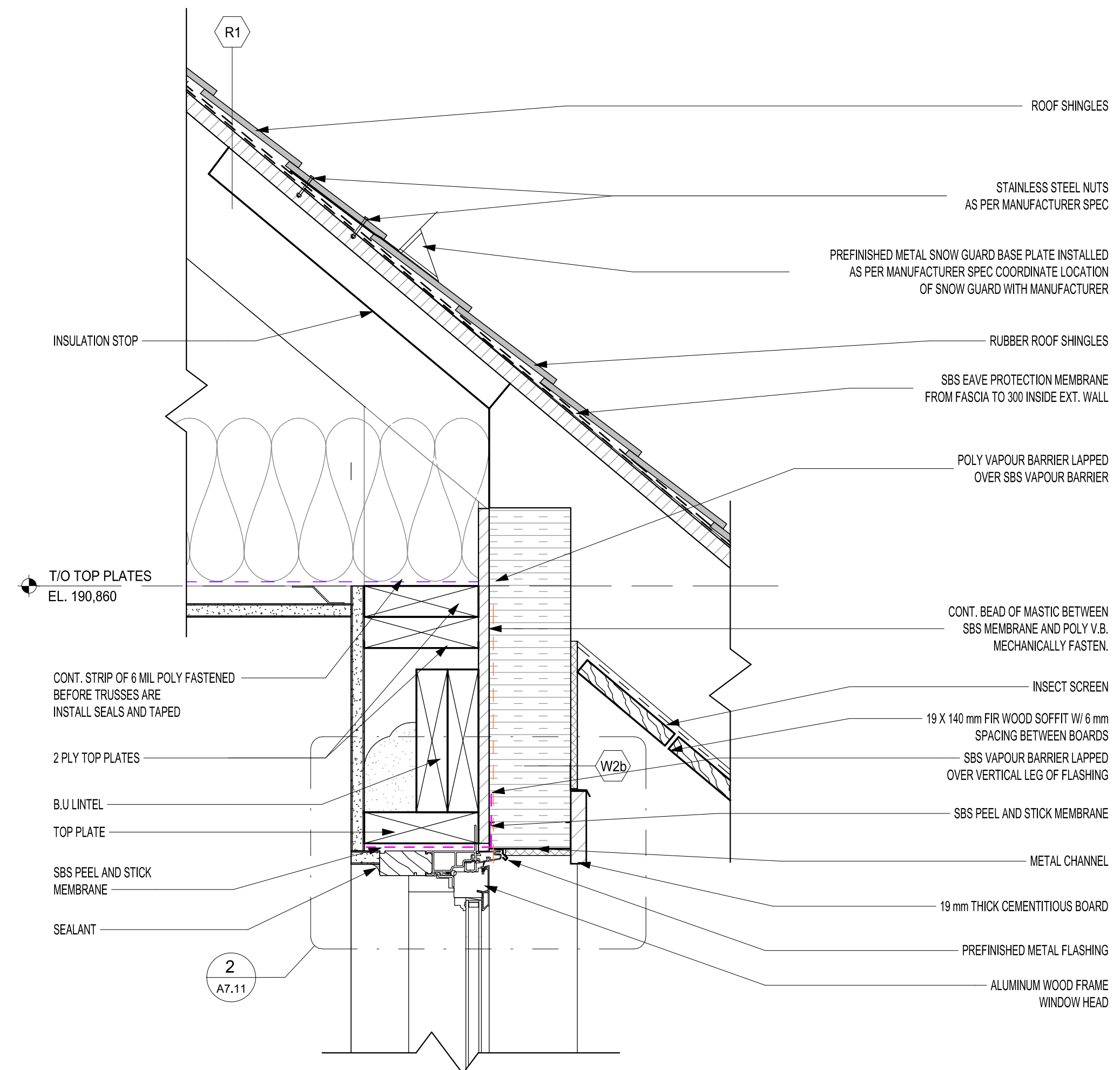
SECTION DETAIL @ LOUVRE HEAD AND  
CONCRETE SLAB

SCALE: 1 : 5



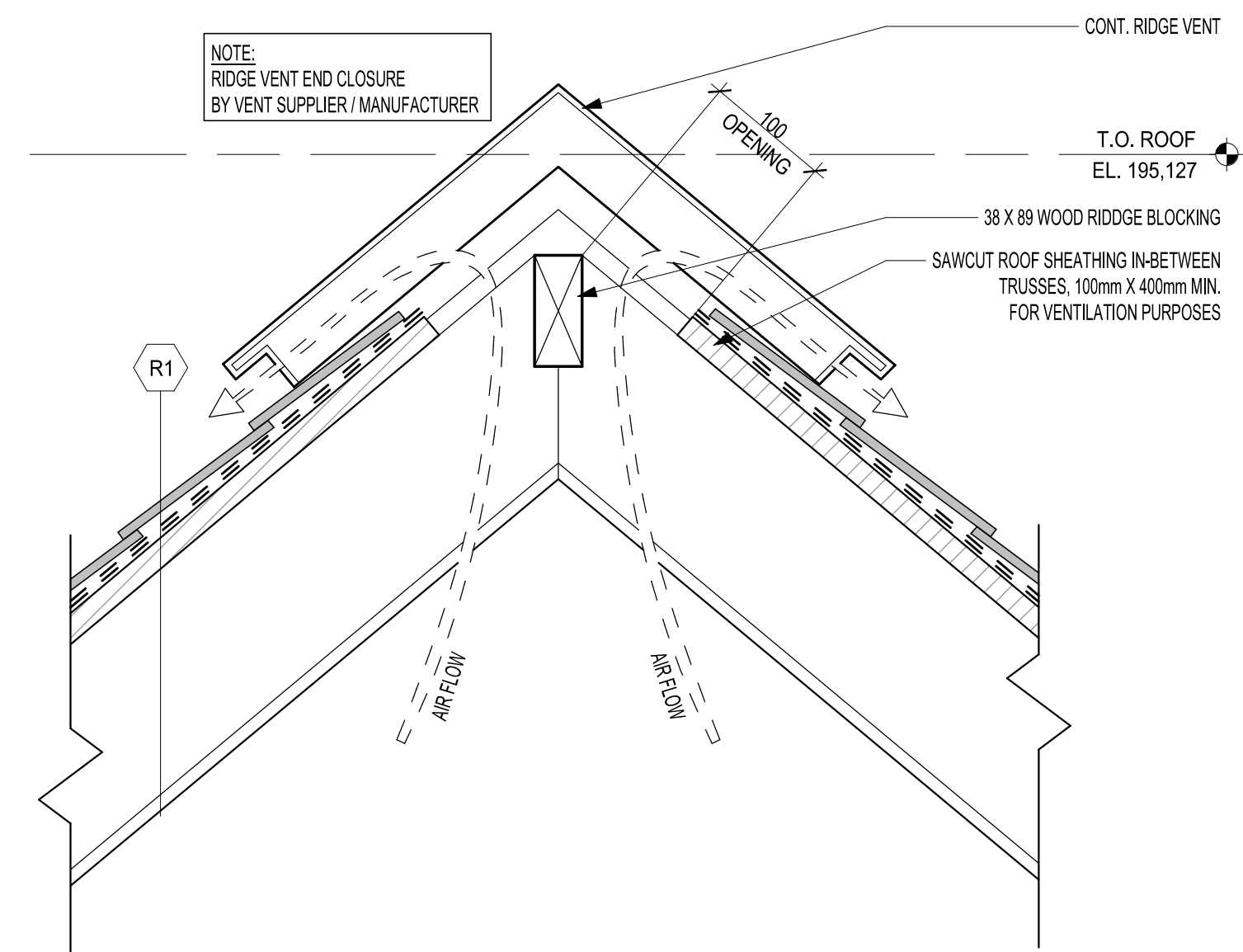
DORMER DETAIL

SCALE: 1 : 10



SECTION DETAIL @ ROOF AND EXTERIOR  
WALL ASSEMBLY

SCALE: 1 : 5



SECTION DETAIL @ RIDGE OF THE ROOF

SCALE: 1 : 5





DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
2	ISSUED FOR TENDER / BP	19/07/19
1	99% IFC DRAWINGS	18/11/28

Client / client



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHIOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

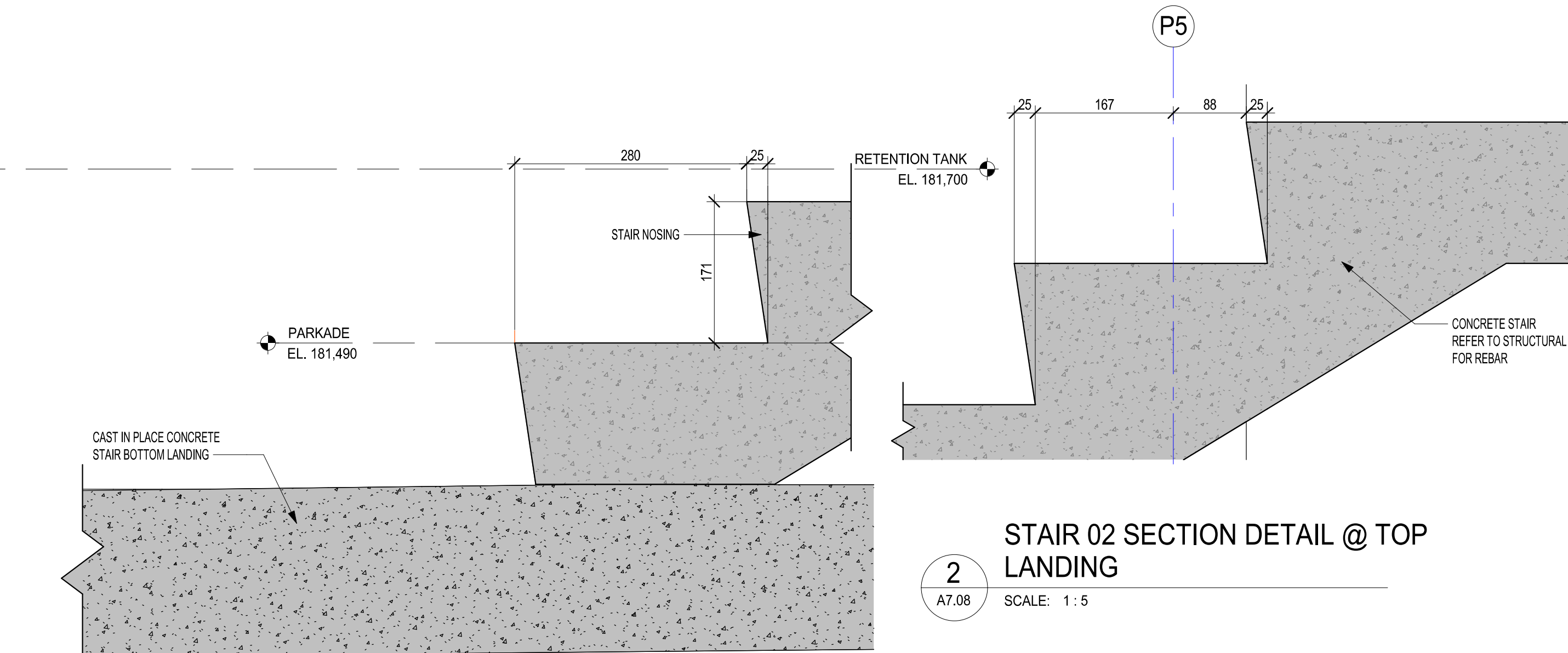
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du  
project

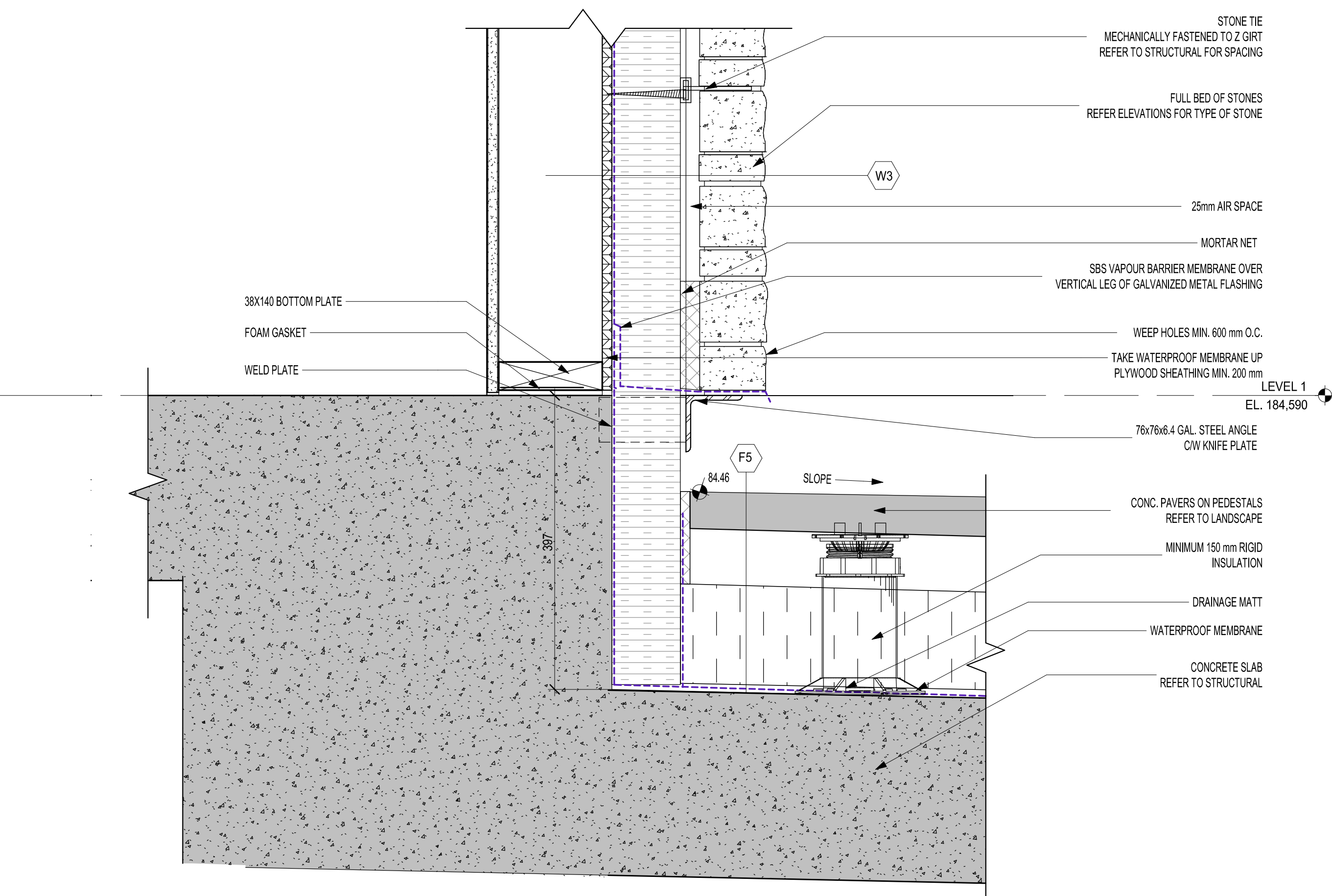
Sheet / Feuille  
**A7.08**

Revision no. /  
La Révision  
no.  
**2**

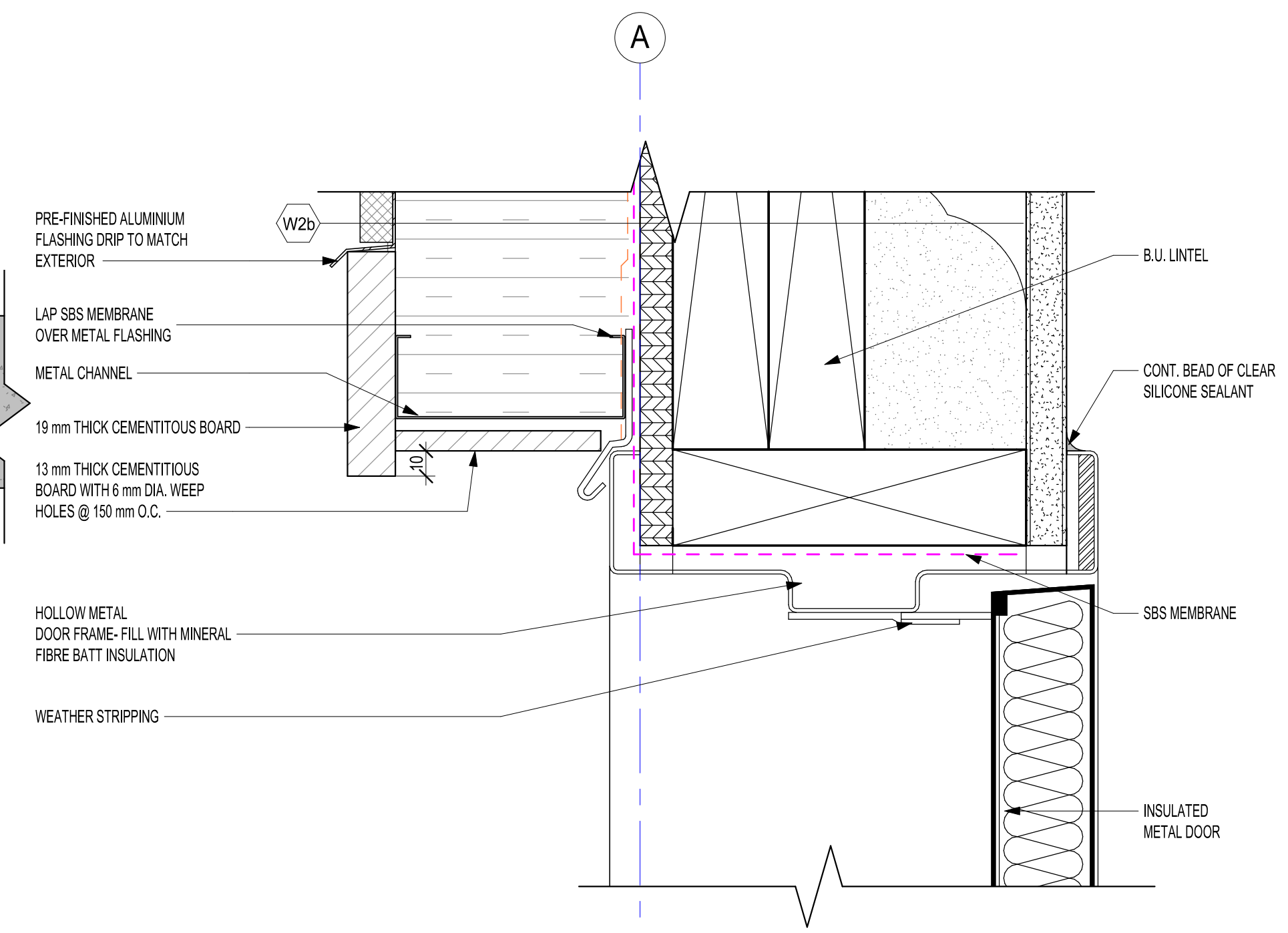


**2**  
A7.08  
**STAIR 02 SECTION DETAIL @ TOP  
LANDING**  
SCALE: 1 : 5

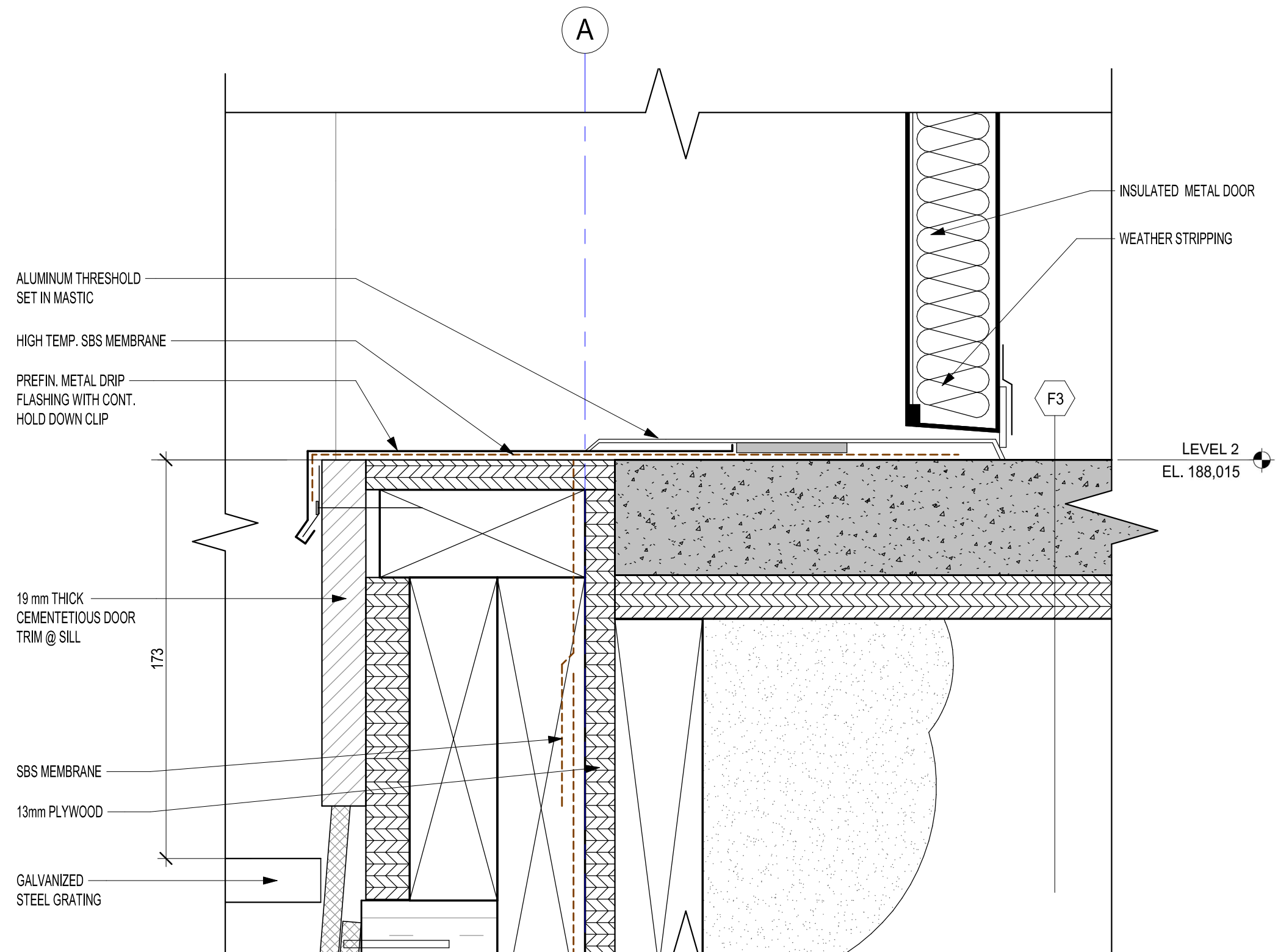
**1**  
A7.08  
**STAIR 02 SECTION DETAIL @ BOTTOM  
LANDING**  
SCALE: 1 : 5



**3**  
A7.08  
**SECTION DETAIL @ STONES**  
SCALE: 1 : 5



**4**  
A7.08  
**SECTION DETAIL @ DOOR HEADER**  
SCALE: 1 : 2



**5**  
A7.08  
**SECTION DETAIL DOOR SILL**  
SCALE: 1 : 2





DO NOT SCALE


2	ISSUED FOR TENDER / BP	19/07/19
1	99% IFC DRAWINGS	18/11/28

Revision / Revisión	Description / Description	Date / Date
Client / client		



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

**Parks Canada**

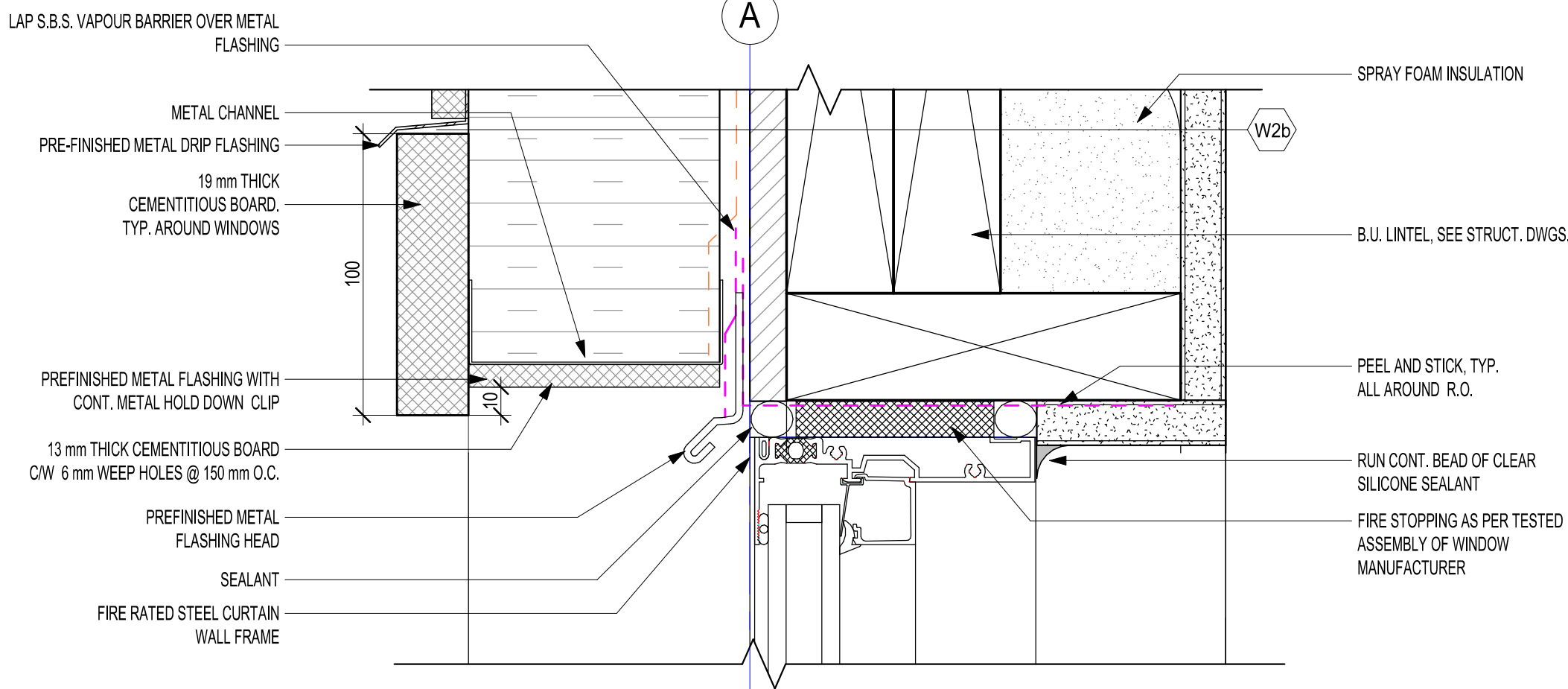
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
---------------------------------	-----------------	--------------------------------------

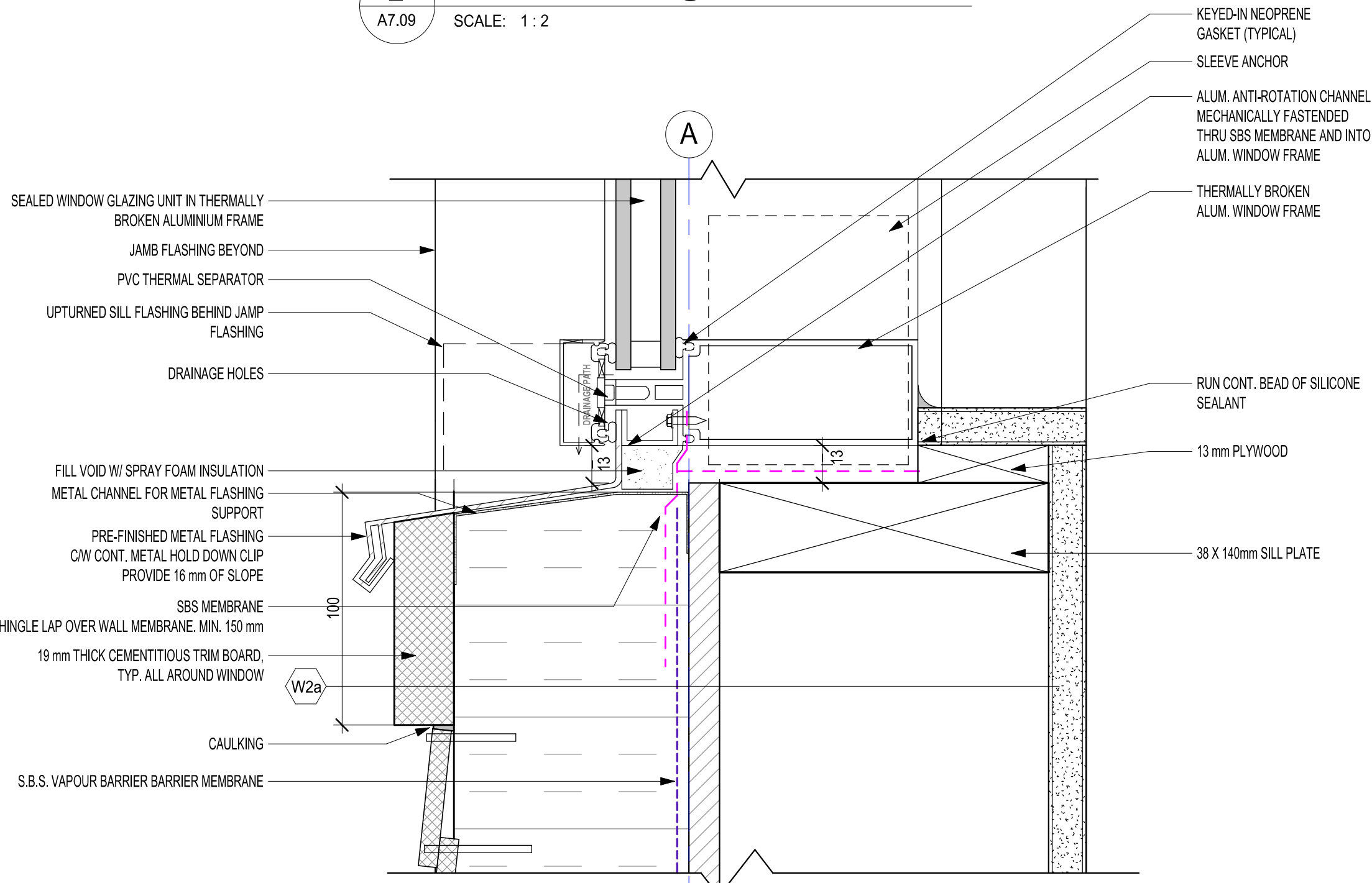
A7.09

2



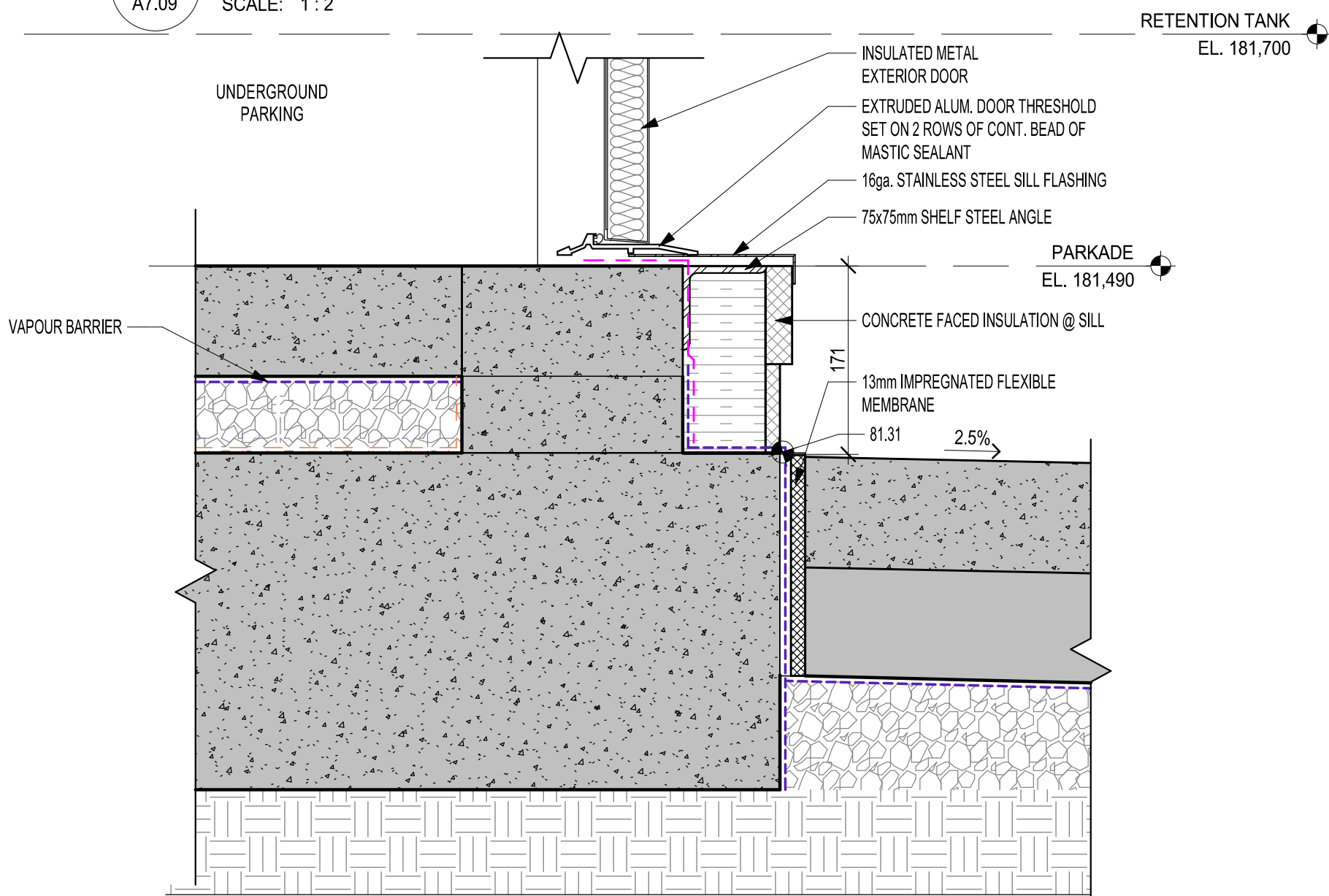
## FIRE RATED STEEL CURTAIN WALL FRAME DETAIL @ WINDOW HEAD

2  
A7.09 SCALE: 1 : 2



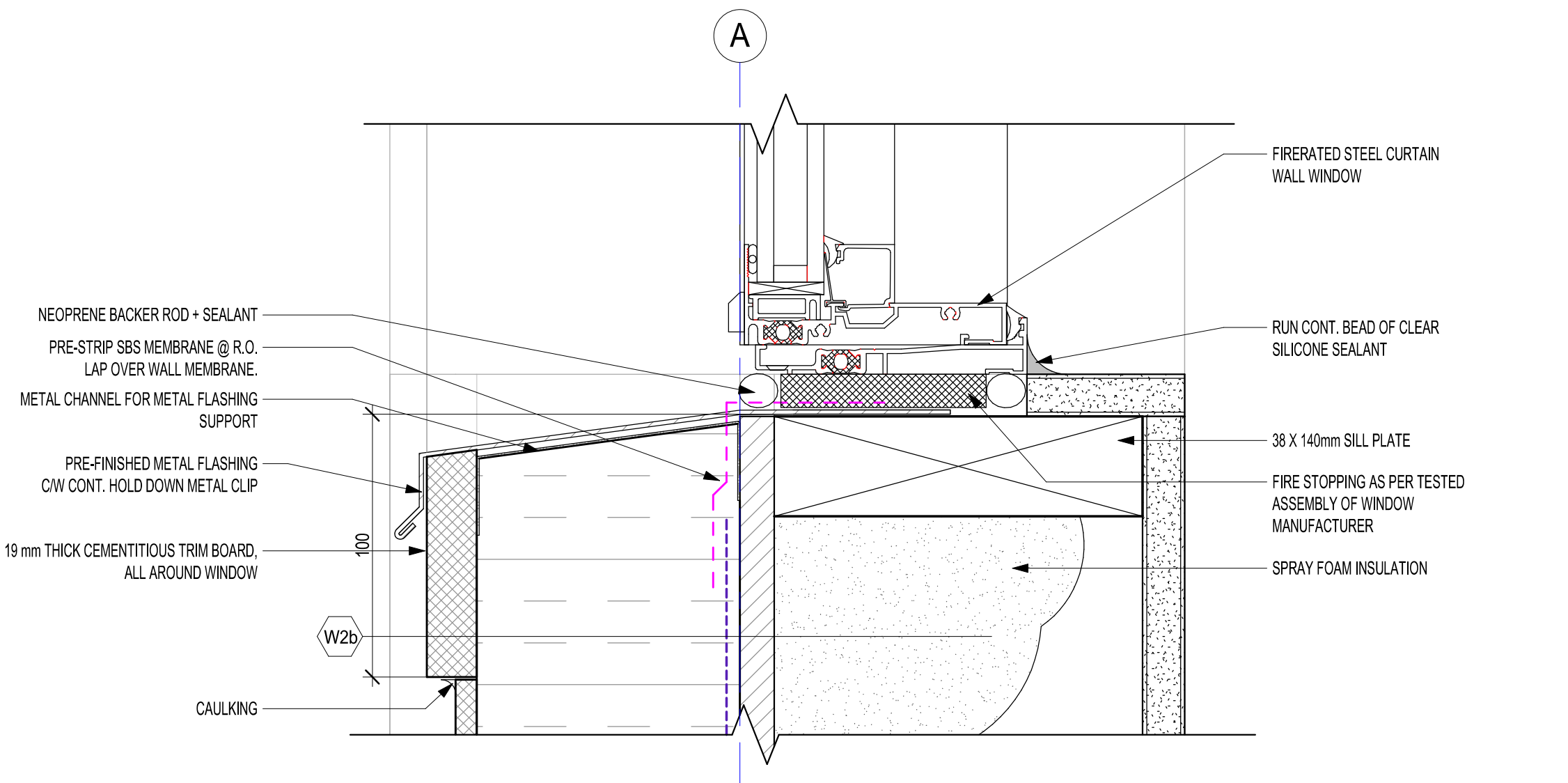
## CURTAIN WALL FRAME SECTION DETAIL @ WINDOW SILL

3  
A7.09 SCALE: 1 : 2



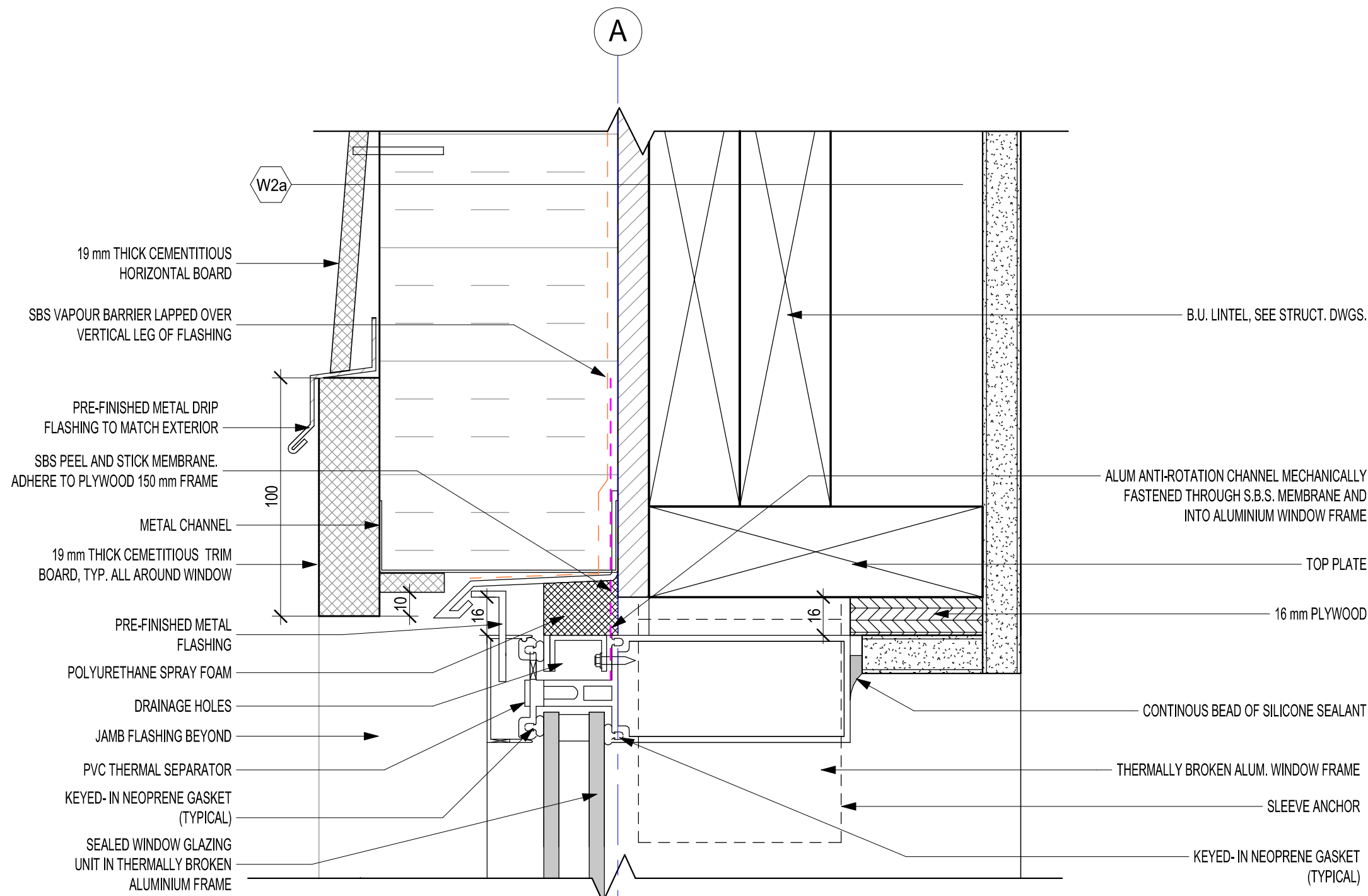
## SECTION DETAIL @ EXIT DOOR SILL

4  
A7.09 SCALE: 1 : 5



## FIRE RATED STEEL CURTAIN WALL FRAME WINDOW SILL

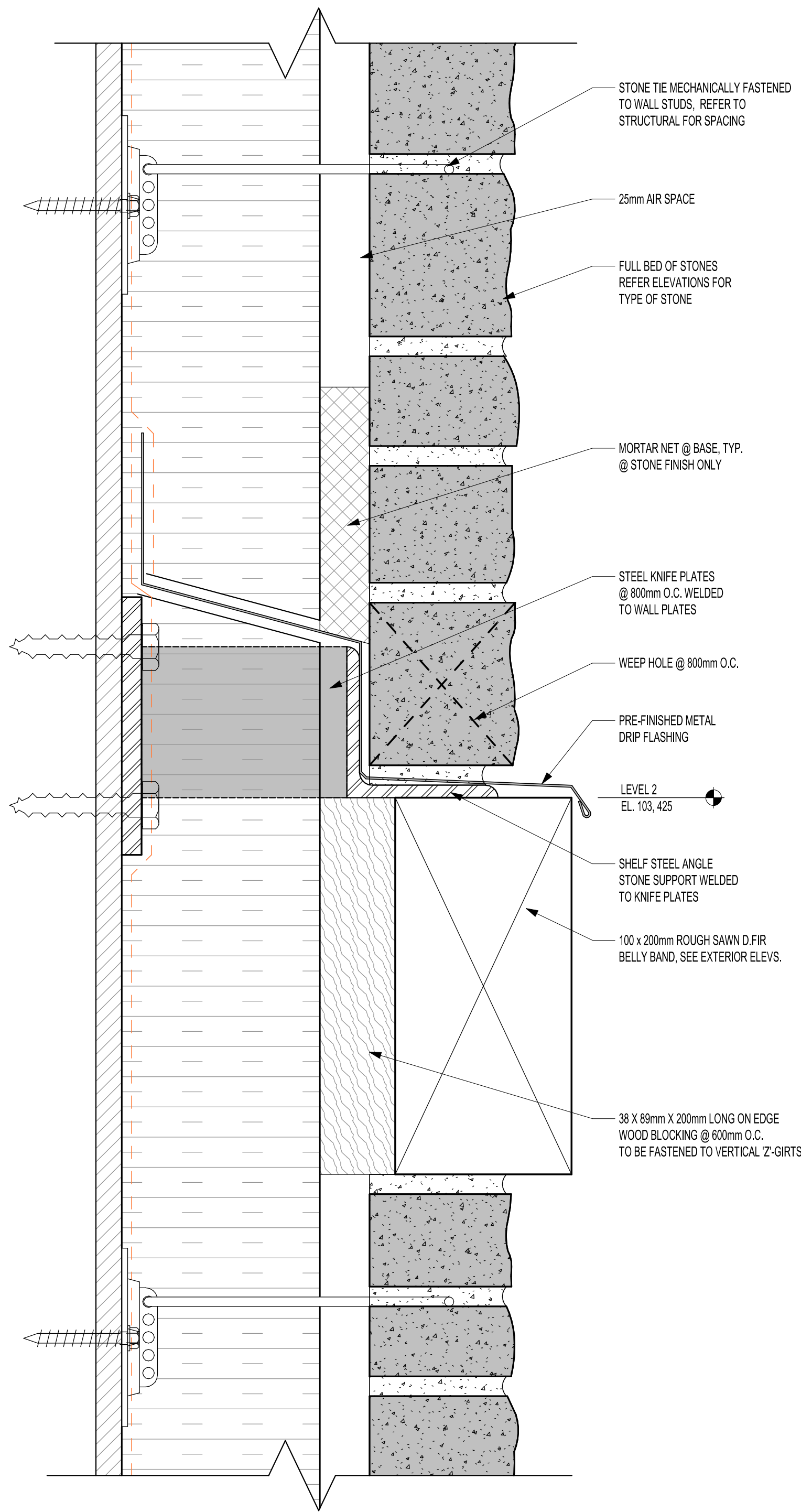
5  
A7.09 SCALE: 1 : 2



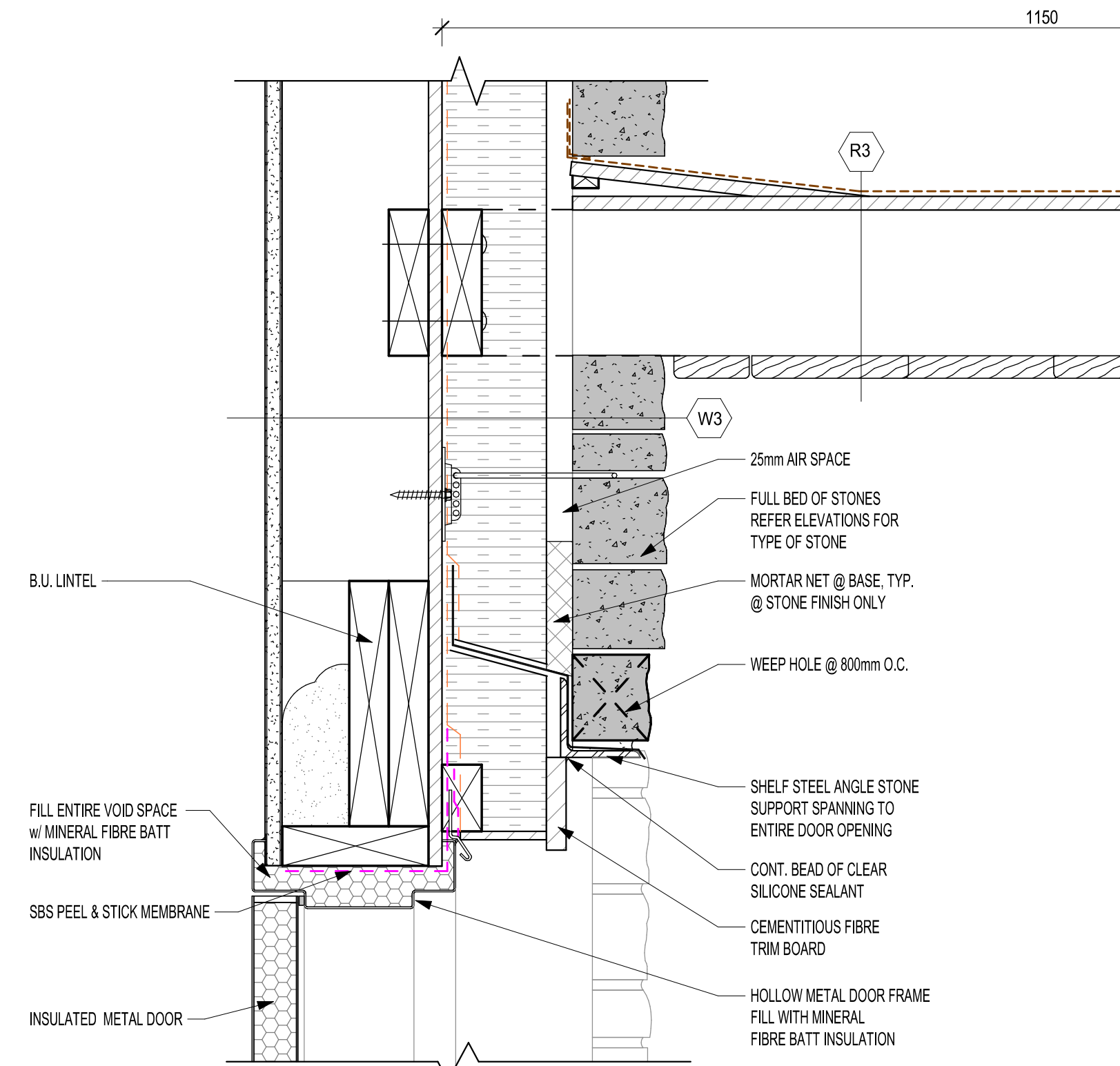
## CURTAIN WALL FRAME SECTION DETAIL WINDOW HEAD

1  
A7.09 SCALE: 1 : 2

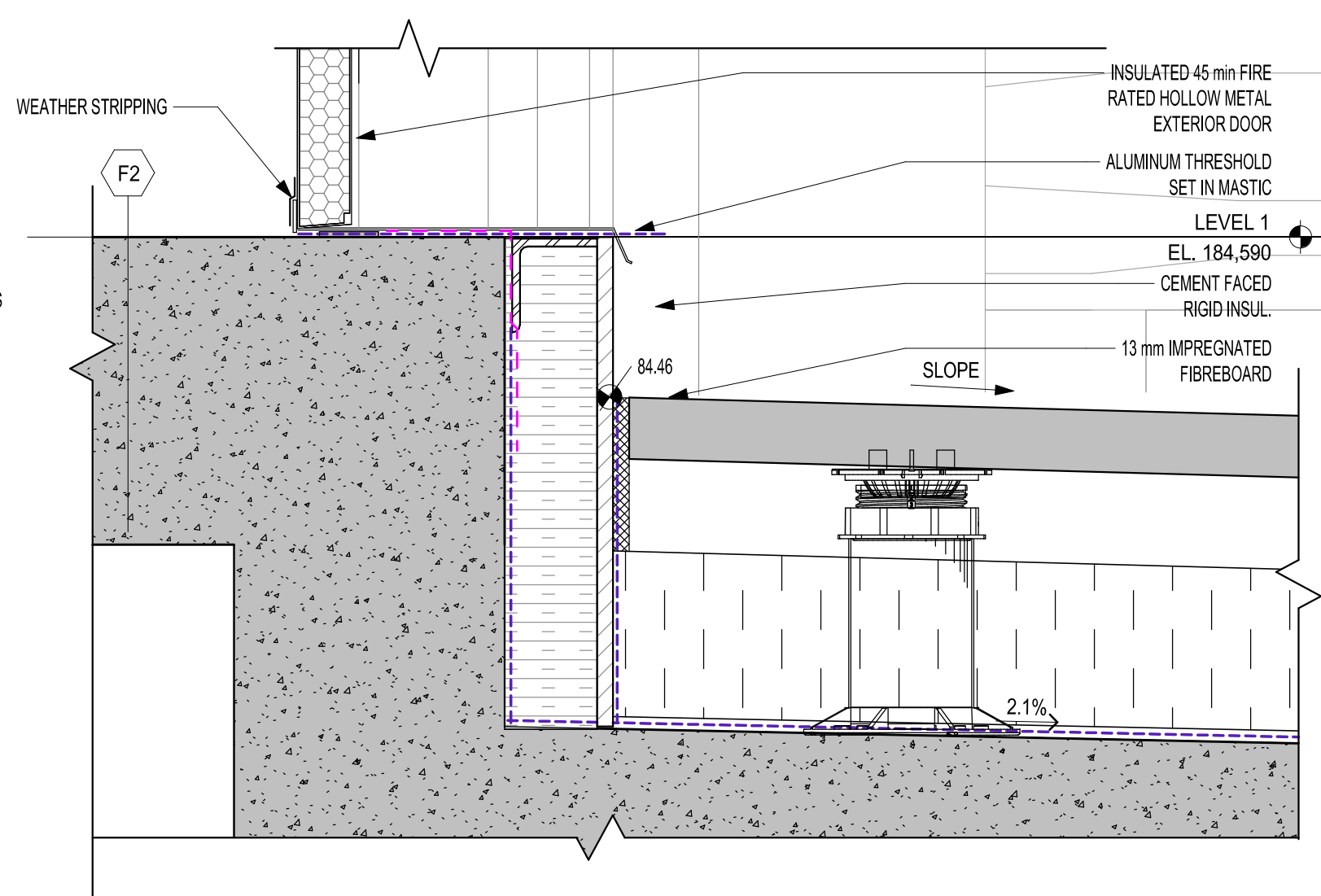




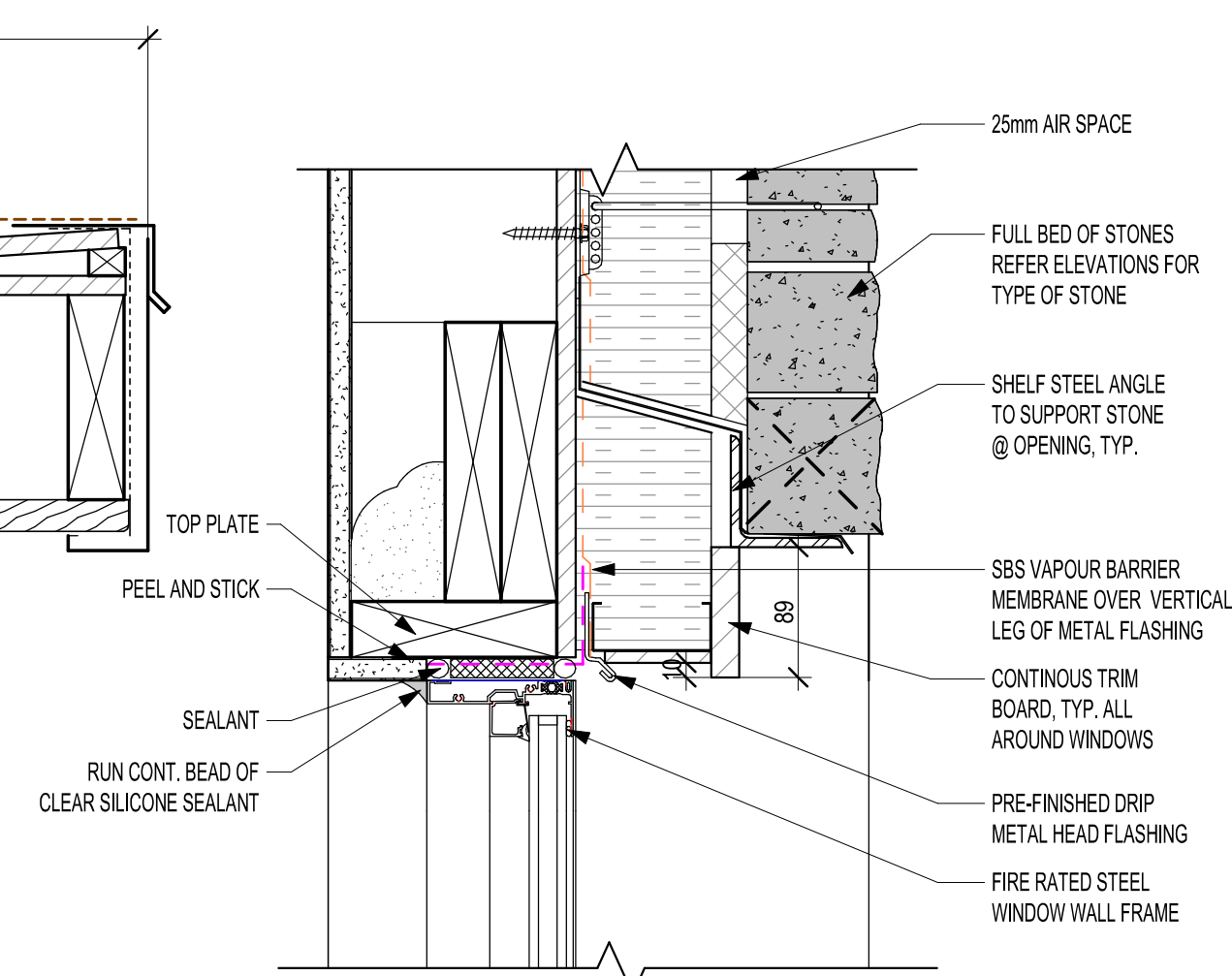
5 BELLY BAND SECTION DETAIL @ STONE  
A7.10 SCALE: 1:2



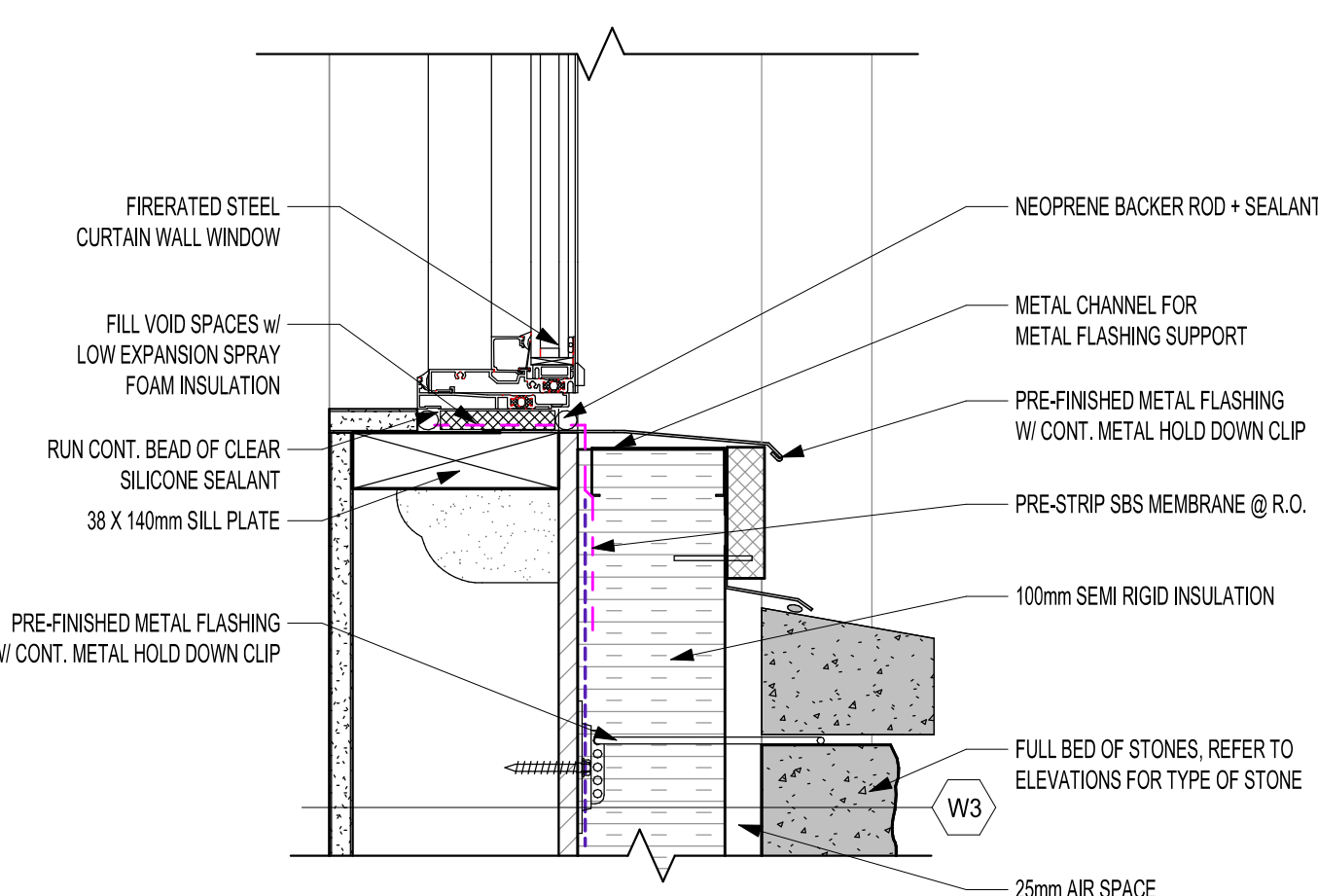
3 45 MIN FIRE RATED HOLLOW METAL DOOR HEAD  
A7.10 SCALE: 1:5



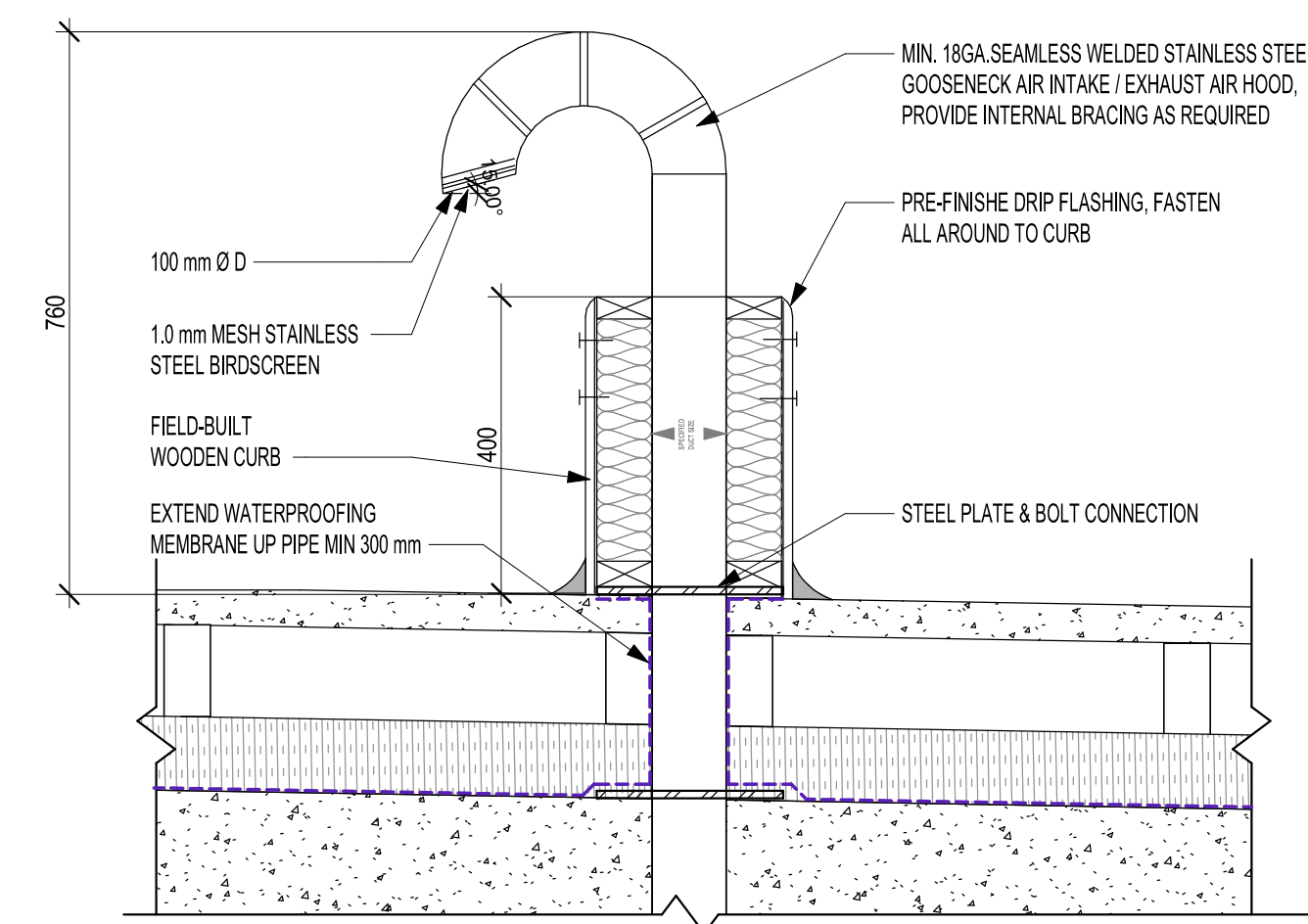
4 45 MIN FIRE RATED HOLLOW METAL DOOR SILL  
A7.10 SCALE: 1:5



1 FIRE RATED CURTAIN WALL FRAME WINDOW HEAD  
A7.10 SCALE: 1:5



2 FIRE RATE CURTAIN WALL FRAME WINDOW SILL  
A7.10 SCALE: 1:5



6 GOOSENECK DETAIL  
A7.10 SCALE: 1:10



DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



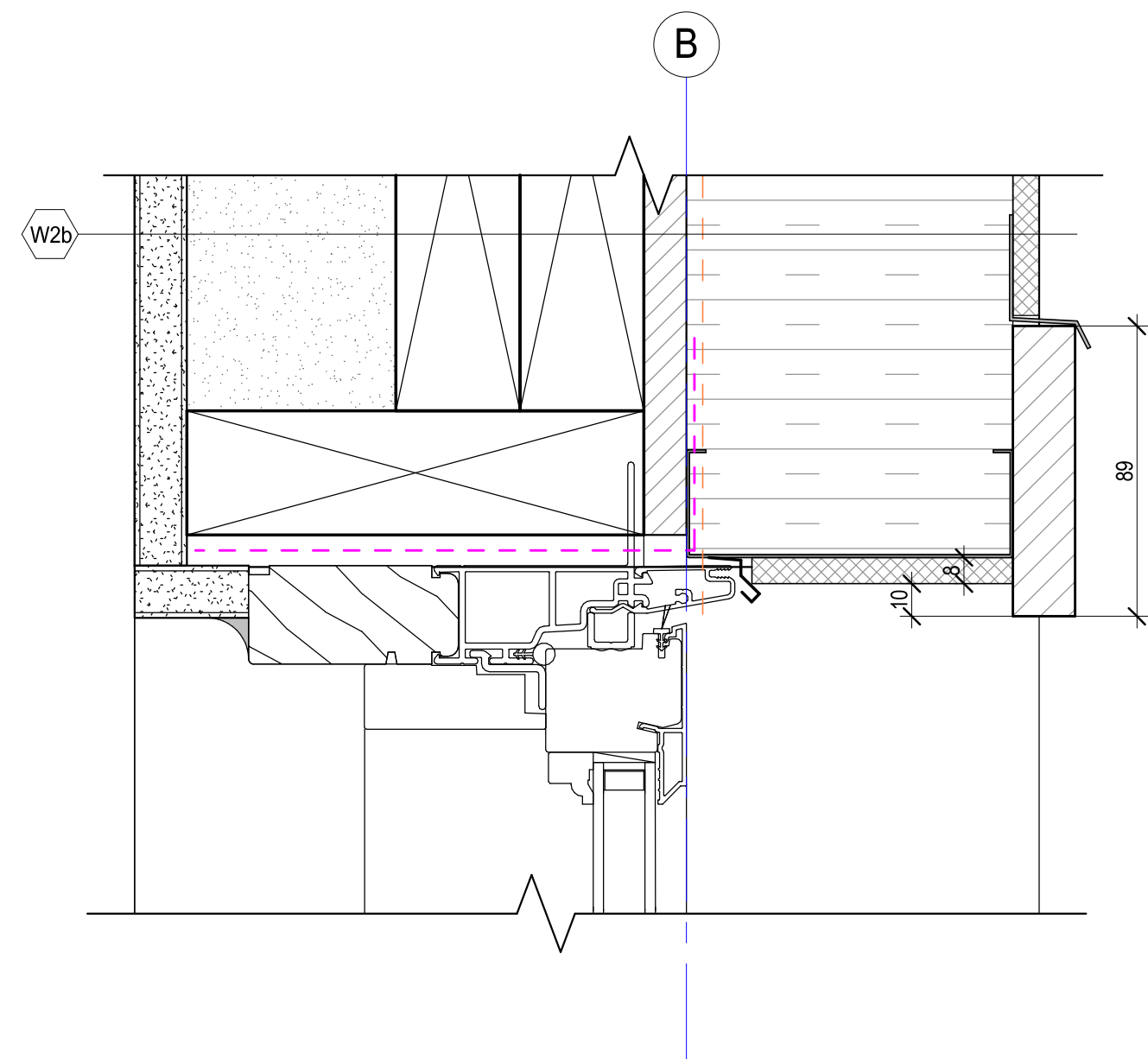
**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHILOME  
Designed by/Concepté par  
PETER SCHULZ  
Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD  
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie  
Client / client  
**Parks Canada**  
Drawing title / Titre du dessin

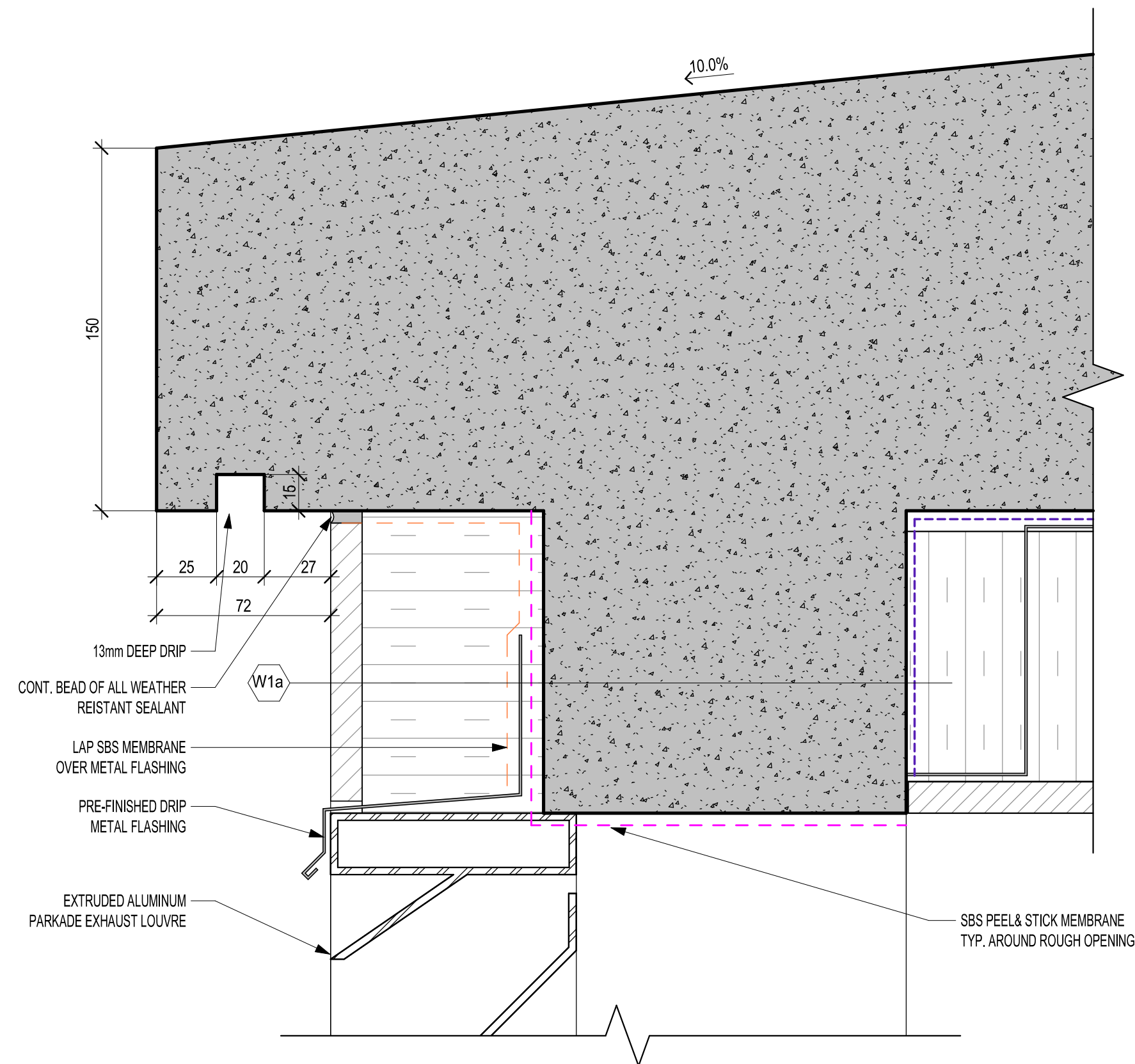
Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A7.10	1



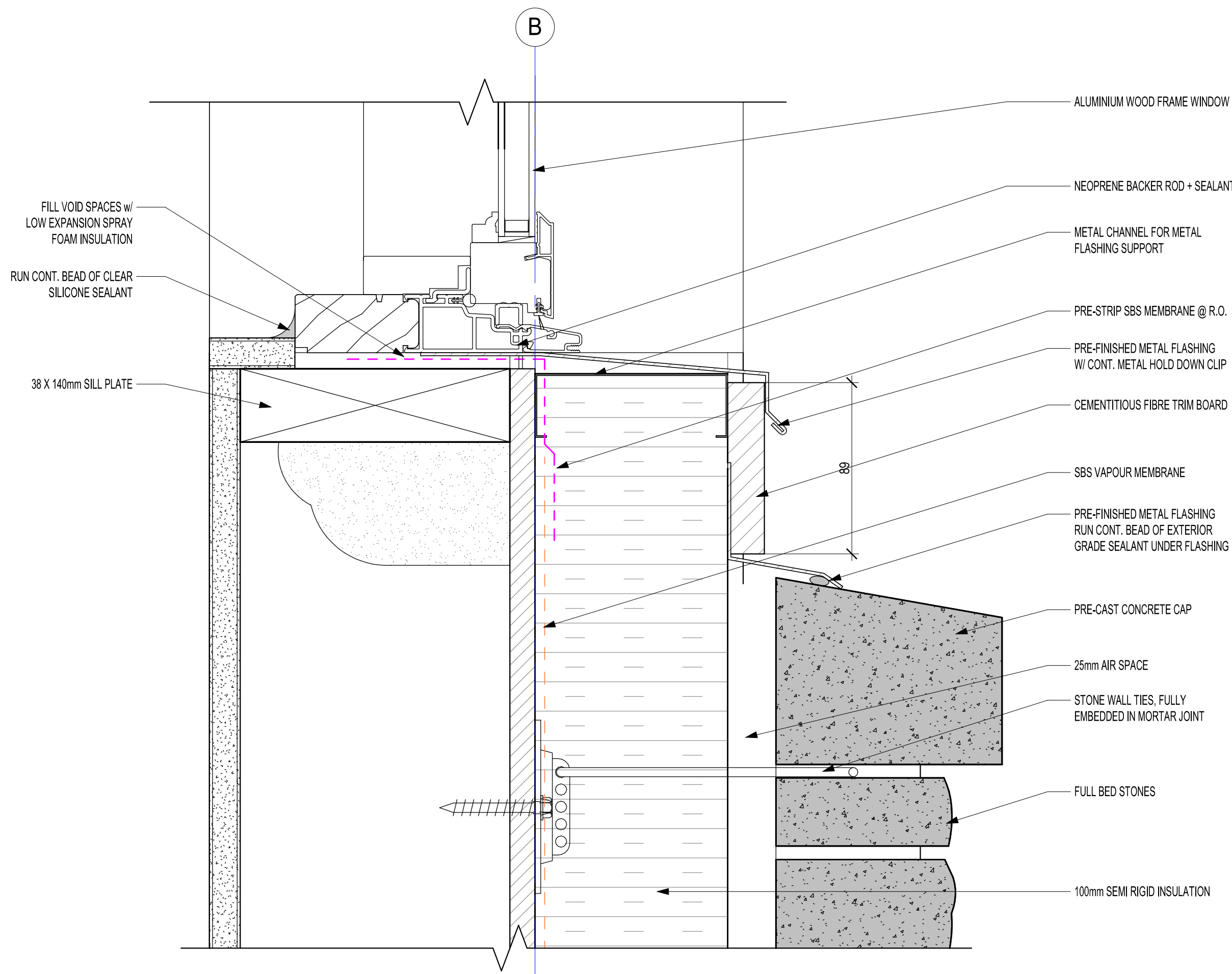




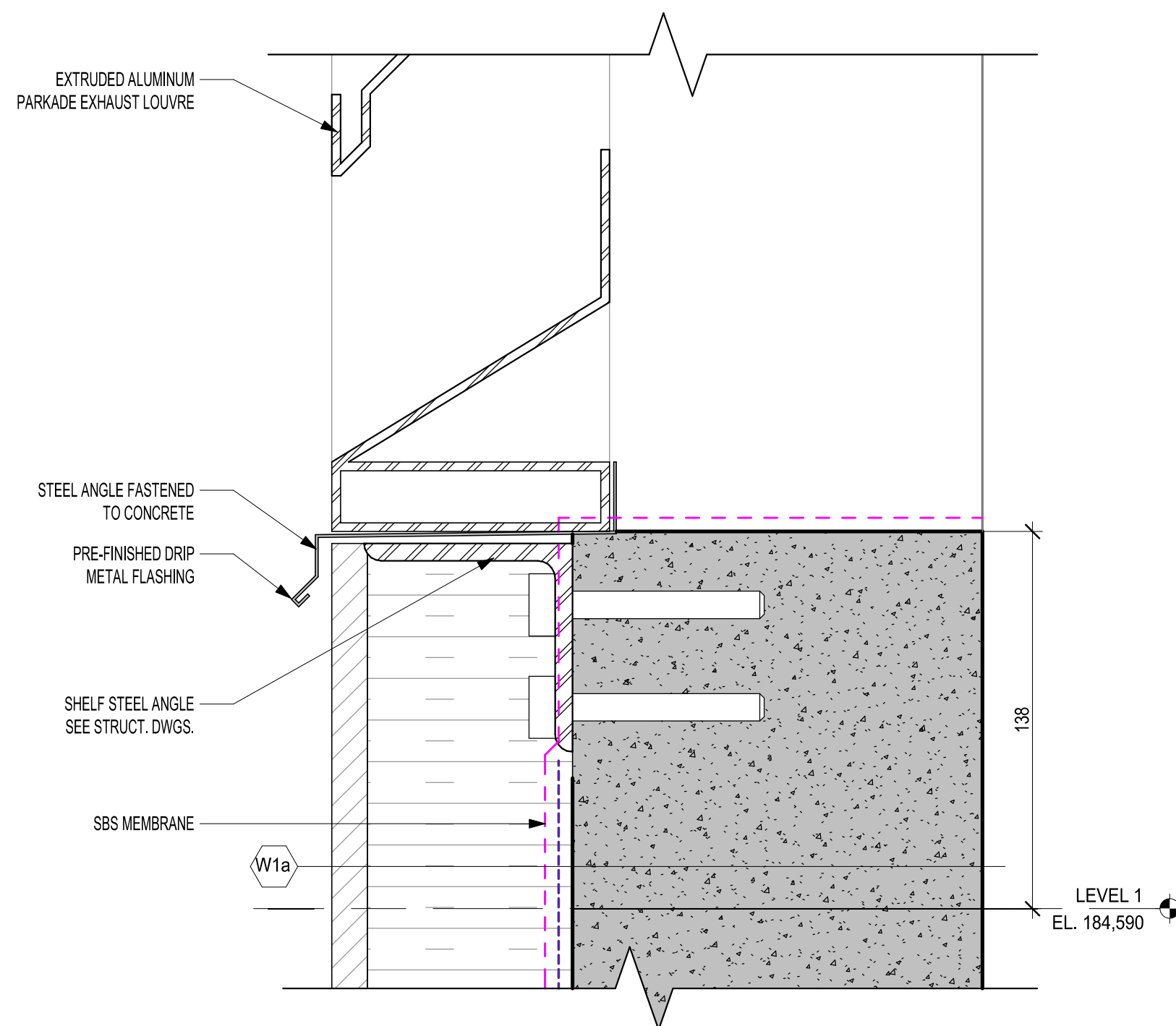
**2 ALUMINIUM WOOD FRAME WINDOW HEAD**  
A7.11 SCALE: 1 : 2



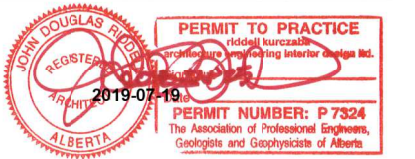
**3 SECTION DETAIL @ LOUVER HEAD @ DOGHOUSE**  
A7.11 SCALE: 1 : 2



**1 ALUMINIUM WOOD FRAME WINDOW SILL**  
A7.11 SCALE: 1 : 2



**4 SECTION DETAIL @ LOUVER SILL @ DOGHOUSE**  
A7.11 SCALE: 1 : 2



DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie  
LAURIE MACDONALD

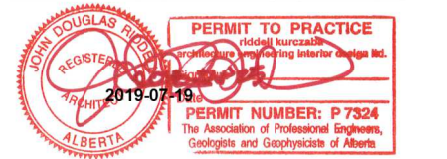
Client / client  
Parks Canada

Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A7.11	1





DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHIROME

Designed by/Concepté par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

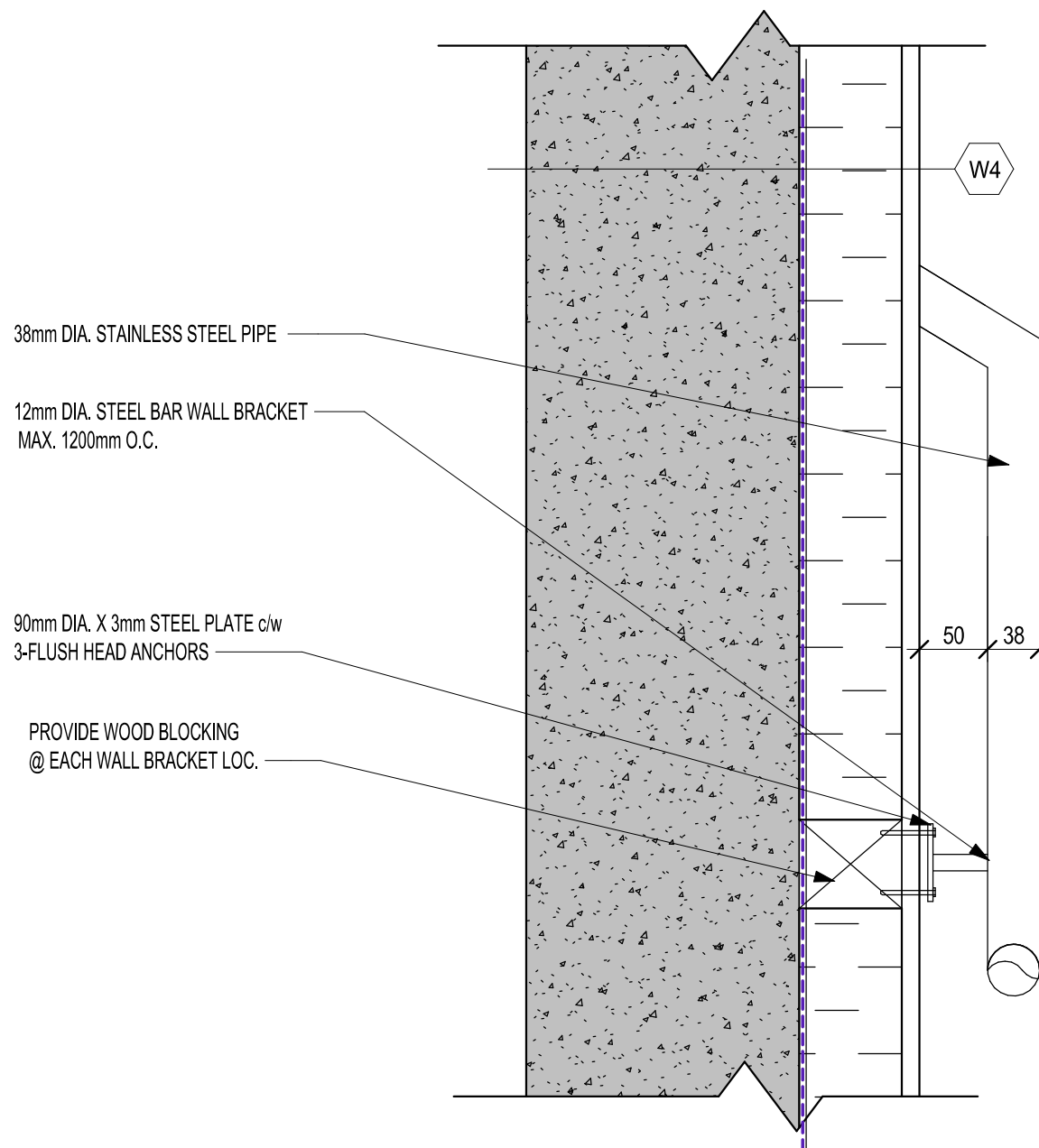
Drawing title / Titre du dessin

SECTION DETAILS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
---------------------------------	-----------------	--------------------------------------

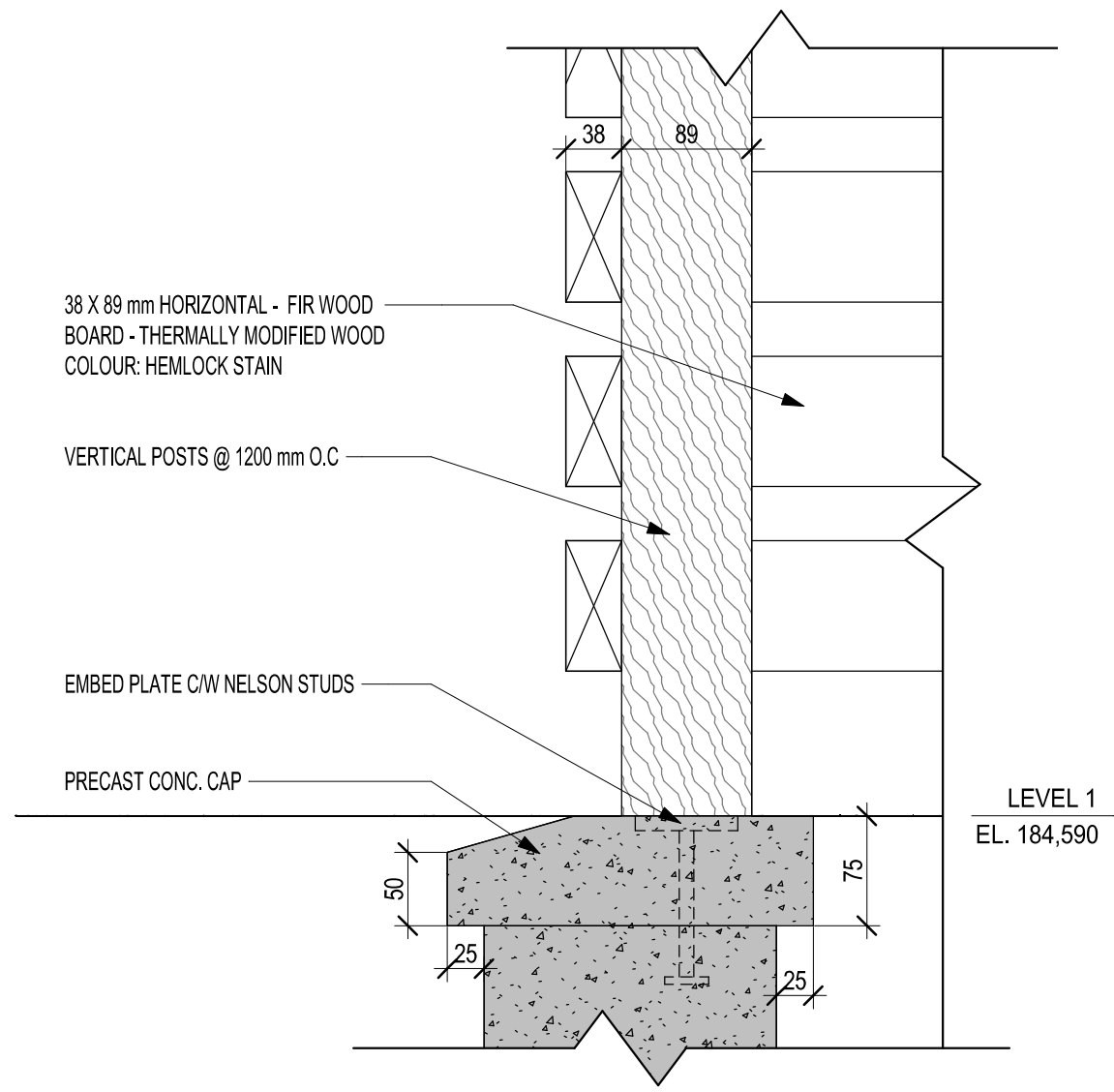
A7.12

1



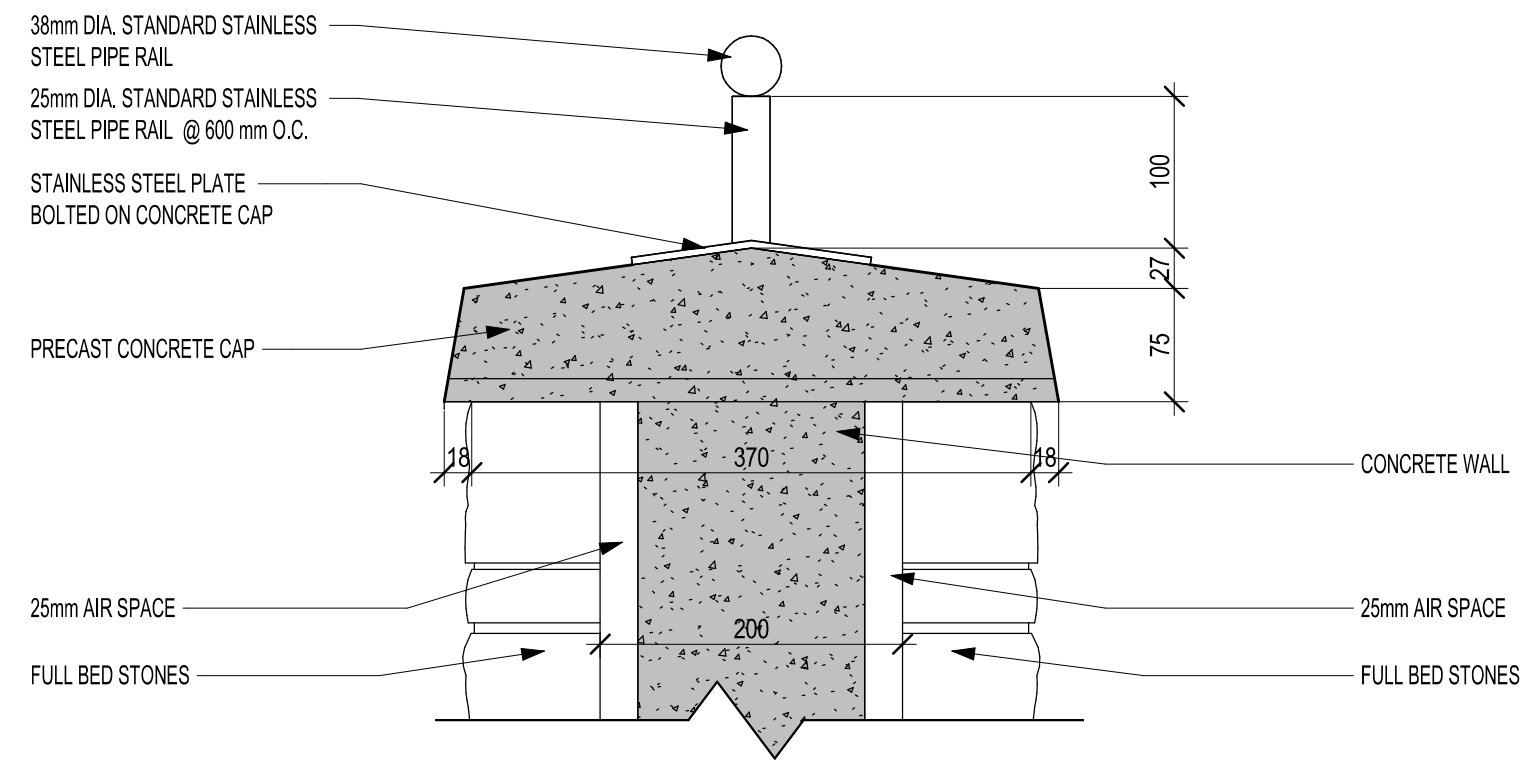
1 HANDRAIL SECTION DETAIL

A7.12 SCALE: 1 : 5



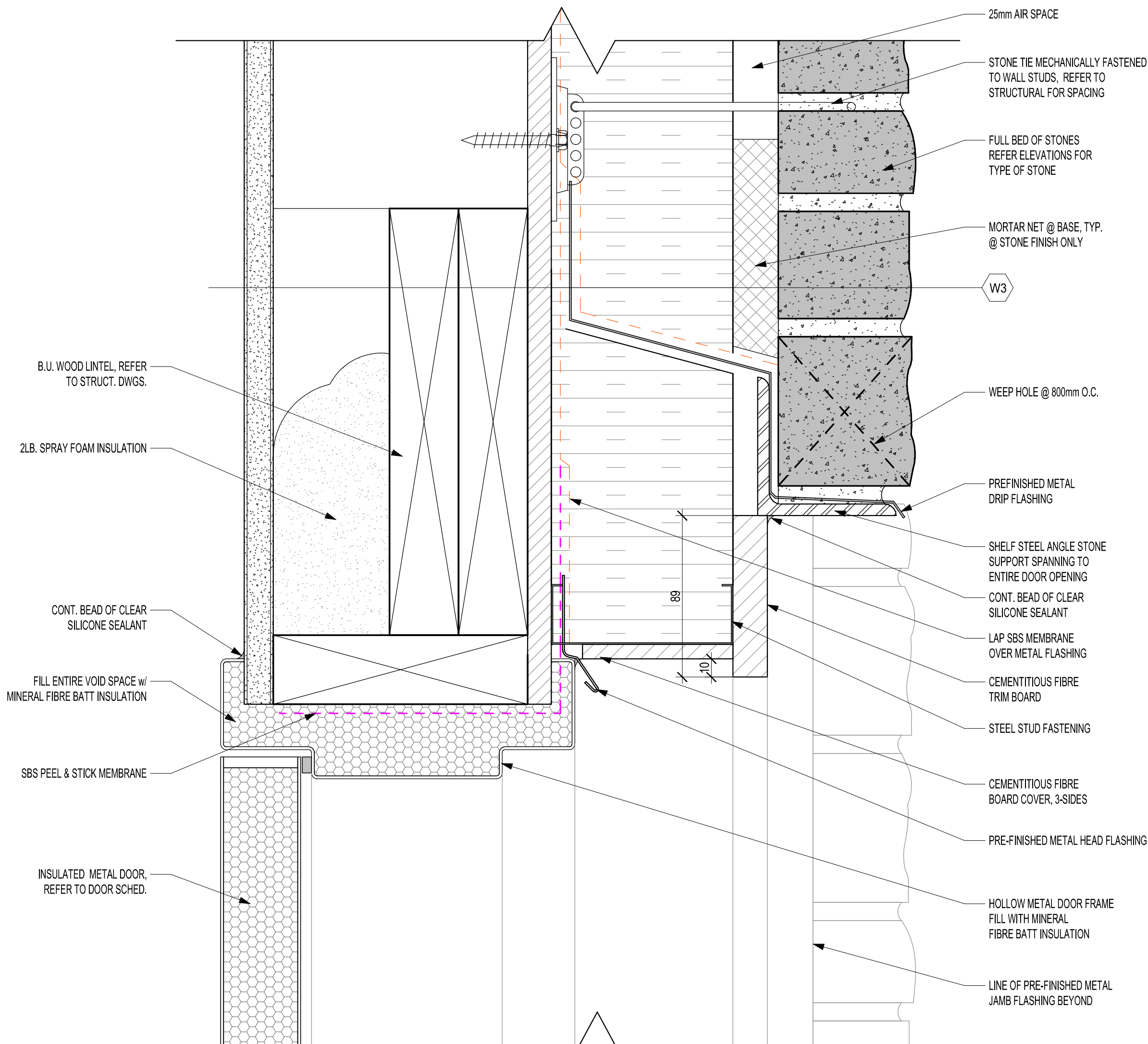
2 STAIR FENCE DETAIL

A7.12 SCALE: 1 : 5



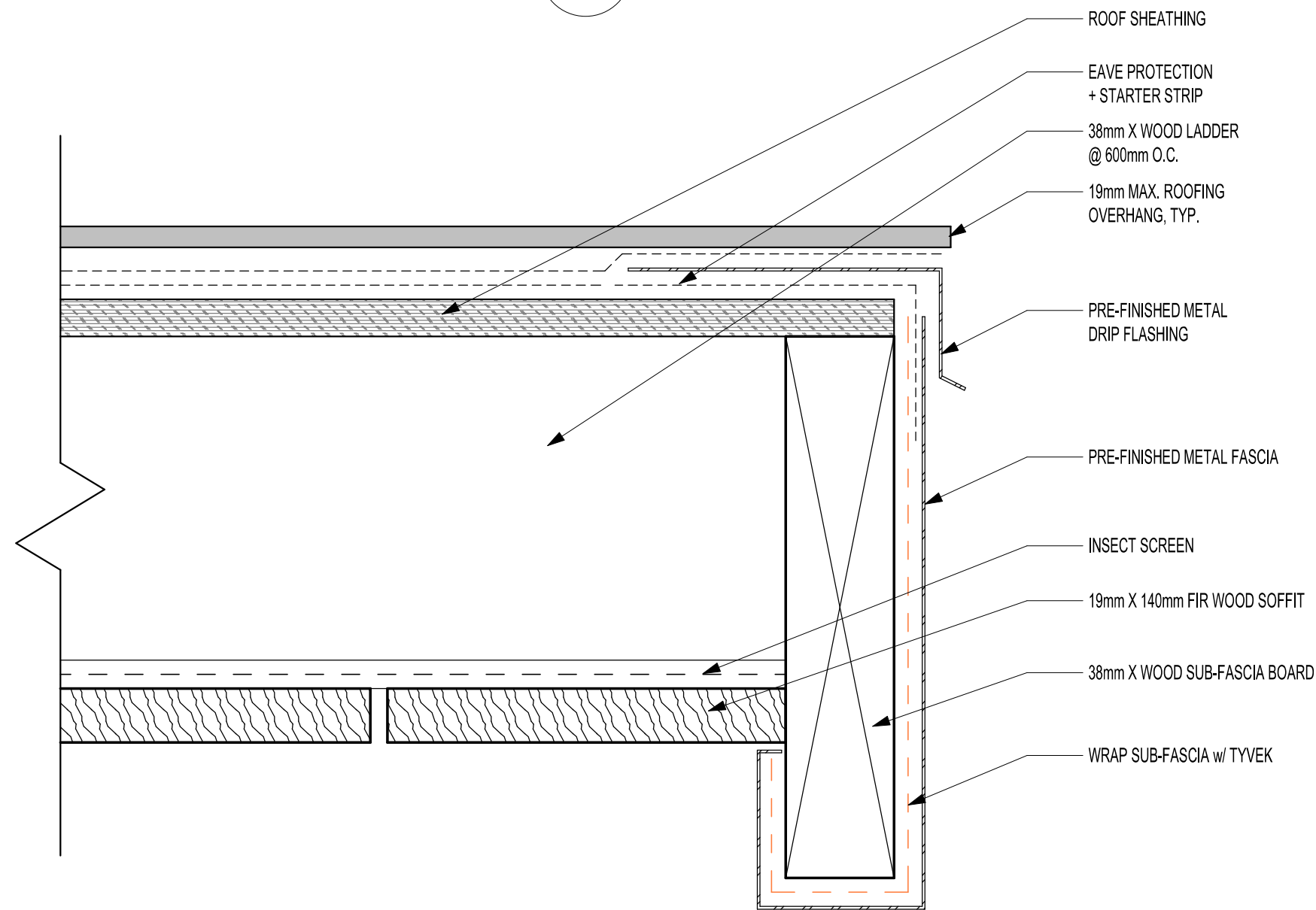
3 GUARDRAIL DETAIL

A7.12 SCALE: 1 : 5



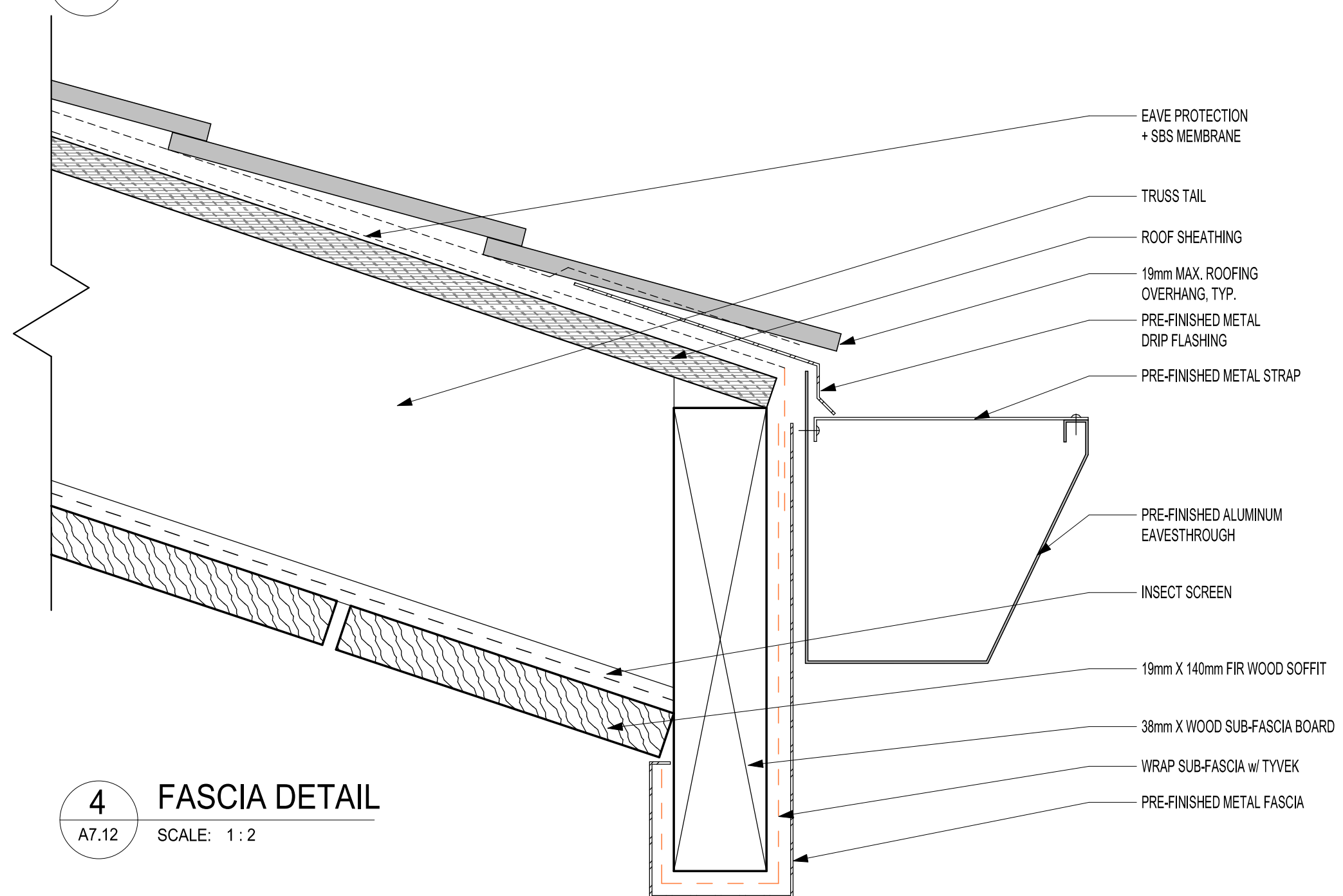
6 TYPICAL FIRE RATED DOOR FRAME

A7.12 SCALE: 1 : 2



5 FASCIA DETAIL @ GABLE END

A7.12 SCALE: 1 : 2



4 FASCIA DETAIL

A7.12 SCALE: 1 : 2





DO NOT SCALE

1	ISSUED FOR TENDER / BP	19/07/19

Revision / Révision	Description / Description	Date / Date
------------------------	---------------------------	-------------

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

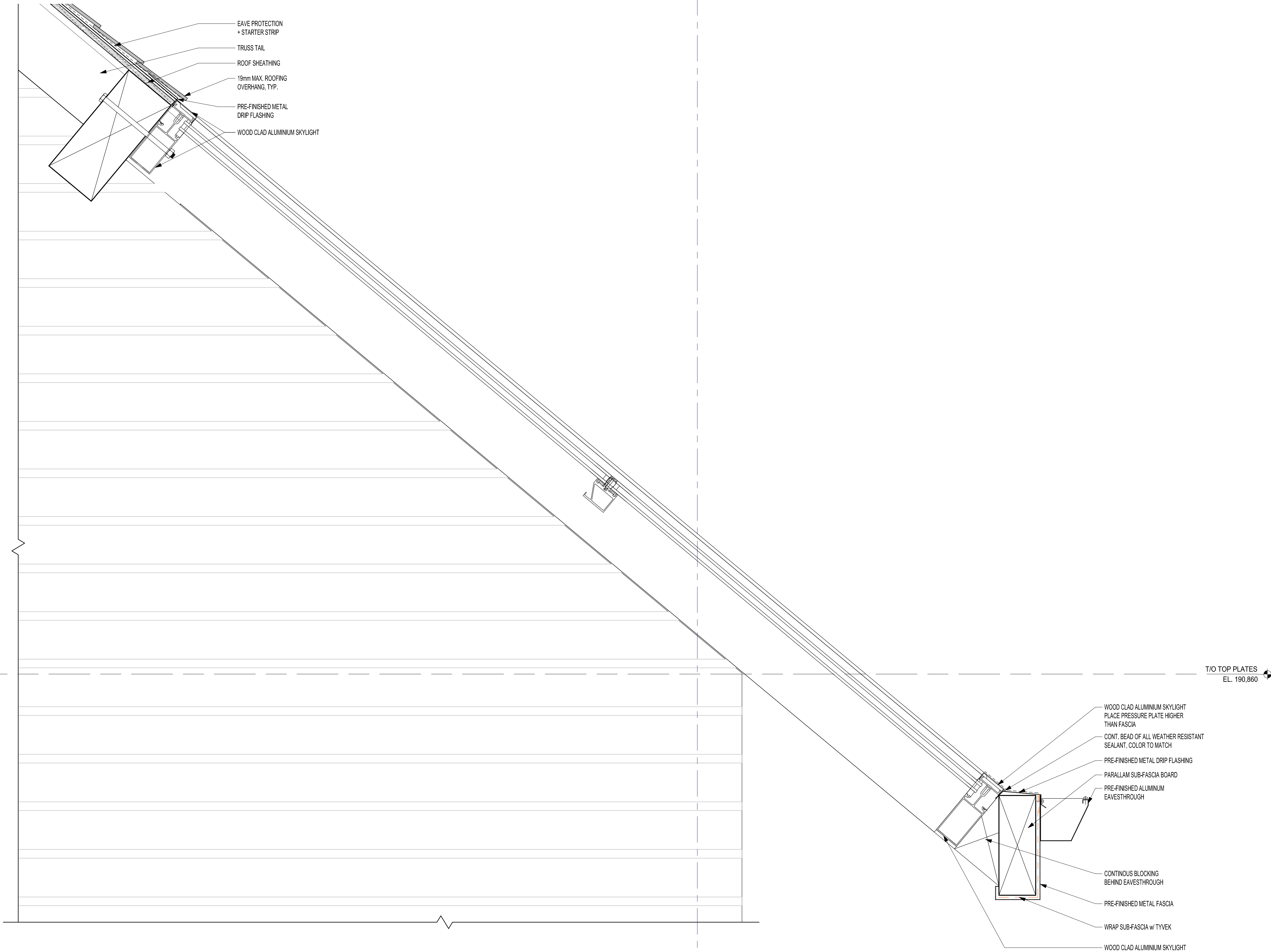
Drawing title / Titre du dessin

SECTION DETAIL

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
---------------------------------	-----------------	--------------------------------------

A7.13

1



1 SKYLIGHT DETAIL 1  
A7.13 SCALE: 1:5







DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
BENNY MANCE/ MARAL SAFARZADEH/ SOPHIE SHOU  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

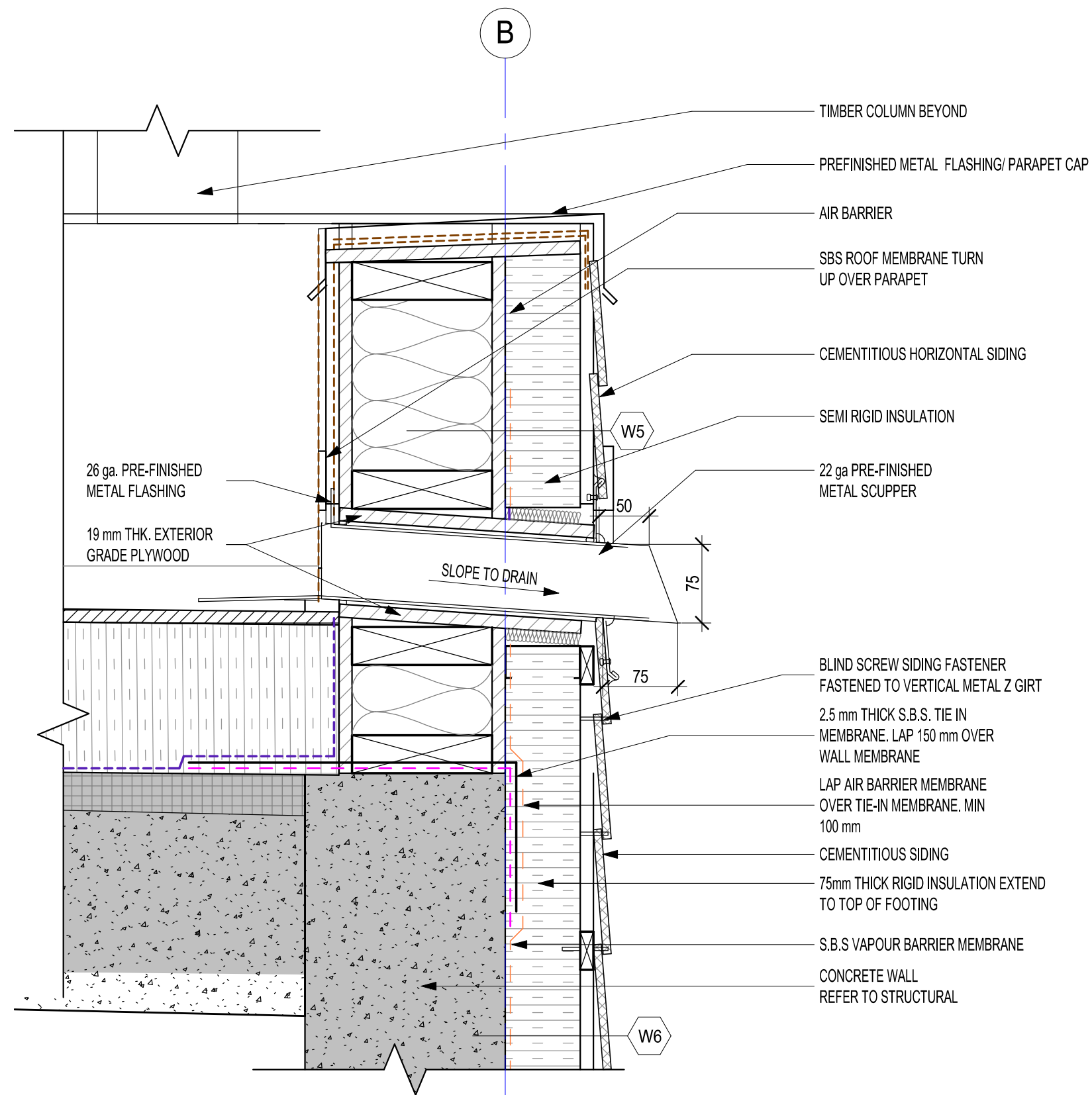
Client / client

Parks Canada

Drawing title / Titre du dessin

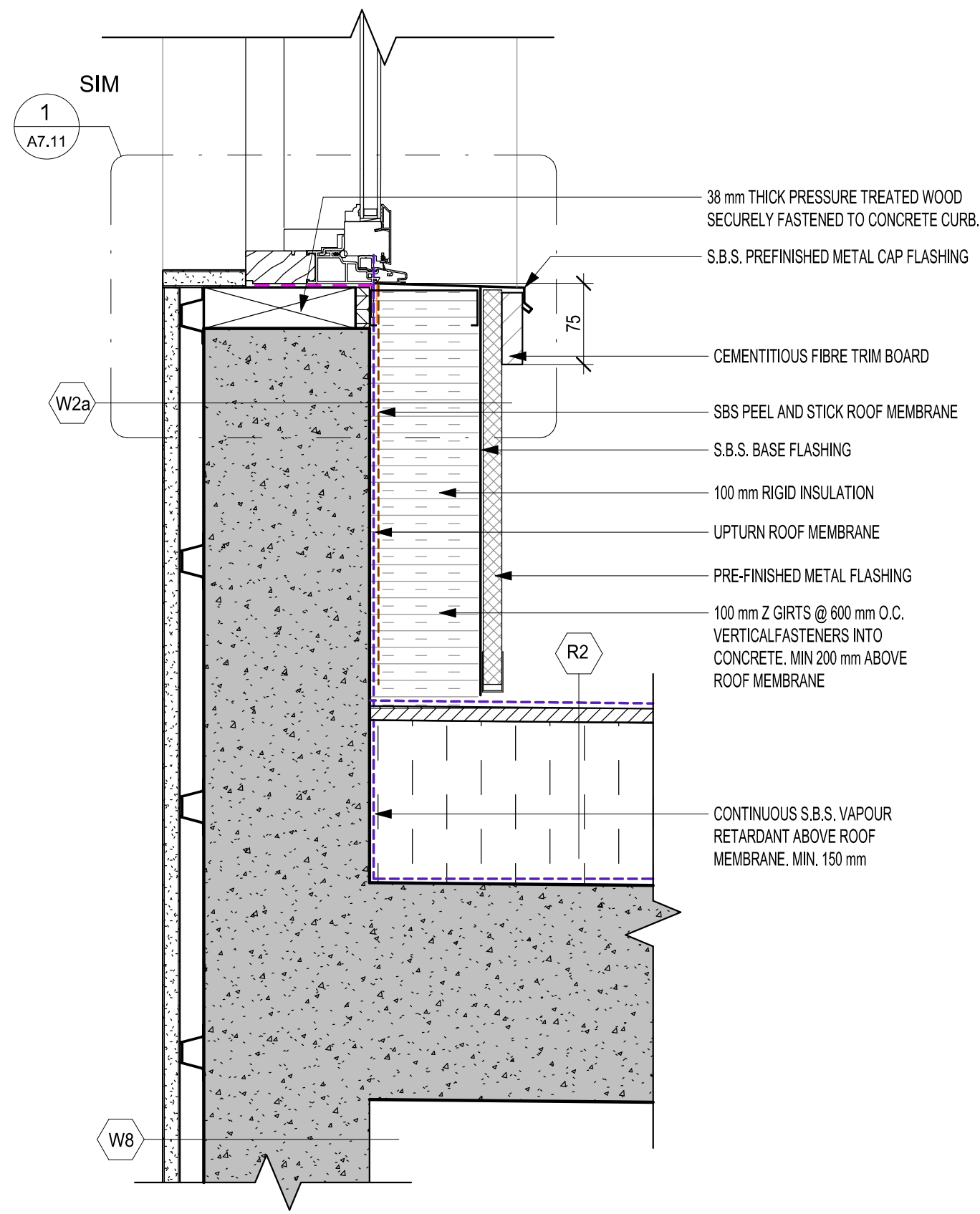
SECTION DETAIL

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A7.14	1



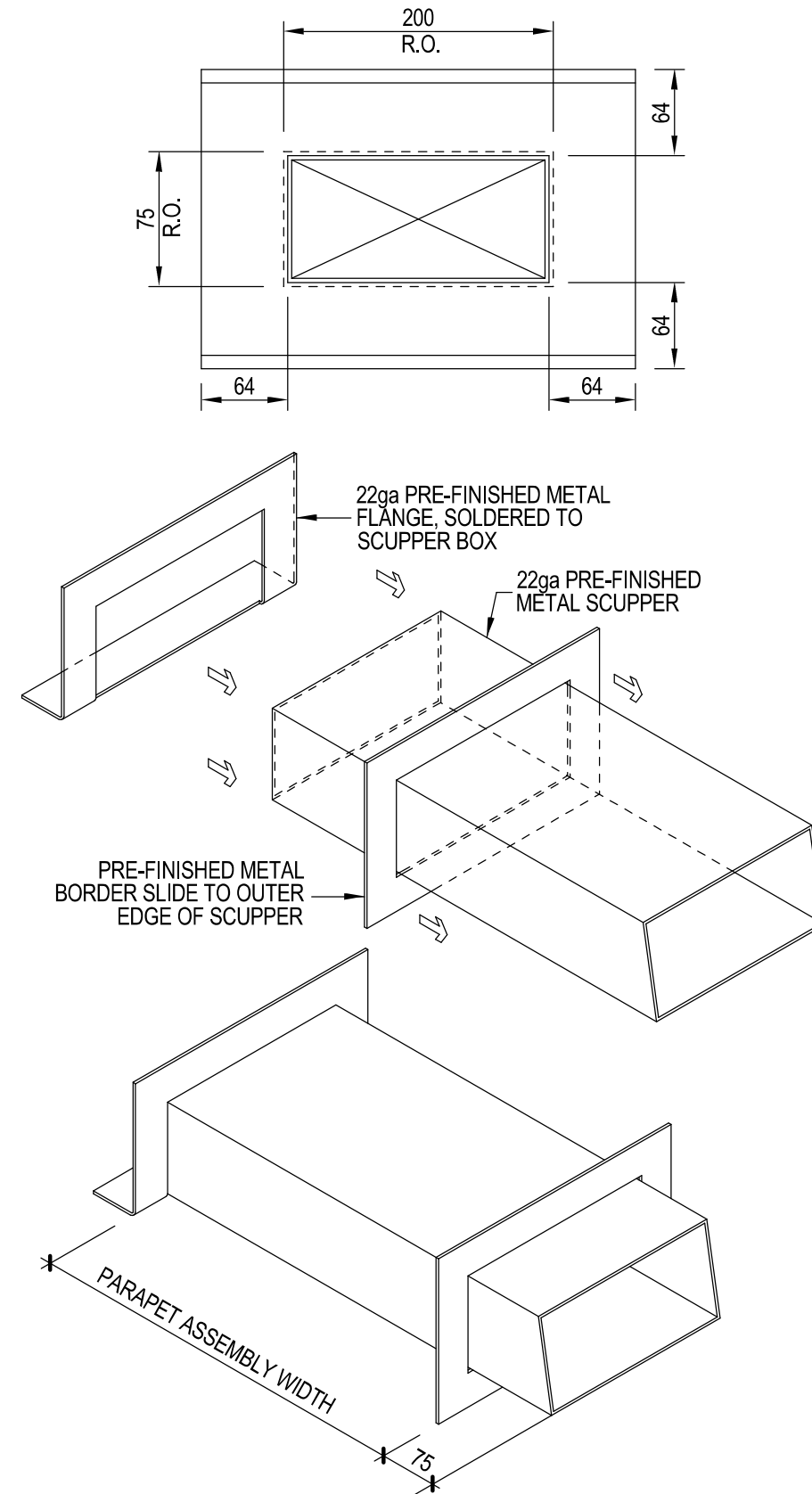
SECTION DETAIL @ UNIT 01, PARAPET  
OVER THE PARKADE'S ROOF

SCALE: 1 : 5



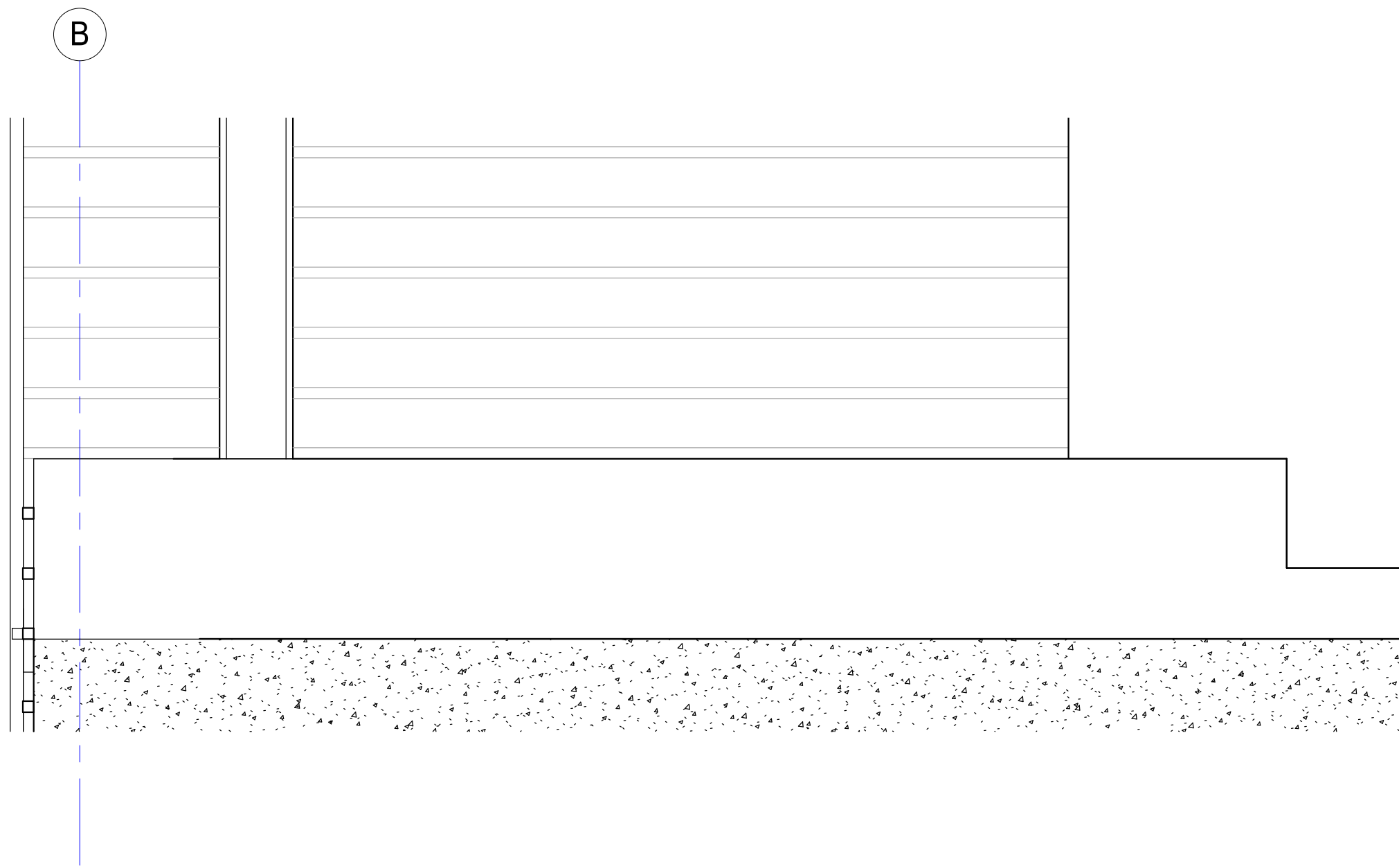
SECTION DETAIL @ UNIT 01, W2a WALL  
OVER MAIN FLOOR SLAB & PARKADE'S  
ROOF

SCALE: 1 : 5



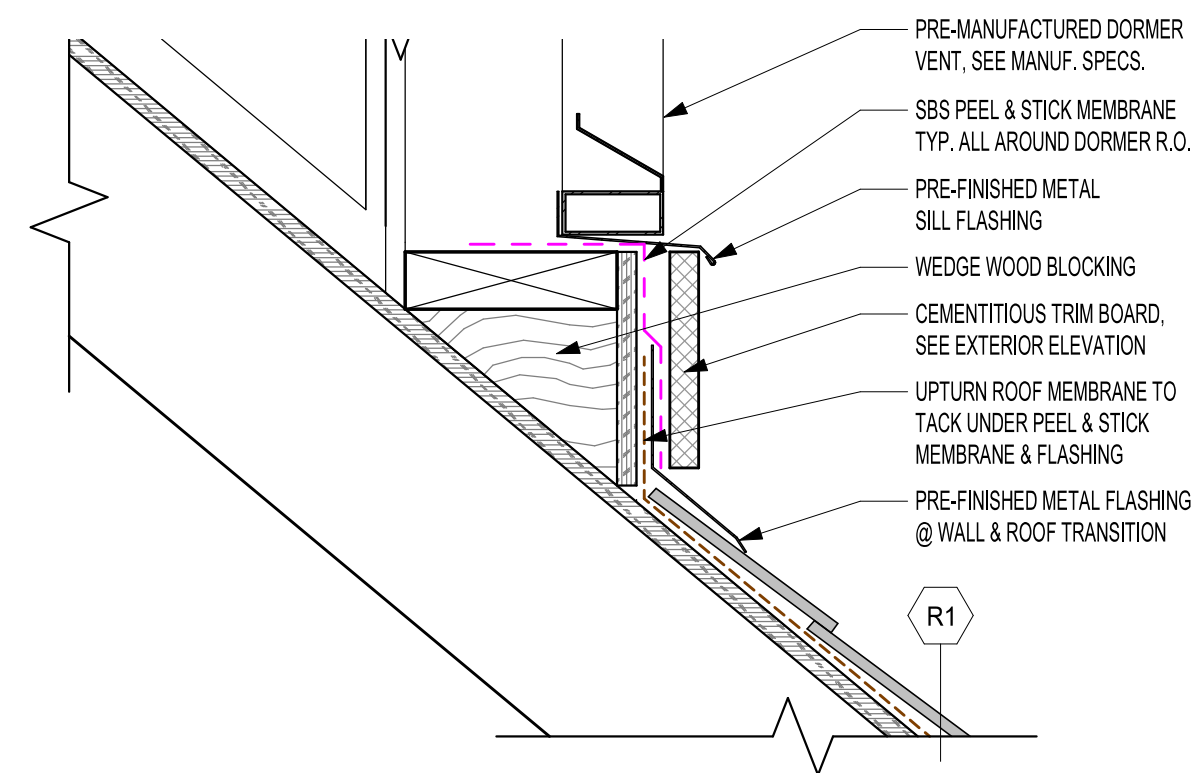
SCUPPER DETAIL

SCALE: 1 : 5



SECTION THROUGH THE PARAPET

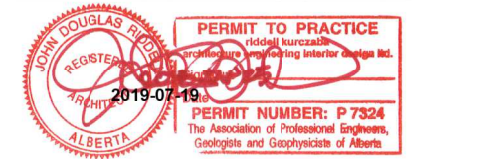
SCALE: 1 : 10



DETAIL THROUGH LOUVER WALL @  
DORMER

SCALE: 1 : 5





DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
4	ISSUED FOR TENDER / BP	19/07/19
3	99% IFC DRAWING	18/11/23
2	99% IFC DRAWING	18/03/18
1	60% IFC DRAWING	18/02/09

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

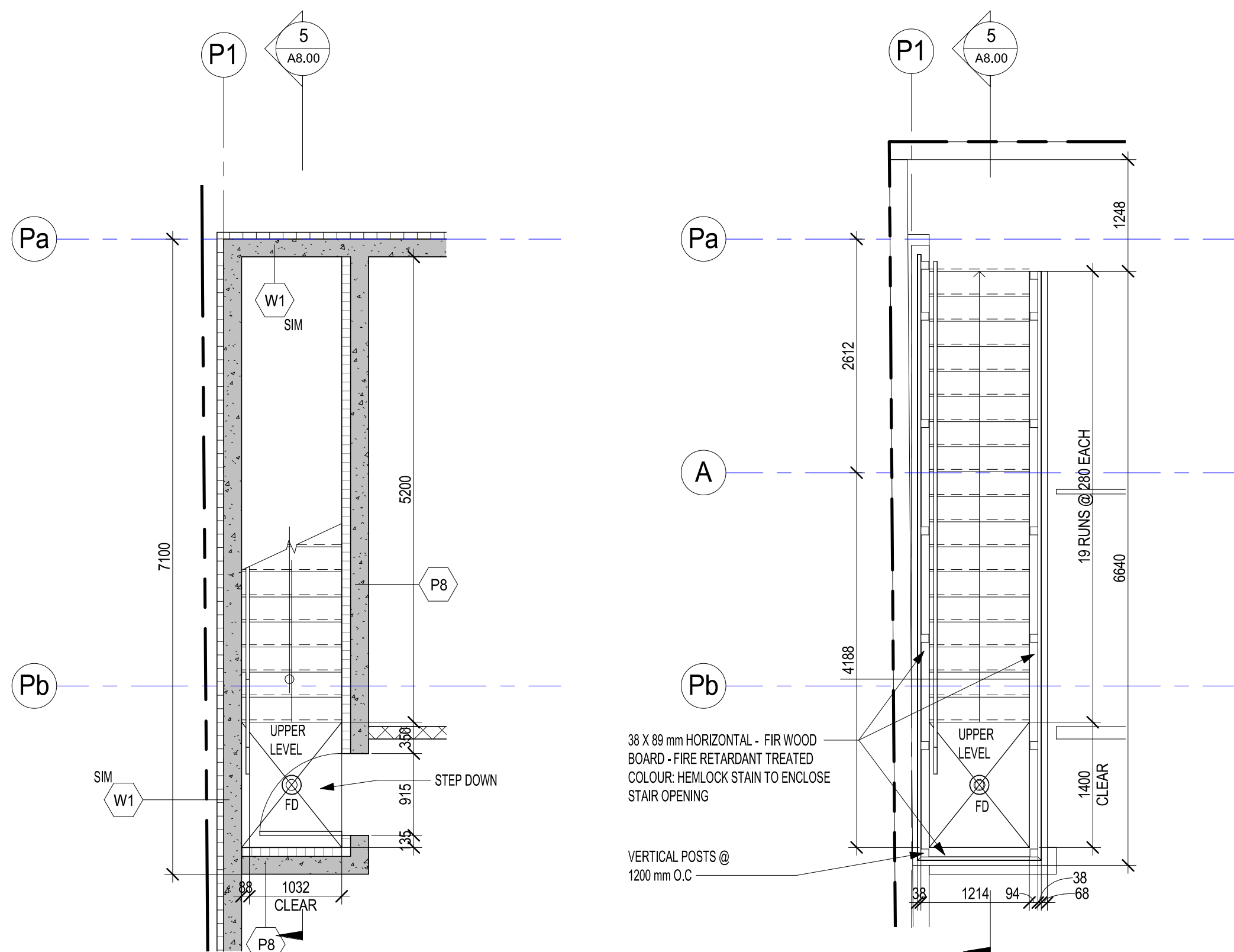
STAIR PLANS AND SECTIONS

Project No. / No. du  
project

Sheet / Feuille  
A8.00

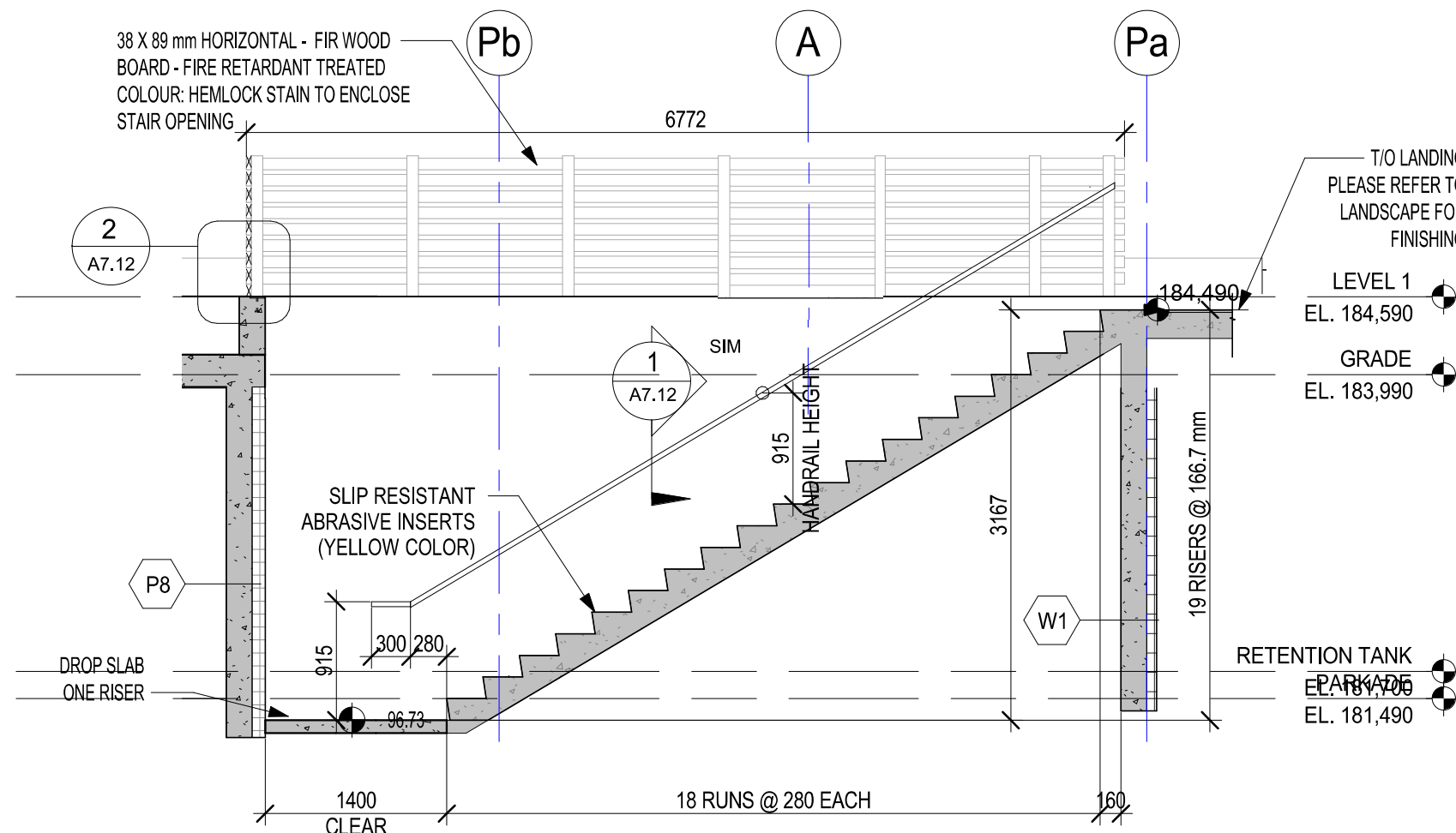
Revision no. /  
La Révision  
no.

4

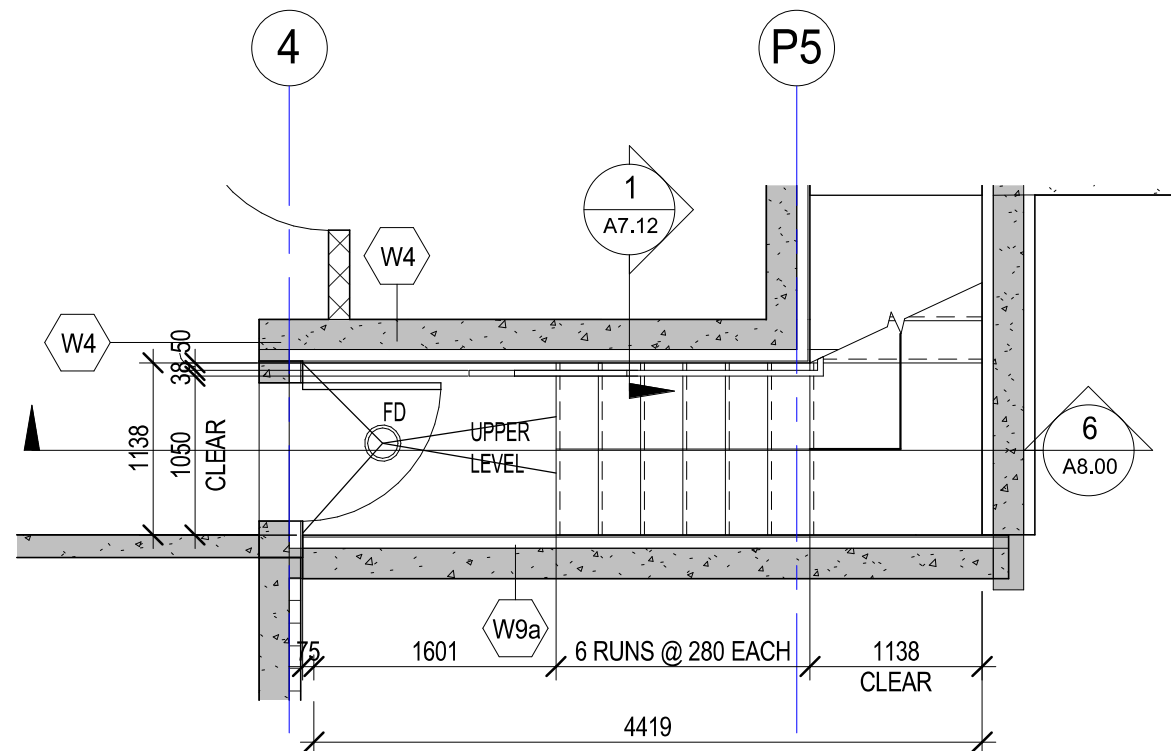


1 STAIR-c PLAN- PARKADE  
A8.00 SCALE: 1 : 50

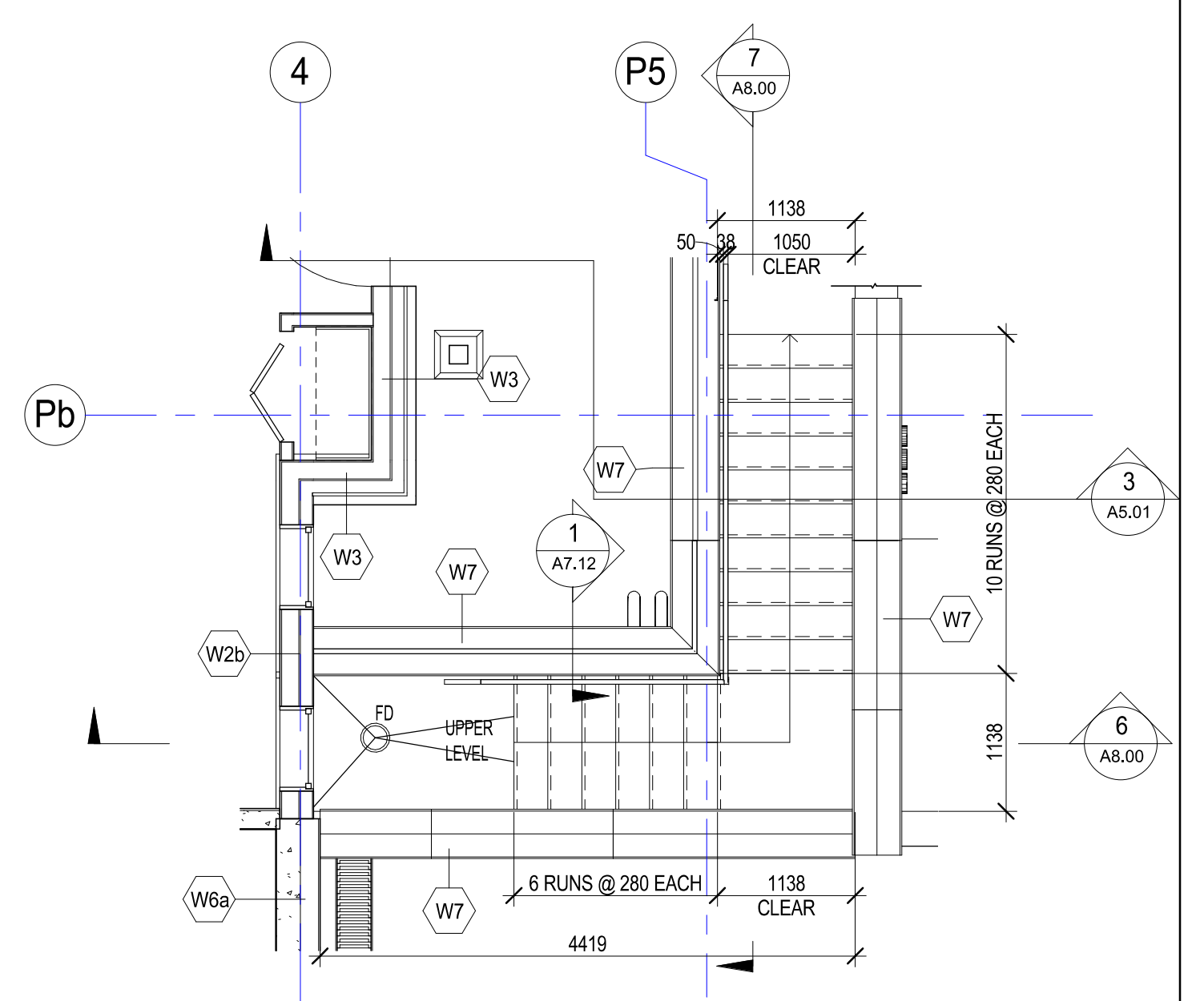
2 STAIR-c PLAN- MAIN FLOOR  
A8.00 SCALE: 1 : 50



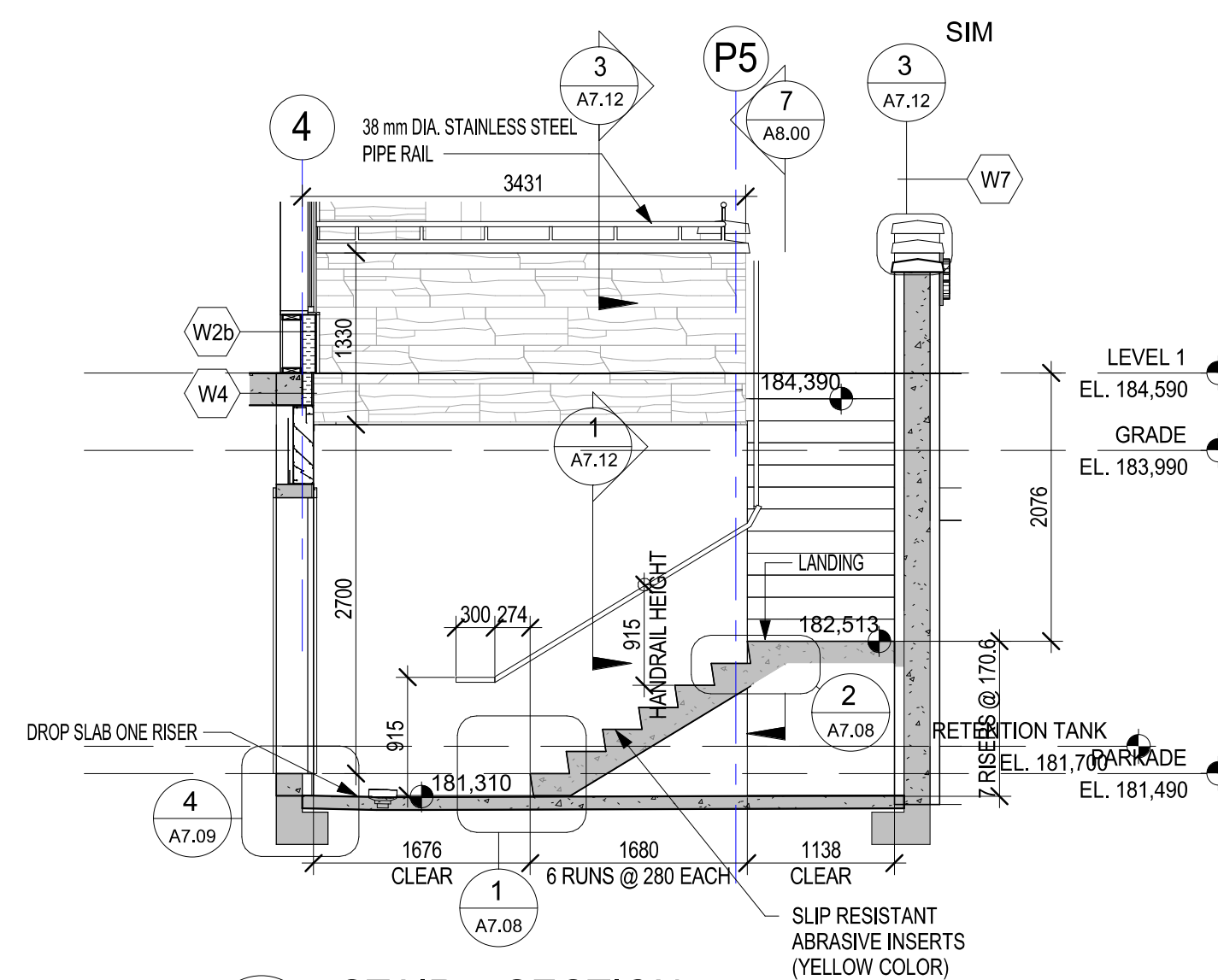
5 STAIR-c SECTION  
A8.00 SCALE: 1 : 50



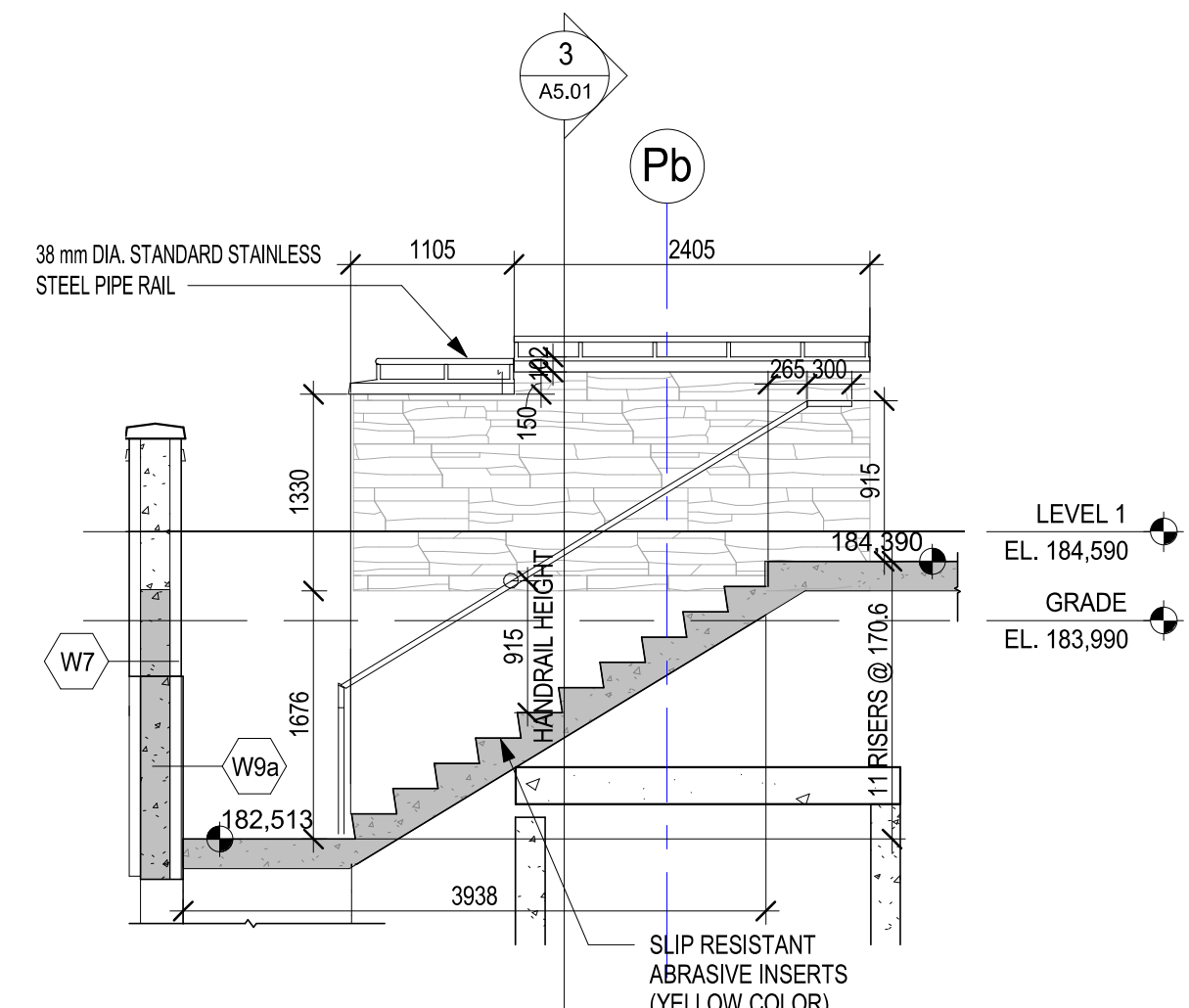
3 STAIR-a PLAN- PARKADE  
A8.00 SCALE: 1 : 50



4 STAIR-a PLAN- MAIN FLOOR  
A8.00 SCALE: 1 : 50



6 STAIR-a SECTION  
A8.00 SCALE: 1 : 50



7 STAIR-a SECTION 02  
A8.00 SCALE: 1 : 50

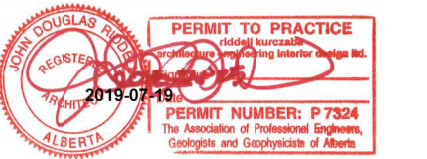




Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A8.01	1







DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
1	ISSUED FOR TENDER / BP	19/07/19

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par

AMINA OYAKHILOME

Designed by/Concept par

PETER SCHULZ

Drawn by/Dessiné par

MARAL SAFARZADEH

Project Manager/Administrateur de Projets

LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

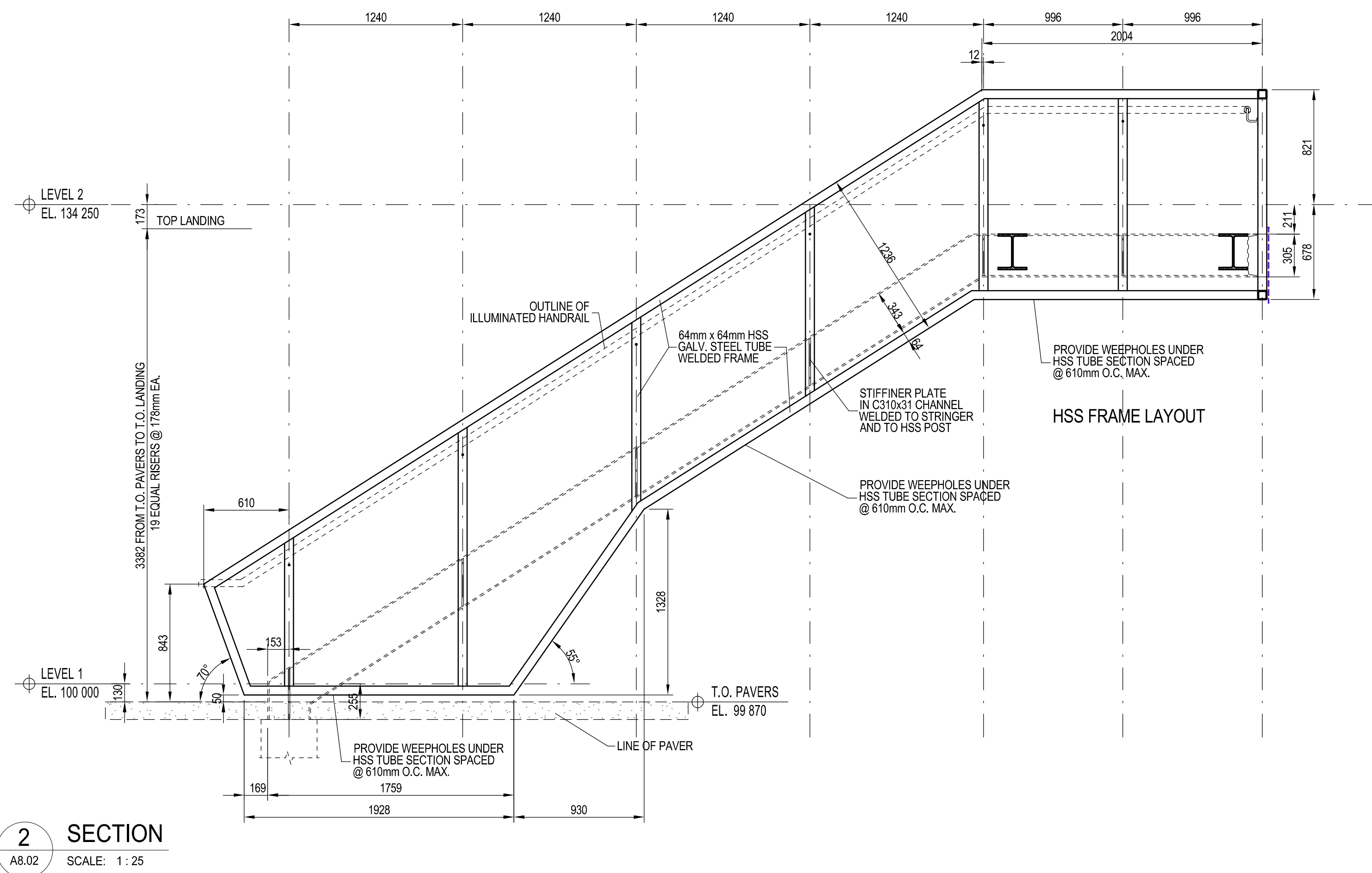
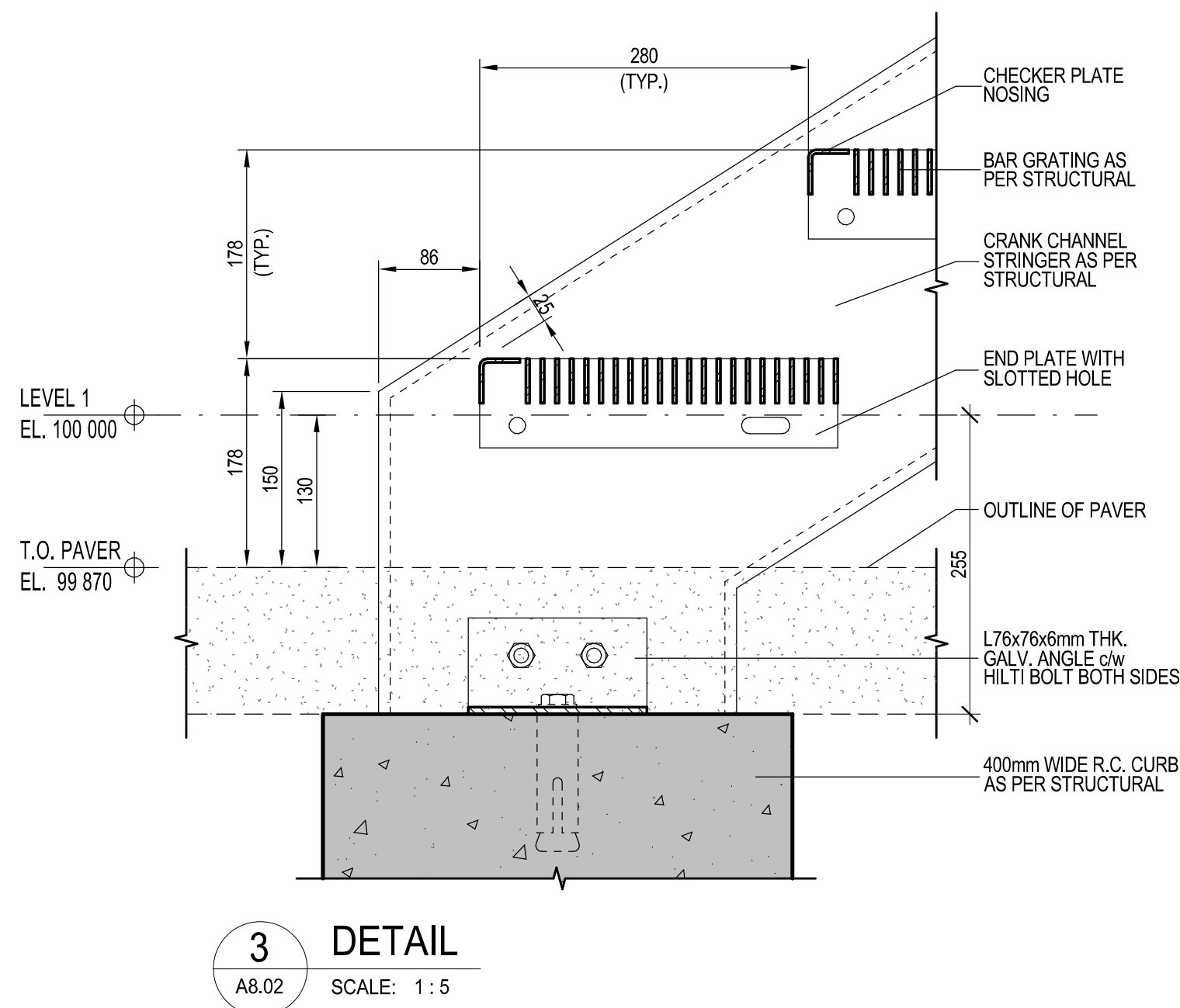
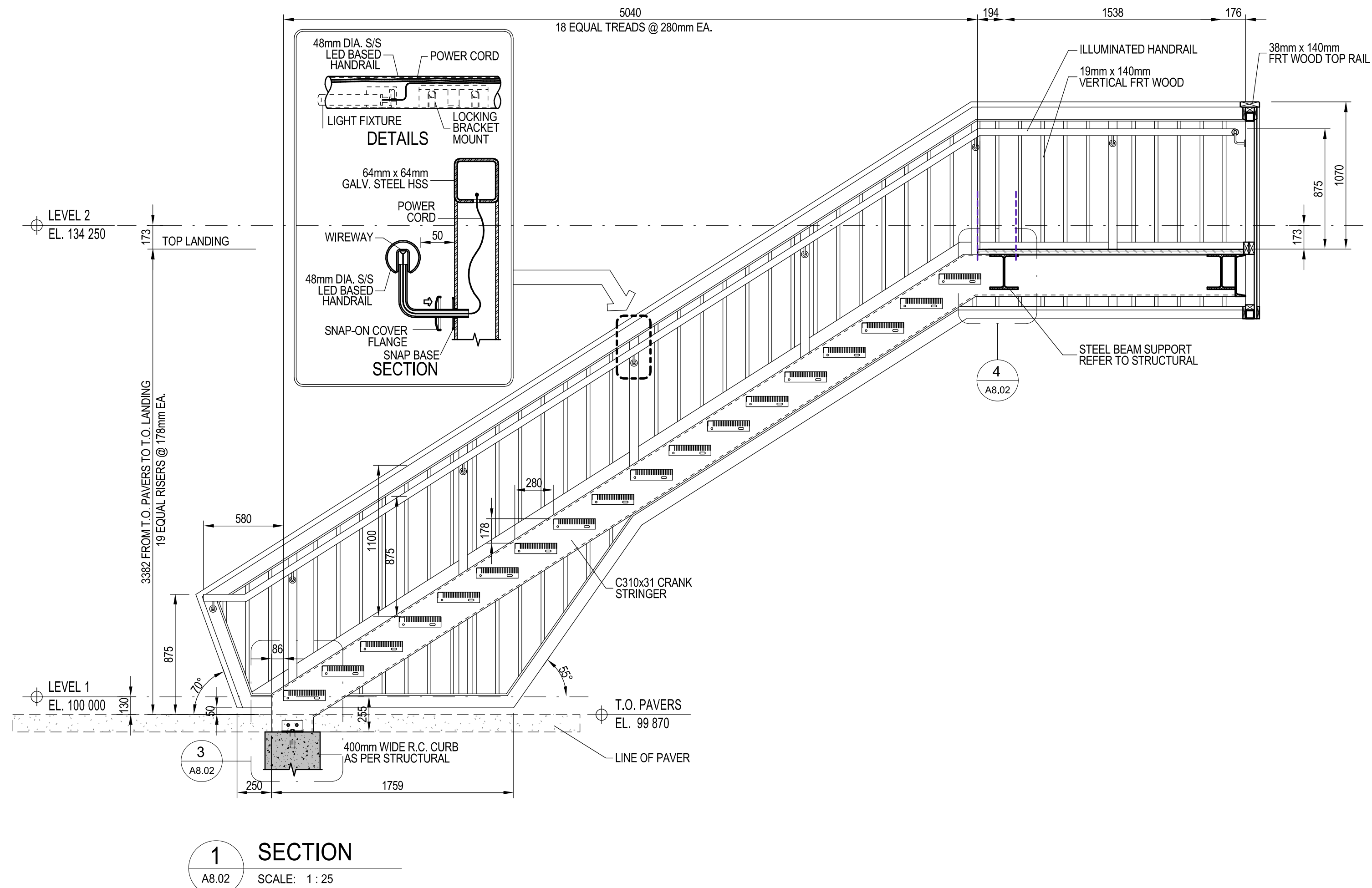
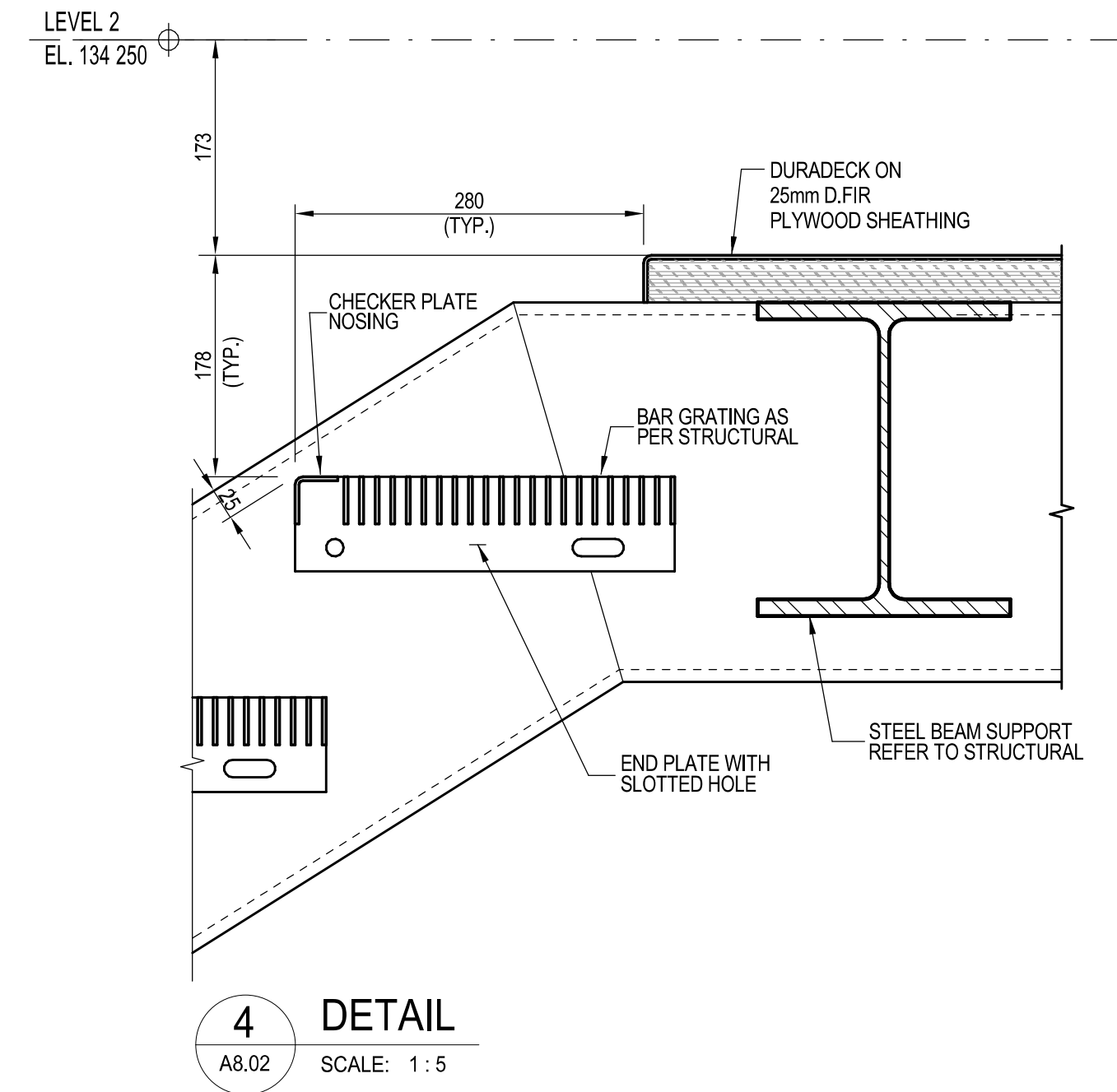
Client / client

Parks Canada

Drawing title / Titre du dessin

STAIR D, E AND F DETAILS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	A8.02	1

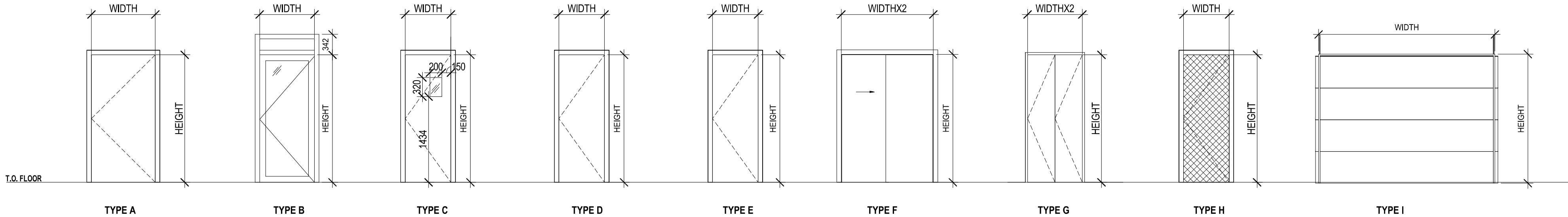




DOOR SCHEDULE												
TYPE	DOOR #	DOOR LEAF			DOOR	DOOR FINISH	DOOR GLASS	FRAME		FIRE RATING	HARDWARE GROUP	COMMENTS
		WIDTH	HEIGHT	THK	MATERIAL			MATERIAL	FINISH			
A	D1	1,067	2,134	45	IHMD	PF		IPS	PT	45MIN	01	
G	D2	914	2,134	45	HCW	PT		WDF	PT		02	
B	D3	915	2,134	45	IHMD	PT	DGSU	IPS	PT	45MIN	03	
D	D4	762	2,134	45	IHMD	PT		IPS	PT		04	
F	D5	1,524	2,134	35	HCW	PT		WDF	PT		05	
D	D6	762	2,134	35	HCW	PT		WDF	PT		06	
D	D7	762	2,134	35	HCW	PT		WDF	PT		07	
G	D8	610	2,134	35	HCW	PT		WDF	PT		08	
E	D9	508	2,134	35	HCW	PT		WDF	PT		09	
I	PD-1	2,896	2,134	38	ISL	PT		ISL	PT		10	
C	PD-2	915	2,134	45	IHMD	PT	DGSU /FSG	PS	PT	45MIN	11	
D	PD-3	915	2,134	45	HMD	PT		PS	PT	45MIN	12	
D	PD-4	915	2,134	45	HMD	PT		PS	PT	45MIN	13	
H	PD-5	762	2,134	35	CL	PF		SL	PT		14	

AL	ALUMINUM - PRE FINISHED BROWN
CL	CHAIN LINK
DGSU	DOUBLE GLAZED SEALED UNIT
FD	FROSTED
FSG	FIRE SAFETY GLASS
HCW	HOLLOW CORE WOOD
HMD	HOLLOW METAL DOOR
IHMD	INSULATED HOLLOW METAL DOOR
IPS	INSULATED PRESSED STEEL FRAME
ISL	INSULATED STEEL
LG	LAMINATED GLASS
MCW	METAL CLAD WOOD
PF	PREFINISHED
PS	PRESSED STEEL FRAME
PT	PAINT
SC	SELF CLOSING
SL	STEEL
WDF	WOOD FRAME

NOTE: REFER TO FLOOR PLAN FOR DOOR SWING DIRECTION



DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client

Parks Canada / Parcs Canada

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par AMINA OYAKHILOME
Designed by/Concept par PETER SCHULZ
Drawn by/Dessine par MARAL SAFARZADEH
Project Manager/Administrateur de Projets LAURIE MACDONALD
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie
Client / client <b>Parks Canada</b>
Drawing title / Titre du dessin

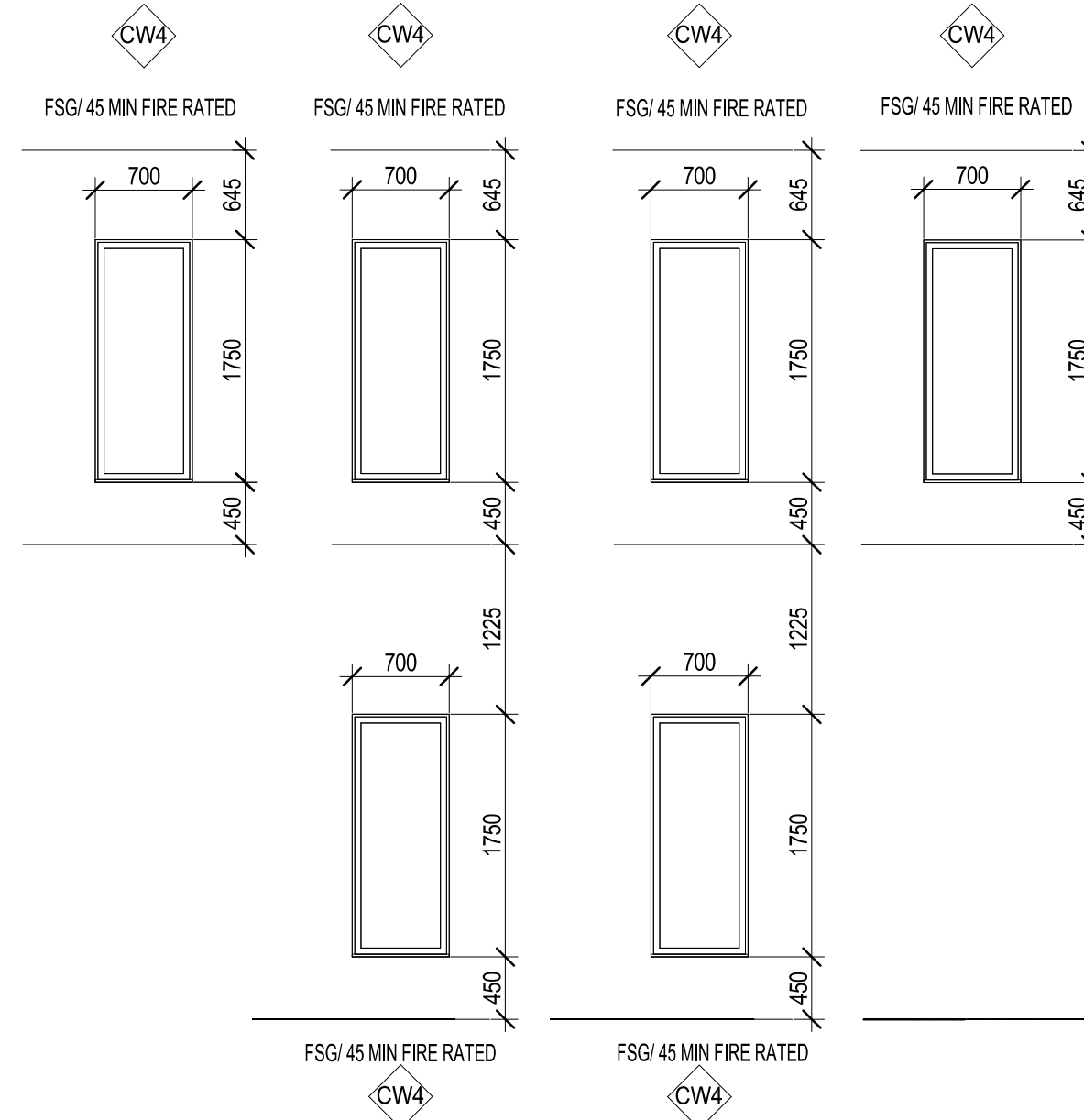
DOOR SCHEDULE

Project No. / No. du project	Sheet / Feuille <b>A9.00</b>	Revision no. / La Révision no. <b>5</b>
------------------------------	---------------------------------	--

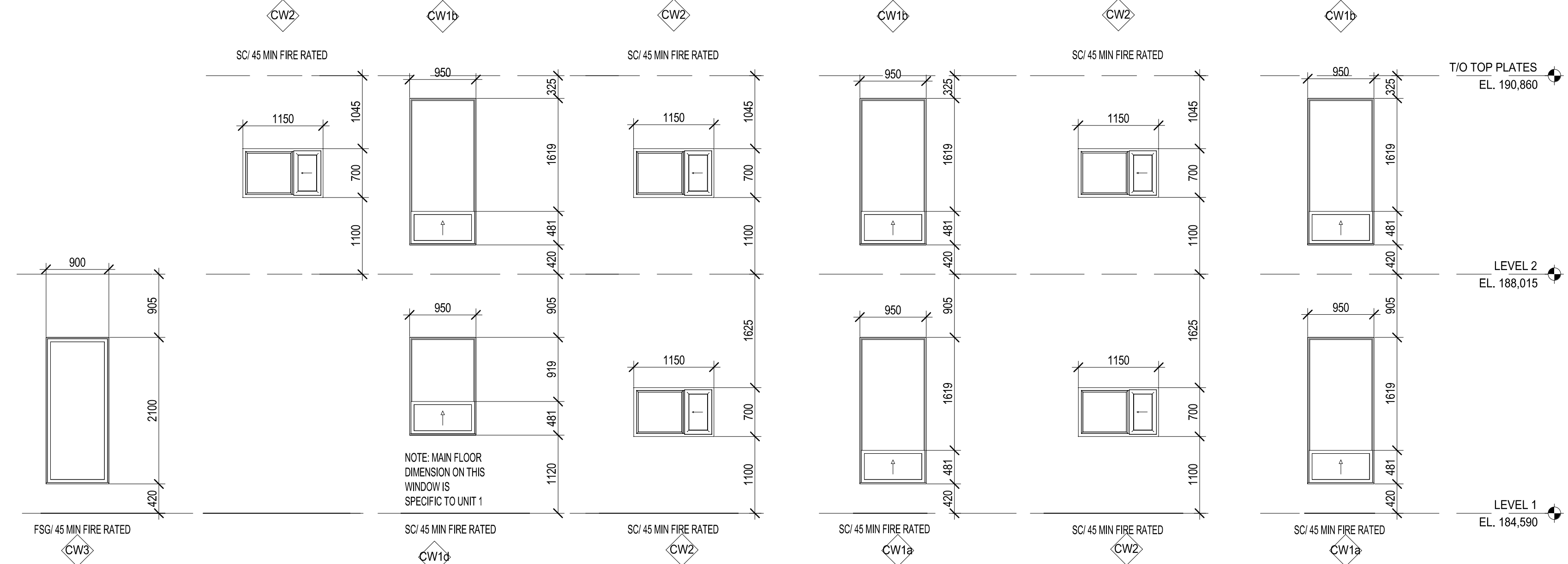




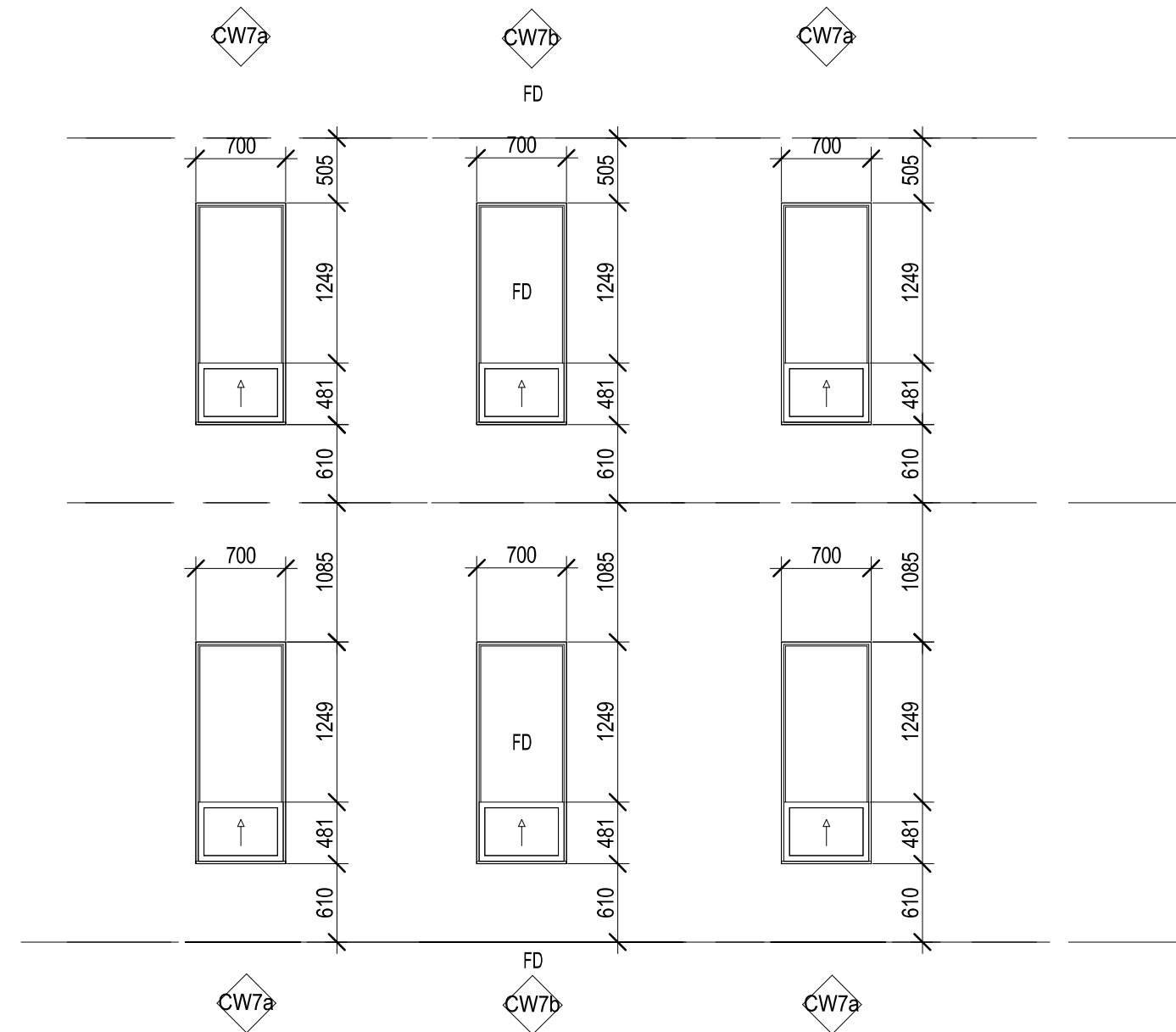
NOTE: EAST SIDE WINDOWS ARE CURTAIN WALL WINDOWS - RATED



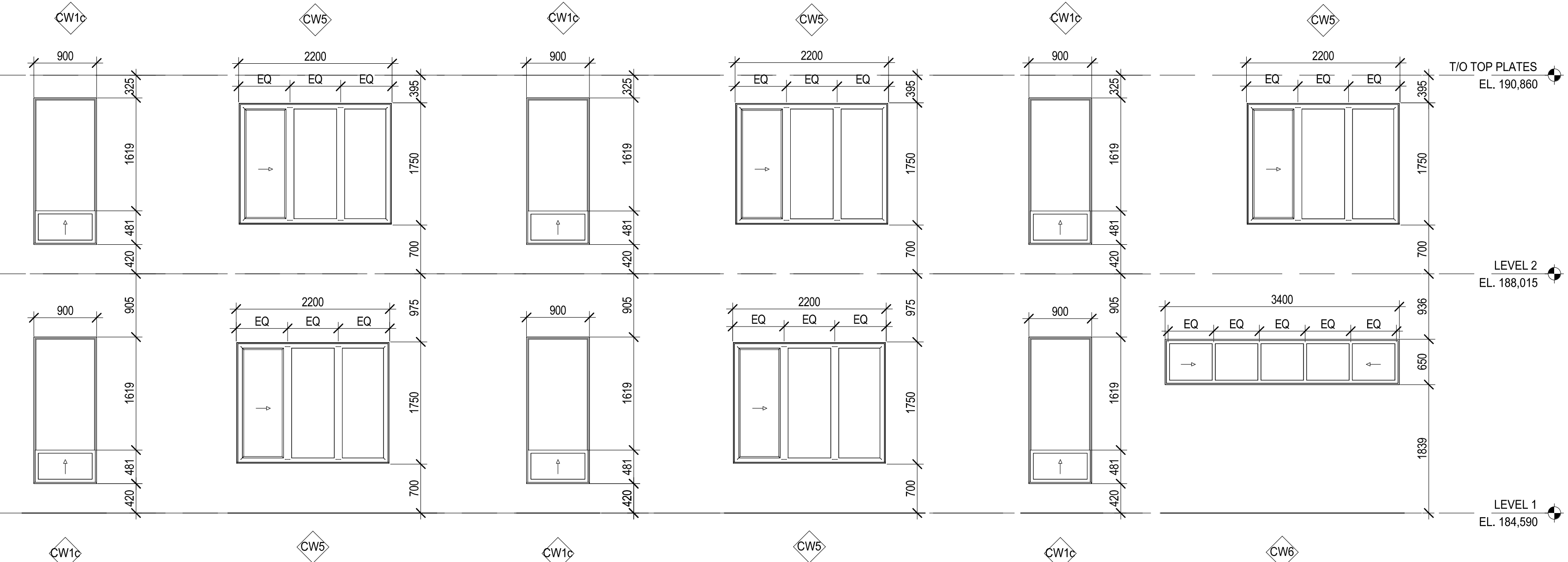
NOTE: NORTH SIDE WINDOWS ARE CURTAIN WALL WINDOWS - RATED / NON RATED



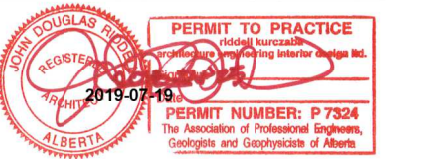
NOTE: WEST SIDE WINDOWS ARE RESIDENTIAL WINDOWS - NON RATED



NOTE: SOUTH SIDE WINDOWS ARE RESIDENTIAL WINDOWS - NON RATED



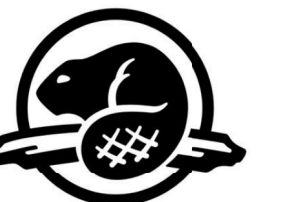
AL	ALUMINUM - PRE FINISHED BROWN
CL	CHAIN LINK
DGSU	DOUBLE GLAZED SEALED UNIT
FD	FROSTED
FSG	FIRE SAFETY GLASS
HCW	HOLLOW CORE WOOD
HMD	HOLLOW METAL DOOR
HMD	INSULATED HOLLOW METAL DOOR
IPS	INSULATED PRESSED STEEL FRAME
ISL	INSULATED STEEL
LG	LAMINATED GLASS
MCW	METAL CLAD WOOD
PF	PREFINISHED
PS	PRESSED STEEL FRAME
PT	PAINT
SC	SELF CLOSING
SL	STEEL
WDF	WOOD FRAME



DO NOT SCALE

5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
1	60% IFC DRAWING	18/02/09
Revision / Revision	Description / Description	Date / Date

Client / client



Parks Canada    Parcs Canada

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'Ingénierie

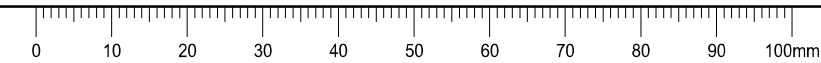
Client / client

Parks Canada


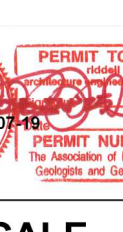


Drawing title / Titre du dessin

## WINDOW SCHEDULE

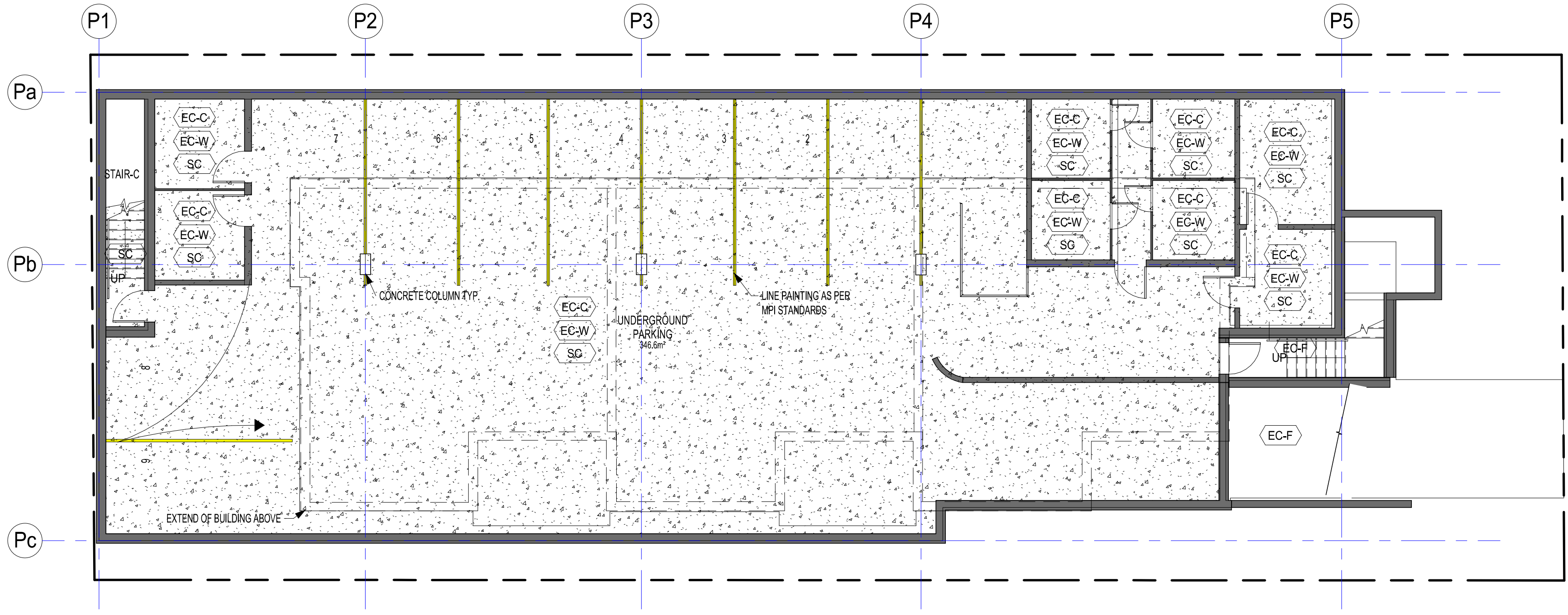
Project No. / No. du project	Sheet / Feuille  <b>A9.01</b>	Revision no. / La Révision no.  <b>5</b>
---------------------------------	-------------------------------------	--





 		
<b>DO NOT SCALE</b>		
4	ISSUED FOR TENDER / BP	19/07/19
3	99% IFC DRAWING	18/11/23
2	96% IFC DRAWING	18/03/19
1	60% IFC DRAWING	18/02/09
Revision / Révision	Description / Description	Date / Date
<div style="display: flex; justify-content: space-between; align-items: center;"> <div>Client / client</div> <div style="text-align: center;">  </div> <div>  <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="text-align: center;"> <b>Parks Canada</b> </div> <div style="text-align: center;"> <b>Parcs Canada</b> </div> </div> </div> </div>		
<div style="text-align: center;"> <b>Banff National Park</b>  <b>Banff, Alberta</b>    <b>PCA - STAFF HOUSING</b>  <b>329 MARTEN STREET</b> </div>		
Approved by/Approuvé par AO		
Designed by/Concept par PS		
Drawn by/Dessiné par MS		
Project Manager/Administrateur de Projets .M		
Architectural and Engineering Resources Manager/ Ressources Architecturales et de Directeur d'ingénierie		
Client / client <b>Parks Canada</b>		
Drawing title / Titre du dessin		
<div style="border: 1px solid black; padding: 20px; margin: 0 auto; width: 80%;"> <p style="font-size: 24px; margin: 0;">DOOR HARDWARE GROUP</p> </div>		
Project No. / No. du Project	Sheet / Feuille	Revision no. / La Révision

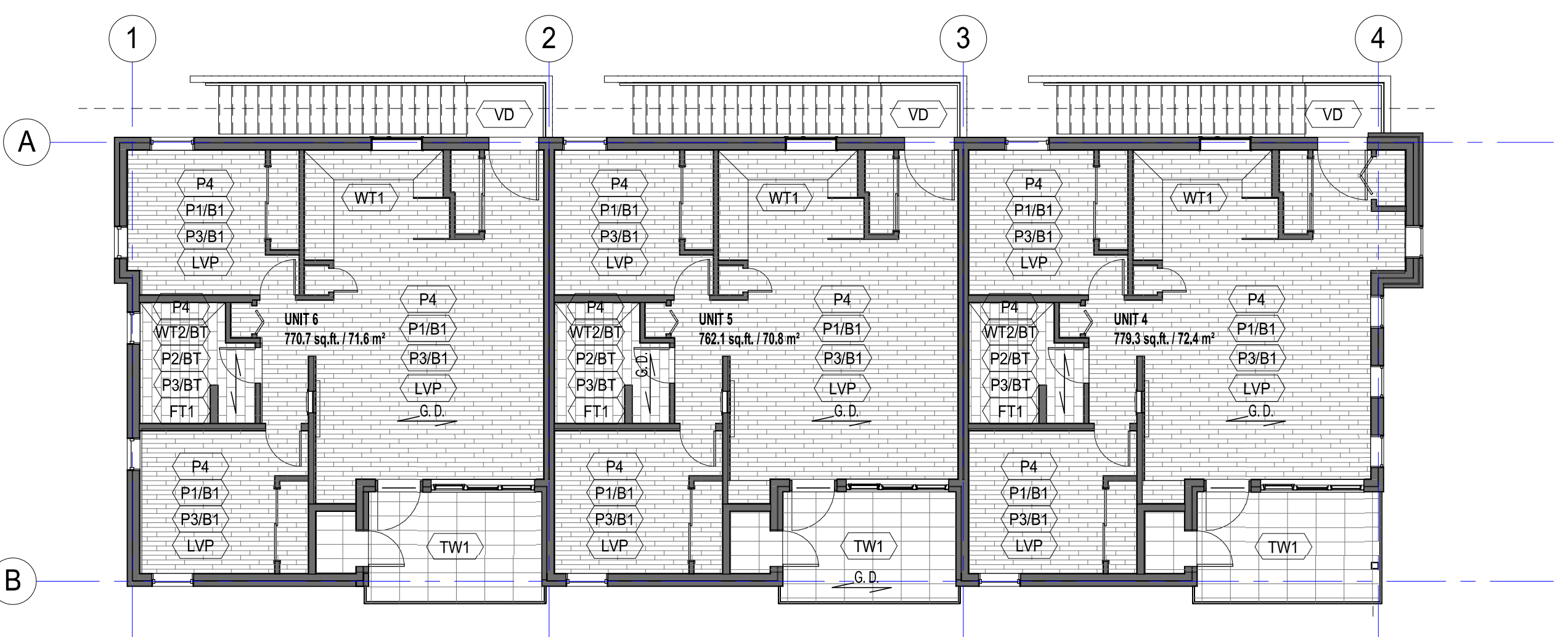




3 UNDERGROUND PARKING WALL AND FINISHES PLAN - OPTION 2  
ID1.00 SCALE: 1 : 100



1 MAIN FLOOR INTERIOR FINISHES PLAN  
ID1.00 SCALE: 1 : 100



2 SECOND FLOOR INTERIOR FINISHES PLAN  
ID1.00 SCALE: 1 : 100

FINISHES NOTES		FINISH LEGEND	
NOTES: 1. ALL FINISHES TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. 2. SEE INTERIOR FINISH SCHEDULE FOR FLOOR, WALL, & MILLWORK FINISH SPECIFICATIONS. 3. ALL FLOOR FINISHES TO TERMINATE AT CENTRE LINE OF DOOR SLAB. 4. REFER TO INTERIOR FINISHES SCHEDULE FOR TRANSITION STRIP INFORMATION.		FLOOR FINISHES	
			LVP LUXURY VINYL PLANK PLACED ON SOUND ATTENUATION UNDERLAY
			FT1 FLOOR TILE 1 PLACED ON SOUND ATTENUATION UNDERLAY
			CPC CAST IN PLACE CONCRETE
			TW1 GEODECK
			SC SEALED CONCRETE WITH TROFIT COATING
			EC-F EXPOSED CONCRETE
			B1 BASEBOARD 1
			BT BASE TILE
			VD VINYL DECKING
			SBS SBS MEMBRANE
SYMBOL LEGEND		WALL FINISHES	
			P1 PAINT 1
			P2 PAINT 2
			P3 PAINT 3
			WT1 WALL TILE 1
			WT2 WALL TILE 2
			EC-W EXPOSED CONCRETE
		CEILING FINISHES	
			EC-C EXPOSED CONCRETE
			P4 SMOOTH CEILING PAINT

Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest

DO NOT SCALE

5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11
Revision / Revision	Description / Description	Date / Date

Client / client

Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHIHOME  
Designed by/Concept par  
PETER SCHULZ  
Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD  
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie  
Client / client  
**Parks Canada**  
Drawing title / Titre du dessin  
**UNDERGROUND PARKING, MAIN AND  
SECOND FLOOR - INTERIOR FINISHES  
PLANS**

Project No. / No. du project	Sheet / Feuille	Revision no. / La Revision no.
ID1.00		5







ELEVATION MATERIALS LEGEND

FLOOR FINISHES	WALL FINISHES	CEILING FINISHES
<div><div>LVP</div><div><div>PRODUCT:</div><div>XL FLOCKINGLUXURY VINYL PLANK / TILE (WITH SMART LOCK)</div><div>MATERIAL:</div><div>VINYL</div><div>COLOR / FINISH:</div><div>RIALTO BRIDGE</div><div>SIZE:</div><div>12"X24"X0.196" THICK</div><div>WEAR LAYER:</div><div>20 MIL</div><div>INSTALLATION:</div><div>BRICK PATTERN WITH GRAIN RUNNING EAST TO WEST AS SHOWN.</div><div>FLAME SPREAD:</div><div>ASTM-E648, CLASS 1</div><div>LOCATION:</div><div>THROUGHOUT SUITES U.N.O</div><div>NOTE1:</div><div>TO BE INSTALLED OVER "INSONOFLOOR" MEMBRANE AND "ACCOUSTIC BOARD" PANEL CONTRACTOR TO CONFIRM WITH SUPPLIER ( ACOUSTITECH)</div></div></div>	<div><div>P1</div><div><div>PRODUCT:</div><div>ACRYLIC LATEX EGGSHELL - WALLS</div><div>COLOR NAME:</div><div>CHANTILLY LACE</div><div>FINISH:</div><div>EGGSHELL HIGH-DURABILLITY SCRUBBABLE PAINT LOW V.OC</div><div>LOCATION:</div><div>ALL INTERIOR SUITES</div><div>NOTE1:</div><div>ENSURE NO VISIBLE STREAKING</div></div></div> <div><div>P2</div><div><div>PRODUCT:</div><div>PAINT - WALLS</div><div>COLOR NAME:</div><div>PEWTER GREY</div><div>FINISH:</div><div>EGGSHELL HIGH-DURABILLITY SCRUBBABLE PAINT LOW V.OC</div><div>LOCATION:</div><div>WASHROOMS</div><div>NOTE1:</div><div>ENSURE NO VISIBLE STREAKING</div></div></div> <div><div>P3</div><div><div>PRODUCT:</div><div>LACQUER FINISH PAINT</div><div>COLOR NAME:</div><div>CHANTILLY LACE</div><div>FINISH:</div><div>EGGSHELL HIGH-DURABILLITY SCRUBBABLE PAINT LOW V.OC</div><div>LOCATION:</div><div>60% GLOSS BASEBOARDS, DOORS AND DOOR CASING WITH THE EXCEPTION OF THE SUITE ENTRY DOORS AND PATIO DOORS</div><div>NOTE1:</div><div>ENSURE NO VISIBLE STREAKING</div></div></div> <div><div>WT1</div><div><div>PRODUCT:</div><div>GLAZED CERAMIC WALL TILE</div><div>COLOR AND FINISH:</div><div>STARRY WHITE</div><div>SIZE:</div><div>2" HIGH X 9" WIDE X 3/8" THICK</div><div>INSTALLATION:</div><div>STRETCHER BOND PATTERN AS SHOWN</div><div>GROUT:</div><div>MAPEI #00 WHITE</div><div>LOCATION:</div><div>KITCHEN</div><div>NOTE1:</div><div>FINISH ANY EXPOSED VERTICAL EDGES WITH SATIN NICKEL SCHLUTER TRIMS AS REQUIRED 10 mm TICK</div></div></div> <div><div>WT2</div><div><div>PRODUCT:</div><div>GLAZED CERAMIC WALL TILE</div><div>COLOR AND FINISH:</div><div>CAPRI GLOSS GREY</div><div>SIZE:</div><div>2" HIGH X 9" WIDE X 3/8" THICK</div><div>INSTALLATION:</div><div>STRETCHER BOND PATTERN AS SHOWN</div><div>GROUT:</div><div>MAPEL #00 WHITE</div><div>LOCATION:</div><div>WASHROOMS</div><div>NOTE1:</div><div>FINISH ANY EXPOSED VERTICAL EDGES WITH SATIN NICKEL SCHLUTER TRIMS AS REQUIRED 10 mm TICK</div></div></div> <div><div>EC-W</div><div><div>PRODUCT:</div><div>EXPOSED CONCRETE</div><div>FINISH / COLOR:</div><div>MATT FINISH</div><div>NOTE1:</div><div>ENSURE CONCRETE IS SMOOTH / CLEAN PRIOR TO APPLICATION</div></div></div> <div><div>B1</div><div><div>PRODUCT:</div><div>MDF BASE</div><div>COLOR AND FINISH:</div><div>COLOR AND FINISH TO MATCH P1</div><div>SIZE:</div><div>SEMI GLOSS LATEX SPRAY FINISH</div><div>PROFILE:</div><div>3" HIGH X 5/8" THICK</div><div>LOCATION:</div><div>FLAT EDGE - NO PROFILE THROUGHOUT ALL SUITES</div></div></div> <div><div>BT</div><div><div>PRODUCT:</div><div>COLORBODY PROCELAIN WALL BASE TILE</div><div>COLOR AND FINISH:</div><div>COLOR AND FINISH TO MATCH FT1</div><div>SIZE:</div><div>3" HIGH X 8" WIDE X 3/8" THICK</div><div>GROUT:</div><div>MAPEI #27 SILVER</div><div>LOCATION:</div><div>THROUGHOUT ALL WASHROOMS</div><div>NOTE1:</div><div>ALIGN JOINT WITH FT1</div></div></div>	<div><div>P4</div><div><div>PRODUCT:</div><div>ACRYLIC LATEX FLAT - CEILINGS</div><div>COLOR NAME:</div><div>CHANTILLY LACE</div><div>FINISH:</div><div>EGGSHELL HIGH-DURABILLITY SCRUBBABLE PAINT LOW V.OC</div><div>LOCATION:</div><div>ALL CEILING</div><div>NOTE1:</div><div>ENSURE NO VISIBLE STREAKING</div></div></div> <div><div>EC-C</div><div><div>PRODUCT:</div><div>EXPOSED CONCRETE</div><div>FINISH / COLOR:</div><div>MATT FINISH</div><div>NOTE1:</div><div>ENSURE CONCRETE IS SMOOTH / CLEAN PRIOR TO APPLICATION</div></div></div> <div><div>NOTE ALL COLORS TO BE DETERMINED BY DEPARTMENTAL REPRESENTATIVE</div></div>



DO NOT SCALE


3	ISSUED FOR TENDER / BP	19/07/19
2	99% IFC DRAWING	18/11/23
1	99% IFC DRAWING	18/03/16

Revision / Revision	Description / Description	Date / Date
------------------------	---------------------------	-------------

Client / client

Parks  
Canada

Parcs  
Canada

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessine par

MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

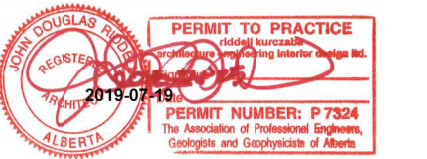
**Parks Canada**

Drawing title / Titre du dessin

ROOM FINISH SCHEDULE

Project No. / No. du project	Sheet / Feuille <b>ID1.01</b>	Revision no. / La Révision no. <b>3</b>
---------------------------------	----------------------------------	--





DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Parks Canada Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par  
MARAL SAFARZADEH

Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

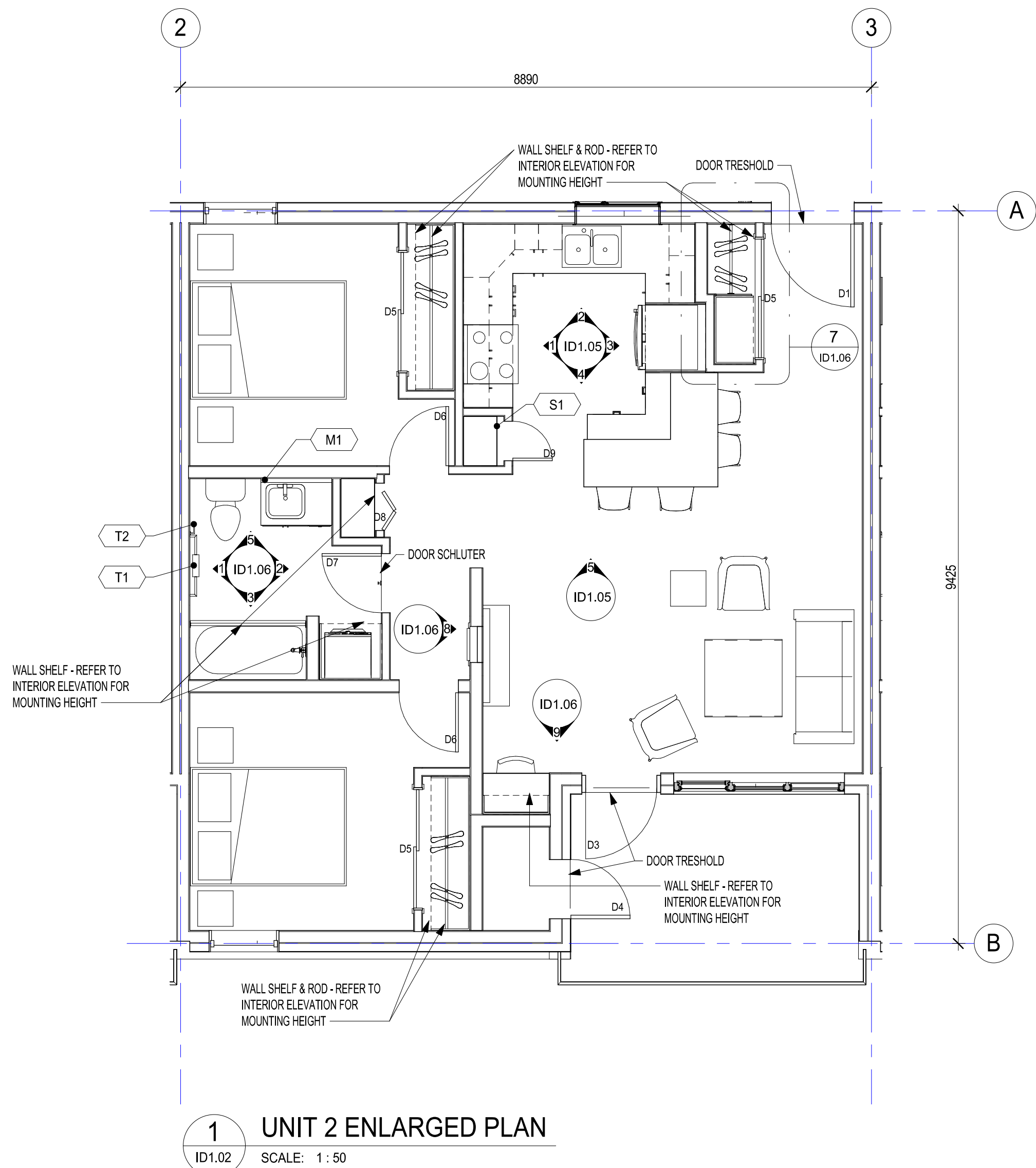
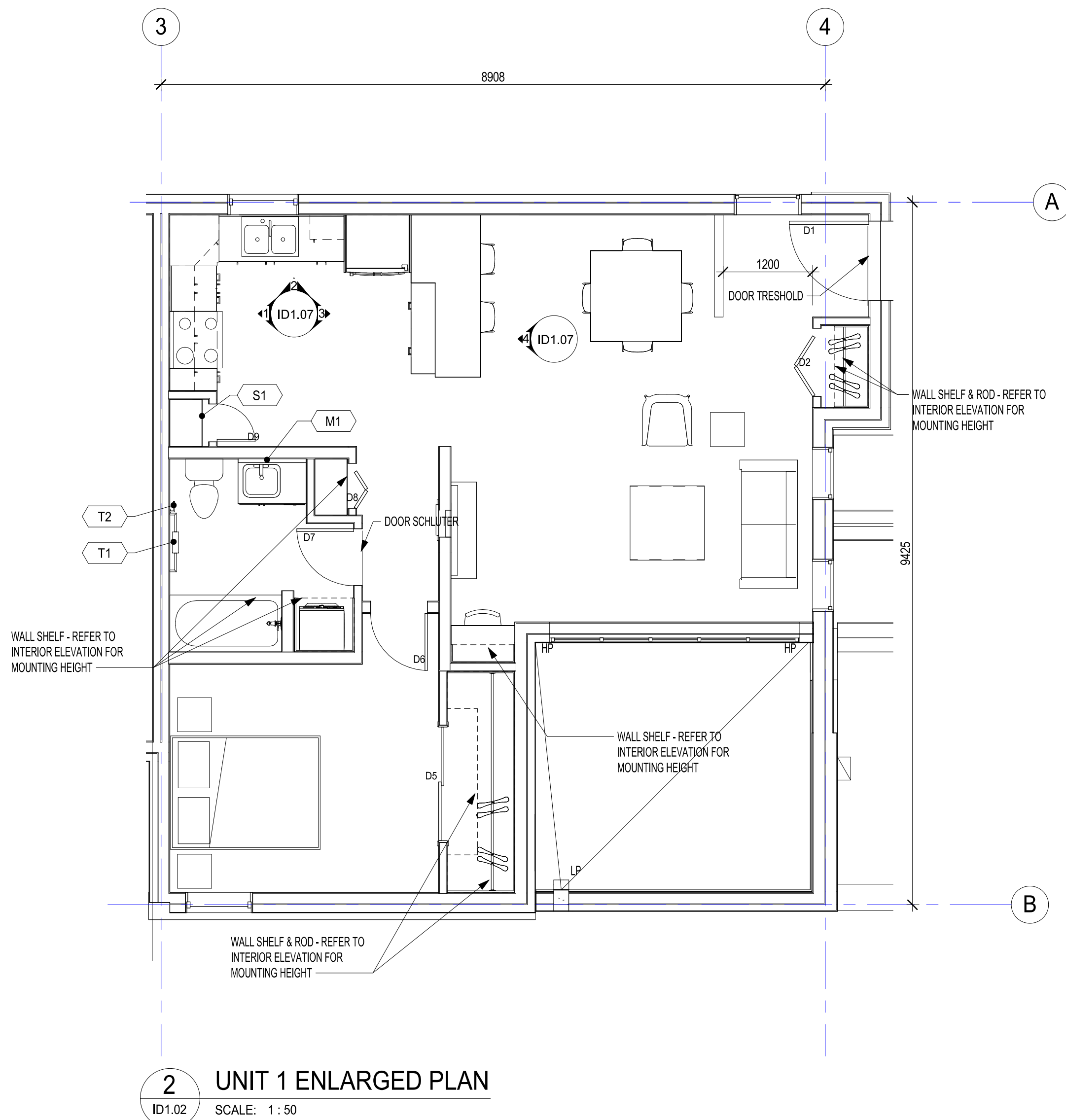
Client / client

Parks Canada

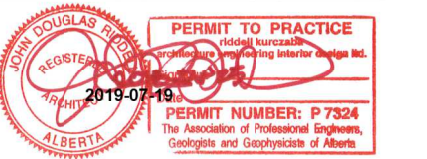
Drawing title / Titre du dessin

ENLARGED UNIT PLANS - UNIT 1 AND 2

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	ID1.02	5







DO NOT SCALE

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Parks  
Canada

Parcs  
Canada

Project title / Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessine par  
MARAL SAFARZADEH

Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

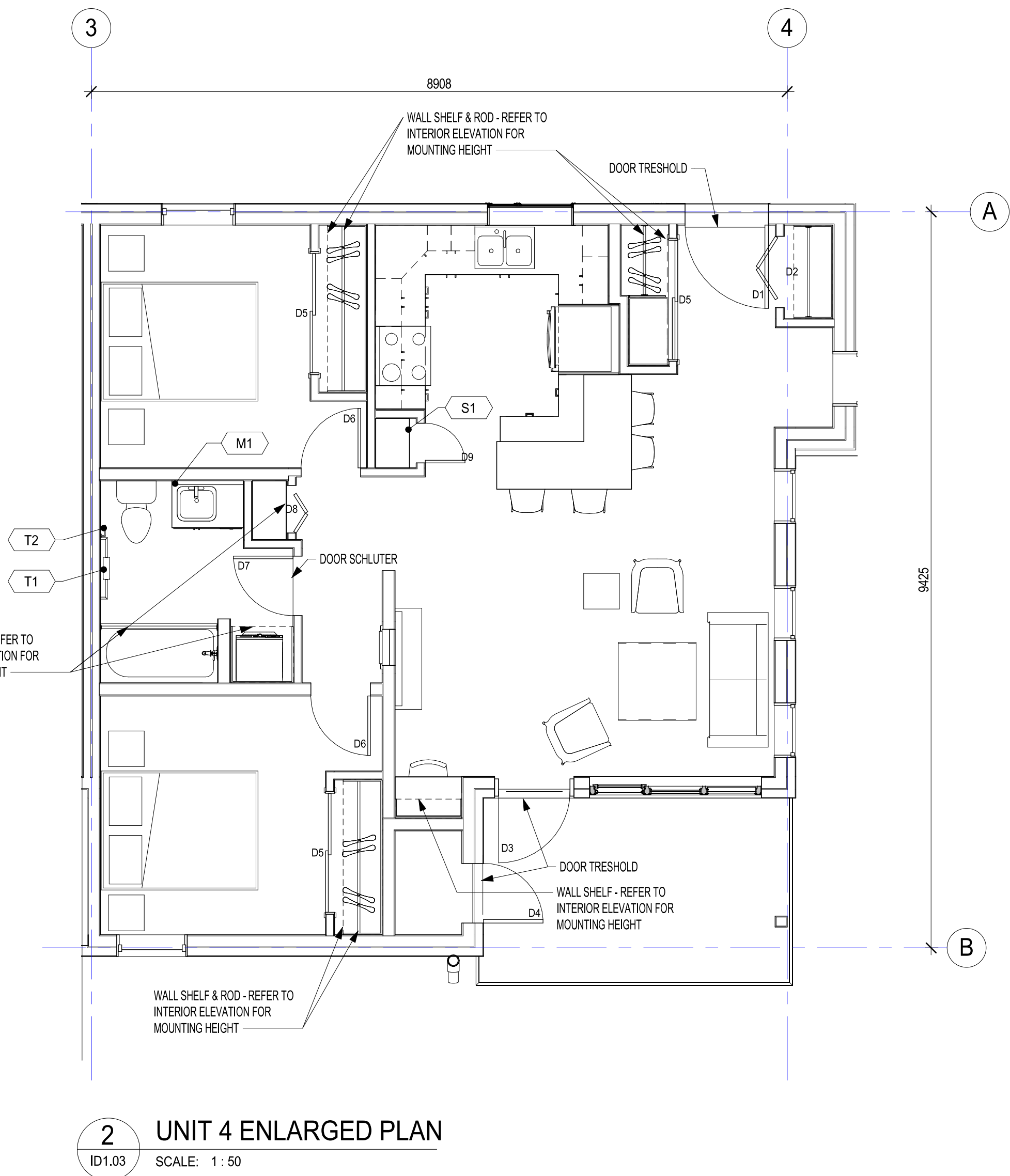
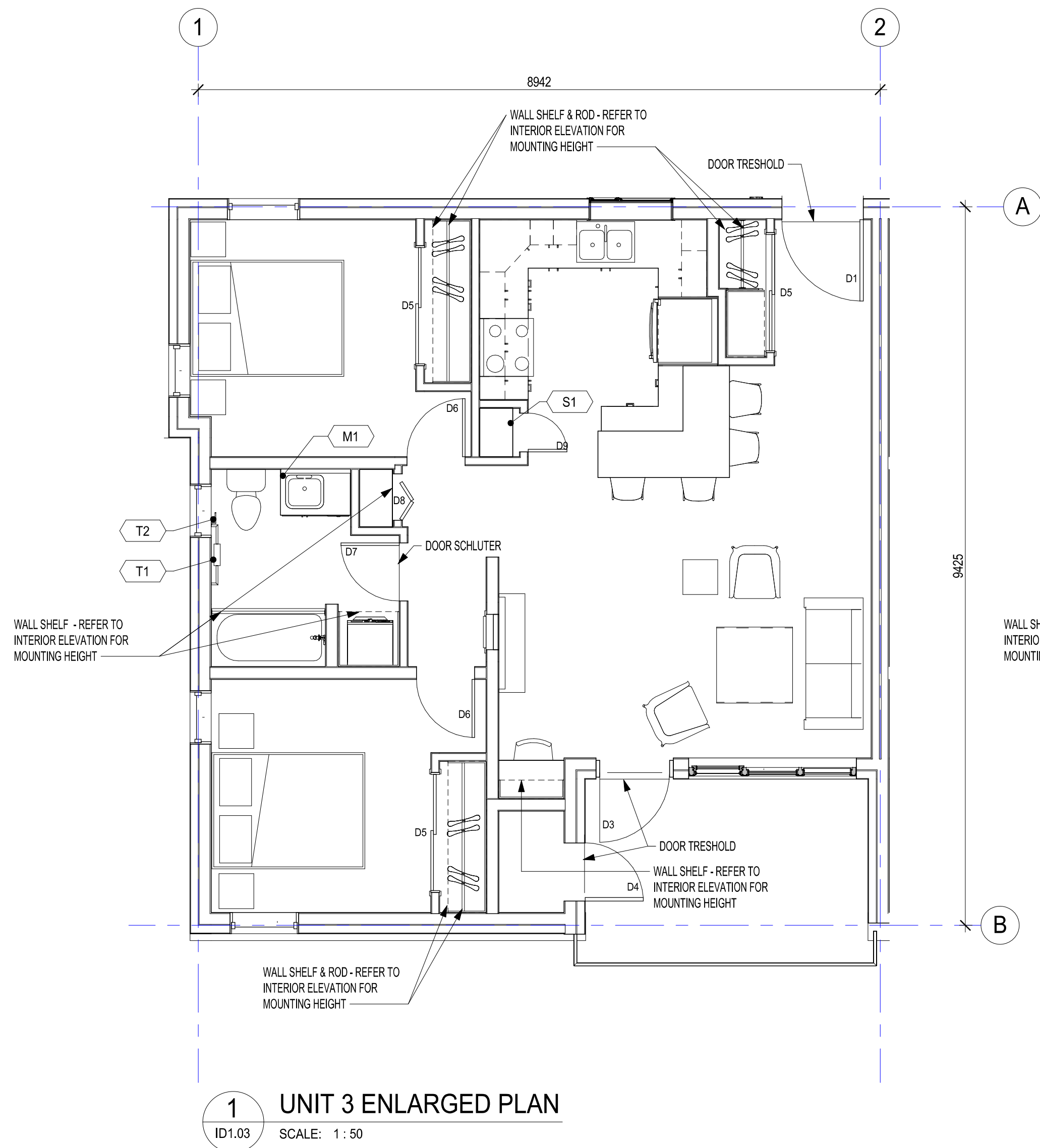
Drawing title / Titre du dessin

ENLARGED UNIT PLANS - UNIT 3 AND 4

Project No. / No. du project	Sheet / Feuille no.	Revision no. / La Révision no.
---------------------------------	------------------------	--------------------------------------

ID1.03

5







DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessiné par

MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

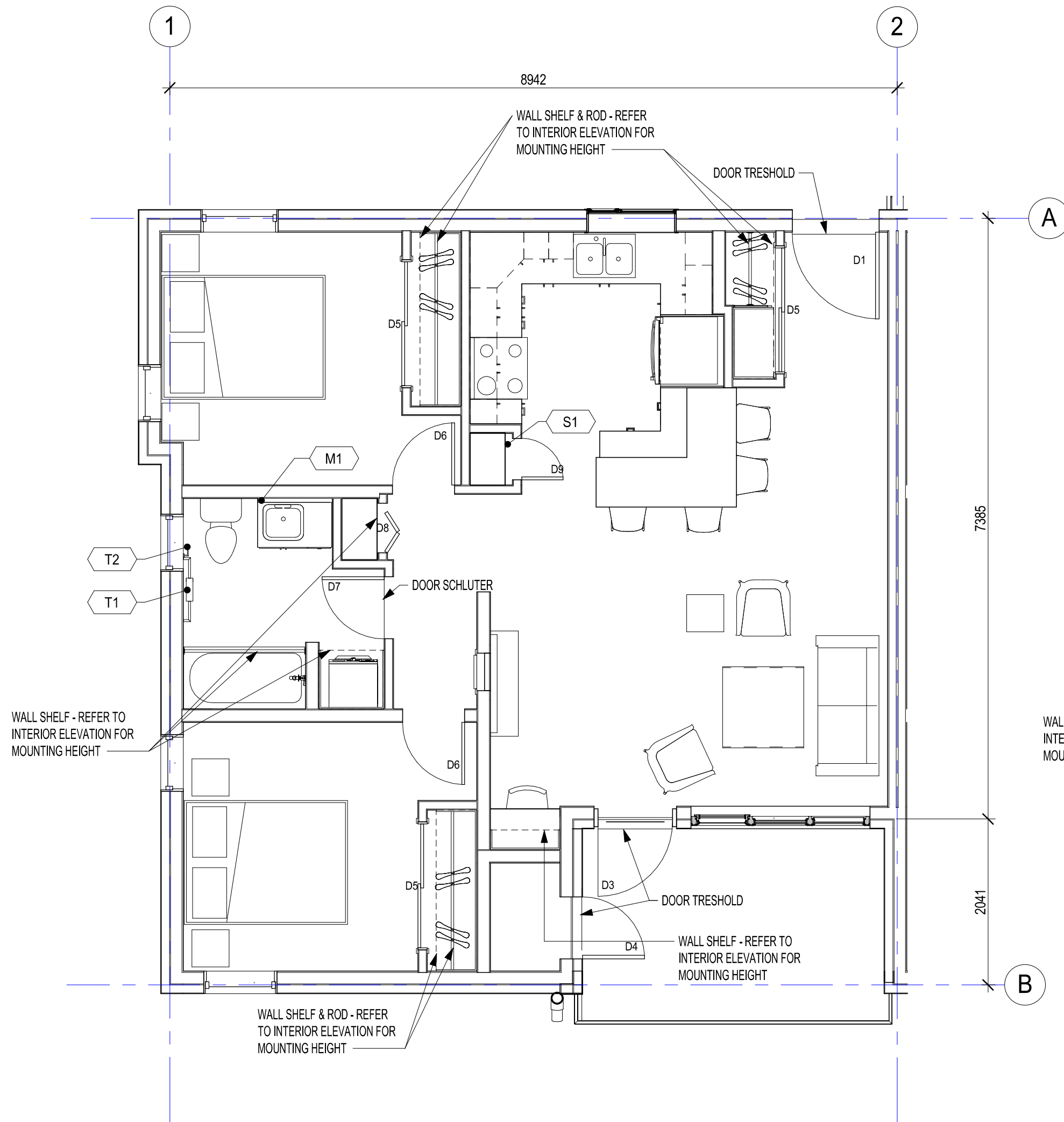
Client / client

Parks Canada

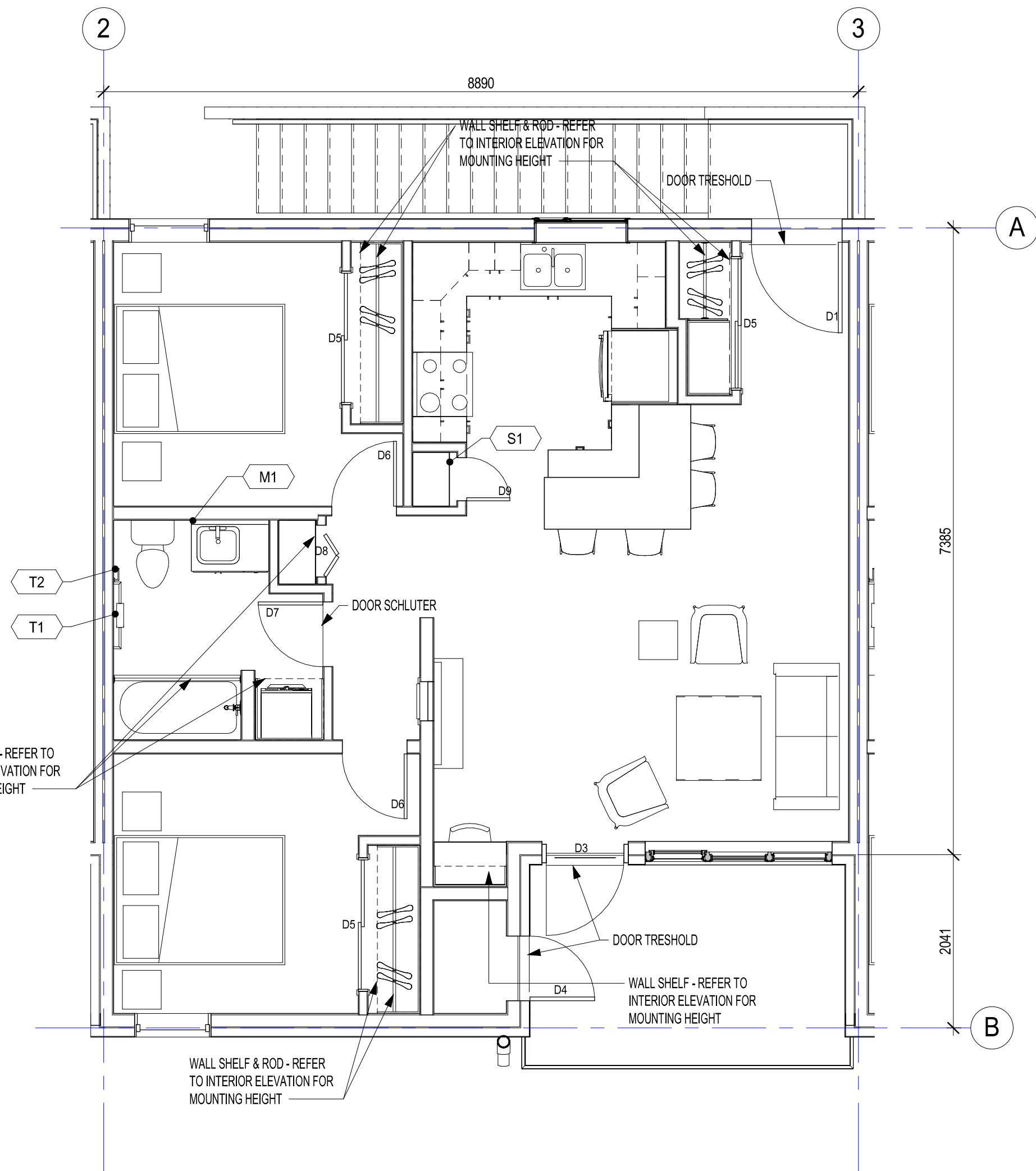
Drawing title / Titre du dessin

ENLARGED UNIT PLANS - UNIT 5 AND 6

Project No. / No. du project	Sheet / Feuille no.	Revision no. / La Révision no.
ID1.04	5	

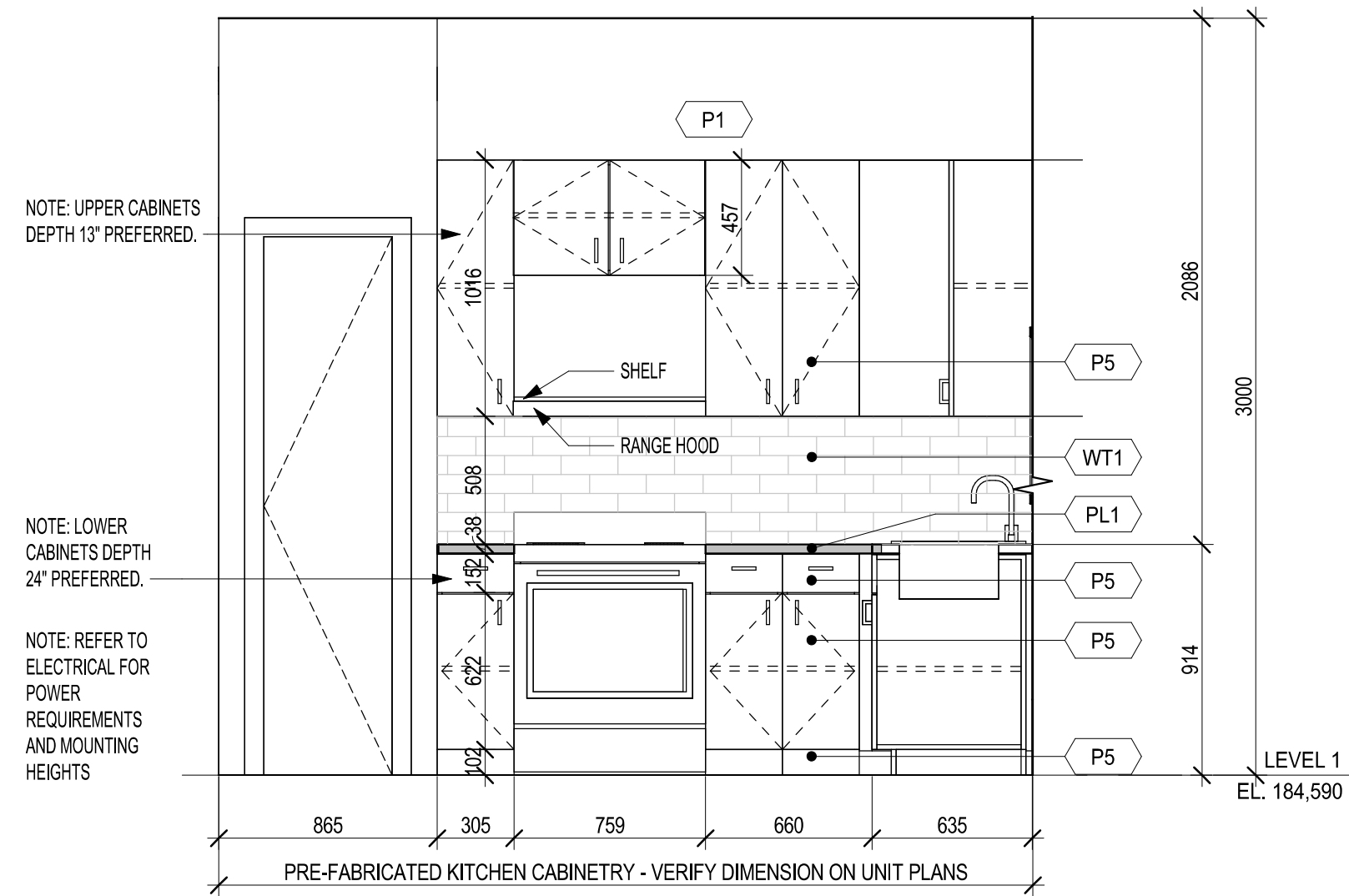


1 UNIT 6 ENLARGED PLAN  
ID1.04 SCALE: 1 : 50

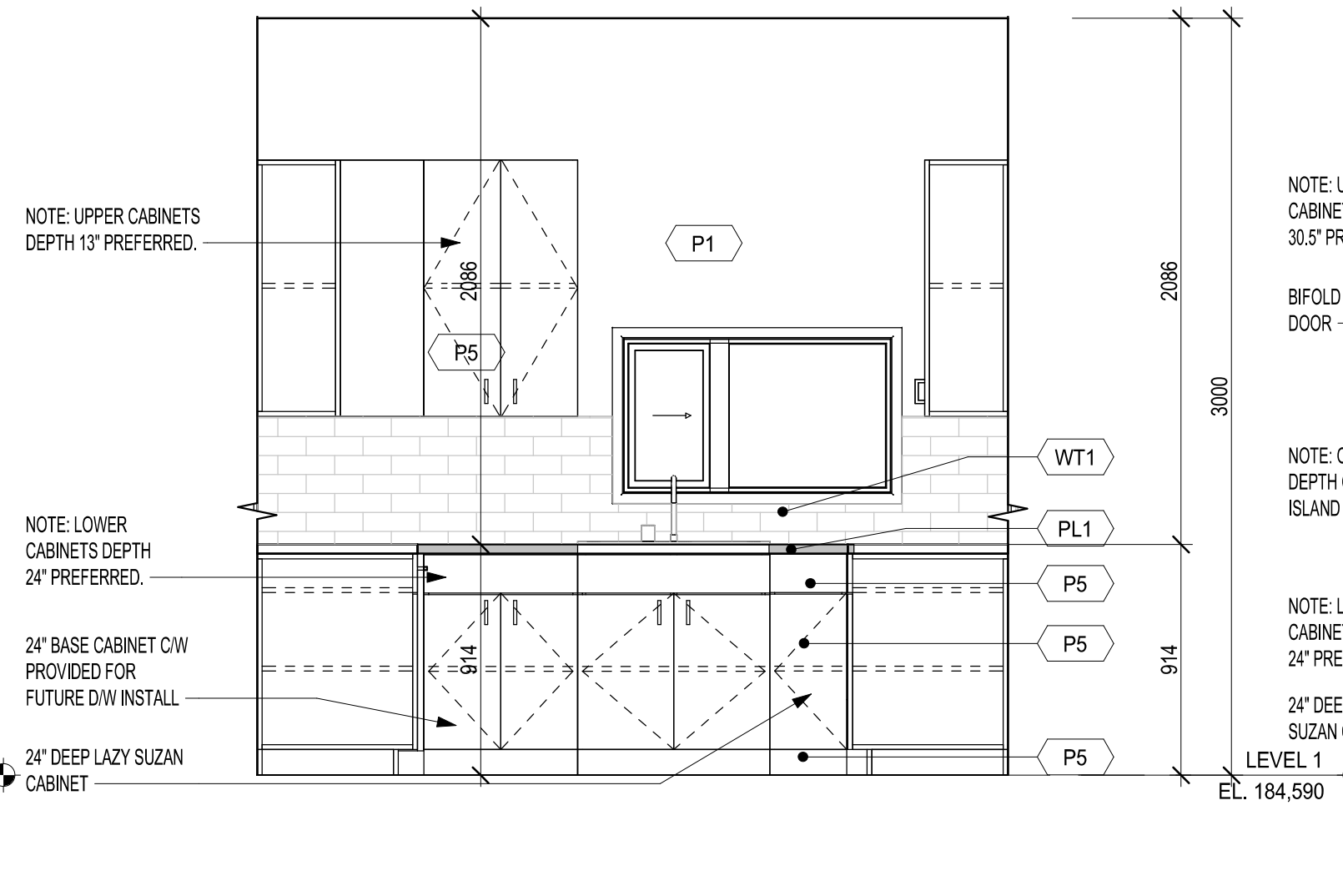


2 UNIT 5 ENLARGED PLAN  
ID1.04 SCALE: 1 : 50

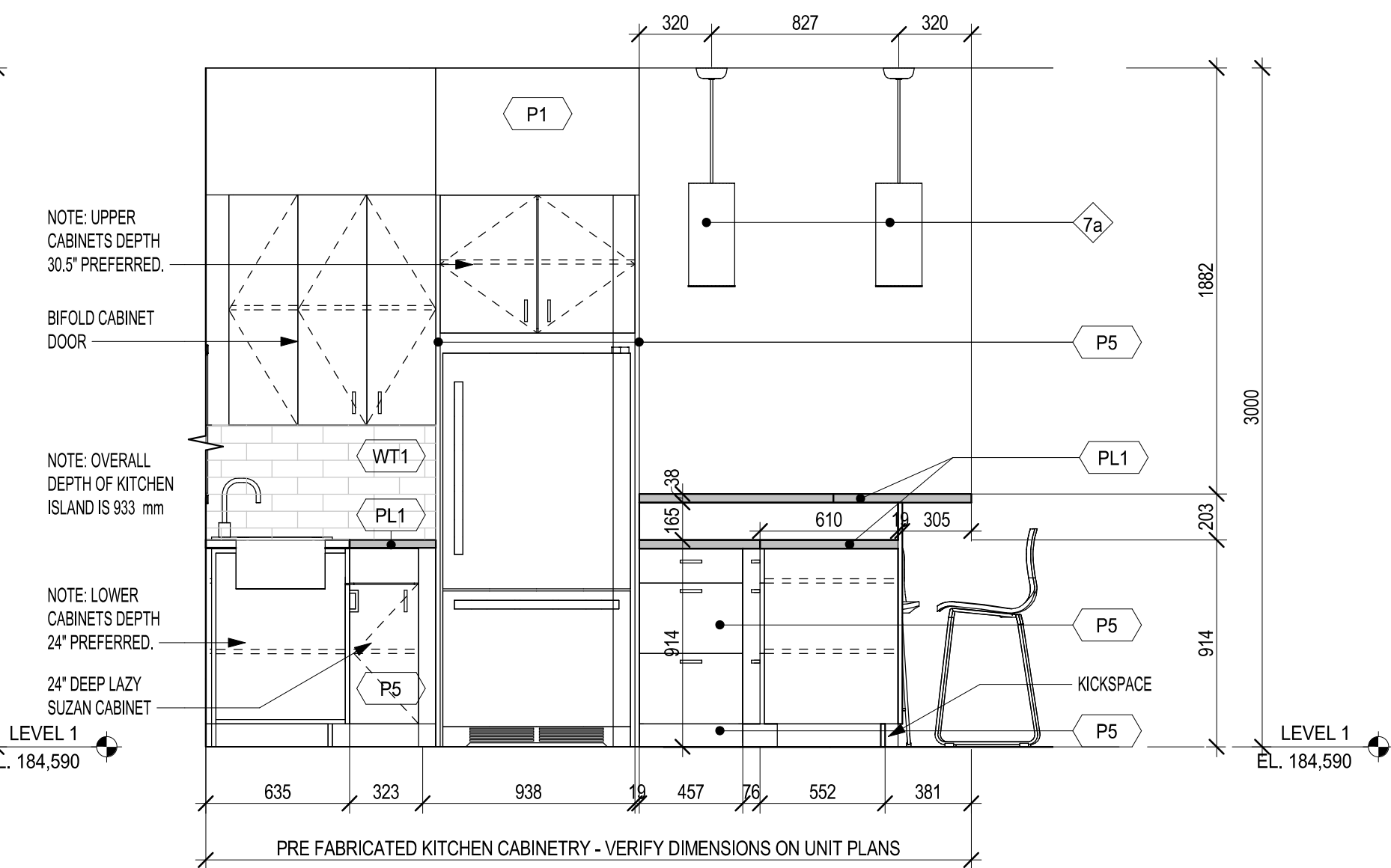




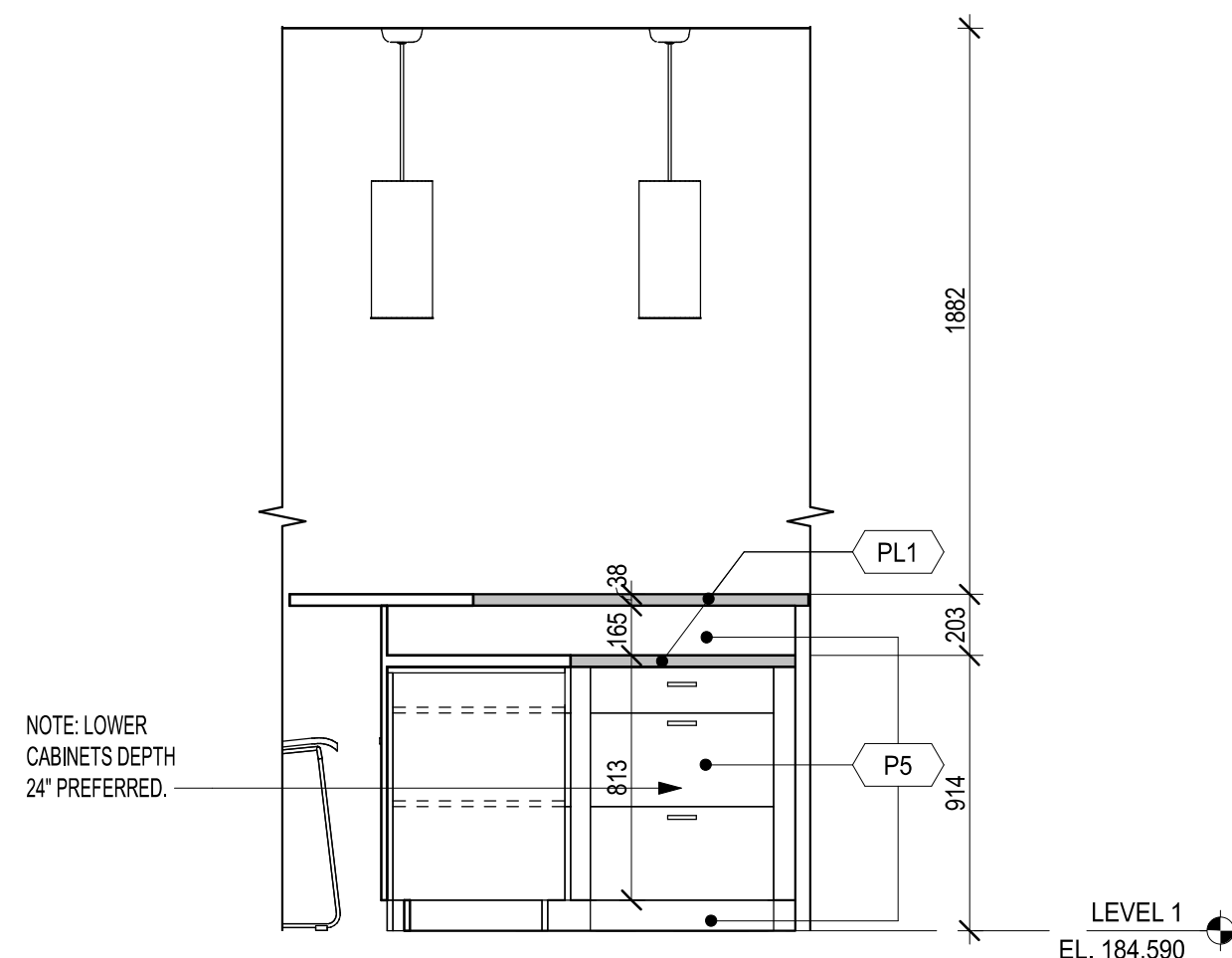
1 UNIT 2-6 TYP. KITCHEN CABINET WALL  
ID1.05 SCALE: 1 : 25



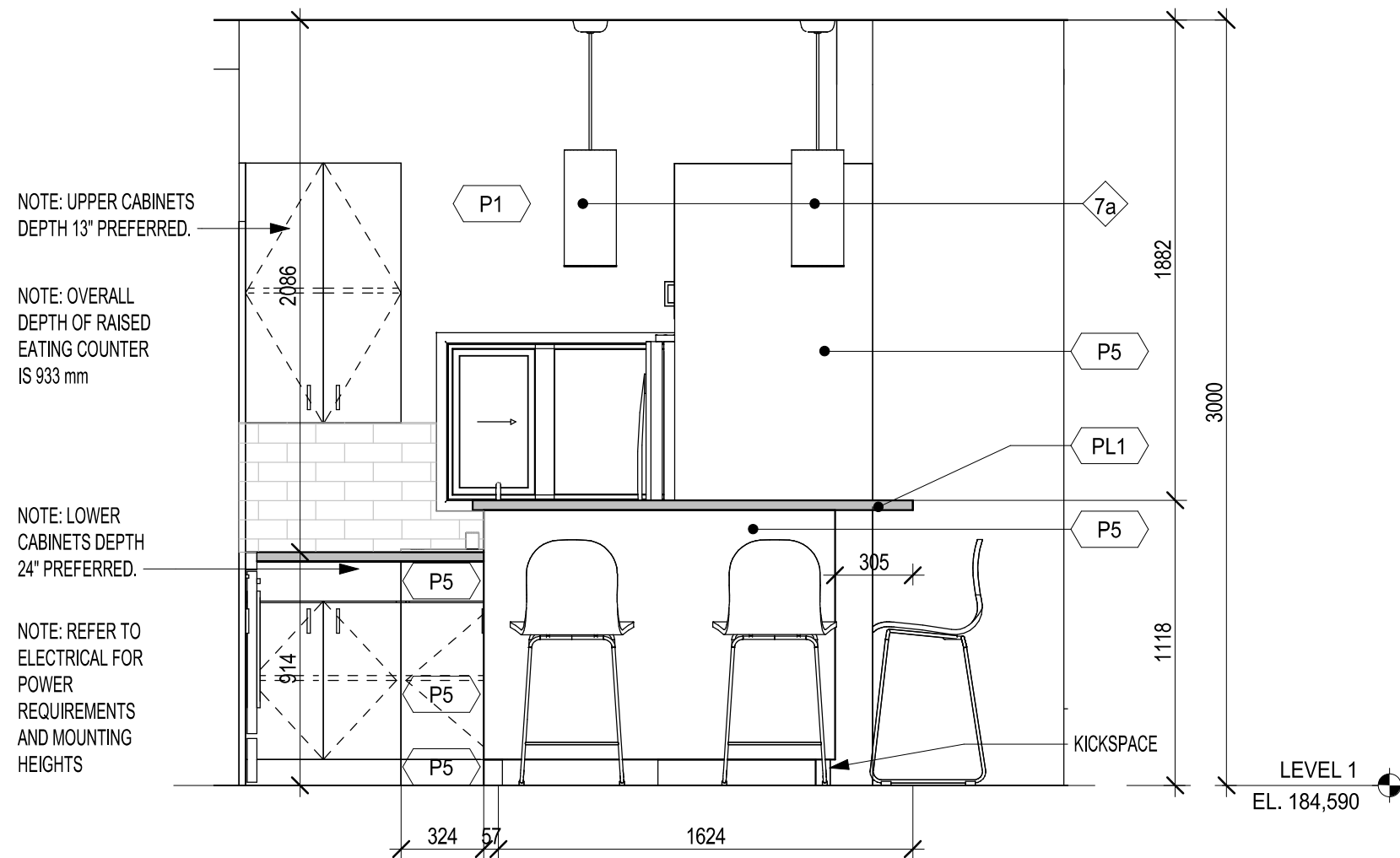
2 UNIT 2-6 TYP. KITCHEN - BACK COUNTER  
ID1.05 SCALE: 1 : 25



3 UNIT 2-6 TYP. KITCHEN - COUNTER  
ID1.05 SCALE: 1 : 25



4 UNIT 2-6 TYP. KITCHEN - BACK OF ISLAND  
ID1.05 SCALE: 1 : 25



5 UNIT 2-6 TYP. KITCHEN - FRONT OF ISLAND  
ID1.05 SCALE: 1 : 25

#### MILLWORK FINISHES SCHEDULE

P5	PRODUCT: COLOR NAME AND #: FINISH:	PAINT - MILLWORK SATIN WHITE PREFINISHED KITCHEN CABINETS COVENTRY, SEMI-GLOSS, HIGH DURABILITY, SCRUBBABLE PAINT, LOW V.O.C. MOISTURE/MILDEW RESISTANT COVENTRY THERMOFOIL COVENTRY ALL EXPOSED MILLWORK (CABINETS, DRAWERS, GABLES) IN KITCHEN AND WASHROOMS
	MATERIAL: PROFILE: LOCATION:	
	NOTE1: NOTE2:	ENSURE NO VISIBLE STREAKING INTERIOR OF ALL MILLWORK TO BE WHITE MELAMINE
PL1	PRODUCT: COLOR NAME AND #: FINISH: PROFILE: SIZE: LOCATION:	PLASTIC LAMINATE TRAVERTINE SILVER 3458-34 GLOSS SQUARE EDGE WRAP CONFIRM SIZE PER PLAN KITCHEN AND WASHROOM COUNTERTOP
	NOTE1:	ENSURE NO VISIBLE SEAMING. IF SEAMING IS REQUIRED, ENSURE SEAMS ARE BOOK MATCHED.
PL2	PRODUCT: COLOR NAME AND #: FINISH: PROFILE: SIZE: LOCATION:	PLASTIC LAMINATE ORGANIC COTTON FINE VELVET FINISH SQUARE EDGE WRAP CONFIRM SIZE PER PLAN WORK SPACE DESK
	NOTE1:	ENSURE NO VISIBLE SEAMING. IF SEAMING IS REQUIRED, ENSURE SEAMS ARE BOOK MATCHED.

#### MILLWORK HARDWARE SCHEDULE

	MILLWORK PULLS AND KNOB TO BE: FINISH: MILLWORK PULL SIZE:	SATIN NICKEL 4"
	NOTE1:	CONFIRM HARDWARE PULL WITH DESIGNER PRIOR TO PURCHASE AND INSTALL
WASHROOM AND CLOSET ACCESSORIES		
M1	PRODUCT: STYLE:	MIRROR "DOUBLE WOOD FRAME CONTEMPORARY MIRROR"
	FINISH: SIZE: LOCATION:	SILVER PAINT FINISH 914X914 mm ALL WASHROOMS, ALIGNED WITH CABINET BELOW, ABOVE SINK AND ABOVE TILE.
H1	PRODUCT: STYLE: FINISH: LOCATION:	ROBE HOOK SINGLE SATIN NICKEL BACK OF WASHROOM DOORS
	NOTE1:	DIMENSIONED ON PLAN
T1	PRODUCT: STYLE: FINISH: LOCATION:	BATH TOWEL BAR SATIN NICKEL HAND TOWEL BAR SATIN NICKEL ALL WASHROOMS
	NOTE1: NOTE2:	DIMENSIONED ON PLAN 2X6 BACKING @ 48" o.c.

T2	PRODUCT: STYLE: FINISH: LOCATION:	TOILET PAPER HOLDER SATIN NICKEL HAND TOILET PAPER HOLDER SATIN NICKEL ALL WASHROOMS
	NOTE1: NOTE2:	DIMENSIONED ON PLAN 2X6 BACKING @ 26" o.c.
R1	PRODUCT: FINISH: LOCATION:	SHOWER ROD - HEAVY DUTY CHROME ALL WASHROOMS
	NOTE1:	1981 mm / 78" HEIGHT
S1	PRODUCT: FINISH: MATERIAL: COLOR: PROFILE: SIZE: LOCATION:	CLOSET SHELVING PAINT GRADE MDF SHELF 1 1/2" SOLID MAPLE NOSING P1 EASED NOSING LENGTH AS REQUIRED 3/4" THICKNESS ALL WASHROOMS, ALL CLOSETS
	NOTE1:	INCLUDE WALL CLEATS PER MOUNTING
R2	PRODUCT: FINISH: MATERIAL: SIZE: LOCATION:	CLOSET RODS STAINLESS 1/16 STEEL - HEAVY DUTY 1 1/4" TUBING - HEAVY DUTY ALL CLOSETS
	NOTE1:	DIMENSIONED ON ELEVATIONS



#### DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWING	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11

Client / client



Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
AMINA OYAKHIHOME  
Designed by/Concept par  
PETER SCHULZ  
Drawn by/Dessiné par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

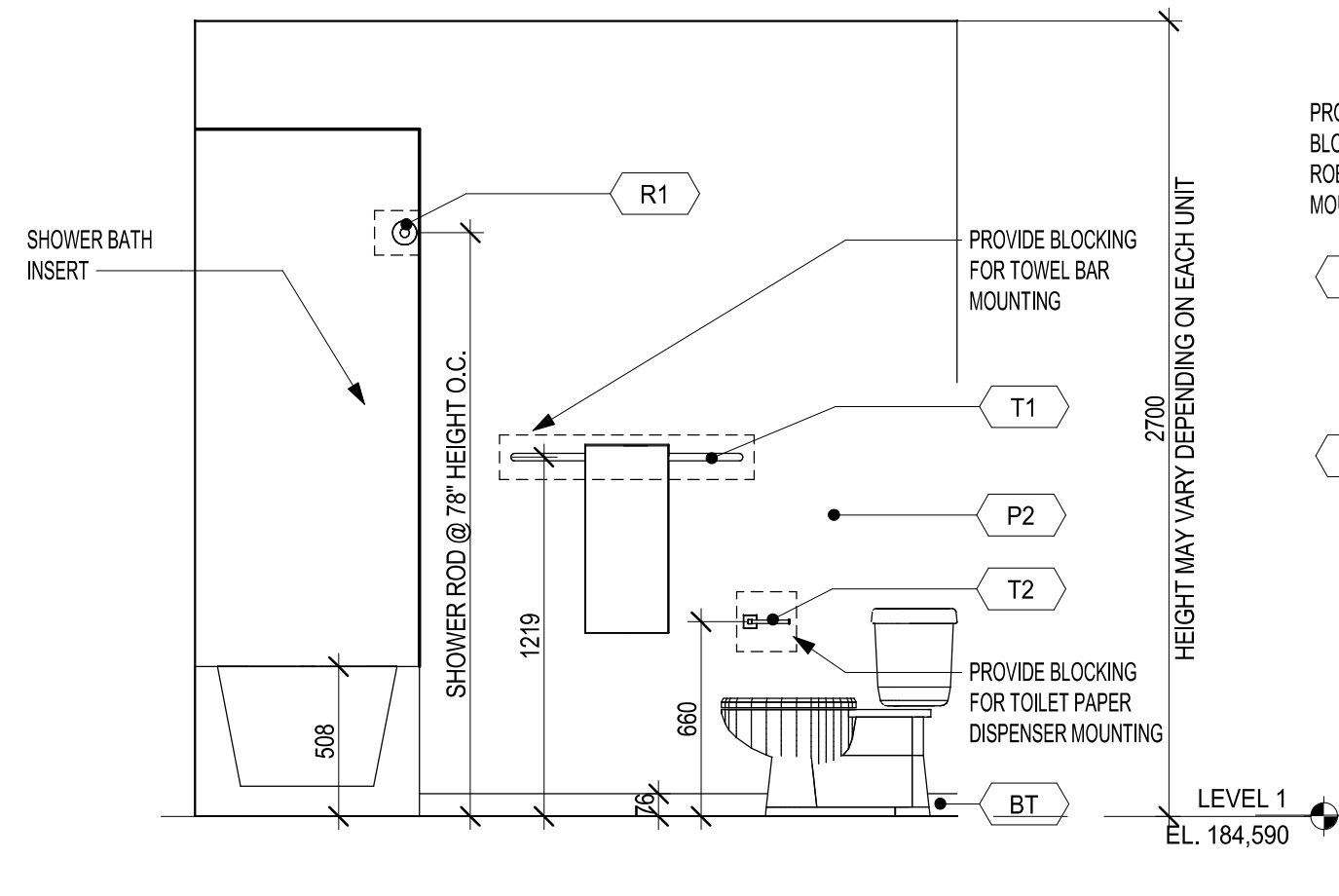
Client / client  
**Parks Canada**

Drawing title / Titre du dessin

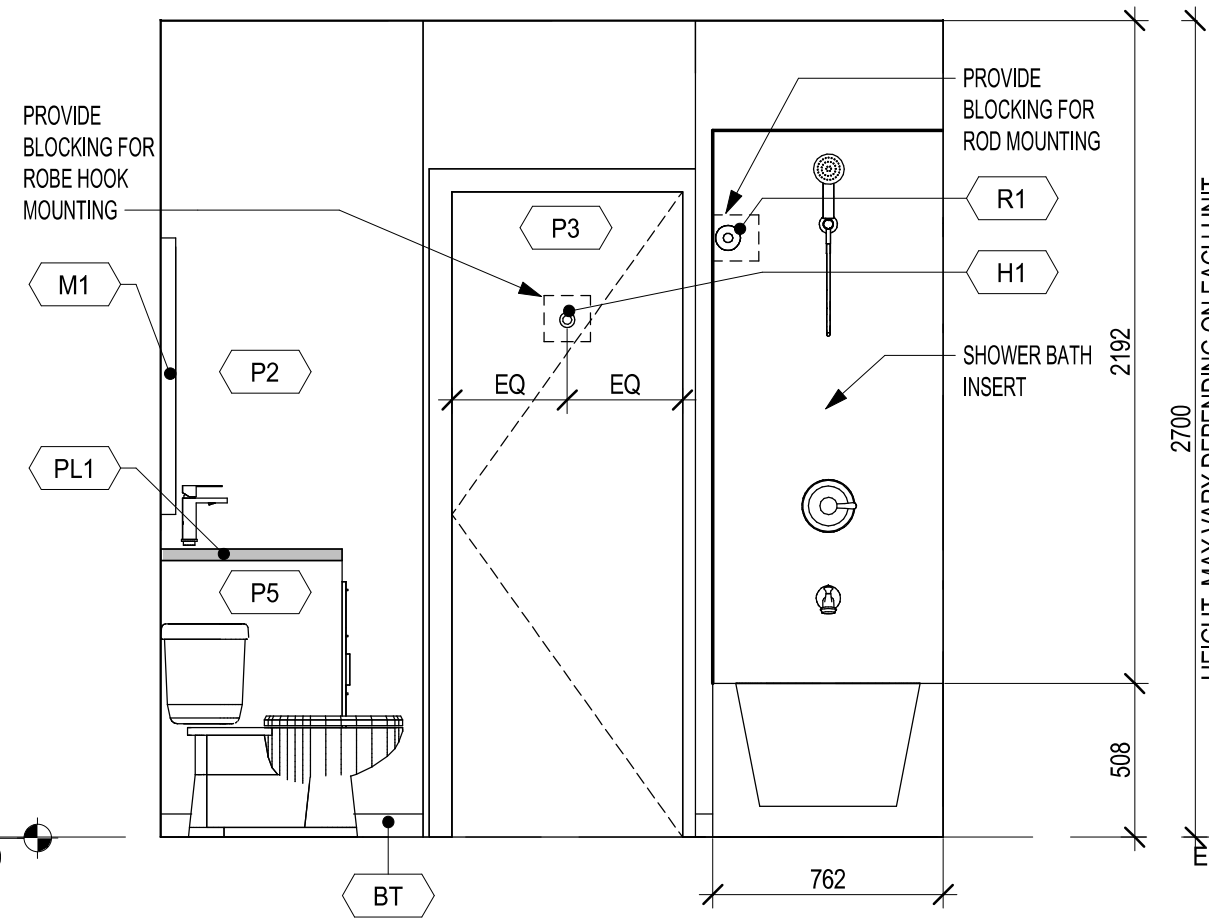
#### INTERIOR ELEVATIONS

Project No. / No. du project	Sheet / Feuille no.	Revision no. / La Révision no.
ID1.05	5	

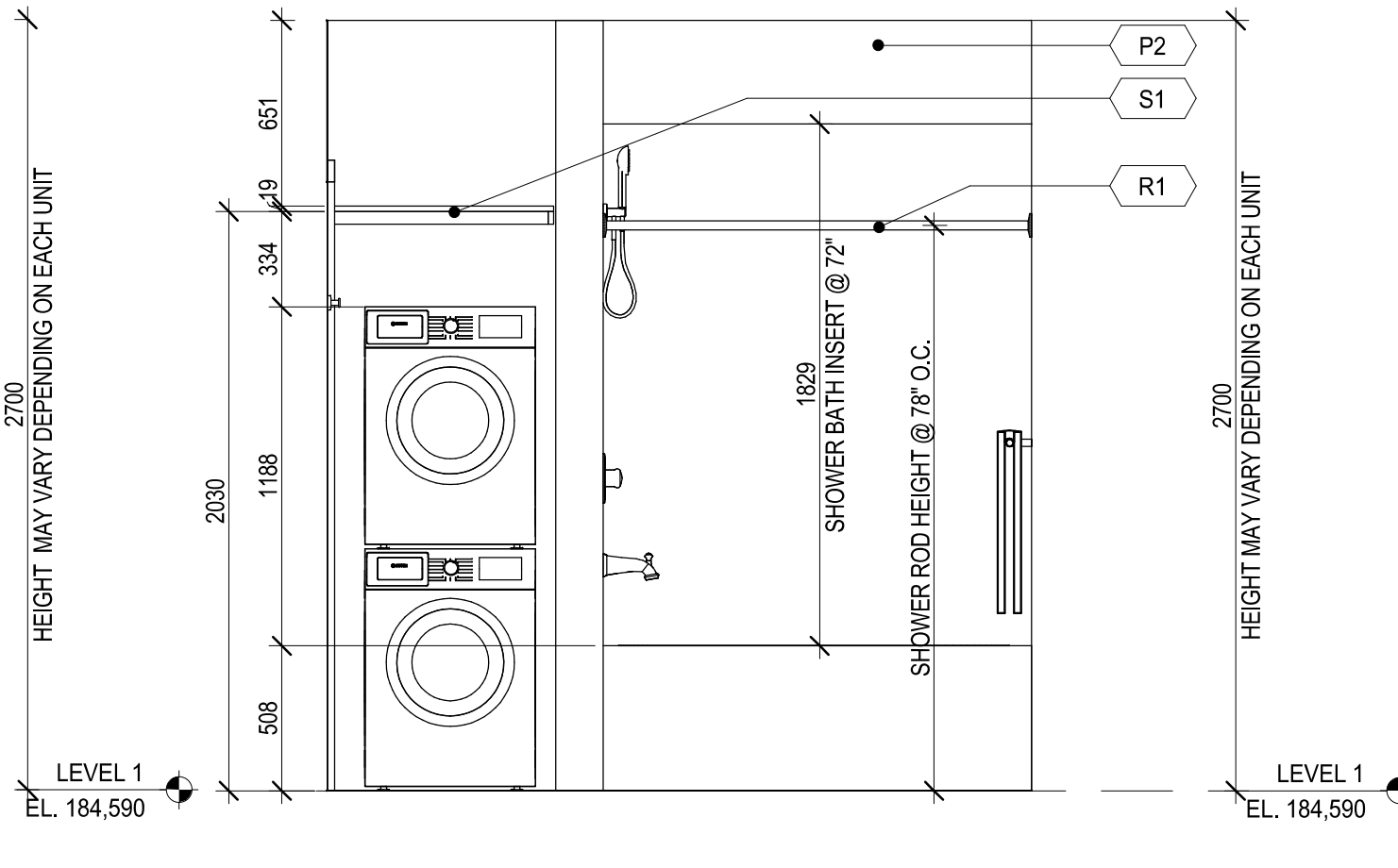




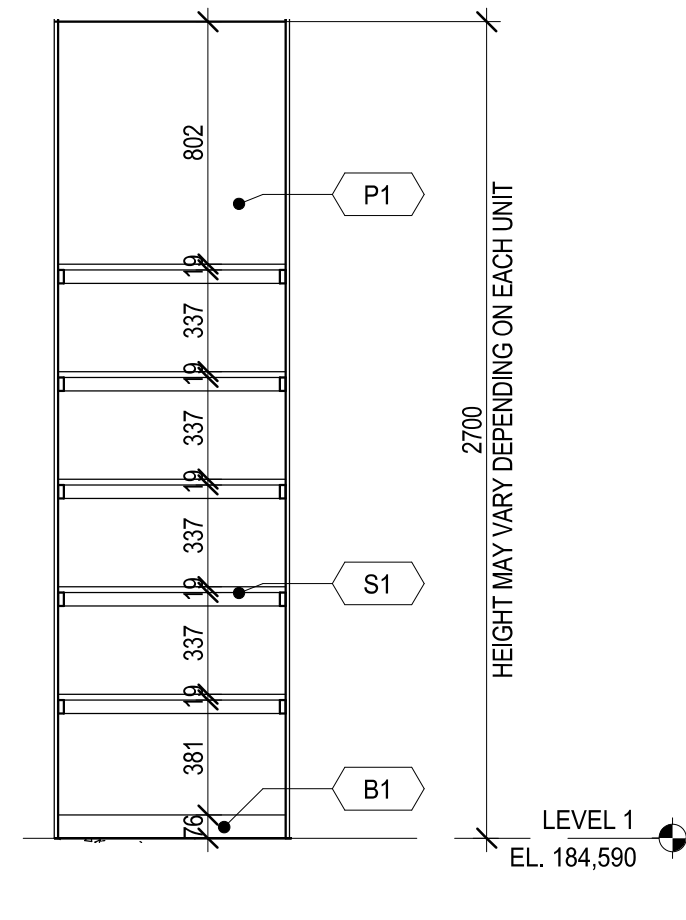
1 TYP. WASHROOM - BACK WALL  
ID1.06 SCALE: 1 : 25



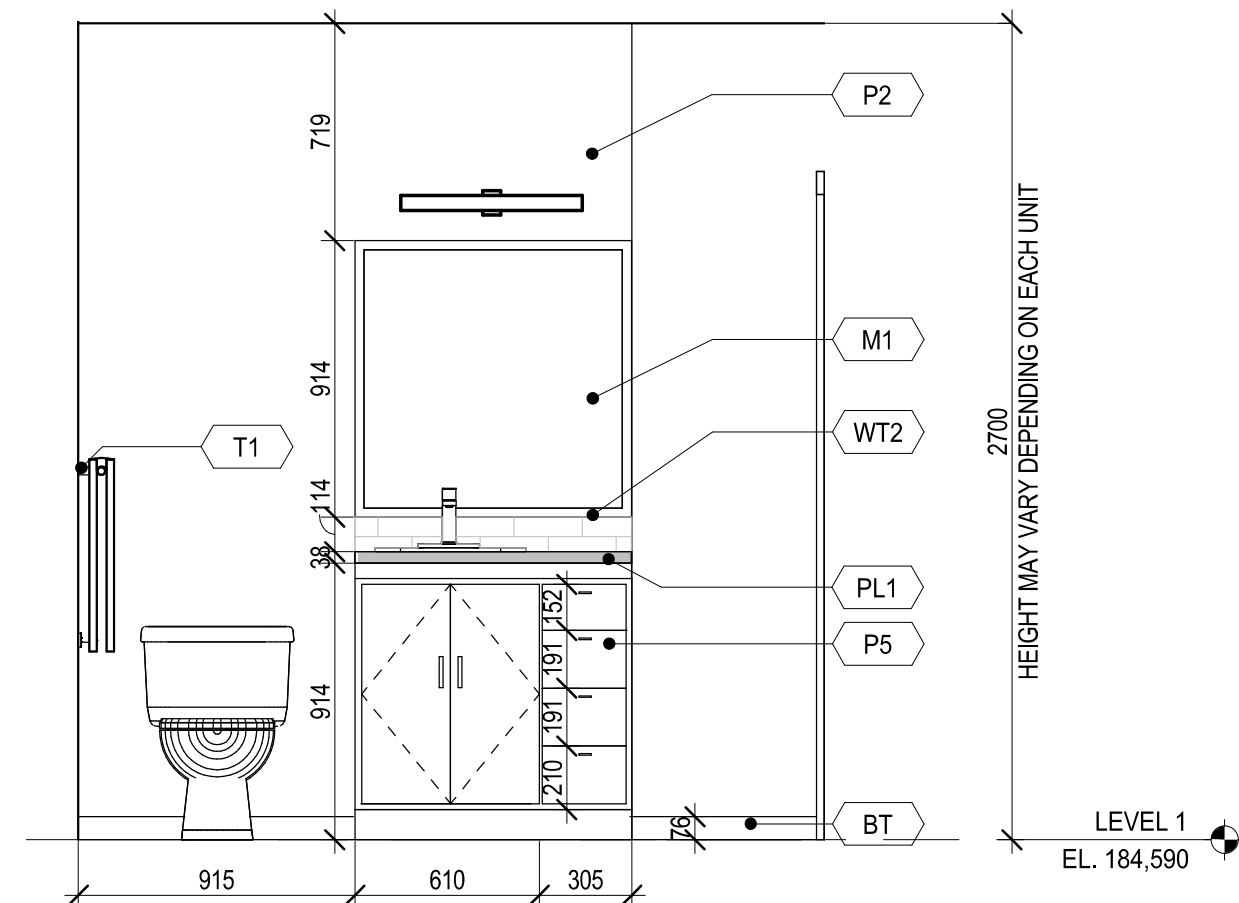
2 TYP. WASHROOM  
ID1.06 SCALE: 1 : 25



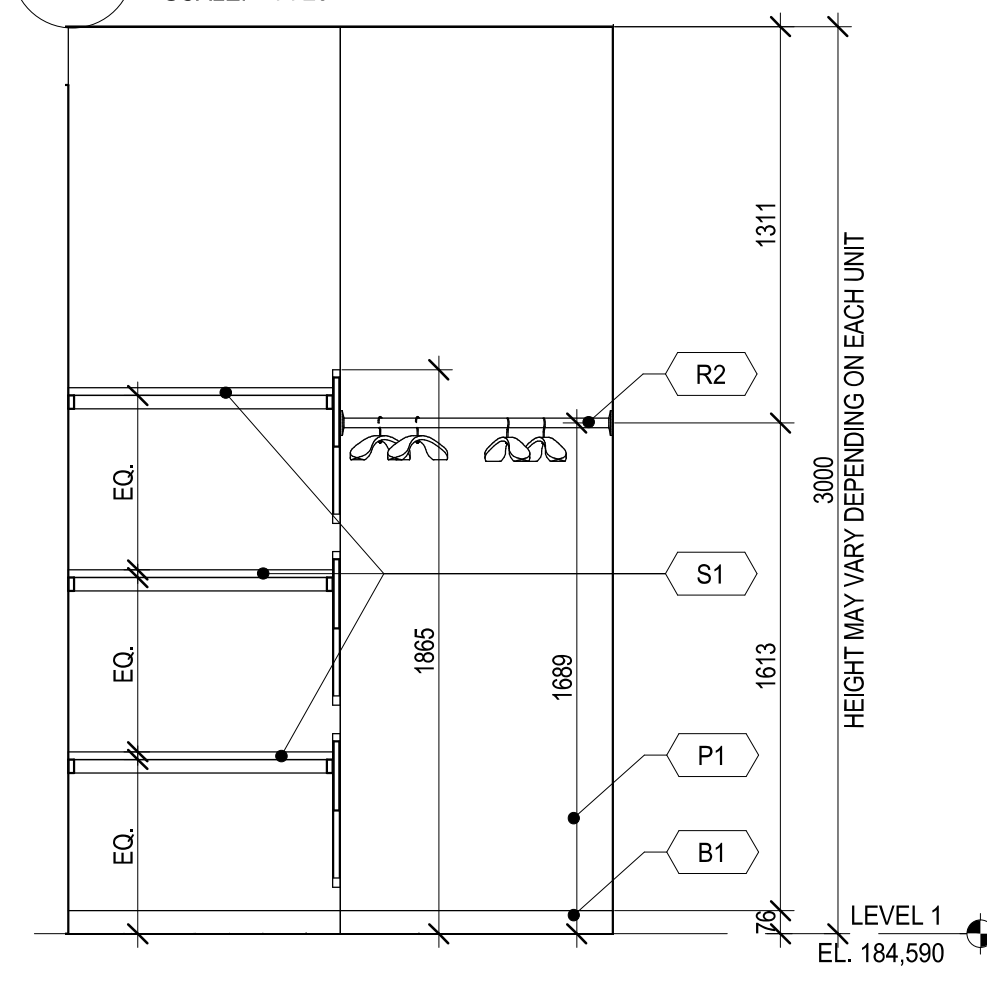
3 TYP. WASHROOM - TUB  
ID1.06 SCALE: 1 : 25



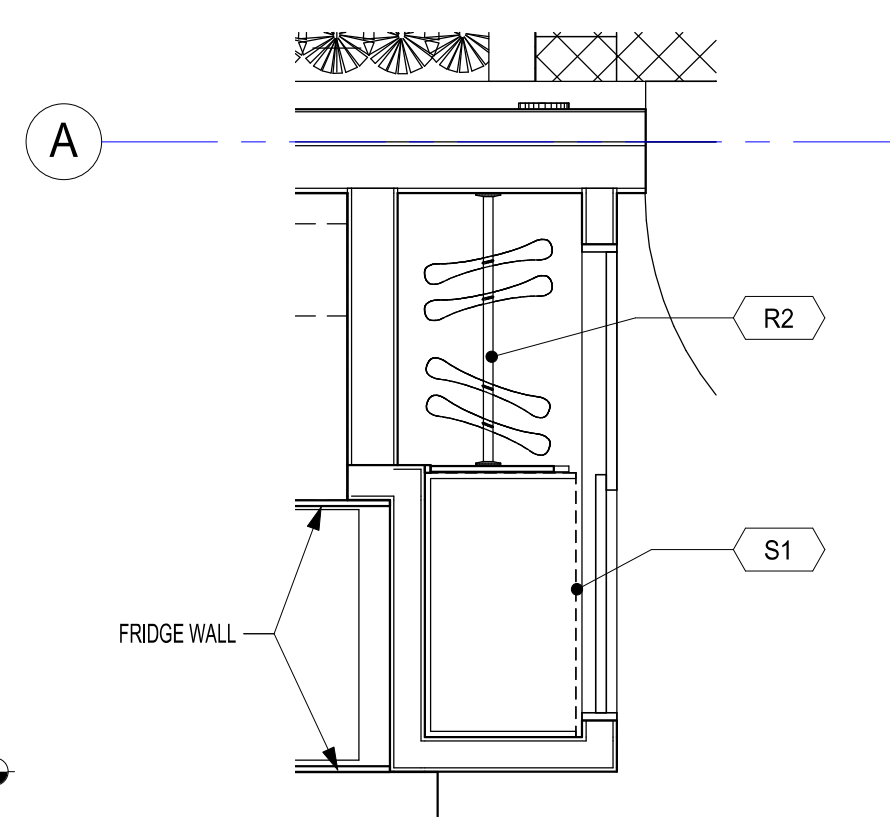
4 LINEN CLOSET  
ID1.06 SCALE: 1 : 25



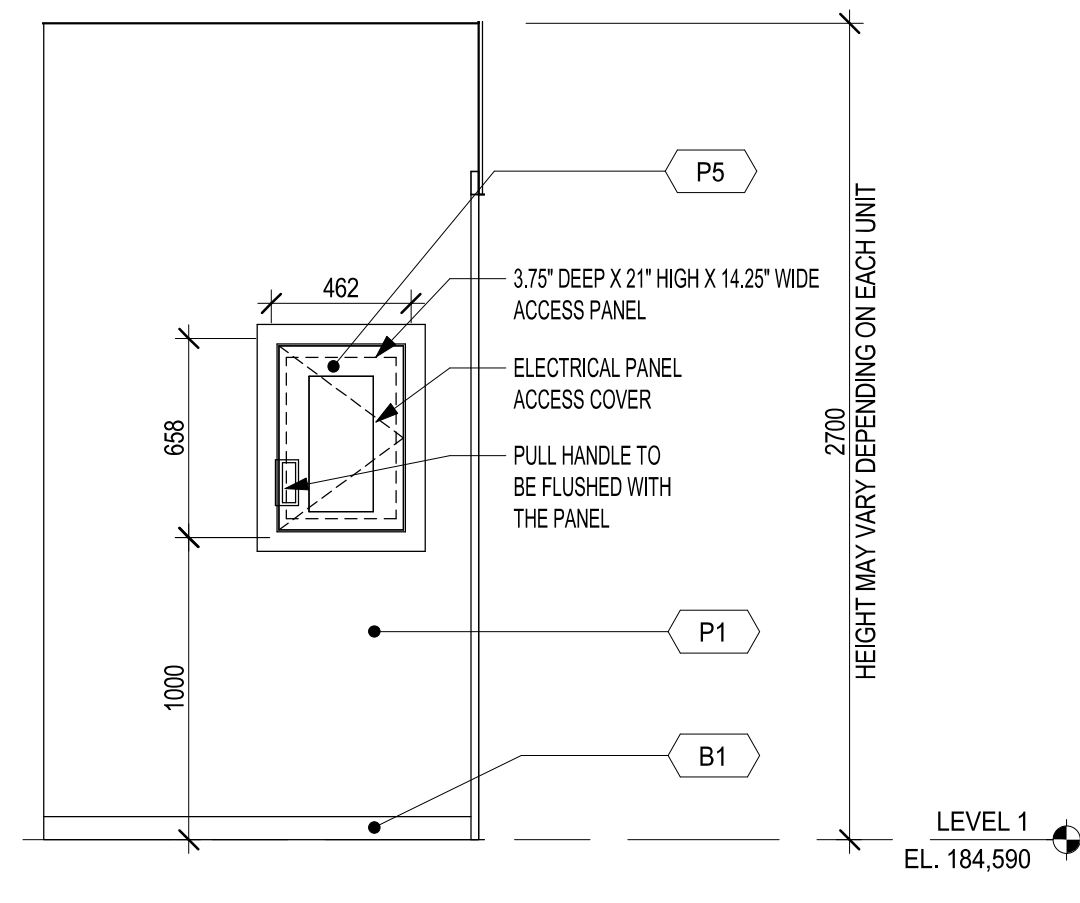
5 TYP. WASHROOM  
ID1.06 SCALE: 1 : 25



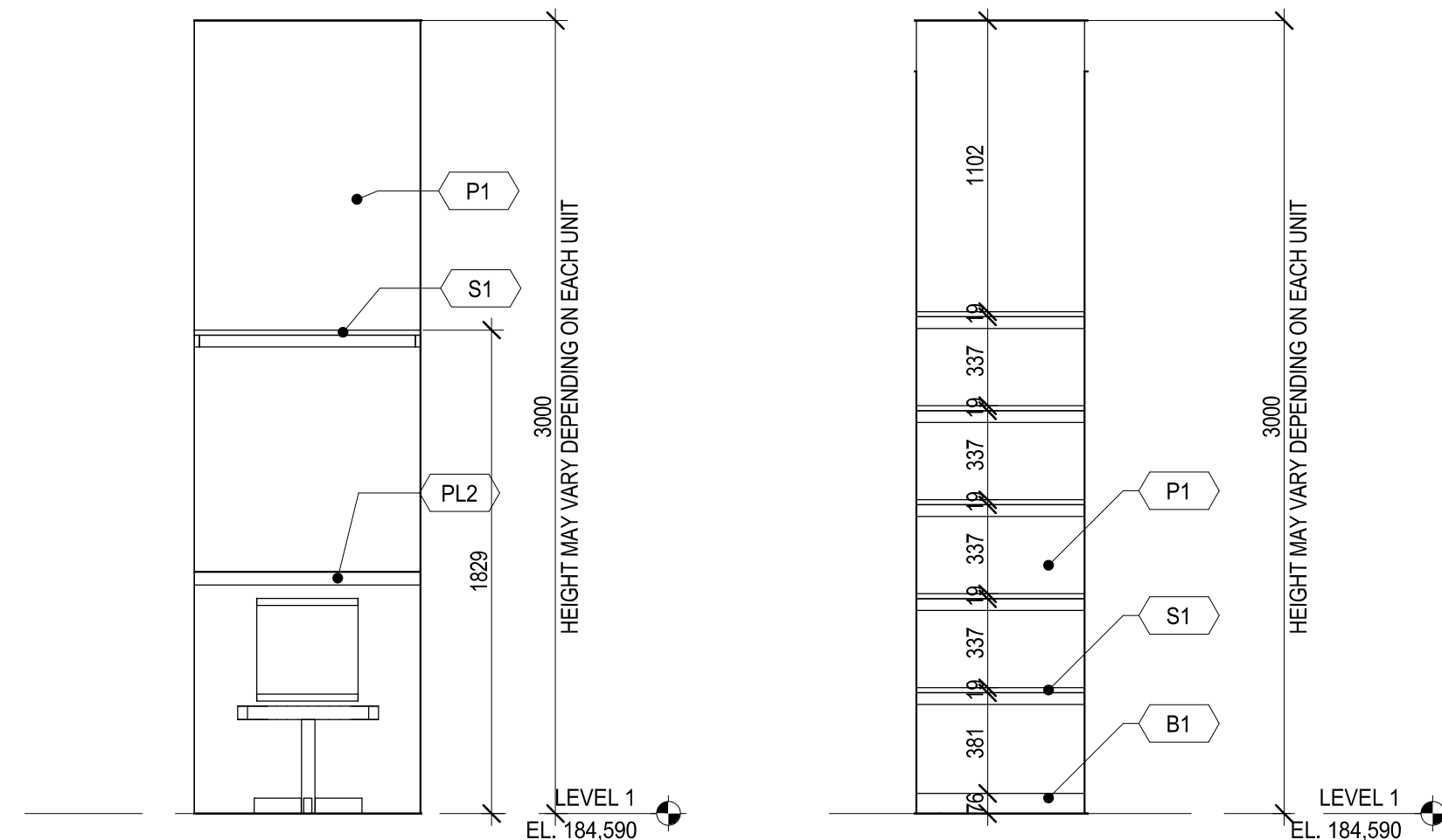
6 CLOSET  
ID1.06 SCALE: 1 : 25



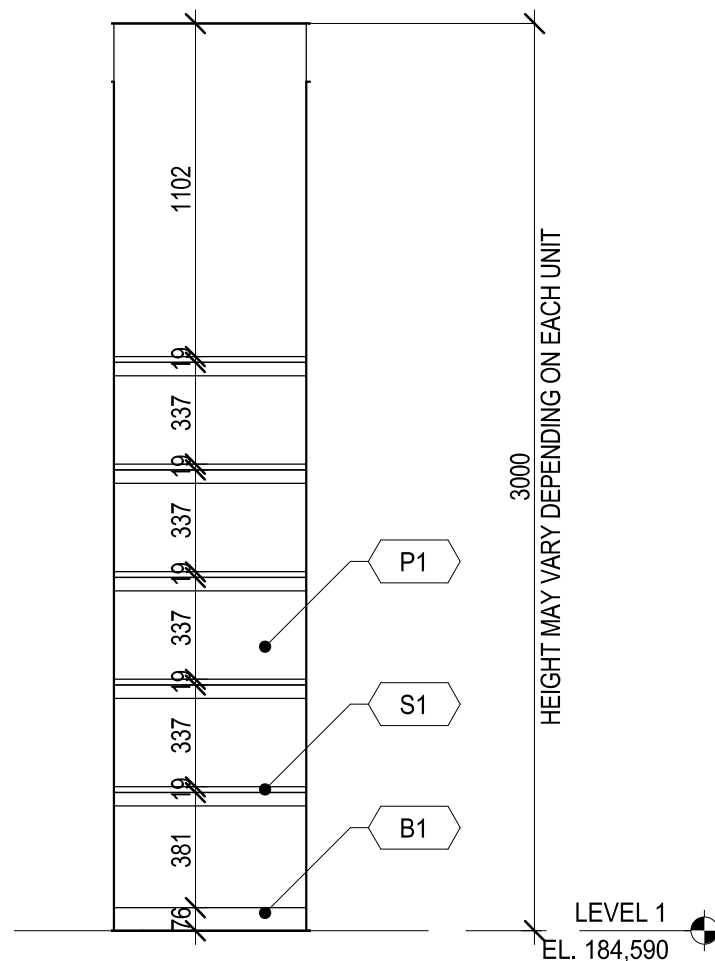
7 CLOSET ENLARGED PLAN  
ID1.06 SCALE: 1 : 25



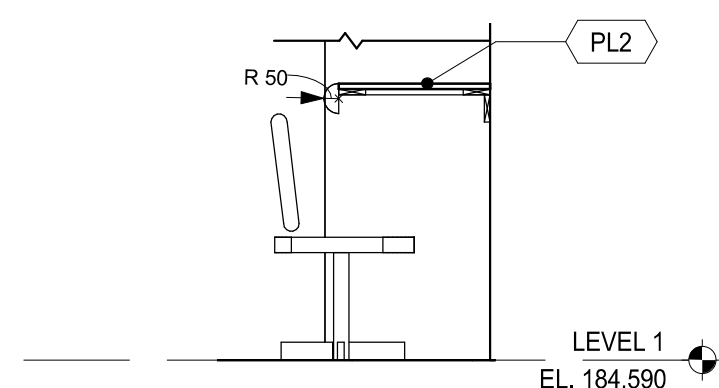
8 ELECTRICAL PANEL  
ID1.06 SCALE: 1 : 25



9 WORK SPACE  
ID1.06 SCALE: 1 : 25



10 PANTRY CLOSET  
ID1.06 SCALE: 1 : 25



11 WORK SPACE SECTION  
ID1.06 SCALE: 1 : 25

MILLWORK FINISHES SCHEDULE		MILLWORK HARDWARE SCHEDULE	
P5	PRODUCT: SATIN WHITE COLOR NAME AND #: FINISH: PREFINISHED KITCHEN CABINETS COVENTRY, SEMI-GLOSS, HIGH DURABILITY, SCRUBBABLE PAINT, LOW V.O.C. MATERIAL: MOISTURE/MILDEW RESISTANT COVENTRY THERMOFOIL PROFILE: COVENTRY LOCATION: ALL EXPOSED MILLWORK (CABINETS, DRAWERS, GABLES) IN KITCHEN AND WASHROOMS  NOTE1: ENSURE NO VISIBLE STREAKING INTERIOR OF ALL MILLWORK TO BE WHITE MELAMINE NOTE2:		MILLWORK PULLS AND KNOB TO BE: FINISH: SATIN NICKEL MILLWORK PULL SIZE: 4"  NOTE1: CONFIRM HARDWARE PULL WITH DESIGNER PRIOR TO PURCHASE AND INSTALL
PL1	PRODUCT: PLASTIC LAMINATE COLOR NAME AND #: FINISH: TRAVERTE SILVER 3458-34 PROFILE: GLOSS SIZE: SQUARE EDGE WRAP LOCATION: CONFIRM SIZE PER PLAN KITCHEN AND WASHROOM COUNTERTOP  NOTE1: ENSURE NO VISIBLE SEAMING. IF SEAMING IS REQUIRED, ENSURE SEAMS ARE BOOK MATCHED.		
PL2	PRODUCT: PLASTIC LAMINATE COLOR NAME AND #: FINISH: ORGANIC COTTON PROFILE: FINE VELVET FINISH SIZE: SQUARE EDGE WRAP LOCATION: CONFIRM SIZE PER PLAN WORK SPACE DESK  NOTE1: ENSURE NO VISIBLE SEAMING. IF SEAMING IS REQUIRED, ENSURE SEAMS ARE BOOK MATCHED.		
WASHROOM AND CLOSET ACCESSORIES		ELECTRICAL PANEL	
M1	PRODUCT: MIRROR STYLE: "DOUBLE WOOD FRAME CONTEMPORARY MIRROR" FINISH: SILVER PAINT FINISH SIZE: 914X914 mm LOCATION: ALL WASHROOMS, ALIGNED WITH CABINET BELOW, ABOVE SINK AND ABOVE TILE.		
H1	PRODUCT: ROBE HOOK STYLE: SINGLE FINISH: SATIN NICKEL LOCATION: BACK OF WASHROOM DOORS  NOTE1: DIMENSIONED ON PLAN		
T1	PRODUCT: BATH TOWEL BAR STYLE: SATIN NICKEL HAND TOWEL BAR FINISH: SATIN NICKEL LOCATION: ALL WASHROOMS  NOTE1: DIMENSIONED ON PLAN NOTE2: 2X6 BACKING @ 48" o.c.		
R1	PRODUCT: SHOWER ROD - HEAVY DUTY FINISH: CHROME LOCATION: ALL WASHROOMS  NOTE1: 1981 mm / 78" HEIGHT		
S1	PRODUCT: CLOSET SHELIVING FINISH: PAINT GRADE MATERIAL: MDF SHELF 1 1/2" SOLID MAPLE NOSING COLOR: P1 PROFILE: EASED NOSING SIZE: LENGTH AS REQUIRED 3/4" THICKNESS LOCATION: ALL WASHROOMS, ALL CLOSETS  NOTE1: INCLUDE WALL CLEATS PER MOUNTING		
R2	PRODUCT: CLOSET RODS FINISH: STAINLESS MATERIAL: 1/16 STEEL - HEAVY DUTY SIZE: 1 1/4" TUBING - HEAVY DUTY LOCATION: ALL CLOSETS  NOTE1: DIMENSIONED ON ELEVATIONS		

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES

Western Region

SERVICES IMMOBILIERS

Région de l'ouest

PERMIT TO PRACTICE

2019-07-16

PERMIT NUMBER: P 7354

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

DO NOT SCALE

5	ISSUED FOR TENDER / BP	19/07/19
4	99% IFC DRAWINGS	18/11/23
3	99% IFC DRAWING	18/03/16
2	60% IFC DRAWING	18/02/09
1	DETAILED DESIGN	17/12/11
Revision / Revision	Description / Description	Date / Date

Client / client

Parks Canada

Parcs Canada

Project title/Titre du projet

Banff National Park

Banff, Alberta

**PCA - STAFF HOUSING**

**329 MARTEN STREET**

Approved by/Approuvé par

AMINA OYAKHILOME

Designed by/Concept par

PETER SCHULZ

Drawn by/Dessiné par

MARAL SAFARZADEH

Project Manager/Administrateur de Projets

LAURIE MACDONALD

Architectural and Engineering Resources Manager/ Ressources Architecturale et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

Interior Elevations

Project No. / No. du projet

ID1.06

Sheet / Feuille

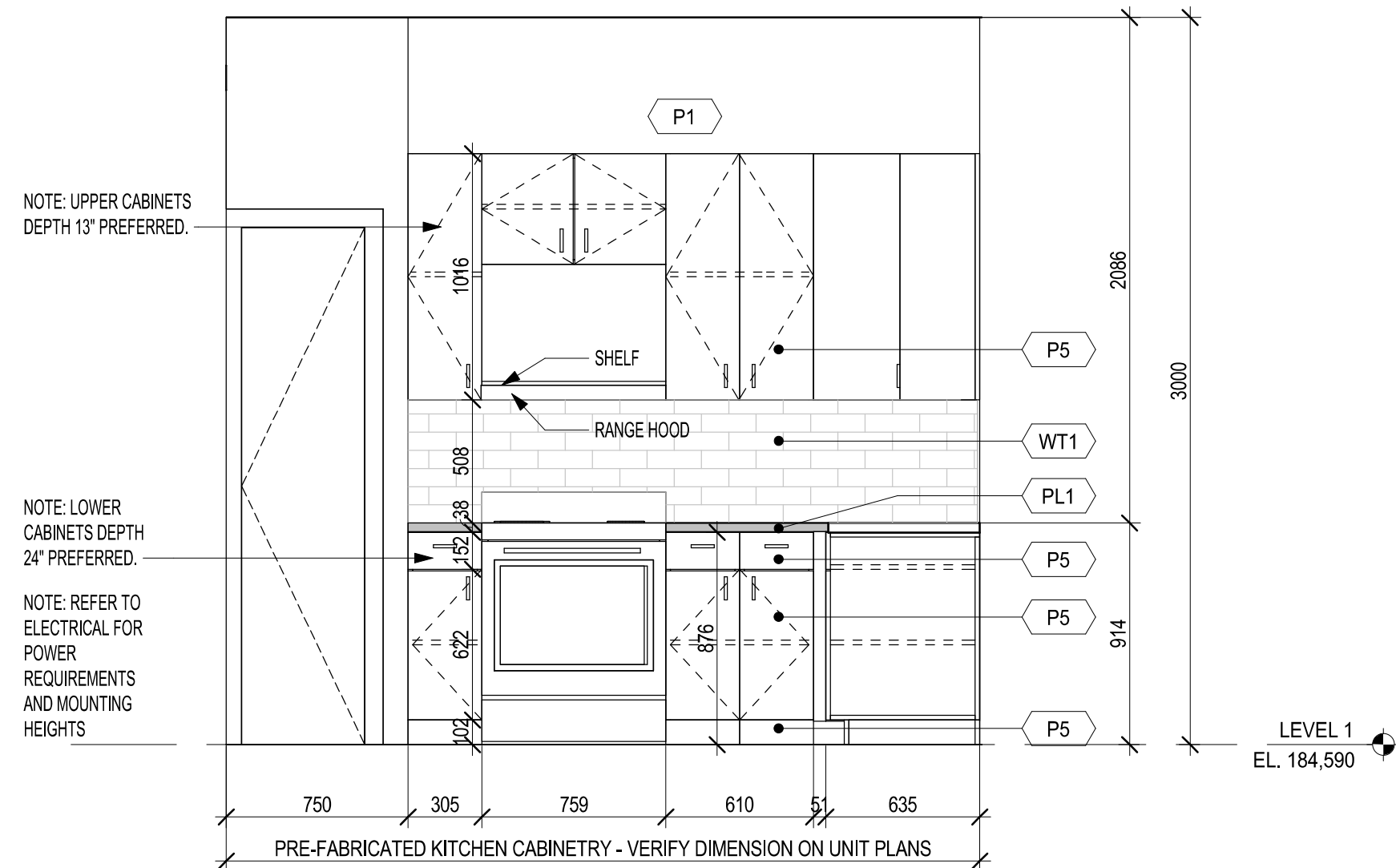
Revision no. / La Révision no.

5

PWGSC - A1 - 841 X 584

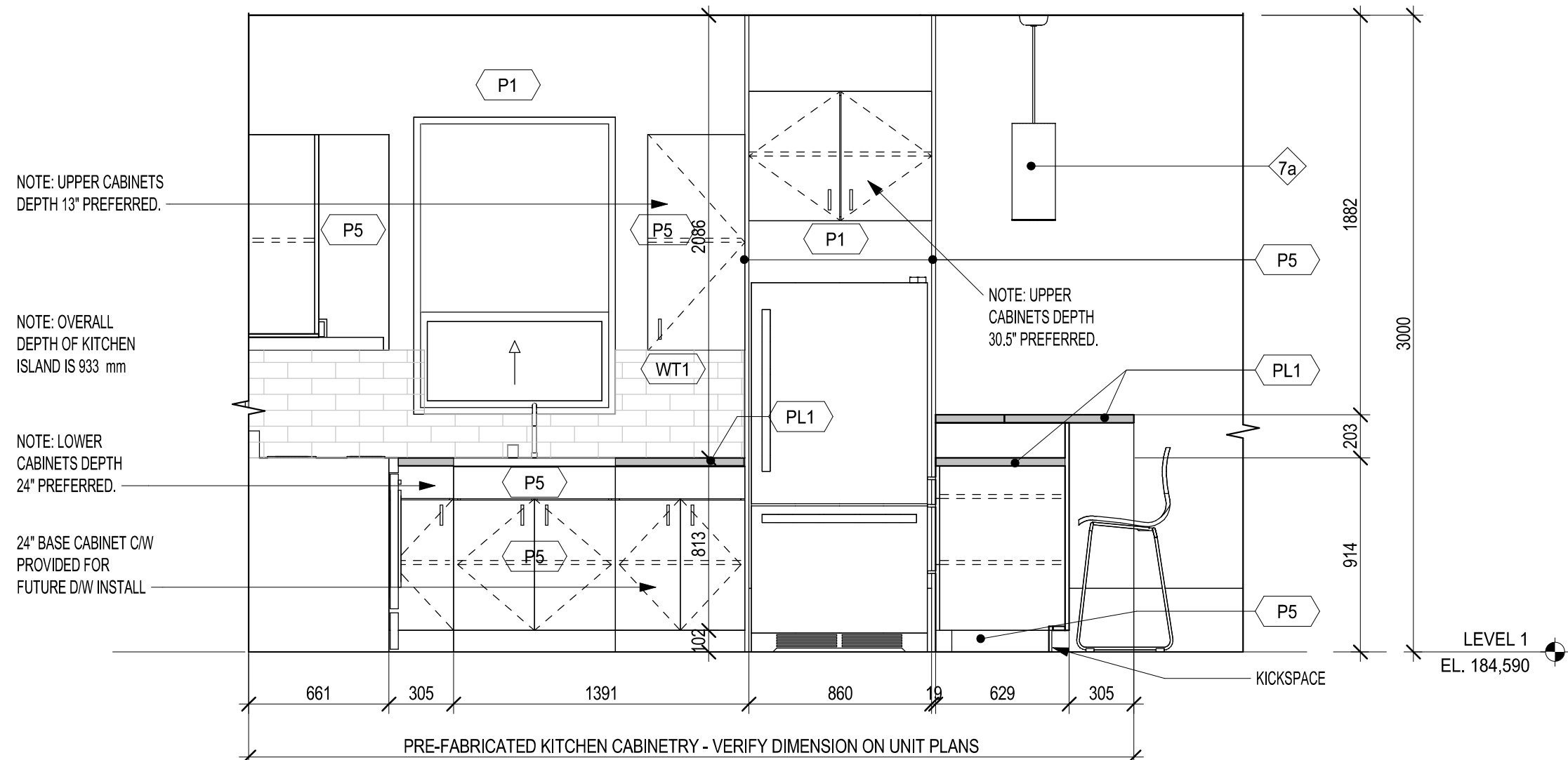
0 10 20 30 40 50 60 70 80 90 100mm





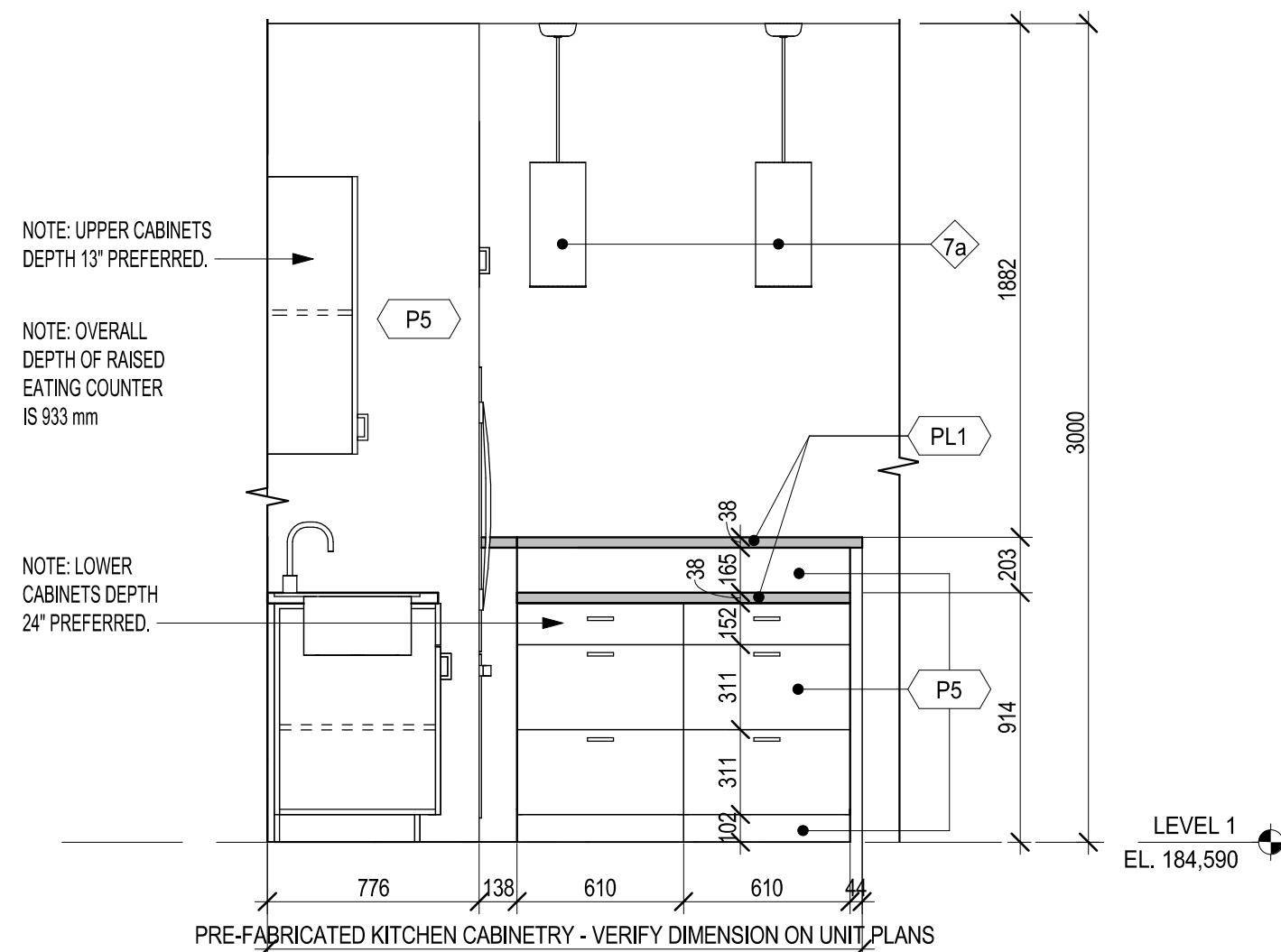
1 UNIT 1 KITCHEN CABINET WALL

ID1.07 SCALE: 1 : 25



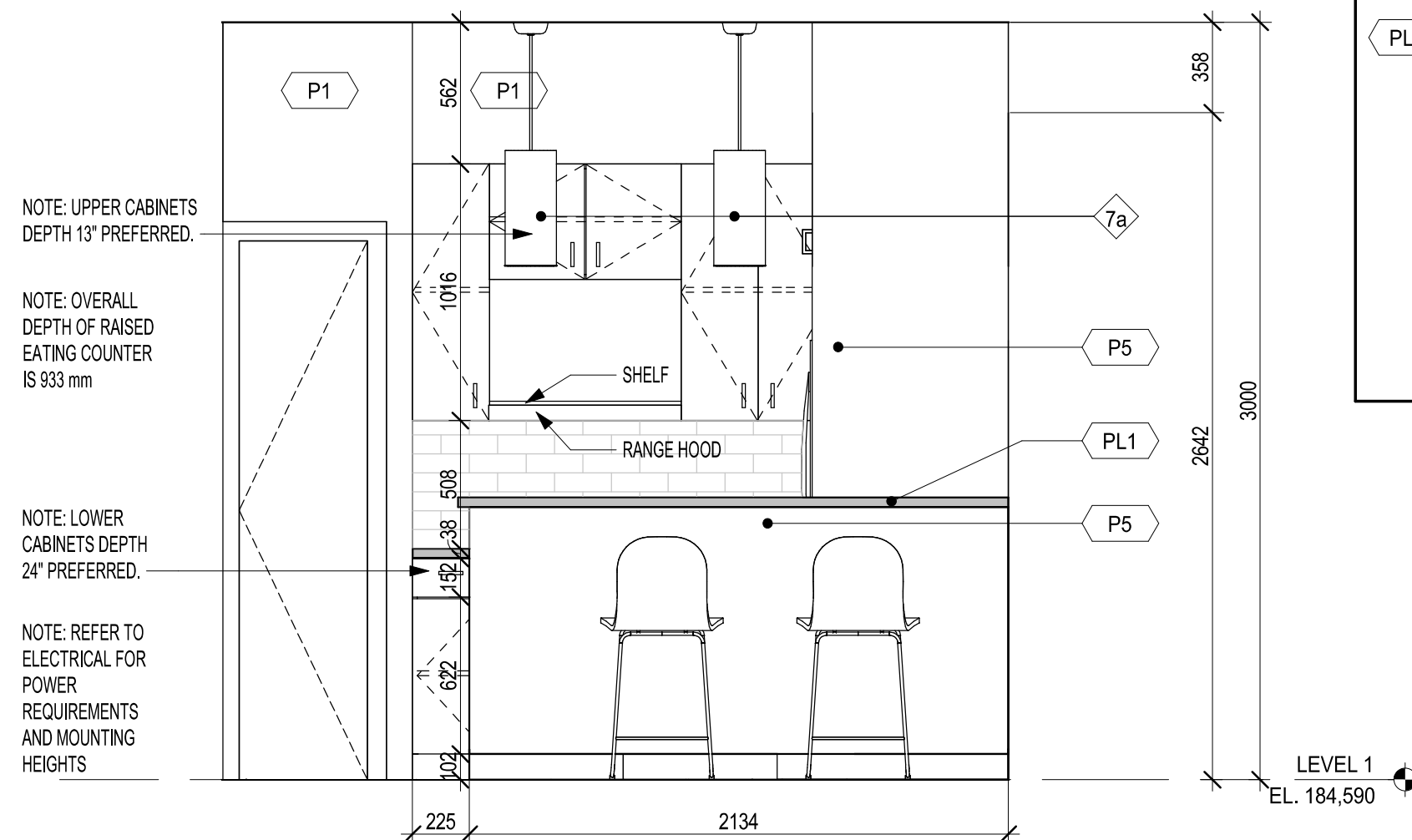
2 UNIT 1 KITCHEN COUNTER

ID1.07 SCALE: 1 : 25



3 UNIT 1 KITCHEN BACK OF ISLAND

ID1.07 SCALE: 1 : 25



4 UNIT 1 KITCHEN FRONT OF ISLAND

ID1.07 SCALE: 1 : 25

#### MILLWORK FINISHES SCHEDULE

P5	PRODUCT: COLOR NAME AND #: FINISH:	PAINT - MILLWORK SATIN WHITE PREFINISHED KITCHEN CABINETS COVENTRY, SEMI-GLOSS, HIGH DURABILITY, SCRUBBABLE PAINT, LOW V.O.C. MOISTURE/MILDEW RESISTANT COVENTRY THERMOFOIL COVENTRY
	MATERIAL: PROFILE: LOCATION:	ALL EXPOSED MILLWORK (CABINETS, DRAWERS, GABLES) IN KITCHEN AND WASHROOMS
	NOTE1: NOTE2:	ENSURE NO VISIBLE STREAKING INTERIOR OF ALL MILLWORK TO BE WHITE MELAMINE
PL1	PRODUCT: COLOR NAME AND #: FINISH: PROFILE: SIZE: LOCATION:	PLASTIC LAMINATE TRAVERTINE SILVER 3458-34 GLOSS SQUARE EDGE WRAP CONFIRM SIZE PER PLAN KITCHEN AND WASHROOM COUNTERTOP
	NOTE1:	ENSURE NO VISIBLE SEAMING. IF SEAMING IS REQUIRED, ENSURE SEAMS ARE BOOK MATCHED.
PL2	PRODUCT: COLOR NAME AND #: FINISH: PROFILE: SIZE: LOCATION:	PLASTIC LAMINATE ORGANIC COTTON FINE VELVET FINISH SQUARE EDGE WRAP CONFIRM SIZE PER PLAN WORK SPACE DESK
	NOTE1:	ENSURE NO VISIBLE SEAMING. IF SEAMING IS REQUIRED, ENSURE SEAMS ARE BOOK MATCHED.

#### MILLWORK HARDWARE SCHEDULE

	MILLWORK PULLS AND KNOB TO BE: FINISH: MILLWORK PULL SIZE:	SATIN NICKEL 4"
	NOTE1:	CONFIRM HARDWARE PULL WITH DESIGNER PRIOR TO PURCHASE AND INSTALL

#### WASHROOM AND CLOSET ACCESSORIES

M1	PRODUCT: STYLE:	MIRROR "DOUBLE WOOD FRAME CONTEMPORARY MIRROR"
	FINISH: SIZE: LOCATION:	SILVER PAINT FINISH 914X914 mm ALL WASHROOMS, ALIGNED WITH CABINET BELOW, ABOVE SINK AND ABOVE TILE.
H1	PRODUCT: STYLE: FINISH: LOCATION:	ROBE HOOK SINGLE SATIN NICKEL BACK OF WASHROOM DOORS
	NOTE1:	DIMENSIONED ON PLAN
T1	PRODUCT: STYLE: FINISH: LOCATION:	BATH TOWEL BAR SATIN NICKEL HAND TOWEL BAR SATIN NICKEL ALL WASHROOMS
	NOTE1: NOTE2:	DIMENSIONED ON PLAN 2X6 BACKING @ 48" o.c.

T2	PRODUCT: STYLE: FINISH: LOCATION:	TOILET PAPER HOLDER SATIN NICKEL HAND TOILET PAPER HOLDER SATIN NICKEL ALL WASHROOMS
	NOTE1: NOTE2:	DIMENSIONED ON PLAN 2X6 BACKING @ 26" o.c.
R1	PRODUCT: FINISH: LOCATION:	SHOWER ROD - HEAVY DUTY CHROME ALL WASHROOMS
	NOTE1:	1981 mm / 78" HEIGHT
S1	PRODUCT: FINISH: MATERIAL: COLOR: PROFILE: SIZE: LOCATION:	CLOSET SHELVE PAINT GRADE MDF SHELF 1 1/2" SOLID MAPLE NOSING P1 EASED NOSING LENGTH AS REQUIRED 3/4" THICKNESS ALL WASHROOMS, ALL CLOSETS
	NOTE1:	INCLUDE WALL CLEATS PER MOUNTING
R2	PRODUCT: FINISH: MATERIAL: SIZE: LOCATION:	CLOSET RODS STAINLESS 1/16 STEEL - HEAVY DUTY 1 1/4" TUBING - HEAVY DUTY ALL CLOSETS
	NOTE1:	DIMENSIONED ON ELEVATIONS



DO NOT SCALE

2 ISSUED FOR TENDER / BP 19/07/19

1 99% IFC DRAWINGS 18/11/23

Revision / Revision Description / Description Date / Date

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
AMINA OYAKHILOME

Designed by/Concept par  
PETER SCHULZ

Drawn by/Dessine par  
MARAL SAFARZADEH  
Project Manager/Administrateur de Projets  
LAURIE MACDONALD

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

INTERIOR ELEVATIONS

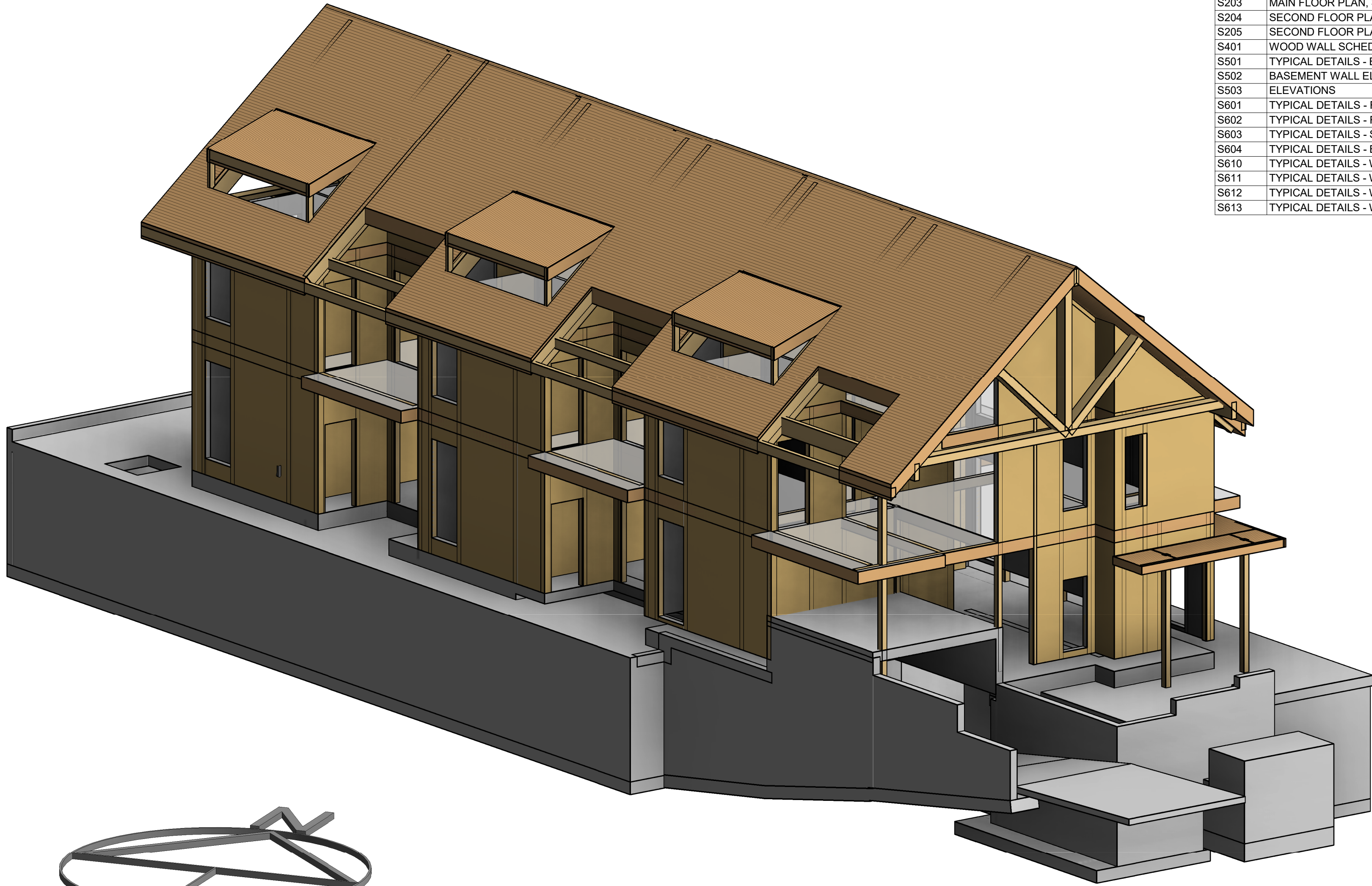
Project No. / No. du  
project

ID1.07

Revision no. /  
La Révision  
no.


2





DRAWING THEME - See below for complete Structural drawing list	
Dwg Series and Theme	
S100's - 3D VIEWS, GENERAL NOTES, LEGEND, LANDSCAPE LOADING DIAGRAM	
S200's - PLANS	
S400's - SHEARWALL SCHEDULES	
S500's - ELEVATIONS	
S600's - SECTIONS AND DETAILS	

DRAWING LIST				
Dwg	Title	Current Revision	Current Revision Description	Current Revision Date
S100	TITLE SHEET	9	Issued for Tender/BP	2019-07-19
S101	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S102	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S103	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S104	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S105	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S106	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S107	GENERAL NOTES	9	Issued for Tender/BP	2019-07-19
S111	LEGENDS AND ABBREVIATIONS	9	Issued for Tender/BP	2019-07-19
S121	SCHEDULES	9	Issued for Tender/BP	2019-07-19
S201	PARKADE PLAN	9	Issued for Tender/BP	2019-07-19
S202.1	MAIN FLOOR PLAN - CONCRETE OUTLINE	9	Issued for Tender/BP	2019-07-19
S202.2	MAIN FLOOR PLAN - REINFORCING	9	Issued for Tender/BP	2019-07-19
S203	MAIN FLOOR PLAN, SECOND FLOOR FRAMING OVER	9	Issued for Tender/BP	2019-07-19
S204	SECOND FLOOR PLAN, ATTIC FRAMING OVER	9	Issued for Tender/BP	2019-07-19
S205	SECOND FLOOR PLAN, ROOF FRAMING OVER	9	Issued for Tender/BP	2019-07-19
S401	WOOD WALL SCHEDULES	9	Issued for Tender/BP	2019-07-19
S501	TYPICAL DETAILS - BASEMENT WALL	9	Issued for Tender/BP	2019-07-19
S502	BASEMENT WALL ELEVATIONS	9	Issued for Tender/BP	2019-07-19
S503	ELEVATIONS	9	Issued for Tender/BP	2019-07-19
S601	TYPICAL DETAILS - FOUNDATION	9	Issued for Tender/BP	2019-07-19
S602	TYPICAL DETAILS - FLAT SLAB	9	Issued for Tender/BP	2019-07-19
S603	TYPICAL DETAILS - SLAB STEP	9	Issued for Tender/BP	2019-07-19
S604	TYPICAL DETAILS - BUILT-UP STRUCTURE & STAIRS	9	Issued for Tender/BP	2019-07-19
S610	TYPICAL DETAILS - WOOD	9	Issued for Tender/BP	2019-07-19
S611	TYPICAL DETAILS - WOOD	9	Issued for Tender/BP	2019-07-19
S612	TYPICAL DETAILS - WOOD	9	Issued for Tender/BP	2019-07-19
S613	TYPICAL DETAILS - WOOD	9	Issued for Tender/BP	2019-07-19



Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

**REAL PROPERTY SERVICES**  
Western Region  
**SERVICES IMMOBILIERS**  
Région de l'ouest



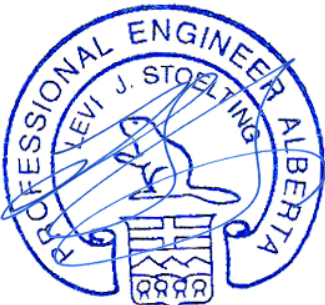
**Glotman-Simpson**  
CONSULTING ENGINEERS

1661 West 5<sup>th</sup> Avenue  
Vancouver, BC V6J 1N5  
T: 604.734.8822  
F: 604.734.8842  
www.glotmansimpson.com

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09
No:	Description:	Date:

Revisions		
Revision / Revision	Description / Description	Date / Date
Client / client		



Parks Canada



Parcs Canada

Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par	Approver
Designed by/Concept par	Designer
Drawn by/Dessine par	Author
Project Manager/Administrateur de Projets	
Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie	
Client / client	
<b>Parks Canada</b>	
Drawing title / Titre du dessin	

TITLE SHEET		
Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	S100	9



## 1. GENERAL NOTES

NOTES, PLANS, DETAILS AND SPECIFICATIONS (IF ANY) SHALL BE READ AS ONE DOCUMENT.

CONSTRUCT THE BUILDING TO THE INTENT OF THE DRAWINGS.

READ AND UNDERSTAND THE INTENT OF STRUCTURAL DESIGN AND OTHER CONSULTANT DRAWINGS INCLUDING ARCHITECTURAL, MECHANICAL, ELECTRICAL, GEOTECHNICAL, LANDSCAPE, ETC.

### APPLICABLE PROJECT CODES:

THIS SECTION INDICATES CODES APPLICABLE TO THE DESIGN OF THIS BUILDING AS PRESENTED IN THE DRAWINGS. THIS SECTION ALSO APPLIES TO THE DESIGN OF STRUCTURAL ELEMENTS WHICH ARE THE RESPONSIBILITY OF OTHERS TO BE DESIGNED BY SPECIALTY STRUCTURAL ENGINEERS.

THE GOVERNING BUILDING CODE SHALL BE:  
ALBERTA BUILDING CODE

FOR THE DESIGN OF STRUCTURAL SYSTEMS ONLY, THE SUPPLEMENT TO THE NATIONAL BUILDING CODE OF CANADA, 2010 EDITION SHALL BE USED WHERE IT COMPLIMENTS THE ABOVE MENTIONED GOVERNING CODES.

### STANDARDS INCLUDE THE FOLLOWING:

CAN/CSA A23.1-09	CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION
CAN/CSA A23.2-09	TEST METHODS AND STANDARD PRACTICES FOR CONCRETE
CAN/CSA A23.3-04 (R2010)	DESIGN OF CONCRETE STRUCTURES
CAN/CSA A23.4-09	PRECAST CONCRETE MATERIALS AND CONSTRUCTION
CAN/CSA S413-07 (R2012)	PARKING STRUCTURES
CAN/CSA S16-09	DESIGN OF STEEL STRUCTURES
CAN/CSA 086-09 CONSOLIDATION	ENGINEERING DESIGN IN WOOD
CAN/CSA S136-07 (R2012)	NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS
CAN/CSA S304.1-04 (R2010)	DESIGN OF MASONRY STRUCTURES

AND ALL REFERENCE CODES AND STANDARDS LISTED WITHIN THESE APPLICABLE STANDARDS.

## 2. SUBMITTALS

SUBMIT SHOP DRAWINGS ELECTRONICALLY FOR REVIEW AS A PDF DOCUMENT ONLY.  
SUBMIT SEALED SHOP DRAWINGS ELECTRONICALLY AS A PDF DOCUMENT ONLY.  
SUBMIT SEALED LETTERS OF ASSURANCE IN ORIGINAL DOCUMENT FORM.

SHOP DRAWINGS SHALL BE SUBMITTED VIA THE ARCHITECT WITH A MINIMUM OF 3 WEEKS FOR REVIEW. DOCUMENTS REQUIRING THE SEAL OF A SPECIALTY STRUCTURAL ENGINEER OR MATERIALS CONSULTANT SHOULD BE SEALED AND ACCOMPANIED BY APPROPRIATE LETTERS OF ASSURANCE WHEN SUBMITTED FOR REVIEW. DOCUMENTS RECEIVED WITHOUT APPROPRIATE USE OF THE SEAL MAY BE RETURNED AND ALL INCOMPLETE SUBMISSIONS MAY REQUIRE A FURTHER COMPLETE SUBMISSION.

REVIEW OF SHOP DRAWINGS IS ONLY FOR GENERAL COMPATIBILITY WITH THE DESIGN CONCEPT. THE CONSULTANT DOES NOT WARRANT OR REPRESENT THAT THE INFORMATION CONTAINED ON THE SHOP DRAWINGS IS EITHER ACCURATE OR COMPLETE. SOLE RESPONSIBILITY FOR CORRECT DESIGN, DETAILS AND DIMENSIONS SHALL REMAIN WITH THE PARTIES SUBMITTING THE DRAWING. REVIEW IS NOT APPROVAL OF DESIGN AND SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO SATISFY REQUIREMENTS OF THE CONTRACT DOCUMENTS.

## 3. LETTERS OF ASSURANCE

LETTERS OF ASSURANCE FOR THE DESIGN OF PRIMARY AND SECONDARY STRUCTURAL COMPONENTS BY SPECIALTY STRUCTURAL ENGINEERS AND OTHER REGISTERED PROFESSIONALS SHALL BE OF THE FORM "SCHEDULE 5 SPECIALTY ENGINEER ASSURANCE OF PROFESSIONAL DESIGN AND FIELD REVIEW" AS PROVIDED BY THE ASSOCIATION OF PROFESSIONAL ENGINEERS AND GEOSCIENTISTS OF ALBERTA. LETTERS OF ASSURANCE SHOULD BE ANNOTATED TO REFER SPECIFICALLY TO THE AREA OF WORK ENCOMPASSED BY THE REGISTERED PROFESSIONAL.

LETTERS OF ASSURANCE BY SPECIALTY STRUCTURAL ENGINEERS ARE REQUIRED FOR:

- ALL CASES WHERE PROFESSIONAL ENGINEERING IS REQUIRED FOR STRUCTURAL OR SEMI-STRUCTURAL ELEMENTS OF THE BUILDING.
- MATERIALS CONSULTANT TO CONFIRM THAT MATERIALS FOR THE PROJECT CONFORM WITH APPLICABLE CODES AND SPECIFICATIONS FOR THE BUILDING.
- SPECIALTY STRUCTURAL ENGINEERS FOR DESIGN AND FIELD REVIEW OF BUILDING ELEMENTS OF COMPONENTS THAT FORM PART OF THE FINAL PRIMARY STRUCTURE INCLUDING THOSE INDICATED IN THE FOLLOWING NOTES
- SPECIALTY STRUCTURAL ENGINEERS FOR DESIGN AND FIELD REVIEW OF SECONDARY STRUCTURAL ELEMENTS OF THE BUILDING REQUIRED TO FACILITATE THE ARCHITECTURAL DESIGN OF THE BUILDING.
- SPECIALTY STRUCTURAL ENGINEERS FOR TEMPORARY WORKS SUCH AS BUILDING STABILITY, FORMWORK, RESHORING, COMPONENT TEMPORARY STABILITY OR STRENGTH, CONFIRMATION OF TEMPORARY LOADS ON THE STRUCTURE, CONSTRUCTION LOADS ON THE STRUCTURE, SEQUENCING OF CONSTRUCTION, ETC. WHETHER ON BEHALF OF THE OWNER OR THE CONTRACTOR(S).
- SPECIALTY STRUCTURAL ENGINEERS FOR SECONDARY AND SEMI-STRUCTURAL ELEMENTS AND ARCHITECTURAL ELEMENTS INCLUDING BUT NOT LIMITED TO STEEL STUDS, SEISMIC TIES FOR BRICK WORK, STONE TIES, ARCHITECTURAL PRECAST, GLAZING, HANDRAILS, ESCALATOR DESIGN AND CONNECTION, WINDOW WASHING ANCHORAGE AND SYSTEMS, ELEVATOR DIVIDER BEAMS, AND SIMILAR ITEMS AS REQUIRED TO FACILITATE THE BUILDING DESIGN.
- GEOTECHNICAL CONSULTANT FOR ALL SOILS AFFECTS INCLUDING SOILS LATERAL LOADING TO THE STRUCTURE, COMPACTION, LIQUEFACTION, BEARING CAPACITY, PASSIVE RESISTANCE, ETC. AS IT RELATES TO BOTH THE TEMPORARY CONSTRUCTION CONDITION OF THE BUILDING AND TO THE FINAL COMPLETED BUILDING.
- SPECIALTY STRUCTURAL ENGINEERS COMMONLY KNOWN AS "SEISMIC CONNECTION ENGINEERS" FOR THE DESIGN AND FIELD REVIEW OF THE ANCHORAGE AND RESTRAINT FOR GRAVITY, WIND AND SEISMIC LOADING INCLUDING DETAILED DESIGN OF THE CONNECTION TO THE PRIMARY STRUCTURAL ELEMENT OF THE BUILDING AS DETERMINED BY THE STRUCTURAL ENGINEER OF RECORD.
- REGISTERED PROFESSIONALS PROVIDING SERVICES TO THE PROJECT AFFECTING OR FORMING PART OF THE PRIMARY STRUCTURE OF THE BUILDING.
- REGISTERED PROFESSIONALS AS MIGHT BE REQUIRED BY THE OWNER OR OTHER CONSULTANTS OR THE AUTHORITY HAVING JURISDICTION.

THE PRIMARY PURPOSE OF THESE LETTERS IS TO VERIFY FULL AND COMPLETE SERVICE BY THE SPECIALTY CONSULTANT. THE EXTENT AND DEPTH OF SERVICE REQUIRED SHALL BE CONSISTENT WITH THAT OF THE STRUCTURAL ENGINEER OF RECORD. FULL TIME SUPERVISION OF THE DESIGN OR WORK IN THE FIELD IS NOT REQUIRED EXCEPT AS DEEMED NECESSARY BY THE SPECIALTY ENGINEER IN THE CIRCUMSTANCES. THE ENGINEER IS RESPONSIBLE FOR CONDUCTING THE NECESSARY FIELD REVIEWS FOR HIS WORK AND SHALL APPLY HIS PROFESSIONAL DISCRETION WITH REGARD TO THE EXTENT OF FIELD REVIEW AND REVIEW AT FABRICATION PLANTS. IN ADDITION, AND NOT TO ANNUL OR DIMINISH THE RESPONSIBILITY OF THE SPECIALTY CONSULTANT, THE STRUCTURAL ENGINEER OF RECORD MAY REQUIRE ADDITIONAL SITE REVIEW BY THE SPECIALTY CONSULTANT OR ALTERNATIVE PARTIES AS HE MAY DEEM SUITABLE. REGARDLESS OF SUCH ADDITIONAL REVIEW, THE FULL ENGINEERING RESPONSIBILITY FOR THE SPECIALTY ELEMENTS SHALL BE BOURN BY THE SPECIALTY CONSULTANT ALONE.

SEE OTHER CONSULTANTS FOR REQUIREMENTS FOR LETTERS OF ASSURANCE PERTAINING TO STRUCTURAL OR NON-STRUCTURAL BUILDING COMPONENTS PERTAINING TO THE WORK OF OTHER CONSULTANTS OR THE OWNER.

## 4. BUILDING MAINTENANCE - LONGTERM

BUILDING STRUCTURE MUST BE PROTECTED BY A FULLY FUNCTIONAL BUILDING ENVELOPE DESIGNED AND REVIEWED BY A ARCHITECT / BUILDING ENVELOPE ENGINEER ON BEHALF OF THE OWNER. PROTECTION OF THE STRUCTURE SHALL INCLUDE MEMBRANES, WATERPROOFING, VAPOUR BARRIERS, SEALERS, DRAINAGE, WEARING COURSE, AND OTHER MEASURES AS NECESSARY AND APPROPRIATE TO EFFECTIVELY SEPARATE THE STRUCTURE FROM THE POTENTIALLY HARMFUL ENVIRONMENTAL EFFECTS OF ANY TYPE.

STRUCTURES ARE DESIGNED WITH THE UNDERSTANDING THAT APPROPRIATE AND TIMELY MAINTENANCE WILL BE PERFORMED DURING THE LIFETIME OF THE STRUCTURE. REGULAR REVIEW OF THE STRUCTURE MUST BE DONE TO CONFIRM ITS INTEGRITY. GLOTMAN SIMPSON DO NOT PERFORM REVIEWS OF EXISTING STRUCTURES UNLESS SPECIFICALLY ENGAGED FOR THESE SERVICES.

WHERE CHANGES ARE FOUND TO HAVE OCCURED IN THE BUILDING STRUCTURE DUE TO ENVIRONMENTAL EFFECTS, MAINTENANCE SHALL BE IMPLEMENTED AT AN EARLY DATE. MAINTENANCE WORK SHALL BE PERFORMED UNDER THE DIRECTION OF ENGINEERS AND BY CONTRACTORS EXPERIENCED IN THE REPAIR OF EXISTING BUILDINGS.

## 5. SPECIALTY STRUCTURAL ENGINEER

A SPECIALTY STRUCTURAL ENGINEER IS AN ENGINEER REGISTERED IN ALBERTA, EMPLOYED BY A CONTRACTOR(S), THE OWNER, OR OTHERS, WHO POSSESSES SPECIALTY KNOWLEDGE OR EXPERIENCE AND IS RESPONSIBLE FOR DESIGN AND FIELD REVIEW OF SPECIFIC COMPONENTS OF THE PRIMARY STRUCTURE AND/OR OTHER SEMI-STRUCTURAL COMPONENTS WHETHER FORMING PART OF THE STRUCTURE OR AS PART OF THE WORK SPECIFIED BY OTHER CONSULTANTS ON THE PROJECT. WORK BY A SPECIALTY STRUCTURAL ENGINEER IS INDEPENDENT OF THE STRUCTURAL ENGINEER OF RECORD.

## 6. TENDER DOCUMENTS

THOSE PRICING OR TENDERING SHOULD OBTAIN A COMPLETE SET OF CURRENT DOCUMENTS INCLUDING ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, SURVEY, GEOTECHNICAL AND OTHER DRAWINGS AND SPECIFICATIONS. CERTAIN INFORMATION REQUIRED TO PROPERLY PRICE WORK INDICATED ON THE STRUCTURAL DRAWINGS MAY BE FOUND IN OTHER CONSULTANTS DRAWINGS.

USE DOCUMENTS ONLY FOR THE PURPOSE INDICATED. DO NOT USE TENDER DOCUMENTS FOR CONSTRUCTION, AND DO NOT PRICE FROM DRAWINGS WHICH ARE NOT ISSUED FOR TENDER OR CONSTRUCTION.

## 7. TEMPORARY AND ANCILLARY WORKS AND SITE SAFETY

THESE ENGINEERING DRAWINGS SHOW THE REQUIREMENTS FOR PERMANENT COMPLETED STRUCTURE ONLY. TEMPORARY WORKS REQUIRED TO COMPLETE THE CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTORS. GLOTMAN SIMPSON ARE NOT RESPONSIBLE FOR DESIGN OR FIELD REVIEW OF TEMPORARY AND ANCILLARY WORK.

THE CONTRACTOR ALONE IS RESPONSIBLE FOR SAFETY IN AND AROUND THE JOBSITE. PROPER AND SAFE METHODS OF CONSTRUCTION SHALL BE USED AT ALL TIMES INCLUDING GUYING AND BRACING OF INCOMPLETE STRUCTURES, FORMWORK, SHORING, RESHORING, FALSEWORK, PLATFORMS, SCAFFOLDING, BARRIERS, WALKWAYS, ETC. AND CONTROL THE INTENSITY, DURATION AND LOCATION OF CONSTRUCTION LOADS UPON THE STRUCTURE.

WHERE SAFETY IS CONCERNED DURING THE COURSE OF CONSTRUCTION, A SPECIALTY ENGINEER SHALL BE ENGAGED TO ASSURE THE SAFETY AND STABILITY OF THE STRUCTURE UNDER TEMPORARY CONDITIONS AND CONSTRUCTION LOADS UNTIL THE STRUCTURE OF THE BUILDING IS COMPLETE.

### FORMWORK

FORMWORK SHALL BE DESIGNED BY THE CONTRACTOR IN ACCORDANCE WITH THE CODE, THE FOLLOWING REQUIREMENTS AND ACI 347 "GUIDE TO FORMWORK FOR CONCRETE" WHEREVER THE ACI REQUIREMENTS DO NOT DIMINISH THE INTENT OR REQUIREMENTS OTHERWISE STATED HEREIN. FORMWORK SHALL BE DESIGNED TO SAFELY SUPPORT THE PRESSURES AND LOAD FROM CONCRETE AND MEN AND EQUIPMENT. FORMWORK SHALL BE DESIGNED TO AVOID ANY OVERLOAD TO THE STRUCTURE OF THE BUILDING. FORMWORK INCLUDING BRACING, RESHORING, FALSEWORK, ETC. SHALL BE DESIGNED AND INSPECTED BY A SPECIALTY ENGINEER WHO IS A REGISTERED PROFESSIONAL ENGINEER WITH EXPERIENCE IN THE PROPOSED METHODS OF FORMWORK CONSTRUCTION. DO NOT CAST CONCRETE ON SUSPENDED FORMWORK OR FOR WALLS OR COLUMNS HIGHER THAN 1200 WITHOUT DESIGN AND INSPECTION BY THE FORMWORK DESIGN ENGINEER.

### WBC ALBERTA

THE GENERAL CONTRACTOR AND SUBCONTRACTORS ARE RESPONSIBLE TO ADMINISTER AND PROVIDE FOR ALL MATTERS RELATED TO THE WORKERS SAFETY INCLUDING AUTHORITIES ADMINISTERING GOVERNMENTAL LAWS AND BYLAWS PERTAINING TO WORKER SAFETY INCLUDING BUT NOT LIMITED TO SITE SAFETY, TEMPORARY AND ANCILLARY WORKS, TRAINING, AND CONTROL OF THE WORK AND WORK PROCESSES. THE CONTRACTORS SHALL ENSURE COMPLIANCE WITH WORKERS HEALTH AND SAFETY REGULATIONS AND GOOD WORK PRACTICES AND WHERE NECESSARY OR PRUDENT SHALL PROVIDE ENGINEERING EXPERTISE TO CONFIRM SUCH COMPLIANCE.

## 8. SITE CONDITIONS AND CONTRACTOR REQUIRED CHANGES

THE GENERAL CONTRACTOR SHALL MARK UP A SET OF STRUCTURAL DRAWINGS WITH DETAILED DIMENSIONS AND SKETCHES OF ALL MODIFICATIONS TO THE STRUCTURE WHICH WERE MADE AS A RESULT OF FIELD CONDITIONS AND CONSTRUCTION PROCEDURES NOT PREDICTED AT THE TIME OF DESIGN AND/OR TENDER. THIS SHALL INCLUDE AS-BUILT MARKUPS OF CONCRETE OUTLINES, CONSTRUCTION JOINT DETAILS, REINFORCEMENT CHANGES, COLUMN LOCATIONS, SIZES, ETC.

CONTRACTORS ARE ENCOURAGED TO SUBMIT REQUESTS FOR CHANGES WHERE SUCH CHANGE CAN RESULT IN MORE EFFICIENT CONSTRUCTION WITH THE SAME OR BETTER PRODUCT. EACH REQUEST FOR CHANGE SHOULD BE ACCOMPANIED BY A SKETCH INDICATING THE PROPOSED CHANGE TO THE DRAWINGS, WHICH MAY BE REVIEWED OR MODIFIED BY THE ENGINEER. THE STRUCTURAL ENGINEER MAY ACCEPT, REJECT OR MODIFY THE SUBMISSION AT HIS SOLE DISCRETION.

## 9. DESIGN BY CONTRACTORS

STRUCTURAL ELEMENTS REQUIRED BUT NOT INDICATED IN THE DRAWINGS SHALL BE DESIGNED BY A SPECIALTY STRUCTURAL ENGINEER. CONNECTIONS BETWEEN STRUCTURAL ELEMENTS REQUIRED BUT NOT SHOWN SHALL BE DESIGNED BY A SPECIALTY STRUCTURAL ENGINEER. SEMI-STRUCTURAL ELEMENTS INDICATED ON ARCHITECTURAL, MECHANICAL, ELECTRICAL AND OTHER DRAWINGS, OR REQUIRED TO FULFILL THE INTENT OF THE WORK SHALL BE DESIGNED BY A SPECIALTY STRUCTURAL ENGINEER FOR GRAVITY AND SEISMIC INTEGRITY AND CONNECTION TO PRIMARY STRUCTURE.

ALTERNATE DESIGNS SUBMITTED BY CONTRACTORS AS SUBSTITUTES TO THE ORIGINAL DESIGN SHALL BE DESIGNED BY A SPECIALTY STRUCTURAL ENGINEER.

DESIGN OF COMPONENTS WHICH RELY ON THE PRIMARY STRUCTURE FOR SUPPORT SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR REVIEW. INDICATE CLEARLY THE METHOD AND MEANS OF ATTACHMENT AND THE MAGNITUDE OF FORCES THAT THE STRUCTURE MUST WITHSTAND. REVIEW BY THE ENGINEER OF RECORD MAY RESULT IN THE NEED TO MODIFY THIS MEANS OF CONNECTION WHICH MUST THEN BE REDESIGNED BY THE SPECIALTY STRUCTURAL ENGINEER.

ALL CONSTRUCTION, DESIGN, MATERIALS AND PRACTICES SHALL COMPLY WITH THE CURRENT EDITIONS OF APPLICABLE CODES AND SHALL INCLUDE SUITABLE LETTERS OF ASSURANCE.

ALL DESIGN BY CONTRACTORS SHALL INCLUDE SUCH MATERIALS AND ELEMENTS AS NECESSARY TO MAKE CONNECTION TO THE PRIMARY STRUCTURE IN A MANNER AND AT A LOCATION WHERE THE PRIMARY STRUCTURE CAN SUSTAIN THE FORCES APPLIED BY THE CONNECTION WITHIN GENERALLY ACCEPTED DESIGN LIMITS. THE DESIGN PROVIDED BY THE CONTRACTOR SHALL NOT BE LIMITED TO CONNECTION TO OTHER SECONDARY ELEMENTS SUCH AS, FOR EXAMPLE, TO STEEL STUDS UNLESS THE SECONDARY ELEMENTS ARE CONFIRMED SUITABLE TO RECEIVE THE LOAD AND, IN TURN, DELIVER THE LOAD TO THE PRIMARY STRUCTURE IN A MANNER AND AT A LOCATION WHERE THE PRIMARY STRUCTURE CAN SUSTAIN THE FORCES APPLIED.

## 10. FIELD REVIEW BY GLOTMAN SIMPSON

THE CONTRACTOR(S) SHALL GIVE NOTICE THAT APPROPRIATE PORTIONS OF THE WORK ARE COMPLETE AND AVAILABLE FOR FIELD REVIEW. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE FIELD REVIEW INSPECTIONS IN A TIMELY MANNER SUITABLE TO THE METHODS AND SCHEDULE OF CONSTRUCTION. WORK COVERED BY FINISHES PRIOR TO FIELD REVIEW BY THE CONSULTANT OR BY SPECIALTY ENGINEERS INCLUDING CONCRETE CAST AROUND REBAR MAY REQUIRE REMOVAL IN ORDER TO REVIEW THE WORK. THE COST OF REMOVAL FOR INSPECTION PURPOSES SHALL BE BOURN BY THE CONTRACTOR. INSTRUCTIONS FOR REMOVAL OF FINISHES OR CONCRETE ARE AT THE SOLE DISCRETION OF THE STRUCTURAL ENGINEER OF RECORD.

FIELD REVIEW IS AT THE PROFESSIONAL DISCRETION OF GLOTMAN-SIMPSON AND IS TO ASCERTAIN GENERAL COMPLIANCE WITH THE STRUCTURAL PLANS AND SUPPORTING DOCUMENTS FOR THE INTEGRITY OF THE PRIMARY STRUCTURAL COMPONENTS OF THE BUILDING ONLY. FIELD REVIEW DOES NOT MAKE GLOTMAN SIMPSON GUARANTORS OF THE CONTRACTORS WORK. FIELD REVIEW IS NOT FOR THE BENEFIT OF THE CONTRACTOR AND MAY NOT FORM PART OF THE CONTRACTORS CONSTRUCTION QUALITY CONTROL WHICH SHALL REMAIN THE RESPONSIBILITY OF THE CONTRACTOR(S). GLOTMAN SIMPSON SHALL NOT BE RESPONSIBLE FOR ACTS OR OMISSIONS OF THE CONTRACTOR OR FOR THE CONTRACTORS FAILURE TO FULFILL THE INTENT OF THE DESIGN DRAWINGS.

THE CONTRACTOR SHALL PROVIDE AT LEAST 24 HR. ADVANCE NOTICE ON A BUSINESS DAY TO INSPECT THE PLACEMENT OF REINFORCEMENT IN ALL CONCRETE POURS ON A BUSINESS DAY. INSPECTIONS SHALL BE DURING NORMAL WORKING HOURS ONLY. INSPECTIONS AT OTHER TIMES REQUIRE 72 HR. NOTICE AND SHALL BE PAID BY THE CONTRACTOR. INSPECTIONS REQUIRING SUBSTANTIAL TRAVEL TIME MUST BE GIVEN ADEQUATE NOTICE.

INSTRUCTIONS GIVEN AS A RESULT OF FIELD REVIEW SHALL NOT BE CAUSE FOR EXTRA CHARGE TO THE CONTRACT.

FIELD REVIEW BY GLOTMAN SIMPSON DOES NOT REPLACE FIELD REVIEW REQUIRED BY SPECIALTY STRUCTURAL ENGINEERS.

WORK MUST BE COMPLETE AT THE TIME OF INSPECTION. WHERE WORK IS INCOMPLETE AT THE TIME OF THE INSPECTION, THE ENGINEER MAY REQUIRE A DULY AUTHORIZED REPRESENTATIVE OF THE MATERIALS CONSULTANT OR OTHER QUALIFIED PARTY TO COMPLETE THE INSPECTION WHEN THE WORK IS FULLY COMPLETE. THE COST OF SUCH INSPECTION SHALL BE PAID BY THE CONTRACTOR. COPIES OF ALL REPORTS SHALL BE FORWARDED TO THE ENGINEER AND THE OWNER.

## 11. CONTRACTOR AS BUILDER CONSTRUCTION AND QUALITY CONTROL

THE GENERAL CONTRACTOR PROVIDES AND IS RESPONSIBLE FOR THE LABOUR, MATERIALS AND EQUIPMENT FOR THE EXECUTION AND QUALITY CONTROL OF THE WORK AS SHOWN IN THE CONTRACT DOCUMENTS. FURTHER, THE GENERAL CONTRACTOR IS RESPONSIBLE FOR THE CONSTRUCTION METHODS, METHODS, TECHNIQUES, SEQUENCES, PROCEDURES, SAFETY PRECAUTION AND PROGRAMS ASSOCIATED WITH THE CONSTRUCTION WORK.

THE CONTRACTOR IS RESPONSIBLE TO CONSTRUCT THE BUILDING STRUCTURE IN ACCORDANCE WITH THE INTENT OF THE CONTRACT DOCUMENTS, TO CHECK AND CONFIRM THAT CONSTRUCTION CONFORMS TO THESE DOCUMENTS AND TO RECORD AND REPORT ERRORS AND OMISSIONS IN CONSTRUCTION TO THE ENGINEER FOR HIS REVIEW.

EACH CONTRACTOR SHALL BE RESPONSIBLE FOR QUALITY CONTROL OF ITS OWN AND ITS SUB-CONTRACTOR'S WORK AND THE GENERAL CONTRACTOR SHALL MAINTAIN OVERALL RESPONSIBILITY FOR CONFORMANCE OF THE WORK TO THE DESIGN DRAWINGS WITHOUT SUBROGATING THIS RESPONSIBILITY TO OTHERS.

## 12. BUILDING ENVELOPE

GLOTMAN SIMPSON DO NOT DESIGN, REVIEW, INSPECT OR VERIFY ANY MATTERS RELATED TO BUILDING ENVELOPE, WATERPROOFING, VAPOUR BARRIER, TANKING, FINISHES OR OTHER APPLIED MATERIALS.

BUILDING STRUCTURE MUST BE PROTECTED BY A FULLY FUNCTIONAL BUILDING ENVELOPE DESIGNED AND REVIEWED BY AN ARCHITECT / BUILDING ENVELOPE ENGINEER ON BEHALF OF THE OWNER. PROTECTION OF THE STRUCTURE SHALL INCLUDE MEMBRANES, WATERPROOFING, VAPOUR BARRIERS, SEALERS, DRAINAGE, WEARING COURSE, AND OTHER MEASURES AS NECESSARY AND APPROPRIATE TO EFFECTIVELY SEPARATE THE STRUCTURE FROM THE POTENTIALLY HARMFUL ENVIRONMENTAL EFFECTS OF ANY TYPE.

## 13. VERIFICATION OF CONSTRUCTION BY OTHERS

WHERE A CONTRACTOR, TRADE, SUPPLIER, OWNER OR OTHER, INCLUDING ANOTHER CONSULTANT, PROVIDES WORK, MATERIALS, OR SPECIFICATIONS THAT RELY UPON THE STRUCTURE IN ANY WAY, SUCH PARTY SHALL INSPECT THE STRUCTURE IN DRAWING FORM AND AS CONSTRUCTED AND DETERMINE WHETHER THE DESIGNED OR AS-BUILT CONDITION OF THE STRUCTURE IS SUITABLE TO THEIR REQUIREMENTS. NOTIFY THE PRIME CONSULTANT OF ALL LOCATIONS WHERE THE STRUCTURE MIGHT ADVERSELY AFFECT CONSTRUCTION BY OTHERS, OR WHERE THE STRUCTURE MIGHT BE ADVERSELY AFFECTED BY THE CONSTRUCTION AND PROVIDE THE NECESSARY REMEDIES.

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%UFT	2019-03-27
6	Issued for 99%UFC	2018-12-13
5	Issued for 99%UFC	2018-04-12
4	Issued for 99%UFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

### Revisions

Revision / Revision	Description / Description	Date / Date
---------------------	---------------------------	-------------

Client / client	
-----------------	--



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par

Approver

Designed by/Concept par

Designer

Drawn by/Dessine par

Author

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

**Parks Canada**

Drawing title / Titre du dessin

### GENERAL NOTES

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
------------------------------	-----------------	--------------------------------

S101

9





14. PARKING STRUCTURES

PARKING STRUCTURES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH CAN/CSA S413 PARKING STRUCTURES.

ONLY THE PORTIONS OF CAN/CSA S413 PARKING STRUCTURES WHICH PERTAIN TO THE PRIMARY STRUCTURE OF THE BUILDING ARE ADDRESSED IN THESE NOTES AND DRAWINGS.

SEE ARCHITECTURAL, MECHANICAL, ELECTRICAL, MATERIALS CONSULTANT AND OTHER CONSULTANT DRAWINGS AND SPECIFICATIONS FOR ALL COMPONENTS AND REQUIREMENTS WHICH DO NOT PERTAIN DIRECTLY TO THE PRIMARY STRUCTURE OF THE BUILDING. THESE ITEMS MAY INCLUDE BUT ARE NOT LIMITED TO: 1) WATERPROOFING MEMBRANES & SEALERS, 2) GRADES, LEVELS, SLOPES AND DRAINAGE, 3) GALVANIZED COMPONENTS AND EMBEDDED MATERIALS, 4) EXPANSION JOINTS AND SLIDING JOINTS, 5) HEATING CABLES, PIPES, SLEEVES AND CONDUIT, 6) INSPECTION AND TESTING, 7) MAINTENANCE, 8) CURING AND PLACING PROCEDURES, 9) CONCRETE FINISHES AND TOLERANCE INCLUDING SLAB FINISHING, 10) PAINTING OR COATINGS.

PROVIDE TOP COVER OF NOT LESS THAN 40MM TO ALL TOP REINFORCEMENT AND 30MM TO ALL BOTTOM REINFORCEMENT OF CONCRETE CAST IN PARKING STRUCTURES AT LOCATIONS.

CONFIRM HEADROOM CLEARANCES, OPENING WIDTH AND HEIGHT, FLOOR-TO-FLOOR, AND OTHER DIMENSIONS WITH DRAWINGS PROVIDED BY OTHER CONSULTANTS AND REPORT ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION OF THE BUILDING ELEMENT.

CURING: SEE MATERIALS CONSULTANT FOR CURING AND PLACING PROCEDURES FOR CONCRETE FOR PARKING STRUCTURES. UNLESS OTHERWISE INDICATED BY THE MATERIALS CONSULTANT, PROVIDE WET CURING WITH SPRINKLERS AND BURLAP FOR 3 DAYS FOLLOWING THE POUR WHEN THE WIND SPEED AT THE PARKING DECK LEVEL EXCEEDS 15 KM/HR AND AIR TEMPERATURE EXCEEDS 15 C.

OPEN STAIRWELLS WHERE STAIRS ARE EXPOSED TO WEATHER FROM ABOVE SHALL HAVE COVER TO REBAR AS NOTED ABOVE INCLUDING DOWELS FROM SIDE WALLS TO STAIR SLABS.

15. GENERAL

- STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, SURVEY AND OTHER DRAWINGS AND SPECIFICATIONS. SPECIFICATIONS SHALL CONTROL OVER THESE DRAWINGS AND GENERAL NOTES ONLY WHERE THE SPECIFICATION PROVIDES FOR MORE STRINGENT REQUIREMENT. READ AND UNDERSTAND THE INTENT OF DESIGN. DRAWINGS SHALL BE READ AS A WHOLE IN CONTEXT WITH THE PROJECT AND IN CONJUNCTION WITH DRAWINGS AND INFORMATION BY OTHERS. DRAWINGS ARE SCHEMATIC REPRESENTATIONS OF THE PROJECT. DRAWINGS ARE NOT INTENDED TO BE PICTORALLY ACCURATE REPRODUCTIONS OF THE CONSTRUCTION BUT, RATHER, TO PROVIDE SUFFICIENT INFORMATION TO COMPLY WITH THE INTENT OF THE DESIGN. SECTIONS AND DETAILS ARE SHOWN TO EXPLAIN THE INTENT OF THE DRAWINGS. SECTIONS ARE NOT CALLED UP AT EVERY OPPORTUNITY HOWEVER THE OBJECTIVE OF THE DRAWINGS IS TO PROVIDE AN EXPERIENCED AND KNOWLEDGEABLE PERSON SUFFICIENT REFERENCES TO HELP DEMONSTRATE THE INTENT OF DESIGN.
- USE THESE DRAWINGS ONLY FOR THE PURPOSES SPECIFICALLY NOTED IN THE REVISION COLUMN. DO NOT CONSTRUCT BY THESE DRAWINGS UNLESS INDICATED. "FOR CONSTRUCTION", THE TERM ISSUED FOR BUILDING PERMIT INDICATES THAT THE DRAWINGS ARE COMPLETE FOR DESIGN OF ALL KEY STRUCTURAL DESIGN ELEMENTS HOWEVER FINAL COORDINATION AND INSTRUCTIONS FOR CONSTRUCTION MAY NOT BE FULLY COMPLETE.
- THESE DRAWINGS ARE PREPARED IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS BY RIDDEL KURCZABA ARCHITECTS.
- THE ARCHITECT IS PRIME CONSULTANT AND REGISTERED COORDINATING PROFESSIONAL FOR THE PROJECT AND IS RESPONSIBLE FOR GENERAL COORDINATION OF THE DRAWINGS. DISCREPANCIES AND INCOMPATIBILITIES IN THE DRAWINGS SHALL BE REPORTED TO THE ARCHITECT. ALL CORRESPONDENCE SHOULD BE SUBMITTED OR DUPLICATED TO THE ARCHITECT WITHOUT DELAY.
- REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR GRADES, FLOOR AND ROOF ELEVATIONS AND SLOPES, AND FOR DIMENSIONS AND LOCATIONS OF DOORS, WINDOWS, RECESSES, SLEEVES, WINDOW WASHING ANCHORAGE AND SYSTEMS, EQUIPMENT, SHAFTS, INSERTS, NAILERS, CHAMFERS, AND SIMILAR ITEMS. GRADES, ELEVATIONS AND SLOPES SHOWN ON STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY AND MUST BE CONFIRMED. MAINTAIN STRUCTURAL THICKNESS INDICATED. SLOPES FOR DRAINAGE REQUIREMENTS MUST BE OBTAINED FROM THE ARCHITECT.
- SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR LOCATIONS AND REQUIREMENTS RELATING TO FIRE RATINGS, FIRE STOPPING, SMOKE SEALING REQUIREMENTS, ETC..
- SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR ALL ASPECTS OF WATERPROOFING, SEALING, JOINTING, TAPING, AIR BARRIER, FLASHING, VENTING, AND SIMILAR REQUIREMENTS FOR BUILDING CONSTRUCTION.
- SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR NON-STRUCTURAL CONCRETE INCLUDING ELEMENTS NOT FORMING PART OF THE PRIMARY STRUCTURE, FLOOR TOPPINGS NOT FORMING PART OF THE STRUCTURAL FLOOR, EXTERIOR FINISH MATERIALS INCLUDING LANDSCAPING MATERIALS AND SIDEWALKS, ETC.. SOME NON-STRUCTURAL CONCRETE MAY BE SHOWN FOR CONVENIENCE ONLY AND MUST BE CONFIRMED WITH ARCHITECTURAL DRAWINGS.
- CONSTRUCT THE BUILDING TO THE INTENT OF THE DRAWINGS. WHERE UNCLEAR, PROVIDE FOR THE INTENT OF THE DESIGN AND LAYOUT CONSIDERING ARCHITECTURAL, STRUCTURAL AND OTHER CONSULTANT INFORMATION. EXTRA CHARGES THAT ARE REQUESTED FOR CONSTRUCTION OF ITEMS THAT COMPLETE OR EXTEND THE DETAIL OF THE BUILDING BUT DO NOT CHANGE THE INTENT OF DESIGN WILL NOT BE GRANTED. WHEN IN DOUBT ALLOW FOR THE MORE ONEROUS ALTERNATIVE. WHEN IN DOUBT, STATE ANY ASSUMPTIONS MADE. PROPERTY LINES MUST BE CLEARLY STAKED AND VISIBLE ON SITE. DO NOT CONSTRUCT OUTSIDE PROPERTY LINES WITHOUT RECEIVING SPECIFIC INSTRUCTION FROM THE ARCHITECT OR OWNER. IF WORK IS SHOWN OUTSIDE THE PROPERTY LINES ON THESE DRAWINGS, FIRST VERIFY WITH THE ENGINEER AND WITH THE ARCHITECT THAT THE WORK SHOULD CONTINUE. ANY WORK OUTSIDE THE PROPERTY LINES THAT IS CONSTRUCTED WITHOUT SPECIFIC VERIFICATION IS SUBJECT TO REMOVAL WITHOUT COST.
- WHERE NOTED HEREIN, THE TERM GENERAL CONTRACTOR OR GC SHALL ALSO REFER TO THE PROJECT, CONSTRUCTION OR CONTRACTS MANAGER.
- THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND OUTLINES WITH THE ARCHITECTURAL DRAWINGS AND NOTIFY ANY ERRORS OR OMISSIONS PRIOR TO COMMENCING WITH WORK. DISCREPANCIES NOT REPORTED ARE THE RESPONSIBILITY OF THE CONTRACTOR(S).
- SHOULD THE BIDDERS OF THIS PROJECT FIND DISCREPANCIES IN, OR OMISSIONS FROM THE DRAWINGS, SPECIFICATIONS OR DOCUMENTS, OR SHOULD HE BE IN DOUBT AS TO THEIR MEANING, THEY MUST NOTIFY THE ENGINEER WHO MAY SEND A WRITTEN INSTRUCTION TO TENDERS.
- THE CONTRACTOR(S) SHALL REVIEW ALL AVAILABLE INFORMATION FOR TENDER AND, WHERE CONFLICT OCCURS BETWEEN ITEMS, INCLUDE THE MORE ONEROUS IN THE TENDER, UNLESS OTHERWISE INDICATED BY THE CONSULTANT PRIOR TO TENDER CLOSING.
- INFORMATION TRANSMITTED TO CONTRACTORS THROUGH TELEPHONE CONVERSATION MUST BE CONFIRMED IN WRITING TO BE BINDING.
- THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS IN THE FIELD TO SUIT EXISTING CONDITIONS. HE SHALL SITE MEASURE AND CONTROL THE PRODUCTION OF WORK ON SITE AND ELSEWHERE TO FULFILL THE INTENT OF THE DRAWINGS. NOTIFY THE ENGINEER OF ANY DIMENSIONAL VARIATION FROM THE PLANS.
- CONTRACTOR(S) SHALL RECORD AND REPORT ANY SITE CONDITIONS WHICH MAY EFFECT THE STRUCTURE (BUILDINGS, BUILDING COMPONENTS, PROPERTY LINES, SOIL CONDITIONS, ETC.).
- CONFIRM HEADROOM CLEARANCES, OPENING WIDTH AND HEIGHT, FLOOR-TO-FLOOR, AND OTHER DIMENSIONS WITH DRAWINGS PROVIDED BY OTHER CONSULTANTS AND REPORT ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION OF THE BUILDING ELEMENT. MAKE AVAILABLE TO THE ENGINEER, AFTER CONTRACT AWARD, A COMPLETE BREAKDOWN OF COSTS FOR THE STRUCTURAL PORTIONS OF THE WORK AS PREPARED FOR THE TENDER. CHARGES FOR EXTRAS TO THE CONTRACT MUST BE BROUGHT TO THE ENGINEERS ATTENTION BEFORE THE WORK PROCEEDS. ADEQUATE TIME MUST BE ALLOWED FOR REVIEW AND APPROVAL OF EXTRAS BY THE ARCHITECT AND/OR OWNER, WORK WHICH PROCEEDS PRIOR TO APPROVAL BY THE CONSULTANT MIGHT NOT BE GRANTED EXTRA PAYMENT.
- DO NOT CUT OR DRILL INTO STRUCTURAL MEMBERS, OR CUT REBAR PROJECTIONS WITHOUT FIRST CONTACTING AND OBTAINING THE PERMISSION OF GLOTMAN SIMPSON.
- WHERE WORK PROCEEDS CONTRARY TO THE INSTRUCTIONS OF THESE GENERAL NOTES, THE CONTRACTOR SHALL BRING THIS MATTER TO THE ATTENTION OF THE ENGINEER FOR HIS CONSIDERATION PRIOR TO PROCEEDING WITH THE WORK. IN ANY EVENT, THE ENGINEER SHALL BE MADE FULLY AWARE OF ALL MODIFICATIONS TO THE DESIGN OR PROCEDURES HEREIN.

- IT IS COMMON TO FIND THAT SOME OF THE INFORMATION IN THE DESIGN DOCUMENTS ARE INCONSISTENT OR INCOMPLETE. THE CONTRACTOR SHALL REVIEW THE DRAWINGS AND CONSTRUCTION AS IT PROCEEDS TO ENSURE THAT THE ASSUMPTIONS MADE IN THE DRAWINGS REFLECT THE REQUIREMENTS OF THE BUILDING CONSTRUCTION AND FIELD CONDITIONS ENCOUNTERED IN THE BUILDING. WHERE DISCREPANCIES ARISE OR THERE IS A MISMATCH BETWEEN THESE DRAWINGS AND THE REQUIREMENTS OF CONSTRUCTION, REPORT IMMEDIATELY TO THE ENGINEER. TO AVOID SCHEDULE DELAY, THE CONTRACTOR SHOULD LOOK AHEAD TO DISCOVER WHETHER THERE ARE ANY DIFFERENCES BETWEEN THE DRAWINGS AND THE REQUIREMENTS OF CONSTRUCTION SO THAT TIME IS PERMITTED FOR REDESIGN SO THAT THE SCHEDULE WILL NOT BE JEOPARDIZED DUE TO MISINFORMATION ABOUT THE EXISTING BUILDING.
- RFI REQUESTS FOR INFORMATION WHETHER FORMAL OR INFORMAL MUST BE SUBMITTED WITH ADEQUATE TIME FOR REVIEW AND RESPOND INCLUDING CONSIDERATION OF THE COMPLEXITY OF THE QUESTION. EACH SUBMISSION OF EACH RFI MUST BE ALLOWED AT LEAST ONE CALENDAR WEEK RESPONSE TIME BY GLOTMAN SIMPSON. RFI SENT LATE COULD BE DELAYED. LATE RFI DO NOT BIND GLOTMAN SIMPSON TO RESPOND ANY FASTER THAN THEIR PRUDENT RESPONSE TIME REQUIRES.
- SITE PRACTICES BY CONTRACTORS OR SUBCONTRACTORS THAT PURPOSELY AVOID PROPER PERFORMANCE OF THE WORK AS DEEMED BY THE STRUCTURAL ENGINEER SHALL BE GROUNDS FOR REQUIRING FULL TIME INSPECTION AND/OR SUPERVISION OF THE PROJECT BY THE ENGINEER OR OTHER INDEPENDENT INSPECTION AGENCY. ALL COSTS FOR ADDITIONAL CONTROL, INSPECTION, TESTING, SUPERVISION OR OTHER ACTIONS NECESSARY FOR QUALITY CONTROL OF THE PROJECT AS DEEMED APPROPRIATE BY THE STRUCTURAL ENGINEER IN HIS SOLE DISCRETION SHALL BE TO THE ACCOUNT OF THE CONTRACTOR REQUIRING THE ADDED WORK.
- WORK FOUND DEFECTIVE AFTER COMPLETION OF THE WORK OR COMPLETION OF THE PROJECT SHALL REMAIN THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE GOOD. THIS OBLIGATION REMAINS ALIVE BEYOND SUBSTANTIAL COMPLETION OF THE PROJECT OR ANY PORTION THEREOF, REGARDLESS OF PRIOR ACCEPTANCE OR APPROVAL.
- ELEMENTS NOT INDICATED IN THIS PACKAGE, OR NOTED AS DEFERRED TO OTHERS FALL WITHIN THE GENERAL CONTRACTOR SCOPE.

16. DESIGN PARAMETERS

DESIGN SUPERIMPOSED LOADS:

SPECIFIED LIVE LOADS (kPa): (SEE ALSO LOAD MAPS)

- |       |   |
|-------|---|
| 1.9   | LIVING AREAS  |
| 2.4   | OFFICE AREAS ABOVE GROUND LEVEL                                       |
| 4.8   | GROUND FLOOR (EXCEPT LIVING AREA)                                     |
| 4.8   | HALLWAYS, EXITS, STAIRS, STORAGE, ETC.                                |
| 2.4   | PARKING AREAS - INTERIOR  |
| 4.8   | EXTERIOR AREAS (WALKWAYS, ETC.)                                       |
| 7.2   | LIBRARIES   |
| 7.2   | FIBRE OPTICS ROOMS  |
| 4.8   | ELECTRICAL ROOMS (EXCEPT TRANSFORMER LOADS SHOWN)                     |
| 12    | FIRE TRUCK ACCESS - VEHICLE WEIGHT: 80,000 LB., 50,000 LB. POINT LOAD |
| 12    | LOADING BAY AND DESIGNATED TRUCK ROUTES                               |
| 3.6   | GROUND SNOW LOAD  |
| 0.1   | RAIN LOAD   |
| 3.6   | MECHANICAL FLOOR (EXCEPT UNIT WEIGHTS NOTED)                          |
| 20(+) | BACKFILL PRESSURE (SEE LOADING DIAGRAM)                               |
|       | SOIL IN EXTERIOR LANDSCAPING (SEE LANDSCAPE LOADING PLAN)             |

SPECIFIED DEAD LOADS (kPa):

- |     |                     |
|-----|---------------------|
| 1.0 | PARTITIONS          |
| 1.0 | ROOFING MATERIALS   |
|     | TO SUIT GREEN ROOFS |

SEISMIC:

Sa(0.2)=0.24 Sa(0.5)=0.14 Sa(1.0)=0.066 Sa(2.0)=0.037  
PGA = 0.12  
Site Class = D Rd=3.0 Ro=1.7  
T=FROM DYNAMIC ANALYSIS

WIND PRESSURE:

650=0.32 kPa BASIC WIND PRESSURE  
DESIGN PRESSURE TO BE CALCULATED FOR INDIVIDUAL ELEMENTS  
WIND UPLIFT ON ROOFS, CANOPIES AND OVERHANGS TO BE CALCULATED

IMPORTANCE FACTORS:

- |     |     |      |
|-----|-----|------|
| Ie= | ULS | SLS  |
| Iw= | 1.0 | 0.90 |
| Ie= | 1.0 | 0.75 |
| Ie= | 1.0 | N/A  |

WATER TABLE ELEVATION: APPROX 100.44m. SEE GEOTECH REPORT FOR REFERENCE ELEVATIONS

CONTRACTORS SHALL REPORT TO THE STRUCTURAL ENGINEER ANY LOADS TO THE BUILDING EXCEEDING THE LOADS INDICATED ON THE PLANS, OR ANY LOADS EXCEEDING 500 POUNDS NOT SHOWN ON THE PLANS.

CONSTRUCTION LOADS INCLUDING SHORING AND RESHORING, MEN AND EQUIPMENT, ETC. SHALL NOT EXCEED THE SPECIFIED DESIGN LIVE LOAD FOR THE STRUCTURAL ELEMENTS. CONTRACTORS MUST CONFIRM ANY QUESTIONABLE LOADING AS REQUIRED FOR TEMPORARY CONDITIONS OF CONSTRUCTION, UNDER THE SUPERVISION OF A PROFESSIONAL ENGINEER.

THE PRIMARY STRUCTURE OF THIS BUILDING HAS BEEN DESIGNED FOR SEISMIC AND WIND LOADS IN ACCORDANCE WITH APPLICABLE PROJECT CODES.

17. SECONDARY AND ARCHITECTURAL BUILDING COMPONENTS

THIS SECTION INDICATES LOADS AND REQUIREMENTS FOR CONSTRUCTION ITEMS NOT PART OF THE PRIMARY STRUCTURE OF THE BUILDING. IT IS PROVIDED FOR THE CONVENIENCE OF THE ARCHITECT AND CONTRACTORS BUT DOES NOT FORM PART OF THE REQUIREMENTS FOR THE PRIMARY STRUCTURE FOR WHICH THESE DRAWINGS APPLY. WHERE OTHER MORE ONEROUS REQUIREMENTS ARE INDICATED ELSEWHERE, AND BY OTHERS OR IN APPLICABLE CODES, THEY SHALL APPLY.

- SECONDARY ELEMENTS AND BUILDING COMPONENTS INCLUDING ARCHITECTURAL, MECHANICAL AND SEMI-STRUCTURAL MEMBERS AND THEIR CONNECTIONS TO THE PRIMARY STRUCTURE SHALL BE DESIGNED AND INSPECTED IN THE FIELD BY A SPECIALTY STRUCTURAL ENGINEER REGISTERED TO PRACTICE IN THE PROVINCE OF BRITISH COLUMBIA FOR THE SUPPLIER.
- SUBMIT TO THE ARCHITECT SHOP DRAWINGS TOGETHER WITH CALCULATIONS AND LETTERS OF ASSURANCE SEALED BY THE SPECIALTY STRUCTURAL ENGINEER INDICATING DETAILS OF CONNECTIONS MADE TO THE BUILDING PRIMARY STRUCTURE. SHOW ALL DESIGN LOADS APPLIED TO THE BUILDING STRUCTURE. THE DESIGN AND INSPECTION OF CONNECTIONS SHALL BE THE RESPONSIBILITY OF THE SUPPLIER.
- SECONDARY AND SEMI-STRUCTURAL BUILDING COMPONENTS SHALL NOT BE BUILT RIGIDLY AGAINST STRUCTURE IN A MANNER WHICH WOULD FORCE REDISTRIBUTION OF LATERAL LOADS IN THE STRUCTURE. PROVIDE EXPANSION AND MOVEMENT JOINTS AT SIDES AND TOP OF RIGID COMPONENTS SUCH AS MASONRY. SUBMIT DETAILS FOR REVIEW BY THE ENGINEER.
- SECONDARY ELEMENTS SHALL BE CONNECTED TO PRIMARY STRUCTURE IN SUCH LOCATIONS AND WITH METHODS WHEREBY THE PRIMARY STRUCTURE IS CAPABLE OF RESISTING IMPOSED FORCES FROM SECONDARY ELEMENTS. PROVIDE ELEMENTS AS NECESSARY TO MAKE CONNECTION TO THE PRIMARY STRUCTURE AS PERMITTED BY THE GLOTMAN SIMPSON. WHERE THE PRIMARY STRUCTURE IS NOT WITHIN THE IMMEDIATE VICINITY, VERIFY THE SYSTEM OF ELEMENTS THAT FACILITATE THE TRANSMISSION OF FORCES TO THE PRIMARY STRUCTURE INCLUDING OTHER ELEMENTS NOT PROVIDED BY THE SPECIALTY ENGINEER. ALERT THE ARCHITECT TO ANY GAPS IN CAPACITY IN THE SYSTEM OR RESTRAINT.
- STORE FRONT GLAZING, WINDOWS AND WINDOW MULLIONS, GLAZED PARTITIONS, CURTAIN WALLS, GLASS BLOCK WALLS, STEEL STUD OR FRAME WALLS, EXTERIOR CLADDING, HANDRAILS, GUARDRAILS, UPSTANDS, AND CONNECTIONS FOR ALL CLADDING MATERIALS INCLUDING BRICK, ETC. SHALL BE DESIGNED FOR LOADS IN ACCORDANCE WITH APPLICABLE PROJECT CODES INCLUDING THE SEISMIC PROVISIONS. PROVIDE ALL NECESSARY CONNECTION AND SUPPORT MATERIALS TO CARRY LOADS OF THE SECONDARY ELEMENTS TO THE PRIMARY STRUCTURE.
- GLAZED WALLS SHALL BE DESIGNED FOR THE LATERAL FORCES OF HANDRAILS AND GUARDS EXCEPT AS OTHERWISE ACCEPTED BY THE REGISTERED COORDINATING PROFESSIONAL RESPONSIBLE FOR EXTERIOR WALL SYSTEMS.
- MAKE PROVISION IN ALL FINISH MATERIALS TO PERMIT THE FREE MOVEMENT OF THE STRUCTURE FOR DEFLECTIONS. SEE NOTES REGARDING DEFLECTIONS, TOLERANCES AND REPAIR OF SLABS OUT OF TOLERANCE.

WIND PRESSURE:

STORE FRONT GLAZING, WINDOWS AND WINDOW MULLIONS, GLAZED PARTITIONS, CURTAIN WALLS, GLASS BLOCK WALLS, STEEL STUD OR FRAME WALLS, AND EXTERIOR CLADDING SHALL BE DESIGNED BY THE SPECIALTY STRUCTURAL ENGINEER FOR THE SUPPLIER.

CALCULATE WIND FORCES USING PRESCRIPTIVE METHODS OF THE BUILDING CODE SECTION 4.1.7. USE FULLY EXPOSED TERRAIN UNLESS OTHERWISE ACCEPTED FOR THE PROJECT. SITE SPECIFIC WIND PRESSURES MAY BE USED IF ACCEPTED BY THE OWNER. CONSIDER THE DYNAMIC EFFECTS OF WIND WHERE NECESSARY.

CORNER PRESSURES ARE TO BE INCREASED AS PER APPLICABLE PROJECT CODES. FOR EXTENT OF ROOF CORNER MAXIMUM SUCTIONS SEE COMMENTARY TO THE NATIONAL BUILDING CODE FIGURES B-7 TO B-12. INWARD PRESSURES VARY OVER THE HEIGHT OF THE BUILDING. OUTWARD SUCTION IS CONSTANT REFERENCED BY THE ROOF HEIGHT OF THE BUILDING. INTERNAL PRESSURES ARE TO BE ADDED TO THESE PRESSURES.

PROVIDE FOR WIND UPLIFT PRESSURES ON CANOPIES (BOTH SURFACES), GLAZING, ROOF OVERHANGS, ETC.

HANDRAIL AND GUARDRAIL LOADS:

HORIZONTAL DESIGN LOADS: BALCONIES OF RESIDENTIAL UNITS 0.75 KN/M OR 1.0 KN ALSO USED WITHIN RESIDENTIAL UNITS

FOR GLASS WALLS BELOW 1200 HIGH  
0.75 KN/M OR 1.0 KN AT ANY LOCATION  
1.0 KN AT ANY LOCATION  
1.0 KN AT ANY LOCATION  
3.0 KN/M  
22 KN AT 500 ABOVE FLOOR SURFACE AT ANY LOCATION  
5 KN AT ANY LOCATION NOT IN COMBINATION WITH FOREGOING LOADS

WALLS ACTING AS A GUARD 5 kPa

FIREWALLS 5 kPa

VERTICAL DESIGN LOADS:

VERTICAL AT TOP OF GUARDRAIL 1.5 KN/M NOT IN COMBINATION WITH FOREGOING LOADS

CONTRACTORS SHALL OBTAIN DESIGN BY A SPECIALTY ENGINEER FOR THE HANDRAIL AND EMBEDS BEFORE COMPLETING THE STRUCTURAL PORTIONS OF THE BUILDING WHICH WILL RECEIVE THE HANDRAIL COMPONENTS.

WALLS BETWEEN STRUCTURE THAT STEPS MORE THAN 600MM SHALL BE DESIGNED AS A GUARD.

FIREWALLS SHALL BE DESIGNED FOR A PRESSURE OF AT LEAST .5 kPa UNDER FIRE CONDITIONS

DIFFERENTIAL MOVEMENTS FOR CLADDING DESIGN:

THE FOLLOWING DEFLECTION GAPS ARE BASED ON THE ASSUMPTION THAT CLADDING AND GLAZING INSTALLATION OCCURS NO SOONER THAN 2 MONTHS AFTER SHORING IS REMOVED FROM SLABS AND BEAMS AND THEY ARE FREE TO DEFLECT. IF INSTALLATION OCCURS AT AN EARLIER TIME, ADDITIONAL VERTICAL MOVEMENT CAN BE ANTICIPATED.

VERTICAL MOVEMENT BETWEEN ANY 2 FLOORS:

REFER TO STRUCTURAL DEFLECTIONS FOR REQUIREMENTS.

HORIZONTAL DISPLACEMENT BETWEEN FLOORS:

SERVICEABILITY CONDITION (WINDOW AND WALL SERVICEABILITY MAINTAINED): ALLOW FOR HORIZONTAL DISPLACEMENT OF 0.01 x INTERSTOREY HEIGHT WITH A MINIMUM OF 20mm UNLESS NOTED OTHERWISE ON THE DRAWINGS.

ULTIMATE CONDITION (WINDOW AND WALL COLLAPSE PREVENTED): ALLOW FOR HORIZONTAL DISPLACEMENT OF 0.025 x INTERSTOREY HEIGHT WITH A MINIMUM OF 60mm UNLESS NOTED OTHERWISE ON DRAWINGS.

VOIDING AND VOID MATERIALS:

WHERE REQUIRED AND AS SHOWN ON THE STRUCTURAL OR ARCHITECTURAL DRAWINGS OR AS NEEDED TO MAINTAIN ALLOWABLE THICKNESS OF BUILT-UP CONCRETE OR OTHER MATERIALS UPON THE STRUCTURE, PROVIDE VOIDING AS REQUIRED. VOIDING SHALL BE:

- FOR INTERIOR SPACES WITHOUT WHEEL LOADS, PROVIDE TYPE 2 CLOSED CELL STYROFOAM UNDER CONCRETE SLAB POURS WITH 2 MPa COMPRESSIVE CAPACITY MINIMUM.
- FOR EXTERIOR SPACES, PROVIDE TYPE 2 CLOSED CELL STYROFOAM WITH HIGH COMPRESSIVE STRENGTH, 7 MPa OR GREATER.
- FOR EARTHEN LANDSCAPED SPACE, PROVIDE CLOSED CELL FREE DRAINING VOIDED STYROFOAM OF SUITABLE COMPRESSIVE STRENGTH BUT NOT LESS THAN 2 MPa.

ALTERNATIVELY, INTERIOR OR EXTERIOR SPACES CAN BE BUILT-UP WITH SUITABLE STRUCTURAL FRAMING TO FORM A VOIDED SPACE. SEE THE ENGINEER FOR DETAILS AND TO CONFIRM LOADING TO THE STRUCTURE.

PROVIDE SUITABLE DRAINAGE FROM ALL VOID SPACES  
PROVIDE WATERPROOFING AS SPECIFIED BY THE ARCHITECT.

BRICK TIES AND BRICK SUPPORT ANGLES:

BRICK TIES AND SUPPORT ANGLES ARE REQUIRED FOR ARCHITECTURAL BRICKWORK SHOWN ON THE ARCHITECTURAL DRAWINGS.

BRICK TIES AND THEIR ANCHORAGE SHALL BE EXECUTED UNDER THE SUPERVISION OF A SPECIALTY STRUCTURAL ENGINEER AND SHALL HAVE CAPACITY TO SUSTAIN DESIGN SEISMIC AND WIND FORCES AND MOVEMENTS IN ACCORDANCE WITH APPLICABLE CODES. BRICK TIES SHALL BE DESIGNED IN ACCORDANCE WITH CSA A370 "CONNECTORS FOR MASONRY". TIES SHALL BE SIDE MOUNTED TO STUDS OR FACE MOUNTED TO CONCRETE OR STRUCTURAL STEEL MEMBERS. IF FACE MOUNTING TO STEEL STUDS, PROVIDE SUITABLE BACKUP MATERIAL WITHIN THE STEEL STUD TO RECEIVE CONNECTORS. PROVIDE TIES WITH RATED, TESTED CAPACITY OF THE V-TIE TYPE. CORRUGATED TIES ARE NOT ACCEPTABLE FOR ANY INSTALLATION. SPACINGS OF THE TIES TO BE ESTABLISHED BY DESIGN AND LOADS FOLLOWED THROUGH TO PRIMARY STRUCTURE. SEE ARCHITECTURAL FOR WALL COMPOSITION INCLUDING WATERPROOFING, CORROSION RESISTANCE, VENTING ETC. GENERAL CONTRACTOR TO COORDINATE VARIOUS TRADES INVOLVED TO ASSURE ALL COMPONENTS IN THE LOAD PATH FROM TIE TO PRIMARY STRUCTURE ARE CAPABLE OF TRANSFERRING THE DESIGN FORCES. PROVIDE TIE DESIGN AND FIELD REVIEW BY SPECIALTY ENGINEER COMPLETE WITH LETTERS OF ASSURANCE.

SPECIALTY ENGINEER TO CONFIRM THAT STEEL STUDS BACKING ANY MASONRY WALLS ARE SUITABLE FOR DEFLECTION LIMITATIONS OF THE MASONRY. ADVISE THE ARCHITECT WHERE THERE IS ANY CONCERN ABOUT THE STIFFNESS OF BACKING TO RECEIVE MASONRY.

PROVIDE SHOP DRAWINGS FOR BRICK TIES AND BRICK SUPPORT ANGLES INCLUDING CONNECTIONS TO STRUCTURE, CORROSION RESISTANCE, ETC. NOTE ALL BRICK ANGLES TO BE HOT DIP GALVANIZED. BRICK TIES TO BE STAINLESS STEEL OR GALVANIZED AS REQUIRED BY CSA A370.

18. SPECIALTY PRODUCTS USED IN DESIGN

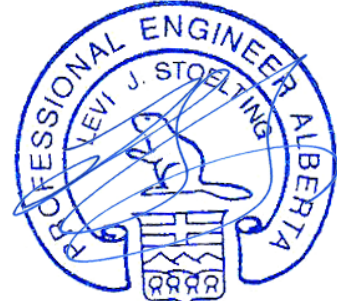
CERTAIN PRODUCTS HAVE BEEN SPECIFIED IN THE DESIGN WHICH ARE SPECIALTY OR PROPRIETARY PRODUCTS. THESE PRODUCTS HAVE RATED CAPACITIES AND CHARACTERISTICS WARRANTED BY THE MANUFACTURER. THESE PRODUCTS HAVE BEEN SELECTED AND SPECIFIED BASED UPON THE MANUFACTURERS REPRESENTATIONS AND GLOTMAN-SIMPSON SHALL NOT BECOME GUARANTORS OF THE PRODUCT. SUCH PRODUCTS SHALL BE INSTALLED IN STRICT CONFORMANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND PROPER WORKMANSHIP OF THE INSTALLATION IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

ALTERNATE SYSTEMS MAY BE ACCEPTABLE IF THEY PROVIDE EQUAL SAFE WORKING LOADS AND A WRITTEN REQUEST IS ACCOMPANIED WITH ENGINEERED DESIGN DATA FOR THE ALTERNATE SYSTEM.

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%UFT	2019-03-27
6	Issued for 99%UFC	2018-12-13
5	Issued for 99%UFC	2018-04-12
4	Issued for 99%UFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision Client / client	Description / Description	Date / Date
--	---------------------------	-------------



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

GENERAL NOTES

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
---------------------------------	-----------------	--------------------------------------

S102

9





19. POST-INSTALLED ANCHORS

ALL ANCHORS INTO EXISTING OR NEW CONCRETE/MASONRY SHALL BE SET IN CLEAN DRY HOLES OF STANDARD LENGTH AND SIZE AS INDICATED BY THE PRODUCT MANUFACTURER BUT NOT LESS THAN THE DEPTH SHOWN ON THE STRUCTURAL DRAWINGS.

ANCHOR CAPACITY USED IN DESIGN IS BASED ON THE GUIDELINES PUBLISHED BY HILTI. ALTERNATE FASTENING SYSTEMS PROPOSED BY THE CONTRACTOR SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR REVIEW AND APPROVAL. MANUFACTURERS PUBLISHED DATA INCLUDING LOAD RESISTANCE, IN-SERVICE AND INSTALLATION TEMPERATURE, CREEP TESTING, FREEZE/THAW TESTING, COMPREHENSIVE INSTALLATION INSTRUCTIONS AND ON SITE TRAINING MUST BE INCLUDED IN PROPOSAL.

POST-INSTALLED ANCHORS SHOWN ON THE DRAWINGS ARE HILTI PRODUCTS. ANCHORS SHALL BE INSTALLED IN STRICT ADHERENCE TO MANUFACTURER SPECIFICATIONS. OBTAIN ON-SITE TRAINING OF INSTALLERS BY HILTI REPRESENTATIVE PRIOR TO ANY INSTALLATION FOR THIS PROJECT. MAINTAIN ON SITE RECORDS OF A CURRENT VALID TRAINING CARD OR LETTER FROM HILTI INDICATING NAMES OF INSTALLERS TRAINED TO INSTALL HILTI PRODUCTS. WHERE IN DOUBT OF SUITABILITY OF ANCHOR FOR INSTALLATION, OBTAIN THE DIRECTION OF HILTI ENGINEERING SUPPORT AT 1-800-363-4458.

- HILTI HIT-HY 200 OR HIT-RE 500V3 TO BE USED INTO CONCRETE ONLY AS FOLLOWS:
- HIT-HY 200 - CLEAN, DRY, WITH HOLE DIAMETER TO MATCH TOLERANCE, HAMMER DRILLED HOLE ONLY.
  - RE500 - CLEAN, DRY, OVERSIZED, HAMMER DRILLED HOLES ONLY.
  - SPECIAL APPLICATION OF RE500 WITH WET HOLE, OVERSIZED HOLE OR DIAMOND CORED HOLES TO HAVE FULL TIME SUPERVISION BY MATERIALS CONSULTANT TO VERIFY PROPER WORKMANSHIP AND CLEANLINESS OF THE HOLE.
  - HIT-HY 70 TO BE USED INTO MASONRY. SITE TESTING IS REQUIRED TO CONFIRM LOAD CAPACITY.
  - THREADED RODS ARE ASTM A193 GRADE B7 OR HILTI HAS-E B7 OR ASTM F1554 GRADE 105KSI ALLTHREAD RODS CLEAN AND FREE OF GREASE OR OTHER SUBSTANCE THAT COULD REDUCE BOND.
  - HILTI TZ ROD - CLEAN, DRY, WITH HOLE DIAMETER TO MATCH TOLERANCE, HAMMER DRILLED HOLE ONLY.
  - NO INSTALLATIONS ARE PERMITTED UNDERWATER OR IN WATER FILLED HOLES OR HOLES NOT CLEANED.

INSTALLATION:

- INSTALL IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS ACCOMPANYING THE PRODUCT
- DRILLING SHALL BE PERFORMED WITH A ROTARY HAMMER DRILL AND CARBIDE TIPPED DRILL BITS OR USE THE HILTI SAFESIT SYSTEM WITH HOLLOW CARBIDE DRILL BIT USED IN CONJUNCTION WITH HILTI VACUUM CLEANER THAT REMOVES DUST AND AUTOMATICALLY CLEANS THE HOLE
- ALTERNATE DRILLING METHODS MUST BE APPROVED BY THE GLOTMAN SIMPSON.
- INJECTION OF ADHESIVE SHALL BE PERFORMED TO PRODUCE AN AIR-VOID FREE INJECTION. USE HILTI HOSE AND PISTON PLUG FOR DEEP INJECTIONS GREATER THAN 400MM.
- OVERHEAD ANCHORS MUST BE INSTALLED USING THE HILTI PROFI OR HILTI HOSE AND PISTON PLUG ACCESSORIES TO ENSURE CORRECT ADHESIVE INJECTION.
- THE CONTRACTOR SHALL RETAIN A HILTI REPRESENTATIVE TO PROVIDE ONSITE ANCHOR INSTALLATION TRAINING FOR ALL INSTALLERS AND SUPERVISORS NOT PREVIOUSLY TRAINED.

ANCHOR TESTING FOR ALL POST-INSTALLED ANCHORS:

PROVIDE LOAD TESTING OF ALL INSTALLATIONS BY THE PROJECT MATERIALS CONSULTANT AS FOLLOWS:

- PROOF LOAD TEST 10% OF ANCHORS BY RANDOM SELECTION.
- TEST TO FAILURE 2% OF ANCHORS (3 MINIMUM) BY RANDOM SELECTION.
- IF ANY PROOF LOAD TESTS FAIL INCREASE TESTING TO 33% OF ANCHORS.
- IF MORE THAN 2% OF ANCHORS FAIL THEN PROOF LOAD TEST 100% OF ANCHORS.
- ANCHORS MUST BE INSTALLED CORRECTLY. IF ANY ANCHORS ARE FOUND TO BE INSTALLED WITHOUT COMPLETE EPOXY INJECTION OR ARE DRILLED SHORTER THAN 75% OF THE REQUIRED DEPTH, THEN PROOF LOAD TEST 100% OF ANCHORS. ANCHORS WITH SHORT EMBEDMENT WILL BE REJECTED.
- CALL MATERIALS CONSULTANT FOR FULL TIME SUPERVISION OF ALL REPAIRS.
- SUBMIT TEST REPORT AND REPAIR REPORT UNDER SEAL OF THE MATERIALS CONSULTANT TO THE STRUCTURAL ENGINEER
- ALL COSTS FOR TESTING TO BE PAID BY THE CONTRACTOR INSTALLING THE ANCHORS.

20. MATERIALS CONSULTANT

THE MATERIALS CONSULTANT IS AN INDEPENDENT REGISTERED PROFESSIONAL AND SHALL PROVIDE AND BE RESPONSIBLE FOR GENERAL CONSULTING, INSPECTION AND TESTING OF MATERIALS FOR THE PROJECT INCLUDING APPROPRIATE LETTERS OF ASSURANCE.

QUALIFICATION:

THE MATERIALS CONSULTANT MAY BE CHOSEN AND RETAINED BY THE REGISTERED COORDINATING PROFESSIONAL OR THE OWNER, OR HE MAY BE RETAINED BY THE CONTRACTOR(S) AS INSTRUCTED BY THE REGISTERED COORDINATING PROFESSIONAL. MATERIALS CONSULTANTS SHALL BE QUALIFIED UNDER CSA A283 CATEGORY 0, 1 OR 2 AND SHALL PERFORM TESTING AND REPORTING ONLY FOR THOSE AREAS IN WHICH THEY HAVE QUALIFIED. ALTERNATIVELY, AND ONLY WHERE IT DOES NOT CONFLICT WITH THE CODE, MATERIALS CONSULTANTS MAY BE ISO 9001: 2000 STANDARD, REGISTERED AND IN GOOD STANDING.

THE FIRMS LISTED ARE PREQUALIFIED AS MATERIALS CONSULTANTS. OTHERS MUST BE QUALIFIED PRIOR TO PROCEEDING WITH THE WORK:

METRO TESTING SERVICES  
LEVELTON ASSOCIATES  
AMEC EARTH AND ENVIRONMENTAL LTD.  
GOLDER ASSOCIATES LTD.

TESTING FIRMS MUST CARRY AND MAINTAIN ERRORS AND OMISSIONS INSURANCE TO QUALIFY.

REPORTING:

REPORTS OF ALL WORK BY THE MATERIALS CONSULTANT SHALL BE SUBMITTED DIRECTLY TO THE REGISTERED COORDINATING PROFESSIONAL WITH COPIES OF STRUCTURAL PORTIONS OF THE WORK TO GLOTMAN-SIMPSON. CONTRACTORS SHALL NOT CONTRACT-OUT OF THIS OBLIGATION.

- THE MATERIALS CONSULTANT SHALL MONITOR THE PROJECT AS HE DEEMS NECESSARY TO ASSURE THAT THE MATERIALS IN THE COMPLETED STRUCTURE ARE IN REASONABLE CONFORMANCE WITH APPLICABLE CODES AND THE INTENT OF THE DESIGN. MONITORING THE PROJECT SHALL INCLUDE REVIEW OF THE CONCRETE MIX DESIGNS AND TESTING OF MATERIALS DELIVERED TO THE SITE PER CSA REQUIREMENTS. MONITORING MAY ALSO INCLUDE REVIEW OF CONCRETE PLACING PROCEDURES AND SUCH OTHER SPECIALIZED WORK AS THE MATERIALS CONSULTANT SHOULD DEEM NECESSARY IN ORDER TO ENSURE THE FINAL MATERIALS PRODUCT SATISFIED SPECIFICATIONS.
- CONCRETE PLACING, CURING AND HANDLING PROCEDURES SHALL BE REVIEWED BY THE MATERIALS CONSULTANT FOR THE INTENDED APPLICATION.
- UNLESS OTHERWISE INDICATED BY THE MATERIALS CONSULTANT, PROVIDE WET CURING WITH SPRINKLERS AND BURLAP FOR 3 DAYS FOLLOWING THE POUR WHEN THE WIND SPEED AT THE PARKING DECK LEVEL EXCEEDS 16 KM/HR AND AIR TEMPERATURE EXCEEDS 16 C.
- THE MATERIALS CONSULTANT MAY WAIVE TESTING REQUIREMENTS BEYOND THE MINIMUM REQUIREMENTS OF CSA WHERE HE IN HIS PROFESSIONAL DISCRETION CONSIDERS REQUIREMENTS REDUNDANT OR UNNECESSARY.
- THE MATERIALS CONSULTANT SHALL HAVE THE AUTHORITY AND RESPONSIBILITY TO REJECT ANY CONCRETE DELIVERED TO THE JOBSITE WHICH DOES NOT CONFORM WITH THE DRAWINGS AND SPECIFICATIONS AND/OR IS NOT EXPECTED TO MEET PERFORMANCE REQUIREMENTS.
- IF THE MATERIALS CONSULTANT SUSPECTS, AT ANY TIME, THAT HE HAS NOT BEEN CALLED TO INSPECT CONCRETE, OR IF INSUFFICIENT NOTICE HAS BEEN PROVIDED, HE SHALL IMMEDIATELY NOTIFY THE REGISTERED COORDINATING PROFESSIONAL.
- CONCRETE TEST CYLINDERS TO BE TAKEN IN ACCORDANCE WITH APPLICABLE CODES.
- THE MATERIALS CONSULTANT SHALL INSPECT ALL CONCRETE BLOCK GROUT, MORTAR AND BLOCKWORK IN ACCORDANCE WITH APPLICABLE CODES.
- THE MATERIALS CONSULTANT SHALL REVIEW SPECIAL CONSTRUCTION PROCEDURES FOR CONCRETE WORK IN ADVERSE WEATHER CONDITIONS. THIS INCLUDES CONCRETE CAST DURING WEATHER BELOW 5 DEGREES CELSIUS OR ABOVE 25 DEGREES CELSIUS, AND ANY OTHER CONDITIONS WHERE THE QUALITY OF THE WORK MAY BE JEOPARDIZED BY ADVERSE WEATHER. WORK UNDERTAKEN WITHOUT SUCH REVIEW SHALL BE THE RISK OF THE CONTRACTOR ALONE.
- MATERIALS CONSULTANT SHALL PROVIDE FULL TIME INSPECTION OF CONCRETE PLACED IN TRANSFER BEAMS, ON SLABS OF 35 MPA OR GREATER, FOR COLUMNS AND WALLS OF 40 MPA OR GREATER, FOR ALL PARKING SLABS AND AS REQUIRED IN ADVERSE WEATHER CONDITIONS.
- FOR PARKING SLABS WET CURING METHODS ARE REQUIRED AS INDICATED IN CAN/CSA-S413. THE MATERIALS CONSULTANT SHALL ADVISE THE CONTRACTOR OF APPROPRIATE CURING METHODS.

- AFTER COMPLETION OF CONSTRUCTION OF ANY PARKING DECK, THE MATERIALS CONSULTANT SHALL USE A PACOMETER OR OTHER APPROPRIATE METHOD TO VERIFY THE TOP CONCRETE COVER OVER REINFORCING MATERIALS. PROVIDE RANDOM INSPECTIONS AS NECESSARY. THE FREQUENCY OF WHICH IS DEPENDENT UPON THE RESULTS AND PERFORMANCE OF THE WORK.
- THE MATERIALS CONSULTANT SHALL REVIEW IN THE PROCEDURES AND QUALITY OF FIELD WELDING OF STEEL DECK TO SUPPORTING STRUCTURAL STEEL TO CONFIRM CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS AND TO ENSURE GOOD WORKMANSHIP. HE SHALL CONFIRM THAT APPROPRIATE CORROSION PREVENTATIVE PAINT IS APPLIED TO WELDS.
- THE MATERIALS CONSULTANT SHALL REVIEW IN THE PROCEDURES AND QUALITY OF SCREWS OR PINS USED FOR THE INSTALLATION OF STEEL DECK ONTO SUPPORTING STRUCTURAL STEEL AND SHALL TO CONFIRM CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS AND TO ENSURE GOOD WORKMANSHIP.
- TESTING IS REQUIRED OF ALL NELSON STUDS, WELDED REBAR ANCHORS, OR BOLT STUDS WELDED IN THE SHOP OR THE FIELD. PROVIDE RANDOM TESTING NECESSARY. THE FREQUENCY OF WHICH IS DEPENDENT UPON THE RESULTS AND PERFORMANCE OF THE WORK. SEE ALSO NOTE 16.
- WHERE TESTING OF AN ELEMENT IS PROVIDED BY A SUBCONTRACTOR, THE MATERIALS CONSULTANT SHALL VERIFY THAT APPROPRIATE TESTING MEASURES HAVE BEEN TAKEN (E.G. TESTING OF NELSON STUDS BY DECK SUPPLIER, BUTT WELDING OF STEEL BEAMS, WELDING OF REBAR, ETC.).
- MATERIALS CONSULTANT SHALL OBTAIN MILL CERTIFICATES FOR REBAR AND VERIFY THE MATERIALS ARE APPROPRIATE FOR USE IN THE LOCATION SPECIFIED INCLUDING SEISMIC ZONE REINFORCING.
- TEST CONCRETE IN POST-TENSIONED SLABS TO ENSURE THAT CHLORIDE ION CONTENT DOES NOT EXCEED .06% BY WEIGHT OF CEMENT, INCLUDING AGGREGATE

21. GEOTECHNICAL CONSULTANT

THE GEOTECHNICAL CONSULTANT IS AN INDEPENDENT REGISTERED PROFESSIONAL WHO SHALL PROVIDE AND BE RESPONSIBLE FOR GENERAL CONSULTING AND FIELD REVIEW OF GEOTECHNICAL ASPECTS OF THE PROJECT WHICH COULD IN ANY WAY AFFECT THE PRIMARY STRUCTURE OF THE BUILDING.

THE GEOTECHNICAL CONSULTANT FOR THIS PROJECT IS:

LONE PINE GEOTECHNICAL LTD.  
BARTEK RYCZYWOLSKI P.ENG  
REPORT #1051

THE GEOTECHNICAL CONSULTANT SHALL BE RESPONSIBLE FOR CONFIRMING THAT THE WORK PRACTICES OF THE CONTRACTOR(S) PERTAINING TO SOILS RELATED WORK CONFORMS TO REQUIREMENTS OF THIS SPECIFICATION, THE GEOTECHNICAL REPORT AND GOOD WORK PRACTICE.

WORK BY THE GEOTECHNICAL CONSULTANT SHALL CONFORM TO THE REQUIREMENTS OF THEIR PROFESSIONAL JURISDICTION INCLUDING GUIDELINES FOR PRACTICE AND IN PARTICULAR SHALL PROVIDE FOR SUPPORT TO THE PRIMARY STRUCTURAL SYSTEM IF THE BUILDING AND ANY OTHER STRUCTURES INDICATED ON THESE DRAWINGS.

GEOTECHNICAL REPORTS FOR THE PROJECT MAY GIVE ALTERNATE FOUNDATION SYSTEMS AND OTHER GENERAL DESIGN INFORMATION. FOR CONSTRUCTION, A GEOTECHNICAL CONSULTANT SHALL REVIEW THE STRUCTURAL DRAWINGS AND PROVIDE ANY NECESSARY REQUIREMENTS FOR PREPARATION OF THE BEARING SURFACES, BACKFILL, DEEP STRATA OR OTHER SOILS WHICH MAY BE NECESSARY FOR THE SAFE, SERVICEABLE PERFORMANCE OF THE STRUCTURE AS DESIGNED.

22. FOUNDATION AND SOILS WORK

- MINIMUM REQUIRED FOUNDATION DESIGN BEARING CAPACITY:

- ULS 135kPa ULTIMATE LIMIT STATE STRIP AND PAD FOOTINGS  
SLS 100kPa

- ALL FOUNDATION GROUND PREPARATION WORK IS OUTSIDE THE SCOPE OF WORK FOR GLOTMAN SIMPSON AND MUST BE PROVIDED BY OTHERS UNDER PROFESSIONAL RESPONSIBILITY OF A GEOTECHNICAL CONSULTANT.
- PREPARE ALL FOUNDATION BEARING STRATA, BACKFILL, DRAINAGE MATERIAL, STRUCTURAL FILL, SLAB OR ASPHALT SUB-BASE AND OTHER GEOTECHNICAL ASPECTS IN ACCORDANCE WITH THE REPORT AND RECOMMENDATIONS OF THE GEOTECHNICAL CONSULTANT.
- BEARING CAPACITY OF ALL BEARING SOIL AND SLAB/ASPHALT SUBGRADE TO BE INSPECTED AND CONFIRMED ON SITE IMMEDIATELY PRIOR TO CASTING CONCRETE BY THE GEOTECHNICAL CONSULTANT.
- PROVIDE DRAINAGE FROM BEHIND ALL STRUCTURAL WALLS WITH DRAIN TILE TIED INTO THE MECHANICAL DRAINAGE SYSTEM. SEE MECHANICAL DRAWINGS FOR DRAIN TILE AND DRAINAGE SYSTEM. SEE GEOTECHNICAL CONSULTANT FOR DETERMINATION OF GROUND WATER FLOWS AND SUITABLE FREE DRAINING FILLS. DRAINAGE EFFICIENCY, DESIGN AND FIELD REVIEW IS OUTSIDE THE SCOPE OF WORK OF GLOTMAN SIMPSON.
- THE GEOTECHNICAL CONSULTANT SHALL VERIFY THAT THE DRAINAGE SYSTEM SUPPLIED BY THE CONTRACTOR PROVIDES SUITABLE DRAINAGE FOR THE SOIL PRESSURE LOADS PROVIDED BY HIM FOR DESIGN. THE GEOTECHNICAL CONSULTANT SHALL CONFIRM THE BACKFILL LOAD PRESSURES USED FOR DESIGN PRIOR TO PROCEEDING WITH CONSTRUCTION OF BACKFILLED WALLS. GEOTECHNICAL ENGINEER TO PROVIDE SUPERVISION OF EXCAVATION AND BACKFILL.
- WALLS SHALL NOT BE BACKFILLED UNTIL THE FLOORS RESTRAINING THE WALLS ARE CONSTRUCTED.
- ALL BACKFILL SHALL BE CLEAN FREE DRAINING GRANULAR MATERIAL AND SHALL BE PLACED AND COMPACTED IN THIN LAYERS AS INDICATED BY THE GEOTECHNICAL ENGINEER. SOIL COMPACTION WITHIN 1200mm OF THE WALL TO BE ACHIEVED USING LIGHT HAND COMPACTING EQUIPMENT SUCH AS A 300mm TO 450mm PLATE TAMPER. AREAS ON CITY PROPERTY TO BE COMPACTED WITH FILL MEETING CITY SPECS AS INSTRUCTED BY THE GEOTECHNICAL CONSULTANT.
- PROVIDE A TWO INCH THICK SKIM COAT OF CONCRETE OVER THE BASE OF ALL FOOTING EXCAVATIONS TO HELP PROTECT AGAINST DEGRADATION OF THE BEARING STRATA. THIS THICKNESS NOT TO BE INCLUDED IN THE FOOTING DEPTH SHOWN ON THE DRAWINGS. SKIM COAT MAY BE DELETED ONLY WITH THE WRITTEN ACCEPTANCE OF THE GEOTECHNICAL CONSULTANT.
- FOOTINGS TO BE CENTERED UNDER COLUMNS AND WALLS UNLESS SPECIFICALLY NOTED OR SHOWN OTHERWISE.
- COLUMN DOWELS TO BE TIED INTO POSITION. DOWELS FOR SHEARWALLS TO BE TIED INTO POSITION.
- FOOTINGS MAY NEED TO BE LOWERED TO ACCOMMODATE MECHANICAL OR ELECTRICAL SERVICES. SEE MECHANICAL, ELECTRICAL AND ARCHITECTURAL DRAWINGS.
- FOOTING ELEVATIONS, IF SHOWN ARE FOR REFERENCE ONLY AND MAY NEED TO BE MODIFIED TO SUIT SITE CONDITIONS, BEARING LEVEL, FLOOR SLOPES AND ELEVATIONS, DRAINS, SERVICES, ETC.
- FOUNDATION BEARING SURFACES MUST BE PROTECTED FROM FREEZING AT ALL TIMES. PROVIDE FROST COVER FOR PERMANENT OR TEMPORARY CONDITIONS AS REQUIRED BY THE GEOTECHNICAL CONSULTANT.
- CONCRETE CAST IN FOOTINGS WITH STANDING WATER SHALL CONFORM TO CSA A23.1 AND BE PLACED UNDER THE FULL TIME SUPERVISION OF THE MATERIALS CONSULTANT.
- MAINTAIN MAXIMUM SLOPE OF 1:5 HORIZ. TO 1:0 VERT. BETWEEN UNDERSIDE OF ADJACENT FOOTINGS OR AS OTHERWISE INDICATED BY THE GEOTECHNICAL CONSULTANT. FOR DEEPER EXCAVATIONS BESIDE EXISTING FOOTINGS, SEE SOILS CONSULTANT FOR PROCEDURES.
- SLAB ON GRADE TO BE SUPPORTED BY STRUCTURAL FILL DESIGNED BY THE GEOTECHNICAL CONSULTANT SUFFICIENT TO SUPPORT THE SLAB ON GRADE FOR THE SERVICE LOADING OF THE SLAB. PROVIDE MINIMUM 150mm LAYER OF FREE DRAINING COMPACTED ENGINEERED FILL UNDER SLAB-ON-GRADE.
- CAST SHEARWALL AND CORE FOOTINGS AGAINST SIDES OF EXCAVATION UNLESS OTHERWISE NOTED.

23. UNDERPINNING, SOIL STABILIZATION, SLOPE STABILITY

- PROVIDE UNDERPINNING AS REQUIRED TO TRANSFER LOADS FROM ADJACENT BUILDING FOUNDATIONS DOWN TO BEARING STRATA AT OR BELOW THE LEVEL OF FOUNDATIONS FOR THIS BUILDING. PROVIDE DESIGN, FIELD REVIEW AND LETTERS OF ASSURANCE BY A REGISTERED PROFESSIONAL ENGINEER. PROVIDE TEMPORARY TIEBACKS AS REQUIRED, AND SUFFICIENT STRUCTURE FOR THE UNDERPINNING TO PERFORM WITHOUT TIEBACKS IN THE LONG TERM. PROVIDE LATERAL LOAD UPON COMPLETED STRUCTURE FOR LONGTERM - RELY ONLY UPON CONTIGUOUS FLOOR LEVELS FOR RESTRAINT OF LATERAL LOADS (SPAN BETWEEN FLOOR LEVELS).
- EXCAVATION SHORING, UNDERPINNING SOIL, STABILIZATION, SLOPE STABILITY AND OTHER SOILS RELATED WORK IS NOT A PART OF THE PRIMARY STRUCTURE OF THE BUILDING AND IS THEREFORE NOT DESIGNED OR MONITORED BY GLOTMAN-SIMPSON. THIS WORK SHALL BE MONITORED BY THE GEOTECHNICAL CONSULTANT.

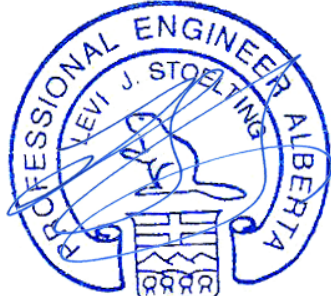
24. SCREW PILES

- PILES ARE STRUCTURE ELEMENTS WITHIN THE GROUND THAT RELY UPON THE GROUND FOR THEIR PERFORMANCE THROUGH ACTIONS SUCH AS FRICTION, END BEARING, LATERAL SUPPORT, CONFINEMENT, ETC. PILES ARE THE DESIGN RESPONSIBILITY OF THE GEOTECHNICAL CONSULTANT AND FALL UNDER THE GEOTECHNICAL LETTERS OF ASSURANCE FOR THE PROJECT. PILE DESIGN BY CONTRACTORS FALL UNDER THE OVERALL LETTERS OF ASSURANCE OF THE GEOTECHNICAL CONSULTANT. DESIGN OF PILES SHOWN HEREIN IS FOR THE STRUCTURE ELEMENT ONLY WHICH RELIES UPON THE GROUND FOR ITS PERFORMANCE.
- PILES ARE STEEL SCREW PILES. CAPACITY SHALL BE:
  - 0.4m DIA HELICAL PILES - 1000kN EFFECTIVE LONGTERM CAPACITIES
  - MAKE ALLOWANCE FOR CORROSION AS REQUIRED, HD GALVANIZE OR AS OTHERWISE TO PROVIDE FOR A MINIMUM 50 YEAR LIFESPAN AS INSTALLED - TO BE VERIFIED BY GEOTECHNICAL CONSULTANT
  - DRIVING METHODS PROVIDED BY CONTRACTOR TO SUIT
  - LOAD PLATE TO BE PROVIDED AT THE TOP OF PILES TO TRANSFER FULL FACTORED CAPACITY OF THE PILE TO SUPPORTING CONCRETE STRUCTURE
  - PILES SHALL HAVE FACTORED DESIGN CAPACITY OF AT LEAST 2 TIMES SERVICE LOAD
- REFER TO SOILS REPORT BY GEOTECHNICAL CONSULTANT.
- OBTAIN FROM THE GEOTECHNICAL CONSULTANT INSTRUCTIONS FOR INSTALLING THE PILES INCLUDING MINIMUM TORQUE REQUIREMENTS. DETAILS FOLLOWING ARE TO BE USED AS A GUIDE ONLY AND SHALL NOT OVERRULE THE GEOTECHNICAL CONSULTANT WHO IS THE PRINCIPAL CONSULTANT RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF THE PILES. ALTERNATE PILE DESIGNS MAY BE ACCEPTED IF PROPOSED AND REVIEWED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CLOSE OF TENDER.
- SPICES IN PILES SHALL BE AS PER PILE MANUFACTURERS REQUIREMENTS WITH CORROSION RESISTANCE EQUAL TO THE OTHER PILE ELEMENTS.
- PILE GROUPS AND PILE CAPS TO BE CENTERED UNDER COLUMNS/WALLS UNLESS SPECIFICALLY NOTED.
- PILE CAPS MAY HAVE TO BE LOWERED TO ACCOMMODATE MECHANICAL OR ELECTRICAL SERVICES. SEE MECHANICAL, ELECTRICAL AND ARCHITECTURAL DRAWINGS.
- PILE CAP ELEVATIONS, IF SHOWN, ARE FOR REFERENCE ONLY AND MUST BE MODIFIED TO SUIT SITE CONDITIONS, BEARING LEVEL, FLOOR SLOPES AND ELEVATIONS, SERVICES, ETC.
- CONCRETE CAST IN PILE CAPS WITH STANDING WATER SHALL CONFORM TO CSA A23.1 AND BE PLACED UNDER THE SUPERVISION OF THE MATERIALS CONSULTANT.
- FOR DEPTHS OF BASE BEARING LEVEL FOR PILES, REFER TO INSTRUCTIONS FROM THE GEOTECHNICAL ENGINEER. MINIMUM BEARING DEPTH SHALL BE TO "HARD BOTTOM", OR DEEPER IF REQUIRED FOR DEVELOPMENT OF REQUIRED BEARING CAPACITY.
- SUBMIT A SHOP DRAWING WITH PROPOSED BASING CRITERIA TO THE GEOTECHNICAL ENGINEER FOR APPROVAL PRIOR TO DRIVING.
- SEE GEOTECHNICAL CONSULTANT AND GENERAL CONTRACTOR FOR INSTRUCTIONS ON PRICING AND TENDER OF PILES, PILE OPTIONS AND ALTERNATE SOLUTIONS.
- TOLERANCES FOR LOCATION OF PILES TO BE +/- 60mm FROM INTENDED LINE AND POSITION. PROVIDE TO THE ENGINEER. PRIOR TO PROCEEDING WITH PILE CAPS, A SURVEY OF AS BUILT PILE POSITIONS INDICATING ANY VARIATIONS FROM INTENDED POSITION. TOLERANCE FOR PLUMB TO BE 2 PERCENT MAXIMUM SLOPE OF SHAFT, TO BE INSPECTED ON SITE BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACING CONCRETE. DO NOT CUT OFF PILES WITHOUT FIRST OBTAINING ACCEPTANCE OF PILE POSITIONS FROM THE ENGINEER.
- THE GEOTECHNICAL ENGINEER SHALL PROVIDE OR ARRANGE FOR CONTINUOUS INSPECTION OF THE PILE INSTALLATION UNDER HIS LETTER OF ASSURANCE FOR THE PROJECT.
- MAINTAIN AND SUBMIT ACCURATE RECORDS OF THE PILE INSTALLATION. PROVIDE TO THE ENGINEER WRITTEN CONFIRMATION THAT THE PILES WERE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE DRAWINGS, INSTRUCTIONS OF THE GEOTECHNICAL ENGINEER, AND GOOD WORK PRACTICES.
- CONTRACTORS SHALL PROVIDE DEWATERING AS NECESSARY TO INSTALL PILES AND PILE CAPS WITHOUT CAUSING EROSION OR SUBSIDENCE OF SURROUNDING STRATIGRAPHY. DESIGN AND TESTING OF PILES FOR COMPRESSION, TENSION OR SHEAR LOADS SHALL BE ACCOMPLISHED AS DIRECTED BY THE GEOTECHNICAL ENGINEER IN ACCORDANCE WITH CSA STANDARDS AND THE NATIONAL BUILDING CODE SENTENCE 4.2.4.1.1(C).
- ALL PILING WORK SHALL BE PERFORMED BY TRAINED PERSONNEL WITH SPECIFIC EXPERIENCE IN THE INSTALLATION OF DRIVEN STEEL PILES. ALL SITE WELDING TO BE IN ACCORDANCE WITH CSA W59 AND TO THE BY CWB CERTIFIED WELDERS.
- PILING WORK, EXCAVATION, SHORING, UNDERPINNING, SOIL STABILIZATION, SLOPE STABILITY AND OTHER SOILS RELATED WORK IS NOT WITHIN THE SCOPE OF WORK BY GLOTMAN-SIMPSON. REFER TO THE GEOTECHNICAL ENGINEER FOR SUPERVISION OF THIS WORK.

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 98%UFT	2019-03-27
6	Issued for 98%UFC	2018-12-13
5	Issued for 98%UFC	2018-04-12
4	Issued for 98%UFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision Client / client	Description / Description	Date / Date
---	---------------------------	-------------



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par Approver
Designed by/Concept par Designer
Drawn by/Dessine par Author Project Manager/Administrateur de Projets
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie Parks Canada
Client / client
Drawing title / Titre du dessin

GENERAL NOTES

Project No. / No. du project	Sheet / Feuille  S103	Revision no. / La Revision no.  9
---------------------------------	-----------------------------	---





25. CONCRETE MATERIALS

1. CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF APPLICABLE CODES AND STANDARDS.
2. ALL CONCRETE IS SPECIFIED AS PER ALTERNATIVE 1) "PERFORMANCE" IN ACCORDANCE WITH CSA A23.1 TABLE 5.
3. STRUCTURAL PERFORMANCE: REFER TO TABLE BELOW:

STRUCTURE COMPONENT OR AS SHOWN ON THE DRAWINGS	28 DAY STRENGTH MINIMUM	MAX AGG MM	EXPOSURE CLASS
SLAB ON GRADE INTERIOR	25 MPA	20	N
SLAB ON GRADE EXTERIOR EXPOSURE	32 MPA	20	C2
PARKING SLAB ON GRADE	25 MPA	20	C4
SIDEWALKS & DRIVES EXTERIOR	32 MPA	20	C2
FOOTINGS	25 MPA	40	N
FOOTINGS FOR SHEARWALLS	25 MPA	40	N
FOOTINGS EXTERIOR AT GRADE	35 MPA	40	F2
PARKING SLABS AND RAMPS	35 MPA	20	C1
EXTERIOR SLAB W/ MEMBRANE OVER	30 MPA	20	F2
EXTR BALCONY SLAB W/ MEMBRANE	30 MPA	20	F2
REBAR SLABS INTERIOR	25 MPA	20	N
REBAR SLABS EXTERIOR EXPOSURE	35 MPA	20	C1
MASONRY GROUT	20 MPA	10	N
MASONRY CONCRETE FILL	25 MPA	14	N
TOPPING NON-STR'L INTR	20 MPA	14	SEE NOTE 9c
TOPPING NON-STR'L EXTR	32 MPA	14	SEE NOTE 9c
TOPPING FOR STEEL DECK	25 MPAN	14	SEE NOTE 9c
COLUMNS IN PARKING AREAS	35 MPA	20	C1
SHEARWALLS INTERIOR	SEE SCHEDULE	20	N
SHEARWALLS EXTERIOR NON-PARKING	SEE SCHEDULE	20	F2
SHEARWALLS IN PARKING AREAS	35 MPA	20	C1
EXTERIOR BASEMENT WALLS	25 MPA	20	F2
OTHER WALLS INTERIOR	25 MPA	20	N
OTHER WALLS EXTERIOR	25 MPA	20	F2
OTHER WALLS PARKING AREAS	35 MPA	20	C1

- a. 56 DAY MIX IS ACCEPTABLE FOR INSTANCES OF CONCRETE STRENGTHS EXCEEDING 46 MPA IN FOOTINGS, COLUMNS AND WALLS.
- b. FOR EXPOSURE CLASS SEE CAN/CSA A23.1 TABLE 1. 2. CONFIRM THE ENVIRONMENT OF THE CONCRETE MATCHES THE CONDITIONS NOTED IN TABLE 1. EXPOSURE CLASS N ASSUMES ENTIRELY INTERIOR CONCRETE AND DOES NOT INCLUDE BALCONIES OR EYEBROWS. FOR SLABS WITH BALCONIES EXPOSED TO FREEZING USE F2. RAFT FOUNDATIONS USED AS PARKING SURFACE ASSUMED TO BE EXPOSURE CLASS C-XL SEE TABLE 1 FOR ALTERNATE PROTECTION SYSTEM.
- c. ALL CEMENT SHALL BE TYPE GU OR GUL PORTLAND CEMENT EXCEPT AS REQUIRED BY THE GEOTECHNICAL CONSULTANT OR MATERIALS CONSULTANT FOR SULFATE RESISTANCE OR OTHER ENVIRONMENTAL OR PERFORMANCE REASONS.
- d. PROVIDE NORMAL DENSITY AGGREGATES FOR ALL CONCRETE. CONCRETE SHALL BE 2400 kg/m³
- e. ALL ADMIXTURES MUST BE APPROVED IN ADVANCE BY THE MATERIALS CONSULTANT.
- f. PROVIDE PLASTICIZER TO CONCRETE FOR AREAS OF SHEARWALLS, COLUMNS BEAMS OR SLABS WHERE REBAR IS CONGESTED OR DUCTS OR OTHER EMBEDDED ITEMS CREATE PLACING DIFFICULTIES. PROVIDE SMALLER MAXIMUM AGGREGATE SIZE AS REQUIRED. MAKE APPROPRIATE AIR AND CEMENT CONTENT ADJUSTMENTS.
- g. SELF CONSOLIDATING CONCRETE MIX IS ENCOURAGED FOR ALL WALLS AND COLUMNS WITH CONGESTED REINFORCING. ALL SCC MATERIALS TO COMPLY WITH CSA A23.1 MOCK UP TESTS TO CONFIRM SCC PERFORMANCE MAY BE REQUIRED PRIOR TO APPROVAL OF MIX DESIGN.
- h. WATER MAY BE ADDED ON SITE TO OBTAIN SPECIFIED SLUMPS ONLY IF IT IS ADDED WITHIN ONE HOUR OF BATCHING AND SUPERPLASTICIZER HAS NOT YET BEEN ADDED. WATER ADDED ON SITE SHALL BE SPECIFIED BY BATCH REPORT. CONCRETE SHALL NOT BE PLACED BEYOND 2 HOURS FOLLOWING BATCHING. TEMPERATURES OF CONCRETE SHALL COMPLY WITH CAN/CSA A23.1.
- i. NO CALCIUM CHLORIDE ADDITIVES ARE PERMITTED IN CONCRETE MIXES WITHOUT WRITTEN ACCEPTANCE OF THE MATERIALS CONSULTANT.
- j. FLYASH IS ENCOURAGED IN MIX DESIGNS HOWEVER THE DELAYED STRENGTH GAIN MUST BE COMPENSATED BY ADDITIONAL RESHORING AND SUPPORT FOR SUSPENDED ELEMENTS. COORDINATE WITH THE FORMWORK AND RESHORING CONTRACTOR TO ENSURE SUITABLE SUPPORT REMAINS FOR ALL SLABS UNTIL THEY HAVE REACHED DESIGN STRENGTH AND STIFFNESS. FLYASH CONTENT SHOULD BE LIMITED IN SLABS RECEIVING ADHERED FLOORING. REFER TO ARCHITECTURAL FLOORING SPECIFICATIONS.
4. DURABILITY PERFORMANCE: REFER TO EXPOSURE CLASS SPECIFICATIONS, AND PROVIDE UNIFORM, DURABLE CONCRETE SUITED TO ITS EXPECTED SERVICE ENVIRONMENT, INCLUDING RESISTANCE TO: CORROSION, SCALING, DELETERIOUS EXPANSION, CHEMICAL DEGRADATION, FREEZE-THAW ATTACK, ABRASION, AND OTHER DETEIORATION PROCESSES TO WHICH THE CONCRETE MIGHT BE EXPOSED.
5. VOLUME STABILITY PERFORMANCE: PROVIDE CONCRETE WITHOUT EXCESSIVE VOLUME CHANGES DUE TO SHRINKAGE OR THERMAL DIFFERENTIALS CAUSED BY HEAT OF HYDRATION.
6. ARCHITECTURAL APPEARANCE AND SURFACE TEXTURE PERFORMANCE: REFER TO ARCHITECTURAL SPECIFICATIONS.
7. GEOMETRICAL PERFORMANCE: REFER TO "CONCRETE CONSTRUCTION" NOTES AND "TOLERANCES" NOTES.
8. ACHIEVE ADDITIONAL CONCRETE PERFORMANCE AND SUSTAINABILITY CRITERIA AS SPECIFIED BY OWNER, ARCHITECT, OR MATERIALS CONSULTANT AS APPLICABLE.
9. THE CONTRACTOR SHALL WORK WITH THE SUPPLIER TO ESTABLISH CONCRETE MIX PROPERTIES TO MEET PERFORMANCE CRITERIA FOR PLASTIC AND HARDENED CONCRETE, CONSIDERING THE CONTRACTOR'S CRITERIA FOR CONSTRUCTION AND PLACEMENT IN ADDITION TO THE PERFORMANCE CRITERIA LISTED IN THESE NOTES.
- a. CONCRETE MIX DESIGNS TO BE SUBMITTED TO THE MATERIALS CONSULTANT FOR REVIEW PRIOR TO COMMENCING THE WORK. SUBMIT CONCRETE CONSTITUENT MATERIALS INCLUDING AGGREGATE QUALIFICATION REPORTS PER CSA A23.1.
- b. PROVIDE TRIAL MIXES FOR ANY UNPROVED MIX DESIGNS.
- c. FOR NON STRUCTURAL CONCRETE INCLUDING TOPPINGS, PROVIDE MIX DESIGNS SUITABLE FOR INTENDED USE FOR REVIEW BY THE ARCHITECT AND MATERIALS CONSULTANT.

QUALITY MANAGEMENT AND VERIFICATION

10. REFER TO NOTES TITLED "CONTRACTOR AS BUILDER - CONSTRUCTION AND QUALITY CONTROL" ON S100 SERIES DRAWINGS.
11. THE CONTRACTOR AND CONCRETE SUPPLIER SHALL EACH IMPLEMENT APPROPRIATE QUALITY CONTROL PLANS TO ENSURE APPLICABLE CONCRETE PERFORMANCE CRITERIA WILL BE MET. SUBMIT QUALITY CONTROL PLAN DOCUMENTATION TO THE MATERIALS CONSULTANT UPON THEIR REQUEST.
12. CONCRETE PLACING, CURING AND HANDLING PROCEDURES TO BE REVIEWED BY THE MATERIALS CONSULTANT FOR THE INTENDED APPLICATION.
13. THE CONTRACTOR AND CONCRETE SUPPLIER SHALL EACH SATISFY THEIR OBLIGATIONS AS LISTED IN TABLE 5 OF CSA A23.1, ALTERNATIVE 1: PERFORMANCE.
14. UNLESS OTHERWISE APPROVED IN WRITING BY THE OWNER, THE CONCRETE SUPPLIER SHALL MEET PLANT CERTIFICATION REQUIREMENTS OF AN APPROPRIATE PROVINCIAL OR NATIONAL INDUSTRY CERTIFICATION PROGRAM SUCH AS THOSE OFFERED BY THE BRITISH COLUMBIA, ALBERTA, OR NATIONAL READY-MIXED CONCRETE ASSOCIATION.
15. CONCRETE TEST SPECIMENS TO BE TAKEN IN ACCORDANCE WITH APPLICABLE CODES.
16. PROVIDE SITE STORAGE FOR INITIAL 24 HOURS CURING OF TEST CYLINDERS.
17. SUBMIT COPY OF CONCRETE TEST RESULTS TO GLOTMAN SIMPSON FOR RECORD PURPOSES.

26. CONCRETE CONSTRUCTION

1. CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF APPLICABLE CODES.
2. THE GENERAL CONTRACTOR SHALL SUPERVISE AND BE RESPONSIBLE FOR THE METHODS AND PROCEDURES OF CONCRETE PLACEMENT. ENSURE THAT CONCRETE PLACEMENT DOES NOT DISPLACE REINFORCING MATERIALS FROM THEIR INTENDED LINE AND POSITION. ENSURE THAT CONCRETE IS PROPERLY CONSOLIDATED IN ALL AREAS. ENSURE THAT CONCRETE PLACING METHODS DO NOT OVERLOAD FORMWORK.

WEATHER CONDITIONS:

3. SPECIAL CONSTRUCTION PROCEDURES FOR CONCRETE WORK IN ADVERSE WEATHER CONDITIONS SHALL BE REVIEWED BY THE MATERIALS CONSULTANT. THIS INCLUDES CONCRETE CAST DURING WEATHER BELOW 5 DEGREES CELSIUS OR ABOVE 20 DEGREES CELSIUS, AND ANY OTHER CONDITIONS SUCH AS HEAVY RAIN WHERE THE QUALITY OF THE WORK MAY BE JEOPARDIZED BY ADVERSE WEATHER. WORK UNDERTAKEN WITHOUT SUCH REVIEW SHALL BE THE RISK OF THE CONTRACTOR ALONE.
4. WORK UNDERTAKEN IN COLD WEATHER CONDITIONS SHALL BE PROTECTED AGAINST FREEZING AND SHALL BE HEATED AND INSULATED AS DIRECTED BY THE MATERIALS CONSULTANT. PROVIDE HEATING AND HOARDING AS REQUIRED TO MAINTAIN THAW CONDITIONS ON EARLY AGE CONCRETE. PROVIDE HEATING AND HOARDING AS REQUIRED TO AVOID FREEZING AND BURSTING OF PIPES OR CONDUIT CONTAINING WATER CAST WITHIN CONCRETE SLABS.

JOINTS AND POUR BREAKS:

5. ALL CONSTRUCTION JOINTS IN STRUCTURAL MEMBERS TO BE REVIEWED BY GLOTMAN-SIMPSON FOR LOCATION AND DETAIL PRIOR TO CONSTRUCTION. REINFORCEMENT TO CONTINUE UNINTERRUPTED THROUGH ALL CONSTRUCTION JOINTS. KEYWAYS TO BE PROVIDED PERPENDICULAR TO THE DIRECTION OF LOAD IN ALL JOINTS. SEE TYPICAL DETAILS.

DIMENSIONAL TOLERANCES:

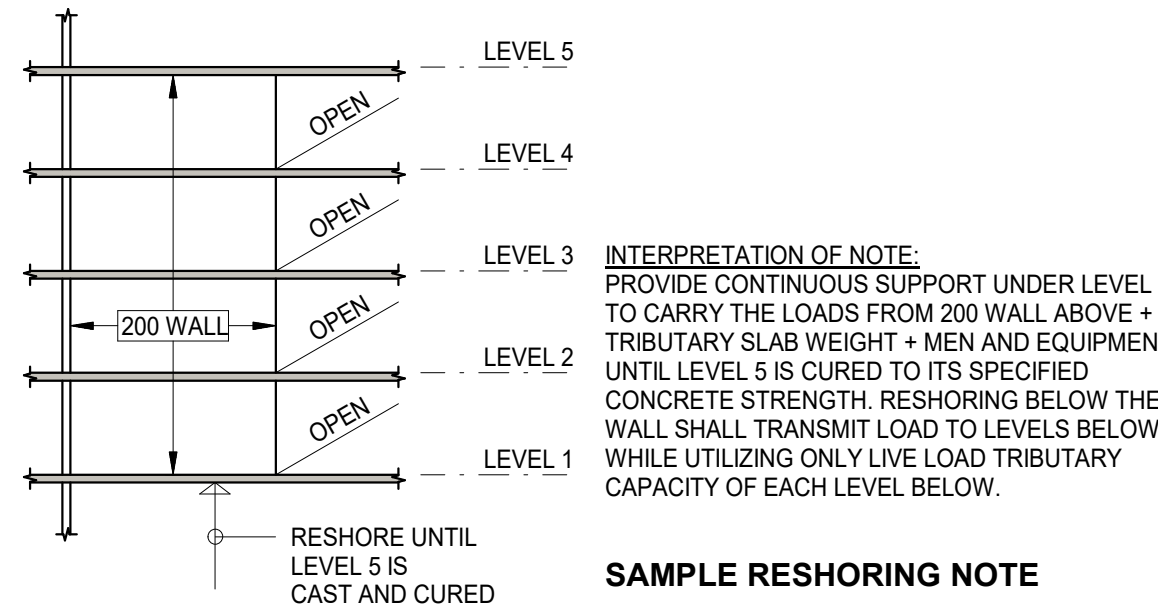
6. SEE NOTES FOR SPECIAL CONSIDERATION OF TOLERANCES
7. TOLERANCES SPECIFIED HEREIN SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PROVIDE CLOSER TOLERANCES REQUIRED BY OTHER BUILDING COMPONENTS.
8. CONFIRM HEADROOM CLEARANCES, OPENING WIDTH AND HEIGHT, FLOOR-TO-FLOOR, AND OTHER DIMENSIONS WITH DRAWINGS PROVIDED BY OTHER CONSULTANTS AND REPORT ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION OF THE BUILDING ELEMENT.

OTHER:

9. PROVIDE SUITABLE CURING FOR ALL CONCRETE IN ACCORDANCE WITH GOOD WORK PRACTICE AND APPLICABLE CODES. SEE MATERIALS CONSULTANT FOR CONFIRMATION OF CURING PROCEDURES.
10. NON-STRUCTURAL CONCRETE FLOOR TOPPING SHALL BE SPECIFIED BY THE ARCHITECT AND REVIEWED FOR SUITABILITY BY THE MATERIALS CONSULTANT. SPECIFICATION OF NON-STRUCTURAL CONCRETE IS NOT PROVIDED BY GLOTMAN SIMPSON.
11. SPECIAL REQUIREMENTS FOR CONTROL OF SHRINKAGE IN WALLS CAST MONOLITHIC OVER 25 FEET IN LENGTH ARE SHOWN IN TYPICAL DETAILS FOR REBAR, KEYS, ETC. SUBMIT DETAILS OF VARIATIONS PROPOSED AND LOCATIONS OF CONSTRUCTION AND CONTROL JOINTS. AVOID VERTICAL CONTROL JOINTS IN WALLS AT BEAM INTERSECTIONS.
12. SHEARWALLS SHALL HAVE SLAB INTERFACES ROUGHENED TO 12mm DEEP.
13. SEE NOTES FOR FORMWORK AND RESHORING.
14. WORK ON PARKING SURFACES SHALL CONFORM TO CSA S413 "PARKING STRUCTURES CONSTRUCTION". CONCRETE SHALL BE PROTECTED FROM PREMATURE DRYING AND EXTREME TEMPERATURE, AND SHALL BE WET-CURED AS INDICATED IN S413 - SEE MATERIALS CONSULTANT FOR CURING GUIDELINES. NOTE THE MOIST CURING REQUIREMENTS FOR PARKING STRUCTURES FOR THE FIRST 3 DAYS AFTER CASTING

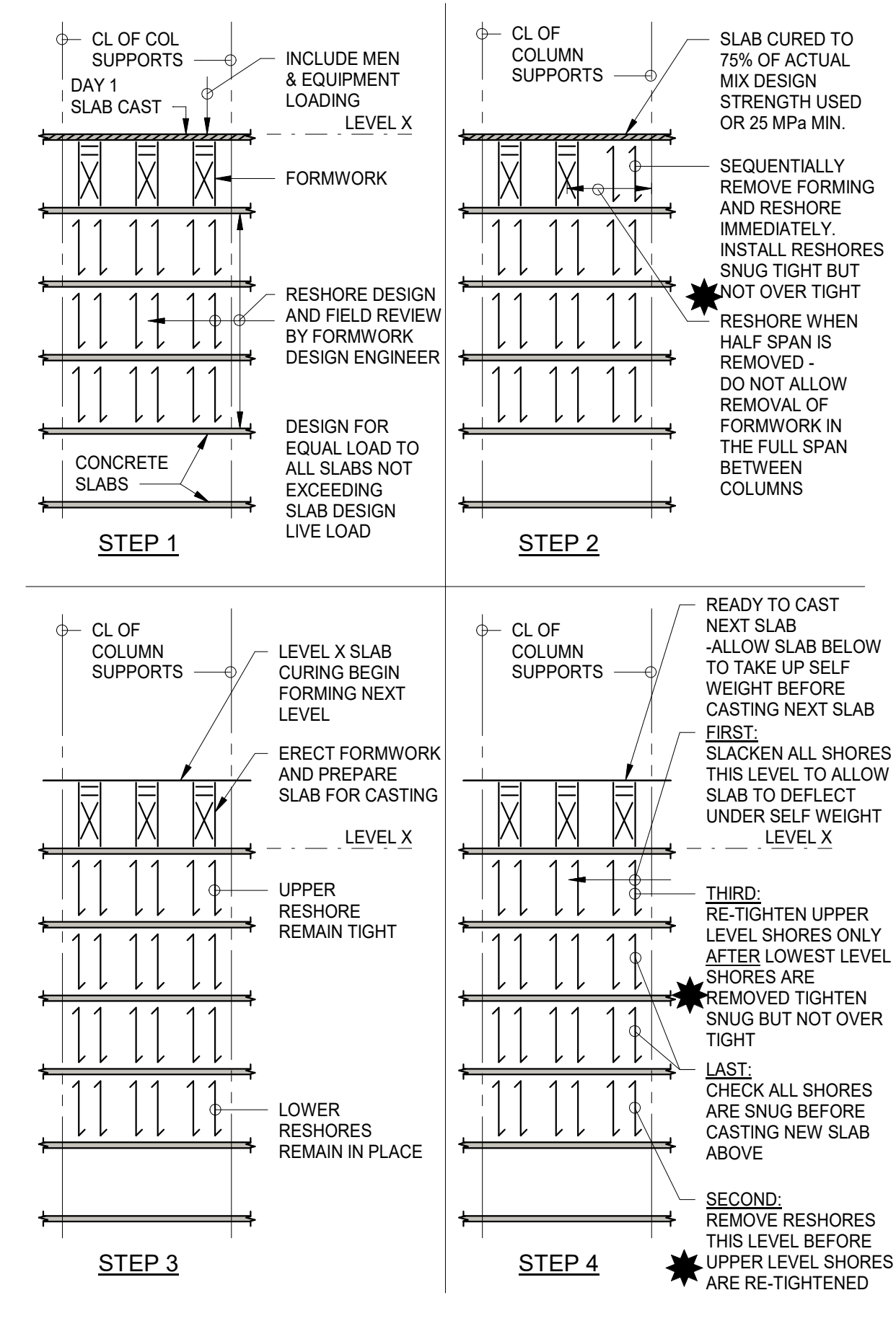
27. FORMWORK AND RESHORING

1. DESIGN AND CONSTRUCT FORMWORK TO ACHIEVE TOLERANCES SPECIFIED HEREIN, ELSEWHERE AND TO GOOD WORK PRACTICE AS APPROPRIATE.
2. FORMWORK TO PROVIDE FOR MEMBER SIZES AND CONFIGURATION AS SHOWN IN STRUCTURAL DRAWINGS. CONFIRM SIZES WITH ARCHITECTURAL AND OTHER DRAWINGS AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
3. FORMWORK FOR CURED COLUMNS SHALL NOT BE REMOVED UNTIL COLUMN CONCRETE HAS REACHED 18 MPA MINIMUM AND CANNOT BE DAMAGED BY THE TOOLS USED. CAREFULLY LOOSEN COLUMN FORMS BY HAND BEFORE EQUIPMENT IS EMPLOYED.
4. FORMWORK SUPPORT FOR CURED SLABS SHALL NOT BE REMOVED UNTIL SLAB CONCRETE HAS REACHED A MINIMUM OF THE GREATER OF 75% OF THE CONCRETE 28 DAY DESIGN STRENGTH, 75% OF THE MIX DESIGN STRENGTH.
5. DESIGN FORMWORK TO LIMIT DEFLECTION OF THE FORMED SURFACE TO WITHIN TOLERANCE SUITABLE FOR THE PROJECT AND ACI RECOMMENDATIONS.
6. DESIGN RESHORING TO LIMIT THE LOAD IMPARTED TO ANY PRIMARY STRUCTURAL MEMBER TO THE SUPERIMPOSED DESIGN LIVE LOAD OF THE MEMBER. FOR EXAMPLE, RESHORING ON SLABS SHALL ACCOUNT FOR THE LIVE LOAD ONLY, NOT INCLUDING PARTITION LOADS OR OTHER DEAD LOADS UPON THE SLAB. SPECIFY INSTALLATION METHODS OF THE RESHORING TO CONTROL LOADING ON THE SLAB AND AVOID EXCESSIVE LOADING AS CAN BE CAUSED BY SUCCESSIVE FLOORS OF RESHORES.
7. "RESHORE" SHOWN IN THE DRAWINGS MAY BE INTERPRETED AS FOLLOWS:



SAMPLE RESHORING NOTE

8. SUBMIT SHOP DRAWINGS FOR FORMWORK AND RESHORING TO THE ENGINEER FOR INFORMATION ONLY INDICATING ALL ELEMENTS OF THE THE FORMWORK AND RESHORING SYSTEM AND THE NET EFFECTIVE LOADING IMPARTED UPON THE STRUCTURE FROM THE FORMWORK AND RESHORING.
9. SHOP DRAWINGS FOR FORMWORK SHALL BE SEALED BY A QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE JURISDICTION OF THIS PROJECT WHO HAS EXPERIENCE WITH THE DESIGN AND CONSTRUCTION OF FORMWORK SYSTEMS. THE FORMWORK DESIGN ENGINEER SHALL PROVIDE LETTERS OF ASSURANCE FOR DESIGN AND FIELD SUPERVISION FOR FORMWORK SYSTEMS. SEE NOTE TEMPORARY WORKS.
10. THE FORMWORK AND RESHORING DESIGN ENGINEER SHALL INSPECT THE FORMWORK AND RESHORING IN THE FIELD AND PROVIDE WRITTEN EVIDENCE OF PROPER WORKMANSHIP IN ACCORDANCE WITH THE SHOP DRAWINGS AND GOOD WORK PRACTICE. SUBMIT THE FIELD INSPECTION REPORTS TO THE ARCHITECT FOR HIS INFORMATION ONLY.
11. SLABS: IMMEDIATELY RESHORE ALL SLABS UNTIL CONCRETE HAS REACHED FULL DESIGN STRENGTH.
12. SLABS WITH CONCRETE NOT MATURED TO SPECIFIED STRENGTH SHALL NOT BE CONSIDERED FOR LOAD CARRYING OF FORMWORK OR RESHORING.
13. PROVIDE RESHORING PROCEDURES AS REQUIRED TO MAINTAIN LOADING UPON FLOOR SLABS AND BEAMS NOT EXCEEDING THE INTENDED DESIGN LOAD. PROVIDE A MINIMUM OF 3 LEVELS OF RESHORES, OR MORE AS REQUIRED TO MAINTAIN LOAD INTENSITY LESS THAN THE SPECIFIED LIVE LOAD FOR DESIGN.
14. PROVIDE WORK PROCEDURES TO PROPERLY IMPLEMENT RESHORING. CONSIDER THE FOLLOWING PROPOSED METHOD OF RESHORING TO LIMIT LOAD UPON LOWER SLAB LEVELS. ALL MEANS AND METHODS REMAIN THE RESPONSIBILITY OF THE CONTRACTOR(S).
15. FLYASH IN CONCRETE MIXES CAN DELAY STRENGTH AND STIFFNESS GAIN IN CONCRETE. COMPENSATE FOR DELAYED CURING BY EXTENDING THE LENGTH OF TIME THAT RESHORING REMAINS SUPPORTING THE SLABS.
16. FORMWORK SUPPORT FOR POST-TENSIONED SLABS SHALL NOT BE REMOVED UNTIL ALL OF THE POST TENSIONING HAS BEEN STRESSED AND CONFIRMED ACCEPTABLE.



Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par	
Approver	
Designed by/Concept par	
Designer	
Drawn by/Dessine par	
Author	
Project Manager/Administrateur de Projets	

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

GENERAL NOTES

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	S104	9





28. CONCRETE SLABS

- FOR SHRINKAGE AND TEMPERATURE REINFORCING SEE REINFORCING NOTES.
- PROVIDE STAGGERED TENSION LAPS FOR REBAR IN BOTTOM OF TWO WAY SLABS.
- PROVIDE MINIMUM REINFORCING IN SLABS AND SLAB BANDS AS NOTED IN REINFORCING STEEL NOTES.
- CONSTRUCTION JOINTS IN SLABS PROVIDE CONTINUOUS BOTTOM MAT AND ADD AS REQUIRED TO MAINTAIN MINIMUM 10M REBAR AT 300mm CENTERS TOP AND BOTTOM WITH A CONTINUOUS KEY OF 1/3 SLAB THICKNESS BY 20mm DEPTH.
- FOR CONSTRUCTION JOINTS IN WIDE SLAB BEAMS PROVIDE CONTINUOUS BOTTOM REINFORCING WITH STAGGERED TENSION LAPS PROJECTING FROM THE FIRST POUR.
- PROVIDE TOP BARS EQUAL TO MINIMUM TEMPERATURE REINFORCEMENT. PROVIDE AT LEAST TWO HORIZONTAL KEYS OF 1/5 THE DEPTH OF THE SLAB BAND EQUAL SPACED.
- PROVIDE 1-15M TOP AND BOTTOM PARALLEL TO ALL SLAB EDGES, INCLUDING AROUND OPENINGS. PROJECT 600 PAST EDGE OF OPENINGS AND 15M1200 DIAGONAL ON ALL INSIDE CORNERS AND CORNER BARS ON OUTSIDE CORNERS.
- PROVIDE 15M SUPPORT BARS AS REQUIRED TO SUPPORT CORNERS OF TIES IN BEAMS AND SLAB BANDS.
- PROVIDE SUFFICIENT CHAIRING TO ENSURE THAT REINFORCEMENT IS NOT DISPLACED WHEN PLACING CONCRETE.
- PROVIDE CORRECT CHAIR HEIGHTS OR SMALLER CHAIRS WITH ADDITIONAL SUPPORT BARS TO SUPPORT PRIMARY STRUCTURAL REINFORCING IN SLABS. PROVIDE SUPPORT BARS AS REQUIRED.
- WHERE SUPPORT REBAR IS WITHIN THE REQUIRED CONCRETE COVER THICKNESS (I.E. LESS THAN 25mm CLEAR COVER IN 2 HOUR FIRE RATED SLABS) IT SHALL NOT BE INCLUDED IN THE STRUCTURAL REBAR. SEE TOP MAT REBAR DETAILS FOR EXTRA SUPPORT BARS REQUIRED AT TOP MATS.
- WHERE SLAB OPENINGS OCCUR AND ARE NOT OTHERWISE DETAILED ON THE STRUCTURAL DRAWINGS, SPREAD REINFORCEMENT EACH SIDE OF THE OPENING WITH THE SAME TOTAL NUMBER OF REBAR PASSING THE OPENING, PLUS ONE. PROVIDE TOP AND BOTTOM EDGE BARS AROUND THE OPENING ADDITIONAL AS NOTED. CONFIRM WITH THE ENGINEER ANY OPENING IN EXCESS OF 450mm IN DIMENSION. DO NOT PERMIT OPENINGS OF ANY SIZE WITHIN 1200MM FROM A COLUMN OR WALL SUPPORT.
- CONDUITS AND SLEEVES WITHIN SLABS AND WALLS MUST BE PLACED WITHIN THE MIDDLE THIRD OF THE THICKNESS OF THE WALL OR SLAB. MAXIMUM SIZE OF CONDUIT IS 1/4 THE SLAB THICKNESS. SPACE CONDUITS OR SLEEVES AT LEAST 3 TIMES THEIR DIAMETER. MAINTAIN WELL CLEAR OF ALL POST-TENSIONING ANCHORAGE, AND 1200mm CLEAR OF GROUPS OF POST-TENSIONING ANCHORAGE. ADDITIONAL REINFORCING OR RELOCATION OF THE MATERIALS MAY BE NECESSARY AS DIRECTED BY GLOTMAN-SIMPSON. SEE TYPICAL DETAILS.
- PROVIDE ADDITIONAL REBAR MATS OVER AREAS OF CONGESTED CONDUIT AS INDICATED IN THE DETAILS AND AS FURTHER INSTRUCTED IN THE FIELD.
- DUCTS WITHIN SLABS AND WALLS MUST BE PLACED WITHIN THE MIDDLE THIRD OF THE THICKNESS OF THE WALL OR SLAB. SPACE DUCTS AT LEAST 2 TIMES THE MAXIMUM DUCT DIMENSION CLEAR BETWEEN, AND 750mm MINIMUM FROM COLUMN OR WALLS. DUCTS TO HAVE WELDED WIRE MESH AND ADDITIONAL REINFORCING OVER AND UNDER THE DUCT AS SHOWN IN DETAILS. PROVIDE 600mm MINIMUM EACH SIDE OF THE COLUMN. ENSURE THAT THEY ARE NOT IN CONFLICT WITH POST TENSION STRANDS AS SHOWN ON THESE PLANS. WHERE CONFLICTS EXIST, PARTIES SHALL AGREE ON FINAL LAYOUT ON SITE AND THE GENERAL CONTRACTOR SHALL DISTRIBUTE A SKETCH OF THE FINAL LAYOUT. THIS SHALL NOT BE CAUSE FOR ADDITIONAL CHARGES.
- WHERE COLUMN CONCRETE STRENGTH EXCEEDS THAT OF THE SLAB BY MORE THAN 12 MPA, CONCRETE OF SAME STRENGTH AS COLUMNS MUST BE PLACED IN THE SLAB IN THE REGION OF THE COLUMN. PROJECT 600mm MINIMUM EACH SIDE OF THE COLUMN. ENSURE THAT THE SLAB CONCRETE IS PLACED WHILE THE HIGHER STRENGTH MIX IS STILL PLASTIC AND THAT VIBRATION INTEGRATES THE TWO MIXES. OPTION, CAST THE ENTIRE SLAB OF THE HIGHER STRENGTH MIX, WITH SUITABLE DURABILITY FOR THE SLAB.
- SLABS ON GRADE TO HAVE 3mm SAWCUTS BY 1/4 SLAB THICKNESS, OR CONSTRUCTION JOINTS, AT ALL COLUMN LOCATIONS AND TO MATCH REENTRANT CORNERS, AND AT 4000mm CENTERS MAXIMUM UNLESS NOTED ON PLAN. UNREINFORCED SLABS ON GRADE TO HAVE SAWCUTS AT 4200mm CENTERS MAXIMUM UNLESS NOTED. SAWCUTS SHALL BE MADE WITHIN 24 HOURS OF CASTING THE SLAB. PANELS OF SLAB ON GRADE TO BE APPROXIMATELY SQUARE WITH NO RETURN CORNERS. EXPOSED CONCRETE TOPPING OVER WATERPROOF MEMBRANE TO HAVE SIMILAR SAWCUTS AT 3000mm CENTERS. ALTERNATIVELY, ZIP-STRIP OR EQUIVALENT MAY BE USED IF APPROVED BY THE ARCHITECT.
- REMOVE ALL CONSTRUCTION DEBRIS FROM THE SLAB PRIOR TO CASTING CONCRETE.
- HOLES IN SLAB FOR MECHANICAL OR PIPING MUST BE MINIMUM THAN 450 FROM COLUMN FACES OR THE FACE OF DROP PANELS UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR OTHERWISE APPROVED PRIOR TO CONSTRUCTION.
- GENERAL CONTRACTOR TO REPORT ANY PLANNED OPENINGS WITHIN 1200mm OF THE COLUMN TO THE ENGINEER FOR REVIEW PRIOR TO CONSTRUCTION.
- CAMBER ALL REINFORCED CONCRETE SLABS, SLAB BANDS AND BEAMS AS INDICATED ON THE DRAWINGS. WHERE NOT OTHERWISE SHOWN, PROVIDE CAMBER EQUAL TO 8mm FOR EVERY 3000mm OF SPAN FOR SPANS UP TO 5400mm. FOR SPANS EXCEEDING 5400, PROVIDE 10mm FOR EVERY 3000mm OF SPAN. FOR EXAMPLES: 4500mm SPAN REQUIRES 9MM CAMBER, 6000mm SPAN REQUIRES 20mm CAMBER, ETC.
- SLAB OR BEAM CANTILEVERS TO BE CAMBERED DOUBLE THE AMOUNT SHOWN ABOVE.
- CAMBER MAY BE PROVIDED BY MEANS OF ADJUSTING BOTH THE FORMWORK SURFACE AND THE CAST CONCRETE SURFACE. ALTERNATIVELY THE CAMBER CAN BE PROVIDED ON THE TOP SURFACE ALONE, BUT ONLY IF APPROVED BY THE ARCHITECT.
- MAINTAIN MINIMUM SLAB OR BEAM THICKNESS THROUGHOUT THE CAMBERED AREA AND SUBMIT DETAILS OF CONCRETE PROFILE FOR REVIEW WHERE THERE IS ANY VARIATION IN CONCRETE OUTLINE FROM THAT SHOWN ON THE DRAWINGS.
- THE GENERAL CONTRACTOR SHALL SUPERVISE AND BE RESPONSIBLE FOR THE METHODS AND PROCEDURES OF CONCRETE PLACEMENT. ENSURE THAT CONCRETE PLACEMENT DOES NOT DISPLACE REINFORCING OR POST-TENSIONING MATERIALS FROM THEIR INTENDED LINE AND POSITION. ENSURE THAT CONCRETE IS PROPERLY CONSOLIDATED IN ALL AREAS. SEE NOTES FOR SURVEY OF SLAB.
- CHAIRS FOR REINFORCEMENT IN EXPOSED SOFFITS OR OTHER AREAS EXPOSED TO WEATHER AND VIEW SHALL BE PLASTIC OR EPOXY COATED.
- SEE ARCHITECTURAL FOR CONCRETE FINISH REQUIREMENTS AND FLOOR HARDENERS.
- COORDINATE THE USE OF FLYASH AND OTHER ADDITIVES WITH RESHORING REQUIREMENTS. BE AWARE THAT ADDITIVES CAN DELAY STRENGTH GAIN AND CAUSE INCREASED DEFLECTIONS. ENSURE RESHORING REMAINS IN PLACE UNTIL SLAB HAS REACHED DESIGN STRENGTH AND STIFFNESS.
- GRIND OFF ALL STAPLES USED FOR STABILIZING CHAIRS AND, WHERE APPEARANCE IS OF CONCERN, IMMEDIATELY PAINT THESE AREAS WITH A PERMANENT SEALER AS APPROVED BY THE ARCHITECT TO HELP PREVENT RUSTING OF THE STAPLES.
- CONCRETE SHALL NOT BE PLACED ON A POST-TENSIONED SLAB FROM A BUCKET UNLESS A SPECIAL PROCEDURE FOR CHAIRING AND CONCRETE PLACEMENT IS USED SUCH THAT THE POST-TENSIONING STRANDS AND REBAR ARE NOT DEFLECTED Laterally DURING THE CONCRETE PLACEMENT.
- CONCRETE SHALL NOT BE PLACED ON A POST-TENSIONED SLAB FROM A PUMP HOSE UNLESS A SPECIAL PROCEDURE FOR PROTECTING THE CHAIRING IS USED SUCH THAT THE POST-TENSIONING STRANDS ARE NOT DISPLACED DURING THE CONCRETE PLACEMENT.

29. CONCRETE CRACKS

- UNDER NORMAL CONDITIONS, CONCRETE WILL CRACK WHETHER IT IS REINFORCED WITH REBAR OR POST-TENSIONING. THE CRACKS FORM AS A RESULT OF INTERNAL TENSION STRESSES IN THE CONCRETE DUE TO VARIOUS INFLUENCES INCLUDING SHRINKAGE AND CREEP OF THE CONCRETE AS IT CURES.
- NUMEROUS FACTORS AFFECT THE SUSCEPTIBILITY OF THE CONCRETE TO CRACK AND THE PROPAGATION OF CRACKS ONCE FORMED, AND THEREFORE THE ACCURATE PREDICTION OF CRACKS IS IMPOSSIBLE.
- PROPER REINFORCING DETAILS INCLUDING LIMITS ON SPACING OF REINFORCING, PLACEMENT OF CRACK CONTROL JOINTS, EDGE REINFORCING AROUND OPENINGS AND THE MINIMUM REINFORCING REQUIREMENTS NOTED ON THESE DRAWINGS HELP TO PREVENT LARGE CRACKS FROM OCCURRING.
- CRACKS CAN FORM AS A RESULT OF FORMWORK AND RESHORING PROCEDURES. CONTRACTOR TO PROVIDE METHODS OF RESHORING THAT MINIMIZE STRESSES ON CONCRETE AND REDUCE CRACKING.
- CRACKS NORMALLY DO NOT IMPAIR THE STRUCTURE FROM PROVIDING ITS FUNCTION, ALTHOUGH DUE TO COSMETIC REASONS OR OTHER CONCERNS CRACKS MAY NEED TO BE REPAIRED. IT MAY ALSO BE NECESSARY TO EPOXY INJECT SOME CRACKS.
- ALLOW FOR EPOXY INJECTION OF ANY CRACKS LARGER THAN 1mm AT ANY LOCATION ALONG THE CRACK IN REGIONS OF LOAD AND SUPPORT ON THE STRUCTURE.
- IF CRACKS OCCUR, PROVIDE DETAILED INFORMATION ON THE CRACK PATTERN FOR REVIEW BY ENGINEER AND THE ARCHITECT WHO MAY PROVIDE INSTRUCTION ON METHODS OF REPAIRING SOME OF THE CRACKS.

30. TOLERANCES

- STRUCTURAL TOLERANCES SHALL BE IN ACCORDANCE WITH APPLICABLE CODES EXCEPT AS NOTED HERE. TOLERANCES FOR ARCHITECTURALLY EXPOSED CONCRETE SURFACES SHALL BE SPECIFIED BY THE ARCHITECT.
- THICKNESS OF SLABS, BEAMS, WALLS, AND OTHER FORMED CONCRETE MEMBERS: DESIGN TOLERANCE -0mm TO +12mm IN NARROW DIMENSION OF MEMBER
- DESIGN TOLERANCE -0mm TO +20mm IN OTHER DIMENSIONS INCLUDING LENGTH OF MEMBERS OVER 1000mm LONG EXCEPT FOR LEVEL AND SIZE AS IT WOULD AFFECT OTHER TRADES
- COLUMN OFFSET BETWEEN FLOOR LEVELS: DESIGN TOLERANCE +/- 8mm FROM INTENDED ALIGNMENT
- COLUMN HEIGHT TO UNDERSIDE OF SLAB OR BEAM: +0mm TO -100mm. NOTE: COLUMN SHOULD NOT EXTEND UP INTO SLAB.
- PLUMBNESS, SLOPE AND ALIGNMENT OF SURFACES: VERTICAL OR SLOPED MEMBERS DESIGN TOLERANCE LESSER OF 1/400 OR 20mm MAX OVER ANY ELEMENT EXCEPT FOR FULL HEIGHT TOLERANCE AS REQUIRED FOR OTHER TRADES SUCH AS ELEVATORS, WALL SYSTEMS, FINISHES AND SIMILAR AS SPECIFIED BY OTHERS.
- ALIGNMENT OF FORMING MATERIALS ALONG A FACE OF CONCRETE 3mm MAXIMUM TOLERANCE EXCEPT FOR ARCHITECTURAL EXPOSED CONCRETE AS SPECIFIED BY THE ARCHITECT.
- SITE REFERENCE SYSTEMS SHALL BE ACCURATELY LOCATED WITHIN 3mm MAX TOLERANCE.
- EMBEDDED ITEMS RECEIVING STRUCTURAL STEEL MEMBERS SHALL BE LOCATED TO WITHIN +/- 8mm OF INTENDED POSITION OR WITH GREATER ACCURACY AS REQUIRED BY THE STEEL ELEMENT DESIGN (EXAMPLE: STEEL BOLT ACCURACY). PROVIDE ANCHOR SYSTEMS WITH TOLERANCE IN THE CONNECTION TO MAKE UP FOR PLACEMENT TOLERANCES.
- ANCHOR BOLT TOLERANCE +/- 3mm FROM INTENDED ALIGNMENT AND 1/400 PLUMB.
- COORDINATE WITH ANCHOR BOLT HOLE SIZES IN STEEL PLATES
- SPECIAL PROVISIONS FOR SLABS AND FINISHED HORIZONTAL SURFACES:
  - MEASURE TOLERANCES WITHIN 18 HOURS OF FINISHING AND BEFORE FORM REMOVAL.
  - MEASURE TO ACCURACY OF 1mm.
  - 1 IN 10 MEASUREMENTS MAY EXCEED TOLERANCE IF MEASUREMENTS ARE UNIFORMLY SPACED THROUGHOUT THE WORK AREA.
  - MEASURE TOLERANCE AT ALL SUPPORT LOCATIONS, MIDSPAN BETWEEN SUPPORTS, SLAB EDGES AND CORNERS AND AT ANY APPARENT HIGH OR LOW SPOTS IN THE SURFACE.
  - MAXIMUM TOLERANCE FROM INTENDED LINE INCLUDING CAMBER AND SLOPE:
    - 0mm TO +16mm BETWEEN SUPPORTS >6000 APART
    - 0mm TO +12mm BETWEEN SUPPORTS <6000 APART
  - FOR AREAS WITH HARD FINISHES WITH HIGH QUALITY REQUIREMENTS:
    - 0mm TO +12mm BETWEEN SUPPORTS >6000 APART
    - 0mm TO +8mm BETWEEN SUPPORTS <6000 APART
- ALLOW FOR LIGHTWEIGHT TOPPING ON ALL SLAB SURFACES TO MAKE UP TOLERANCES AS REQUIRED BY THE ARCHITECT AT HIS SOLE DISCRETION.

31. SURVEY CONTROL & MAINTENANCE OF TOLERANCES

- PROVIDE SURVEY CONTROL AND MEASUREMENT IN ACCORDANCE WITH THESE NOTES AND APPLICABLE CODES TO CONFIRM THAT CONSTRUCTION MEETS TOLERANCE REQUIREMENTS OF THESE NOTES, APPLICABLE CODES AND TOLERANCES NOTED BY OTHERS INCLUDING THE ARCHITECT AND OWNER. SEE "TOLERANCES".
- PROVIDE BASE POINT FOR SURVEY AT OUTSIDE CORNER OF STAIR OR ELEVATOR SHAFT AND MEASURE ALL SLAB SURVEY FROM SINGLE LOCATION.
- SURVEY THE FIRST SUSPENDED SLAB ABOVE GRADE AND THE FIRST 'TYPICAL' TOWER FLOOR AS FOLLOWS:
  - FORMWORK BEFORE SLAB IS CAST
  - SLAB SURFACE WITHIN 18 HOURS OF FINISHING AND BEFORE FORMWORK REMOVAL
  - IMMEDIATELY AFTER FORMWORK REMOVAL
  - IMMEDIATELY AFTER RESHORE REMOVAL (NOTE THAT IMPROPER RESHORE TECHNIQUES CAN IMPOSE SLAB DEFLECTIONS)
  - 3 MONTHS AFTER RESHORE REMOVAL
- SURVEY SLABS AT THE FOLLOWING LOCATIONS:
  - AT COLUMNS, ENDS OF WALLS AND OTHER SUPPORTS.
  - AT SLAB EDGES, CORNERS AND TIPS OF CANTILEVERS
  - MIDSPAN BETWEEN SUPPORTS
  - AT ANY NOTICEABLE HIGH POINTS OR LOW POINTS.EACH SURVEY SHOULD RECORD SLAB ELEVATIONS AT THE SAME LOCATION FOR LATER REFERENCE AND ANALYSIS PURPOSES.
- WHENEVER SLAB IS OUTSIDE TOLERANCE, SURVEY SLAB THICKNESS AT THE FOLLOWING LOCATIONS:
  - AT COLUMNS, ENDS OF WALLS AND OTHER SUPPORTS.
  - AT SLAB EDGES, CORNERS AND TIPS OF CANTILEVERS
  - MIDSPAN BETWEEN SUPPORTS
  - AT ANY NOTICEABLE HIGH POINTS OR LOW POINTSREPORT SURVEY RESULTS IN +/- DIMENSION FROM DESIGN THICKNESS.
- SEE ENGINEER FOR FOLLOWUP SURVEY OF ADDITIONAL SLABS BASED UPON RESULTS OF THE FIRST SLAB SURVEY.
- MAKE ALLOWANCES TO REPAIR STRUCTURE TO MEET TOLERANCES. ALLOW FOR GRINDING OF HIGH POINTS EXCEEDING MAXIMUM TOLERANCE AT TIME OF SURVEY BEFORE FORMS ARE REMOVED. ALLOW FOR SELF LEVELING TOPPING IN LOW POINTS EXCEEDING MINIMUM TOLERANCE. PROVIDE PROPOSED TOPPING MATERIAL AND PROCEDURE FOR REVIEW BY MATERIALS CONSULTANT BEFORE PERFORMING THE WORK.
- ASSESS AND RESOLVE REPAIR REQUIREMENTS AND PROCEDURES BEFORE FINISHES BEGIN.
- REPAIR COLUMNS CAST OVER HEIGHT BY CHIPPING DOWN TO LEVEL WITH THE UNDERSIDE OF SLAB. THE CENTRAL PORTION OF THE COLUMN INSIDE THE REBAR CAGE MAY BE SLOPED UPWARD AT 45 DEGREES MAXIMUM BUT NO PART OF THE COLUMN SHALL BE HIGHER THAN 50mm ABOVE THE BOTTOM OF THE SLAB.

32. STRUCTURAL DEFLECTIONS

- UNDER NORMAL CONDITIONS, CONCRETE SLABS AND BEAMS WILL DEFLECT WHETHER REINFORCED WITH REBAR OR POST-TENSIONING. STEEL STRUCTURES WILL DEFLECT UNDER LOAD AND VARIOUS ENVIRONMENTAL CONDITIONS. BECAUSE DEFLECTIONS RESULT FROM A WIDE VARIETY OF FACTORS, THE ACCURATE PREDICTION OF THE MAGNITUDE OF DEFLECTIONS IS DIFFICULT. DEFLECTIONS CAN BE UPWARD OR DOWNWARD AND CAN CHANGE OVER TIME, DEPENDING UPON VARIOUS CHARACTERISTICS OF THE STRUCTURE AND ITS ENVIRONMENT. PROPER ALLOWANCE MUST BE MADE IN FINISHES AND ATTACHED ELEMENTS TO PERMIT THE STRUCTURE TO DEFLECT FREELY WITHOUT DAMAGE TO THE COLLATERAL ELEMENTS. THE DETAILS FOR ATTACHMENT OF THESE ELEMENTS ARE PROVIDED BY OTHERS.
- DEFLECTIONS DO NOT IMPAIR THE STRUCTURE FROM PROVIDING ITS FUNCTION AND, UNDER NORMAL CONDITIONS, ARE NOT AN INDICATION OF A WEAKNESS IN THE STRUCTURE.
- DEFLECTIONS CAN BE COMPENSATED BY CAMBER AS NOTED ELSEWHERE AND UNDER CERTAIN CONDITIONS TOPPING MATERIALS CAN BE USED TO LEVEL SLAB SURFACES.
- MAKE ALLOWANCE IN FINISHES AND ANY REQUIRED ATTACHMENTS TO THE PERMIT STRUCTURE TO DEFLECT WITHOUT RESISTANCE. NOTE THAT NON-STRUCTURAL WALL SYSTEMS REQUIRE FLEXIBLE CONNECTIONS TO SLABS BOTH TOP AND BOTTOM AND MIGHT REQUIRE THE ABILITY TO ACCEPT DEFLECTIONS ALONG THE SPAN OF STRUCTURE THAT THE WALLS REST UPON. ALLOW A DEFLECTION ALLOWANCE OF AT LEAST SPAN/240 OR 20mm MINIMUM OR MORE AS REQUIRED.
- IT IS THE RESPONSIBILITY OF THE WALL SYSTEM PROVIDER TO ENSURE THEY HAVE FULL AND SUFFICIENT INFORMATION ABOUT THE LONGTERM PERFORMANCE OF THE SLAB SYSTEM. WHEN IN DOUBT, OBTAIN ANTICIPATED DESIGN DEFLECTION ALLOWANCES FROM THE ENGINEER. WHEN WALL SYSTEMS ARE VULNERABLE TO FAILURE DUE TO MOVEMENT, PROVIDE FURTHER AND CONSERVATIVE ALLOWANCE FOR MOVEMENT.
- AREAS SENSITIVE TO FLOOR LEVELNESS REQUIRE GRINDING OR TOPPING TO ACHIEVE TIGHT TOLERANCES.

CONCRETE STRUCTURES:


- HORIZONTAL CONCRETE STRUCTURE SUCH AS SLABS AND BEAMS SPECIFIED ON THESE DRAWINGS HAS BEEN DESIGNED TO CONTROL DEFLECTIONS. CONTRACTORS TO ALLOW FOR AT LEAST 20mm DEFLECTION AFTER FORMWORK AND RESHORING HAS BEEN REMOVED, OR DOUBLE THE CAMBER NOTED IN THE DRAWINGS, OR GREATER AS NOTED ON THE DRAWINGS. UPWARD CAMBER SHOULD BE PROVIDED AS NOTED. MOST OF THIS CAMBER IS EXPECTED TO COME OUT AS THE SLABS OR BEAMS CARRY THEIR SELF WEIGHT AFTER FORMWORK IS REMOVED.
- SEE NOTES ON FORMWORK.
- SEE NOTES ON TOLERANCES.
- SEE NOTES ON SURVEY CONTROL AND MAINTENANCE OF TOLERANCES
- THE CONTRACTOR IS CAUTIONED THAT SLAB DEFLECTION CAN EXCEED THE CALCULATED DEFLECTIONS IF PROPER CONSTRUCTION PROCESSES ARE NOT FOLLOWED. FOLLOWING ARE SOME CONSTRUCTION PROCEDURES THAT CAN AFFECT SLAB FLATNESS:
  - SLABS NOT CAST WITH SPECIFIED CAMBER
  - UNINTENDED THICKENING OF SLABS OVER TOP REINFORCING MATS
  - DEFLECTION OR SUBSIDENCE OF FORMWORK
  - CURING OF CONCRETE IS NOT PERFORMED EFFECTIVELY
  - RESHORING OF SLABS OR BEAMS ARE NOT ERECTED IMMEDIATELY AFTER FORMS ARE REMOVED
  - SLABS OR BEAM FORMS ARE FULLY REMOVED BEFORE RESHORES ARE INSTALLED
  - INADEQUATE NUMBER OF FLOORS ARE ENGAGED FOR SHORING SUPPORT
  - RESHORING IS NOT TIGHTENED BETWEEN SLABS
  - RESHORING IS OVER-TIGHTENED BETWEEN SLABS
  - RESHORING IS TEMPORARILY REMOVED
  - RESHORING IS REMOVED BEFORE THE SLAB IS ADEQUATELY CURED
  - RESHORING POSTS ARE NOT ALIGNED BETWEEN FLOOR LEVELS
  - SLABS OR BEAMS ARE OVERLOADED WITH CONSTRUCTION MATERIALS AFTER SHORES HAVE BEEN REMOVED
  - SLAB OR BEAMS ARE OVERLOADED BY STOCKPILING FINISHING MATERIALS SUCH AS GYPSUM WALL BOARD, TILES, STONE FINISHES, PRECAST CONCRETE, OR OTHER HEAVY MATERIALS.
  - DAMAGE TO SLABS OR BEAMS AFTER CASTING BY CUTTING, CHIPPING, OR CORING OF HOLES
  - EARLY AGE DRYING OR EXCESSIVE HEATING OF THE TOP SURFACE
  - MISPLACEMENT OF REINFORCING STEEL INCLUDING INADEQUATE CHAIRING OF TOP REINFORCEMENT.
  - IMPROPER MONITORING OF CONCRETE TESTING
  - LOW CONCRETE STRENGTH
  - ADDITION OF WATER TO CONCRETE ON SITE.
  - DAMAGE TO POST-TENSIONING TENDONS

STRUCTURAL STEEL STRUCTURES:

- HORIZONTAL STEEL STRUCTURE SUCH AS BEAMS AND JOISTS SPECIFIED ON THESE DRAWINGS HAVE BEEN DESIGNED TO CONTROL DEFLECTIONS. ALLOW FOR AT LEAST 20mm DEFLECTION AFTER STRUCTURE IS COMPLETED.
- UPWARD CAMBER SHOULD BE CONSTRUCTED INTO THE STRUCTURE AS NOTED ON THESE PLANS. THIS CAMBER IS EXPECTED TO COME OUT OF THE STRUCTURE ONCE THE ENTIRE STRUCTURE HAS BEEN ERECTED. TEMPORARY SHORING HAS BEEN REMOVED AND CONCRETE SHRINKAGE HAS COMPLETED.
- TEMPORARY SHORING IS MEANS AND METHODS OF CONSTRUCTION AND IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR
- THE CONTRACTOR IS CAUTIONED THAT STRUCTURE DEFLECTION CAN EXCEED THE CALCULATED DEFLECTIONS IF PROPER CONSTRUCTION PROCESSES ARE NOT FOLLOWED. FOLLOWING ARE SOME CONSTRUCTION PROCEDURES THAT CAN AFFECT SLAB FLATNESS:
  - BEAMS OR JOISTS ARE NOT ERECTED WITH SPECIFIED CAMBER.
  - CONCRETE TOPPING IS NOT CAST WITH SPECIFIED CAMBER
  - UNINTENDED THICKENING OF SLABS OVER EMBEDDED ITEMS OR AT SUPPORTS
  - CURING OF CONCRETE IS NOT PERFORMED EFFECTIVELY
  - SLAB OR BEAMS ARE OVERLOADED WITH CONSTRUCTION MATERIALS OR EQUIPMENT
  - SLAB OR BEAMS ARE OVERLOADED BY STOCKPILING FINISHING MATERIALS SUCH AS GYPSUM WALL BOARD, TILES, STONE FINISHES, PRECAST CONCRETE, OR OTHER HEAVY MATERIALS.
  - DAMAGE TO SLABS OR BEAMS AFTER CONSTRUCTION BY CUTTING, CHIPPING, OR CORING
  - SHORING IS REMOVED BEFORE THE CONCRETE IS ADEQUATELY CURED FOR COMPOSITE MEMBERS.
  - DEFLECTION OR SUBSIDENCE OF SHORING
  - MISPLACEMENT OF REINFORCING STEEL INCLUDING INADEQUATE CHAIRING OF TOP REINFORCEMENT.
  - IMPROPER MONITORING OF CONCRETE TESTING
  - LOW CONCRETE STRENGTH
  - ADDITION OF WATER TO CONCRETE ON SITE.
  - ERRORS IN INSTALLATION OR DAMAGE TO STEEL DECKING

33. NON STRUCTURAL TOPPINGS - GRINDING

- ALLOW FOR GRINDING AND/OR TOPPING OF SLABS AS REQUIRED TO ACHIEVE QUALITY WORKMANSHIP AND SLAB LEVELNESS AS DETERMINED BY THE ARCHITECT.
- ALLOW FOR GRINDING HIGH POINTS IN SLABS THICKER THAN SPECIFIED WHERE HEIGHT OF FINISHED CONCRETE SURFACE OR THE QUALITY OF SURFACE IS UNSUITABLE FOR FINAL FLOOR FINISHING PRODUCTS.
- ALLOW FOR LIGHTWEIGHT NON STRUCTURAL TOPPING IN LOW POINTS OF SLAB AS REQUIRED TO ACHIEVE FLOOR LEVEL SUITABLE FOR FINAL FLOOR FINISHING PRODUCTS.
- PROVIDE PROPOSED TOPPING MATERIAL AND PROCEDURE FOR REVIEW BY MATERIALS CONSULTANT BEFORE PERFORMING THE WORK.
- ASSESS AND RESOLVE REPAIR REQUIREMENTS AND PROCEDURES BEFORE PARTITIONING BEGINS.



Public Works and Government Services Canada


Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES

Western Region

SERVICES IMMOBILIERS

Région de l'ouest



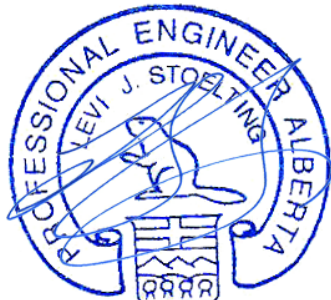
Glotman-Simpson CONSULTING ENGINEERS

1661 West 5<sup>th</sup> Avenue  
Vancouver, BC V6J 1Y6  
T: 604.734.8822  
F: 604.734.8842  
www.glotmansimpson.com

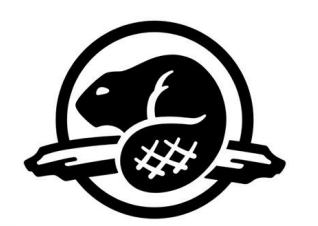
Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%UFT	2019-03-27
6	Issued for 99%UFC	2018-12-13
5	Issued for 99%UFC	2018-04-12
4	Issued for 99%UFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No.	Description:	Date:
Revisions		
Revision / Revision	Description / Description	Date / Date
Client / client		
		
Parks Canada Parcs Canada		

Project title/Titre du projet

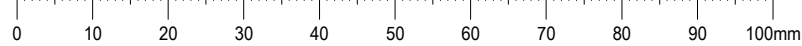
Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par
Approver
Designed by/Concept par
Designer
Drawn by/Dessine par
Author
Project Manager/Administrateur de Projets
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie
Client / client
Parks Canada
Drawing title / Titre du dessin

GENERAL NOTES

Project No. / No. du project	Sheet / Feuille	Revision no. / La Revision no.
	S105	9





34. REINFORCING STEEL

REINFORCEMENT SHALL BE DEFORMED BILLET STEEL OF THE FOLLOWING GRADES:

CSA G30.18	GRADE 400 MPA - 10M AND LARGER REBARS
CSA G30.5	GRADE 300 MPA - WELDED WIRE MESH
CSA G30.15	GRADE 300 MPA - DEFORMED WELDED WIRE MESH
CSA G30.16	GRADE 400 MPA - WELDABLE REBAR

SUBSTITUTE REINFORCING OF U.S. DESIGNATION MAY BE PERMITTED UPON REQUEST - PROVIDE EQUIVALENT STRENGTH AND AREA OF REINFORCING.

COVER TO PRIMARY REINFORCING:

	FIRE RESISTANCE RATING (SEE ARCHITECTURAL)		
	UP TO 1HR.	2HR.	3HR.
FACES CAST AGAINST GROUND COLUMNS:	75mm	N/A	N/A
TO VERTICAL REINFORCING	40mm	50mm	50mm
EXPOSED: GROUND OR WEATHER	50mm	50mm	50mm
BEAMS OR SLAB BANDS:	40mm	40mm	40mm
TO REINFORCING	50mm	50mm	50mm
EXPOSED: GROUND OR WEATHER			
SLABS:			
TO REINFORCING	20mm	25mm	32mm
PARKING DECKS SEVERE EXPOSURE PER CSA S413	60mm	60mm	60mm
PARKING DECKS NORMAL EXPOSURE PER CSA S413	40mm	40mm	40mm
BOTTOM OF PARKING SLAB	30mm	30mm	32mm
WALLS:			
TO REINFORCING	20mm	20mm	20mm
EXPOSED TO WEATHER	32mm	32mm	32mm
ZONE REINFORCING	32mm	32mm	32mm
EXPOSED TO FIRE 2 SIDES	50mm	50mm	50mm

NOTE: COVER SHOWN TO PRIMARY REINFORCING - IE. COLUMN VERTICAL BARS, BEAM LONGITUDINAL BARS, ZONE VERTICAL BARS, ETC. TIES SHALL NOT HAVE COVER LESS THAN 20mm CLEAR.

DESIGNATION OF BARS:

STRAIGHT BARS:	7-25M5600	DENOTES SEVEN - 25M REBARS X 5600mm LONG
BENT BARS:	8B15M1370	DENOTES EIGHT - 15M REBARS X 1370mm LONG HOOKED ONE OR BOTH ENDS AS SHOWN. NOTE: LENGTH SHOWN INCLUDES THE LENGTH OF A STANDARD HOOK. LONGER HOOKS REQUIRED AS SHOWN. FOR HOOK LENGTHS SEE CSA A23.1

BARS SHOWN SOLID LINE	—————	IN TOP OF SLAB AND BEAMS OR NEAR FACE OF WALL
BARS SHOWN BROKEN LINE	-----	IN BOTTOM OF SLAB AND BEAMS OR FAR FACE OF WALL

MINIMUM LAP SPlice LENGTHS (NON-SEISMIC ELEMENTS):

MINIMUM LAP SPlice LENGTHS OF REINFORCEMENT FOR NON-SEISMIC ELEMENTS (UNLESS NOTED OTHERWISE):						
BAR SIZE	TENSION LAPS FOR BEAM OR SLAB BAND TOP REINF	TENSION LAPS FOR BEAM OR SLAB BAND BOTTOM REINF	TENSION LAPS FOR WALL VERT'S SLAB BOTTOM REINF AND TOP REINF IN SLABS < OR = 300	HOOK DEVELOPMENT	MASONRY LAPS SINGLE CORES OR BOND BEAMS	MASONRY LAPS DOUBLE CORES OR BOND BEAMS
	SEE NOTE (f) BELOW	SEE NOTE (f) BELOW			SEE NOTE (g) BELOW	SEE NOTE (g) BELOW
		TENSION LAPS FOR WALL HORIZ AND TOP REINF IN SLABS > 300				
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
10M	750	575	425	225	500	500
15M	1050	800	600	325	500	975
20M	1275	975	750	400	775	1725
25M	2050	1575	1200	525	1200	2700
30M	2425	1875	1400	600	N/A	N/A
35M	2900	2225	1675	725	N/A	N/A
NOTES:						
a.	WHERE LAP DIMENSIONS ARE SHOWN ON DRAWINGS, SUCH DIMENSIONS SHALL CONTROL.					
b.	STAGGER TENSION LAP IN BOTTOM OF TWO WAY SLABS.					
c.	SEE SCHEDULES FOR COLUMN/Shearwall LAPS.					
d.	DIVIDE ABOVE TENSION LAP SPLICES BY 1.3 FOR TENSION DEVELOPMENT LENGTHS. (NOT LESS THAN 300mm)					
e.	MULTIPLY ABOVE VALUES BY 1.5 FOR EPOXY COATED REINFORCING.					
f.	MULTIPLY BY 0.75 WHEN LAP ENCLOSED WITHIN TIES OR STIRRUPS. (NOT LESS THAN 300mm)					
g.	MULTIPLY MASONRY LAP SPLICES BY 0.6 FOR EMBEDMENT.					
h.	ABOVE VALUES (EXCEPT MASONRY LAPS) MAY BE ADJUSTED FOR CONCRETE STRENGTH AS FOLLOWS (NOT LESS THAN 300mm)					
	30MPa MULTIPLY BY 0.92					
	35MPa MULTIPLY BY 0.85					
	40MPa MULTIPLY BY 0.79					
	45MPa MULTIPLY BY 0.75					
	50MPa MULTIPLY BY 0.71					
i.	WHERE fy=400MPa, MULTIPLY ABOVE VALUES BY fy/400					

TEMPERATURE REINFORCEMENT:

PROVIDE THE FOLLOWING MINIMUM REINFORCEMENT AS BOTTOM STEEL IN EACH DIRECTION:

SLAB THICKNESS	TEMPERATURE REINFORCEMENT BOTTOM	TEMPERATURE REINFORCEMENT TOP
150 mm OR LESS	10M @ 350 mm	
TO 180 mm	10M @ 300 mm	
TO 200 mm	10M @ 250 mm	
TO 230 mm	10M @ 200 mm	
TO 250 mm	15M @ 375 mm	
TO 280 mm	15M @ 350 mm	
TO 300 mm	15M @ 325 mm	
300+ TO 400mm	20M @ 350 mm	
400+ TO 500mm	20M @ 300 mm	
500+ TO 600mm	20M @ 250 mm	
600+ TO 800mm	25M @ 300 mm	
800+ TO 1000mm	30M @ 300 mm	
1000+ TO 1200mm	30M @ 300 mm PLUS 20M @ 300 mm	
1200+ TO 1500mm	30M @ 300 mm PLUS 20M @ 300 mm	
1500+ TO 1800mm	30M @ 300 mm PLUS 25M @ 300 mm	
1800+ TO 2100mm	30M @ 300 mm PLUS 30M @ 300 mm	

MINIMUM WALL REINFORCEMENT:

PROVIDE THE FOLLOWING MINIMUM REINFORCEMENT IN ALL CAST-IN-PLACE CONCRETE WALLS UNLESS GREATER AMOUNTS OF REINFORCING ARE SHOWN ON THE PLANS:

WALL THICKNESS	TEMPERATURE REINFORCEMENT
UP TO 150mm	10M @ 325 O/C EA. WAY CENTERLINE OF WALL
UP TO 200mm	10M @ 250 O/C EA. WAY CENTERLINE OF WALL
UP TO 250mm	10M @ 300 EA. WAY EA. FACE
UP TO 300mm	10M @ 300 EA. WAY EA. FACE
UP TO 350mm	10M @ 300 EA. WAY EA. FACE
UP TO 400mm	10M @ 250 EA. WAY EA. FACE

PROVIDE 2-15M HORIZ. BOT. OF ALL WALL POURS

MINIMUM SLAB BAND REINFORCEMENT:

PROVIDE MINIMUM REINFORCING IN SLAB BANDS AND WIDE BEAMS AS FOLLOWS:

- 4-20M TOP CONTINUOUS IN ALL SLAB BANDS UP TO 2400 WIDE, TENSION LAP MIDSPAN, HOOK 90 DEGREES AT ENDS OR SLAB BANDS OR PROJECT 1200 BEYOND THE TERMINATION OF THE SLAB BAND INTO THE SLAB. SPlice MIDSPAN.
- 6-20M TOP CONTINUOUS IN ALL SLAB BANDS OVER 2400 WIDE UP TO 3600 WIDE, TENSION LAP MIDSPAN, HOOK 90 DEGREES AT ENDS OR SLAB BANDS OR PROJECT 1200 INTO THE SLAB BEYOND. SPlice MIDSPAN.
- 15M @ 300 IN SIDE FACES OF SLAB BANDS 600 DEEP OR DEEPER.
- 10M 6 LEG TIES @ 300 O/C MINIMUM IN SLAB BANDS 600 DEEP OR DEEPER IN SLAB BANDS UP TO 2400 WIDE. PROVIDE 8 LEG TIES FOR SLAB BANDS UP TO 3600 WIDE. SEE PLANS FOR HEAVIER TIES AS REQUIRED.
- FOR SLAB BANDS WITH CONCENTRATED TRANSFER LOADS SUCH AS COLUMNS OR INTERSECTING SLAB BANDS, PROVIDE MINIMUM TIES FULL LENGTH.

- ALL REINFORCEMENT TO BE CHAIRED AND TIED IN ITS FINAL POSITION IN ACCORDANCE WITH THE DRAWINGS AT NOT MORE THAN 900mm CENTERS TO PREVENT ANY MOVEMENT DURING THE PLACEMENT OF CONCRETE. STAPLE ALL CHAIRS TO FORMWORK PRIOR TO PLACING CONCRETE.
- PLACEMENT OF REINFORCING AND ALL CUTTING, LAPPING AND BENDING DETAILS TO BE IN ACCORDANCE WITH ACI DETAILING PRACTICE.
- CHAIRS FOR REINFORCEMENT IN EXPOSED SOFFITS OR OTHER AREAS EXPOSED TO WEATHER AND VIEW SHALL BE PLASTIC OR EPOXY COATED. ALL CHAIRS IN PARKING STRUCTURES SHALL BE PLASTIC COATED.
- REINFORCEMENT MUST BE CLEAN AND FREE FROM ANY SUBSTANCE WHICH MAY HASTEN RUSTING OR REDUCE CONCRETE BOND. ANY QUESTIONABLE MATERIALS TO BE CLEANED OR REPLACED AT THE CONTRACTORS EXPENSE TO THE SATISFACTION OF THE CONSULTANT.
- MAKE ALL HORIZONTAL REINFORCEMENT IN WALLS OR COLUMNS CONTINUOUS AT CORNERS AND LAP.
- PROVIDE MINIMUM 2-15M BARS PARALLEL TO ALL EDGES OF SLABS AND AROUND OPENINGS, EXTEND 600 BEYOND CORNERS. PROVIDE ONE 15M X 1200 DIAGONAL AT EACH RETURN CORNER OR OPENING IN SLAB OR WALL. BEND SLAB OR WALL TRIM BARS CONTINUOUS AROUND OUTSIDE CORNERS. ADDITIONAL BARS MAY BE REQUIRED FOR POST-TENSIONED ANCHORS.
- PROVIDE DOWELS BETWEEN JOINING CONCRETE SURFACES TO MATCH BARS IN LATER POUR (E.G. STAIR LONGITUDINAL REBAR, WALL REINFORCING, ETC.).
- DOWELS FOR CONCRETE WALLS (NOT SHEARWALLS) AND COLUMNS SHALL PROJECT A COLUMN LAP LENGTH ABOVE FOOTING OR SUPPORT LEVELS. DOWELS FOR SHEARWALLS (INCLUDING ZONES AND WALL STEEL) SHALL PROJECT A FULL TENSION LAP LENGTH ABOVE FOOTINGS AND SLAB SURFACES. CONTRACTOR TO ENSURE THAT ALL DOWELS ALIGN WITH VERTICAL REINFORCING AND WITH THE CORES OF MASONRY WALLS.
- SHOP TEST ALL NELSON STUDS OR REBAR ANCHORS APPLIED IN THE FIELD.
- REINFORCING FOR SIDEWALKS AND EXTERIOR CONCRETE PAVING FOR FOOT TRAFFIC ONLY SHALL BE 10M @ 350 O/C FOR JOINTS UP TO 4500mm CENTERS.
- FOR SLAB JOINTS LESS THAN 2400mm CENTERS, REINFORCING MAY BE REDUCED TO 10M PERIMETER PLUS 152x152 MW13.3/13.3 WELDED WIRE MESH PLACED MIDHEIGHT OF SLAB.
- ALL REINFORCEMENT IN SHEARWALLS AND SEISMIC ELEMENTS SHALL BE GRADE 400 MPA G30.18W STEEL-WELDABLE.
- SEE SHEARWALL SCHEDULE FOR ZONE AND SHEARWALL REINFORCING NOTES.

35. CONCRETE BLOCK UNIT MASONRY

NOTE: MASONRY CONTRACTOR SHALL OBSERVE "THE MASONRY REPORT" PUBLISHED BY THE MASONRY INSTITUTE OF ALBERTA REPORT NO. 41 "GROUTING HOLLOW UNITS", AND REPORT NO. 36 "GROUT", AND OTHER APPLICABLE REPORTS.

NOTE: TEST MASONRY CONSTRUCTION IN ACCORDANCE WITH CSA REQUIREMENTS INCLUDING GROUT, MORTAR AND CONCRETE BLOCKS. SEE MATERIALS CONSULTANT.

- MASONRY TO BE CONSTRUCTED IN ACCORDANCE WITH CSA S304. CONTRACTOR SHOULD NOTE CLAUSE 4.2.2 OF CSA S304, IN WHICH SPECIAL INSPECTION OF REINFORCED MASONRY IS REQUIRED, AND SECTIONS 4.10 AND 4.11.
- THESE ENGINEERING DRAWINGS SHOW THE PERMANENT STRUCTURE ONLY AND DO NOT INCLUDE COMPONENTS AND PROCEDURES THAT MAY BE REQUIRED FOR SAFETY AND SEQUENCE OF WORK DURING THE CONSTRUCTION, WHICH SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- MASONRY REQUIRED FOR STRUCTURAL PURPOSES IS SHOWN ON THESE DRAWINGS. MASONRY REQUIRED ONLY FOR ARCHITECTURAL PURPOSES IS SHOWN FOR REFERENCE ONLY. SEE ARCHITECTURAL FOR LOCATION OF SEMI-STRUCTURAL WALLS. FOR BRICKWORK AND VENEER, SEE ARCHITECTURAL.
- CONCRETE UNIT MASONRY TO BE TYPE H - 15 MPA (BASED ON NET AREA) CONFORMING TO CSA A165.1-M. CLASSIFICATION H/15/A/M.
- USE ONLY TYPE S MORTAR, PREMIXED TO SPECIFICATION OR SITE MIXED BY PROPORTION. SITE MIXED MORTAR SHALL BE VERIFIED BY A MATERIALS CONSULTANT.

LOAD BEARING MASONRY WALLS

- INCLUDING: WALLS AROUND ELEVATOR SHAFTS, BETWEEN STAIRS, SIDES OF EXIT CORRIDORS, WALLS AROUND RESIDENTIAL UNITS, AND WALLS AROUND PUBLIC SPACES AND ALL EXTERIOR WALLS (UNLESS OTHERWISE SHOWN) TO BE:
  - WALLS TO BE RUNNING BOND
  - REINFORCEMENT:
    - HORIZONTAL REINFORCING: GALVANIZED DUROWALL LADDER WITH 9 GAUGE SIDE RODS AND 9 GAUGE CROSS RODS @ 400mm O/C
    - VERTICAL REINFORCEMENT: 15M @ 800mm O/C FOR WALLS UP TO 2400mm HIGH AND 2-15M @ 800mm O/C FOR HIGHER WALLS
    - EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
- VERTICAL REBAR TO BE TIED IN POSITION WITH SINGLE BARS AT CENTERLINE OF WALL AND DOUBLE BARS PLACED 12mm CLEAR COVER TO THE BLOCK EACH FACE.
- CONCRETE FILL IN WALLS TO BE fc = 25 MPA AT 28 DAYS, TRANSIT MIXED WITH SLUMP OF 150mm AND 10mm MAXIMUM AGGREGATE SIZE AND NO MORE THAN 2 HOURS OLD AT TIME OF PLACING - SEE SECTION ON CONCRETE NOTES.
- HEADERS OVER ALL OPENINGS TO BE 400mm DEEP WITH 2-15M BOND BEAM BOTTOM EXTENDING 600mm BEYOND EDGE OF ROUGH OPENING. OBTAIN SPECIAL DESIGN FOR HEADERS WIDER THAN 1800mm AND FOR HEADERS WITH CONCENTRATED LOADS ON WALLS ABOVE OPENINGS.
- COREFILLS WITH 2-15M VERTICAL EACH SIDE OF ALL OPENINGS FULL HEIGHT BETWEEN LATERAL SUPPORTS FOR WALLS. PROVIDE ONE EXTRA COREFILL FOR EACH VERTICAL REBAR CUT OFF AT THE OPENINGS AND AT EACH END AND EACH CORNER OF WALLS.
- COREFILL AT ALL LOCATIONS OF ANCHOR BOLTS TO THE WALL AND WHERE STEEL SECTIONS REST UPON OR CONNECT TO THE WALL.
- BOND BEAMS REQUIRED AT 2400mm O/C AND AT THE TOP OF EVERY WALL. PROVIDE 2-15M MINIMUM IN EACH BOND BEAM AND PROJECT COREFILLS INTO BOND BEAMS 130mm MINIMUM.
- TENSION LAP ALL VERTICAL REBAR AND STAGGER LAP ALL HORIZONTAL REBAR. PROVIDE CORNER BARS TO MATCH HORIZONTAL REBAR.
- WALLS BUILT ON CONCRETE SLABS SHALL HAVE 400mm DEEP BOND BEAM FULL LENGTH ALONG THE BOTTOM OF THE WALL WITH DOWELS FROM THE SLAB TO MATCH WALL VERTICAL REINFORCING. RESHORE UNDER THE SLAB TO CONSTRUCT THE WALL.
- PROVIDE LATERAL SUPPORT AT THE TOP OF ALL WALLS - SEE TYPICAL DETAILS.

NON-LOAD BEARING MASONRY WALLS

- WALLS OTHER THAN THOSE MENTIONED ABOVE INCLUDING WALLS AROUND STORAGE ROOMS EXCEPT ROOMS WITHIN RESIDENTIAL UNITS, BASEMENT PARTITIONS, ETC. (UNLESS OTHERWISE SHOWN) TO BE:
    - WALLS TO BE RUNNING BOND
    - PARTITIONS LESS THAN 1.9kPa AND UNDER 2.7m HIGH MAY BE UNREINFORCED.
    - REINFORCEMENT:
      - HORIZONTAL REINFORCING: GALVANIZED DUROWALL LADDER WITH 9 GAUGE SIDE RODS AND 9 GAUGE CROSS RODS @ 400mm O/C
      - VERTICAL REINFORCEMENT: 15M @ 1200mm O/C FOR WALLS UP TO 3.6m HIGH AND 2-15M @ 1200mm O/C FOR HIGHER WALLS UNLESS OTHERWISE SHOWN EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
  - VERTICAL REBAR TO BE TIED IN POSITION WITH SINGLE BARS AT CENTERLINE OF WALL AND DOUBLE BARS PLACED 12mm CLEAR COVER TO THE BLOCK EACH FACE.
  - CONCRETE FILL IN WALLS TO BE fc=25 MPA AT 28 DAYS, TRANSIT MIXED WITH SLUMP OF 150mm AND 10mm MAXIMUM AGGREGATE SIZE AND NO MORE THAN 2 HOURS OLD AT TIME OF PLACING - SEE SECTION ON CONCRETE NOTES.
  - HEADERS OVER ALL OPENINGS TO BE 400mm DEEP WITH 2-15M BOND BEAM BOTTOM EXTENDING 600mm BEYOND EDGE OF ROUGH OPENING. OBTAIN SPECIAL DESIGN FOR HEADERS WIDER THAN 1800mm.
  - COREFILLS WITH 2-15M VERTICAL EACH SIDE OF ALL OPENINGS FULL HEIGHT BETWEEN LATERAL SUPPORTS FOR WALLS. PROVIDE ONE EXTRA COREFILL FOR EACH VERTICAL REBAR CUT OFF AT THE OPENINGS AND AT EACH END AND EACH CORNER OF WALLS.
  - BOND BEAMS REQUIRED AT 2400mm O/C AND AT THE TOP OF EVERY WALL. PROVIDE 2-15M MINIMUM IN EACH BOND BEAM AND PROJECT COREFILLS INTO BOND BEAMS 130mm MINIMUM.
  - TENSION LAP ALL VERTICAL REBAR AND STAGGER LAP ALL HORIZONTAL REBAR. PROVIDE CORNER BARS TO MATCH HORIZONTAL REBAR.
  - WALLS BUILT ON CONCRETE SLABS SHALL HAVE 400mm DEEP BOND BEAM FULL LENGTH ALONG THE BOTTOM OF THE WALL WITH DOWELS FROM THE SLAB TO MATCH WALL VERTICAL REINFORCING. RESHORE UNDER THE SLAB TO CONSTRUCT THE WALL.
  - PROVIDE LATERAL SUPPORT AT THE TOP OF ALL WALLS - SEE TYPICAL DETAILS.
- PROVIDE DOWELS IN CONCRETE FOUNDATIONS TO MATCH VERTICAL REINFORCEMENT OF WALLS ABOVE.
  - PROVIDE CLEANOUTS AND INSPECTION HOLES AT THE BOTTOM OF ALL CORES CONTAINING REINFORCING WHERE THE POUR LIFT OF THE CORE EXCEED 1.5m IN HEIGHT. CLEAN ALL INTERNAL FINS.
  - PROVIDE SPECIAL PROCEDURES FOR CONCRETE CONSOLIDATION SUCH AS PUDDLING WHERE THE POUR LIFT OF THE CORE EXCEEDS 1.5m IN HEIGHT. CORES SHALL NOT BE CAST HIGHER THAN 3.3m.
  - IN FREEZING WEATHER THE GROUT SHALL BE HEATED USING BOTH HEATED AGGREGATE AND HOT WATER SUCH THAT THE MIX IS ABOVE 20 DEGREES CELSIUS AT THE TIME OF PLACING AND THE CONCRETE DOES NOT FREEZE FOR A PERIOD OF 24 HOURS FOLLOWING PLACING. OBTAIN THE INSTRUCTIONS OF THE MATERIALS CONSULTANT.
  - IN NON-STRUCTURAL WALLS, PROVIDE SHRINKAGE CONTROL JOINTS OVER 6m IN LENGTH AT 6m MAXIMUM SPACING. HORIZONTAL REINFORCING TO BE 50% DISCONTINUOUS ACROSS CONTROL JOINTS. CONTROL JOINTS NOT TO BE PLACED IMMEDIATELY ADJACENT TO OPENINGS UNLESS APPROVED BY THE ENGINEER. SEE ARCHITECTURAL FOR LOCATIONS AND FOR DETAILS OF THE CONTROL JOINT. PROVIDE PLASTIC OR METAL SLEEVE AROUND REBAR REINFORCING CROSSING CONTROL JOINTS.
  - IN STRUCTURAL WALLS, PROVIDE SHRINKAGE CONTROL JOINTS ONLY AS SHOWN ON THE STRUCTURAL DRAWINGS.
  - CONCRETE CONTRACTOR TO PROVIDE FOR DOVETAIL ANCHOR SLOTS AT LOCATIONS WHERE MASONRY WALLS MEET CONCRETE COLUMNS OR WALLS. STEEL CONTRACTORS TO PROVIDE MASONRY ANCHOR STRAPS 3mm THICK, 40mm WIDE X 150mm LONG WITH 25mm LEG AT 800mm O/C VERTICALLY TO ALL STEEL COLUMNS WHERE MASONRY WALLS MEET SUCH COLUMNS. PROVIDE COREFILLS NEXT TO ALL CONCRETE OR STEEL WALLS OR COLUMNS. MASONRY CONTRACTOR TO COORDINATE REQUIREMENTS FOR THE MASONRY WALLS WITH STEEL AND CONCRETE CONTRACTORS.
  - OBSERVE THE SLAB DESIGN LIVE LOADS AND DO NOT PLACE MATERIALS ON SLABS WHICH EXCEED THE DESIGN LIVE LOADS.

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%/IFT	2019-03-27
6	Issued for 99%/IFC	2018-12-13
5	Issued for 99%/IFC	2018-04-12
4	Issued for 99%/IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision Client / client	Description / Description	Date / Date
-------------------------------------	---------------------------	-------------



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par

Approver

Designed by/Concept par

Designer

Drawn by/Dessine par

Author

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

GENERAL NOTES

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
------------------------------	-----------------	--------------------------------

S106

9





36. WOOD FRAMING

1.

WOOD FRAMING HAS BEEN DESIGNED IN ACCORDANCE WITH APPLICABLE PROJECT CODES. ALL FRAMING TO BE SEASONED LUMBER OF SHAPES AND SIZES INDICATED ON THE PLAN. SUBSTITUTIONS SHALL BE SUBMITTED IN WRITING TO GLOTMAN-SIMPSON FOR APPROVAL PRIOR TO CONSTRUCTION.

2.

ALL STRUCTURAL LUMBER TO BE STAMPED BY MANUFACTURER INDICATING GRADE AS FOLLOWS EXCEPT AS NOTED:
- JOISTS & BUILT-UP BEAMS:

EXTERIOR STUDS AND STAND ALONE COLUMNS:

INTERIOR STUD WALLS:

SPRUCE-PINE-FIR NO 2 OR D. FIR NO. 2 OR BETTER

SPRUCE-PINE-FIR NO 2 OR BETTER (FINGER JOINTED STUDS NOT ACCEPTABLE FOR EXTERIOR STUDS)

SPRUCE-PINE-FIR STUD GRADE OR BETTER
4.

FINGER JOINTED STUDS MAY BE USED ONLY FOR WALLS WITHOUT LATERAL FORCES DUE TO WIND OR SEISMIC AND WHERE TENSION FORCES MAY RESULT. FINGER JOINTED STUDS SHALL NOT BE USED AT HOLD DOWN ANCHORS OR HOLD DOWN STRAPS AS LOCATED ON PLAN. EXTERIOR WALLS OR WALLS WITH HEAVY ATTACHED FINISH MATERIALS SUCH AS STONE FOR EXAMPLE.

NOTE: ALL FINGER JOINTED STUDS SHALL BE MADE WITH HEAT RESISTIVE ADHEISIVE. REJECT ANY LUMBER WITH SPLITS OR CHECKS GREATER THAN 1.5mm, LOOSE KNOTS, OR TIGHT KNOTS LARGER THAN 1/4 THE MEMBER DEPTH.

FLOOR JOISTS MAY BE TJ OR MINIMUM 2X10 AT 400 O/C TYPICAL UNLESS NOTED. DO NOT MIX SAWN LUMBER AND TJ JOISTS IN SAME AREA.

PROVIDE DOUBLE JOISTS UNDER ALL PARTITION WALLS. SAWN LUMBER FLOOR JOISTS TO HAVE KNOTS ONLY ON THE UPPER SIDE OF THE JOIST. JOISTS WITH KNOTS ON THE BOTTOM (TENSION) FACE SHALL BE REPLACED.

LINTELS AND BEAMS TO BE CLEAR LUMBER OR WITH TIGHT KNOTS ON THE UPPER SIDE OF THE BEAM ONLY. FOR NAILING AND BOLTING SEE MINIMUM REQUIREMENTS BELOW. PROVIDE ONE TOP PLATE MINIMUM CONTINUOUS OVER BEAMS AND EXTEND 1500mm BEYOND END OF BEAM TO LAP AND NAIL TO ADJACENT PLATES WITH 75mm NAILS AT 150mm O/C.

ALL FRAMING, BRIDGING, BLOCKING, NAILING AND OTHER DETAILS NOT SPECIFIED ON DRAWINGS TO CONFORM TO CANADIAN MORTGAGE AND HOUSING CORPORATION STANDARDS, APPLICABLE PROJECT CODES, AND GOOD WORK PRACTICE.

COLUMNS MADE OF LAMINATED STUDS UNDER ALL BUILT-UP LINTELS AND BEAMS TO MATCH WIDTH OF BEAM (MINIMUM NUMBER OF STUDS TO EQUAL NUMBER OF BEAM LAMINATIONS). TO SUPPORT ENGINEERED WOOD BEAMS, PROVIDE ONE ADDITIONAL STUD (MINIMUM NUMBER OF STUDS TO MATCH WIDTH OF BEAM PLUS ONE STUD). ENSURE THAT POSTS AND COLUMNS ARE CONTINUOUS THROUGH ALL FLOORS TO FOUNDATIONS WITH SOLID BLOCKING WITHIN FLOOR LEVELS.

PROVIDE FULL BEARING UNDER ALL POSTS. PROVIDE ADDITIONAL BLOCKING AS REQUIRED TO CARRY VERTICAL LOADS THROUGH TO THE FOUNDATION WITH THE BEARING AREA GREATER THAN THE AREA OF THE POST.

PROVIDE DOUBLE BOTTOM PLATES FOR AT THE BASE OF ALL WALLS WHERE CONNECTION IS MADE TO FOUNDATIONS.

SHEATHING UN

ROOFS

WALLS

FLOORS

12mm PLYWOOD

12mm PLYWOOD

5/8" T&G D.FIR PLYWOOD GLUE & NAIL

75mm COMMON NAILS @ 150mm EDGES & 300mm INTERIOR

75mm COMMON NAILS @ 150mm EDGES & 300mm INTERIOR

75mm COMMON NAILS@ 150mm EDGES & 300mm INTERIOR

SHEATHING TO BE COFI PLYWOOD EXTERIOR GRADE SHEATHING PLACED WITH GRAIN PERPENDICULAR TO JOISTS OR STUDS AND WITH STAGGERED JOINTS.

14.

PROVIDE BRIDGING BETWEEN JOISTS AT 2.1m CENTRES MAXIMUM AND UNDER ALL PARTITION WALLS PERPENDICULAR TO FRAMING DIRECTION. USE ONLY 2X2 DIAGONAL CROSS BRACING WITHIN THE SPAN. IF SOLID BRIDGING IS INDICATED, PROVIDE AS ADDITIONAL TO 2X2 CROSS BRIDGING. PROVIDE SOLID BLOCKING AT ALL SUPPORTS BETWEEN JOISTS. PROVIDE A MINIMUM OF 2 TOE NAILS FROM EACH BLOCKING MEMBER TO THE TOP PLATE EXCEPT AT SHEAR WALLS WHERE A MINIMUM OF 4 TOE NAILS ARE REQUIRED EACH BLOCKING MEMBER.

15.

STUDS AND JOISTS TO ALIGN AT BEARING WALLS. PROVIDE TWO 2X TOP PLATES LAPPED 1500mm MINIMUM AND NAILED WITH 75mm NAILS AT 150mm O/C STAGGERED ALONG LAP.

16.

STEEL CONNECTORS FOR WOOD MEMBERS SHALL BE CSA APPROVED COMMERCIALY AVAILABLE PIECES WITH RATED LOAD CAPACITIES. SEE NOTES FOR CONNECTORS TO PRESERVATIVE TREATED LUMBER.

17.

PROVIDE JOIST OR BEAM HANGERS FOR ALL FLUSH CONNECTIONS. PRESSURE BLOCKING IS NOT PERMITTED.

18.

PROVIDE POST BASE AND POST CAP SUPPORTS FOR ALL COLUMNS AND BUILT-UP POSTS WHICH ARE NOT WITHIN WALLS

19.

BUILT-UP BEAMS:

2-PLY:

3-PLY:

4-PLY:

5 OR MORE:

75mm COMMON NAILS - 3 ROWS AT 300mm ONE SIDE

75mm COMMON NAILS - 3 ROWS AT 300mm EACH SIDE

75mm COMMON NAILS - 3 ROWS AT 300mm TO PREVIOUS PLY

75mm COMMON NAILS - 3 ROWS AT 300mm TO PREVIOUS PLY PLUS 12mm MACHINE BOLTS C/W WASHERS - ONE TOP AND BOTTOM ADJACENT ANY BEAM CONNECTOR OR POST ABOVE PLUS ONE TOP AND BOTTOM AT SUPPORT. BOLTS AT SUPPORT REQUIRED ONLY FOR BEAMS OVER 3-PLY.

BLOCK NARROW BEAMS TO FULL WIDTH OF STUD WALL. ALL BEAMS TO BE FRAMED FLUSH WITH TOP OF JOISTS UNLESS NOTED ON PLANS OR OTHERWISE APPROVED BY GLOTMAN-SIMPSON. PROVIDE ADDITIONAL 2-2X10 DROPPED MINIMUM DIRECTLY OVER WINDOW/DOOR HEADERS UNLESS NOTED OTHERWISE ON PLANS AND CONFIRM WITH GLOTMAN-SIMPSON.

20.

BUILT-UP STUD POSTS:

2-PLY:

3-PLY:

4-PLY:

5 OR MORE:

75mm COMMON NAILS - 3 ROWS AT 300mm ONE SIDE

75mm COMMON NAILS - 3 ROWS AT 300mm EACH SIDE

75mm COMMON NAILS - 3 ROWS AT 300mm TO PREVIOUS PLY

75mm COMMON NAILS - 3 ROWS AT 300mm TO PREVIOUS PLY PLUS 12mm MACHINE BOLTS C/W WASHERS - ONE TOP AND BOTTOM AND AT 1800mm MAX CENTRES.

POSTS OVER 2.4m HIGH PROVIDE 12mm MACHINE BOLTS C/W WASHERS TOP AND BOTTOM AND AT 1800mm CENTRES OVER FULL HEIGHT OF POST.

21.

STEEL MEMBERS USED IN FRAMING SHALL FIT TIGHT TO WOOD MEMBERS. BE SHOP PRIMED WITH RUST INHIBITIVE PAINT (EXCEPT AS REQUIRED FOR TREATED LUMBER), AND BE COORDINATED WITH THE ARCHITECTURAL FINISHES TO ENSURE NO ENCROACHMENT UPON FINAL FINISHED SURFACES.

22.

MAXIMUM HEIGHT FOR INTERIOR NON-LOAD BEARING 2X4 INTERIOR PARTITION WALLS IS 4.3 METERS. MAXIMUM HEIGHT FOR INTERIOR NON-LOAD BEARING 2X6 INTERIOR PARTITION WALLS IS 6.9m

23.

PROVIDE PRESERVATIVE TREATED LUMBER WITH SUITABLE CONNECTORS WHERE CONSTRUCTION IS OUTDOOR OR IN POTENTIALLY MOIST LOCATIONS OR IN DIRECT CONTACT WITH CONCRETE OR MASONRY EXTERIOR WALLS. CRAWLSPACE PONY WALLS SHALL HAVE PRESERVATIVE TREATED SILL PLATES. NOTES FOR CONNECTORS FOR PERSERVATIVE TREATED LUMBER.

24.

GLULAM AND PARALLAM FABRICATION TO CONFORM TO CSA 0122 AND SHALL BE MANUFACTURED IN PLANTS CERTIFIED BY CSA 0177. DESIGN TO CONFORM TO APPLICABLE CODES

25.

GLULAM BEAMS TO BE 24F-E SINGLE BENDING GRADE FOR SINGLE SPAN BEAMS AND 24F-EX DOUBLE BENDING GRADE FOR MULTIPLE SPAN BEAMS. GLULAM COLUMNS TO BE 24F-EX DOUBLE BENDING GRADE. ALL GLULAM BEAMS AND COLUMNS TO BE EXTERIOR SERVICE GRADE REGARDLESS OF THEIR POSITION IN THE BUILDING AND FEATURED AS REQUIRED BY THE ARCHITECT. ARCHITECTURAL FINISH GRADE MEMBERS TO BE STAMPED WITH MANUFACTURER'S IDENTIFICATION MARK ON TOP FACE.

26.

PROVIDE STEEL CONNECTORS FOR ALL GLULAM CONNECTIONS. ALL HARDWARE HANGERS, CONNECTORS, ETC. REQUIRED FOR GLULAM COLUMNS AND BEAMS TO BE SPECIFIED AND SUPPLIED BY GLULAM MANUFACTURER. SHOP DRAWINGS AND ERECTION DRAWINGS ARE REQUIRED FOR ALL GLULAMS, GLULAM HARDWARE, HANGERS, CONNECTORS, ETC. SUBMIT SHOP DRAWINGS AND ERECTION DRAWINGS TO GLOTMAN SIMPSON FOR REVIEW PRIOR TO FABRICATION.

27.

GLULAM, PARALLAM, AND MICROLAM IF ANY TO BE DELIVERED AND ERECTED WITH WATERPROOF WRAPPING IN PLACE. MAINTAIN WEATHERPROOF COVERING UNTIL BUILDING IS ENCLOSED

28.

GLULAM, PARALLAM, AND MICROLAM IF ANY TO BE CONNECTED WITH BOLTED OR LAGGED CONNECTIONS WITH STEEL CONNECTOR PLATES UNLESS NOTED. PROVIDE STEEL CONNECTORS WITH RATED LOAD CAPACITIES FOR THE LOADS GIVEN ON THE DRAWINGS. FOR CONNECTIONS WITH NO LOADS INDICATED, SUPPLY CONNECTORS WITH CAPACITIES EQUAL TO OR GREATER THAN THE SHEAR CAPACITY OF THE SUPPORTED MEMBER. SPECIALLY FABRICATED CONNECTORS TO BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THIS JURISDICTION.

29.

INSTALL ALL TRUS JOIST PRODUCTS IF ANY IN STRICT ACCORDANCE WITH TRUS JOIST SPECIFICATIONS. MAINTAIN A DRY ENVIRONMENT FOR ALL TRUS JOIST PRODUCTS.

30.

TRUS JOIST MACMILLAN LTD. TO PROVIDE DETAILS OF REQUIRED BLOCKING, BRIDGING AND CONNECTION DETAILS FOR TRUS JOIST PRODUCTS.

31.

MICROLAM OR PARALLAM BEAMS IF ANY AS MANUFACTURED BY TRUS JOIST LTD. STRUCTURAL PROPERTIES AS SUPPLIED AND WARRANTED BY THE MANUFACTURER. MICROLAM TO BE MINIMUM 1.8E MICROLAM LVL AND PARALLAMS TO BE A MINIMUM 2.0E PARALLAM PSL.

32.

ENGINEERED WOOD FLOORS IF ANY ARE DESIGNED USING TRUS JOIST MACMILLAN PRODUCTS. IF A SPECIFIED MEMBER IS NO LONGER AVAILABLE, SUBSTITUTE A MEMBER OF CURRENT SPECIFICATION WITH EQUAL OR GREATER STRENGTH AND STIFFNESS.

33.

ANY PROPOSED ALTERNATE FRAMING SYSTEMS MUST USE CCMC EVALUATED PRODUCTS. PROVIDE CCMC EVALUATION REPORT AS REQUESTED BY ENGINEER. ANY PRODUCT PROPOSED AS AN ALTERNATE MUST HAVE EQUAL OR GREATER STRENGTH AND STIFFNESS CHARACTERISTICS THAN THE SPECIFIED DESIGN. IT IS THE RESPONSIBILITY OF THE SUPPLIER OF THE ALTERNATE PRODUCT TO PROVIDE SUFFICIENT DATA TO PROVE THEIR PRODUCT. WHEN SUPPLYING THIS INFORMATION TO GLOTMAN-SIMPSON, THE SUPPLIER SHALL LIST THEIR PROPOSED ALTERNATIVE ALONG WITH THE SPECIFIED DESIGN MEMBER AND LIST THE COMPARATIVE STRENGTH AND STIFFNESS CHARACTERISTICS OF BOTH PRODUCTS. THESE CHARACTERISTICS MUST EITHER BE BOTH IN WORKING STRESS DESIGN FORMAT OR BOTH IN LIMIT STATES DESIGN FORMAT AND MUST BE DIRECTLY COMPARABLE VALUES.

34.

MICROLAM BEAMS OVER 2 LAMINATIONS TO BE NAILED AND BOLTED AS NOTED ABOVE EXCEPT WITH 20 MM DIAMETER BOLTS. ADDITIONALLY, PROVIDE 20mm DIA. MACHINE BOLTS ALTERNATE TOP AND BOTTOM AT 600mm O/C.

35.

BOLTS TO BE A307 MACHINE BOLTS WITH WASHERS EACH END IN TIGHT FIT DRILLED HOLE.

36.

REDI-ROD TO BE A MINIMUM OF 36 KSI YIELD STEEL.

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest

Glottman · Simpson  
CONSULTING ENGINEERS

1661 West 5<sup>th</sup> Avenue  
Vancouver, BC V6J 1N5  
T: 604.734.8822  
F: 604.734.8842  
www.glottmansimpson.com

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glottman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.

9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13

No:	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision	Description / Description	Date / Date
Client / client		

Parks Canada

Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

GENERAL NOTES

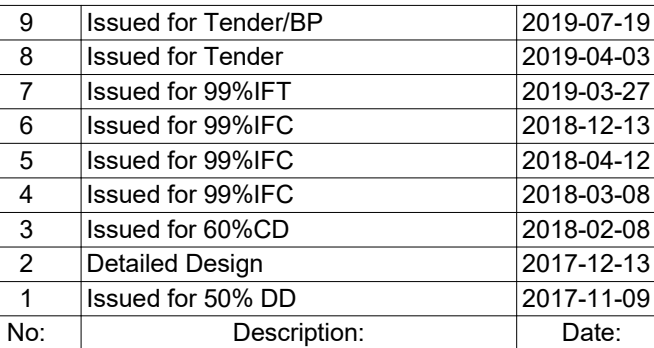
Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no
------------------------------	-----------------	-------------------------------

S107

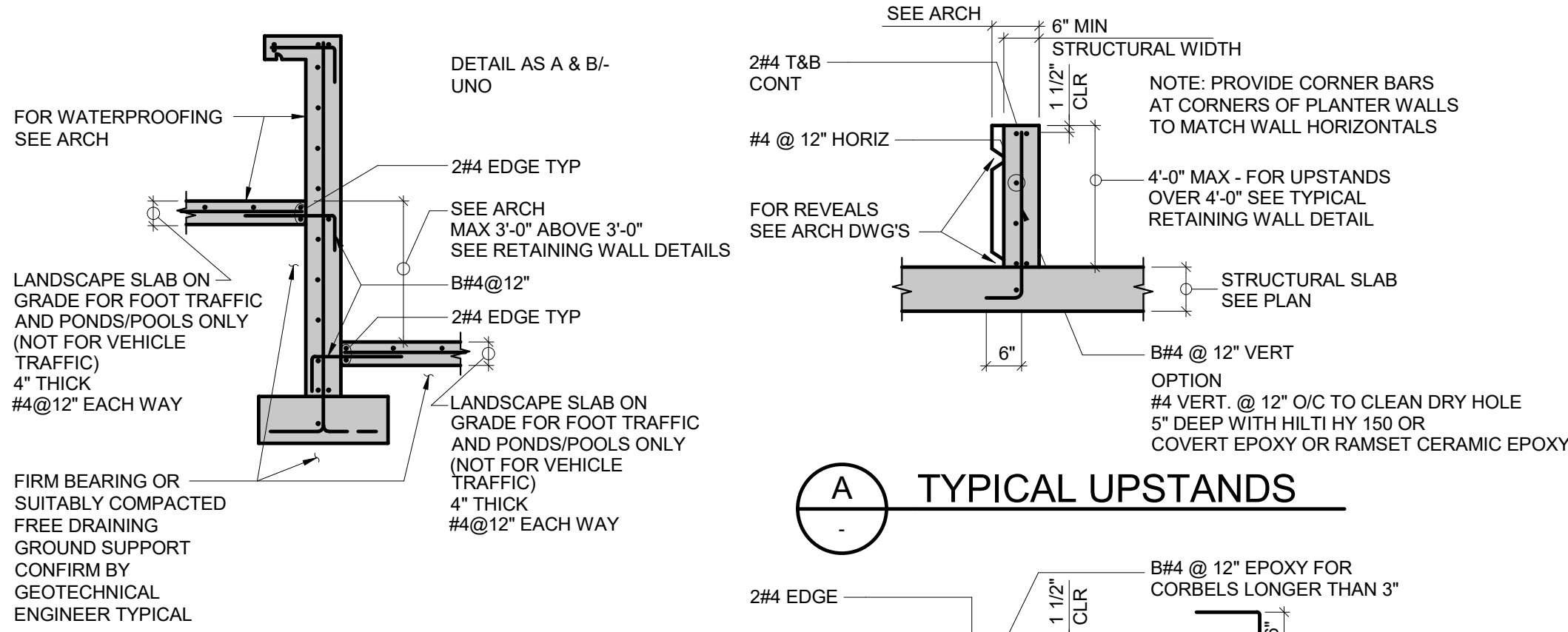
9

PWGSC - A1 - 841 X 594

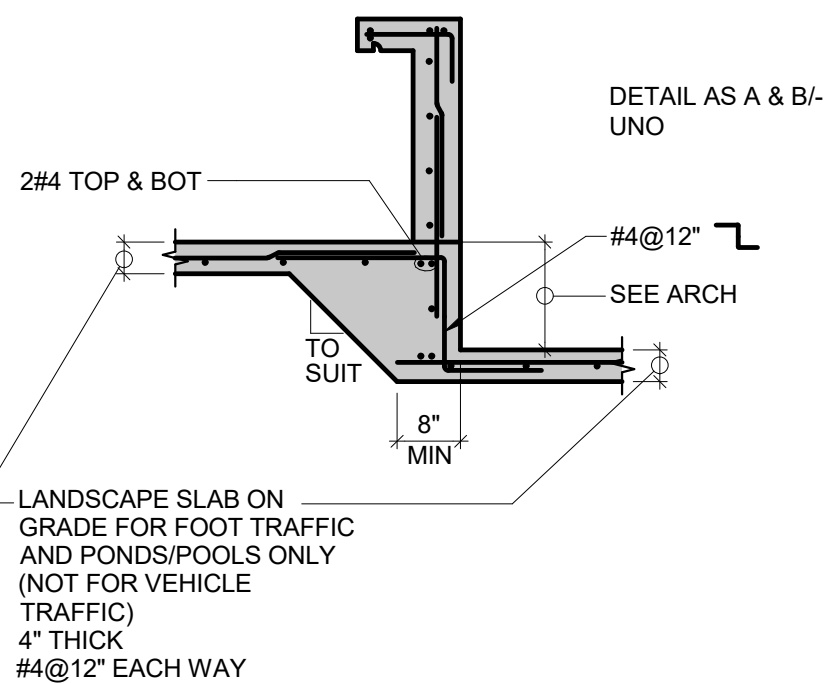








D LANDSCAPE WALLS



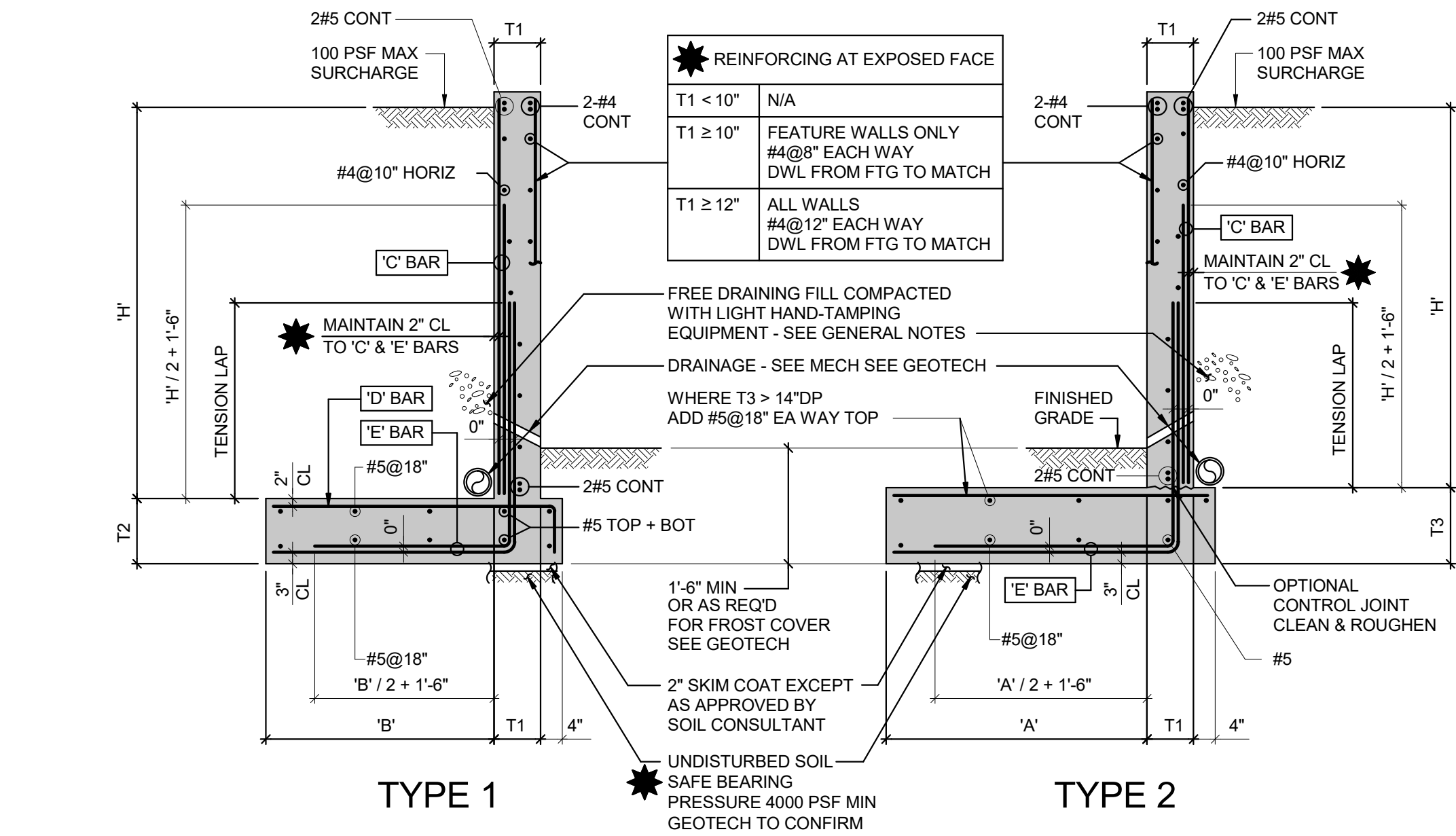
E LANDSCAPE WALLS

5 LANDSCAPE WALL DETAILS

S201

NTS

GSC-LSC1B-2



TYPE 1

TYPE 2

'H'	'B'	'A'	T1	T2	T3	'C' BAR	'D' BAR	'E' BAR	TENSION LAP
2'-0"	1'-0"	1'-0"	6"	10"	12"	N/A	B#4@12"	B#4 ALT@12"	2'-6"
2'-1" TO 4'-0"	2'-0"	2'-0"	8"	12"	14"	#4 ALT@10"	B#4@10"	B#4 ALT@10"	2'-6"
4'-1" TO 6'-0"	3'-6"	4'-0"	8"	12"	14"	#5 ALT@12"	B#5@12"	B#5 ALT@12"	3'-0"
6'-1" TO 8'-0"	5'-0"	6'-6"	8"	12"	14"	#5 ALT@6"	B#5@9"	B#5 ALT@6"	3'-0"
8'-1" TO 10'-0"	6'-6"	8'-6"	10"	14"	16"	#6 ALT@6"	B#6@9"	B#6 ALT@6"	3'-6"
10'-1" TO 12'-0"	8'-6"	10'-6"	12"	16"	18"	#6 ALT@5"	B#6@5"	B#6 ALT@5"	3'-6"
12'-1" TO 14'-0"	11'-0"	13'-6"	12"	18"	20"	#6 ALT@3"	B#6@5"	B#6 ALT@3"	3'-6"
14'-1" TO 16'-0"	14'-6"	15'-6"	14"	20"	22"	#6 ALT@2 1/2"	B#6@4"	B#6 ALT@2 1/2"	3'-6"

6 RETAINING WALL DETAILS

S202.1

NTS

GSC-RET1B-8

SOFTWOOD LUMBER		
SIZE NOMINAL	ACTUAL INCHES	ACTUAL mm
2x4	3 1/2"	38x89
2x6	5 1/2"	38x140
2x8	7 1/2"	38x191
2x8	7 1/4"	38x184
2x10	9 1/2"	38x241
2x10	9 1/4"	38x235
2x12	11 1/2"	38x292
2x12	11 1/4"	38x286

NOTE: DIMENSION CONVERSIONS ARE APPROXIMATE AND MAY VARY BETWEEN VARIOUS ENGINEERED PRODUCTS/ MANUFACTURERS OR SUPPLIERS

3 SOFTWOOD LUMBER SPEC

1 : 20

## DIMENSION CONVERSION

ENGINEERED JOISTS (DEPTH)		
NOMINAL	ACTUAL INCHES	ACTUAL mm
10	9 1/2"	241
12	11 7/8"	302
14	14"	356
16	16"	406
18	18"	457
20	20"	508
22	22"	559
24	24"	610

NOTE: DIMENSION CONVERSIONS ARE APPROXIMATE AND MAY VARY BETWEEN VARIOUS ENGINEERED PRODUCTS/ MANUFACTURERS OR SUPPLIERS

4 ENGINEERED JOIST SPEC

1 : 20

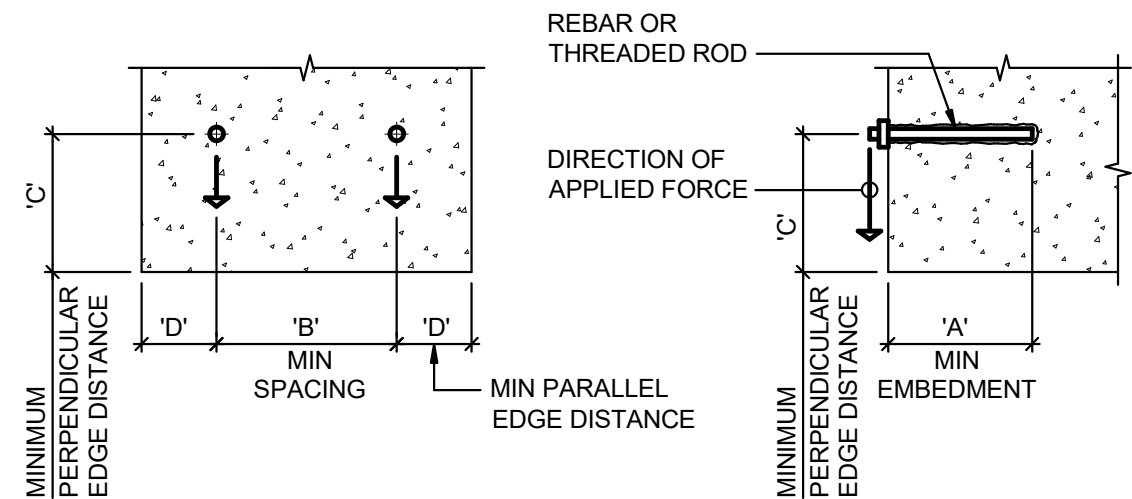
## DIMENSION CONVERSION

Table 1: Minimum Embedment Lengths for Rebar Using Hilti HY200								
BAR SIZE	f <sub>c</sub> =2000psi MINIMUM				f <sub>c</sub> =4000psi AND GREATER			
	'A'	'B'	'C'	'D'	'A'	'B'	'C'	'D'
#3, #4	8"	9"	9"	8"	6"	6"	6"	6"
#5, #6	13"	15"	15"	13"	10"	11"	11"	10"
#7, #8	16"	19"	19"	16"	14"	15"	15"	14"
#9, #10	20"	23"	23"	20"	18"	21"	21"	18"
#11	20"	25"	25"	20"	20"	24"	24"	20"

NOTE: ENGINEER OF RECORD MUST BE CONSULTED IF EDGE CONDITIONS AND/OR SPACING DO NOT MEET THE MINIMUM REQUIREMENTS SPECIFIED ABOVE.

Table 2: Minimum Embedment Lengths for Threaded Rods Using Hilti HY200								
THREADED ROD SIZE	f <sub>c</sub> =2000psi MINIMUM				f <sub>c</sub> =4000psi AND GREATER			
	'A'	'B'	'C'	'D'	'A'	'B'	'C'	'D'
3/8", 1/2"	6"	9"	9"	6"	4"	6"	6"	4"
5/8", 3/4"	10"	15"	15"	10"	7"	11"	11"	7"
7/8", 1"	13"	19"	19"	13"	10"	15"	15"	10"
1 1/4"	15"	23"	23"	15"	14"	21"	21"	14"

NOTE: ENGINEER OF RECORD MUST BE CONSULTED IF EDGE CONDITIONS AND/OR SPACING DO NOT MEET THE MINIMUM REQUIREMENTS SPECIFIED ABOVE.



NOTES:

- ALL ADHESIVE ANCHORS TO BE HILTI HY200 ICC ESR 3187 (LARR 25964) OR RE500 ICC ESR 2322 (LARR 25700).
- THIS DETAIL APPLIES TO THREADED B7 ROD (HAS STANDARD ASTM A36) OR FOR EMBEDMENT OF REINFORCING BARS.
- ANCHORS TO BE INSTALLED IN CLEAN DRY HOLE WITH EMBEDMENT AND SPACING AS SPECIFIED IN THE MINIMUM EMBEDMENT TABLE 1 OR TABLE 2. CLEAN HOLES WITH HIGH PRESSURE AIR PLUS HILTI BRUSH UNTIL ALL MATERIAL IS REMOVED AND FINAL BRUSHING RESULTS IN CLEAR AIR WHEN BLOWN OUT.
- INSTALLATION AND MATERIALS TO CONFORM TO HILTI REQUIREMENTS. INSTALLATION TO BE PERFORMED BY HILTI TRAINED AND CERTIFIED INSTALLER.
- SEE GENERAL NOTES FOR FURTHER REQUIREMENTS.
- SPECIAL INSPECTION OF ANCHOR INSTALLATION IS REQUIRED.

1 ADHESIVE ANCHORS

NTS

GSC-ANC1A-2

COLUMN SCHEDULE			
LEVEL	f <sub>c</sub> MPa	1	TIES
MAIN FLOOR		HOOK 90° TO TOP OF SLAB TYP	MAIN
PARKADE	45 MPa	300x600 8-30M DOWEL TO MATCH COLUMN VERT TYP UNO	PARKADE 10M@300

ENGINEERED BEAMS (DEPTH)		
NOMINAL	ACTUAL INCHES	ACTUAL mm
4	3 1/2"	89
6	5 1/2"	140
8	7 1/4"	184
10	9 1/4"	235
10	9 1/2"	241
12	11 1/4"	286
12	11 7/8"	302
14	14"	356
16	16"	406
18	18"	457
19	18 3/4"	476
19	19"	483
20	20"	508
22	22"	559
24	24"	610

NOTE: DIMENSION CONVERSIONS ARE APPROXIMATE AND MAY VARY BETWEEN VARIOUS ENGINEERED PRODUCTS/ MANUFACTURERS OR SUPPLIERS

ENGINEERED BEAMS (WIDTH)		
NOMINAL	ACTUAL INCHES	ACTUAL mm
2	1 1/2"	38
2	1 3/4"	44
3.5	3 1/2"	89
5.25	5 1/4"	133
7	7"	178

2 ENGINEERED BEAM SPEC DIMENSION CONVERSION

1 : 20

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.

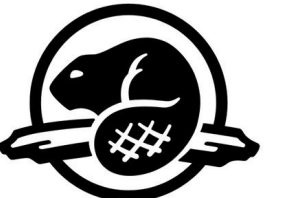


9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08

No: Description: Date:

Revisions

Revision / Revision Description / Description Date / Date  
Client / client



Parks Canada Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessiné par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

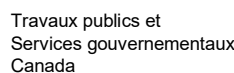
SCHEDULES

Project No. / No. du project  
Sheet / Feuille  
Revision no. / La Révision no.

S121

9

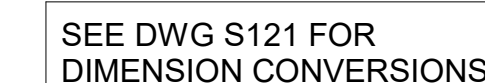




**Glottman · Simpson**  
CONSULTING ENGINEERS

1661 West 5<sup>th</sup> Avenue  
Vancouver, BC V6J 1N5  
T: 604.734.8822  
F: 604.734.8842  
[www.glottmansimpson.com](http://www.glottmansimpson.com)

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

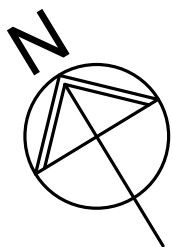
RevisionsClient / clientRevisión no. /  
La Révision

1 : 100  
NAM/LCE

STRIP FOOTING SCHEDULE				
Mark	Width	Depth	Description	Reinforcing
SF1	810	305	OFFSET	
SF2	914	305	CENTERED	







Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No.	Description	Date
-----	-------------	------

Revisions		
Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessiné par  
Author  
Project Manager/Administrateur de Projets

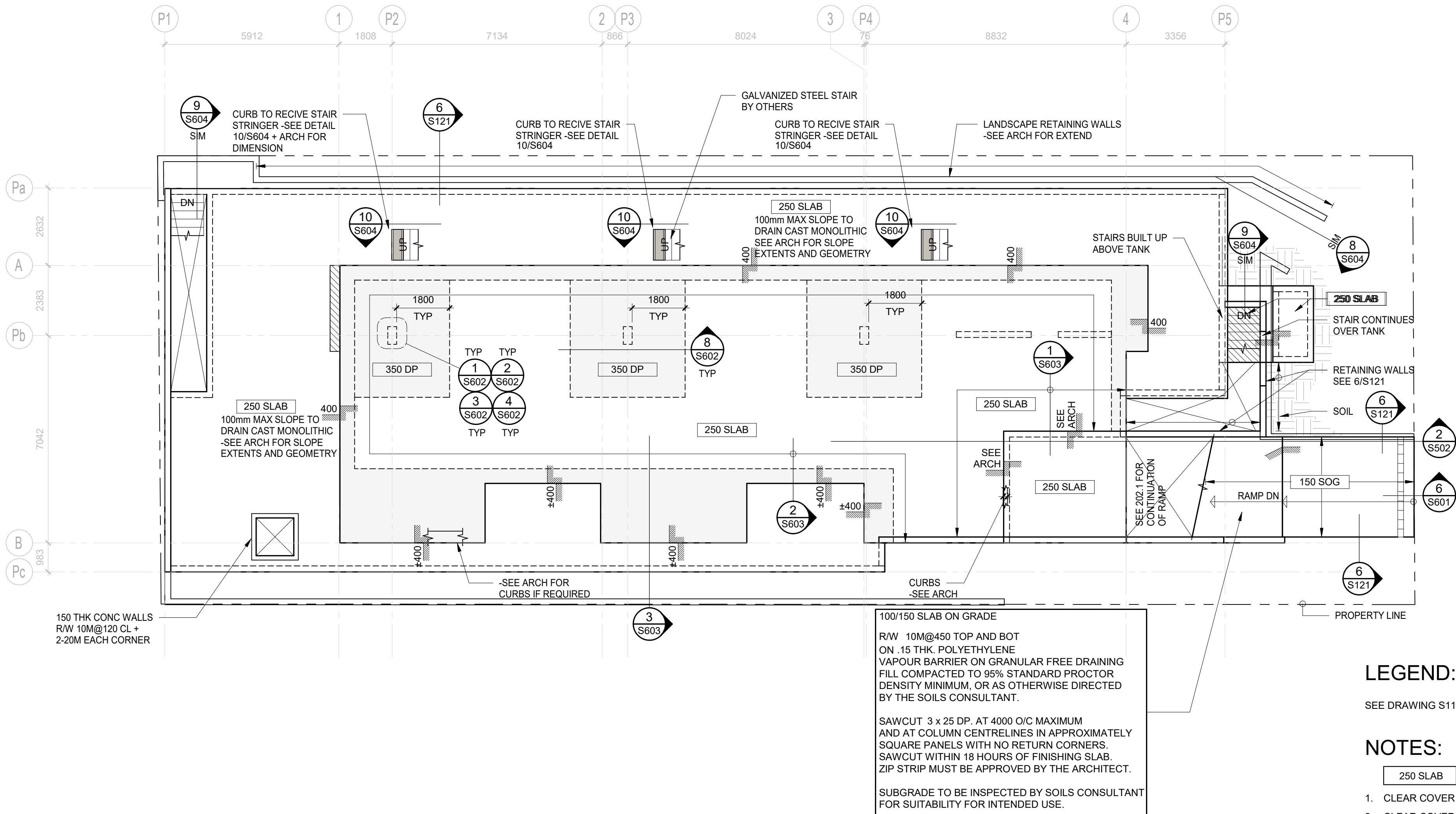
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

MAIN FLOOR PLAN - CONCRETE OUTLINE

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	<b>S202.1</b>	<b>9</b>



### MAIN FLOOR PLAN - CONCRETE OUTLINE

1 : 100  
NAM/LCB

### LEGEND:

SEE DRAWING S111 FOR LEGEND

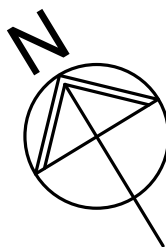
### NOTES:

- CLEAR COVER TOP -20
- CLEAR COVER BOTTOM -25
- TEMPERATURE REBAR -SEE GENERAL NOTES, S100 SERIES DWGS. PROVIDE TEMPERATURE REBAR BOTTOM UPPER LAYER WITH STAGGERED TENSION LAPS IN ALL SLAB AREAS U/N. PROVIDE TEMPERATURE REBAR TWO DIRECTIONS BOTTOM IN ALL SLAB AREAS WHERE BOTTOM STEEL IS NOT OTHERWISE INDICATED, INCLUDING CANTILEVERED SLABS.
- REBAR MAY BE SHOWN ON SECTIONS AND NOT SHOWN ON PLANS SEE SECTIONS.
- FOR TYPICAL DETAILS SEE S600 SERIES DRAWINGS
- CONFIRM ALL SLAB ELEVATIONS, STEPS, SLOPES, AND OPENINGS WITH ARCHITECTURAL AND OTHER CONSULTANT DRAWINGS.
- ROUGHEN SLABS AT SHEARWALL INTERFACES.
- BALCONIES AND ROOF AREAS TO BE SLOPED TO DRAIN. SEE ARCHITECTURAL FOR CONCRETE OUTLINES AND SLOPES.
- PROVIDE TAPERED TOPPING ON SLAB AT BALCONIES TO DRAIN (SEE ARCH. - MAX. 38mm THICK)
- PROVIDE CAMBER TO SLABS AS SHOWN AND AS INDICATED IN THE GENERAL NOTES.
- PROVIDE NON-STRUCTURAL TOPPING AS REQUIRED TO ACHIEVE BOTH ARCHITECTURAL FLATNESS REQUIREMENTS AND FLOOR FINISH TOLERANCES.
- RESHORE TO CAST UPSTANDS OR WALLS ABOVE.
- PROVIDE SHORING AND RE-SHORING PROCEDURES TO ENSURE CONSTRUCTION LOADS DO NOT EXCEED THE SPECIFIED DESIGN LIVE LOAD. SEE GENERAL NOTES.
- FOR ALL DRAINAGE AND WATERPROOFING SEE ARCH.

SEE DWG S121 FOR  
DIMENSION CONVERSIONS







Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

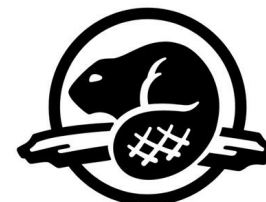
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
No:	Description:	Date:

Revisions

Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessiné par  
Author  
Project Manager/Administrateur de Projets

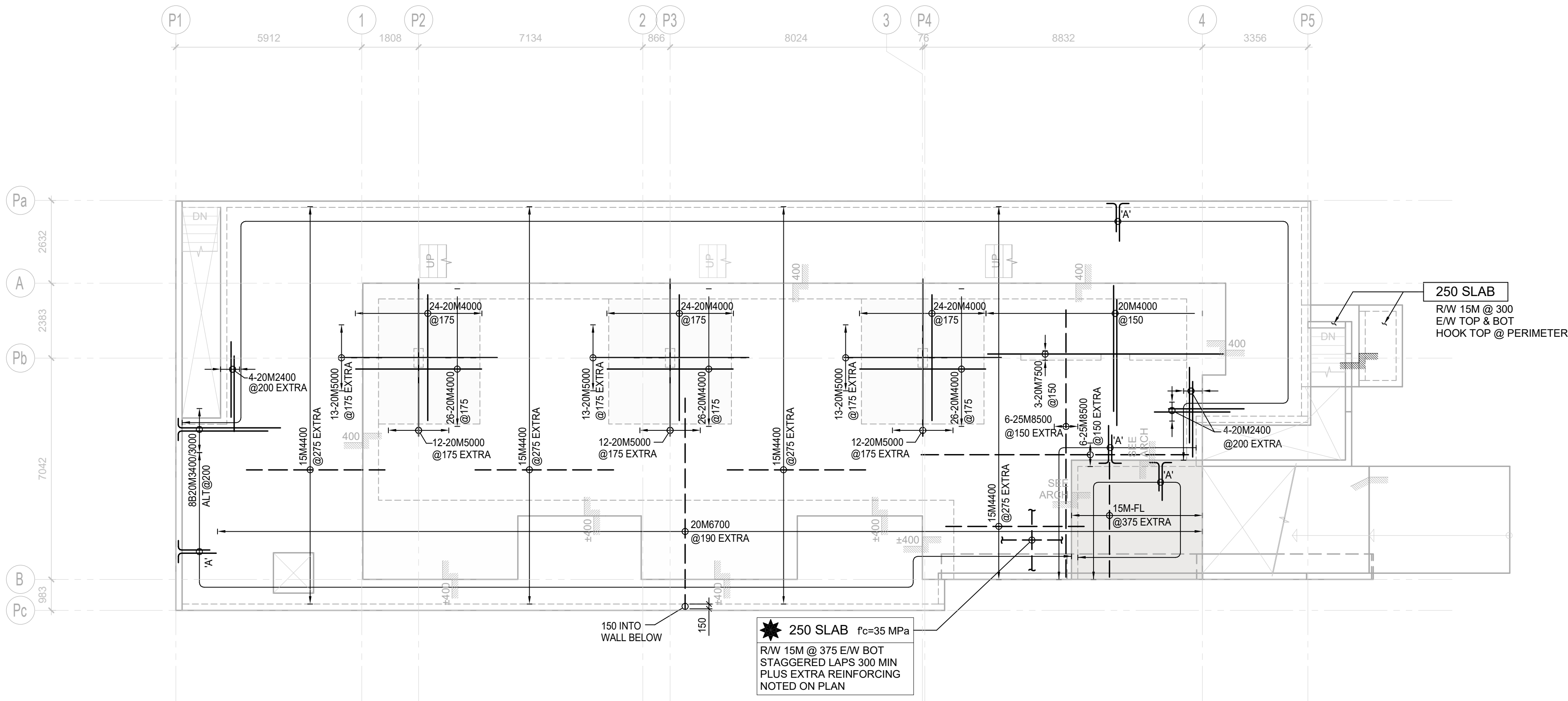
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

MAIN FLOOR PLAN - REINFORCING

Project No. / No. du project	Sheet / Feuille S202.2	Revision no. / La Révision no. 9
---------------------------------	---------------------------	---



MAIN FLOOR PLAN - REINFORCING

1 : 100  
NAM/LCB/GH

REBAR PLACING ORDER (UNLESS NOTED ON PLAN)	
↗	UPPER LAYER TOP
↘	LOWER LAYER TOP
↖	UPPER LAYER BOTTOM
↙	LOWER LAYER BOTTOM

LEGEND:

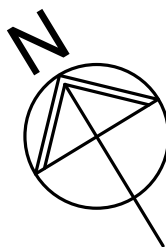
SEE DRAWING S111 FOR LEGEND

NOTES:

SEE DRAWINGS202.1 FOR NOTES

SEE DWG S121 FOR  
DIMENSION CONVERSIONS





Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

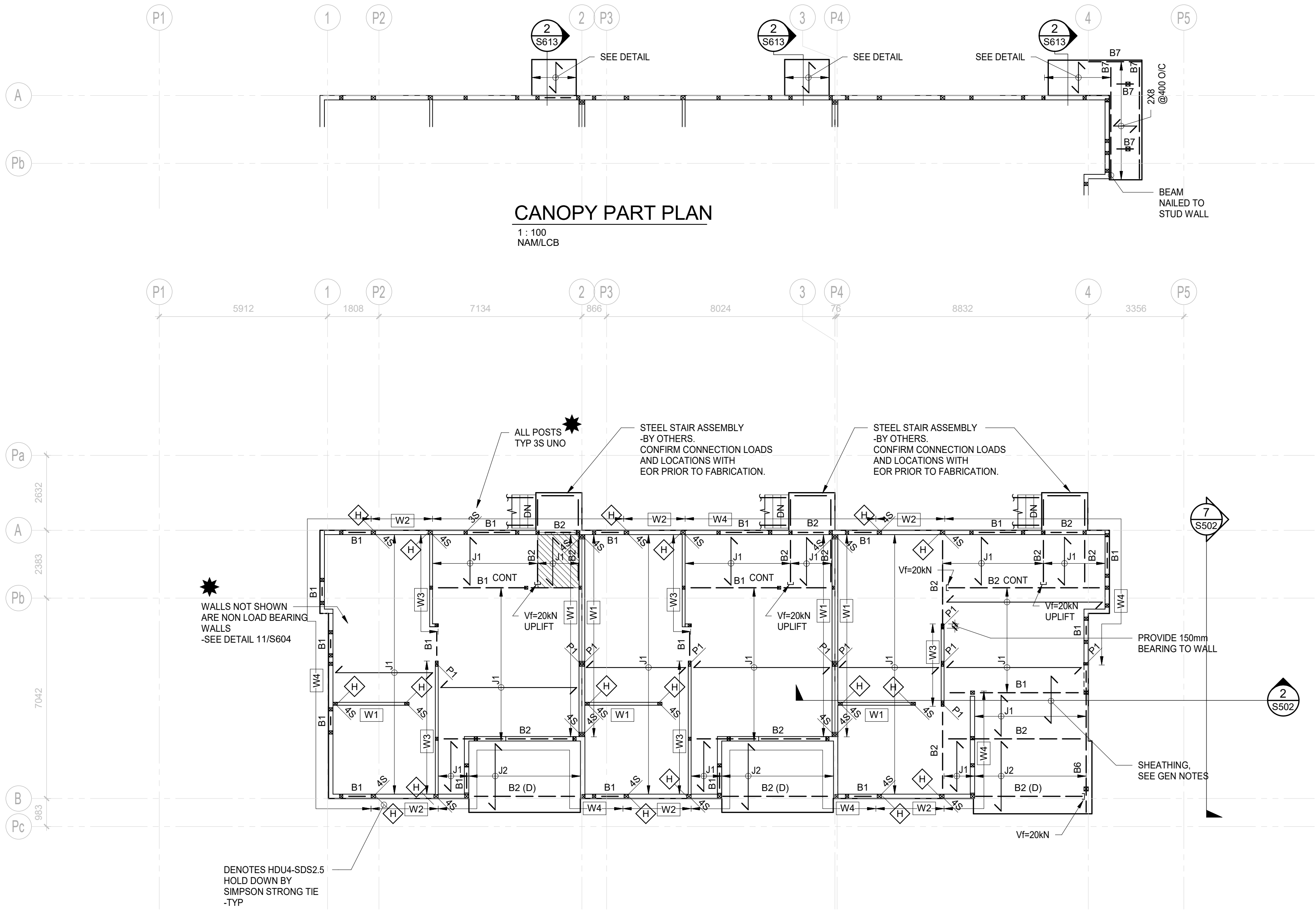
**MAIN FLOOR PLAN, SECOND FLOOR**  
**FRAMING OVER**

Project No. / No. du  
project

**S203**

Revision no. /  
La Révision  
no.

**9**



**MAIN FLOOR PLAN, SECOND FLOOR FRAMING OVER**

1 : 100  
NAM/LCB

WOOD POST SCHEDULE	
Type Mark	Description
P1	3 1/4"x7" 2.2E PSL

JOIST SCHEDULE	
TYPE MARK	DESCRIPTION
J1	11 7/8" DP TJI 230 @400 o/c OPTION: SPF 2x12 @ 300/400 o/c
J2	SPF 2x10 @ 400 o/c
J3	SPF 2x12 @ 300 o/c

WOOD BEAM SCHEDULE	
Type Mark	Description
B1	2 PLY SPF 2x12
B2	
B3	5 1/4" x 16" 2.0E PSL
B4	5 1/4" x 11 7/8" 2.0E PSL
B6	5 1/4" x 9 1/2" 2.2E PSL
B7	2 PLY SPF 2x8

(D) DENOTES DROPPED BEAM

**LEGEND:**

SEE DRAWING S111 FOR LEGEND

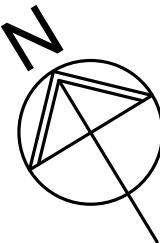
**FLOOR FRAMING NOTES (UNO):**

- POSTS UNDER BUILT-UP BEAMS TO HAVE STUD LAMINATIONS EQUAL TO NUMBER OF BEAM LAMINATIONS.
- FOR SIZE AND SPACING OF WALL STUDS, SEE WALL SCHEDULE.
- PROVIDE TOP MOUNTED HANGERS FOR ALL FLUSH CONNECTIONS BETWEEN PARALLAM BEAMS.
- PROVIDE STANDARD METAL COLUMN CAPS AND BASES FOR ALL EXTERIOR WOOD POSTS OR STAND ALONE POSTS.
- ALL METAL CONNECTORS TO BE MANUFACTURED BY MGA CONNECTORS, SIMPSON STRONG TIE OR APPROVED EQUAL.
- ALL METAL CONNECTORS, BOLTS, NAILS, AND OTHER METAL PRODUCTS IN POTENTIALLY MOIST CONDITIONS OR IN CONTACT WITH ANY PRESERVATIVE TREATED WOOD MUST AS A MINIMUM BE EITHER G185 GALVANIZED, HOT DIP GALVANIZED, OR STAINLESS STEEL.

GSW-NTS1A-7

SEE DWG S121 FOR  
DIMENSION CONVERSIONS





Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

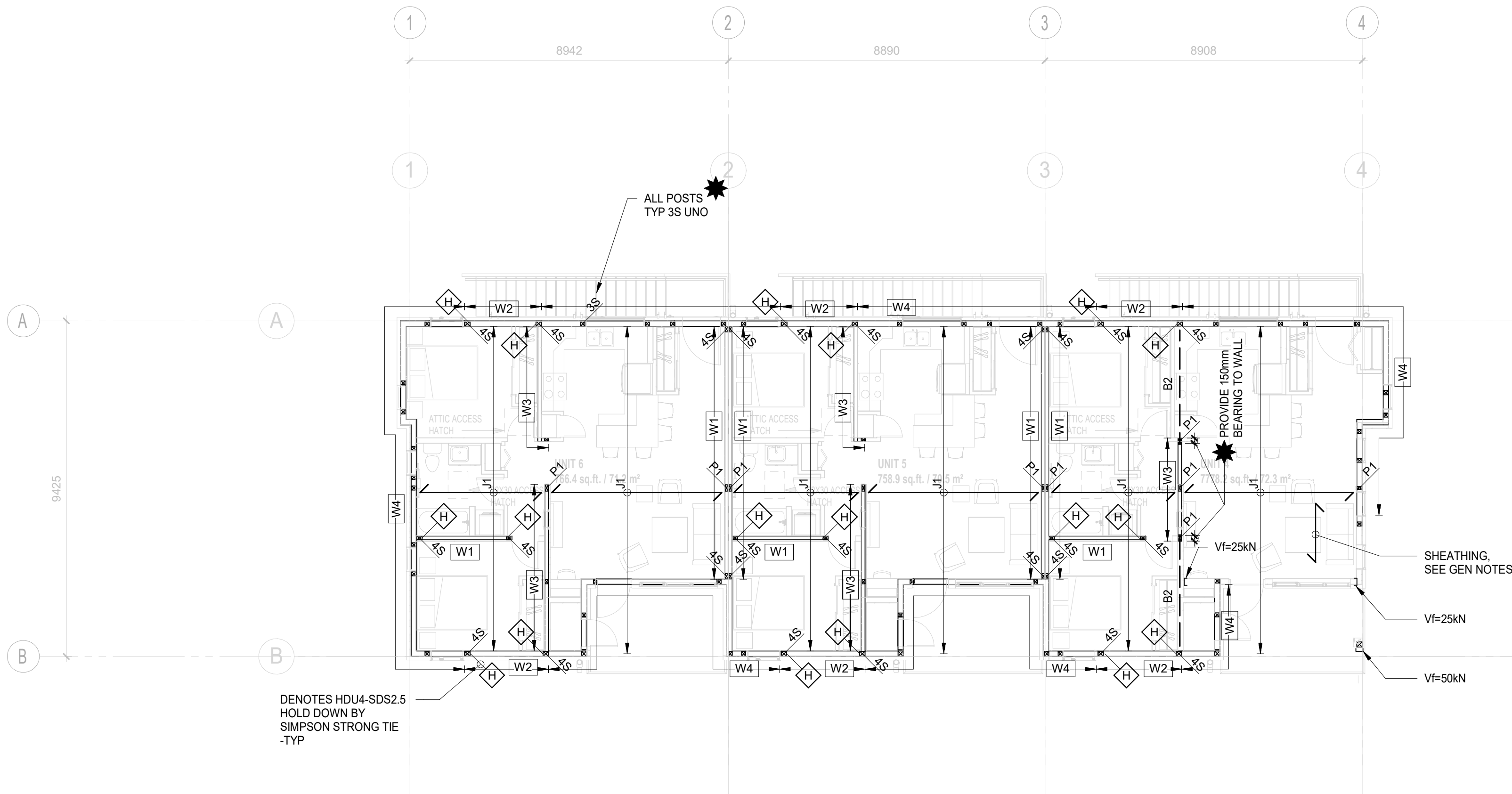
**SECOND FLOOR PLAN, ATTIC FRAMING OVER**

Project No. / No. du project

**S204**

Revision no. /  
La Révision no.

**9**



## SECOND FLOOR PLAN, ATTIC FRAMING OVER

1 : 100  
NAM/LCB

NOTE: STICK FRAMED ATTIC AND ROOF FRAMING MAY BE SUBSTITUTED FOR PREFABRICATED WOOD TRUSS FRAMING DESIGNED BY OTHERS. TRUSS DESIGNER TO ENSURE LOAD BEARING ELEMENTS UTILIZE ONLY EXTERIOR WALLS AND CENTERLINE BUILDING RIDGE BEAM. PROVIDE EOR WITH SHOP DRAWINGS TO REVIEW PRIOR TO FABRICATION.

## WOOD POST SCHEDULE

Type Mark	Description
P1	3 1/4"x7" 2.2E PSL

## JOIST SCHEDULE

TYPE MARK	DESCRIPTION
J1	11 7/8" DP TJI 230 @400 o/c OPTION: SPF 2x12 @ 300/400 o/c
J2	SPF 2x10 @ 400 o/c
J3	SPF 2x12 @ 300 o/c

## WOOD BEAM SCHEDULE

Type Mark	Description
B1	2 PLY SPF 2x12
B2	
B3	5 1/4" x 16" 2.0E PSL
B4	5 1/4" x 11 7/8" 2.0E PSL
B6	5 1/4" x 9 1/2" 2.2E PSL
B7	2 PLY SPF 2x8

(D) DENOTES DROPPED BEAM

## LEGEND:

SEE DRAWING S111 FOR LEGEND

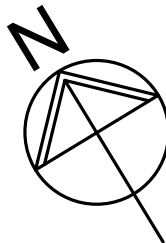
## FLOOR FRAMING NOTES (UNO):

- POSTS UNDER BUILT-UP BEAMS TO HAVE STUD LAMINATIONS EQUAL TO NUMBER OF BEAM LAMINATIONS.
- FOR SIZE AND SPACING OF WALL STUDS, SEE WALL SCHEDULE.
- PROVIDE TOP MOUNTED HANGERS FOR ALL FLUSH CONNECTIONS BETWEEN PARALLAM BEAMS.
- PROVIDE STANDARD METAL COLUMN CAPS AND BASES FOR ALL EXTERIOR WOOD POSTS OR STAND ALONE POSTS.
- ALL METAL CONNECTORS TO BE MANUFACTURED BY MGA CONNECTORS, SIMPSON STRONG TIE OR APPROVED EQUAL.
- ALL METAL CONNECTORS, BOLTS, NAILS, AND OTHER METAL PRODUCTS IN POTENTIALLY MOIST CONDITIONS OR IN CONTACT WITH ANY PRESERVATIVE TREATED WOOD MUST AS A MINIMUM BE EITHER G185 GALVANIZED, HOT DIP GALVANIZED, OR STAINLESS STEEL.

GSW-NTS1A-7

SEE DWG S121 FOR  
DIMENSION CONVERSIONS





Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
2	Detailed Design	2017-12-13
1	Issued for 50% DD	2017-11-09

No:	Description:	Date:
-----	--------------	-------

Revisions		
Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessiné par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

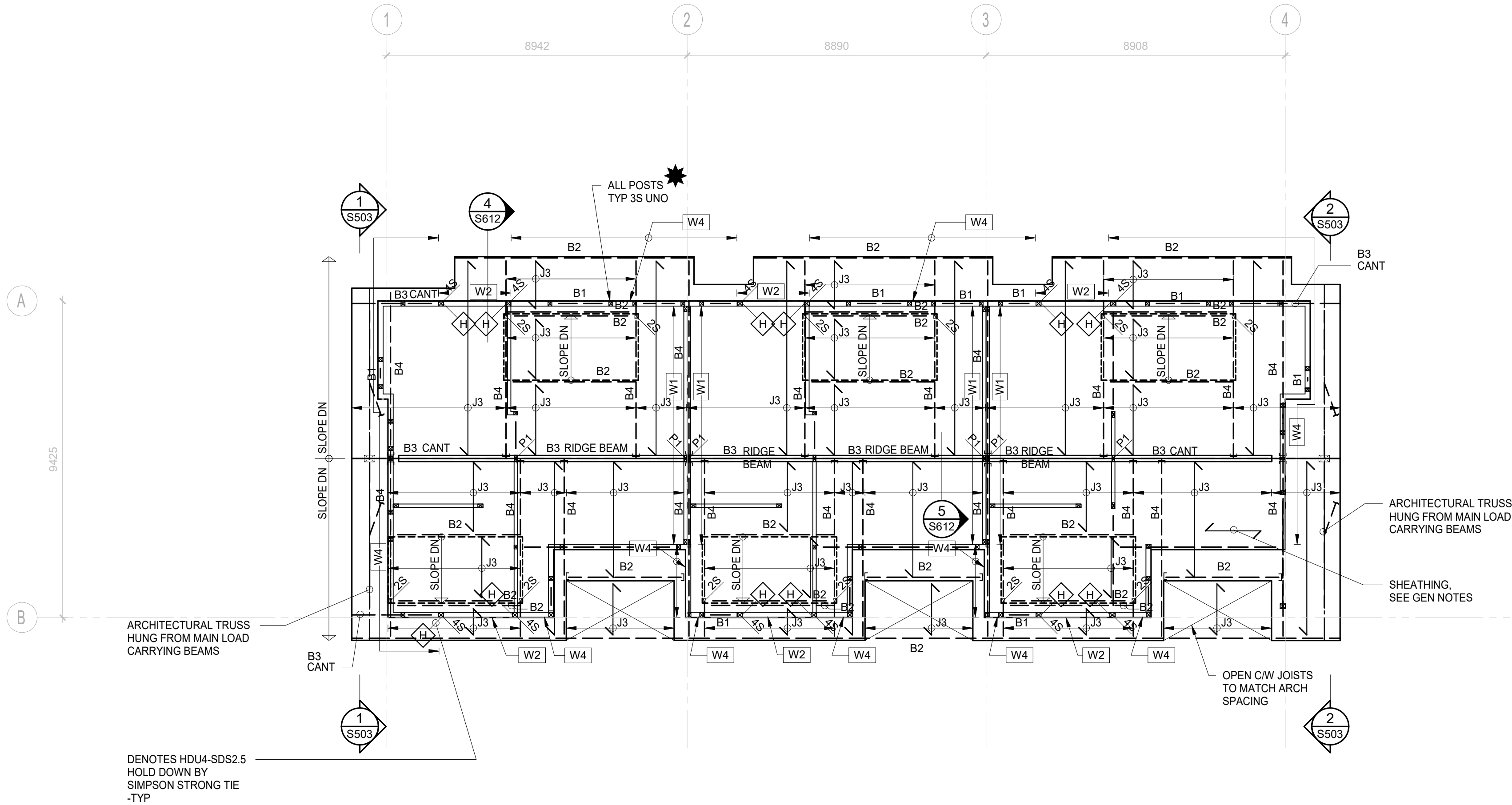
Drawing title / Titre du dessin

**SECOND FLOOR PLAN, ROOF FRAMING OVER**

Project No. / No. du project  
Sheet / Feuille  
Revision no. / La Révision no.

**S205**

**9**



## SECOND FLOOR PLAN, ROOF FRAMING OVER

1 : 100  
NAM/LCB

NOTE: STICK FRAMED ATTIC AND ROOF FRAMING MAY BE SUBSTITUTED FOR PREFABRICATED WOOD TRUSS FRAMING DESIGNED BY OTHERS. TRUSS DESIGNER TO ENSURE LOAD BEARING ELEMENTS UTILIZE ONLY EXTERIOR WALLS AND CENTERLINE BUILDING RIDGE BEAM. PROVIDE EOR WITH SHOP DRAWINGS TO REVIEW PRIOR TO FABRICATION.

## WOOD POST SCHEDULE

Type Mark	Description
P1	3 1/4"x7" 2.2E PSL

## JOIST SCHEDULE

TYPE MARK	DESCRIPTION
J1	11 7/8" DP TJI 230 @400 o/c OPTION: SPF 2x12 @ 300/400 o/c
J2	SPF 2x10 @ 400 o/c
J3	SPF 2x12 @ 300 o/c

## WOOD BEAM SCHEDULE

Type Mark	Description
B1	2 PLY SPF 2x12
B2	
B3	5 1/4" x 16" 2.0E PSL
B4	5 1/4" x 11 7/8" 2.0E PSL
B6	5 1/4" x 9 1/2" 2.2E PSL
B7	2 PLY SPF 2x8

(D) DENOTES DROPPED BEAM

## LEGEND:

SEE DRAWING S111 FOR LEGEND

## ROOF FRAMING NOTES (UNO):

- POSTS UNDER BUILT-UP BEAMS TO HAVE STUD LAMINATIONS EQUAL TO NUMBER OF BEAM LAMINATIONS.
- FOR SIZE AND SPACING OF WALL STUDS, SEE STUD WALL SCHEDULE ON DWG.
- ALL METAL CONNECTORS, BOLTS, NAILS, AND OTHER METAL PRODUCTS IN POTENTIALLY MOIST CONDITIONS OR IN CONTACT WITH ANY PRESERVATIVE TREATED WOOD MUST AS A MINIMUM BE EITHER G185 GALVANIZED, HOT DIP GALVANIZED, OR STAINLESS STEEL.

GSW-NTS1B-8

SEE DWG S121 FOR  
DIMENSION CONVERSIONS



NAM/LCB

WOOD WALL SCHEDULE

W1 - SHEAR AND BEARING WALL								W2 - SHEAR AND BEARING WALL							
LEVEL	STUDS	SHEATHING	BLOCK	LAG	NAILING	CLIP	ANCHOR	LEVEL	STUDS	SHEATHING	BLOCK	LAG	NAILING	CLIP	ANCHOR
ROOF			30 T.S.			A35 CLIPS @1200 O/C		ROOF			30 T.S.			A35 CLIPS @ 1200 O/C	
	SPF 2x4 #1/2 @ 400 O/C	13 SPF 75 NAILS @ 100 O/C AT PANEL EDGES @ 300 O/C IN FIELD							SPF 2x6 #1/2 @400 O/C	13 SPF 75 NAILS @150 O/C AT PANEL EDGES @ 300 O/C FIELD					
ATTIC			30 T.S.		75 NAILS @150 O/C	A35 CLIPS @900 O/C		ATTIC			30 T.S.		75 NAILS @ 150 O/C	A35 CLIPS @ 1200 O/C	
	SPF 2x4 #1/2 @ 400 O/C	13 SPF 75 NAILS @ 100 O/C AT PANEL EDGES @ 300 O/C IN FIELD							SPF 2x6 #1/2 @400 O/C	13 SPF 75 NAILS @150 O/C AT PANEL EDGES @ 300 O/C FIELD					
L2			30 T.S.		75 NAILS @150 O/C	A35 CLIPS @500 O/C		L2			30 T.S.		75 NAILS @ 150 O/C	A35 CLIPS @ 1200 O/C	
	SPF 2x4 #1/2 @ 400 O/C	13 SPF 75 NAILS @ 100 O/C AT PANEL EDGES @ 300 O/C IN FIELD							SPF 2x6 #1/2 @400 O/C	13 SPF 75 NAILS @150 O/C AT PANEL EDGES @ 300 O/C FIELD					
L1 SLAB							ANCHOR BOLTS@1200 O/C	L1 SLAB							ANCHOR BOLTS@1200 O/C

NAM/LCB

WOOD WALL SCHEDULE

W3 - BEARING WALL								W4 - BEARING WALL							
LEVEL	STUDS	SHEATHING	BLOCK	LAG	NAILING	CLIP	ANCHOR	LEVEL	STUDS	SHEATHING	BLOCK	LAG	NAILING	CLIP	ANCHOR
ROOF			30 T.S.					ROOF			30 T.S.				
	SPF 2x4 #1/2 @ 400 O/C	13 SPF 75 NAILS @ 150 O/C AT PANEL EDGES @ 300 O/C IN FIELD GYPSUM SHEATHING, SEE ARCH. PROVIDE MIDHEIGHT BLOCKING FOR STABILITY							SPF 2x6 #1/2 @400 O/C	13 SPF 75 NAILS @ 150 O/C AT PANEL EDGES @ 300 O/C IN FIELD GYPSUM SHEATHING, SEE ARCH. PROVIDE MIDHEIGHT BLOCKING FOR STABILITY					
ATTIC			30 T.S.		75 NAILS @150 O/C			ATTIC			30 T.S.		75 NAILS @ 150 O/C		
	SPF 2x4 #1/2 @ 400 O/C	13 SPF 75 NAILS @ 150 O/C AT PANEL EDGES @ 300 O/C IN FIELD GYPSUM SHEATHING, SEE ARCH. PROVIDE MIDHEIGHT BLOCKING FOR STABILITY							SPF 2x6 #1/2 @400 O/C	13 SPF 75 NAILS @ 150 O/C AT PANEL EDGES @ 300 O/C IN FIELD GYPSUM SHEATHING, SEE ARCH. PROVIDE MIDHEIGHT BLOCKING FOR STABILITY					
L2			30 T.S.		75 NAILS @150 O/C			L2			30 T.S.		75 NAILS @ 150 O/C		
	SPF 2x4 #1/2 @ 200 O/C	13 SPF 75 NAILS @ 150 O/C AT PANEL EDGES @ 300 O/C IN FIELD GYPSUM SHEATHING, SEE ARCH. PROVIDE MIDHEIGHT BLOCKING FOR STABILITY							SPF 2x6 #1/2 @400 O/C	13 SPF 75 NAILS @ 150 O/C AT PANEL EDGES @ 300 O/C IN FIELD GYPSUM SHEATHING, SEE ARCH. PROVIDE MIDHEIGHT BLOCKING FOR STABILITY					
L1 SLAB							ANCHOR BOLTS@1200 O/C	L1 SLAB							ANCHOR BOLTS@1200 O/C

WALL SCHEDULE NOTES:

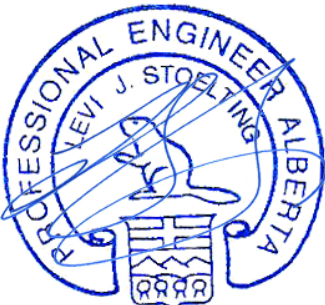
LEVEL	REFERS TO THE FLOOR LEVEL ABOVE THE LOWEST SUPPORT LEVEL FOR WOOD FRAMING. LEVEL 1 IS THE FOUNDATION OR SLAB SUPPORT FOR WOOD FRAMING.
STUDS	VERTICAL WALL STUDS BETWEEN LEVELS. ADDITIONAL STUDS REQUIRED FOR BUILT UP POSTS. FRAMING AROUND WINDOWS, PERPENDICULAR STUD FOR STABILITY BRACING, ETC. ALL STUDS TYPE 2 SHRINKAGE RATING.
SHEATHING	PANELS OF PLYWOOD OR DRYWALL APPLIED TO THE STUDS FOR STRUCTURAL PURPOSES. PLYWOOD SHEARWALL PANELS HAVE HEAVY NAILING PATTERNS. DRYWALL PROVIDES STABILITY FOR WALL STUDS. PROVIDE DOUBLE STUDS AT ALL PANEL EDGES STAGGER NAILS FOR SPACING SMALLER THAN OR EQUAL TO 75
BLOCK	FLOOR FRAMING MEMBERS IN LINE WITH WALLS SHOWN IN DETAILS. BLOCKING MEMBERS RECEIVE NAILING AND LAGS FOR SHEARWALL FORCE TRANSFER AND PROVIDE BEARING WIDTH FOR STUD LOADING ONTO WALLS BELOW. ALL BLOCKING TO HAVE SHRINKAGE RATING AS NOTED FOR FLOOR SYSTEMS. BLOCKING AT ROOF LEVEL MAY BE SUBSTITUTED WITH NOMINAL LUMBER OF APPROPRIATE DEPTH. BLOCKING CONSISTING OF MULTIPLE PLYS SHALL BE LAMINATED USING 75 NAILS @ 150 O/C
LAG	LAG BOLTS TO BE 200 LONG UNO. INSTALL BETWEEN SHEARWALL BOTTOM PLATES AND BLOCKING MEMBERS TO TRANSFER SHEARWALL FORCES. WHERE LAGS ARE REQUIRED IN 89 T.S + 44 T.S BLOCKING THEY SHALL BE INSTALLED AT THE CENTER OF THE 89 WIDE MEMBER.
NAILING	NAILS BETWEEN PLATES, FLOOR SHEATHING AND BLOCKING SHOWN IN DETAILS. NOTE TOE NAILS TO HAVE DOUBLE ROWS OR SINGLE ROW WITH HALF SPACING.
CLIP	CLIP TO BE FRAMING ANCHORS BY SIMPSON STRONG TIE A35 OR A35F PLACED WITH CENTRELINE CROSSING THE SHEAR TRANSFER PLANE AND WITH ALL HOLES FILLED WITH NAILS 38 JOIST HANGER NAILS.
ANCHOR	ANCHORS TO LEVEL 1 SLAB - SEE DETAILS

SEE DWG S121 FOR  
DIMENSION CONVERSIONS

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
2	Detailed Design	2017-12-13
No:	Description:	Date:

Revisions		
Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet		
Banff National Park Banff, Alberta		
PCA - STAFF HOUSING 329 MARTEN STREET		
Approved by/Approuve par Approver		
Designed by/Concept par Designer		
Drawn by/Dessine par Author Project Manager/Administrateur de Projets		
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie		
Client / client Parks Canada		
Drawing title / Titre du dessin		
WOOD WALL SCHEDULES		
Project No. / No. du project	Sheet / Feuille S401	Revision no. / La Révision no. 9





Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

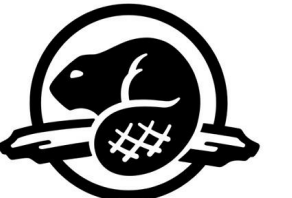
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
No:	Description:	Date:

Revisions

Revision / Revision Client / client	Description / Description	Date / Date
---	---------------------------	-------------



**Parks Canada**  
Parcs Canada

Project title/Titre du projet

**Banff National Park**  
Banff, Alberta

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par Approver
Designed by/Concept par Designer
Drawn by/Dessiné par Author
Project Manager/Administrateur de Projets

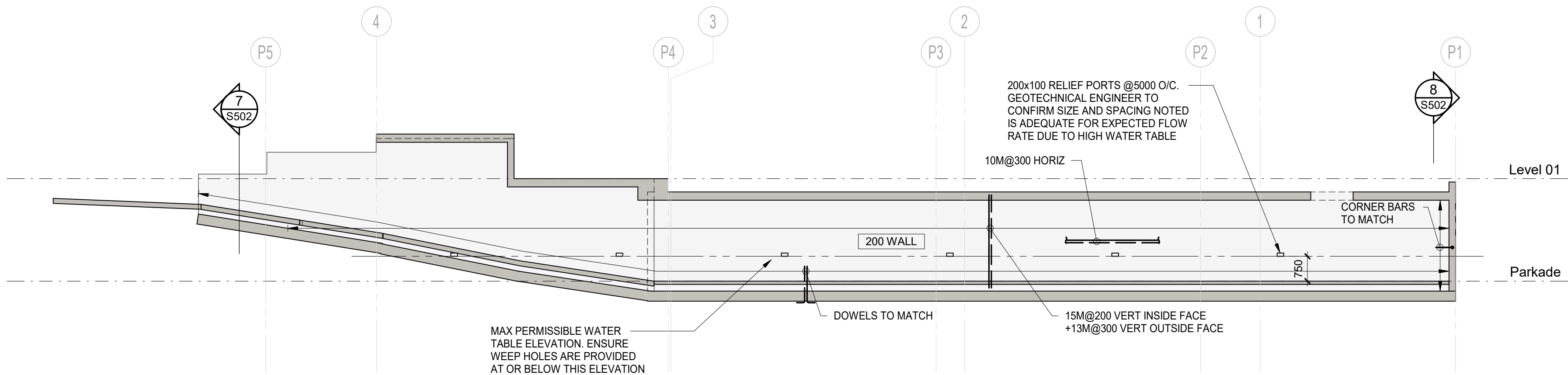
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

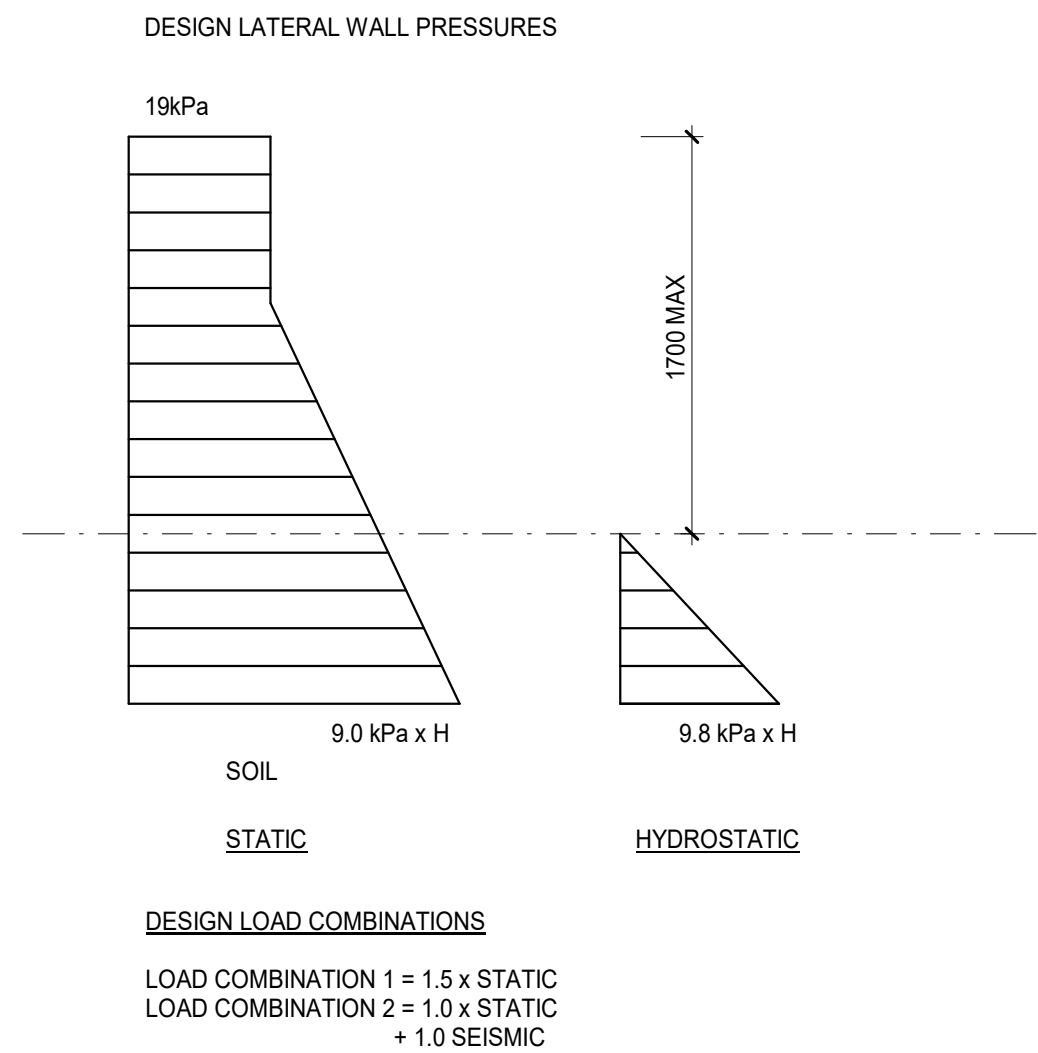
Drawing title / Titre du dessin

TYPICAL DETAILS - BASEMENT WALL

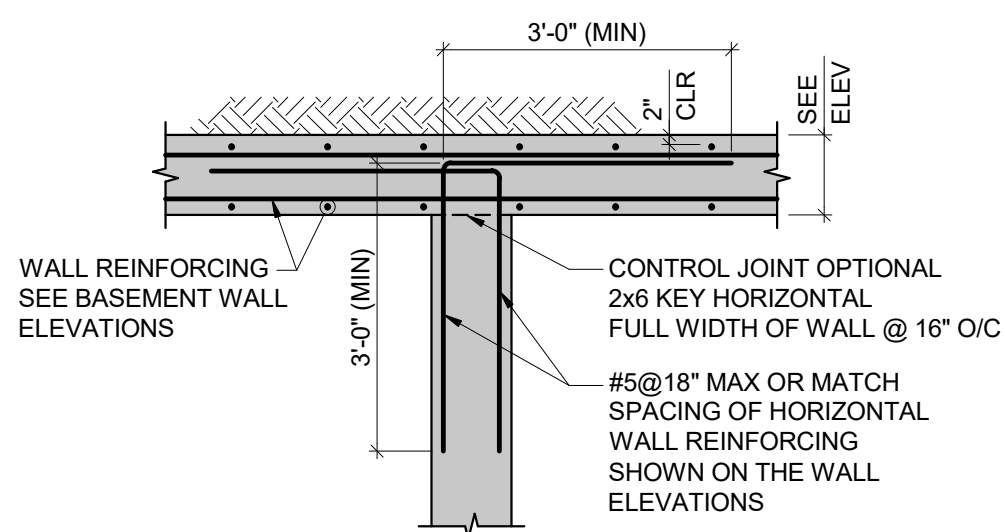
Project No. / No. du project	Sheet / Feuille <b>S501</b>	Revision no. / La Révision no. <b>9</b>
---------------------------------	--------------------------------	--



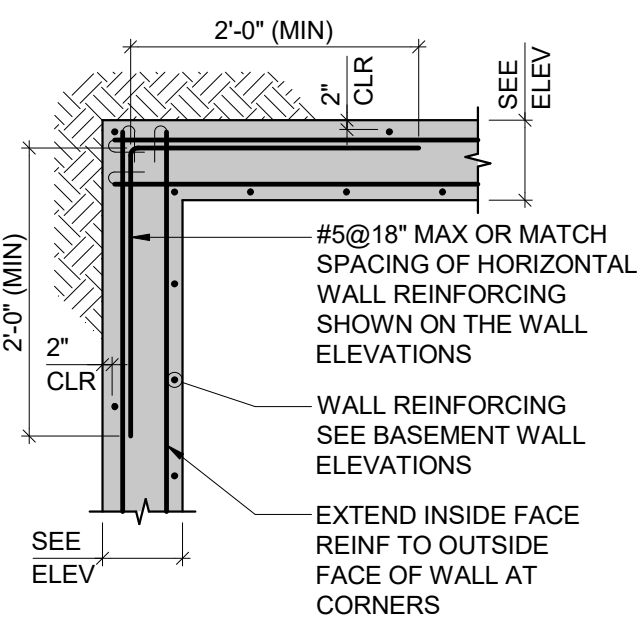
**1 ELEVATION ALONG GL 'Pc'**  
S201 1 : 100  
NAM/GH



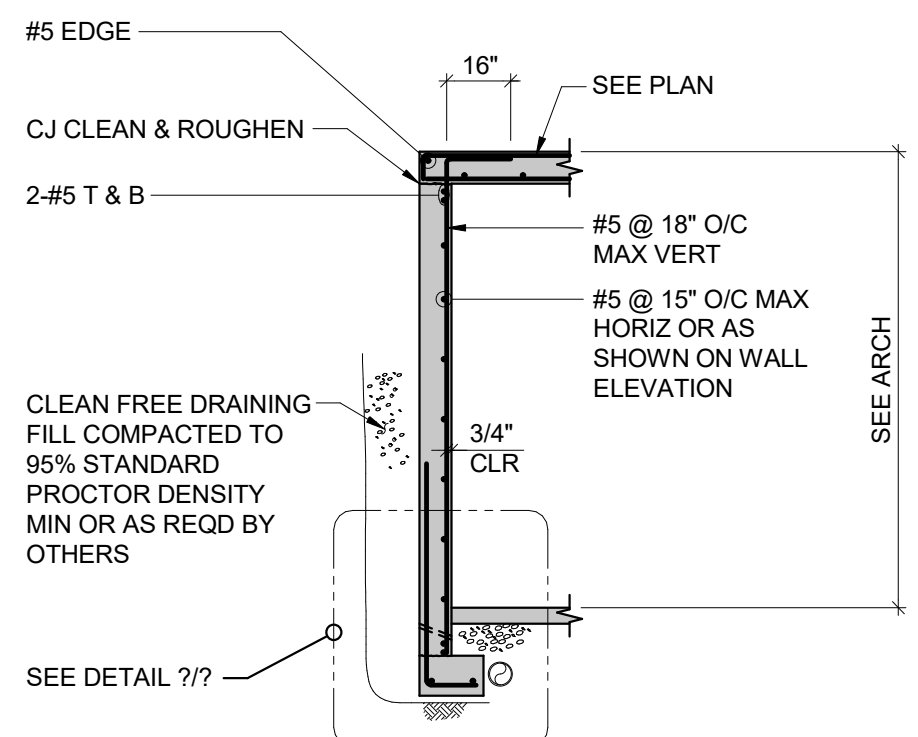
**LATERAL EARTH PRESSURE DESIGN LOADS**  
1 : 20  
NAM/LCB



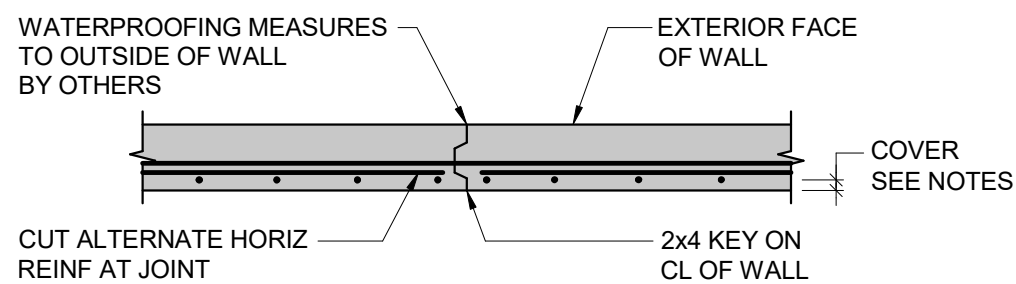
**6 TYPICAL BASEMENT WALL PERPENDICULAR**  
NTS GSC-WAL6C



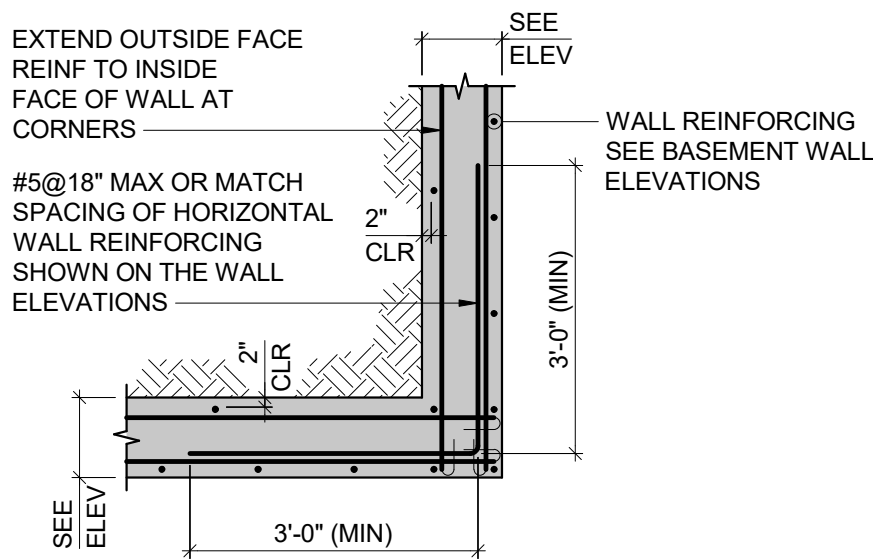
**4 TYPICAL BASEMENT WALL OUTSIDE CORNER**  
NTS GSC-WAL6A-2



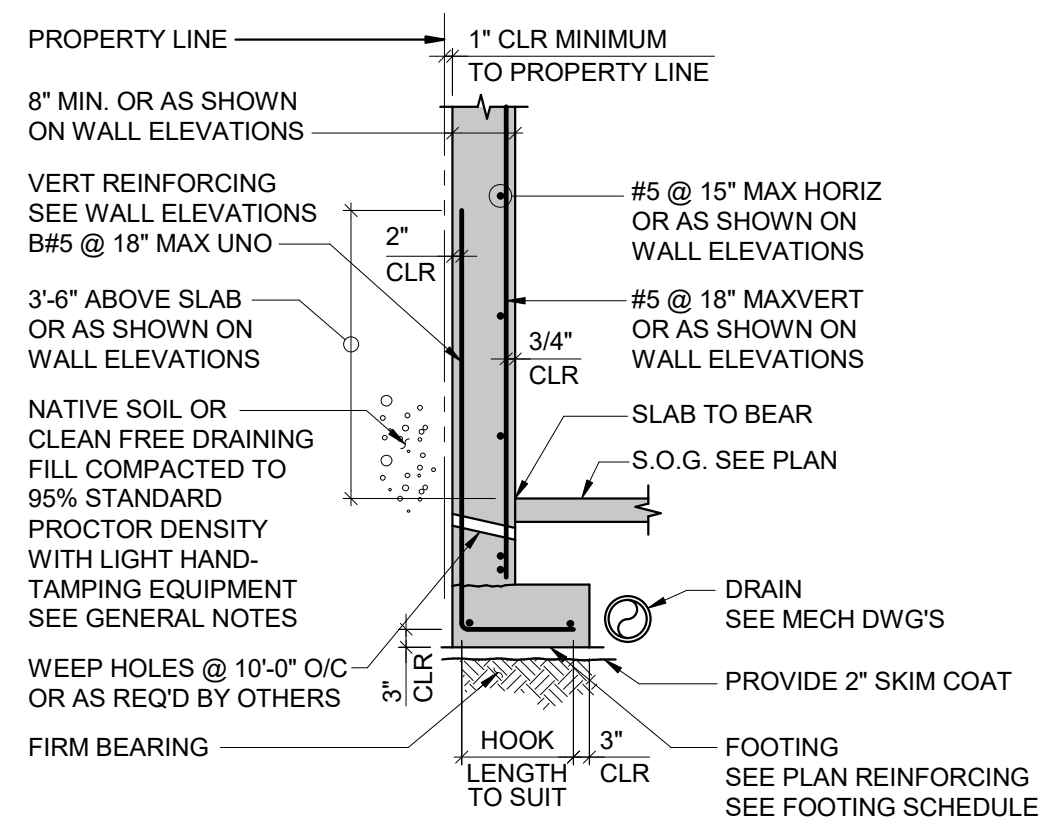
**2 TYPICAL WALL SECTION**  
NTS GSC-WAL1A-5



**9 TYPICAL WALL CONSTRUCTION JOINT**  
NTS GSC-JNT1C-4



**5 TYPICAL BASEMENT WALL INSIDE CORNER**  
NTS GSC-WAL6B



**3 TYPICAL EXTERIOR WALL FTG AT PROPERTY LINE UNLESS NOTED OTHERWISE**  
NTS GSC-FTG1A-REV



Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

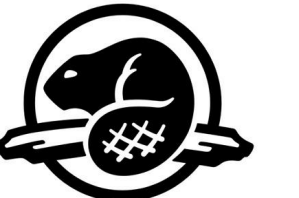
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08

No.	Description:	Date:
Revisions		

Revision / Revision Client / client	Description / Description	Date / Date
---	---------------------------	-------------



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessiné par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

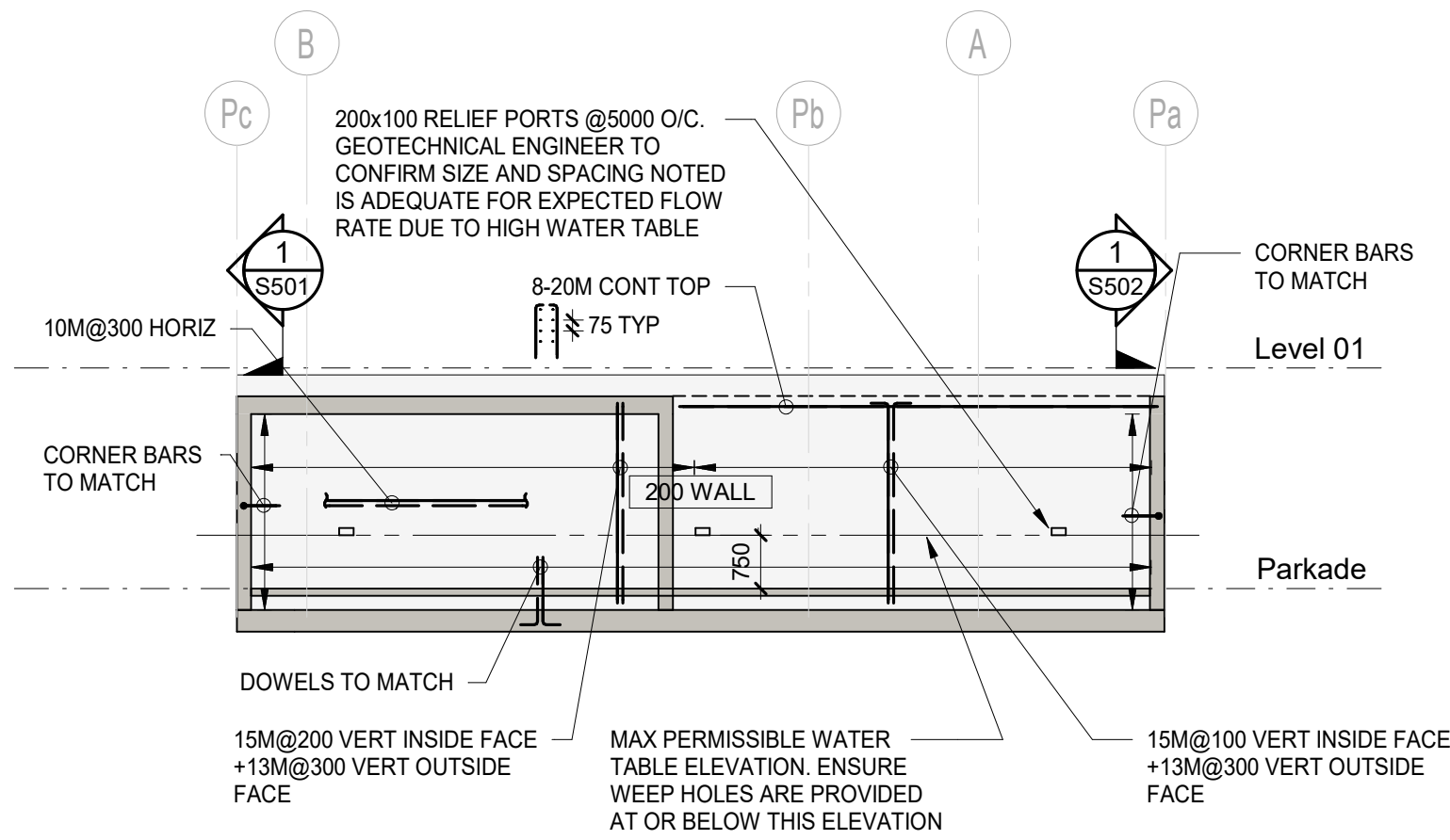
Drawing title / Titre du dessin

BASEMENT WALL ELEVATIONS

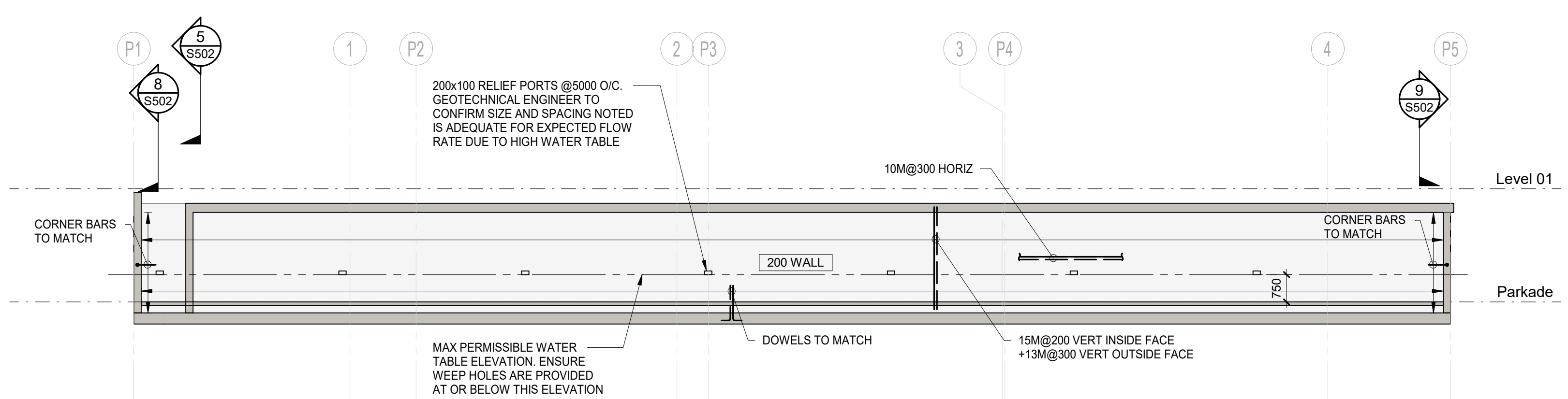
Project No. / No. du  
project

Sheet / Feuille  
**S502**

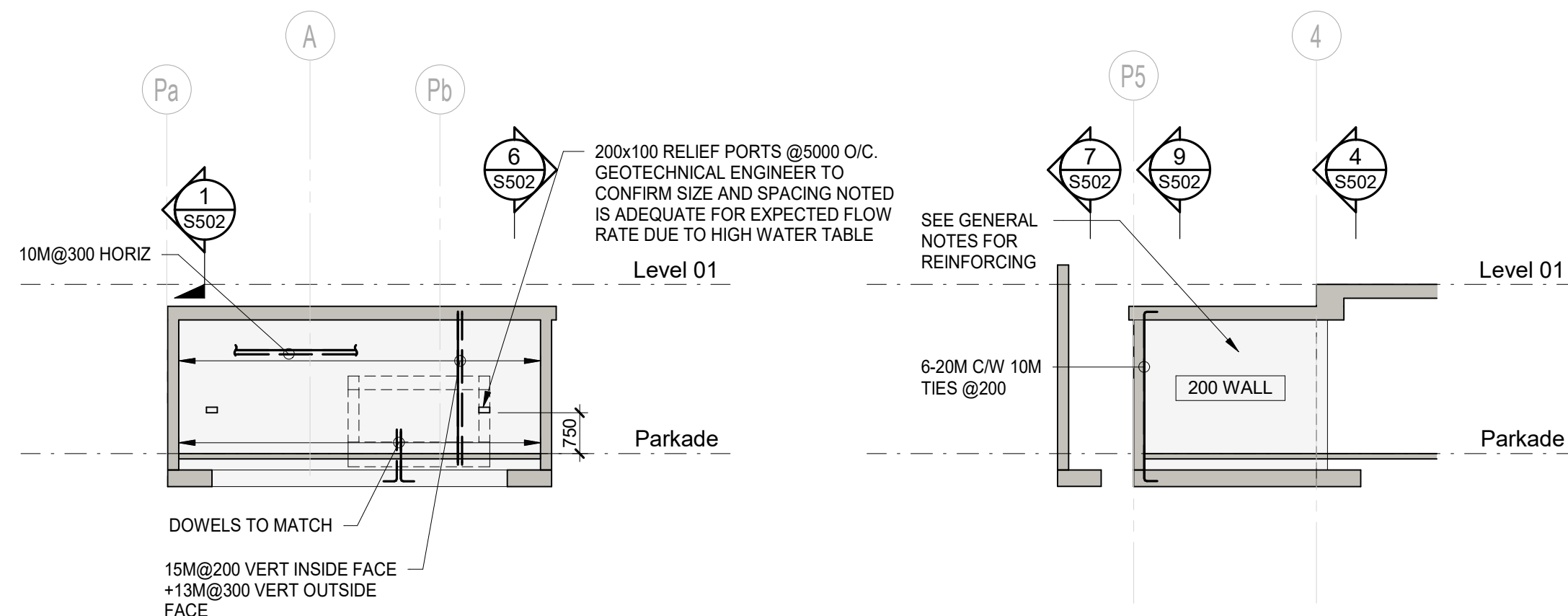
Revision no. /  
La Revision  
no.  
**9**



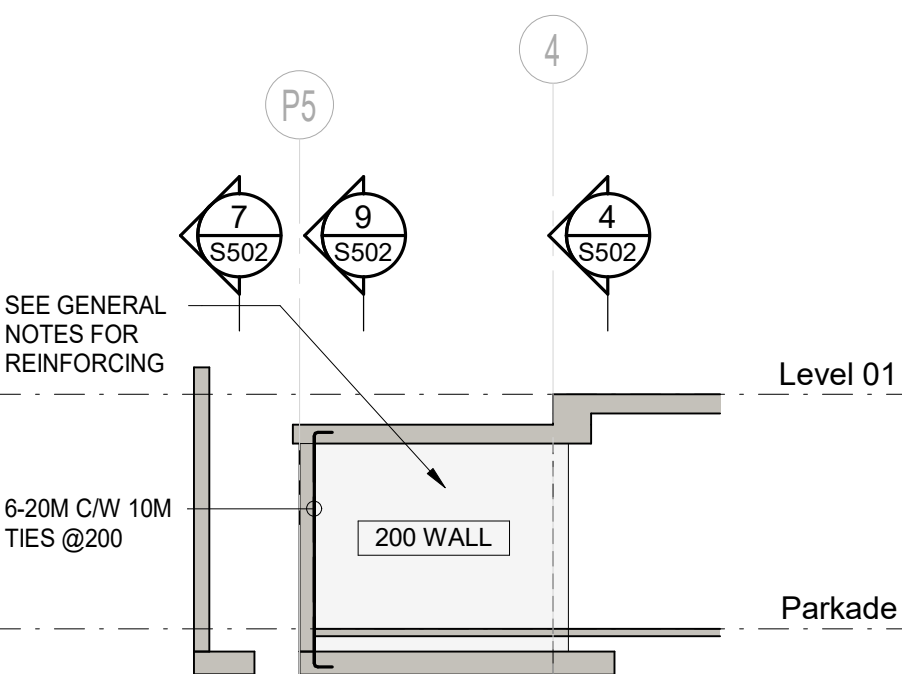
**8** **ELEVATION ALONG GL 'P1'**  
S201 1: 100 NAM/GH



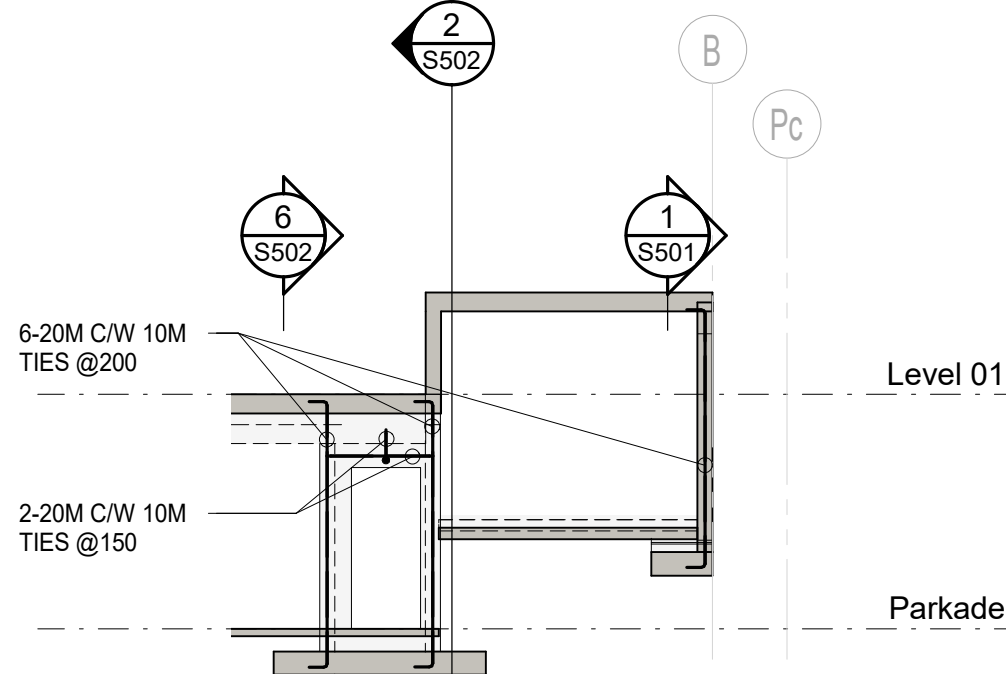
**1** **ELEVATION ALONG GL 'Pa'**  
S201 1: 100 NAM/GH



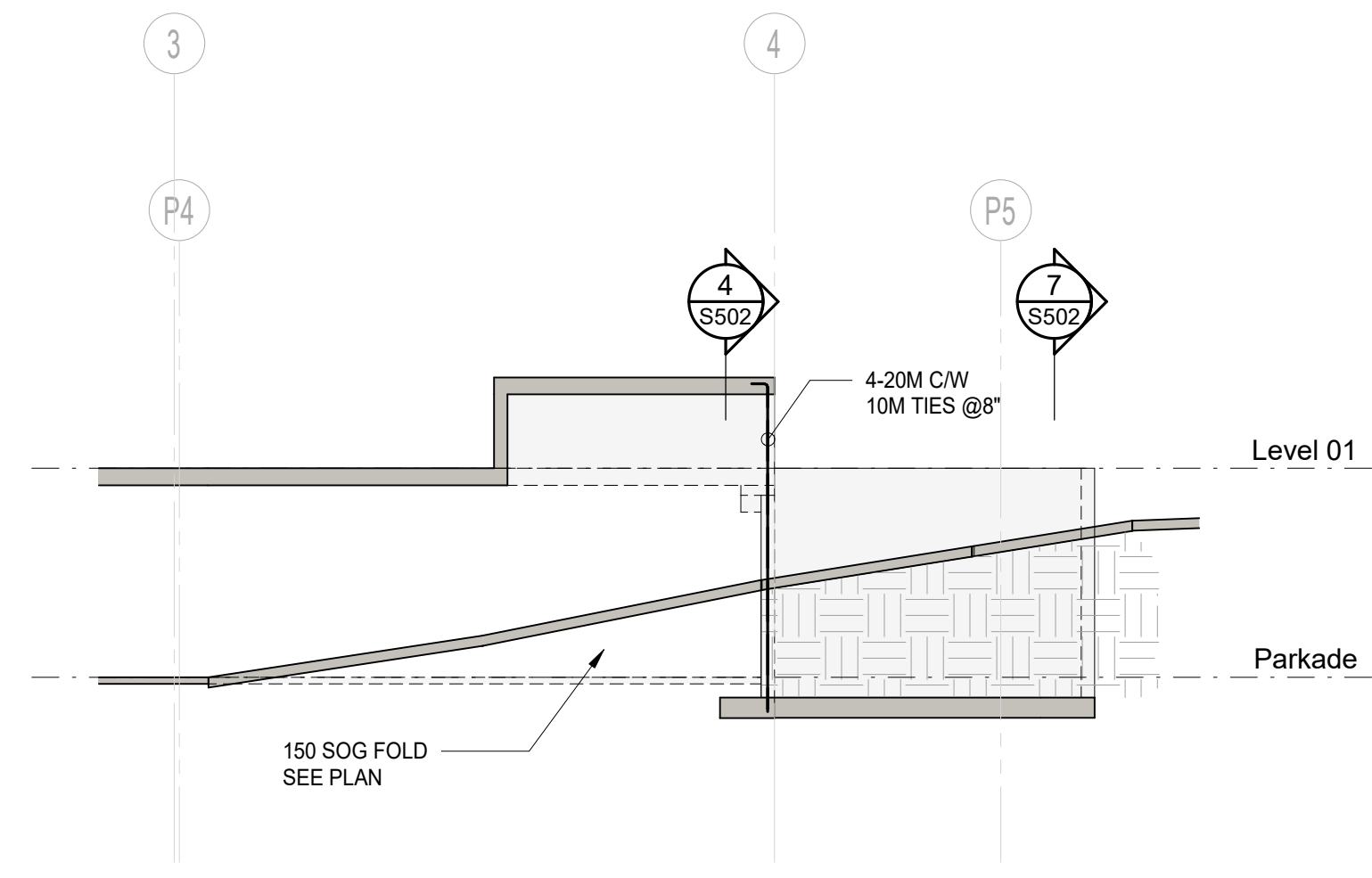
**9** **ELEVATION ALONG GL 'P5'**  
S201 1: 100 NAM/GH



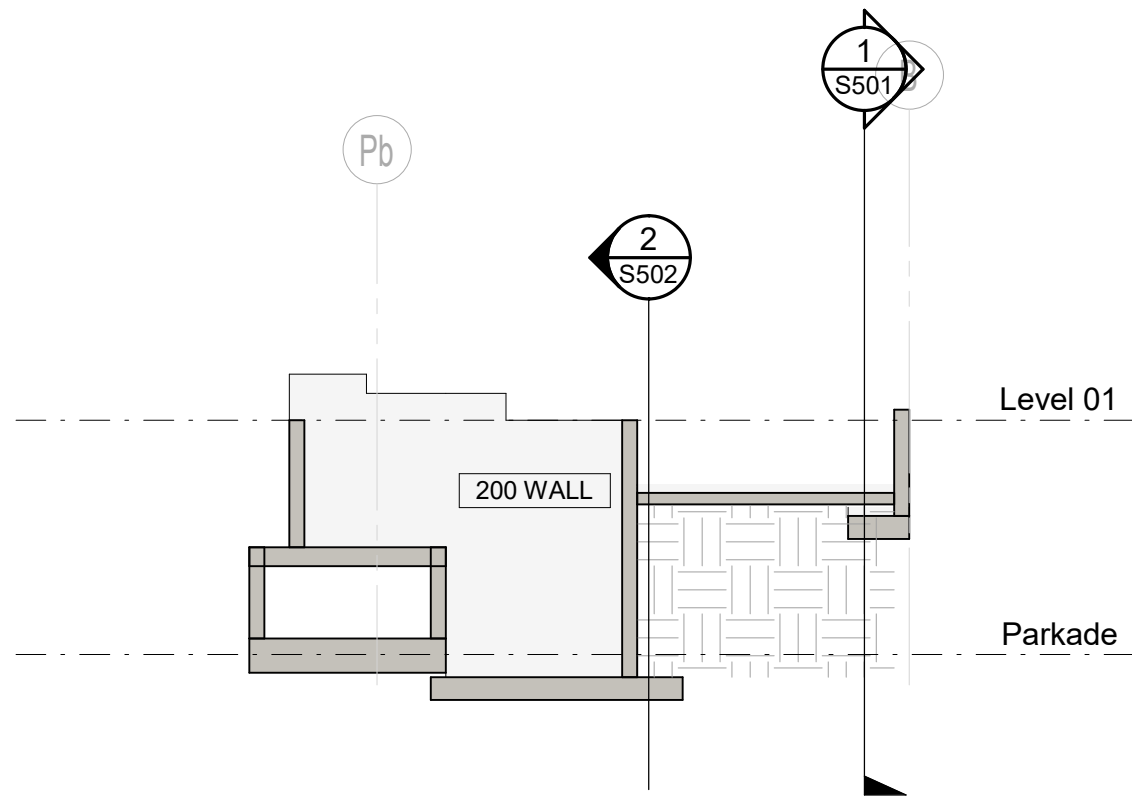
**6** **ELEVATION ALONG GL 'Pb+'**  
S201 1: 100 NAM/GH



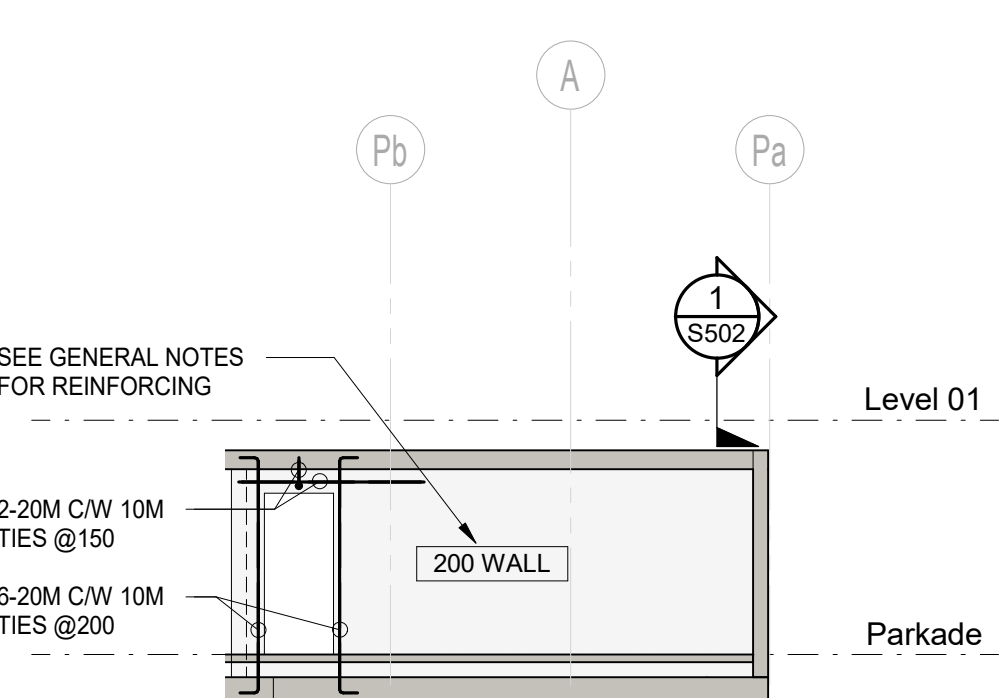
**4** **ELEVATION ALONG GL '4'**  
S201 1: 100 NAM/GH



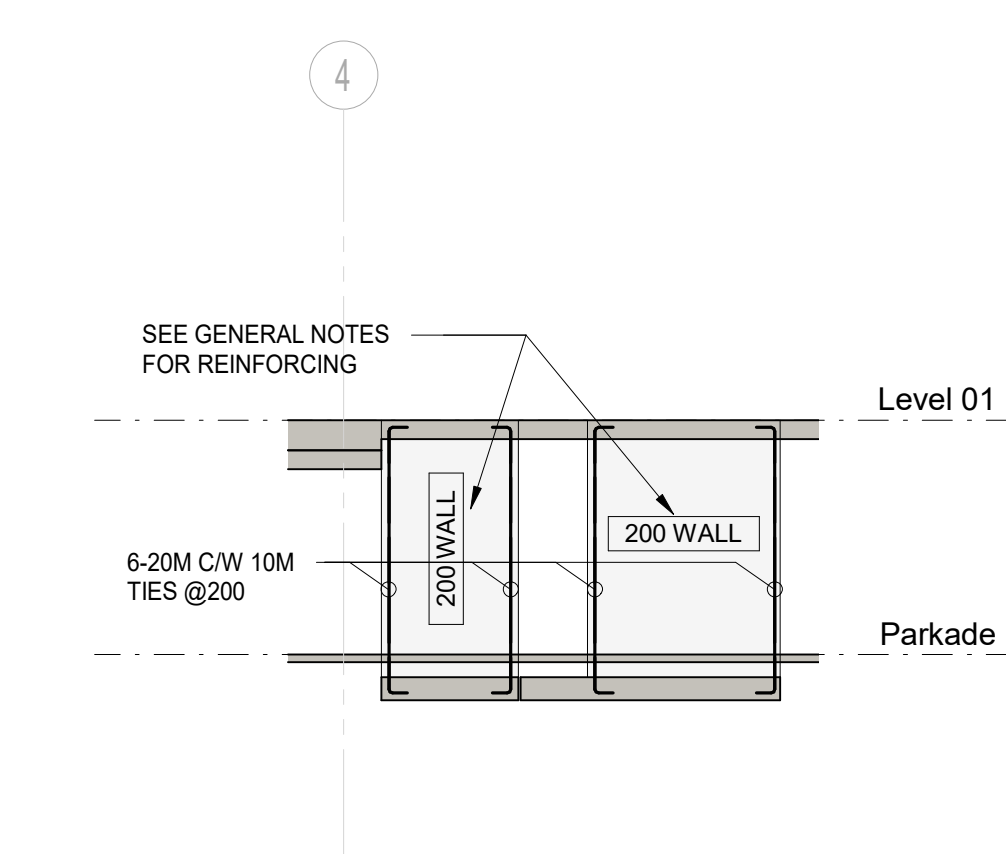
**2** **ELEVATION ALONG GL 'Pb+' (1)**  
S201 1: 100



**7** **ELEVATION ALONG GL 'P5+'**  
S201 1: 100 NAM/MDH



**5** **ELEVATION ALONG GL 'P1+'**  
S201 1: 100 NAM/GH



**3** **ELEVATION ALONG GL '4-'**  
S201 1: 100 NAM/GH



Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
No:	Description:	Date:

Revisions

Revision / Revision Client / client	Description / Description	Date / Date
---	---------------------------	-------------



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

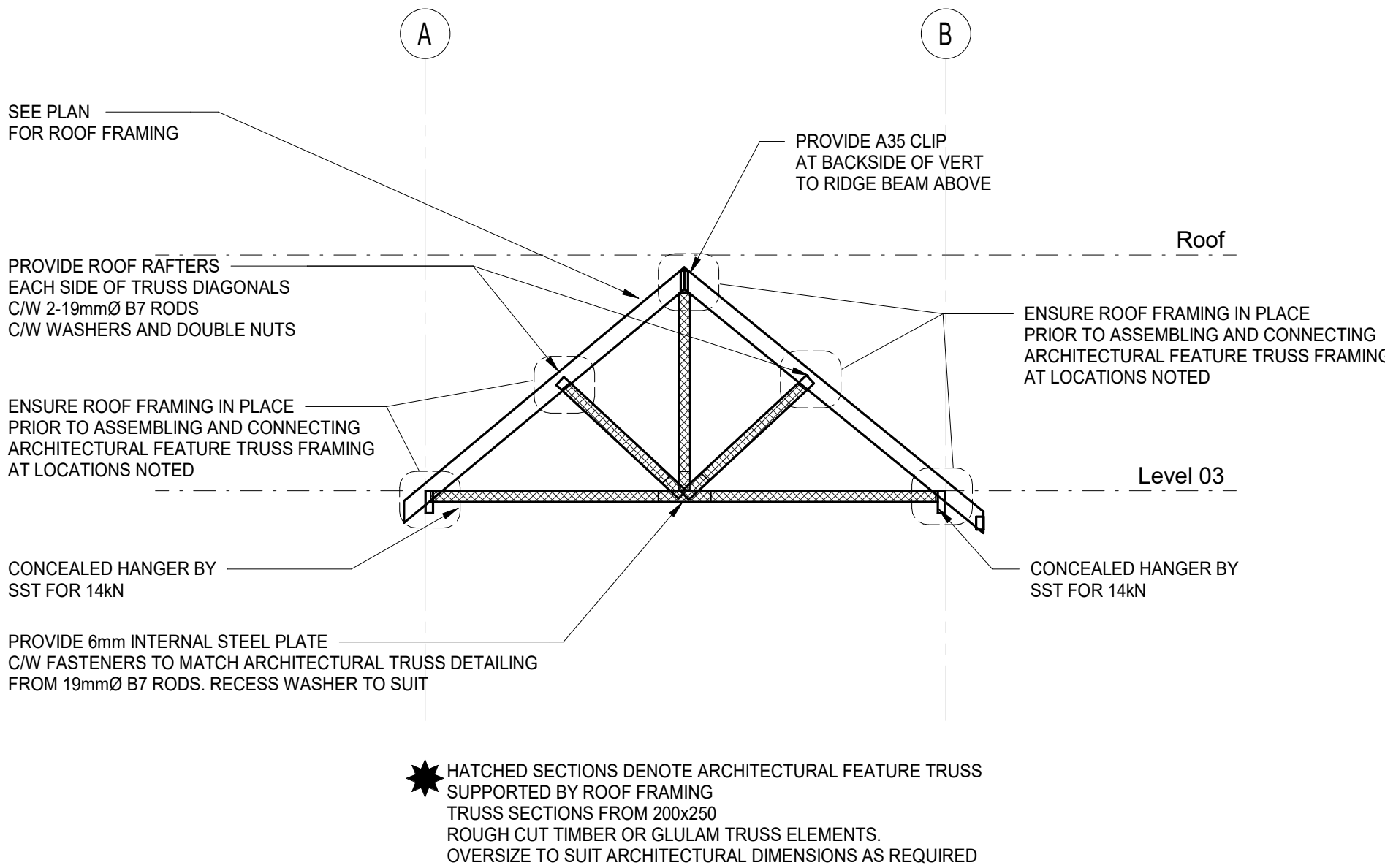
Client / client

**Parks Canada**

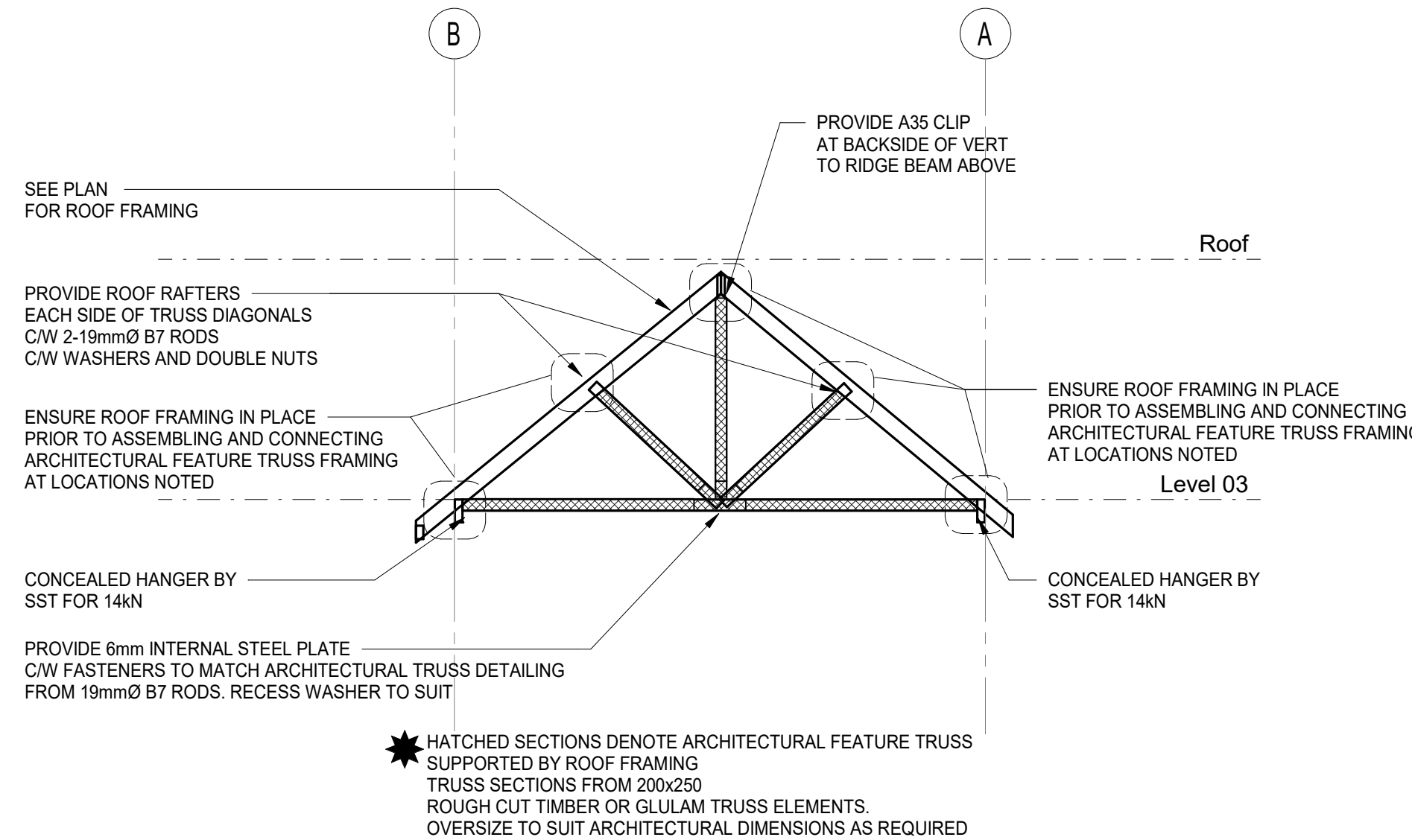
Drawing title / Titre du dessin

ELEVATIONS

Project No. / No. du project	Sheet / Feuille <b>S503</b>	Revision no. / La Révision no. <b>9</b>
---------------------------------	--------------------------------	--

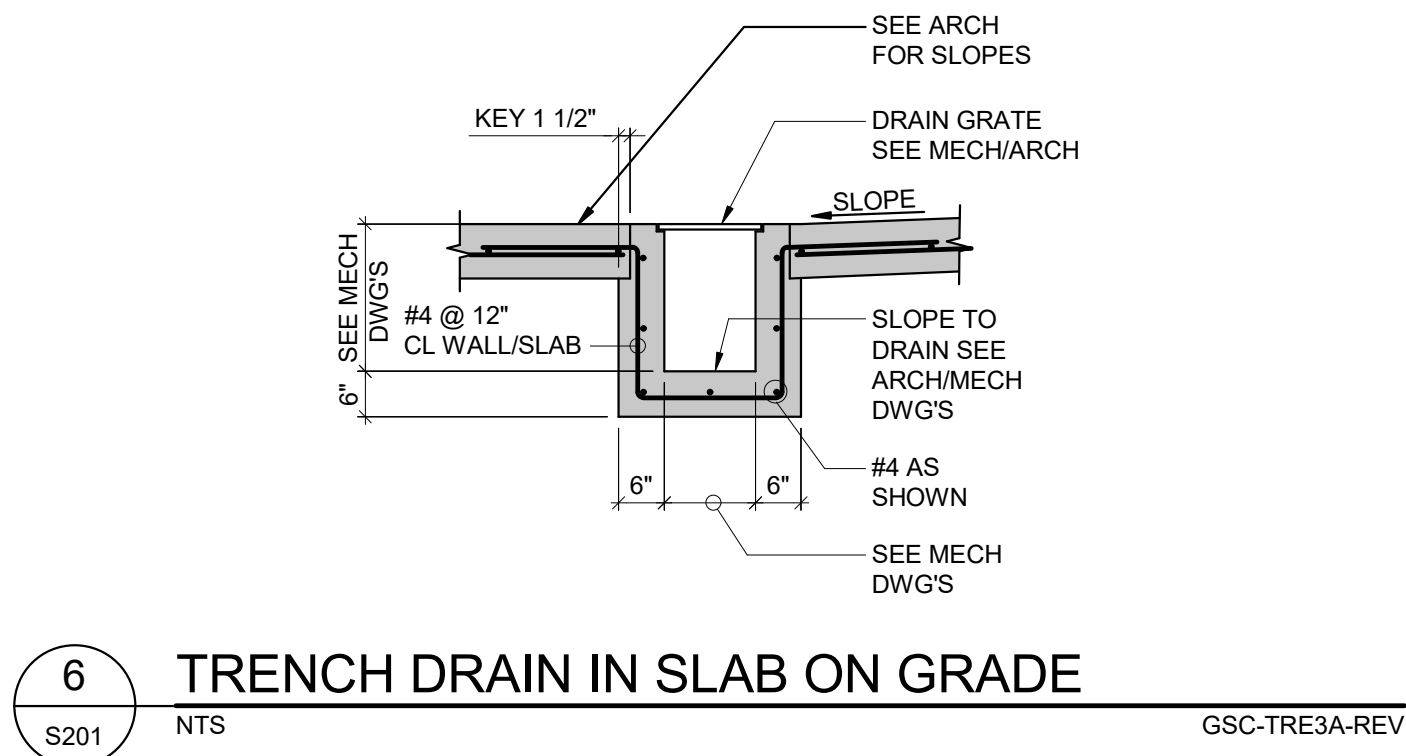


**1** **ARCH TRUSS ELEVATION NEAR GL '1'**  
S204 1 : 100 NAM/LCB,CYS



**2** **ARCH TRUSS ELEVATION NEAR GL '4'**  
S204 1 : 100 NAM/LCB,CYS





4

APRON SLAB

NTS

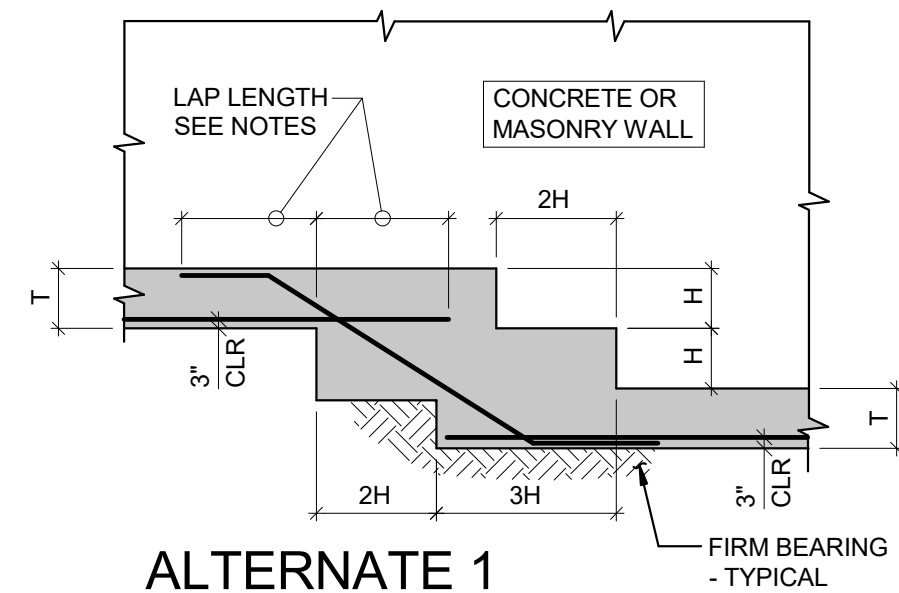
GSC-APR2A-4

The drawing consists of two main views: a Plan view at the top and a Section view at the bottom.

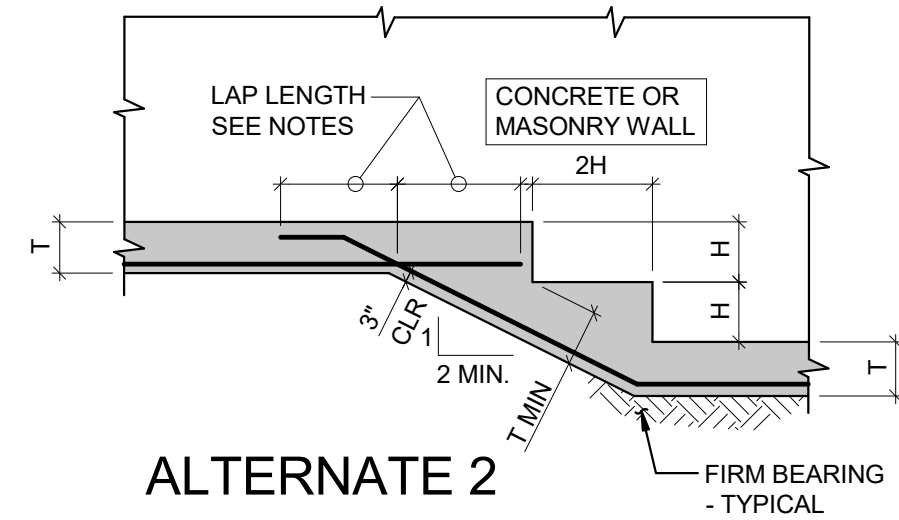
**Plan View:** Shows a rectangular column and footing. The column is centered within the footing. Dimensions include "WIDTH" and "LENGTH" for the footing, both labeled "SEE SCHEDULE". Reinforcing bars are shown with "SHORT WAY REINFORCING" and "LONG WAY REINFORCING", both labeled "SEE SCHEDULE". A dashed line indicates the "CL COLUMN & FOOTING".

**Section View:** Shows a cross-section of the column and footing. The column is on top of the footing. Dimensions include "DEPTH" for the footing, labeled "SEE SCHEDULE". Reinforcing bars are shown with "COLUMN VERT", "COLUMN TIES", "COLUMN LAP", and "FINISHED SLAB LEVEL". A "STRUC CONCRETE SEALER REQD SEE ARCH" is indicated on the left. "TIE SPACING" and "1/2 TIE SPACE MAX" are shown for the footing. "2-TIES TO DOWELS" are shown at the base of the column. A "3\" CLR" is shown between the footing and the ground. A "SOLID BEARING" is shown at the base of the footing, with a note "SEE SOILS REPORT". A "12\" OR AS REQUIRED BY MECHANICAL" dimension is shown for the footing. "TOP REINFORCING IF REQUIRED SEE SCHEDULE" is indicated on the right. A note at the bottom states: "4\" OR GREATER AT LOWEST POINT OF S.O.G. AS REQ'D TO ACHIEVE BEARING OR TO ALLOW MECH. PIPES TO PASS ON TOP OF FOOTING. SEE MECH DWGS. FOOTINGS TO BE LOWERED WHERE ADJACENT TO DEEPER EXCAVATION. MAINTAIN MAX 1.5:1.0 SLOPE BETWEEN UNDERSIDE OF ADJACENT EXCAVATION OR AS REQ'D BY SOILS CONSULTANT."

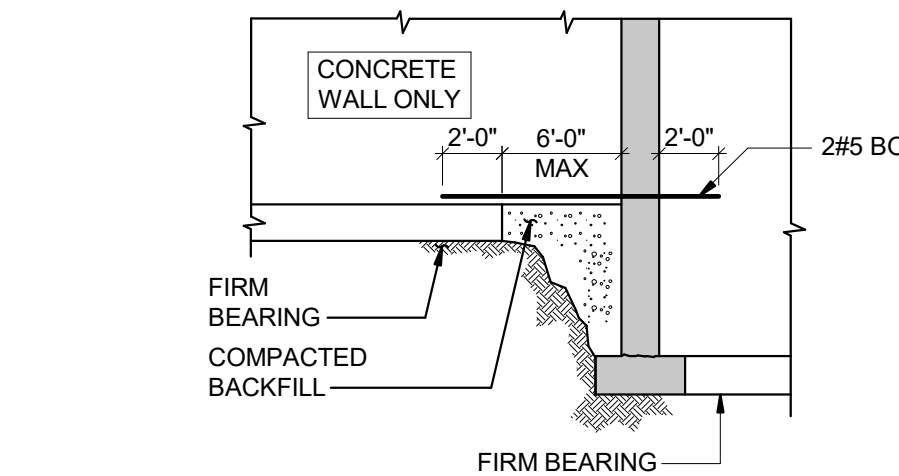
1 TYPICAL COLUMN FOOTING



## ALTERNATE 1

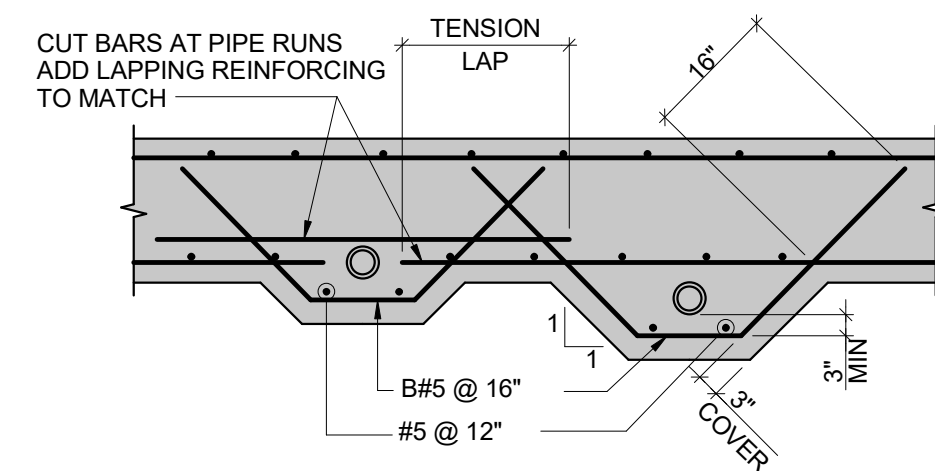


## ALTERNATE 2

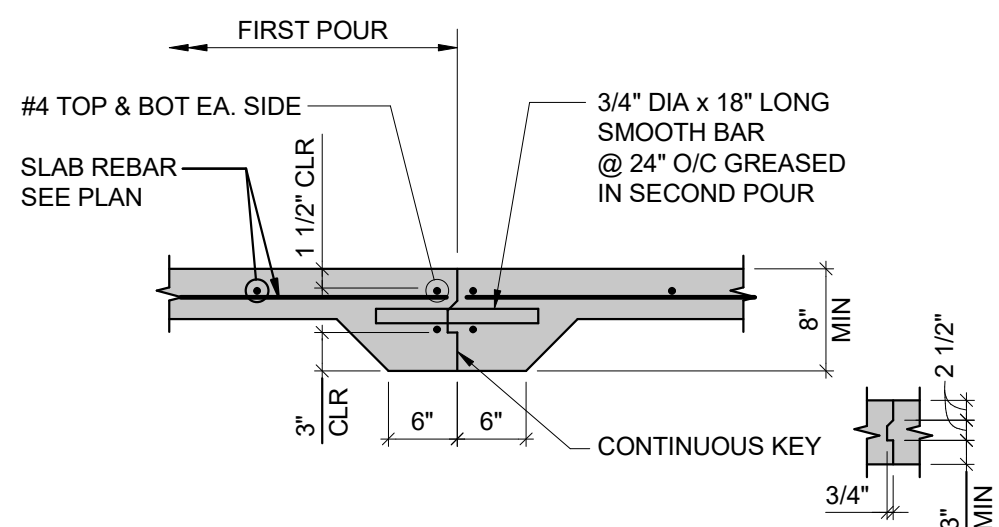


### ALTERNATE 3

5 TYPICAL STEPPED FOOTING



2 TYPICAL PIPES IN FOOTINGS



## 3 SLAB ON GRADE CONSTRUCTION JOINT

9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
No:	Description:	Date:

Revisions

Revision / Révision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par Approver	
Designed by/Concept par Designer	
Drawn by/Dessiné par Author	
Project Manager/Administrateur de Projets	
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie	
Client / client <b>Parks Canada</b>	
Drawing title / Titre du dessin	

TYPICAL DETAILS - FOUNDATION

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	S601	9

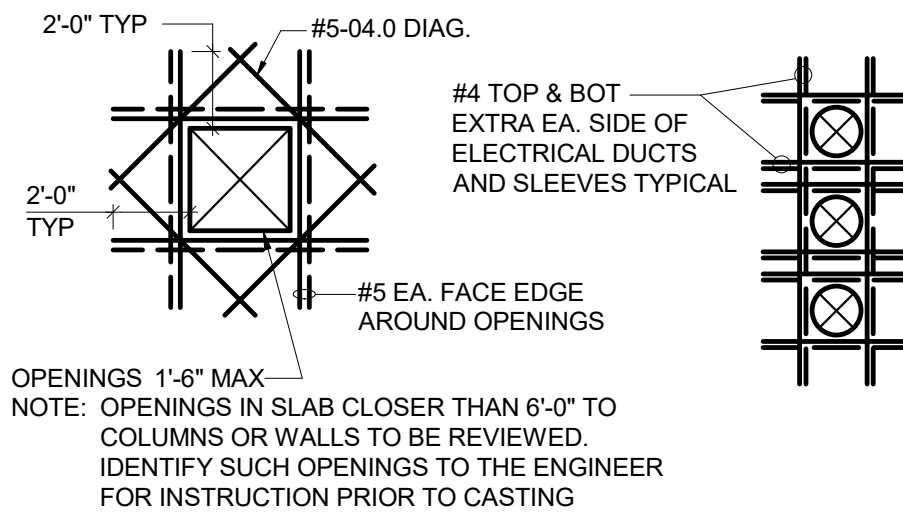




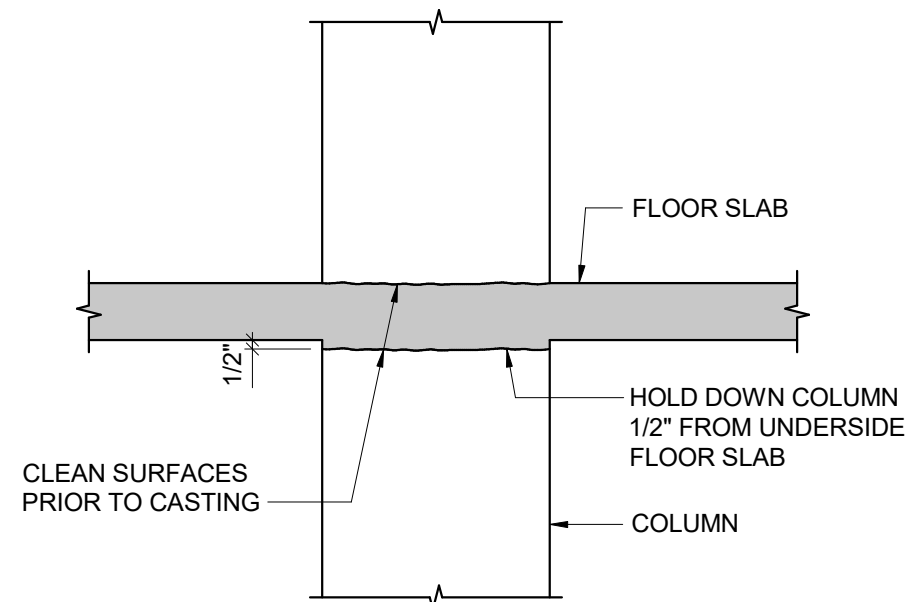
Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

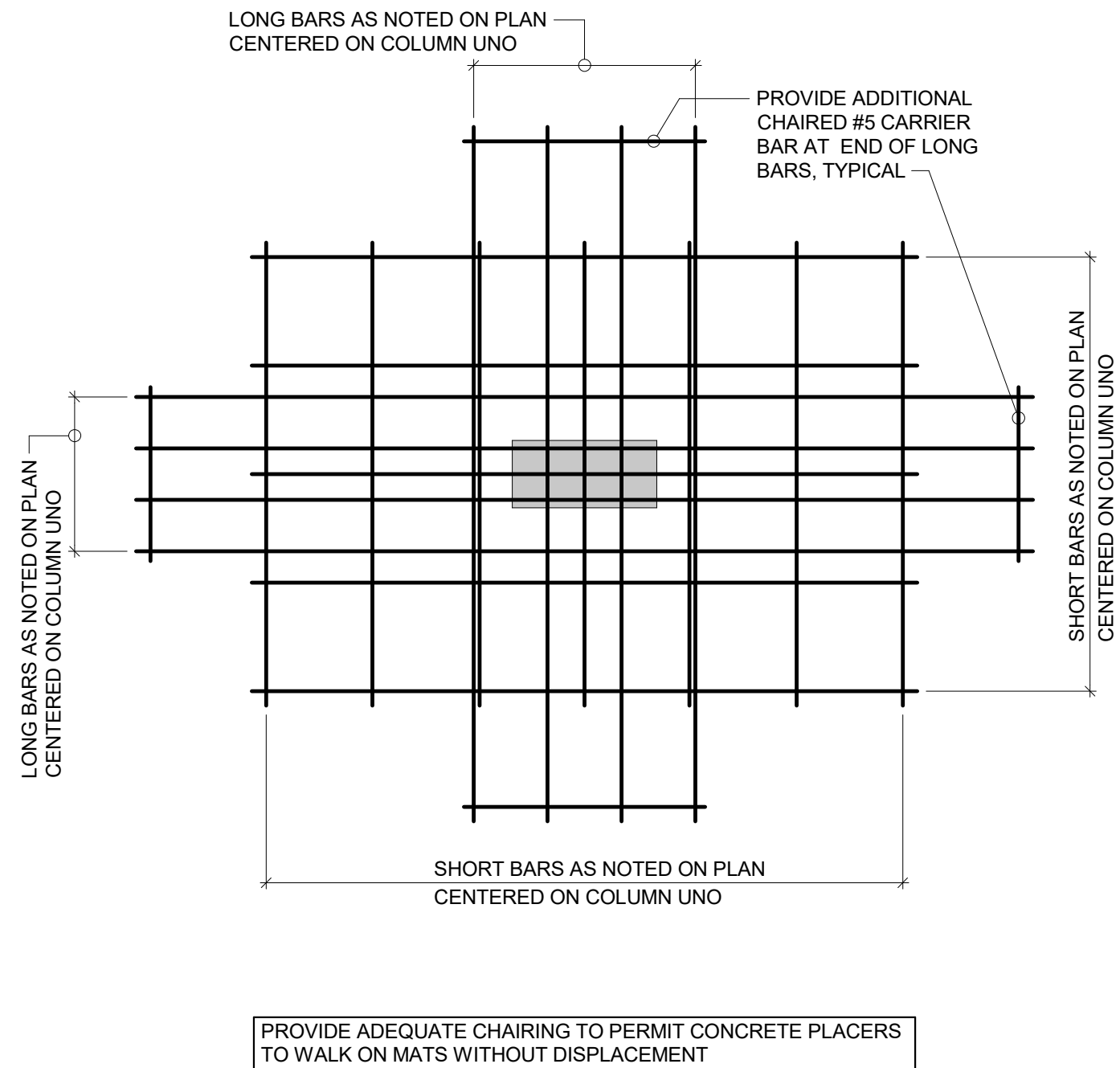
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



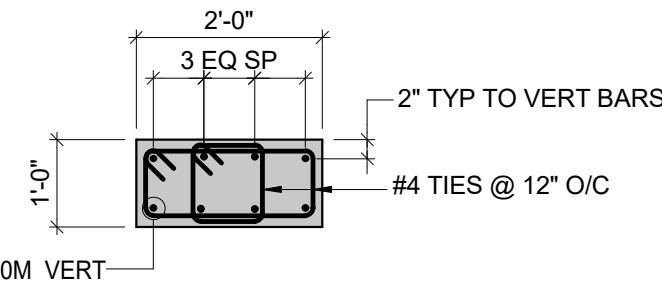
6 TYPICAL REINFORCING AROUND SLAB AND WALL OPENINGS  
GSC-OPN2A-4  
NTS



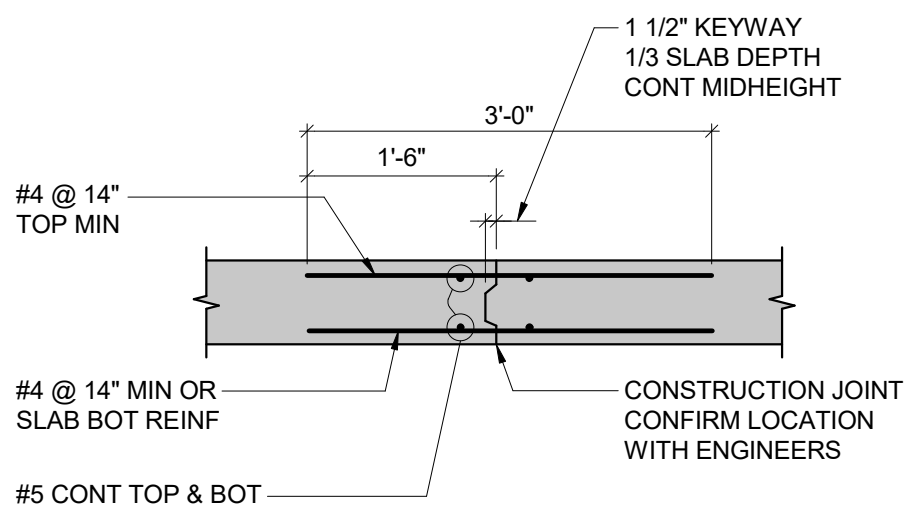
4 TYPICAL COLUMN AT FLAT PLATE FLOOR  
GSC-COL1B-4  
NTS



1 TYPICAL TOP MAT LAYOUT  
GSC-SLB1B-6  
NTS

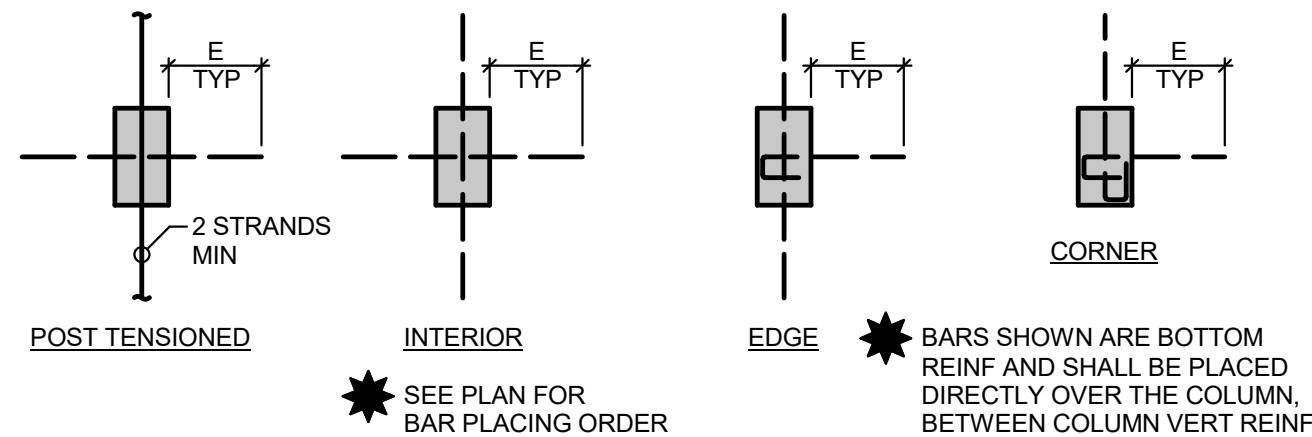


7 TYPICAL COLUMN UNO  
GSC-COL2E-3  
S201 NTS

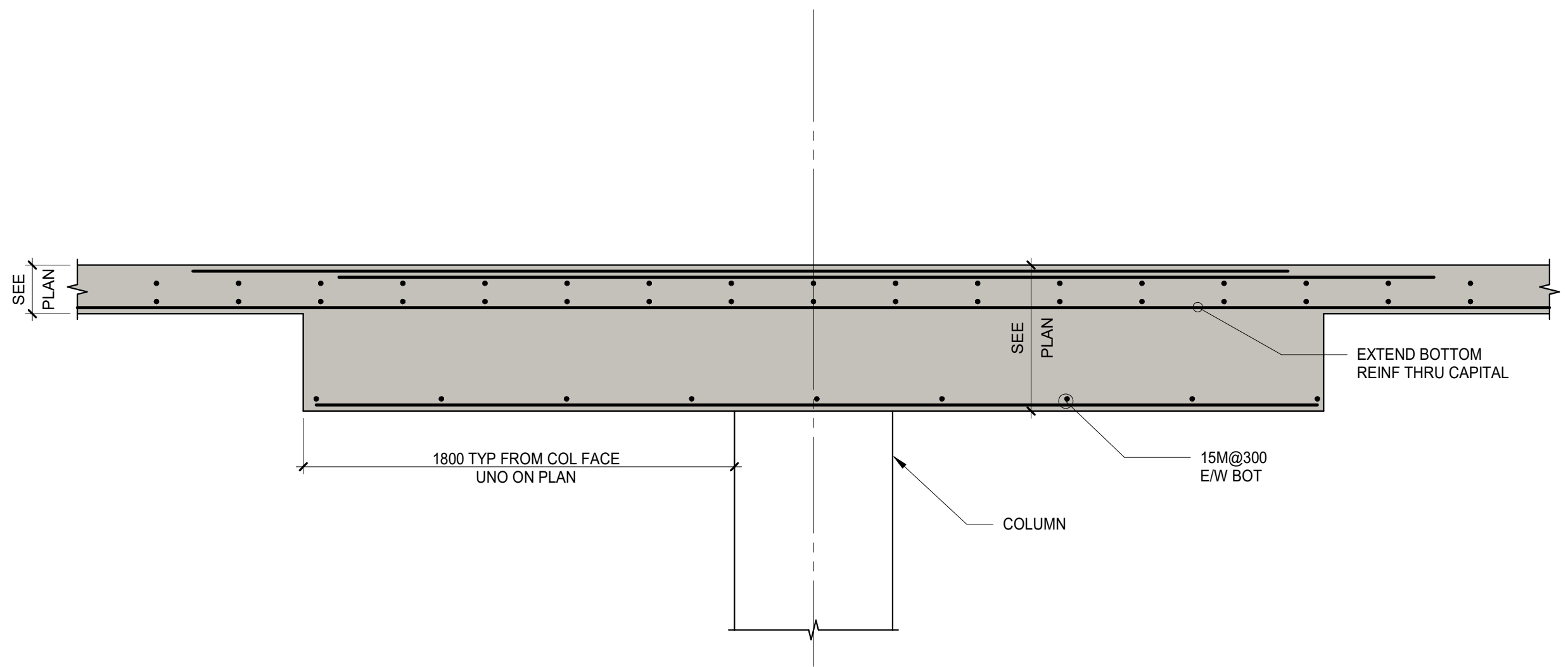


5 SLAB CONSTRUCTION JOINT  
GSC-JNT1A-4  
NTS

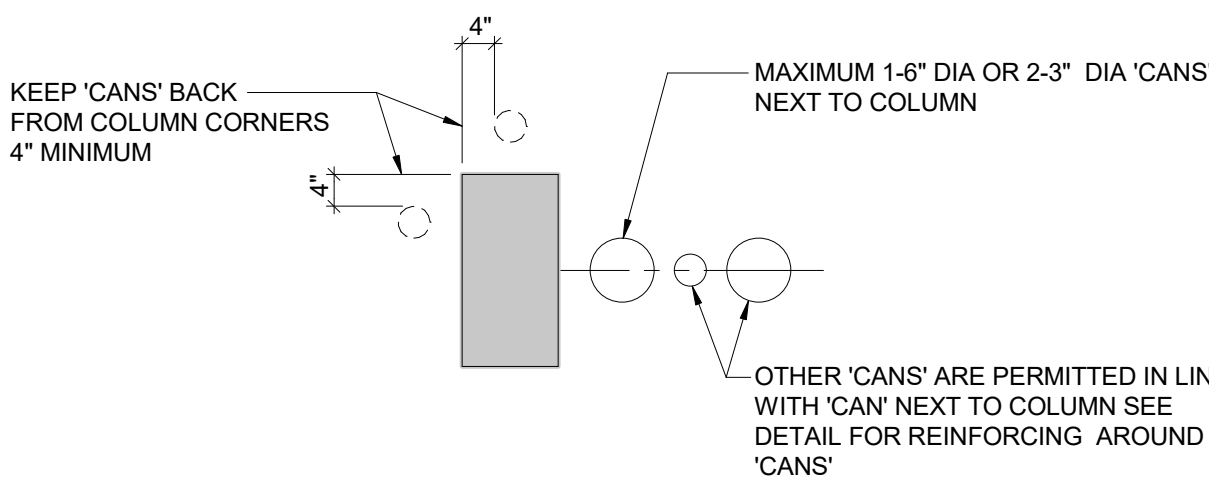
SLAB THICKNESS T (INCHES)	REINFORCING EXTENSION E (FEET)	REINFORCING REQUIRED
T < 9"	4'-0"	3#5/3B#5
9" ≤ T < 12"	4'-0"	3#6/3B#5
T ≥ 12"	6'-0"	3#8/3B#5



2 TYPICAL FLAT SLAB INTEGRITY REINFORCING  
GSC-SLB1A-5  
S202.1 NTS



8 SECTION THRU TYPICAL CAPITAL  
GSC-CON4A-2  
S202.1 1 : 20 NAM/SGP



3 TYPICAL SLAB PENETRATIONS OF FLAT PLATE FLOORS AT COLUMNS UNO  
GSC-CON4A-2  
S202.1 NTS

9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08

No.	Description:	Date:
-----	--------------	-------

Revisions

Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par

Approver

Designed by/Concept par

Designer

Drawn by/Dessiné par

Author

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

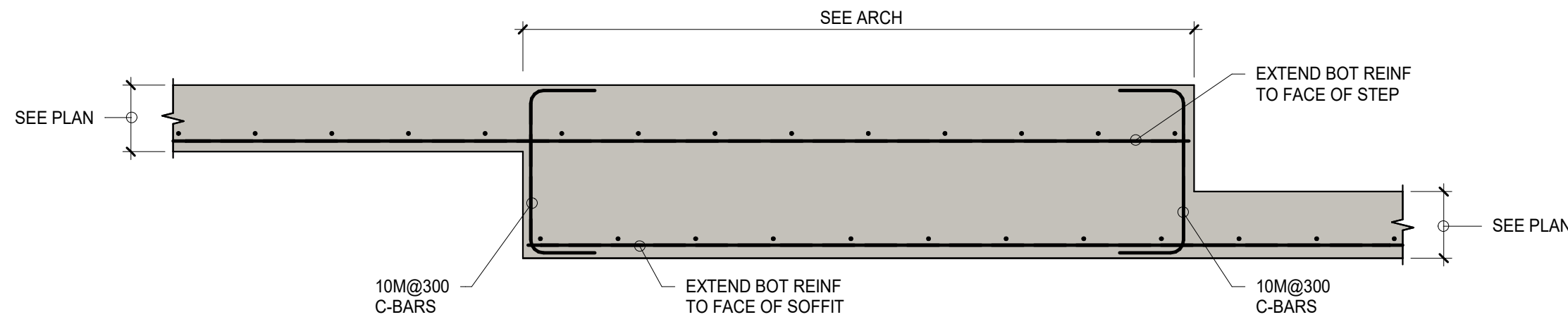
Parks Canada

Drawing title / Titre du dessin

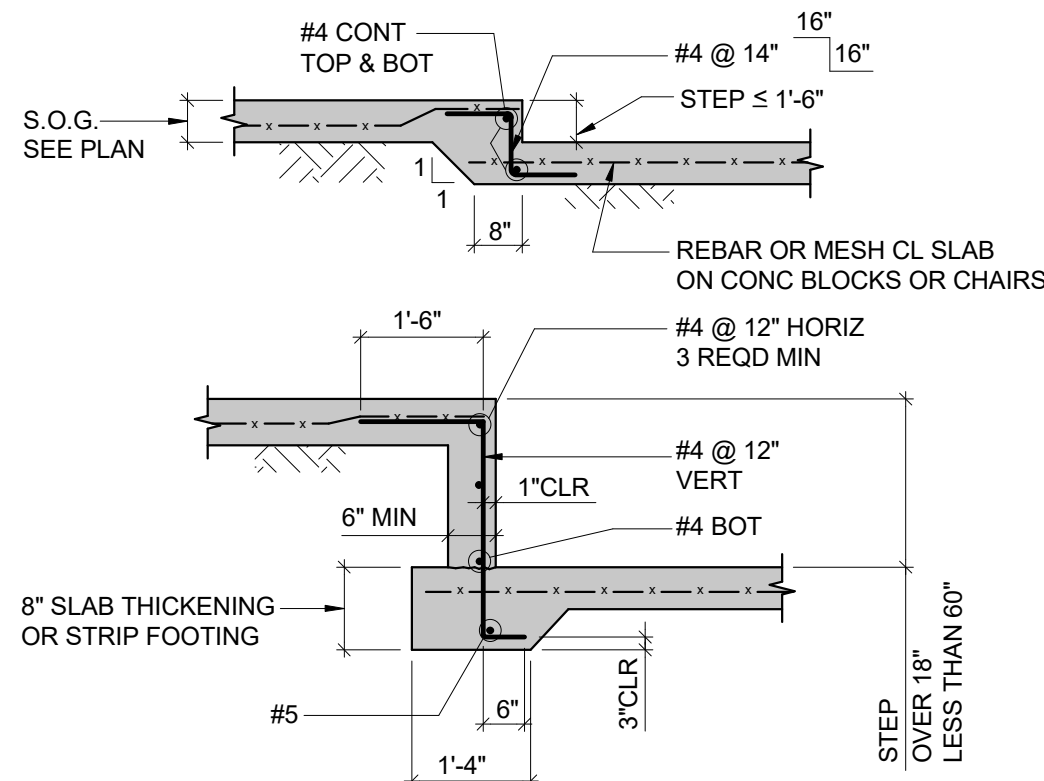
TYPICAL DETAILS - FLAT SLAB

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	S602	9

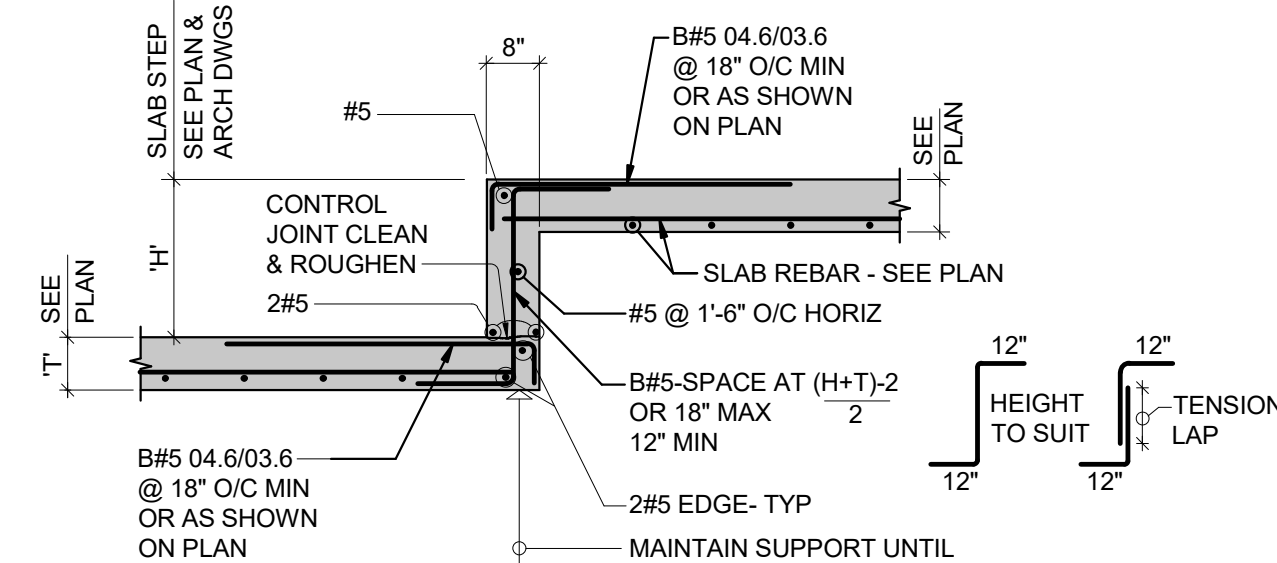




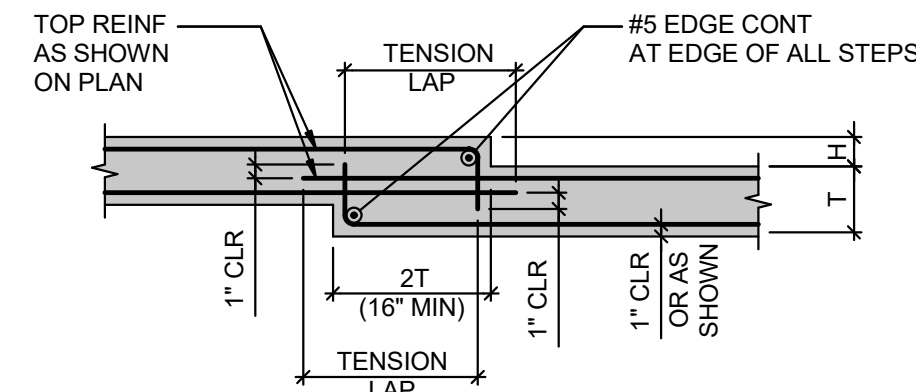
3 REINFORCING THROUGH STEP  
S202.1 1 : 20 NAM/LCB



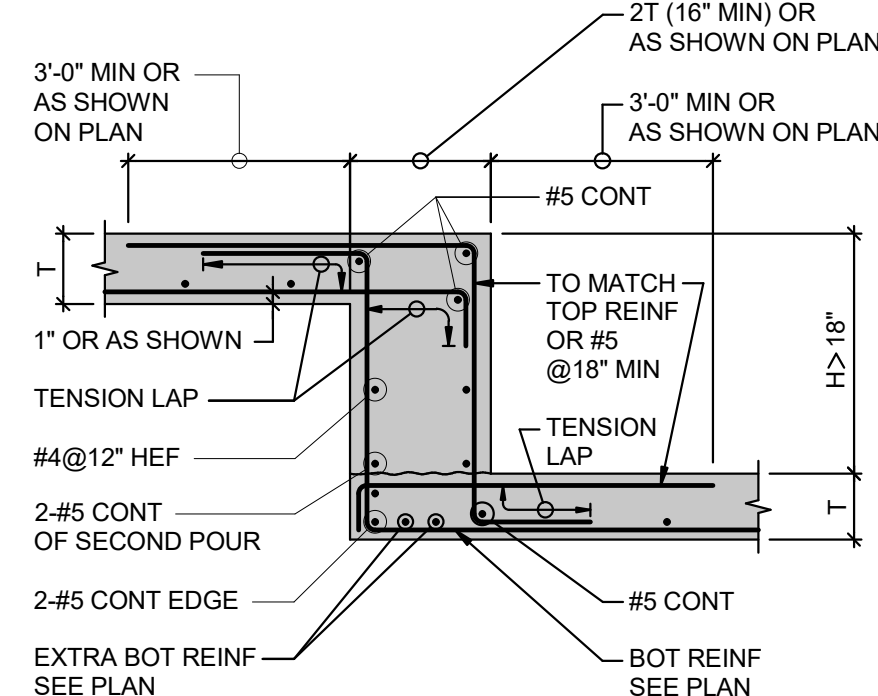
4 SLAB STEP - SLAB ON GRADE  
S201 INTERIOR AREAS ONLY NTS GSC-STP3A-3



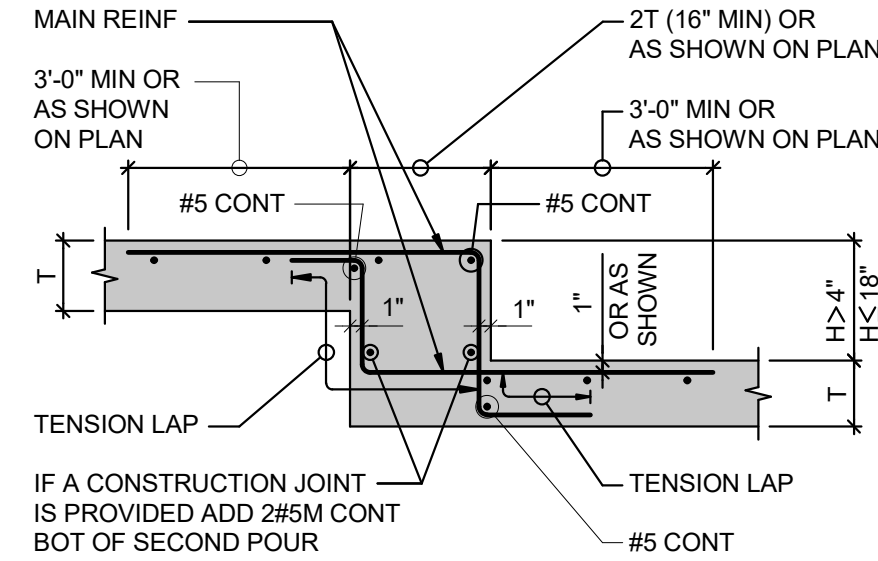
1 200 WIDE SLAB STEP DETAIL  
PARALLEL TO SLAB SPAN  
NTS GSC-STP1B-4



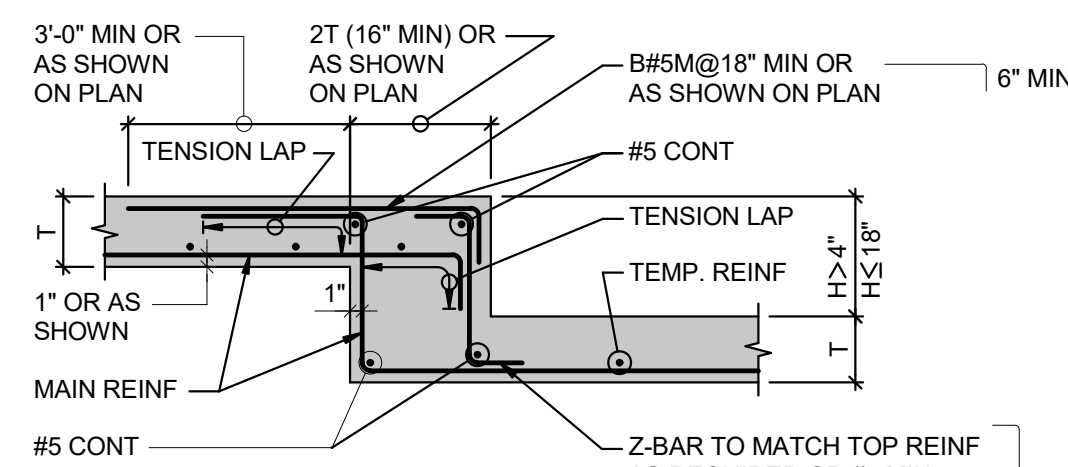
SLAB STEP H ≤ 4"



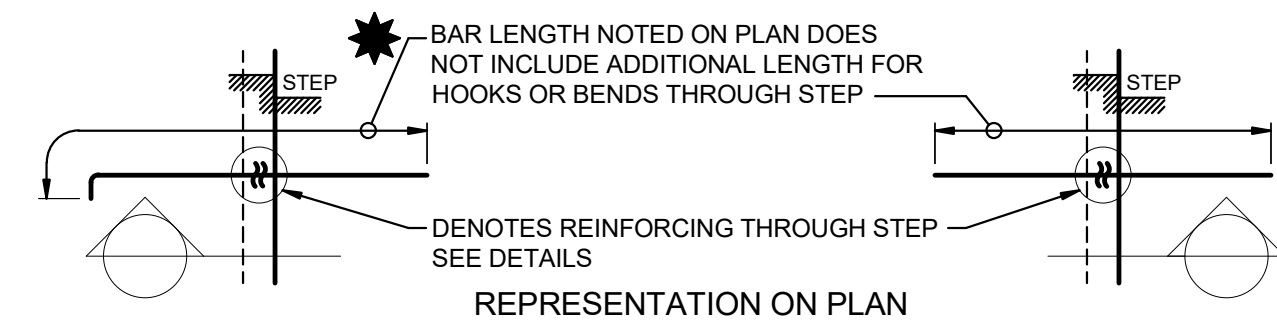
SLAB STEP H > 18"



TOP REINF IN STEPPED SLAB  
TO BE READ IN CONJUNCTION WITH 'BOTTOM REINF IN STEPPED SLAB'



BOTTOM REINF IN STEPPED SLAB  
TO BE READ IN CONJUNCTION WITH 'TOP REINF IN STEPPED SLAB'



2 TYPICAL SLAB STEP DETAIL  
NTS GSC-STP1F-9

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08

No.	Description:	Date:
-----	--------------	-------

Revisions		
Revision / Revision	Description / Description	Date / Date
Client / client		



Approved by/Approve par	Approver
Designed by/Concept par	Designer
Drawn by/Dessine par	Author
Project Manager/Administrateur de Projets	

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

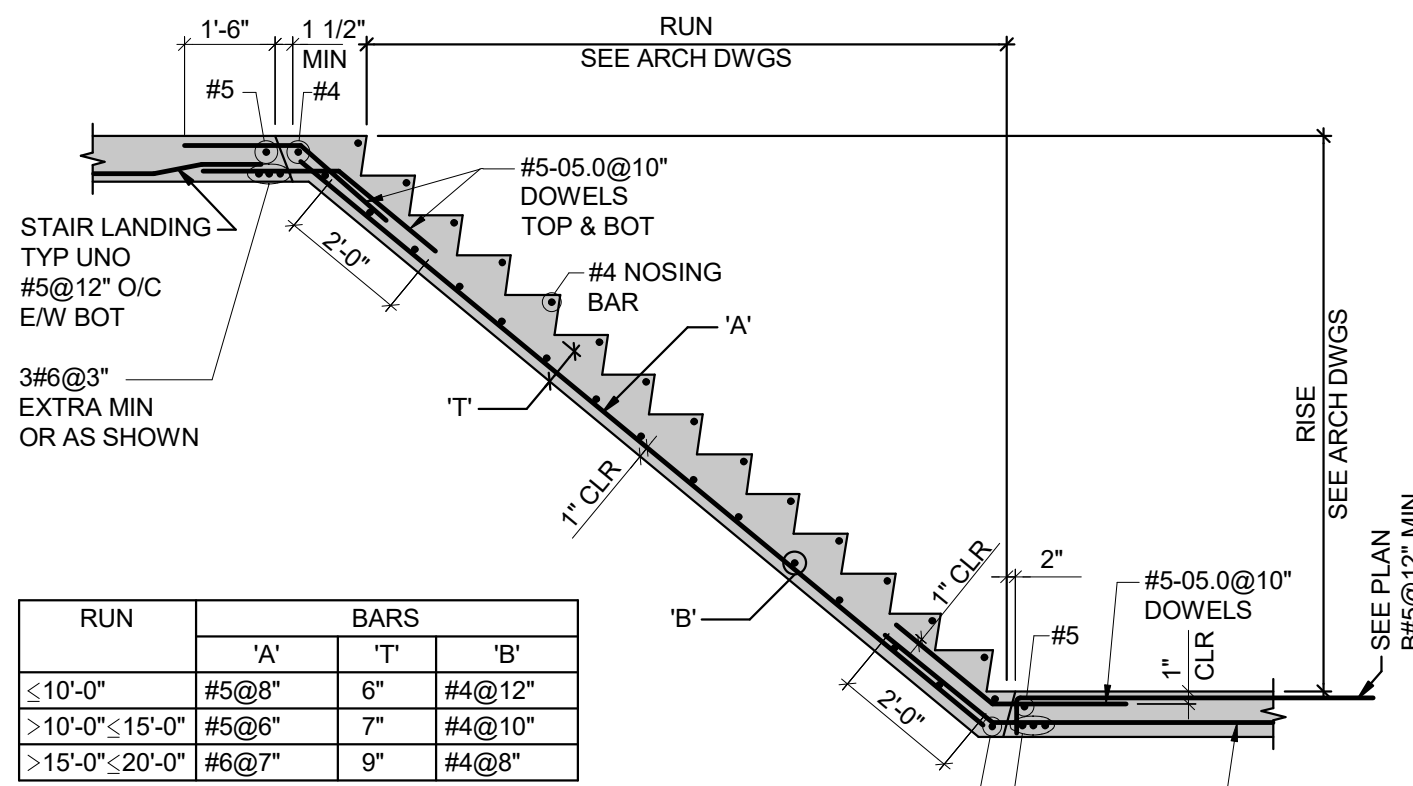
Client / client  
Parks Canada

Drawing title / Titre du dessin

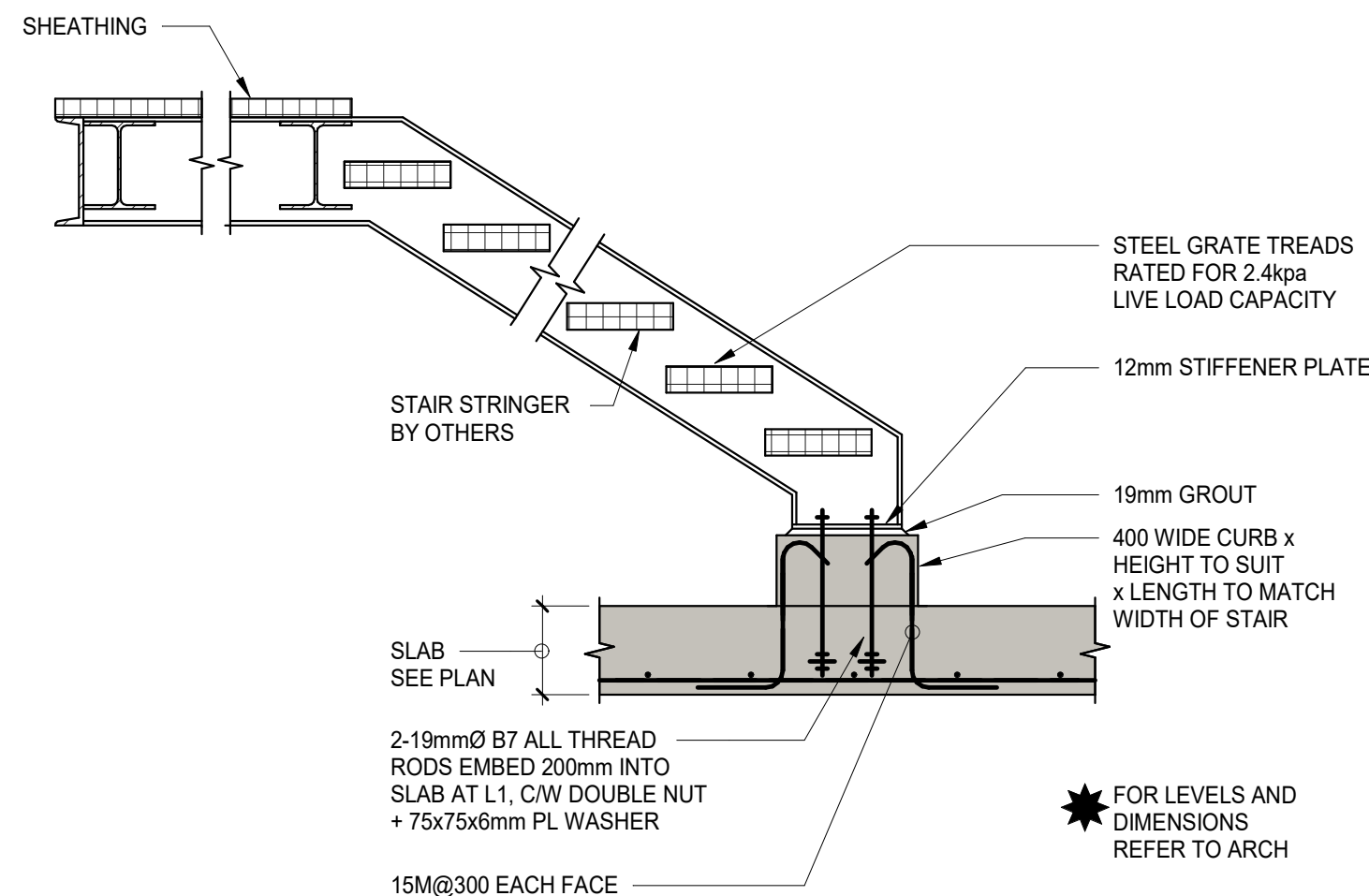
TYPICAL DETAILS - SLAB STEP

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	S603	9

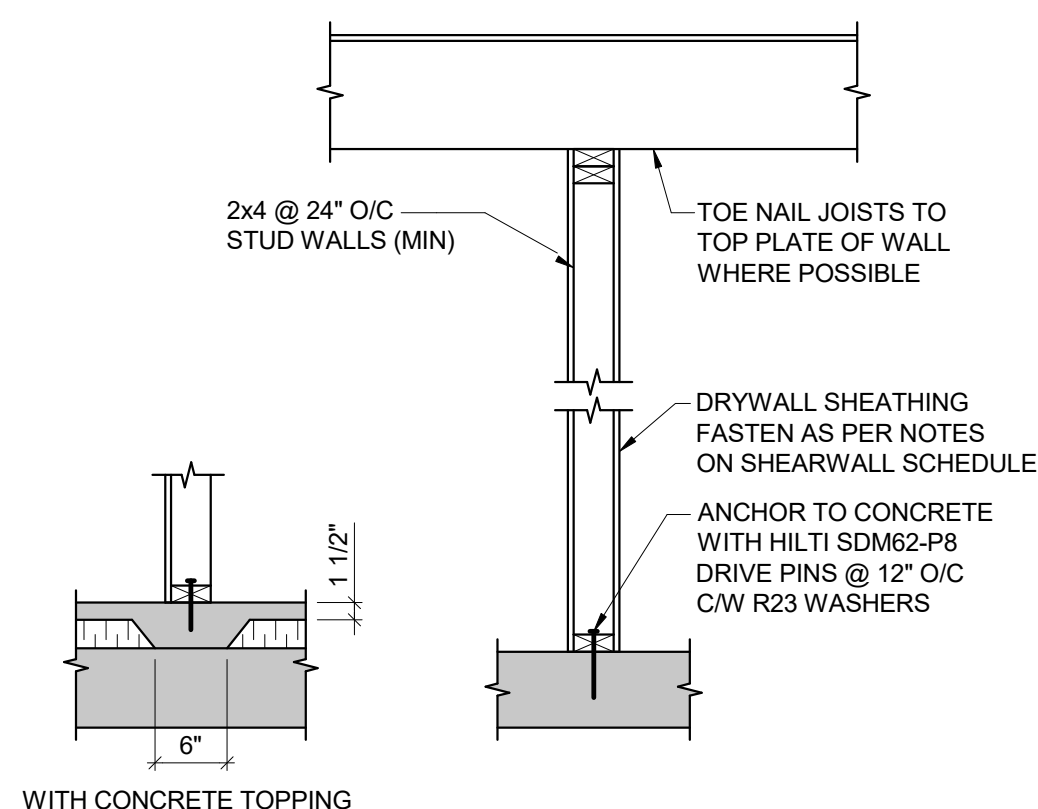




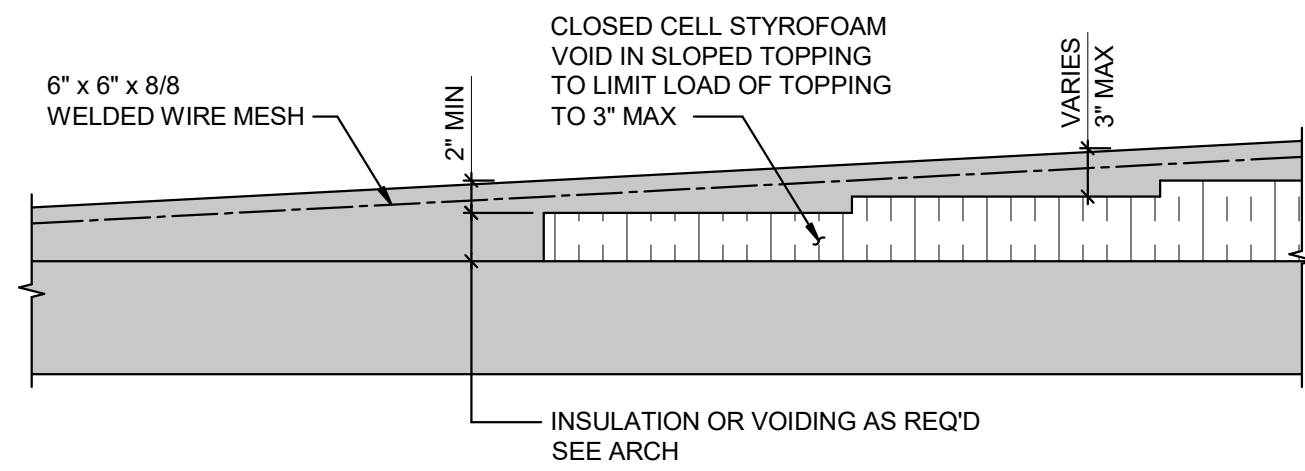
**9 TYPICAL CAST IN PLACE STAIR**  
S201 NTS GSC-STR3B-6



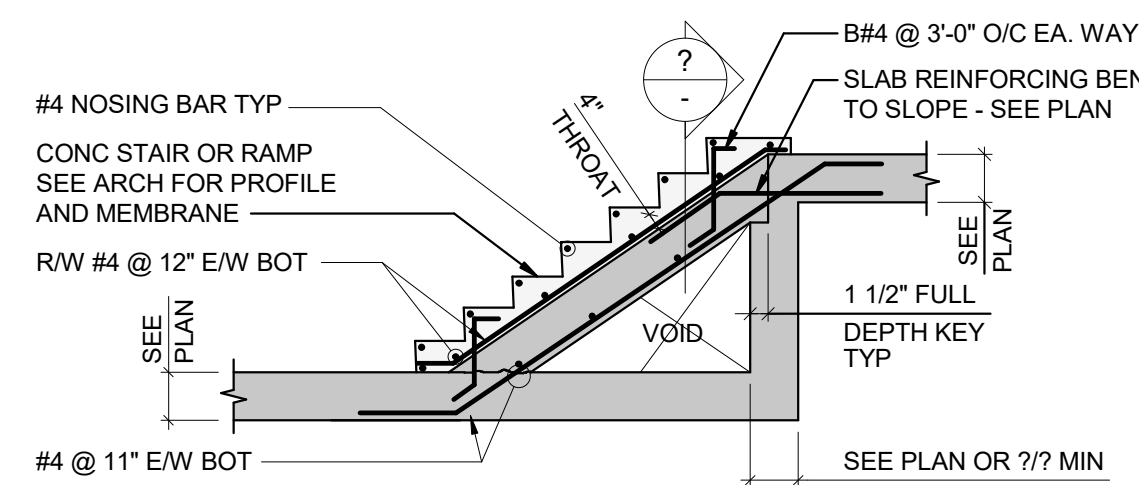
**10 EXTERIOR STAIR STRINGER PEDESTAL**  
S202.1 1:20 NAM/LCB



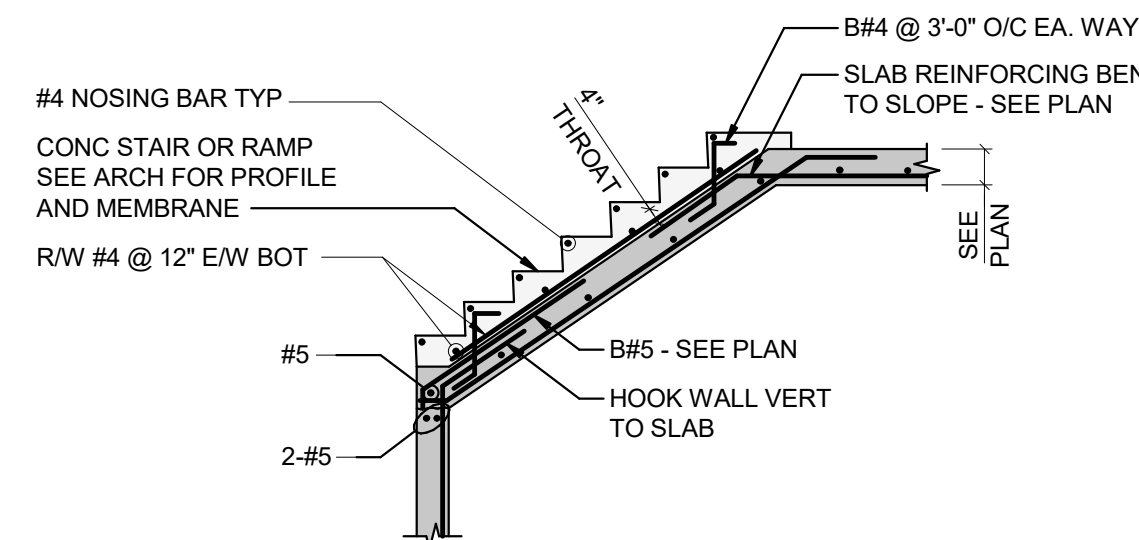
**11 TYPICAL NON-LOAD BEARING WALL**  
NTS GSW-WAL2A-2



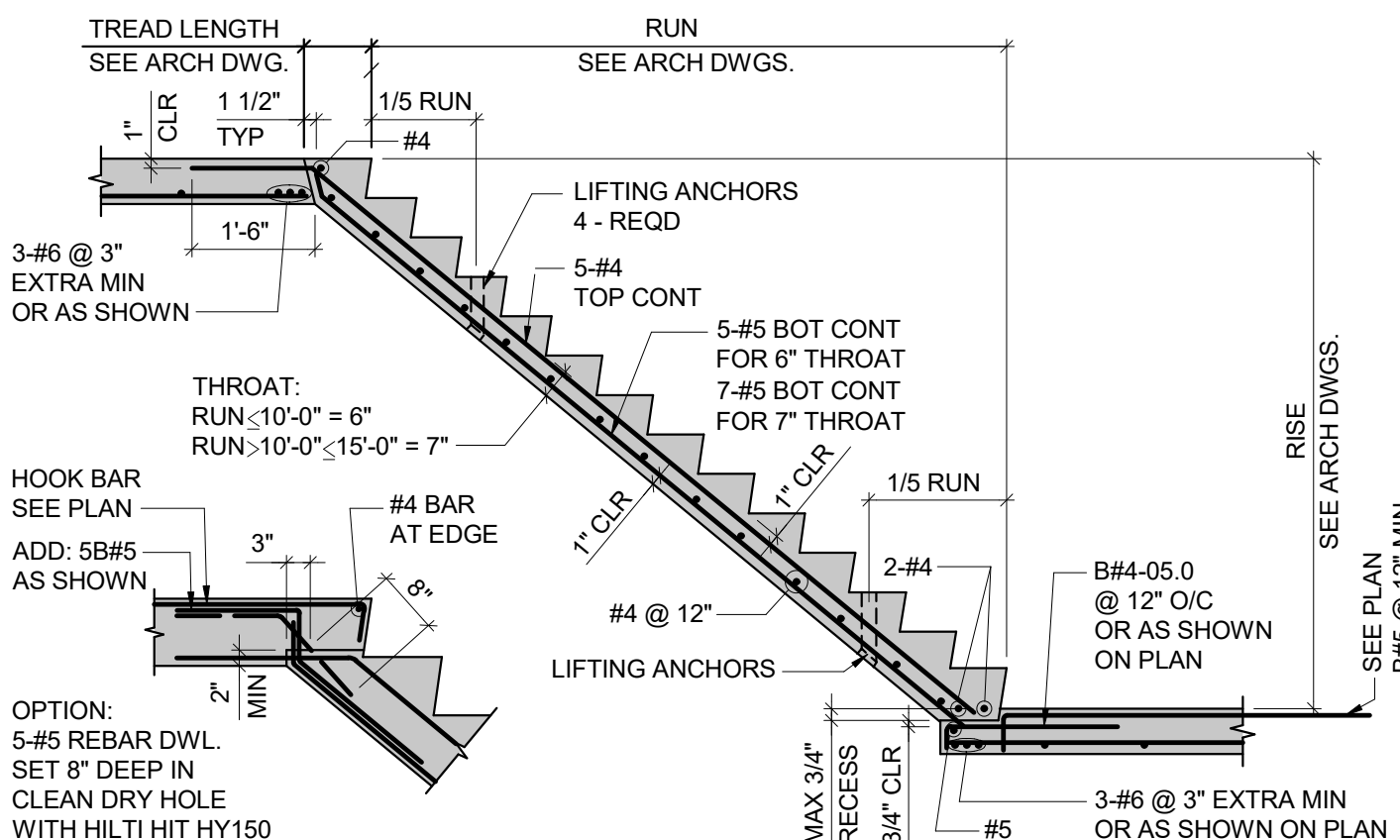
**6 TYPICAL VOIDED TOPPING**  
NTS GSC-BUC3D-2



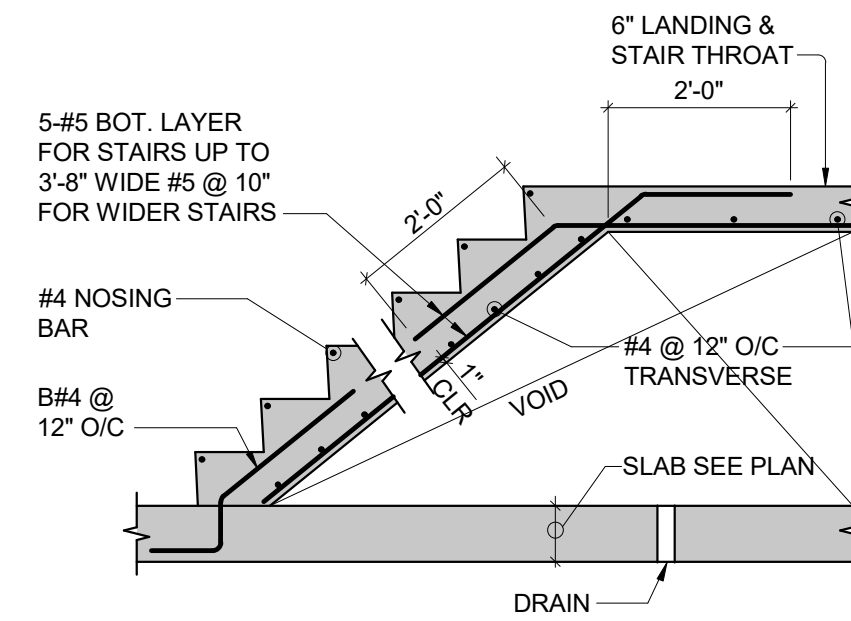
**8 TYP BUILT-UP STAIR/RAMP ON SUSPENDED SLAB UNO**  
S202.1 (SEE ARCH DWGS FOR LOCATION) NTS GSC-BUC4A-4



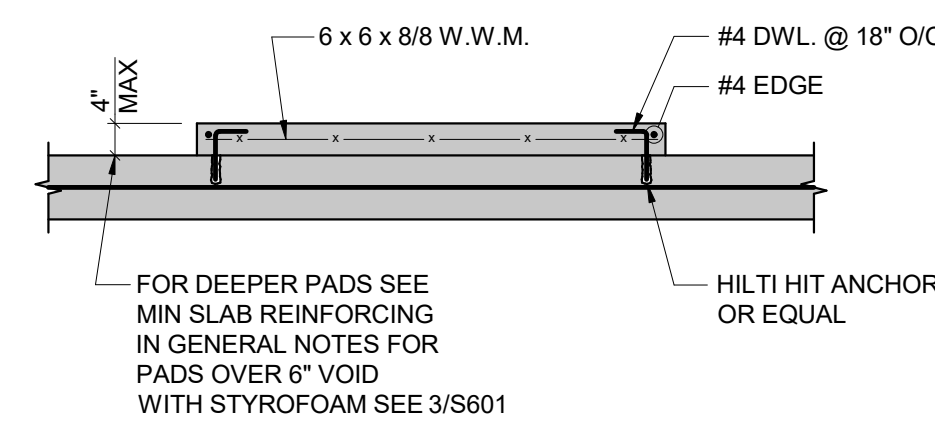
**2 TYPICAL BUILT-UP STAIR/RAMP ON SUSPENDED SLAB UNO**  
NTS (SEE ARCH DWGS FOR LOCATION) GSC-BUC4C-3



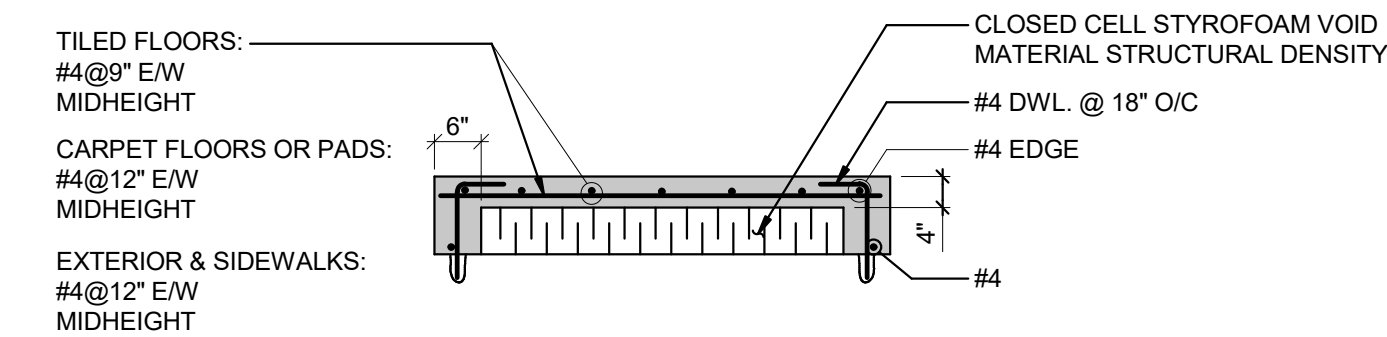
**7 TYPICAL PRECAST STAIR**  
UP TO 3'-8\"/>



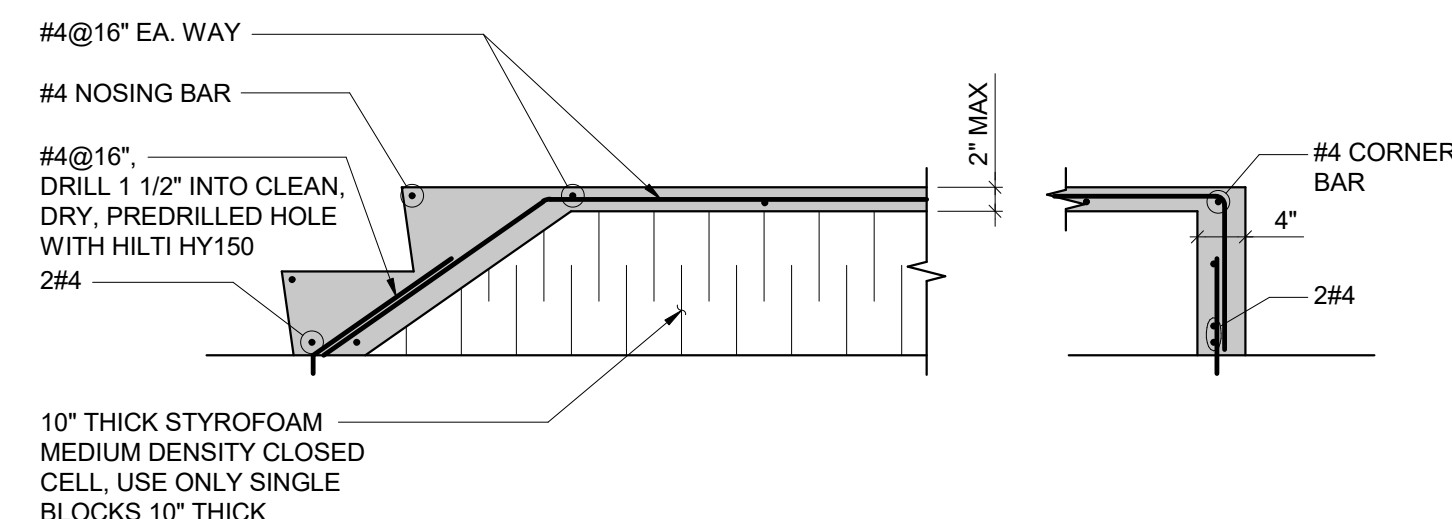
**1 TYPICAL BUILT-UP STAIR UNO**  
NTS GSC-BUC1A-4



**3 TYPICAL PADS AND CURBS**  
NTS GSC-BUC3A-4



**4 TYPICAL RAISED SIDEWALK OR PAD**  
NTS GSC-BUC3B-4



**5 TYPICAL RAISED FLOOR**  
NTS GSC-BUC3C-3



No.	Description:	Date:
9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08

Revisions		
Revision / Revision Client / client	Description / Description	Date / Date

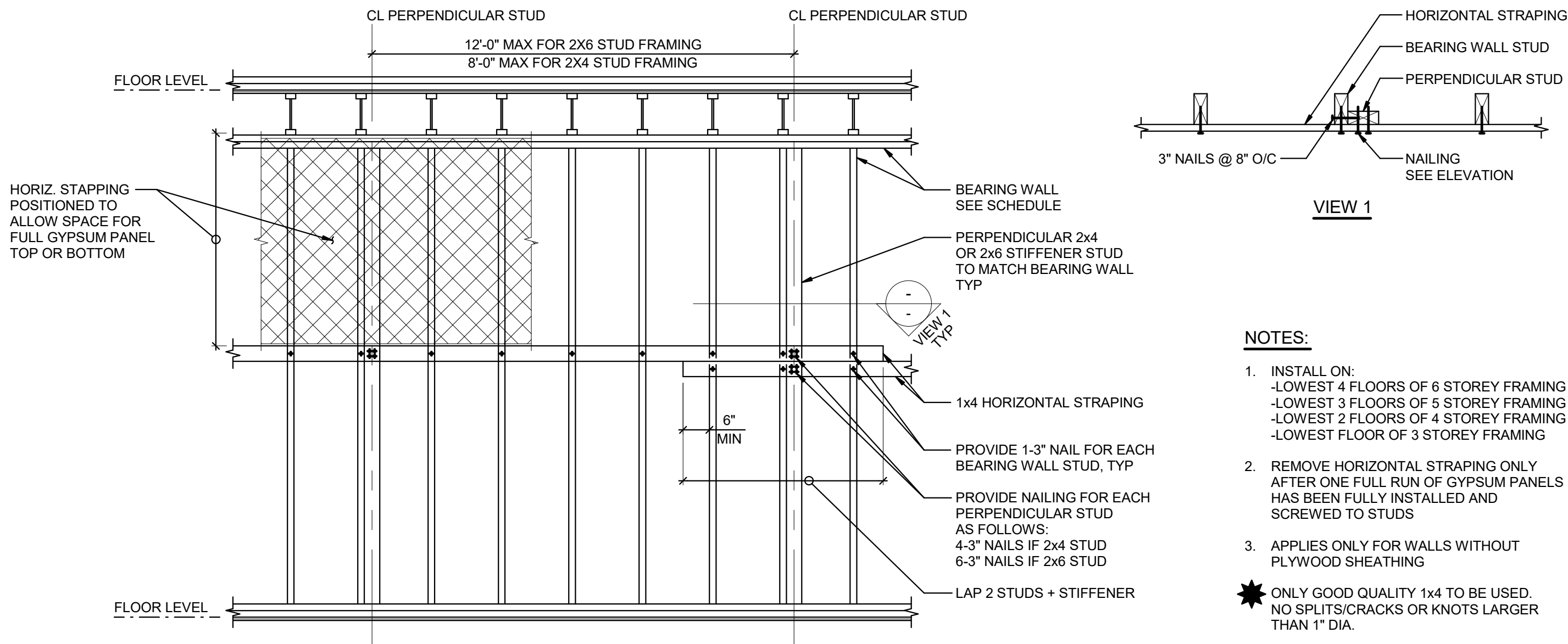


Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**  
Approved by/Approuvé par  
Approver  
Designed by/Concept par  
Designer  
Drawn by/Dessiné par  
Author  
Project Manager/Administrateur de Projets  
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie  
Client / client  
**Parks Canada**  
Drawing title / Titre du dessin

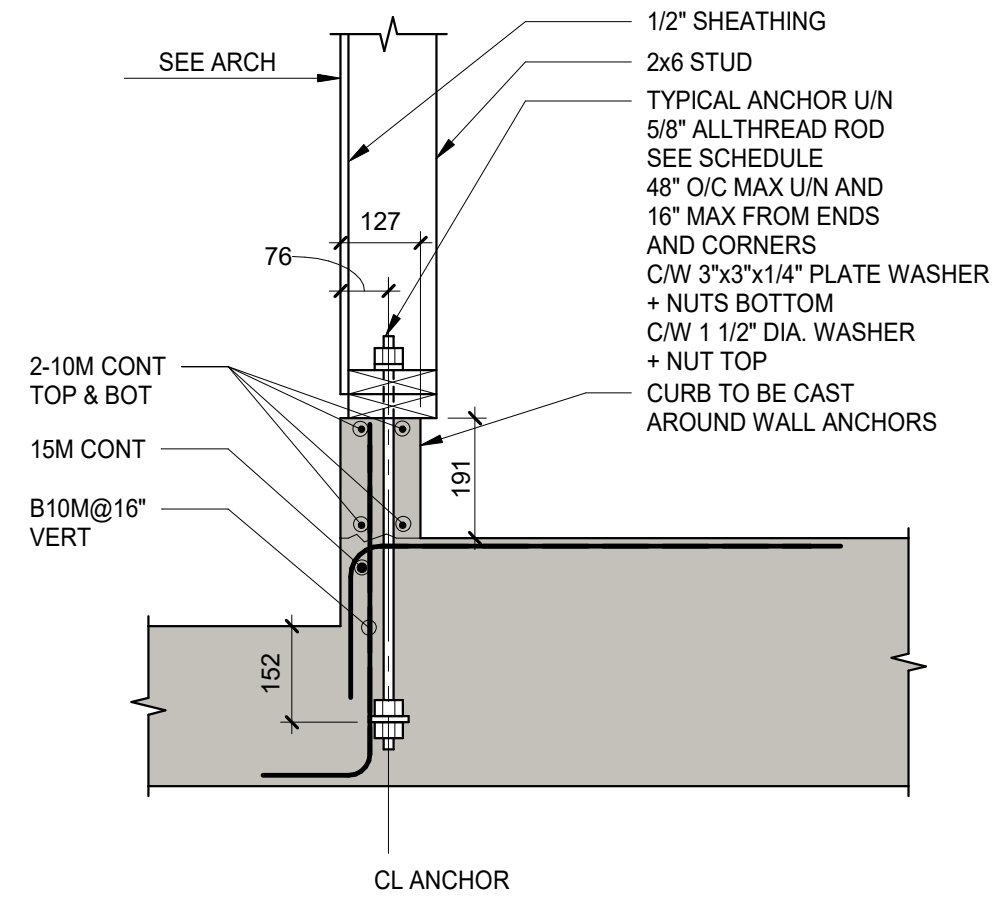
TYPICAL DETAILS - BUILT-UP STRUCTURE & STAIRS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	<b>S604</b>	<b>9</b>

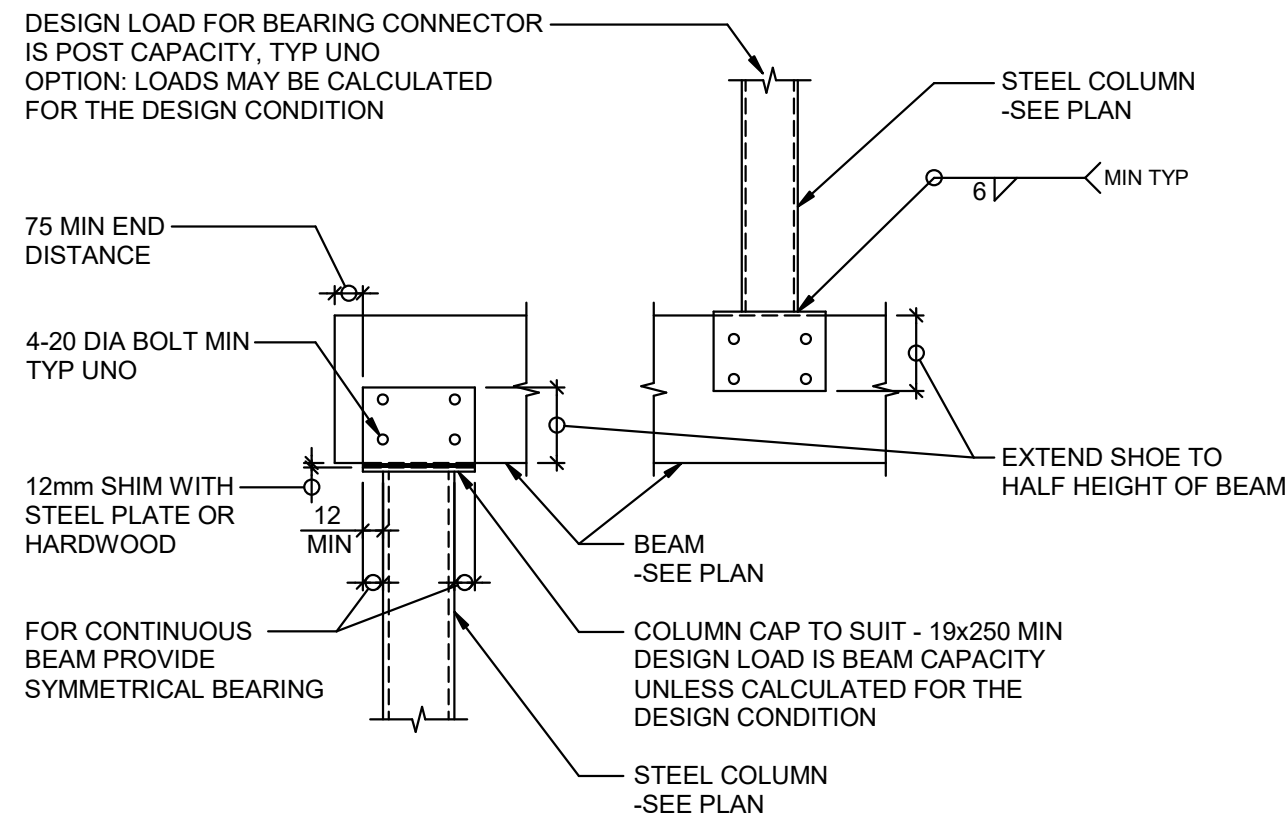




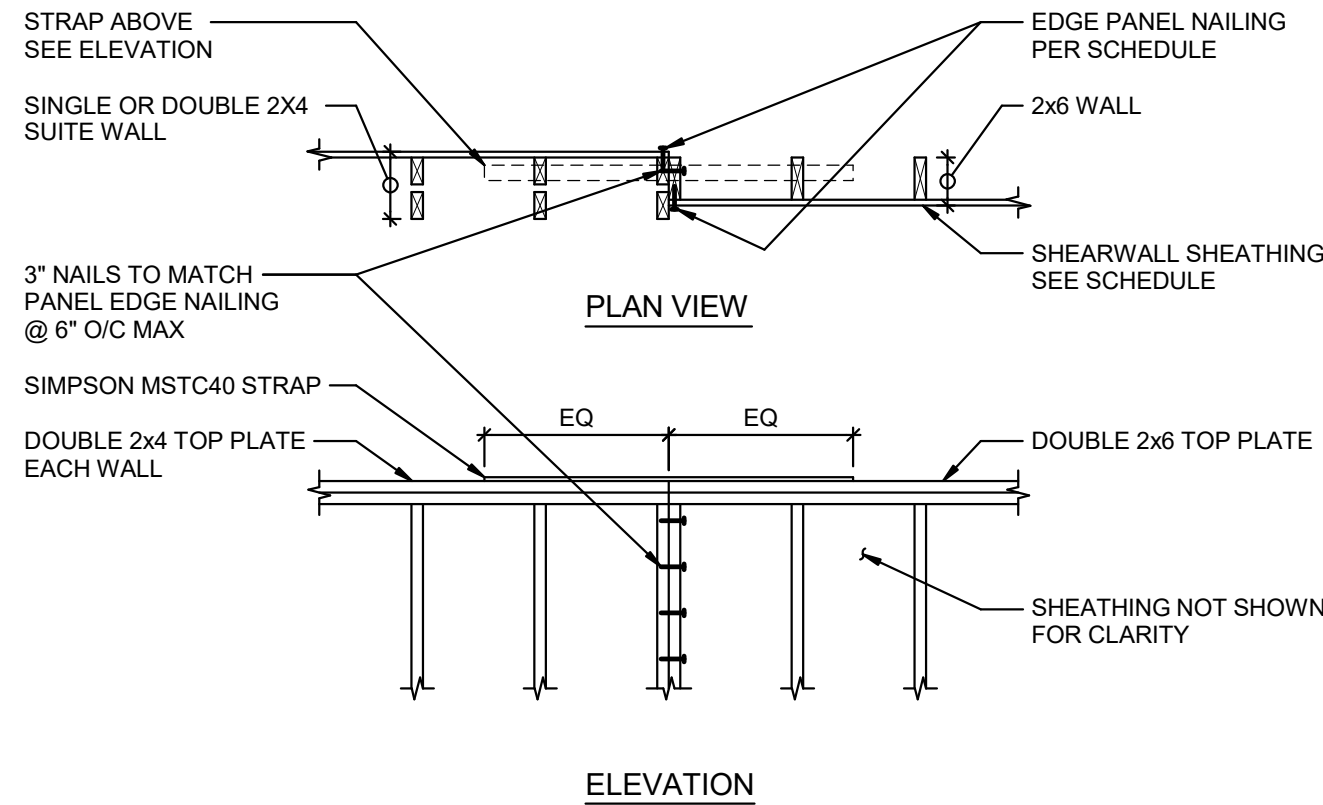
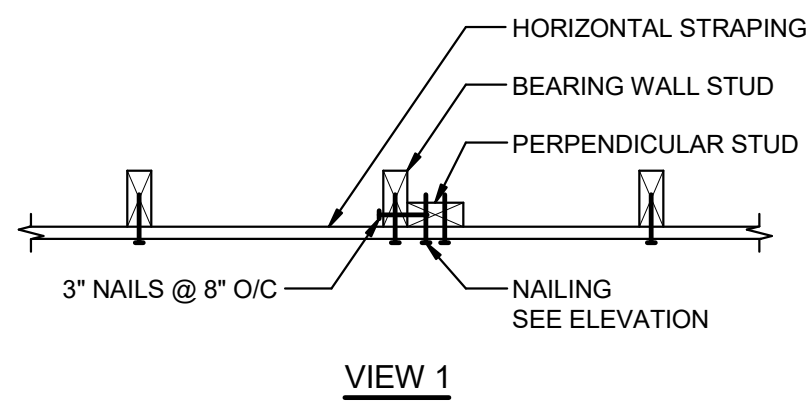
4 BEARING WALL TEMPORARY HORIZONTAL STRAPING  
NTS  
ACT, RDS/JPB



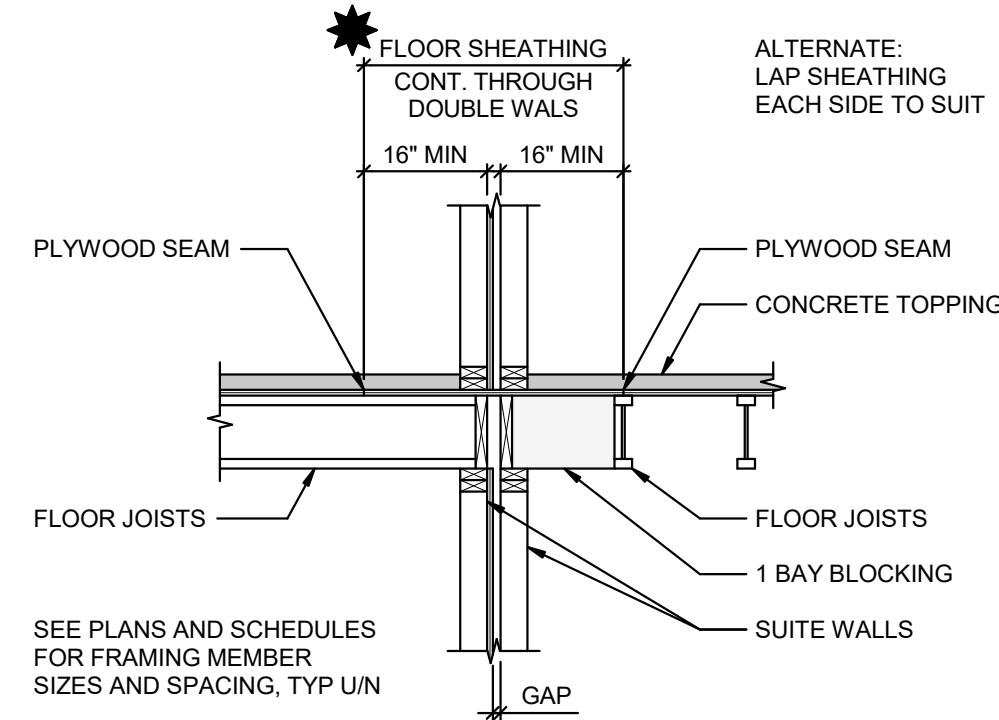
5 TYPICAL BASE EXTERIOR  
1 : 12  
RDS/JPB



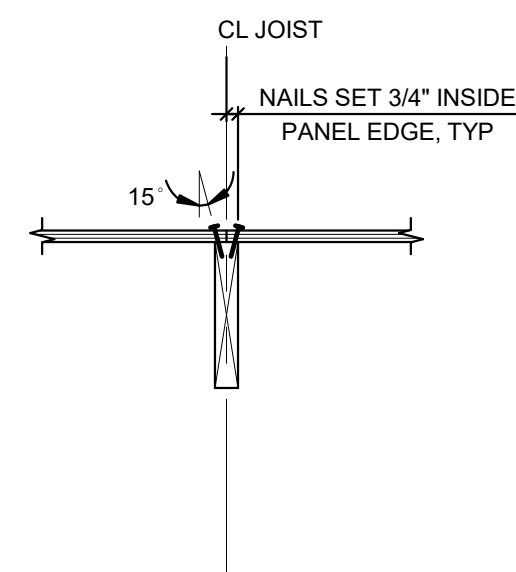
6 TYPICAL STEEL COLUMN CAP  
NTS



1 2x4 TO 2x6 SHEARWALL TRANSITION  
1/2\"/>



2 FLOOR SHEATHING AT SUITE WALLS  
1/2\"/>



3 NAILING AT SHEATHING EDGES  
1\"/>

SEE DWG S121 FOR  
DIMENSION CONVERSIONS

Copyright Reserved.  
This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.  
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08

No:	Description:	Date:
-----	--------------	-------

Revision / Revision Client / client	Description / Description	Date / Date
---	---------------------------	-------------



Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par  
Approver  
Designed by/Concept par  
Designer  
Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**  
Drawing title / Titre du dessin

TYPICAL DETAILS - WOOD

Project No. / No. du project	Sheet / Feuille <b>S610</b>	Revision no. / La Révision no. <b>9</b>
---------------------------------	--------------------------------	--



Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

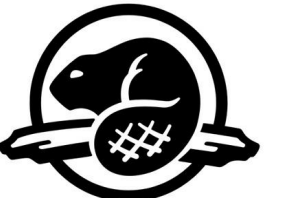
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
3	Issued for 60%CD	2018-02-08
No:	Description:	Date:

Revisions

Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par	Approver
Designed by/Concepté par	Designer
Drawn by/Dessiné par	Author
Project Manager/Administrateur de Projets	

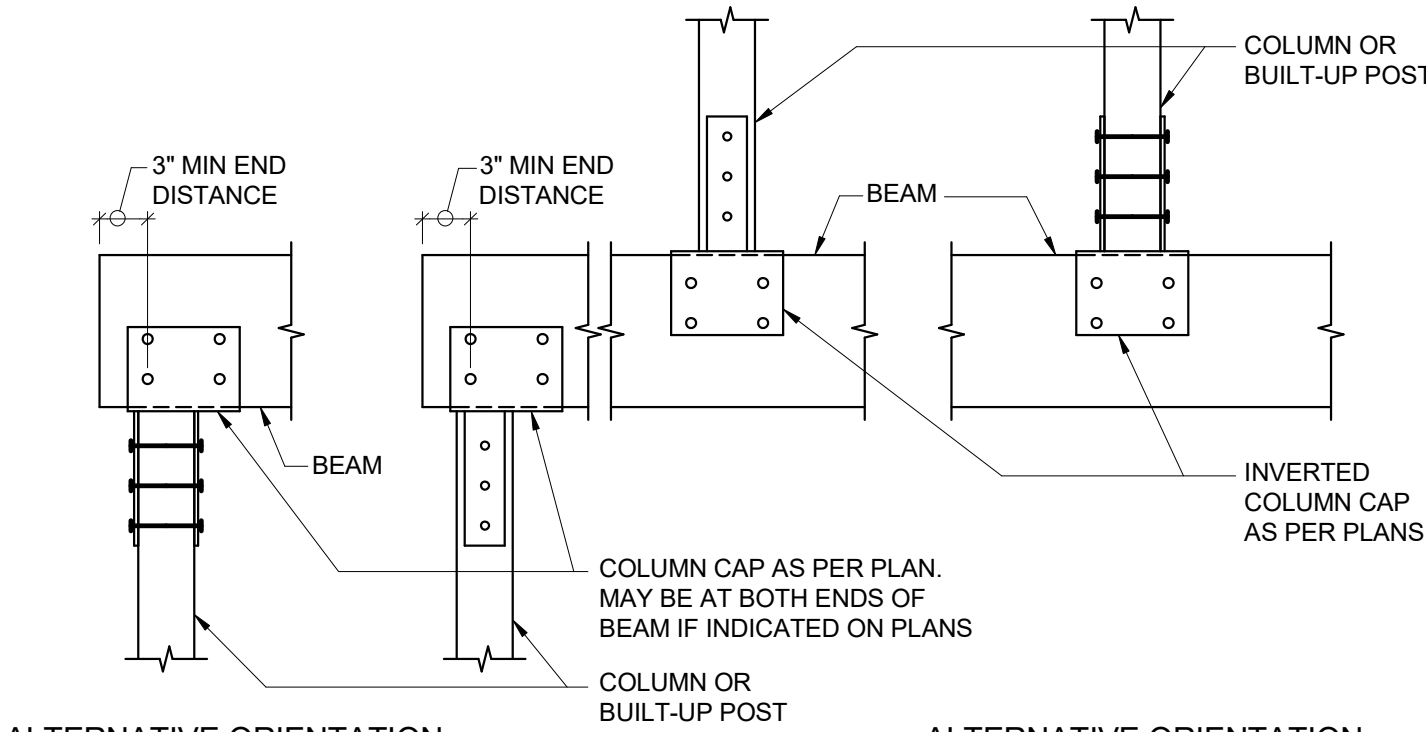
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

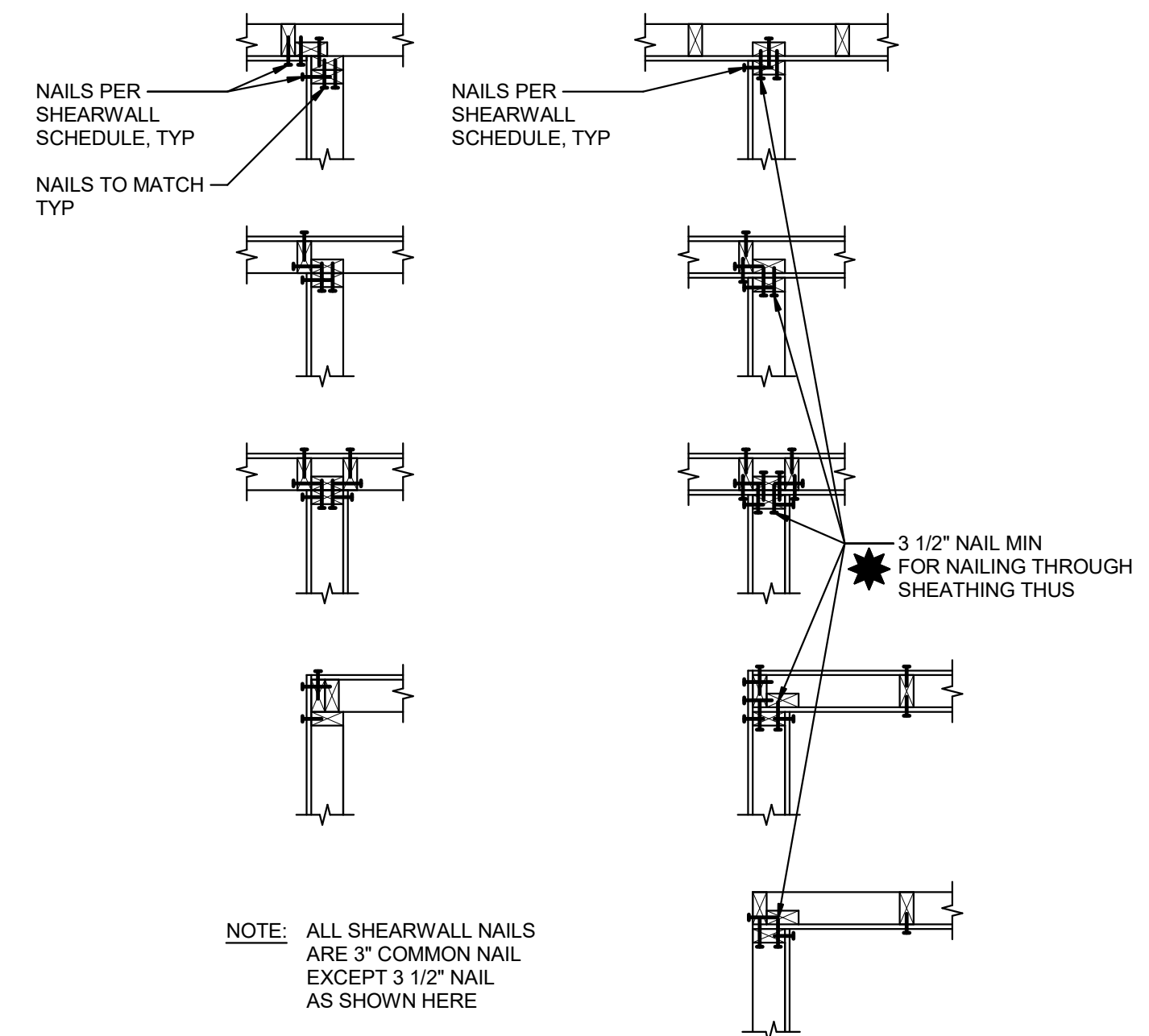
Drawing title / Titre du dessin

TYPICAL DETAILS - WOOD

Project No. / No. du project	Sheet / Feuille S611	Revision no. / La Révision no. 9
---------------------------------	-------------------------	---



7 TYPICAL HOLDOWN COLUMN CAP  
AND INVERTED COLUMN CAP  
NTS GSW-HLD1C-2



8 SHEARWALL INTERSECTION NAILING  
ARRANGEMENT TYPICAL  
NTS GSW-WAL3A

HANGERS USED SHALL BE RATED FOR A MINIMUM OF THE FOLLOWING LOADS:

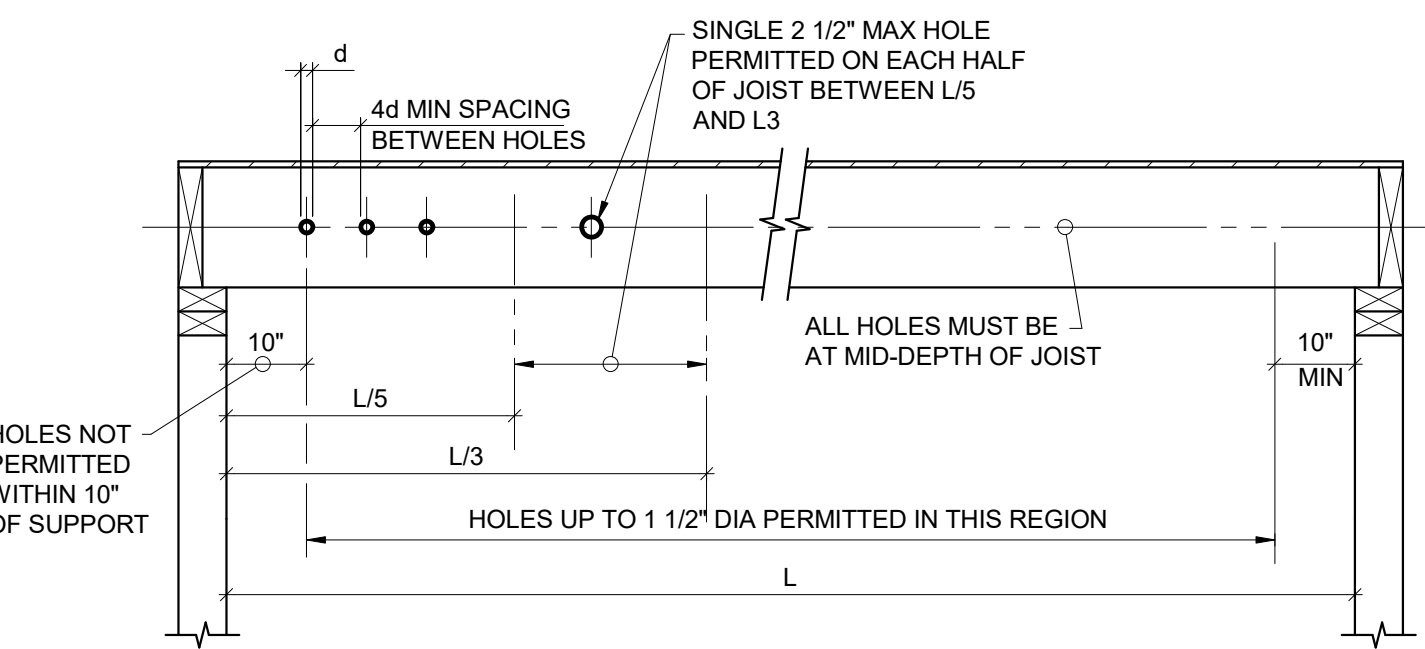
	FACTORED SHEAR RESISTANCE	ALLOWABLE LOAD (FLOOR (100))
2-2x10	3.21 (kips)	2.38 (kips)
3-2x10	4.81	3.56
4-2x10	6.41	4.75
5-2x10	8.02	5.94
2-2x12	3.55 (kips)	2.62 (kips)
3-2x12	5.32	3.94
4-2x12	7.10	5.26
5-2x12	8.88	6.58

REFER TO SUPPLIERS CATALOGUE FOR LOAD CAPACITIES.

NOTE:  
FACTORED SHEAR RESISTANCE LOADS SHALL BE USED WHEN MANUFACTURER'S DATA IS IN LIMIT STATES DESIGN FORMAT, WHILE ALLOWABLE LOAD (FLOOR (100)) LOADS SHALL BE USED WHEN MANUFACTURER'S DATA IS IN WORKING STRESS FORMAT. CONTACT SUPPLIER WHEN FORMAT IS IN DOUBT.

PARALLAM OR GLULAM HANGERS SHALL BE DESIGNED FOR LOADS INDICATED ON PLANS.

4 TYP FLUSH CONNECTION OF BUILT-UP BEAM  
NTS GSW-BEA1A-2

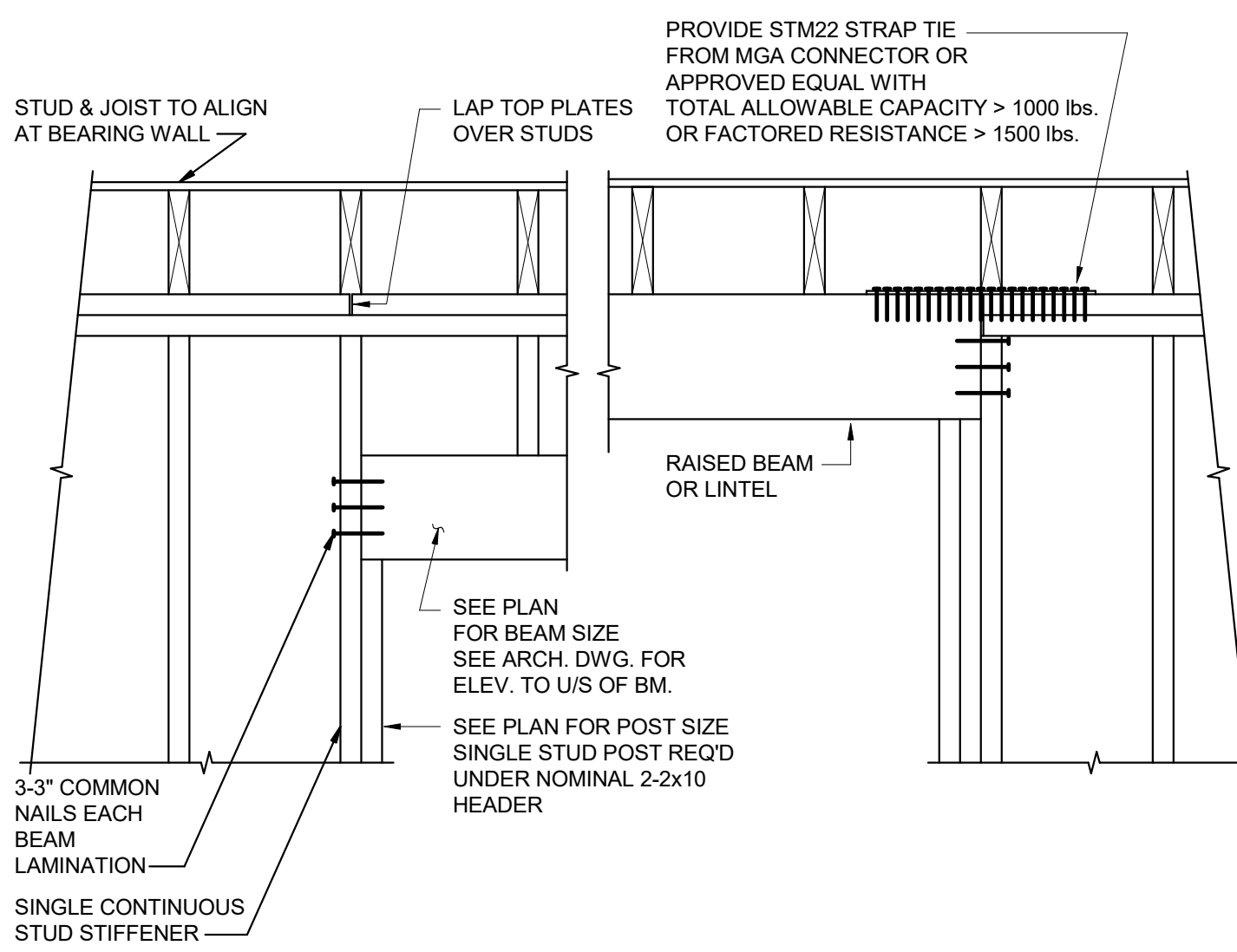


NOTES:  
-HOLES MUST BE DRILLED PERPENDICULAR THROUGH JOISTS. SKEWED HOLES NOT ACCEPTABLE  
-DO NOT DRILL MORE HOLES THAN REQUIRED  
-HOLES TO BE 1/4" MAX LARGER DIAMETER THAN PIPE SIZE  
-IF HOLE REQUIRED IS OUTSIDE OF THESE RANGES CONTACT ENGINEER.

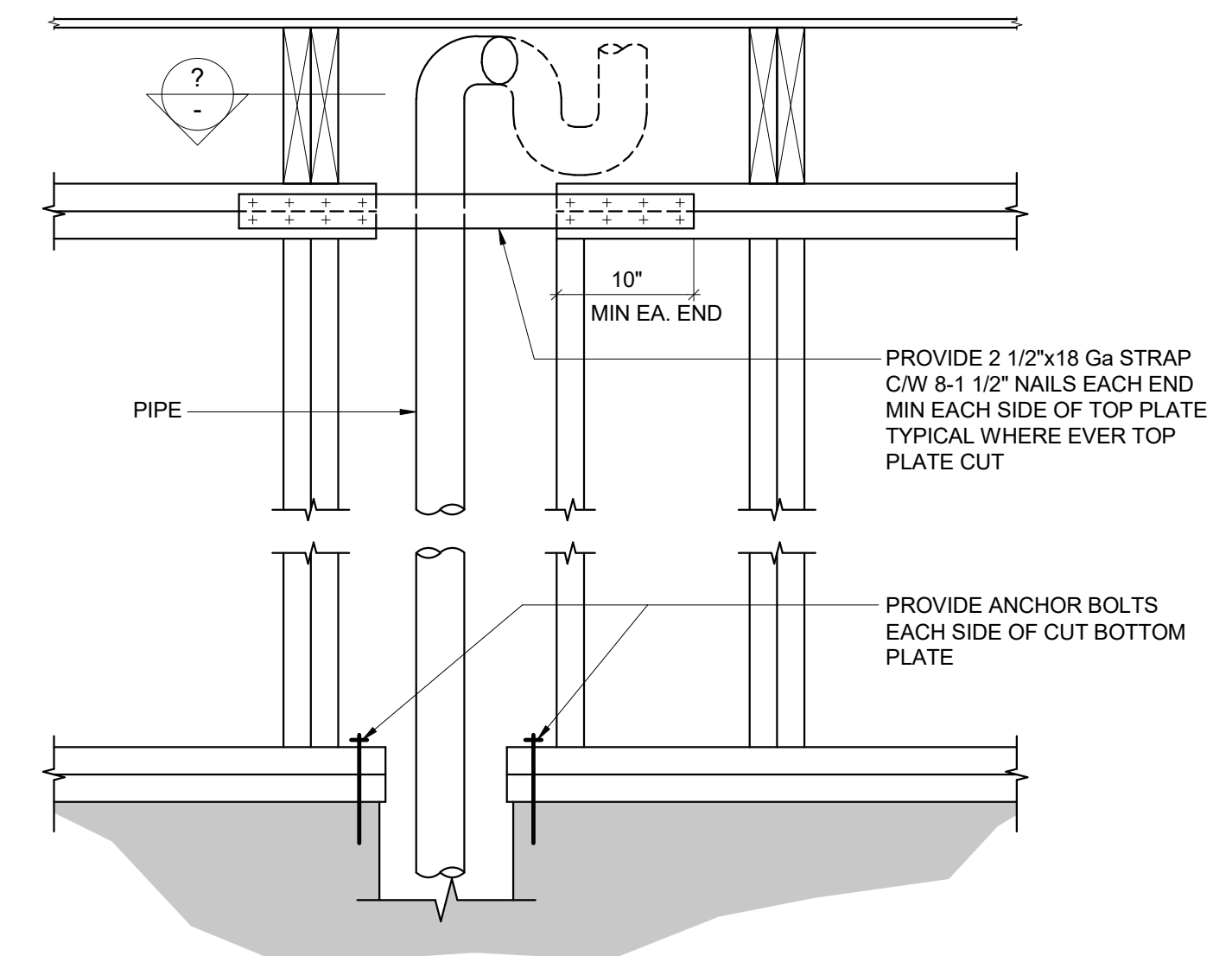
5 JOIST HOLE GUIDE  
NTS GSW-MEC2A-2

LAG SIZE	HOLE SIZE	
	DENSE HARDWOOD	NEW SPRUCE
1/4"	3/16" DIA	1/8" DIA
3/8"	9/32" DIA	3/16" DIA
1/2"	3/8" DIA	1/4" DIA
5/8"	1/2" DIA	3/8" DIA
3/4"	9/16" DIA	7/16" DIA
7/8"	5/8" DIA	9/16" DIA
1"	3/4" DIA	11/16" DIA

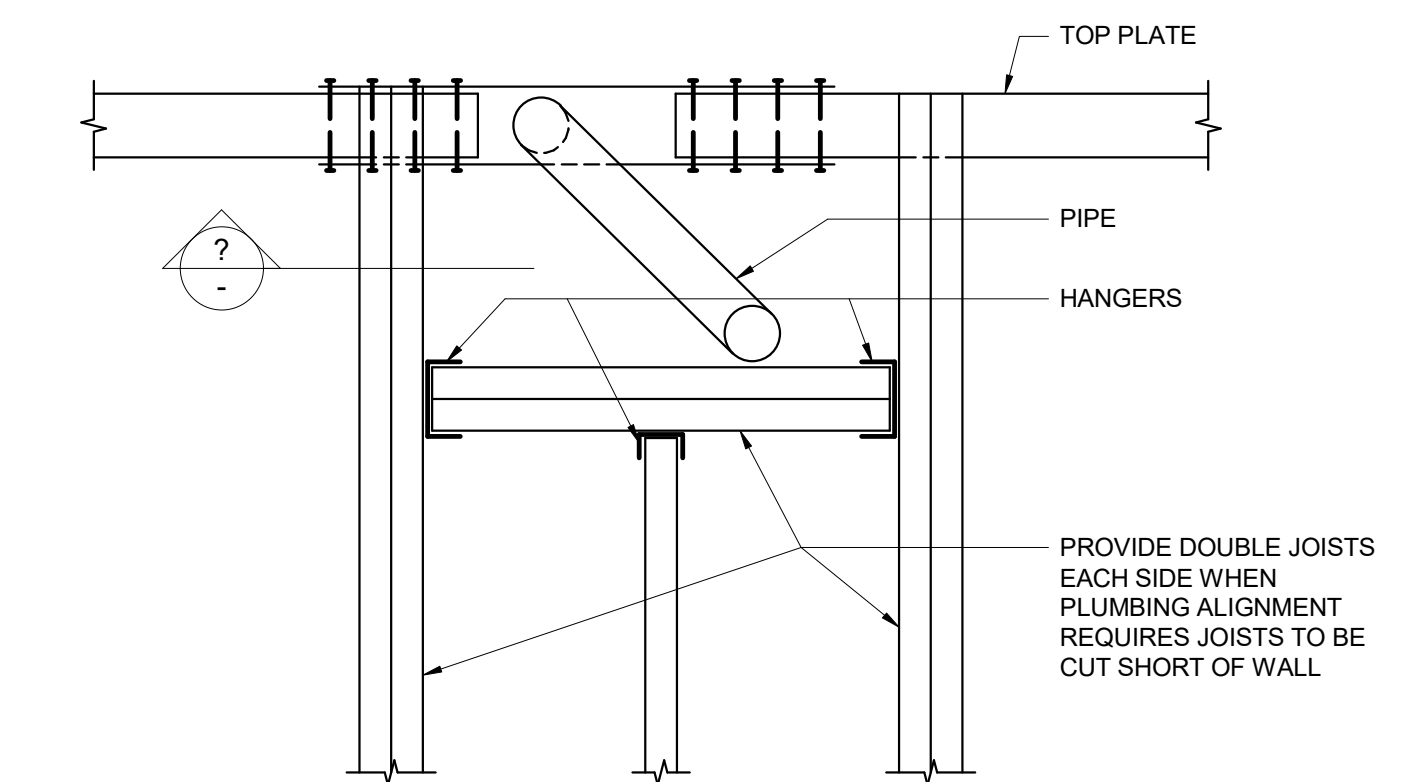
6 PREDRILLED HOLE FOR LAGBOLTS  
NTS GSW-BLT1A-3



1 TYPICAL LINTEL OR HEADER FRAMING  
NTS GSW-HDR1A-2



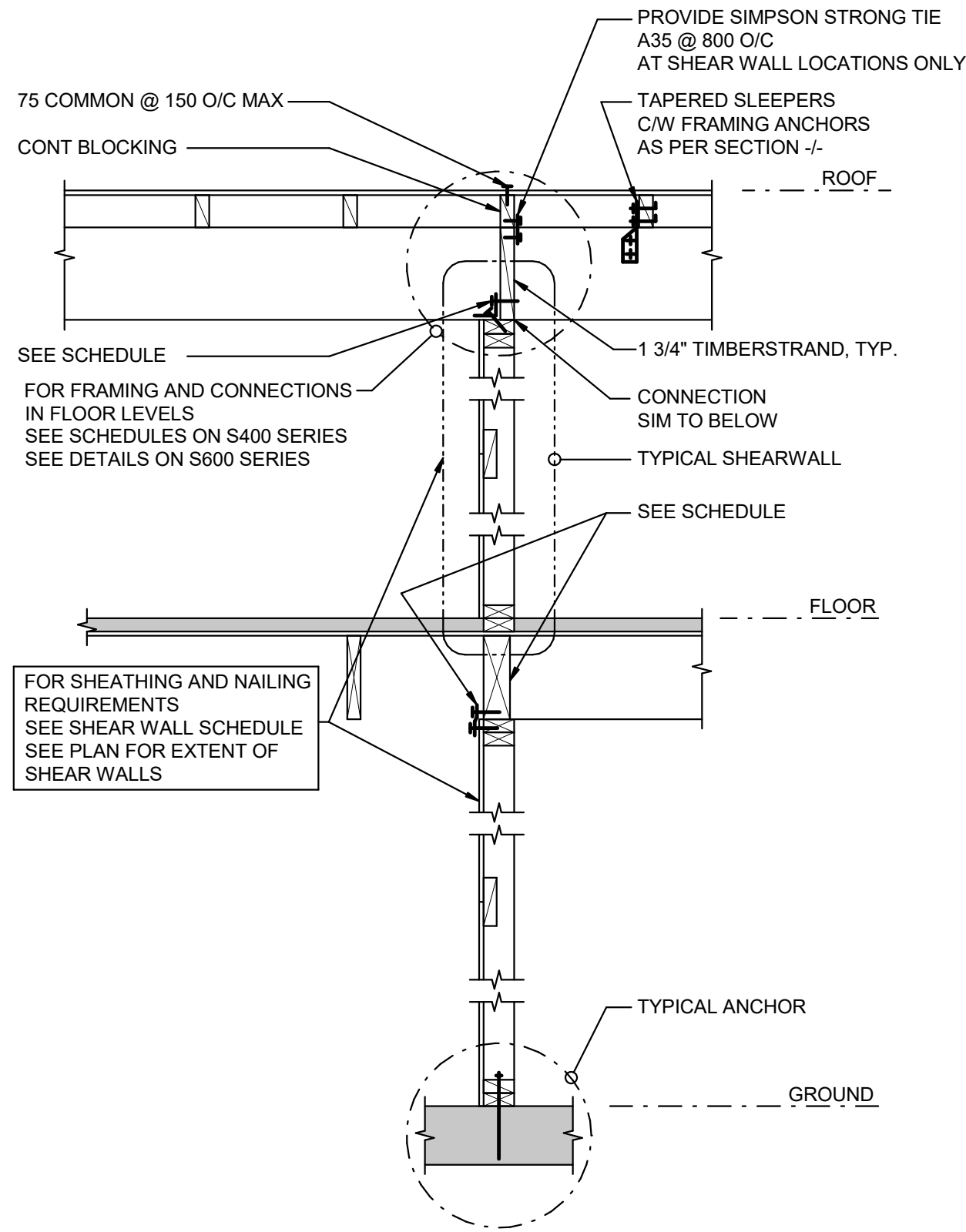
2 TYPICAL PLUMBING STACK ELEVATION  
NTS GSW-MEC1A-2



3 TYPICAL PLUMBING STACK PLAN  
NTS GSW-MEC1B-2

SEE DWG S121 FOR  
DIMENSION CONVERSIONS



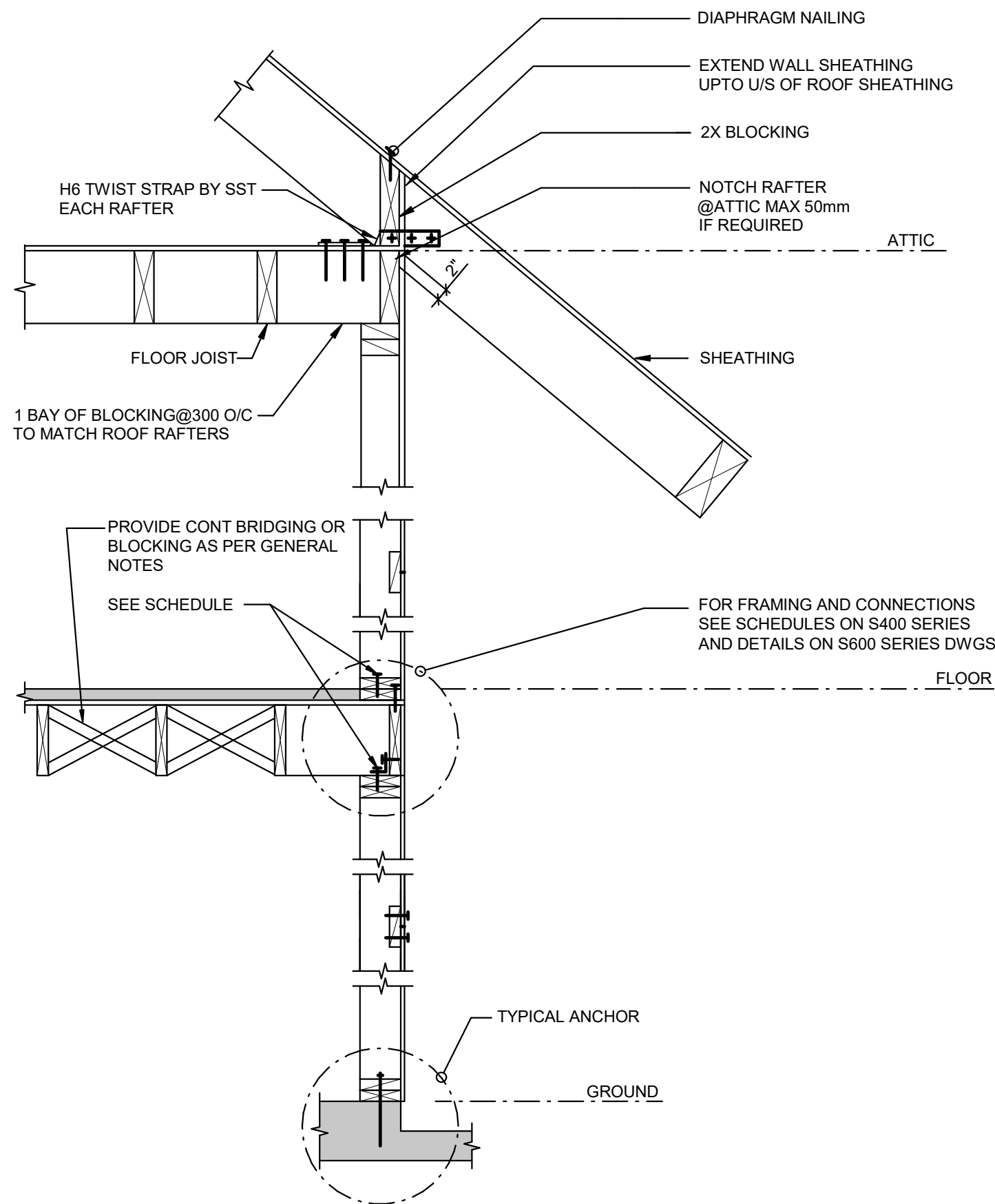


**3 TYPICAL INTERIOR LOAD BEARING SHEARWALL**

NTS

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/T/JI JOISTS/PSL BEAMS ETC)

00944-REV

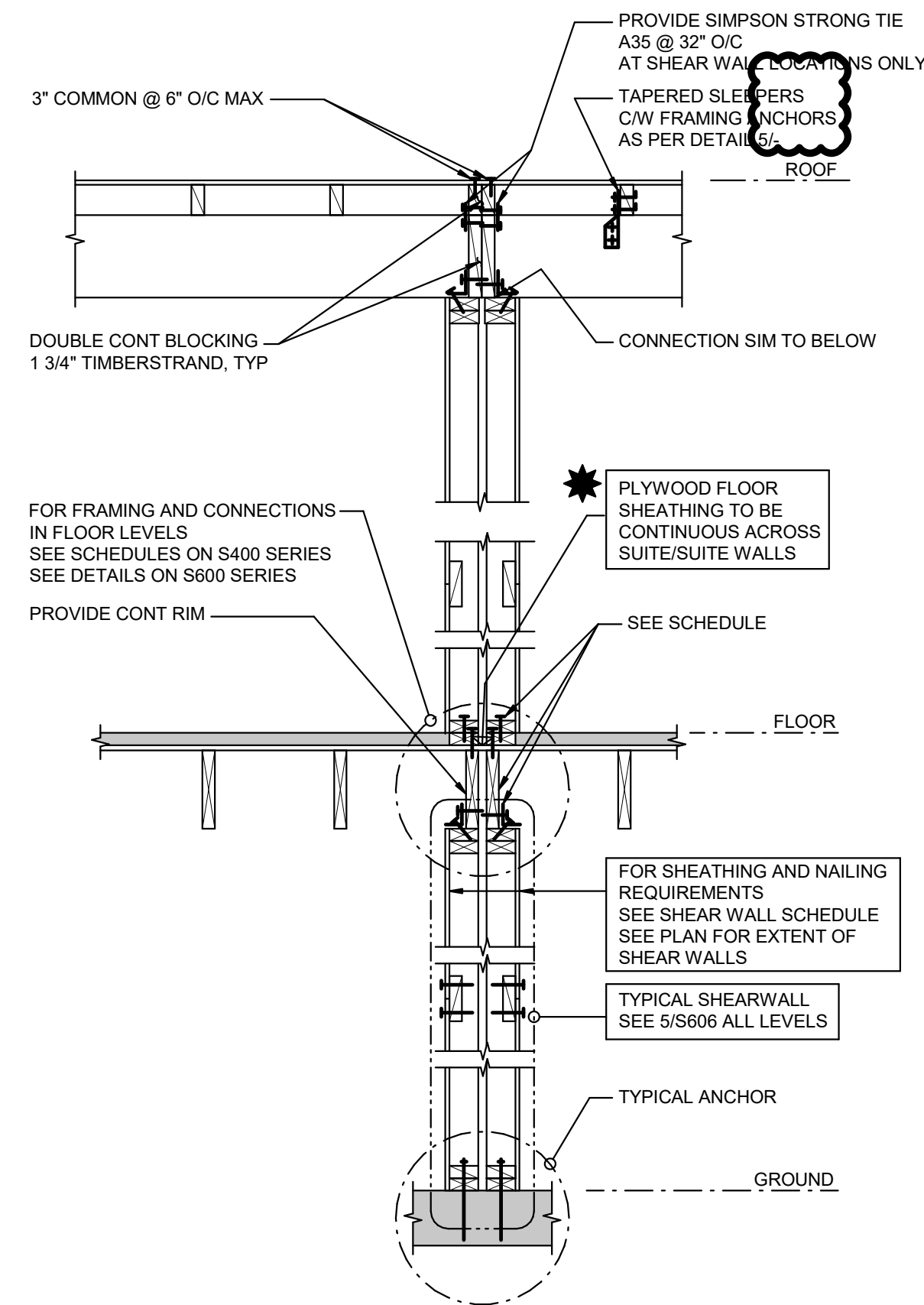


**2 TYPICAL EXTERIOR LOAD BEARING WALL**

NTS

RDS/JBP

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/T/JI JOISTS/PSL BEAMS ETC)

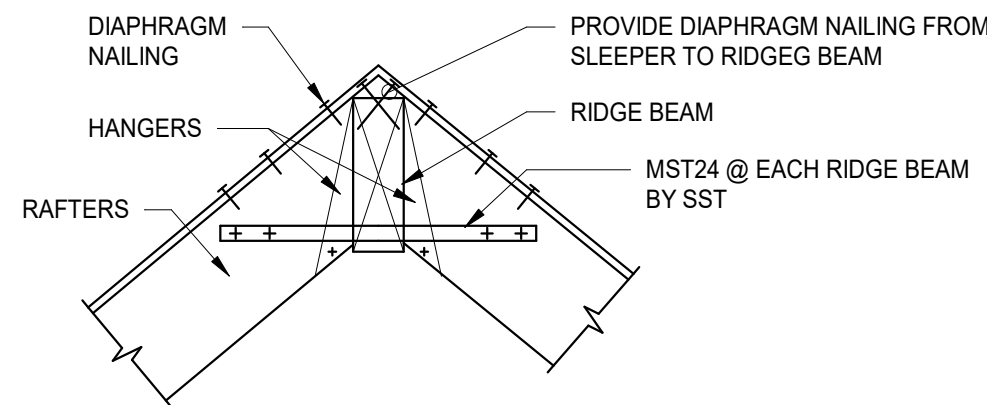


**1 TYPICAL SUITE/SUITE LOAD BEARING WALL**

NTS

RDS/JBP

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/T/JI JOISTS/PSL BEAMS ETC)

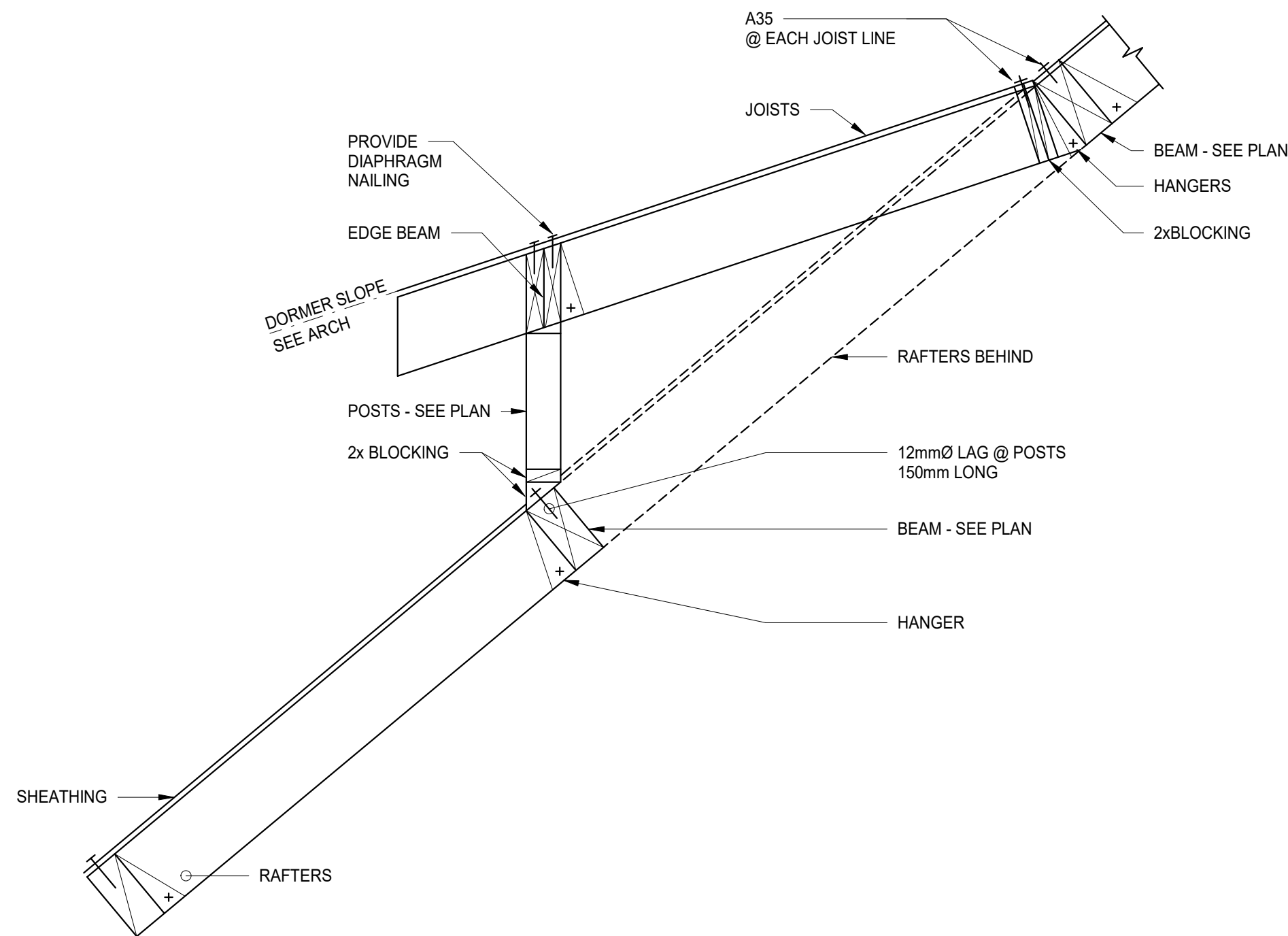


**5 RIDGE BEAM DETAIL**

S205

1 : 20

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/T/JI JOISTS/PSL BEAMS ETC)



**4 SECTION THRU DORMER**

S205

1 : 20

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/T/JI JOISTS/PSL BEAMS ETC)

SEE DWG S121 FOR DIMENSION CONVERSIONS

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
No:	Description:	Date:

Revision / Revision	Description / Description	Date / Date
Client / client		



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

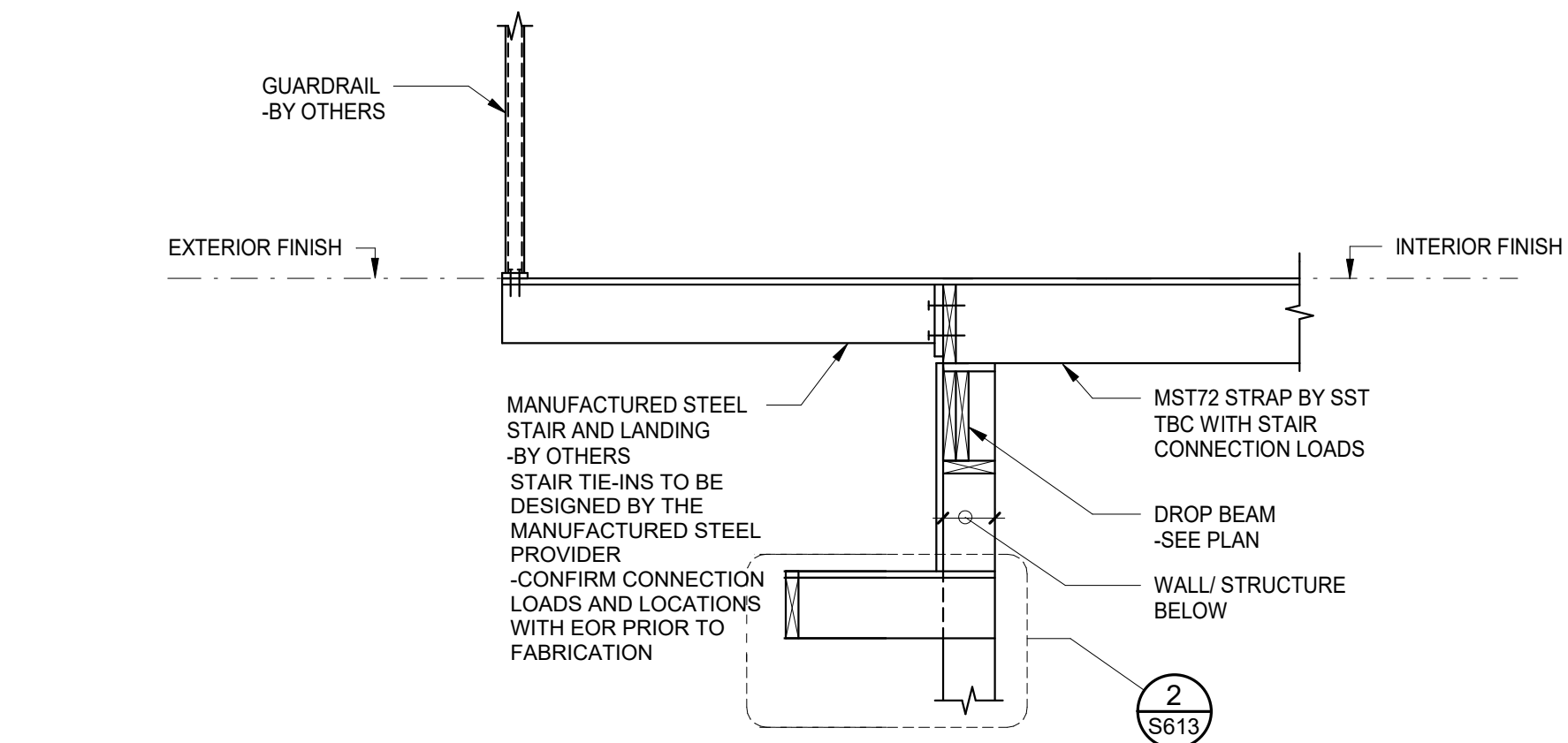
Drawing title / Titre du dessin

TYPICAL DETAILS - WOOD

Project No. / No. du project	Sheet / Feuille	Revision no. / La Revision no.
	<b>S612</b>	<b>9</b>



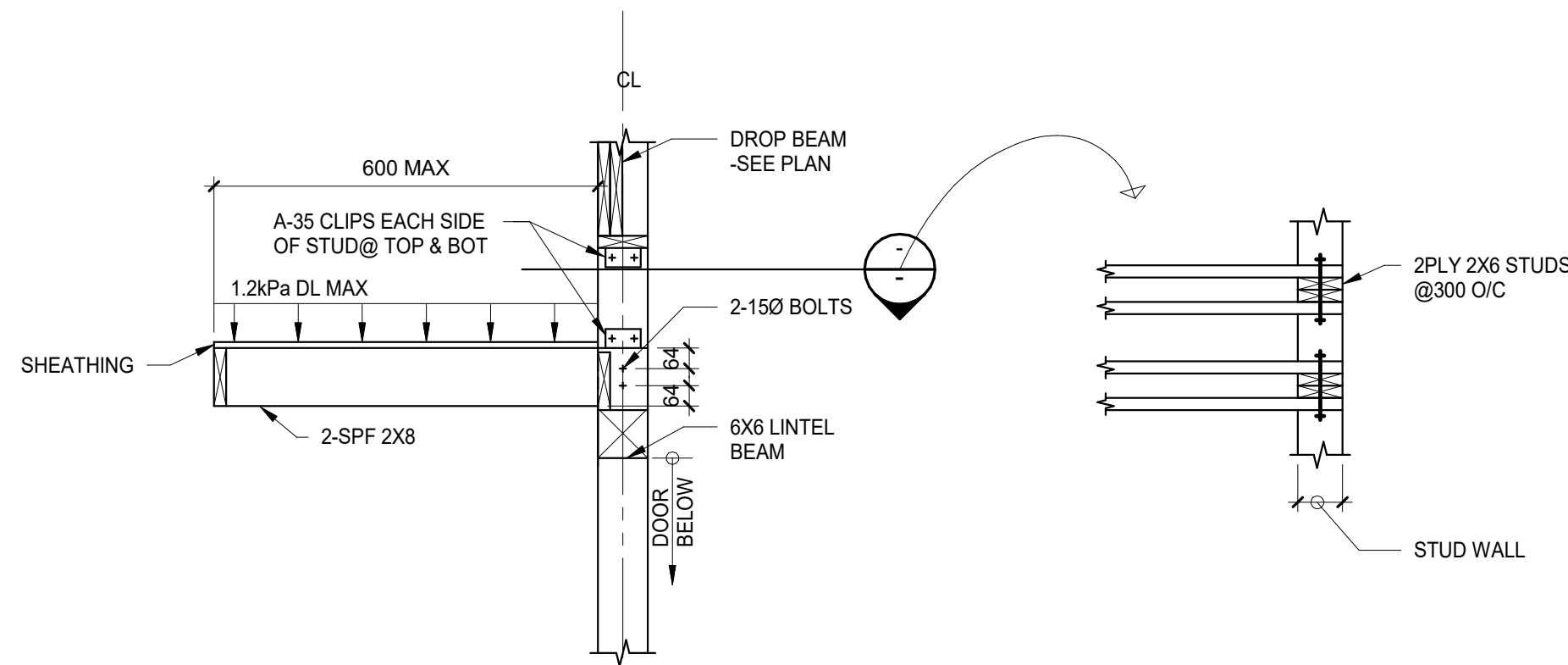




## 1 DETAIL THROUGH EXTERIOR STAIR LANDING

1 : 20  
NAM/LCB

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER  
SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/TJI JOISTS/PSL BEAMS ETC)



## 2 CANOPY CONNECTION DETAIL

1 : 20  
NAM/LCB

NOTE: JOIST AND BEAM SIZES/SECTION SHAPE IS SHOWN SCHEMATICALLY AS DIMENSIONAL LUMBER  
SEE PLAN FOR SIZE AND TYPE (DIMENSIONAL LUMBER/TJI JOISTS/PSL BEAMS ETC)

Copyright Reserved.

This plan and design are, and at all times remain the exclusive property of Glotman Simpson Consulting Engineers and cannot be used or reproduced without written consent. Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and this office shall be informed of any variations from the dimensions and conditions shown on the drawings.

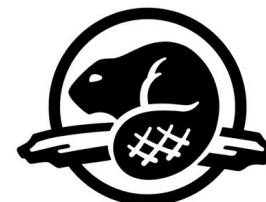
Sketches may be issued which augment or alter the information presented on this drawing. It is the responsibility of parties using this drawing to ensure that they are in possession of all such sketches.



9	Issued for Tender/BP	2019-07-19
8	Issued for Tender	2019-04-03
7	Issued for 99%IFT	2019-03-27
6	Issued for 99%IFC	2018-12-13
5	Issued for 99%IFC	2018-04-12
4	Issued for 99%IFC	2018-03-08
No:	Description:	Date:

### Revisions

Revision / Revision Client / client	Description / Description	Date / Date
---	---------------------------	-------------



**Parks Canada** **Parcs Canada**

Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par  
Approver

Designed by/Concept par  
Designer

Drawn by/Dessine par  
Author  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin

TYPICAL DETAILS - WOOD

Project No. / No. du project	Sheet / Feuille <b>S613</b>	Revision no. / La Révision no. <b>9</b>
---------------------------------	--------------------------------	--





# PARKS CANADA STAFF HOUSING

329 MARTEN STREET, BANFF, ALBERTA

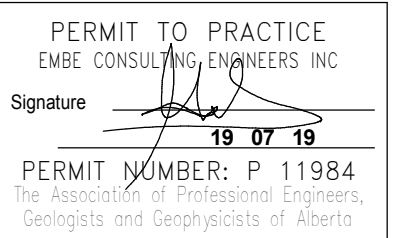
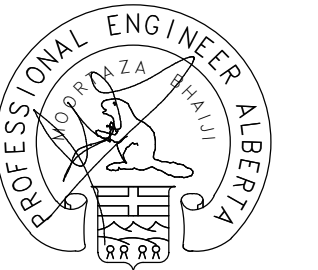
ISSUED FOR TENDER/ BP  
19 07 19

REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest



EMBE CONSULTING ENGINEERS

SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



## DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
9	ISSUED FOR TENDER/ BP	19 07 19
8	TENDER - REV2	19 06 19
7	TENDER	19 04 08
6	TENDER	18 11 28
5	99% IFC	18 11 20
4	COORDINATION	18 11 13
3	99% IFC	18 03 21
2	60% IFC	18 02 08
1	100% DD	09 11 28

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
MB

Designed by/Concept par  
DL

Drawn by/Dessine par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

MECHANICAL COVER PAGE

Project No. / No. du  
project

Sheet / Feuille  
no

Revision no. /  
La Révision  
no

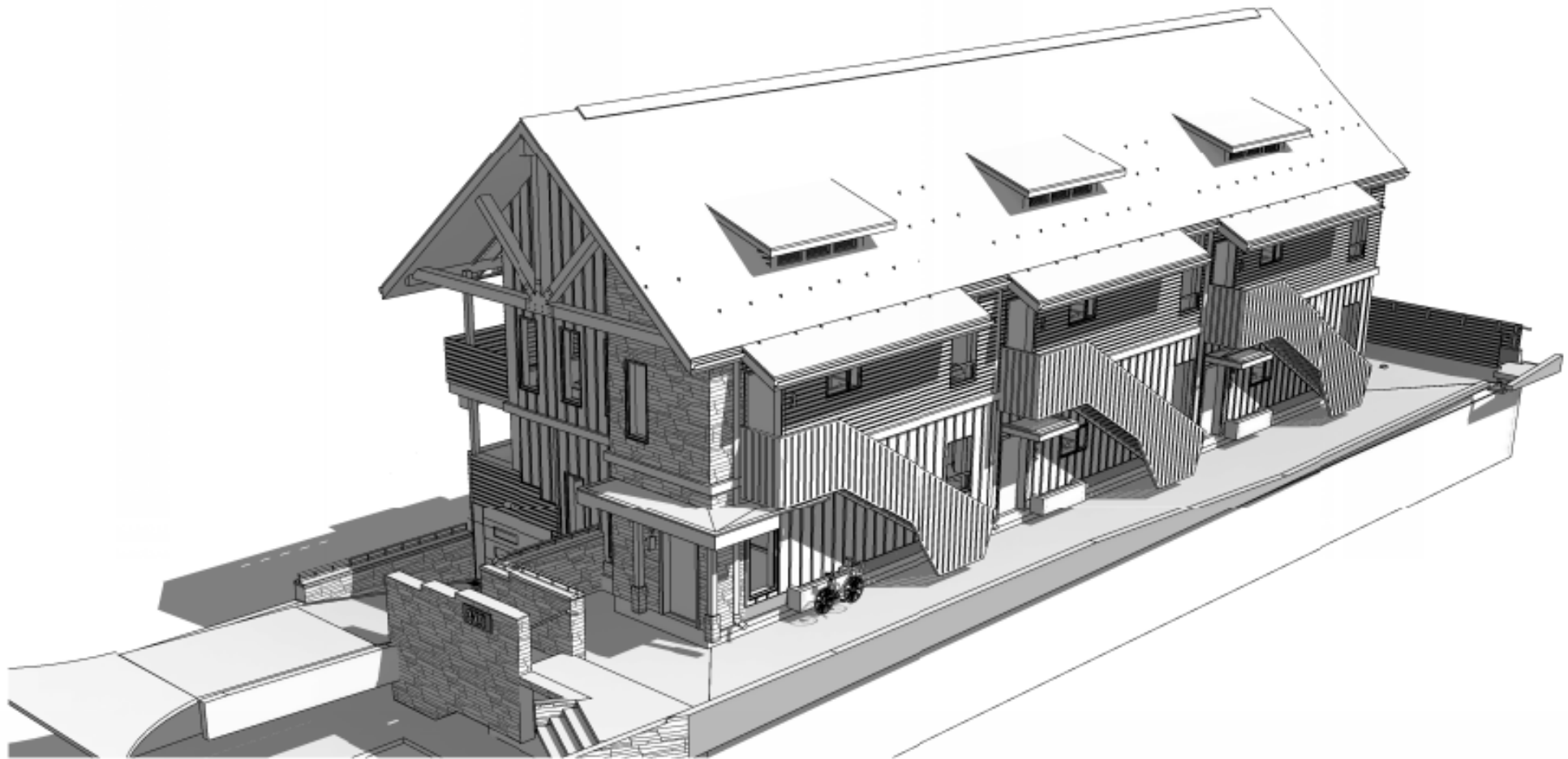
M0

9

PLUMBING LEGEND		
— S —	SANITARY BELOW	
— S —	SANITARY ABOVE	
— EXSAN —	EXISTING SANITARY	
— V —	SANITARY VENT	
— ST —	STORM BELOW	
— ST —	STORM ABOVE	
— EXST —	EXISTING STORM LINE	
— CDP —	CONDENSATE PIPE	
— R —	RADON EXHAUST LINE	
— G —	GAS LINE	
— EXGAS —	EXISTING GAS LINE	
— — — — —	DOMESTIC COLD WATER	
— — — — —	DOMESTIC HOT WATER - 140°F	
— — — — —	DOMESTIC HOT WATER RECIRC	
— EXCW —	EXISTING DOMESTIC COLD WATER	
— CA —	COMPRESSED AIR	
— EXCA —	EXISTING COMPRESSED AIR	
— VAC —	VACUUM LINE	
— FW —	FILTERED WATER	
— PW —	PRESSURED WATER LINE	
— BA —	BREATHING AIR LINE	
— HWS —	HEATING SUPPLY LINE	
— HWR —	HEATING RETURN LINE	
— HWRR —	HEATING REVERSE RETURN LINE	
— HGS —	HOT GLYCOL SUPPLY LINE	
— HGR —	HOT GLYCOL RETURN LINE	
— EX —	EXISTING LINE	
CO — CO	CLEAN OUT BELOW/ABOVE GRADE	
~	PIPE BREAK	
FD	FLOOR DRAIN	
HD	HUB DRAIN	
AD	AREA DRAIN	
PD	PLANTER DRAIN	
RD	ROOF DRAIN	
SV	SHUT OFF VALVE	
GV	GLOBE/BALANCING VALVE	
CV	CONTROL VALVE	
STR	STRAINER	
RV	RELIEF VALVE	
SV	SOLENOID VALVE	
Z	BACKFLOW PREVENTOR	
CV	CHECK VALVE	
HB	HOSE BIBB	
P	PUMP	
P-TRAP	P-TRAP	
LB	LAUNDRY BOX	
PRV	PRESSURE REDUCING VALVE	
GC	GAS COCK	
GM	GAS METER	
WM	WATER METER	
CW STOP	COLD WATER C/W STOPS	
HW STOP	HOT WATER C/W STOPS	
DF	DIRECTION OF FLOW	
PR	PIPE RISE	
PD	PIPE DROP	
PTD	PIPE TEE DOWN	
PTU	PIPE TEE UP	

H.V.A.C. LEGEND		
SA	SUPPLY AIR DUCT	
RA	RETURN AIR DUCT	
EA	EXHAUST AIR DUCT	
FA	FRESH AIR DUCT	
SAF	SUPPLY AIR DIFFUSER	
RAF	ROUND S/A DIFFUSER	
SG	SUPPLY AIR GRILLE	
MUA	MAKE-UP AIR DIFFUSER	
LD	LINEAR DIFFUSER	
DG	DOOR GRILLE	
RG	RETURN AIR GRILLE	
SWSG	SIDE WALL SUPPLY GRILLE	
SWRG	SIDE WALL RETURN GRILLE	
L	LOUVER	
EH	EXHAUST HOOD	
FD	FLEX DUCT	
EG	EXHAUST GRILLE	
DB	DUCT BREAK	
BD	BALANCING DAMPER	
CD	BACKDRAFT DAMPER	
MD	MOTORIZED DAMPER	
FD	FIRE DAMPER	
ODBD	OPPOSED BLADE DAMPER	
T	THERMOSTAT	
R	REMOTE SENSOR	
C	CONTROLLER	
ADA	AIR DIRECTION ARROW	
DUC	DOOR UNDERCUT (1" DEPTH)	
DF	DIRECTION OF FLOW	
CO	CARBON MONOXIDE SENSOR	
EF	EXHAUST FAN	
SEWF	SIDE WALL EXHAUST FAN	
IH	INFRARED HEATER	
FFH	FORCE FLOW HEATER	
BH	BASE BOARD HEATER	
ND	NEW DUCT	
ALD	ACOUSTICALLY LINED DUCTWORK	
TILD	THERMALLY INSULATED DUCTWORK	
D	DEMOLITION	
R	RELOCATE	

ABBREVIATION		
SAD	SUPPLY AIR DUCT	
RAD	RETURN AIR DUCT	
EAD	EXHAUST AIR DUCT	
FAD	FRESH AIR DUCT	
BD	BALANCING DAMPER	
FD	FIRE DAMPER	
CW	COME WITH	
T/A	TO ABOVE	
T/B	TO BELOW	
F/A	FROM ABOVE	
F/B	FROM BELOW	
S/A	SUPPLY AIR	
R/A	RETURN AIR	
E/A	EXHAUST AIR	
O/A	OUTSIDE AIR	
DUC	DOOR UNDERCUT	
RTU	ROOF TOP UNIT	
FCU	FAN COIL UNIT	
MUA	MAKE UP AIR UNIT	
VAV	VARIABLE AIR VOLUME	
CAV	CONSTANT AIR VOLUME	
EF	EXHAUST FAN	
FUR	FURNACE UNIT	
CU	CONDENSING UNIT	
CH	CHILLER UNIT	
FF	FORCE FLOW UNIT	
BB	BASEBOARD UNIT	
IF	INFRARED HEATING UNIT	
AC	AIR COMPRESSOR	
DCW	DOMESTIC WATER	
DHW	HOT WATER	
DHWR	RECIRCULATION WATER	
DCVA	DOUBLE-CHECK VALVE ASSEMBLY	
DCBP	DOUBLE-CHECK BACKFLOW PREVENTOR	
NFHB	NON FREEZE HOSE BIBB	
S	SANITARY LINE	
ST	STORM LINE	
V	SANITARY VENT LINE	
WS	WASTE STACK	
WC	WATER CLOSET	
LAV	LAVATORY	
BT	BATHTUB	
KS	KITCHEN SINK	
BS	BAR SINK	
SH	SHOWER	
MS	MOP SINK	
URI	URINAL	
LB	LAUNDRY BOX	
RWL	RAINWATER LEADER	
ER	EXISTING TO REMAIN	



01  
M0  
KEY PLAN  
NTS





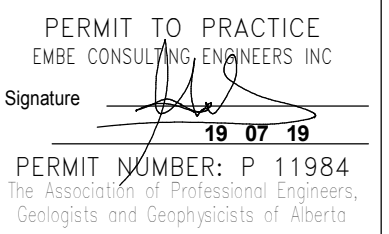
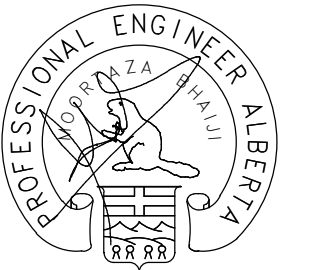


EMBE CONSULTING ENGINEERS

SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7

403-460-2277

info@embeconsulting.ca



DO NOT SCALE DRAWINGS

10	ISSUED FOR TENDER/ BP	19 07 19
9	TENDER - REV3	19 07 09
8	TENDER - REV2	19 06 19
7	TENDER	19 04 08
6	TENDER	18 11 28
5	99% IFC	18 11 20
4	COORDINATION	18 11 13
3	99% IFC	18 03 21
2	60% IFC	18 02 08
1	100% DD	09 11 28

Revision / Révision	Description / Description	Date / Date
------------------------	------------------------------	-------------

Client / client



Parks Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

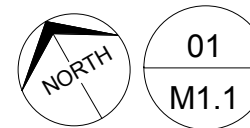
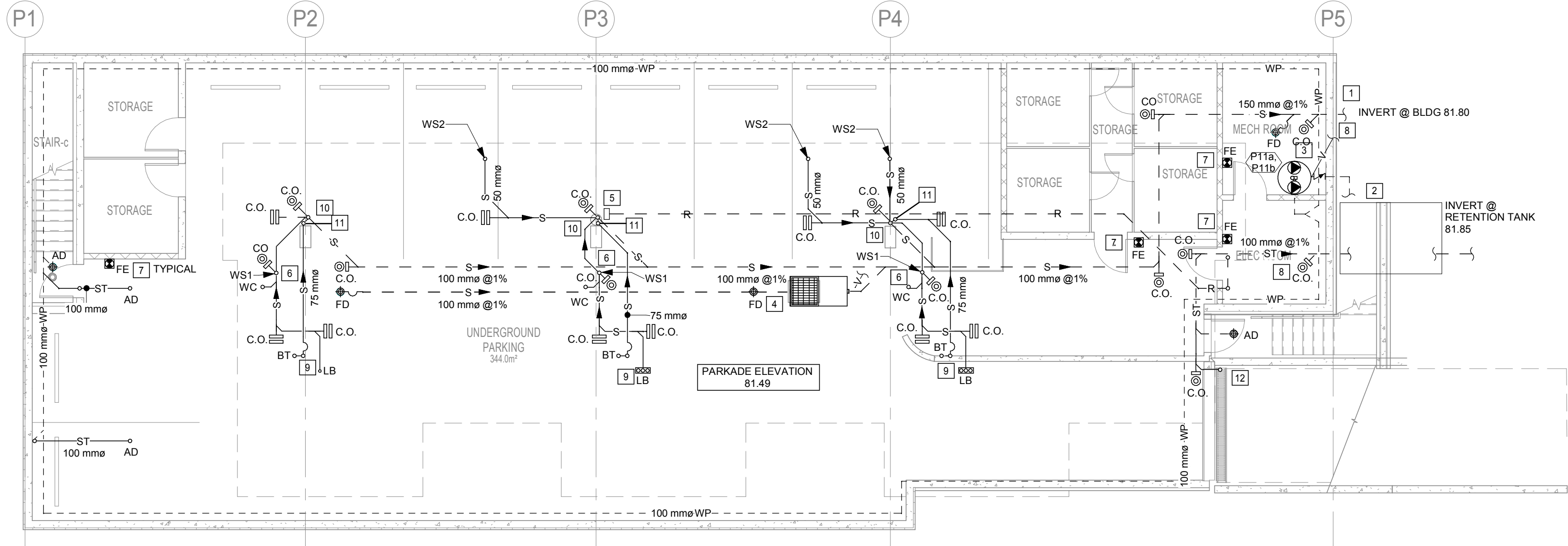
Drawing title / Titre du dessin

PARKADE AND MAIN FLOOR - DRAINAGE  
LAYOUT

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
---------------------------------	-----------------	--------------------------------------

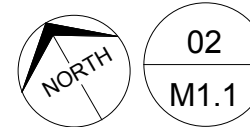
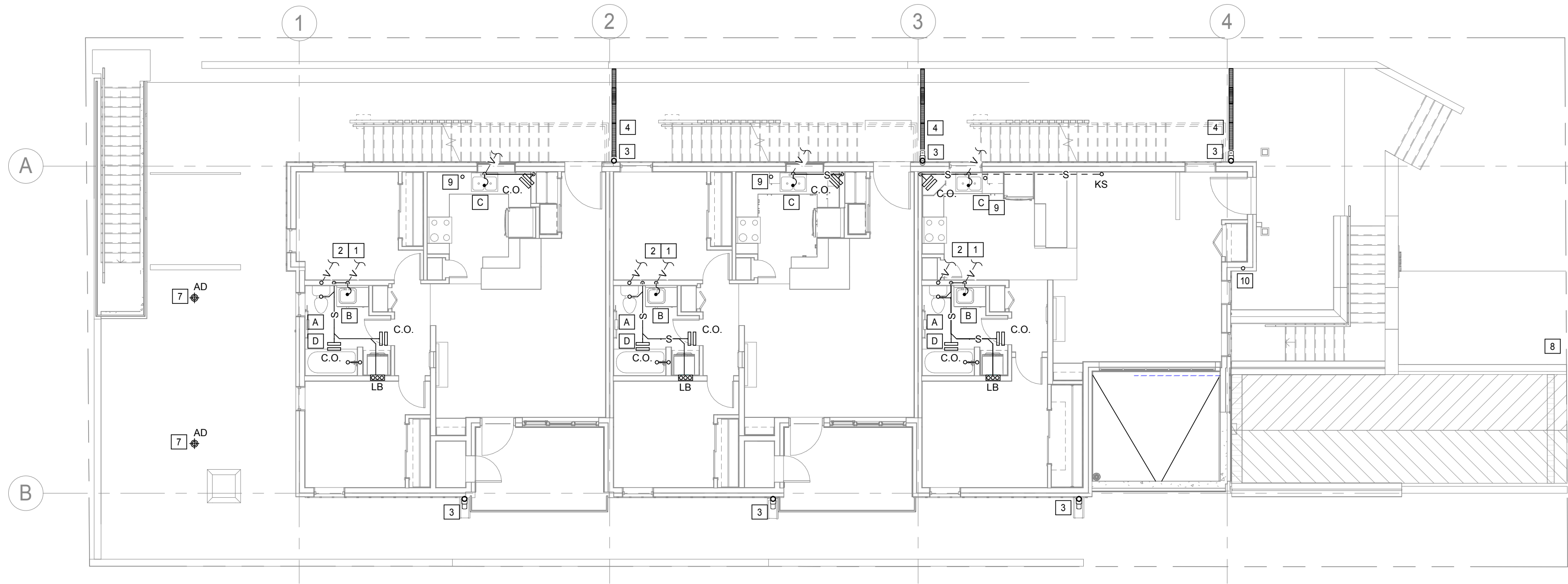
M1.1

10



PARKADE FLOOR PLAN - DRAINAGE LAYOUT

1:100



MAIN FLOOR PLAN - DRAINAGE LAYOUT

1:100

GENERAL NOTES:

1. BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
2. LOCATIONS OF SERVICES ARE APPROXIMATE. VERIFY ON SITE AND WITH CIVIL DRAWINGS.
3. WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
4. SANITARY VENTING SIZED PER LOCAL PLUMBING CODES.
5. CONTRACTOR TO COORDINATE ALL PIPE ROUTING, DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
6. CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR PIPING IF REQUIRED.

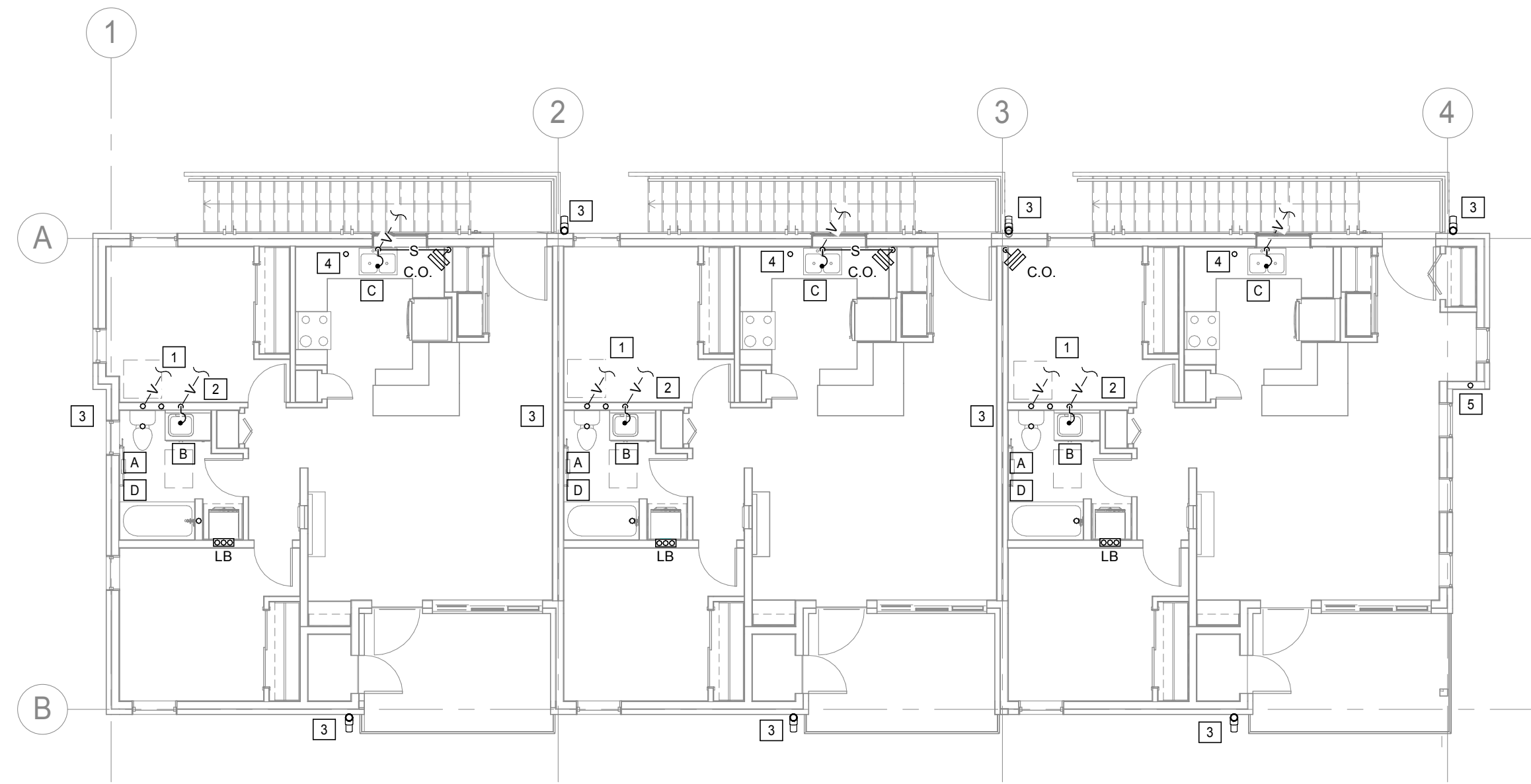
PARKADE DRAINAGE NOTES:

1. APPROXIMATE LOCATION OF 150mmØ SANITARY SERVICE INTO BUILDING. CONFIRM INVERT WITH CIVIL DRAWINGS. PROVIDE NEW CLEAN OUT AS REQUIRED.
2. APPROXIMATE LOCATION STORM TANK.
3. PROVIDE WEEPING TILE SUMP C/W LEAD LAG PUMPS. PROVIDE BACK WATER VALVE AT SUMP OUTLET. VENT UP THROUGH ROOF. COORDINATE PARTITION WALL WITH SUMP ON SITE. CONFIRM EXACT LOCATION ON SITE. SEE DETAIL 06/M6.
4. PROVIDE DOUBLE COMPARTMENT MUD SUMP. VENT AS REQUIRED PER CODE.
5. RADON SUCTION PIT. REFER TO DETAIL 04/M6.
6. 100mmØ WASTE STACK FROM ABOVE.
7. PROVIDE 4.5KG FIRE EXTINGUISHER PER NFPA10.
8. PROVIDE CLEANOUT AT BUILDING INVERT.
9. 75mmØ WASTE STACK FOR SHOWER DRAIN FROM ABOVE.
10. DROP SHOWER DRAIN WASTE STACK AND OTHER WASTE STACK BEHIND THE COLUMN. COORDINATE TO RUN THE DRAIN PIPE AROUND THE COLUMN.
11. PROVIDE 1066mm LONG THERMODRAIN DRAIN WATER HEAT RECOVERY UNIT MODEL NUMBER T0342B ON WASTE STACK BEHIND THE COLUMN. INSTALL AS PER MANUFACTURER'S INSTRUCTIONS. REFER TO 03/M6.1 FOR DETAIL.
12. PROVIDE KLASSIKDRAIN KS200, ZURN OR WATTS APPROVED EQUIVALENT TRENCH DRAIN. PROVIDE TRAFFIC RATED GRATE. INSTALL AS PER MANUFACTURER'S RECOMMENDATION.
13. EXTEND 100mmØ RADON PIPE UP THROUGH ROOF.

MAIN FLOOR DRAINAGE NOTES:

1. 100mmØ WASTE STACK TO BELOW.
2. EXTEND 50mmØ SANITARY VENT TO ABOVE.
3. 100mmØ ROOF DRAIN FROM ABOVE.
4. PROVIDE KLASSIKDRAIN KS200 MODEL NUMBER 145441 200mm, ZURN OR WATTS APPROVED EQUIVALENT TRENCH DRAIN WITH OPEN ENDS. COORDINATE SLOPE AND DRAIN LENGTH WITH ARCHITECT. REFER 10/M6 FOR DETAIL. INSTALL AS PER MANUFACTURER'S RECOMMENDATION.
5. NOT USED.
6. NOT USED.
7. APPROXIMATE LOCATION OF AREA DRAIN. CONTRACTOR TO CONFIRM EXACT LOCATION ON SITE.
8. TRAFFIC RATED GRATE BY STRUCTURAL.
9. DRAIN DISHWASHER TO KITCHEN SINK P-TRAP.
10. 100Ø RADON PIPE TO ABOVE.





01  
M1.2

SECOND FLOOR PLAN - DRAINAGE LAYOUT

1:100

GENERAL NOTES:

1. BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
2. LOCATIONS OF SERVICES ARE APPROXIMATE, VERIFY ON SITE AND WITH CIVIL DRAWINGS.
3. WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
4. SANITARY VENTING SIZED PER LOCAL PLUMBING CODES.
5. CONTRACTOR TO COORDINATE ALL PIPE ROUTING, DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
6. CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR PIPING IF REQUIRED.

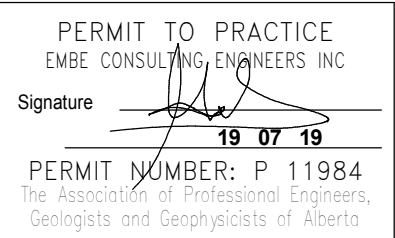
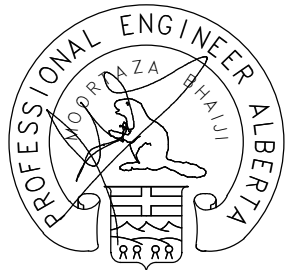
SECOND FLOOR DRAINAGE NOTES:

- 1 100mmØ WASTE STACK TO BELOW.
- 2 EXTEND 50mmØ SANITARY VENT THROUGH ROOF, C/W BIRDSCREEN AND RAIN CAP.
- 3 100mØ ROOF DRAIN DOWN SPOUT, MATERIAL SPEC BY ARCHITECT.
- 4 DRAIN DISHWASHER BEFORE KITCHEN P-TRAP.
- 5 100Ø RADON PIPE UP THROUGH THE ROOF. REFER TO 04/M6 FOR DETAIL.



EMBE CONSULTING ENGINEERS

SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



DO NOT SCALE DRAWINGS

Revision / Revision	Description / Description	Date / Date
8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
MB

Designed by/Concept par  
DL

Drawn by/Dessine par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

SECOND FLOOR - DRAINAGE LAYOUT

Project No. / No. du project

M1.2

Revision no. /  
La Révision no.

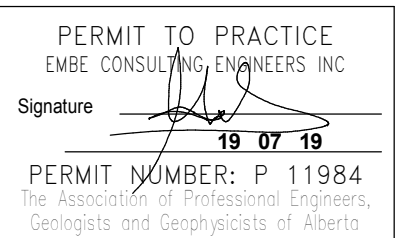
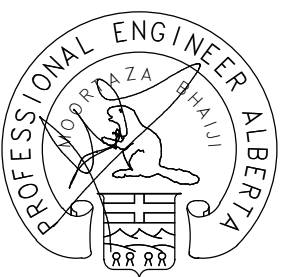
8





EMBE CONSULTING ENGINEERS

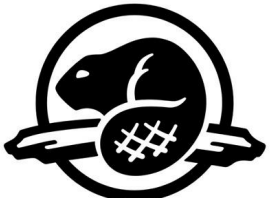
SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Client / client



Parks Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

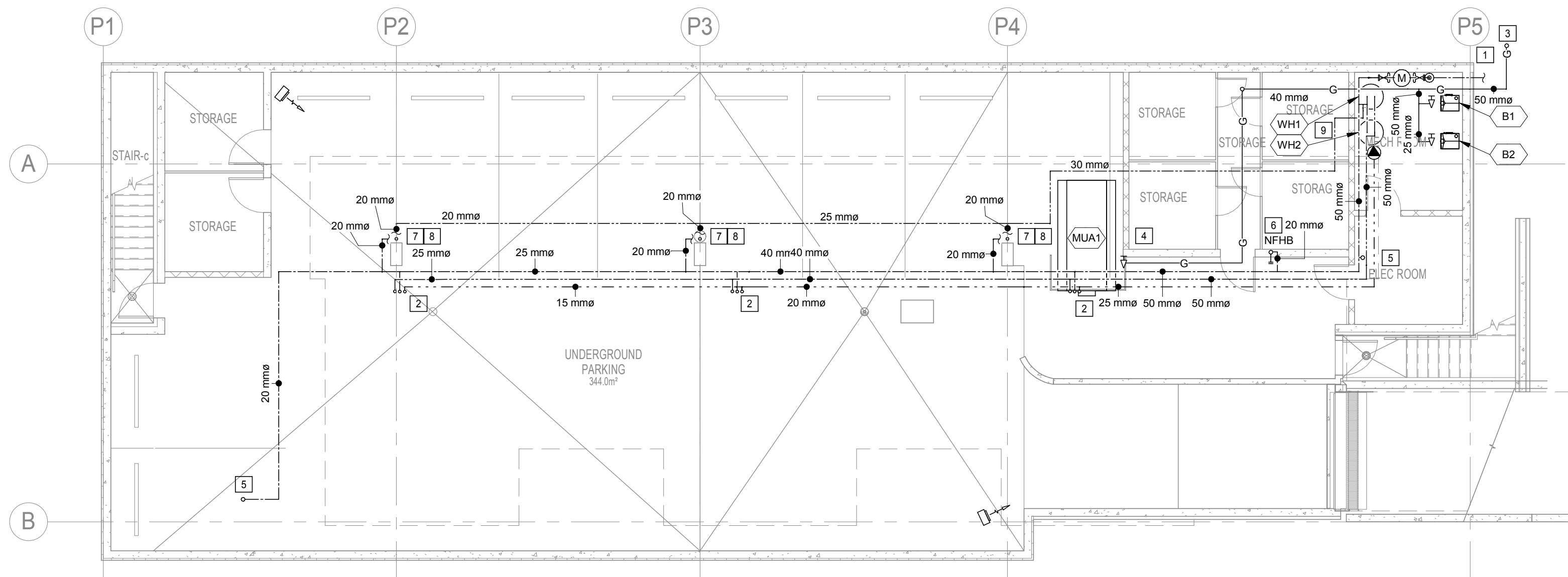
PARKADE AND MAIN FLOOR - PLUMBING  
LAYOUT

Project No. / No. du  
project

M2.1

Revision no. /  
La Révision  
no.

8



01  
M2.1

PARKADE PLUMBING LAYOUT

1 : 100



02  
M2.1

MAIN FLOOR PLAN - PLUMBING LAYOUT

1 : 100

GENERAL NOTES:

1. BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
2. LOCATIONS OF SERVICES ARE APPROXIMATE. VERIFY ON SITE AND WITH CIVIL DRAWINGS.
3. WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
4. SANITARY VENTING SIZED PER LOCAL PLUMBING CODES.
5. CONTRACTOR TO COORDINATE ALL PIPE ROUTING, DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
6. CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR PIPING IF REQUIRED.
7. ALL PLUMBING FIXTURES TO HAVE STOP VALVES IN ALL SUPPLIES.

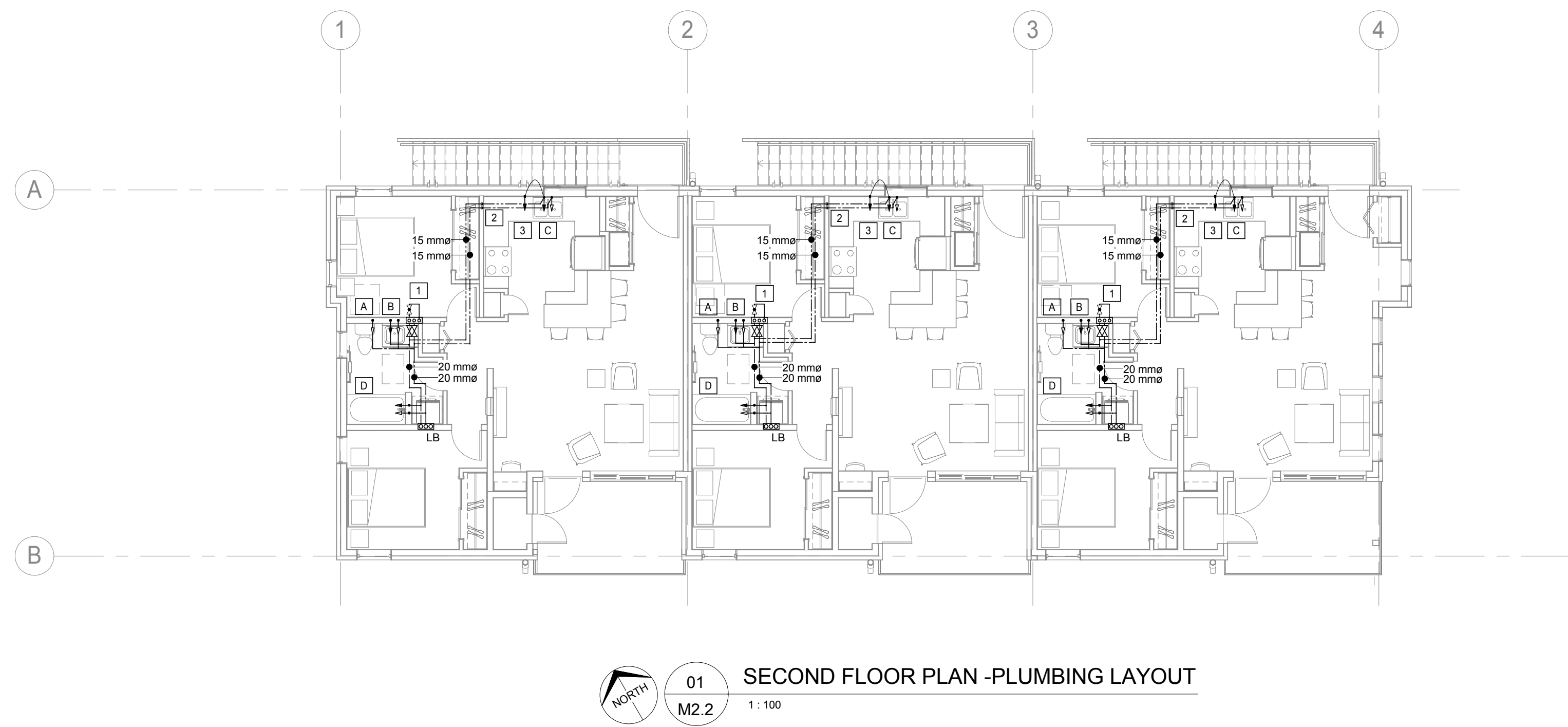
PARKADE PLUMBING NOTES:

- 1 APPROXIMATE LOCATION OF EXISTING INCOMING 50mmØ DCW LINE. CONTRACTOR TO CONFIRM EXACT LOCATION WITH CIVIL DRAWINGS.
- 2 EXTEND 25mmØ CW AND HW LINES AND 15mmØ RECIRC LINE TO MAIN FLOOR ABOVE CW SHUT-OFF VALVES IN THE PARKADE.
- 3 50mmØ GAS LINE FROM ABOVE. EXTEND TO BOILER B1 AND B2 CW GAS COCK.
- 4 EXTEND 40mmØ GAS LINE TO MUA1 CW GAS COCK.
- 5 EXTEND 20mmØ HW AND CW TO HOSE BIBB ABOVE.
- 6 APPROXIMATE LOCATION OF CW NON-FREEZE HOSE BIBB FOR PARKADE.
- 7 APPROXIMATE LOCATION OF 75mmØ THERMODRAIN TD342B WASTE WATER HEAT RECOVERY UNIT ON SHOWER DRAIN STACK.
- 8 EXTEND 20mmØ CW AND HW LINES TO AND FROM THE WASTE WATER HEAT RECOVERY UNIT. INSTALL AS PER MANUFACTURER'S INSTRUCTIONS. REFER 03/M8.1 FOR DETAIL.
- 9 EXTEND 30mmØ HOT WATER RECOVERY PIPE AND CONNECT TO CW INLET PIPE TO THE WATER HEATERS.

MAIN FLOOR PLUMBING NOTES:

- 1 EXTEND 20mmØ CW AND HW LINES TO EACH UNIT CW SHUT-OFF VALVE.
- 2 EXTEND 20mmØ CW AND HW LINES AND 15mmØ RECIRC LINE TO SECOND FLOOR ABOVE.
- 3 APPROXIMATE LOCATION OF INCOMING GAS LINE. CONTRACTOR TO CONFIRM EXACT LOCATION ON SITE. EXTEND 50mmØ GAS LINE FROM GAS METER AND DROP BELOW TO PARKADE.
- 4 APPROXIMATE LOCATION OF CW NON-FREEZE HOSE BIBB FROM PARKADE BELOW. LOCATE HOSE BIBB RISER FROM PARKADE TO THE MAIN FLOOR INSIDE THE DOG HOUSE. COORDINATE WITH LOCATION OF DOG HOUSE ON SITE.
- 5 20mmØ CW NON-FREEZE HOSE BIBB RISER FROM PARKADE BELOW. PROVIDE FURRED PLUMBING WALL INSIDE THE CLOSET AS REQUIRED. COORDINATE WITH ARCHITECT.
- 6 DROP CW AND HW LINES IN THE WALL AND RUN UNDERCOUNTER TO THE SINK.
- 7 EXTEND 20mmØ HW HOSE TO DISHWASHER FROM THE KITCHEN SINK.



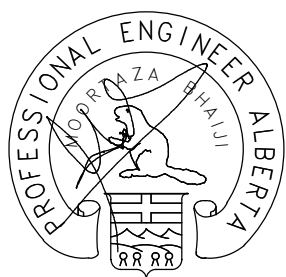


- GENERAL NOTES:**
1. BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
  2. LOCATIONS OF SERVICES ARE APPROXIMATE. VERIFY ON SITE AND WITH CIVIL DRAWINGS.
  3. WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
  4. SANITARY VENTING SIZED PER LOCAL PLUMBING CODES.
  5. CONTRACTOR TO COORDINATE ALL PIPE ROUTING, DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
  6. CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR PIPING IF REQUIRED.
  7. ALL PLUMBING FIXTURES TO HAVE STOP VALVES ON ALL FIXTURES.

- PLUMBING NOTES:**
- 1 EXTEND 20mmØ CW AND HW LINES AND 15mmØ RECIRC LINES TO EACH UNIT C/W SHUT-OFF VALVES ON EITHER SIDE OF BALANCING VALVE.
  - 2 DROP CW AND HW LINES IN THE WALL AND RUN UNDERCOUNTER TO THE SINK.
  - 3 EXTEND 20mmØ HW HOSE TO DISHWASHER FROM THE KITCHEN SINK.



**EMBE CONSULTING ENGINEERS**  
SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



PERMIT TO PRACTICE  
EMBE CONSULTING ENGINEERS INC.  
Signature \_\_\_\_\_  
19 07 19  
PERMIT NUMBER: P 11984  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Client / client



Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

**Parks Canada**

Drawing title / Titre du dessin

SECOND FLOOR - PLUMBING LAYOUT

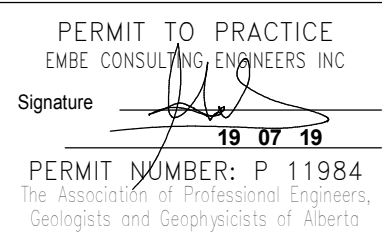
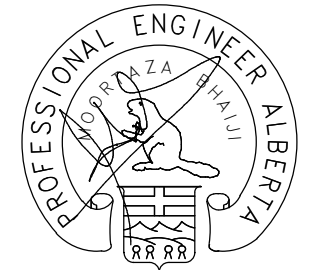
Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	M2.2	8





EMBE CONSULTING ENGINEERS

SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



DO NOT SCALE DRAWINGS

8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Revision / Revisión	Description / Description	Date / Date
------------------------	------------------------------	----------------

Client / client



Parks Canada  
Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

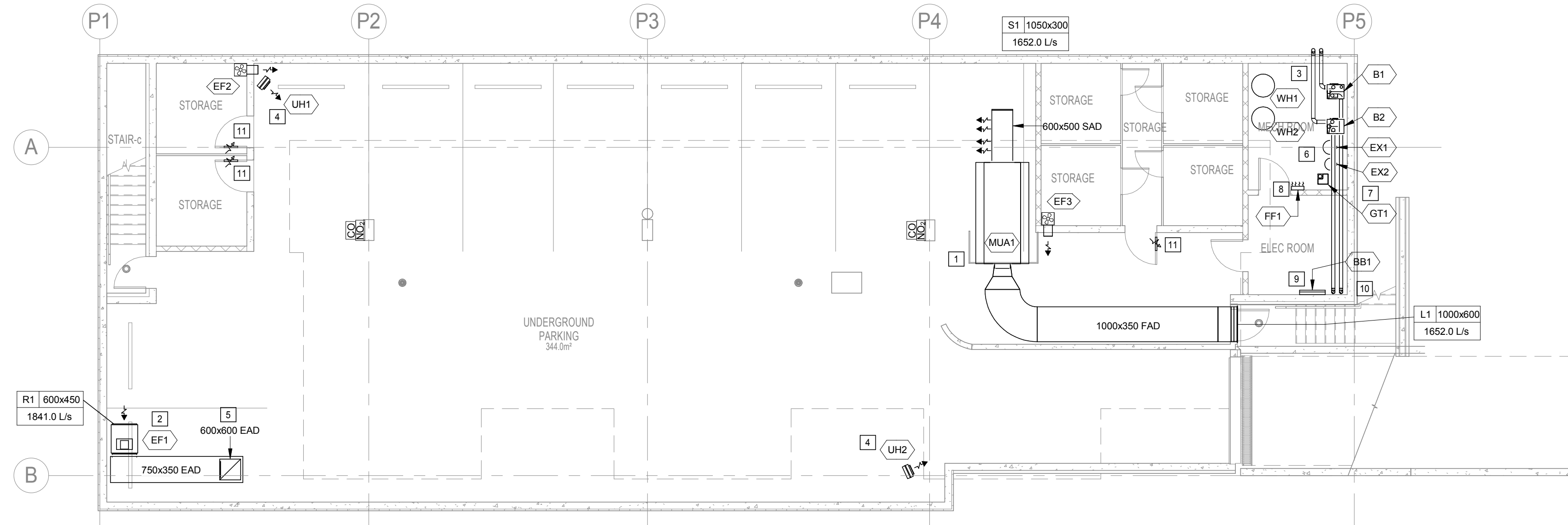
PARKADE AND MAIN FLOOR - H.V.A.C.  
LAYOUT

Project No. / No. du  
project

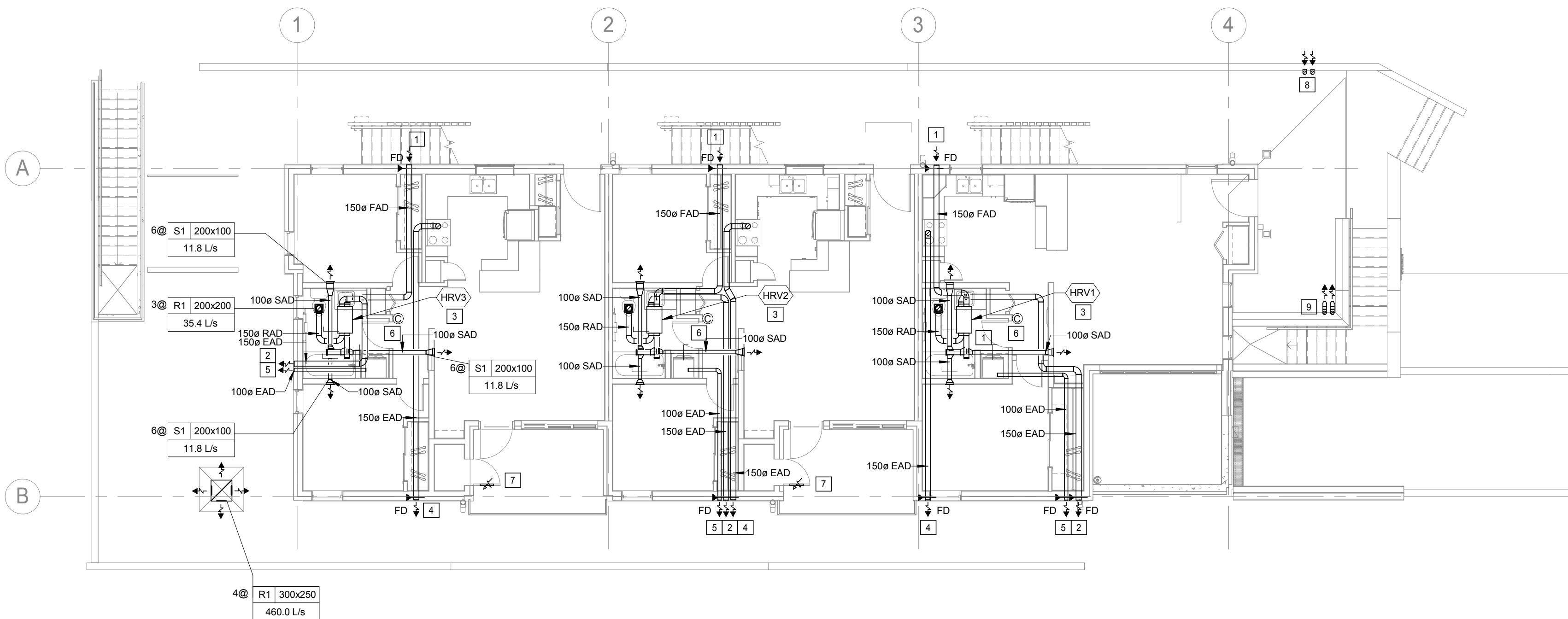
M3.1

Revision no. /  
La Révision  
no.

8



01  
M3.1  
PARKADE - H.V.A.C. LAYOUT  
1:100



02  
M3.1  
MAIN FLOOR PLAN - H.V.A.C. LAYOUT  
1:100

GENERAL NOTES:

- BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
- LOCATIONS OF SERVICES ARE APPROXIMATE. VERIFY ON SITE AND WITH CIVIL DRAWINGS.
- WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
- CONTRACTOR TO ENGAGE STRUCTURAL ENGINEER TO VERIFY ALL SEISMIC REQUIREMENTS FOR PIPE AND DUCT HANGING METHODS.
- ALL BRANCH DUCTWORK TO HAVE BALANCING DAMPERS.
- RUN ALL DUCTWORK AT HIGHEST LEVEL POSSIBLE - WHERE JOIST SPACING AND WEBBING ALLOWS DUCTWORK TO BE RUN IN JOIST SPACE.
- CONTRACTOR TO COORDINATE ALL DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
- CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR DUCTING IF REQUIRED.

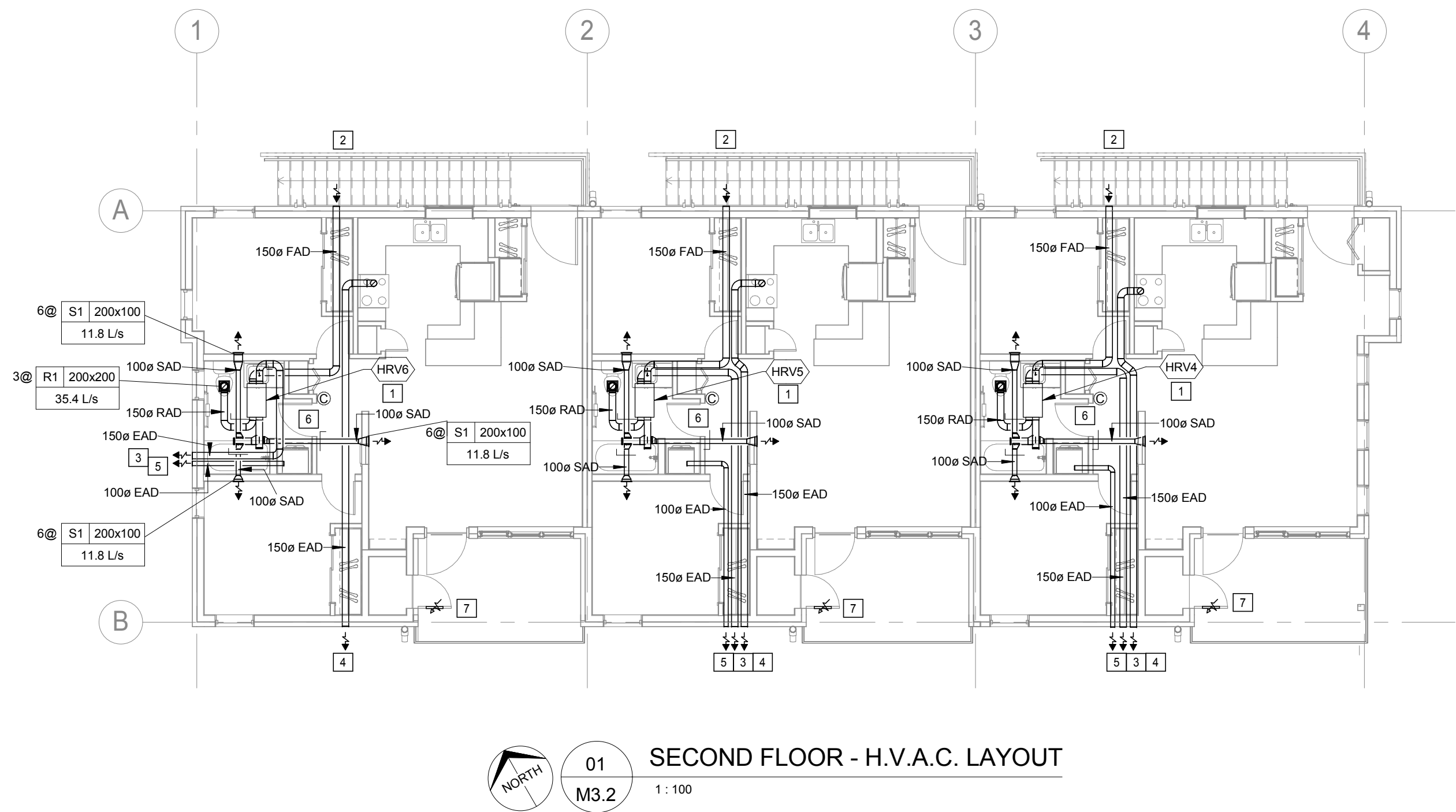
PARKADE H.V.A.C. NOTES:

- LOCATION OF MUA1, CEILING SUSPENDED. MAINTAIN 1840mm MINIMUM CLEARANCE BELOW MUA1.
- LOCATION OF INLINE EXHAUST FAN EF1, CEILING SUSPENDED.
- EXTEND 100mmØ F/A INTAKE FROM ABOVE TO BOILER C/W BIRDSCREEN AND GOOSENECK.
- CEILING SUSPENDED UNIT HEATERS UH1 AND UH2 AT HIGHEST LEVEL.
- EXTEND 600x600 E/A DUCT TO DOG HOUSE ABOVE.
- APPROXIMATE LOCATION OF AMTROL AX-40V AND AX-15V EXPANSION TANK. COORDINATE ON SITE WITH MECHANICAL ROOM LAYOUT.
- APPROXIMATE LOCATION OF AXIOM MF-200 GLYCOL STORAGE TANK. COORDINATE ON SITE WITH MECHANICAL ROOM LAYOUT.
- ELECTRICAL TO PROVIDE 1.5KW FORCEFLOW HEATER. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- PROVIDE 1.5KW ELECTRIC BASEBOARD BY ELECTRICAL. SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- EXTEND 100mmØ FLUE DUCTS FROM BOILER TO ABOVE C/W BIRDSCREEN AND GOOSENECK. ENSURE 1800mm CLEARANCE FROM ALL AIR INLETS.
- PROVIDE FIRE RATED 250mm x 100mm DOOR GRILLE.

MAIN FLOOR H.V.A.C. NOTES:

- EXTEND 150mmØ F/A DUCT TO HRV. PROVIDE REVERSOMATIC SWBS-8 WALL BOX. ENSURE 900mm CLEARANCE FROM ALL AIR EXHAUSTS. COORDINATE WITH ARCHITECTURAL FOR 45 MIN F.R.R.
- EXTEND 150mmØ E/A DUCT FROM HRV. PROVIDE REVERSOMATIC SWBS-8 WALL BOX.
- PROVIDE 1.5KW DUCT HEATER IN HRV F/A DUCT C/W FLOW PROVING SWITCH, SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR. ELECTRICAL HOOK UP BY ELECTRICAL CONTRACTOR. PROVIDE DUCT MOUNTED THERMOSTAT. DUCT HEATER TO BE SLIP-IN, DUCT MOUNTED AND INSTALLED AS PER MANUFACTURER'S INSTRUCTIONS. INTERLOCK WITH HRV.
- EXTEND 150mmØ KITCHEN EXHAUST. PROVIDE REVERSOMATIC SWBS-8 WALL BOX. ENSURE 900mm CLEARANCE FROM ALL AIR INLETS.
- EXTEND 100mmØ DRYER VENT C/W REVERSOMATIC JWB-4 WALL BOX.
- PROVIDE ALDES 611242 HRV CONTROLLER 1524MM A.F.F. HRV TO RUN CONTINUOUSLY AT LOW SPEED.
- PROVIDE EH PRICE 250mm X 100mm DOOR GRILLES AT HIGH AND LOW LEVEL.
- 100mmØ COMBUSTION AIR INTAKE FOR BOILERS C/W GOOSENECK AND BIRDSCREEN. FLUE TO BE 450mm A.F.F. AIR INTAKE DUCTS TO BE LOCATED BEHIND THE BENCH ON THE MAIN FLOOR AND GOOSENECK SHALL FACE AWAY FROM THE BENCH. COORDINATE WITH ARCHITECTURAL AND LANDSCAPING FOR EXACT LOCATION OF BENCH ON SITE.
- 100mmØ BOILER FLUE FROM BELOW C/W GOOSENECK AND BIRDSCREEN. ENSURE 1800mm CLEARANCE FROM ALL AIR INLETS. FLUE TO BE 450mm A.F.F.





#### GENERAL NOTES:

1. BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
2. LOCATIONS OF SERVICES ARE APPROXIMATE. VERIFY ON SITE AND WITH CIVIL DRAWINGS.
3. WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
4. CONTRACTOR TO ENGAGE STRUCTURAL ENGINEER TO VERIFY ALL SEISMIC REQUIREMENTS FOR PIPE AND DUCT HANGING METHODS.
5. ALL BRANCH DUCTWORK TO HAVE BALANCING DAMPERS.
6. RUN ALL DUCTWORK AT HIGHEST LEVEL POSSIBLE - WHERE JOIST SPACING AND WEBBING ALLOWS DUCTWORK TO BE RUN IN JOIST SPACE.
7. CONTRACTOR TO COORDINATE ALL DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
8. CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR DUCTING IF REQUIRED.

#### SECOND FLOOR H.V.A.C. NOTES:

- 1] PROVIDE 1.5kW DUCT HEATER IN HRV S/A DUCT. SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR. ELECTRICAL HOOK UP BY ELECTRICAL CONTRACTOR. PROVIDE DUCT MOUNTED THERMOSTAT. DUCT HEATER TO BE SLIP-IN, DUCT MOUNTED AND INSTALLED AS PER MANUFACTURER'S INSTRUCTIONS.
- 2] EXTEND 150mmØ F/A DUCT TO HRV. PROVIDE REVERSOMATIC SWBS-8 WALL BOX. ENSURE 900mm CLEARANCE FROM ALL AIR EXHAUST.
- 3] EXTEND 150mmØ E/A DUCT FROM HRV. PROVIDE REVERSOMATIC SWBS-8 WALL BOX.
- 4] EXTEND 150mmØ KITCHEN EXHAUST DUCT. PROVIDE REVERSOMATIC SWBS-8 WALL BOX. ENSURE 900mm CLEARANCE FROM ALL AIR INLETS.
- 5] EXTEND 100mmØ DRYER VENT C/W REVERSOMATIC SWBS-8 WALL BOX.
- 6] PROVIDE ALDES 611242 HRV CONTROLLER 1524MM A.F.F. HRV TO RUN CONTINUOUSLY AT LOW SPEED.
- 7] PROVIDE EH PRICE 250mm X 100mm DOOR GRILLES AT HIGH AND LOW LEVEL.



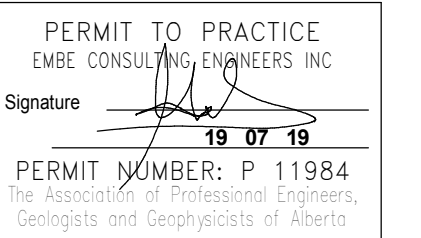
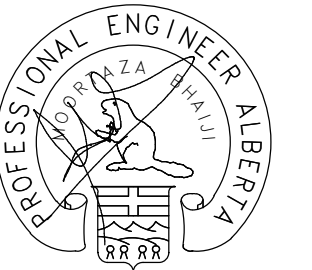
#### EMBE CONSULTING ENGINEERS

SUITE 204, 110 12th AVENUE, S.W.

CALGARY, AB, T2R 0G7

403-460-2277

info@embeconsulting.ca



#### DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Client / client



Parks Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

SECOND FLOOR - H.V.A.C. LAYOUT

Project No. / No. du  
project

Sheet / Feuille  
M3.2

Revision no. /  
La Révision  
no.  
8





EMBE CONSULTING ENGINEERS

SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca

GENERAL NOTES:

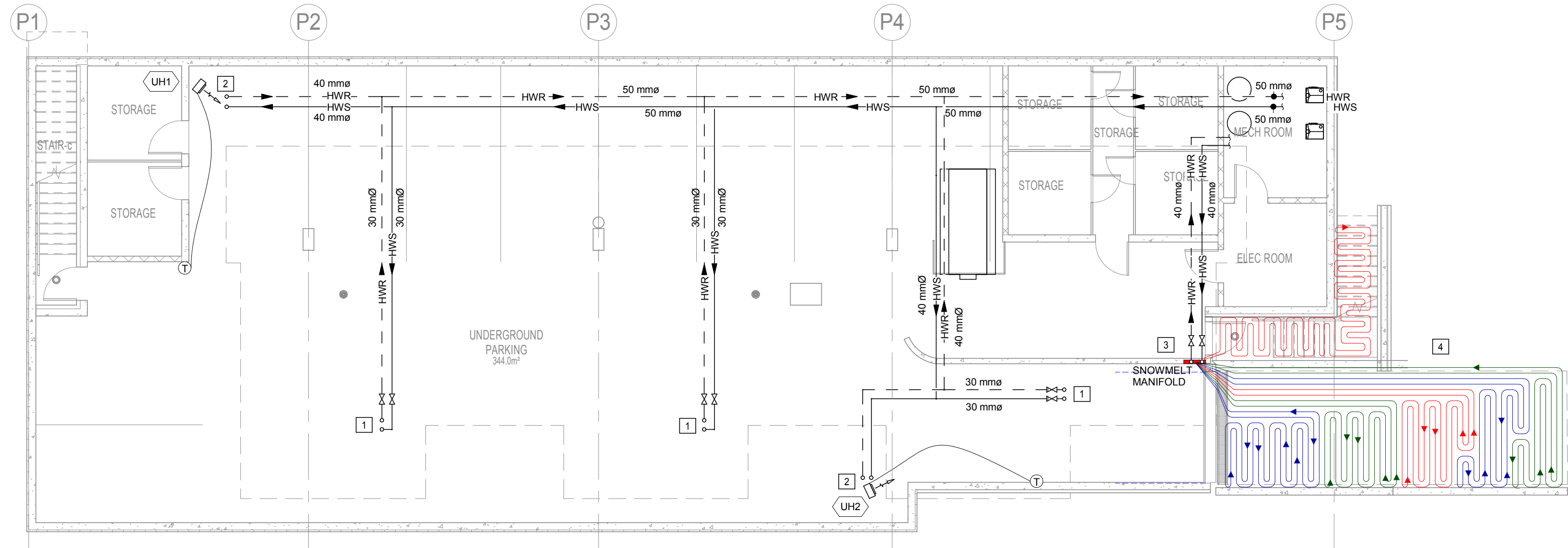
- BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
- LOCATIONS OF SERVICES ARE APPROXIMATE. VERIFY ON SITE AND WITH CIVIL DRAWINGS.
- WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
- SANITARY VENTING SIZED PER LOCAL PLUMBING CODES.
- CONTRACTOR TO COORDINATE ALL PIPE ROUTING, DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
- CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR PIPING IF REQUIRED.

PARKADE HYDRONIC NOTES:

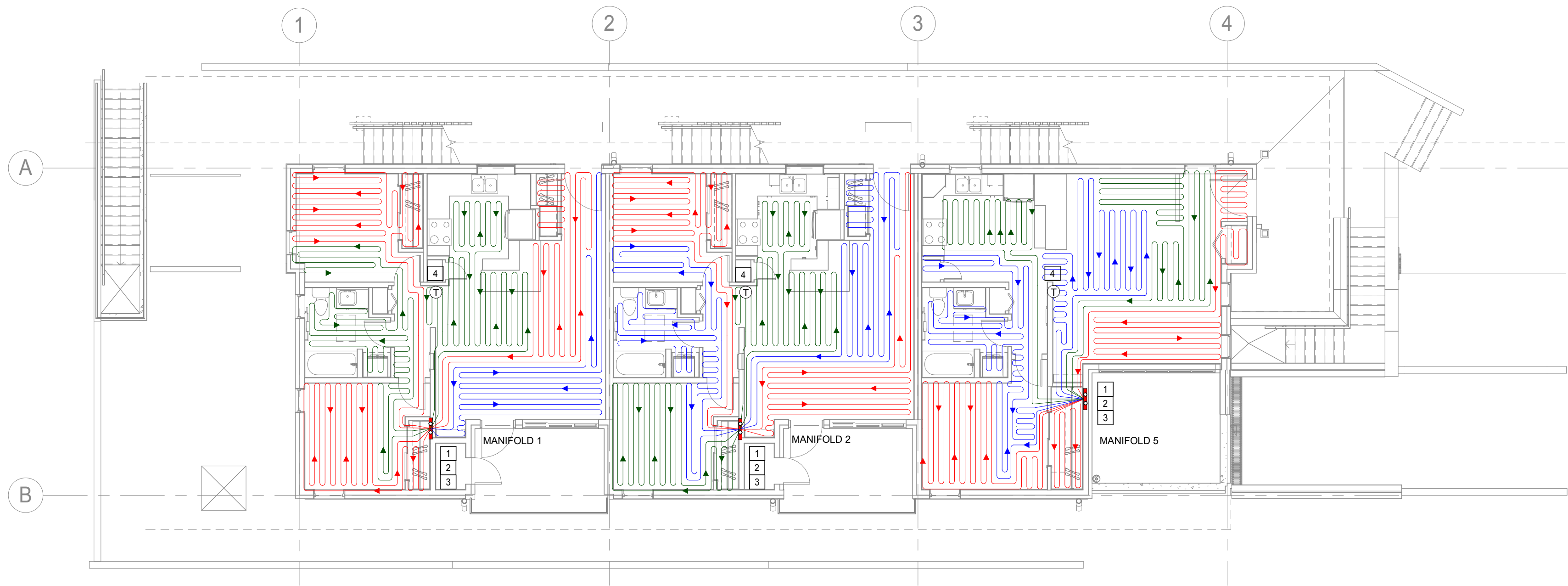
- 30mmØ HWS AND HWR TO AND FROM MAIN AND SECOND FLOOR.
- 40mmØ HWS AND HWR TO AND FROM HYDRONIC UNIT HEATERS. PROVIDE LOCKBOX FOR THERMOSTAT.
- DROP 30mmØ HWS AND HWR TO AND FROM SNOWMELT MANIFOLD LOCATION. REFER TO SNOWMELT HEATING SCHEDULE FOR DETAIL.
- IN-FLOOR PIPING LAYOUT IS SCHEMATIC ONLY. CONTRACTOR TO SUBMIT FINAL LAYOUT DRAWINGS FOR APPROVAL.

MAIN FLOOR HYDRONIC NOTES:

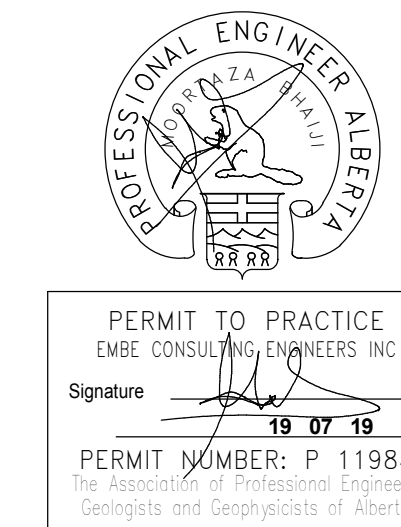
- 30mmØ HWS AND HWR TO AND FROM PARKADE TO MAIN FLOOR.
- 25mmØ HWS AND HWR TO AND FROM SECOND FLOOR ABOVE.
- CONNECT HWS AND HWR TO IN-FLOOR HEATING MANIFOLD AS PER MANUFACTURER'S INSTRUCTIONS. REFER TO IN-FLOOR HEATING SCHEDULES FOR DETAIL.
- THERMOSTAT TO BE MOUNTED AT 1500mm A.F.F.
- IN-FLOOR PIPING LAYOUT IS SCHEMATIC ONLY. CONTRACTOR TO SUBMIT FINAL LAYOUT DRAWINGS FOR APPROVAL.



01  
M4.1  
1 : 100  
PARKADE - HYDRONIC LAYOUT



02  
M4.1  
1 : 100  
MAIN FLOOR PLAN - HYDRONIC LAYOUT



DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Client / client



Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

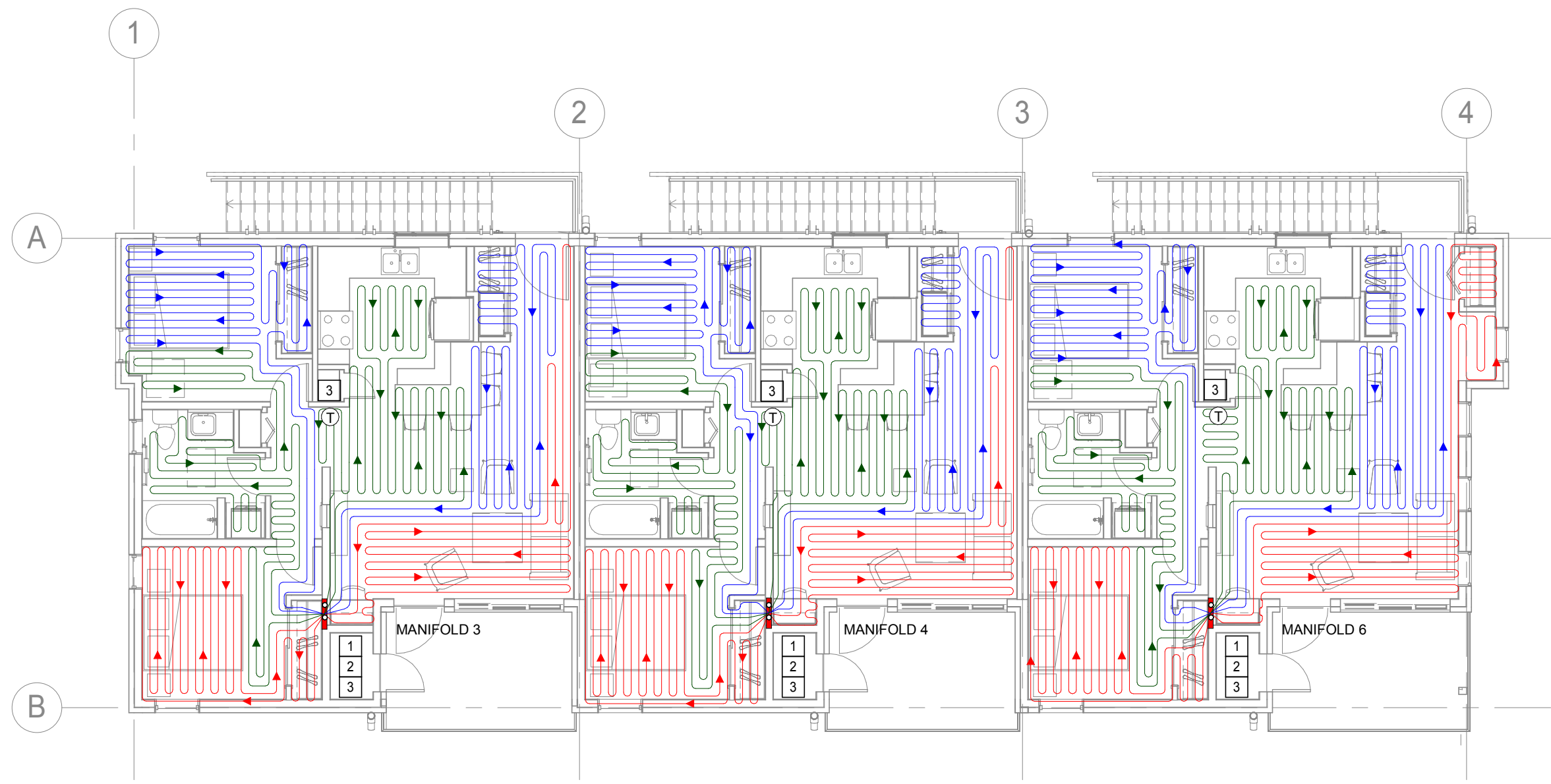
Client / client  
**Parks Canada**

Drawing title / Titre du dessin

**PARKADE AND MAIN FLOOR - HYDRONIC  
LAYOUT**

Project No. / No. du project	Sheet / Feuille no.	Revision no. / La Révision no.
	<b>M4.1</b>	<b>8</b>





 01  
M4.2 1 : 100

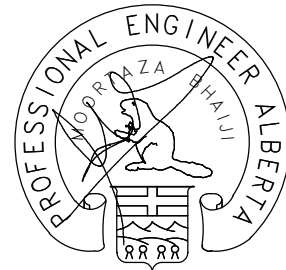
SECOND FLOOR - HYDRONIC LAYOUT

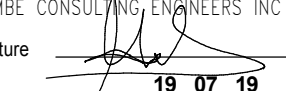
- GENERAL NOTES:**
1. BIDDING CONTRACTORS ARE TO REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING TENDER PRICE.
  2. LOCATIONS OF SERVICES ARE APPROXIMATE, VERIFY ON SITE AND WITH CIVIL DRAWINGS.
  3. WHERE DISCREPANCIES ARE FOUND, CONTACT ENGINEER IN WRITING PRIOR TO SUBMITTING PRICE.
  4. SANITARY VENTING SIZED PER LOCAL PLUMBING CODES.
  5. CONTRACTOR TO COORDINATE ALL PIPE ROUTING, DUCT ROUTING ETC. WITH OTHER TRADES PRIOR TO ANY INSTALLATION IN ORDER TO REDUCE CONFLICTS ON SITE.
  6. CONTRACTOR TO COORDINATE ANY BLOCK-OUTS IN CONCRETE SLAB AND WALLS FOR PIPING IF REQUIRED.

- SECOND FLOOR HYDRONIC NOTES:**
- 1 25mmØ HWS AND HWR TO AND FROM MAIN FLOOR BELOW.
  - 2 CONNECT HWS AND HWR TO IN-FLOOR HEATING MANIFOLD AS PER MANUFACTURER'S INSTRUCTIONS. REFER TO IN-FLOOR HEATING SCHEDULES FOR DETAIL.
  - 3 THERMOSTAT TO BE MOUNTED AT 1500mm A.F.F.
  - 4 IN-FLOOR PIPING LAYOUT IS SCHEMATIC ONLY. CONTRACTOR TO SUBMIT FINAL LAYOUT DRAWINGS FOR APPROVAL.



**EMBE CONSULTING ENGINEERS**  
SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



PERMIT TO PRACTICE  
EMBE CONSULTING ENGINEERS INC.  
Signature   
19 07 19  
PERMIT NUMBER: P 11984  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

**DO NOT SCALE DRAWINGS**

Revision / Révision	Description / Description	Date / Date
9	ISSUED FOR TENDER/ BP	19 07 19
8	TENDER - REV2	19 06 19
7	TENDER	19 04 08
6	TENDER	18 11 28
5	99% IFC	18 11 20
4	COORDINATION	18 11 13
3	99% IFC	18 03 21
2	60% IFC	18 02 08
1	100% DD	09 11 28

Client / client



**Parks Canada**

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

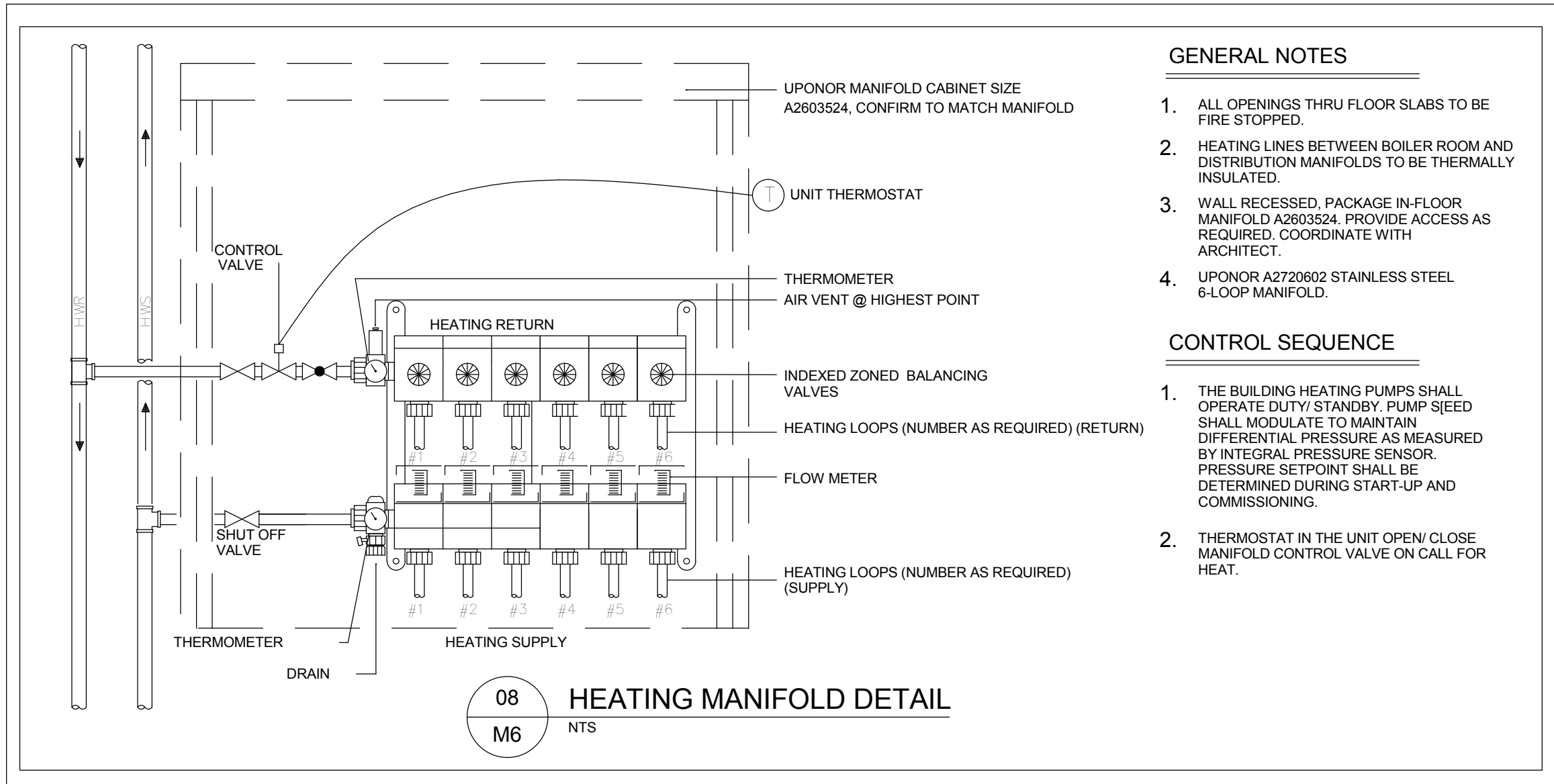
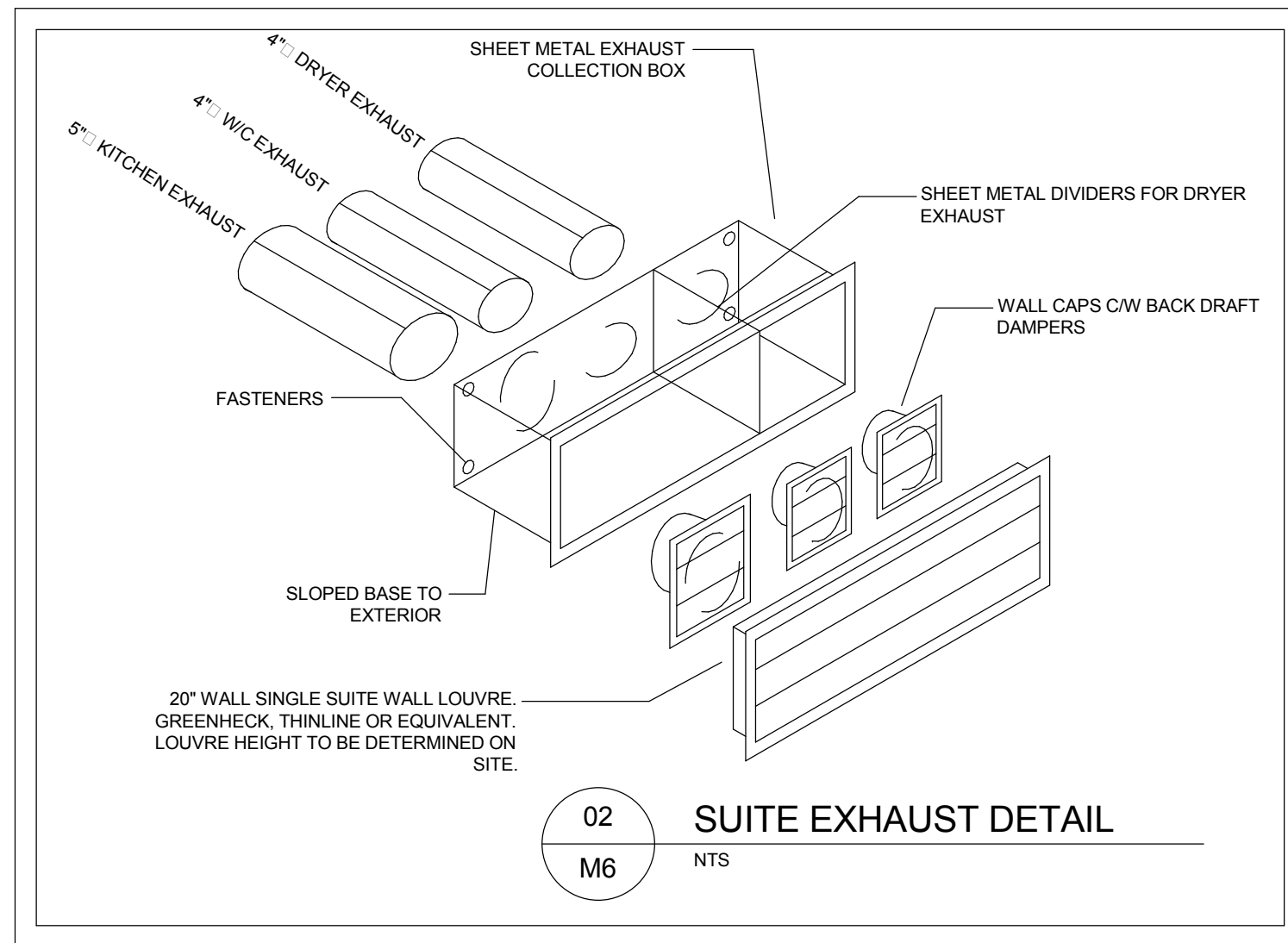
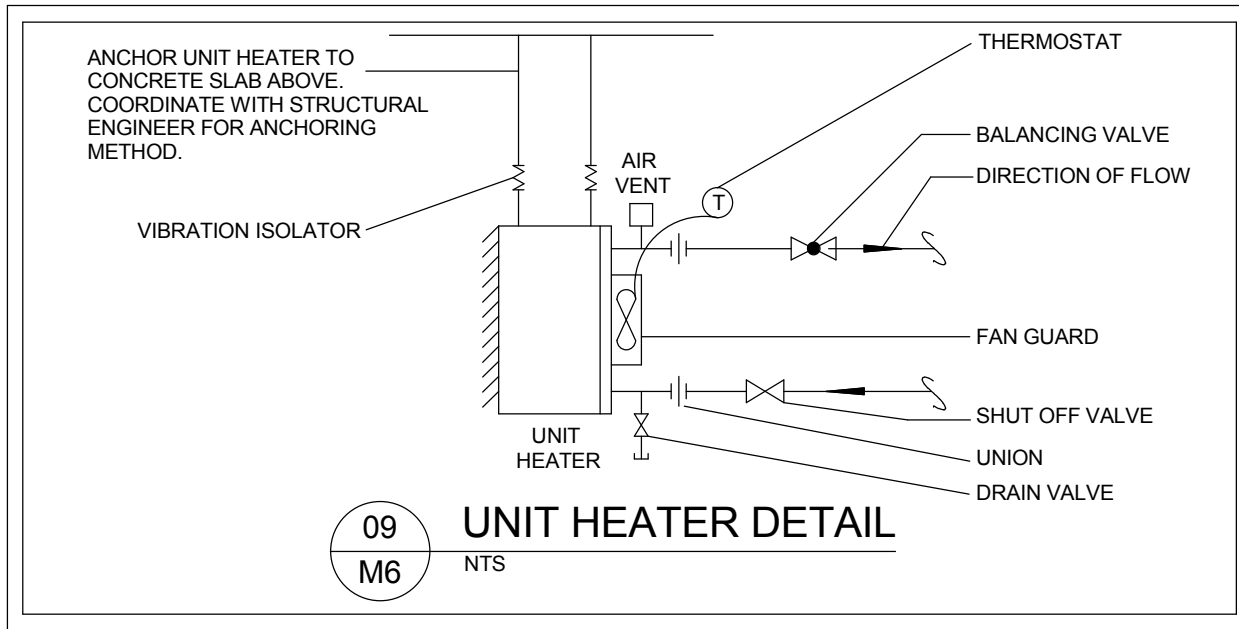
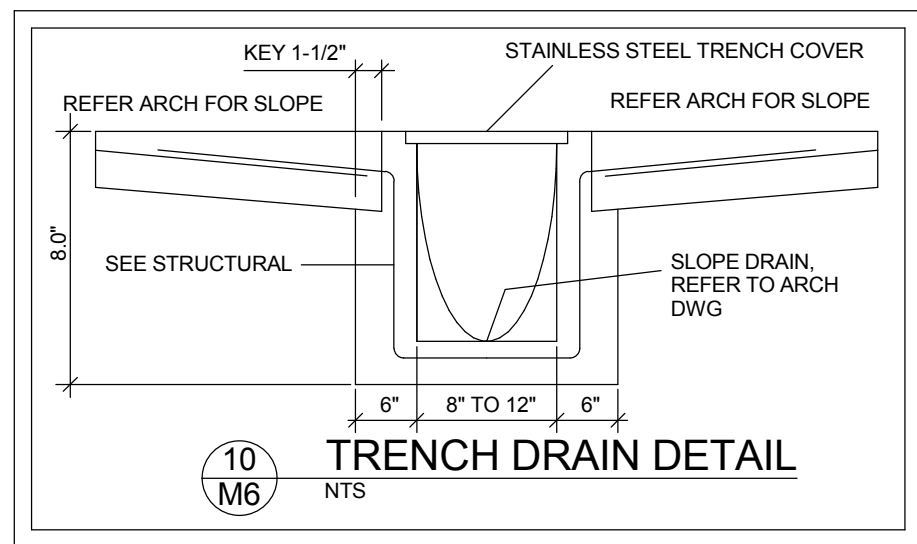
**Parks Canada**

Drawing title / Titre du dessin

SECOND FLOOR - HYDRONIC LAYOUT

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	M4.2	9



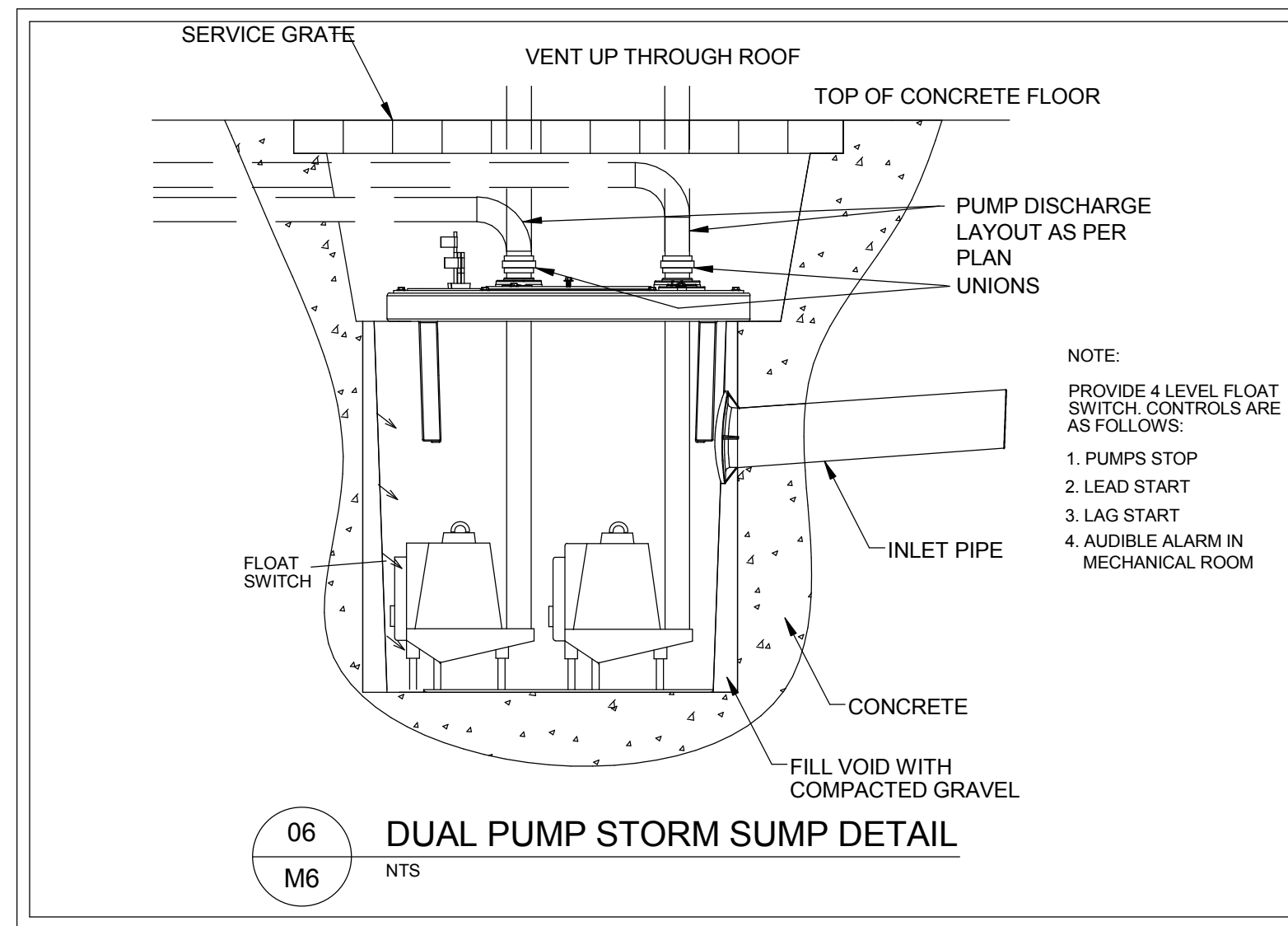


#### GENERAL NOTES

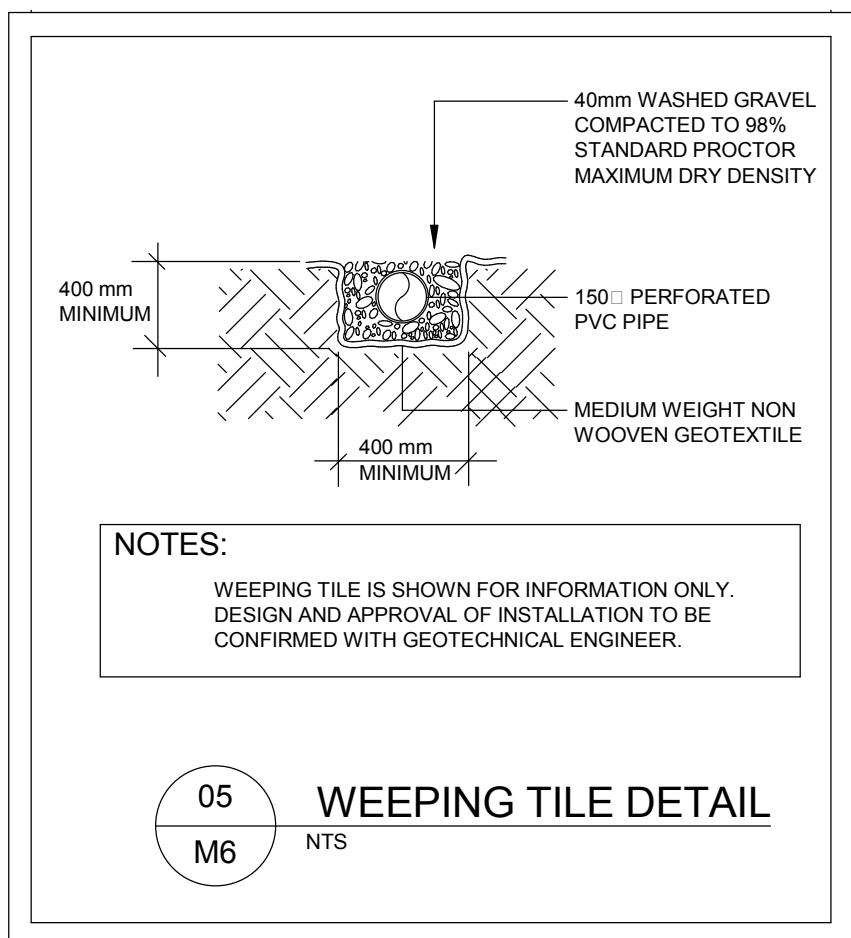
1. ALL OPENINGS THRU FLOOR SLABS TO BE FIRE STOPPED.
2. HEATING LINES BETWEEN BOILER ROOM AND DISTRIBUTION MANIFOLDS TO BE THERMALLY INSULATED.
3. WALL RECESSED, PACKAGE IN-FLOOR MANIFOLD A2603524. PROVIDE ACCESS AS REQUIRED. COORDINATE WITH ARCHITECT.
4. UPONOR A2720602 STAINLESS STEEL 6-LOOP MANIFOLD.

#### CONTROL SEQUENCE

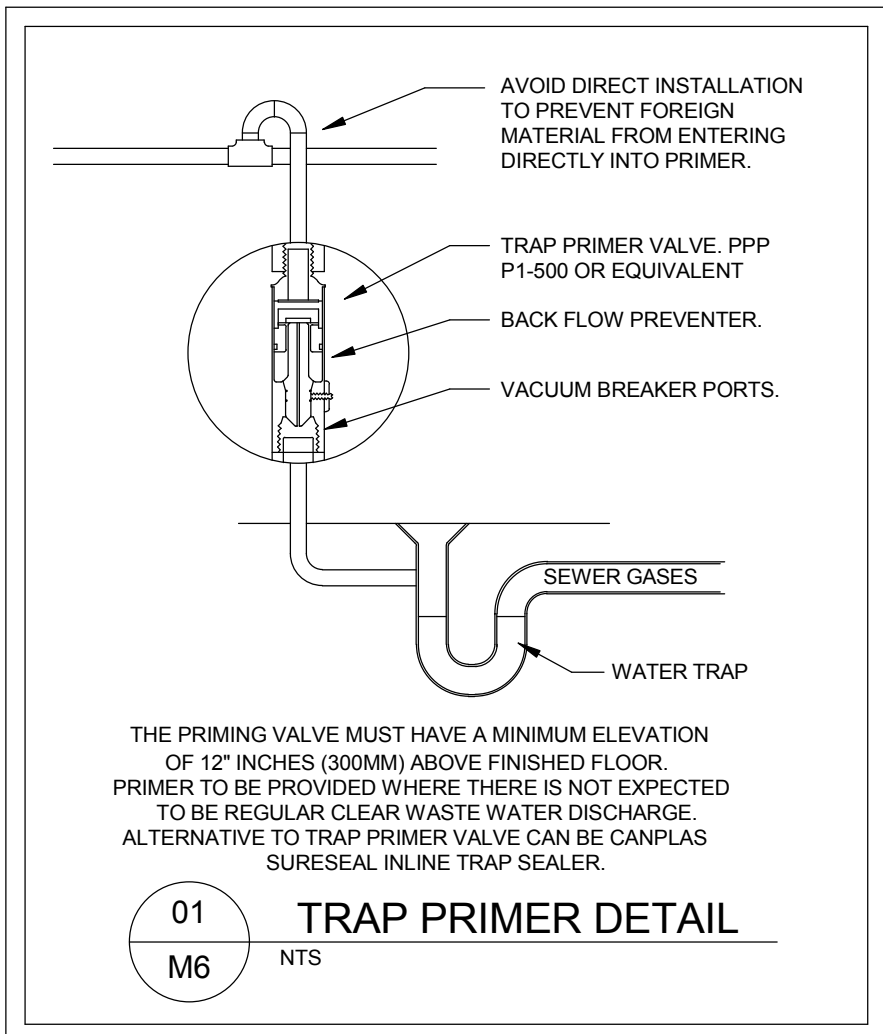
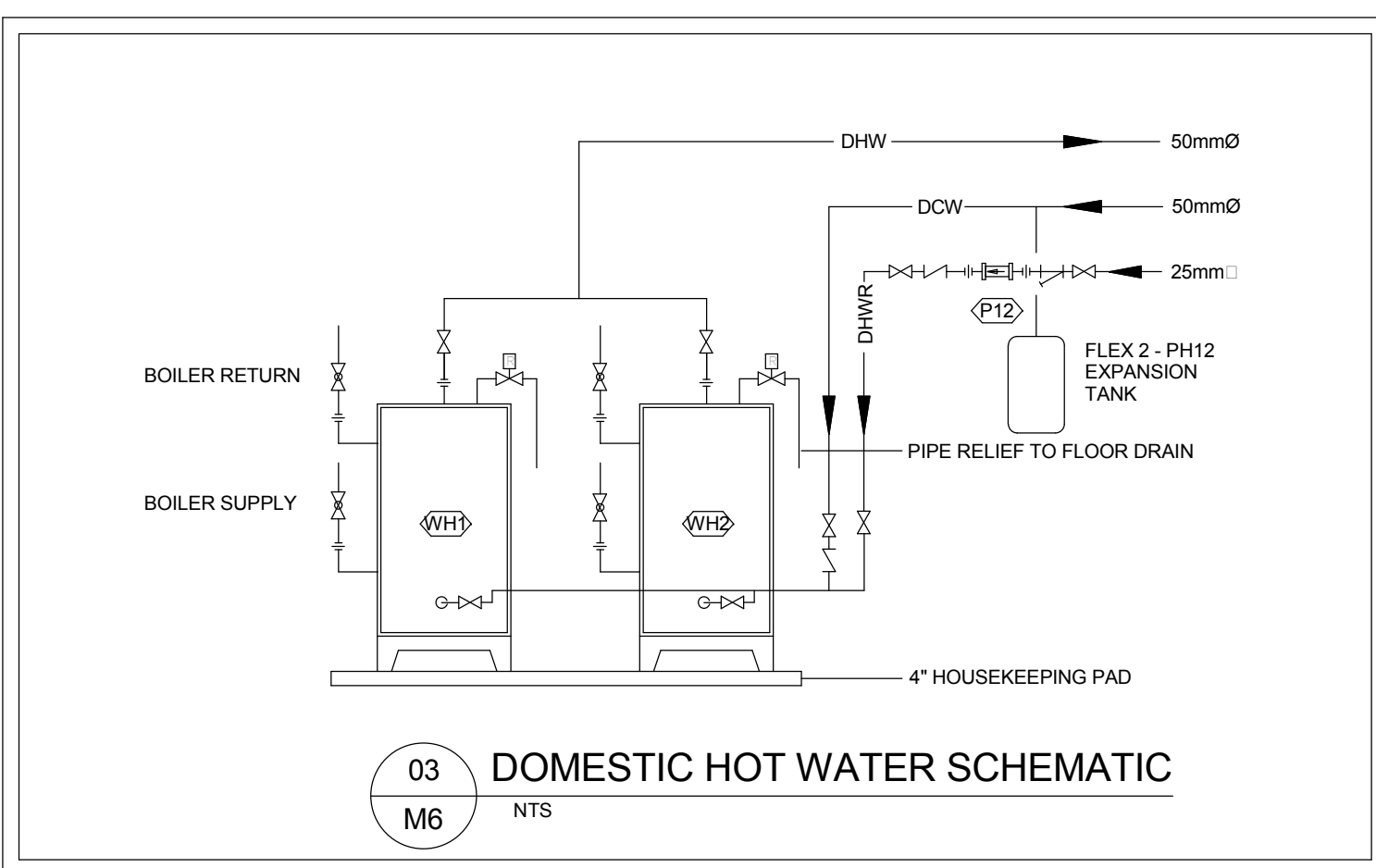
1. THE BUILDING HEATING PUMPS SHALL OPERATE DUTY/STANDBY. PUMP SPEED SHALL MODULATE TO MAINTAIN DIFFERENTIAL PRESSURE AS MEASURED BY INTEGRAL PRESSURE SENSOR. PRESSURE SETPOINT SHALL BE DETERMINED DURING START-UP AND COMMISSIONING.
2. THERMOSTAT IN THE UNIT OPEN/ CLOSE MANIFOLD CONTROL VALVE ON CALL FOR HEAT.



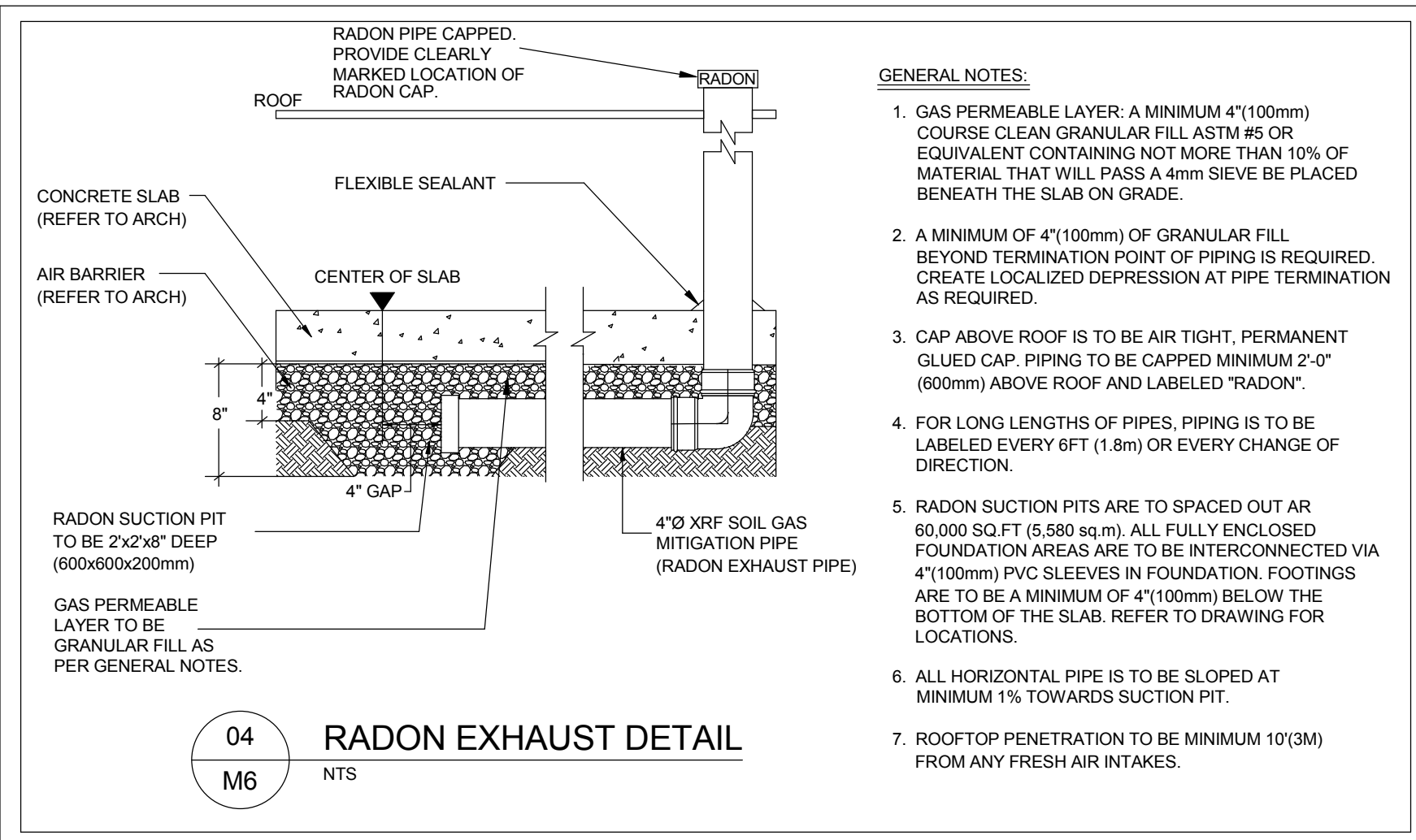
- NOTE:  
PROVIDE 4 LEVEL FLOAT SWITCH. CONTROLS ARE AS FOLLOWS:
1. PUMPS STOP
  2. LEAD START
  3. LAG START
  4. AUDIBLE ALARM IN MECHANICAL ROOM



NOTES:  
WEEPING TILE IS SHOWN FOR INFORMATION ONLY. DESIGN AND APPROVAL OF INSTALLATION TO BE CONFIRMED WITH GEOTECHNICAL ENGINEER.

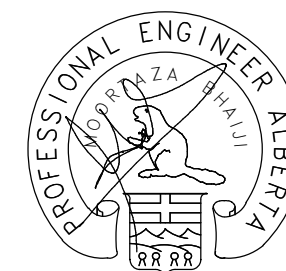
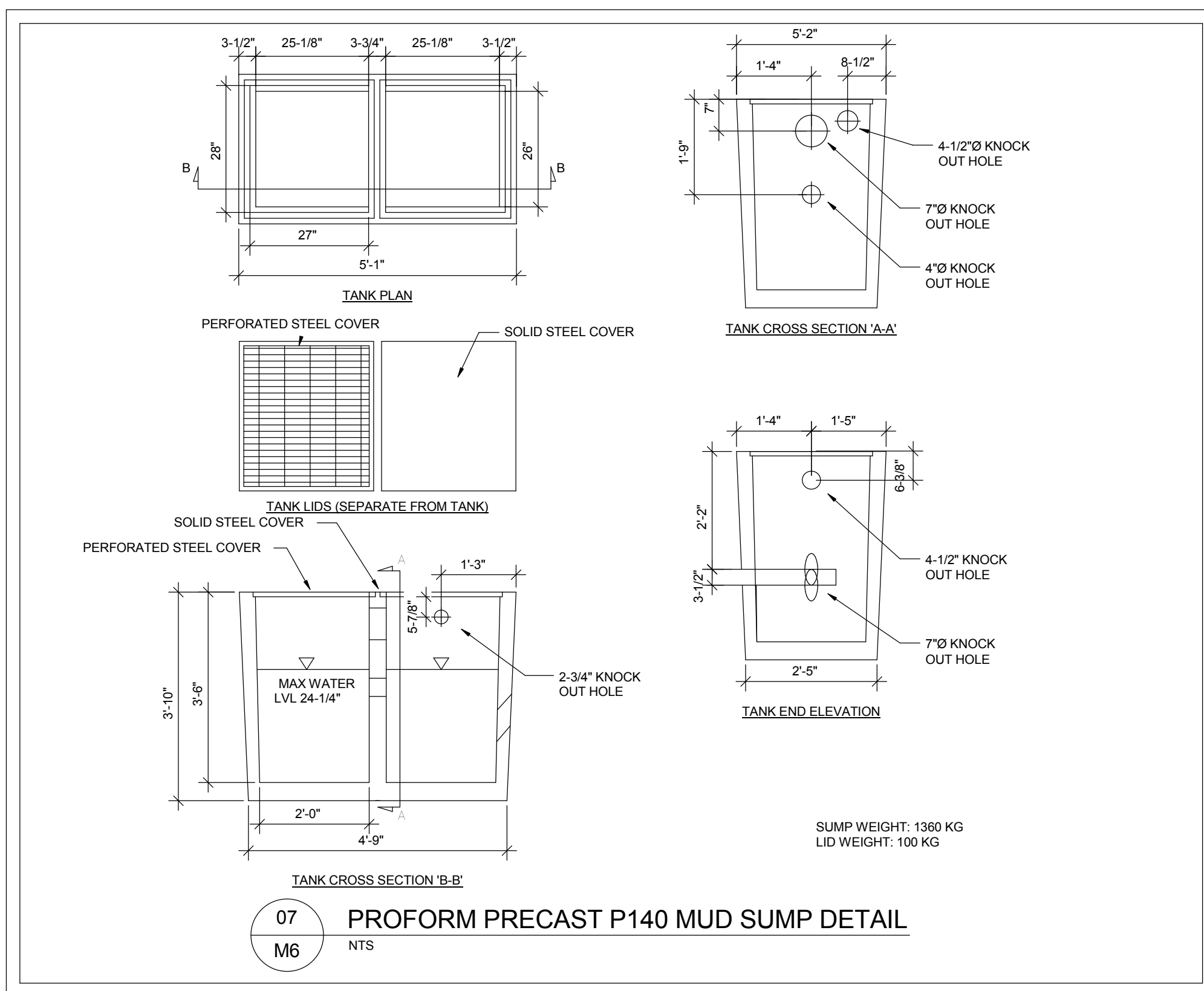


THE PRIMING VALVE MUST HAVE A MINIMUM ELEVATION OF 12" INCHES (300MM) ABOVE FINISHED FLOOR. PRIMER TO BE PROVIDED WHERE THERE IS NOT EXPECTED TO BE REGULAR CLEAR WASTE WATER DISCHARGE. ALTERNATIVE TO TRAP PRIMER VALVE CAN BE CANPLAS SURESEAL INLINE TRAP SEALER.



#### GENERAL NOTES:

1. GAS PERMEABLE LAYER: A MINIMUM 4"(100mm) COURSE CLEAN GRANULAR FILL ASTM #5 OR EQUIVALENT CONTAINING NOT MORE THAN 10% OF MATERIAL THAT WILL PASS A 4mm SIEVE BE PLACED BENEATH THE SLAB ON GRADE.
2. A MINIMUM OF 4"(100mm) OF GRANULAR FILL BEYOND TERMINATION POINT OF PIPING IS REQUIRED. CREATE LOCALIZED DEPRESSION AT PIPE TERMINATION AS REQUIRED.
3. CAP ABOVE ROOF IS TO BE AIR TIGHT, PERMANENT GLUED CAP. PIPING TO BE CAPPED MINIMUM 2'-0" (600mm) ABOVE ROOF AND LABELED "RADON".
4. FOR LONG LENGTHS OF PIPES, PIPING IS TO BE LABELED EVERY 6FT (1.8m) OR EVERY CHANGE OF DIRECTION.
5. RADON SUCTION PITS ARE TO BE SPACED OUT AT 60,000 SQ.FT (5,580 sq.m). ALL FULLY ENCLOSED FOUNDATION AREAS ARE TO BE INTERCONNECTED VIA 4"(100mm) PVC SLEEVES IN FOUNDATION. FOOTINGS ARE TO BE A MINIMUM OF 4"(100mm) BELOW THE BOTTOM OF THE SLAB. REFER TO DRAWING FOR LOCATIONS.
6. ALL HORIZONTAL PIPE IS TO BE SLOPED AT MINIMUM 1% TOWARDS SUCTION PIT.
7. ROOFTOP PENETRATION TO BE MINIMUM 10'(3M) FROM ANY FRESH AIR INTAKES.



PERMIT TO PRACTICE  
EMBE CONSULTING ENGINEERS INC.  
Signature: [Signature]  
19 07 19  
PERMIT NUMBER: P 11984  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

#### DO NOT SCALE DRAWINGS

Revision / Revision	Description / Description	Date / Date
9	ISSUED FOR TENDER/ BP	19 07 19
8	TENDER - REV3	19 07 09
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08

Client / client



Parks Canada  
Parcs Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par  
MB

Designed by/Concept par  
DL

Drawn by/Dessiné par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

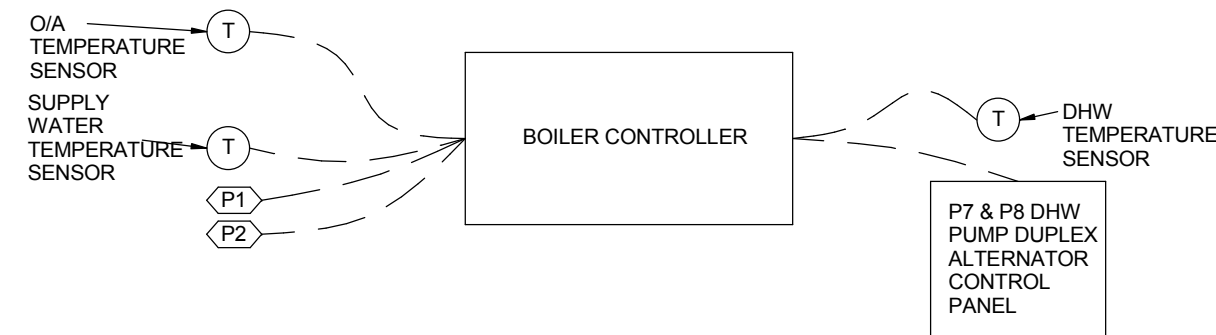
#### MECHANICAL DETAILS

Project No. / No. du projet	Sheet / Feuille	Revision no. / La Révision no.
-----------------------------	-----------------	--------------------------------

M6

9

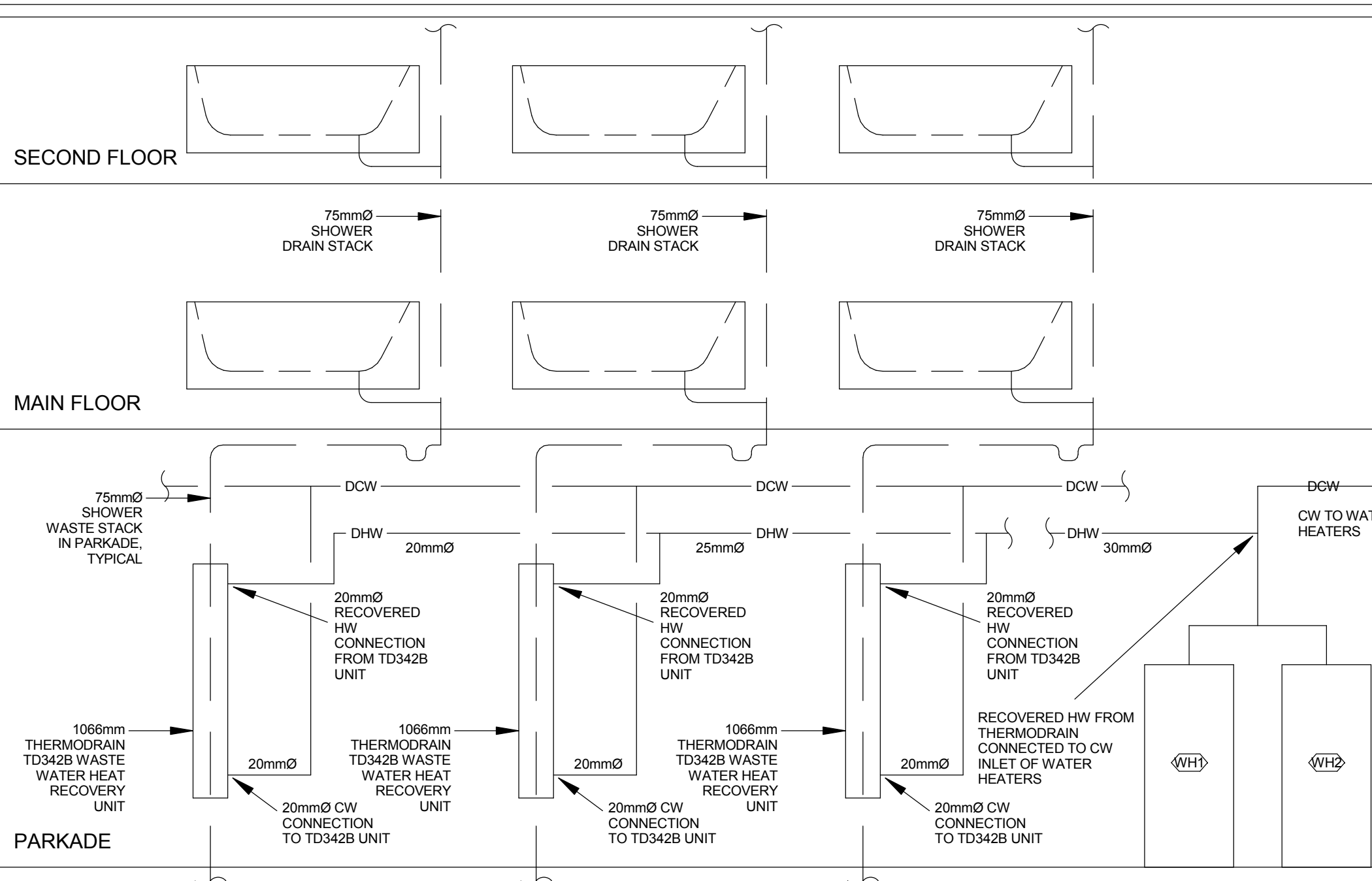




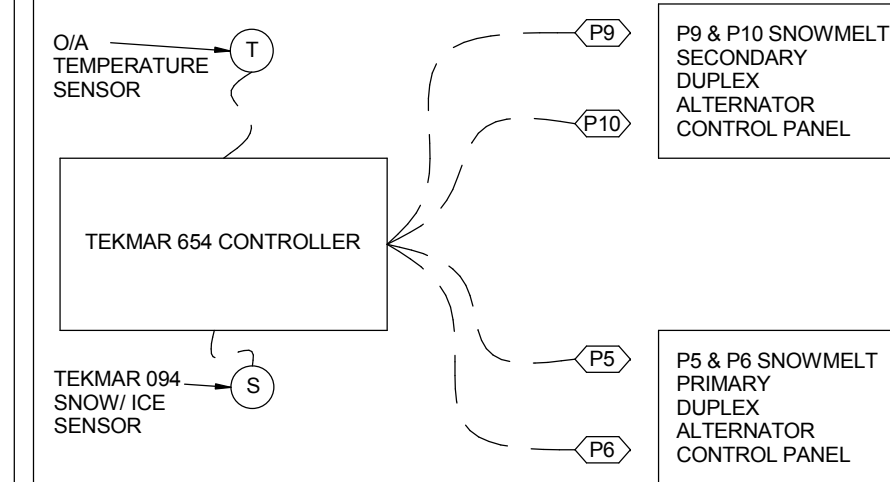
#### CONTROL SEQUENCE

1. BOILER SYSTEM (2 BOILER ARRANGEMENT) PROVIDES HEAT TO DOMESTIC HOT WATER SYSTEM AND BUILDING HEATING LOOP. THIS SYSTEM SHALL OPERATE YEAR ROUND.
2. THE BOILER CONTROLLER SHALL PROVIDE LEAD/LAG CONTROL OF MULTIPLE BOILER.
3. EACH BOILER SHALL HAVE DEDICATED CONTROLLER. BOILER CONTROLLER SHALL OBTAIN A START/STOP COMMAND AND A SUPPLY TEMPERATURE SETPOINT FROM SUPPLY TEMPERATURE SENSOR. THE CONTROLLER SHALL START/STOP THE ASSOCIATED BOILER PUMP, MONITOR WATER FLOW AND SUPPLY WATER TEMPERATURE. BOILER SHALL SHUT DOWN AUTOMATICALLY IF NO FLOW CONDITION IS DETECTED AND ON LOW WATER CONDITION. BOILER CONTROLLER SHALL PROVIDE STATUS AND ALARM SIGNAL.
4. THE CONTROLLER SHALL START/STOP BOILERS AS REQUIRED TO MAINTAIN THE PRIMARY LOOP TEMPERATURE AT SETPOINT. THE LEAD BOILER SHALL START FIRST, WHEN IT REACHES 90% CAPACITY, LAG BOILER SHALL BE STARTED. BOILERS SHALL BE STOPPED IN REVERSE ORDER WHEN THEY DROP BELOW 40% CAPACITY.
5. THE CONTROLLER SHALL ROTATE LEAD/LAG BOILER EVERY 500 HOURS. THE CONTROLLER SHALL MONITOR BOILER STATUS, BOILER ALARM, BOILER CIRCULATION PUMP STATUS.
6. THE CONTROLLER SHALL RESET THE HEATING SUPPLY WATER TEMPERATURE BASED ON OUTDOOR AIR TEMPERATURE. REFER TO HEATING SCHEMATIC FOR SCHEDULED TEMPERATURE.
7. THE CONTROLLER SHALL INCORPORATE A DOMESTIC HOT WATER PRIORITY. ON CALL FOR HEAT FROM THE DOMESTIC HOT WATER SYSTEM, THE CONTROLLER SHALL SET THE BOILER SUPPLY TEMPERATURE AT 82.2°C. WHEN THE DOMESTIC HOT WATER SYSTEM IS SATISFIED, THE BOILER SUPPLY TEMPERATURE SHALL REVERT BACK TO PREVIOUS SETPOINT.
8. THE CONTROLLER SHALL MONITOR THE STATUS OF PUMPS AND WATER TEMPERATURE. ALARMS SHALL BE GENERATED WHEN ON PUMP FAILURE AND OUT-OF-RANGE TEMPERATURE.

02  
M6.1 NTS  
**BOILER CONTROLLER SCHEMATIC**



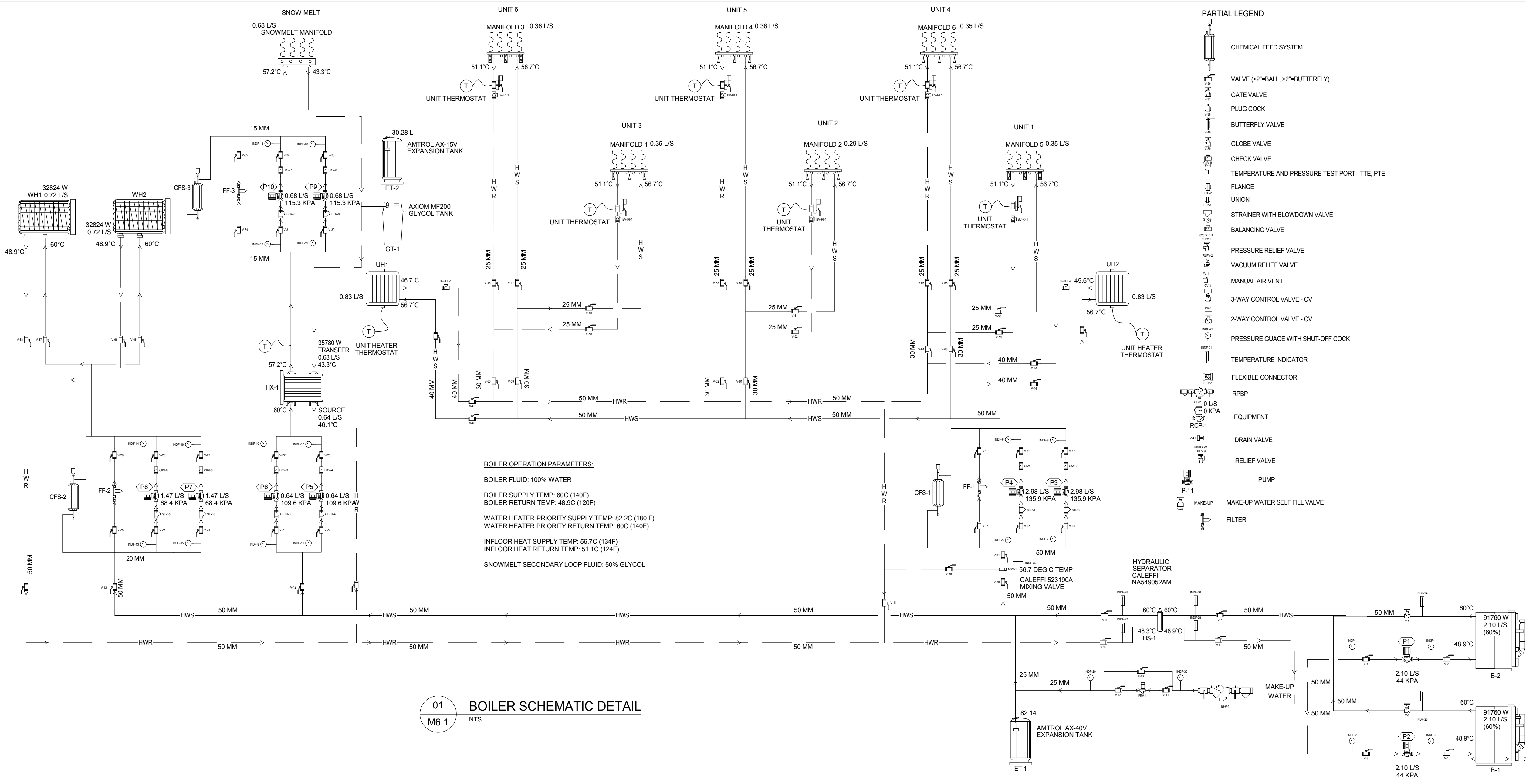
03  
M6.1 NTS  
**SHOWER DRAIN WASTE WATER HEAT RECOVERY SCHEMATIC**



#### CONTROL SEQUENCE

1. RAMP SNOWMELT SYSTEM TO BE CONTROLLED BY STAND ALONE TEKMAR 654 CONTROLLER C/W SNOW SENSOR. CONTROLLER SHALL CYCLE THE SNOW MELT SECONDARY PUMPS AND MODULATE SNOW MELT PRIMARY PUMPS TO MAINTAIN SUPPLY WATER TEMPERATURE AT SETPOINT.

04  
M6.1 NTS  
**SNOWMELT CONTROL SCHEMATIC**



01  
M6.1 NTS  
**BOILER SCHEMATIC DETAIL**

#### DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER/ BP	19 07 19
4	TENDER	19 04 08
3	99% IFC	18 11 20
2	COORDINATION	18 11 13
1	99% IFC	18 03 21

Client / client

#### MECHANICAL DETAILS



MANIFOLD-5 IN-FLOOR HEATING SCHEDULE	
AREA	72.4 m2
RATE OF HEAT LOSS	20.71 MJ/Hr
TOTAL WATER FLOW	0.36 L/S
OUTPUT	27.05 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	65.8 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.06 L/S
PRESSURE DROP	31.38 kPa
PIPE SPACING	150 mm O.C.

MANIFOLD-6 IN-FLOOR HEATING SCHEDULE	
AREA	72.4 m2
RATE OF HEAT LOSS	20.57 MJ/Hr
TOTAL WATER FLOW	0.36 L/S
OUTPUT/m2	31.33 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	65.8 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.06 L/S
PRESSURE DROP	31.08 kPa
PIPE SPACING	150 mm O.C.

MANIFOLD-3 IN-FLOOR HEATING SCHEDULE	
AREA	71.6 m2
RATE OF HEAT LOSS	20.34 MJ/Hr
TOTAL WATER FLOW	0.35 L/S
OUTPUT	29.68 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	65.5 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.05 L/S
PRESSURE DROP	28.99 kPa
PIPE SPACING	150 mm O.C.

MANIFOLD-4 IN-FLOOR HEATING SCHEDULE	
AREA	70.8 m2
RATE OF HEAT LOSS	20.13 MJ/Hr
TOTAL WATER FLOW	0.35 L/S
OUTPUT	32.22 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	64.3 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.05 L/S
PRESSURE DROP	28.09 kPa
PIPE SPACING	150 mm O.C.

MANIFOLD-1 IN-FLOOR HEATING SCHEDULE	
AREA	71.6 m2
RATE OF HEAT LOSS	20.34 MJ/Hr
TOTAL WATER FLOW	0.35 L/S
OUTPUT	30.53 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	65.5 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.05 L/S
PRESSURE DROP	29.29 kPa
PIPE SPACING	150 mm O.C.

MANIFOLD-2 IN-FLOOR HEATING SCHEDULE	
AREA	70.8 m2
RATE OF HEAT LOSS	20.13 MJ/Hr
TOTAL WATER FLOW	0.29 L/S
OUTPUT	24.59 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	64.3 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.04 L/S
PRESSURE DROP	21 kPa
PIPE SPACING	150 mm O.C.

SNOWMELT MANIFOLD HEATING SCHEDULE	
AREA	38.9 m2
TOTAL WATER FLOW	0.68 L/S
OUTPUT	125 MJ/Hr
NUMBER OF LOOPS	6
AVERAGE LENGHT OF LOOP	51.8 m
PIPE SIZE/LOOP	15 mm
AVERAGE WATER FLOW PER LOOP	0.11 L/S
PRESSURE DROP	35 kPa
PIPE SPACING	150 mm O.C.

EXPANSION TANK SCHEDULE				
TAG	MANUFACTURER	MODEL	VOLUME	REMARKS
EX1	AMTROL	AX-40V	82.1 L	861 KPA OPERATING PRESSURE
EX2	AMTROL	AX-15V	30.3 L	861 KPA OPERATING PRESSURE

GLYCOL FEED TANK SCHEDULE				
Mark	MANUFACTURER	MODEL	VOLUME	ELECTRICAL (V/PH/Hz)
GT1	AXIOM	MF200	25.0 L	120/1/60, 50W
				50% GLYCOL SERVING SNOWMELT SECONDARY LOOP.

BOILER UNIT SCHEDULE						
TAG	LOCATION	MANUFACTURER	MODEL	GAS (kWh)	HEATING CAPACITY (kWh)	ELECTRICAL (V/PH/Hz)
B1	PARKADE MECH ROOM	LOCHINVAR OR EQUAL	WHB399	116.93	111.07	120/1/60, MCA: 4.5A
						WALL MOUNTED. PROVIDE LOW WATER CUT OFF SWITCH, FLOW SWITCH. INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS
B2	PARKADE MECH ROOM	LOCHINVAR OR EQUAL	WHB399	116.93	111.07	120/1/60, MCA: 4.5A
						WALL MOUNTED. PROVIDE LOW WATER CUT OFF SWITCH, FLOW SWITCH. INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS

EXHAUST FAN SCHEDULE						
TAG	LOCATION	MANUFACTURER	MODEL	AIR FLOW	E.S.P.(kPa)	ELECTRICAL (V/PH/Hz)
EF1	PARKADE	GREENHECK	BSQ-180	184.0 L/s	0.15	115/1/60, 1HP
						INTERLOCK WITH MUA1 AND CO/NO2 DETECTION SYSTEM. SUSPENDED IN PARKADE CEILING.
EF2	PARKADE STORAGE	BROAN	L250L	118.0 L/s	0.024	115/1/60, 166W, 2.1A
EF3	PARKADE STORAGE	BROAN	L150L	70.8 L/s	0.024	115/1/60, 100W, 1.3A
						INTERLOCK WITH STORAGE ROOM LIGHTS.

DOMESTIC HOT WATER HEATER SCHEDULE						
TAG	LOCATION	MANUFACTURER	MODEL	CAPACITY	BTU/HR INPUT	RECOVERY @ 94°C
WH1	MECH ROOM	TRIANGLE TUBE OR EQUAL	SMART 40	136 LT	INDIRECT	681 LT/HR
						INSTALL ON HOUSE KEEPING PADS. SEE BOILER SCHEMATIC FOR PIPING
WH2	MECH ROOM	TRIANGLE TUBE OR EQUAL	SMART 40	136 LT	INDIRECT	681 LT/HR
						INSTALL ON HOUSE KEEPING PADS. SEE BOILER SCHEMATIC FOR PIPING

GAS EQUIPMENT SCHEDULE	
PROVIDE NEW LOW PRESSURE GAS METER. EXTEND 2"Ø GAS LINE FROM GAS METER TO TENANT SPACE. SIZING BASED ON 100 FEET LENGTH TO FURTHEST EQUIPMENT.	
GAS METER SIZE: 1,500 CFH GAS EQUIPMENT LOAD: 1,198 CFH	
BOILER B1 BOILER B2 MUA1	399 CFH 399 CFH 452 CFH
TOTAL LOAD	1,198 CFH 1,198,000 BTU/H

UNIT HEATER SCHEDULE							
TAG	LOCATION	MANUFACTURER	MODEL	HEATING CAPACITY (kWh)	WEIGHT	ELECTRICAL (V/PH/Hz)	REMARKS
UH1	PARKADE	REZNOR	WS-96/120	19.48	34 KG	115/1/60, 0.041 HP	HYDRONIC UNIT HEATER, C/W PROGRAMMABLE THERMOSTAT AND THERMOSTAT GUARD
UH2	PARKADE	REZNOR	WS-96/120	19.48	34 KG	115/1/60, 0.041 HP	HYDRONIC UNIT HEATER, C/W PROGRAMMABLE THERMOSTAT AND THERMOSTAT GUARD

PLUMBING FIXTURE SCHEDULE									
TAG	FIXTURE	MANUFACTURE R	CAT. #	MODEL	ACCESSORIES	TRIM/SUPPLIES	TRAP	DRAIN	VENT
A	WATER CLOSET (ADA)	AMERICAN STANDARD	2854.128	MADERA FLOWISE, 419mm HEIGHT, 4.2 Lpf, ELONGATED SEAT, FLUSHOMETER MANUAL FLUSH VALVE, ADA COMPLIANT, MODEL 3461.001	SOLID PLASTIC, OPEN FRONT, WHITE SEAT, BOLTS, NUTS AND CAPS FLEXIBLE HOSE C/W STOPS ON SUPPLIES	MANUAL FLUSH VALVE AMERICAN STADARD MODEL 6047.121	INTEGRAL	75	38
B	COUNTERTOP LAVATORY	AMERICAN STANDARD	9494.001	CADET UNIVERSAL ACCESS	C/W WASTE FITTINGS AND BASKET STRAINER	MOEN CHATEAU L4621	P-TRAP	40	32
C	KITCHEN SINK	KINDRED	QDL2031/7/1	DOUBLE BOWL DROP-IN, 1 HOLE ON CENTRE	C/W WASTE FITTINGS AND BASKET STRAINER	MOEN CHATEAU 7425	P-TRAP	32	32
D	TUB	AMERICAN STANDARD	STUDIO 1500x750 MODEL 2953	ACRYLIC BATHTUB WITH INTEGRAL APRON	C/W STOPS ON SUPPLIES	MOEN BRANTFORD T2153-2570	P-TRAP	40	32
CONFIRM ALL PLUMBING FIXURES WITH ARCHITECT, OWNER AND INTERIOR DESIGNER.									

PUMP SCHEDULE									
TAG	SERVICE	MANUFACTURER	MODEL	FLOW (L/S)	HEAD (kPa)	MOTOR POWER	ELECTRICAL L (V/PH/Hz)	REMARKS	
P1	BOILER PUMP	GRUNDFOS	UPS-43-100F	2.16	44.83	1/3 HP, 370W	115/1/60	3-SPEEDS, INLINE, WET ROTOR CIRCULATOR. CONTROLLED BY BOILER CONTROLLER. SET PUMP ON MEDIUM SPEED.	
P2	BOILER PUMP	GRUNDFOS	UPS-43-100F	2.16	44.83	1/3 HP, 370W	115/1/60	3-SPEED, INLINE, WET ROTOR CIRCULATOR. CONTROLLED BY BOILER CONTROLLER. SET PUMP ON MEDIUM SPEED.	
P3	IN-FLOOR HEATING PUMP	GRUNDFOS	MAGNA3 40-180F	2.98	135.9	606W	115/1/60	INTEGRAL VFD. MAINTAINS CONSTANT PRESSURE. SET PRESSURE SETPOINT TO 20FT HEAD FOR COMMISSIONING	
P4	IN-FLOOR HEATING PUMP	GRUNDFOS	MAGNA3 40-180F	2.98	135.9	606W	115/1/60	INTEGRAL VFD. MAINTAINS CONSTANT PRESSURE. SET PRESSURE SETPOINT TO 20FT HEAD FOR COMMISSIONING.	
P5	SNOWMELT PRIMARY PUMP	GRUNDFOS	MAGNA3 40-180F	0.64	109.6	594W	115/1/60	INTEGRAL VFD, INLINE, WET ROTOR CIRCULATOR. CONTROLLED BY TEKMAR 854 SENSOR.	
P6	SNOWMELT PRIMARY PUMP	GRUNDFOS	MAGNA3 40-180F	0.64	109.6	594W	115/1/60	INTEGRAL VFD, INLINE, WET ROTOR CIRCULATOR. CONTROLLED BY TEKMAR 095 SENSOR.	
P7	DOMESTIC WATER HEATER PUMP	GRUNDFOS	UPS 26-150F	1.47	68.4	1/3 HP, 370W	115/1/60	INLINE WET ROTOR CIRCULATOR, PROVIDE TEKMAR 150 CONTROLLER TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT ON WATER HEATER. SET AT MEDIUM SPEED.	
P8	DOMESTIC WATER HEATER PUMP	GRUNDFOS	UPS 26-150F	1.47	68.4	1/3 HP, 370W	115/1/60	INLINE WET ROTOR CIRCULATOR, PROVIDE TEKMAR 150 CONTROLLER TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT ON WATER HEATER. SET AT MEDIUM SPEED.	
P9	SNOWMELT SECONDARY PUMP	GRUNDFOS	UPS 26-150F	0.63	115.3	1/3 HP, 370W	115/1/60	3-SPEED, INLINE, WET ROTOR CIRCULATOR. CONTROLLED BY BOILER CONTROLLER. SET PUMP ON MEDIUM SPEED.	
P10	SNOWMELT SECONDARY PUMP	GRUNDFOS	UPS 26-150F	0.63	115.3	1/3 HP, 370W	115/1/60	3-SPEED, INLINE, WET ROTOR CIRCULATOR. CONTROLLED BY BOILER CONTROLLER. SET PUMP ON MEDIUM SPEED.	
P11a, P11b	SUMP PUMP	LIBERTY PUMP	1100 SERIES DUPLEX SEWAGE SYSTEM WITH TWO L71M3 PUMPS	8.83	44.8	3/4 HP, 12A	115/1/60	DUPLEX SUMP PUMP C/W DUPLEX CONTROL PANEL AND 4 POINT FLOAT SWITCH. LEAD/ LAG OPERATION. GENERAL CONTRACTOR TO MONITOR GROUND WATER DE-WATERING FLOW RATE DURING CONSTRUCTION AND CONFIRM FINAL PUMP SELECTION WITH ENGINEER PRIOR TO PURCHASING.	
P12	DOMESTIC HOT WATER RECIRC PUMP	GRUNDFOS	UP 15-18B5	0.18	29.8	0.04 HP, 85W	115/1/60	INLINE CIRCULATOR C/W TIMER AND AQUASTAT. SET AT MEDIUM SPEED.	

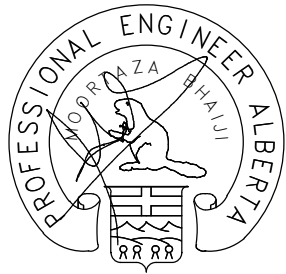
HRV SCHEDULE							
TAG	LOCATION	SERVES	MANUFACTURER	MODEL	SUPPLY AIR FLOW	SUPPLY E.S.P (kPa)	ELECTRICAL (V/PH/Hz)
HRV1	UNIT 1 WASHROOM	UNIT1	ALDES	H80-HF	35.4 L/s	0.04	120/1/60, 1.5A, 160W
						MOUNT HORIZONTAL IN WASHROOM CEILING SPACE. DRAIN CONDENSATE TO NEAREST DRAIN. PROVIDE ACCESS AS PER MANUFACTURER'S RECOMMENDATION. PROVIDE 611242 CONTROLLER. SET LOW SPEED AT 40 CFM AND HIGH SPEED AT 75 CFM. SET DISCHARGE AIR TEMPERATURE AT 20C.	
HRV2	UNIT 2 WASHROOM	UNIT2	ALDES	H80-HF	35.4 L/s	0.04	120/1/60, 1.5A, 160W
						MOUNT HORIZONTAL IN WASHROOM CEILING SPACE. DRAIN CONDENSATE TO NEAREST DRAIN. PROVIDE ACCESS AS PER MANUFACTURER'S RECOMMENDATION. PROVIDE 611242 CONTROLLER. SET LOW SPEED AT 40 CFM AND HIGH SPEED AT 75 CFM. SET DISCHARGE AIR TEMPERATURE AT 20C.	
HRV3	UNIT 3 WASHROOM	UNIT3	ALDES	H80-HF	35.4 L/s	0.04	120/1/60, 1.5A, 160W
						MOUNT HORIZONTAL IN WASHROOM CEILING SPACE. DRAIN CONDENSATE TO NEAREST DRAIN. PROVIDE ACCESS AS PER MANUFACTURER'S RECOMMENDATION. PROVIDE 611242 CONTROLLER. SET LOW SPEED AT 40 CFM AND HIGH SPEED AT 75 CFM. SET DISCHARGE AIR TEMPERATURE AT 20C.	
HRV4	UNIT 4 WASHROOM	UNIT4	ALDES	H80-HF	35.4 L/s	0.04	120/1/60, 1.5A, 160W
						MOUNT HORIZONTAL IN WASHROOM CEILING SPACE. DRAIN CONDENSATE TO NEAREST DRAIN. PROVIDE ACCESS AS PER MANUFACTURER'S RECOMMENDATION. PROVIDE 611242 CONTROLLER. SET LOW SPEED AT 40 CFM AND HIGH SPEED AT 75 CFM. SET DISCHARGE AIR TEMPERATURE AT 20C.	
HRV5	UNIT 5 WASHROOM	UNIT5	ALDES	H80-HF	35.4 L/s	0.04	120/1/60, 1.5A, 160W
						MOUNT HORIZONTAL IN WASHROOM CEILING SPACE. DRAIN CONDENSATE TO NEAREST DRAIN. PROVIDE ACCESS AS PER MANUFACTURER'S RECOMMENDATION. PROVIDE 611242 CONTROLLER. SET LOW SPEED AT 40 CFM AND HIGH SPEED AT 75 CFM. SET DISCHARGE AIR TEMPERATURE AT 20C.	
HRV6	UNIT 6 WASHROOM	UNIT6	ALDES	H80-HF	35.4 L/s	0.04	120/1/60, 1.5A, 160W
						MOUNT HORIZONTAL IN WASHROOM CEILING SPACE. DRAIN CONDENSATE TO NEAREST DRAIN. PROVIDE ACCESS AS PER MANUFACTURER'S RECOMMENDATION. PROVIDE 611242 CONTROLLER. SET LOW SPEED AT 40 CFM AND HIGH SPEED AT 75 CFM. SET DISCHARGE AIR TEMPERATURE AT 20C.	

MAKE UP AIR UNIT SCHEDULE						
TAG	LOCATION	MANUFACTURER	MODEL	AIR FLOW	E.S.P.(kPa)	HEAT INPUT (kWh)
MUA1	PARKADE	THERMOTEK OR EQUIVALENT	T3-D-500-G15	1652.0 L/s	0.13	132.456
				ELECTRICAL (V/PH/Hz)		
				230/1/60, 2HP, 12.7A MCA, 20A MOCBP		
				WEIGHT		
				401 KG		
				REMARKS		
				SUSPEND FROM CEILING C/W SPRING ISOLATION - HORIZONTAL DISCHARGE. INTERLOCK WITH EF1 AND CO/NO2 DETECTION SYSTEM.		

CO/NO2 MONITORING SCHEDULE			
TAG	LOCATION	MODEL	REMARKS
CO/NO2	PARKADE	ARMSTRONG MONITORING	INTERLOCK WITH MUA AND EXHAUST FAN CONTROLS. CALIBRATE TO FACTORY SETTINGS LOW VOLTAGE WIRING BY CONTROLS CONTRACTOR. TRIP POINTS @ 25/100ppm CO, 1/3ppm NO2.



EMBE CONSULTING ENGINEERS  
SUITE 204, 110 12th AVENUE, S.W.  
CALGARY, AB, T2R 0G7  
403-460-2277  
info@embeconsulting.ca



PERMIT TO PRACTICE  
EMBE CONSULTING ENGINEERS INC.  
Signature \_\_\_\_\_  
19 07 19  
PERMIT NUMBER: P 11984  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

DO NOT SCALE DRAWINGS

8	ISSUED FOR TENDER/ BP	19 07 19
7	TENDER - REV2	19 06 19
6	TENDER	19 04 08
5	TENDER	18 11 28
4	99% IFC	18 11 20
3	COORDINATION	18 11 13
2	99% IFC	18 03 21
1	60% IFC	18 02 08
Revision /	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
MB

Designed by/Concept par  
DL

Drawn by/Dessine par  
DL

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

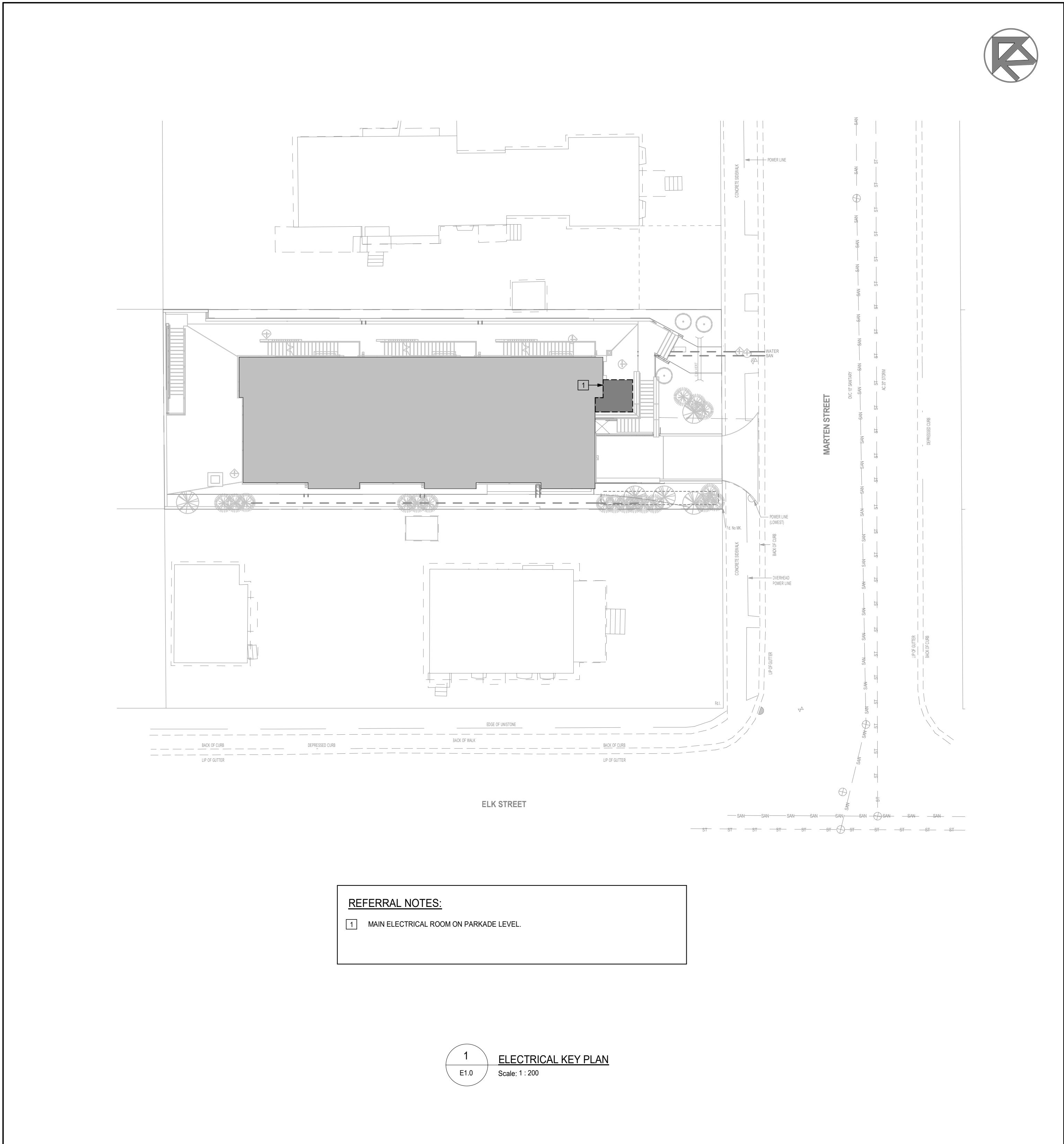
Drawing title / Titre du dessin

MECHANICAL SCHEDULES

Project No. / No. du project	Sheet / Feuille  M7	Revision no. / La Révision no.  8
---------------------------------	---------------------------	---






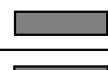








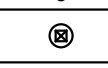


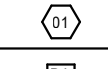





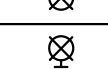


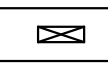








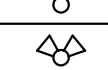


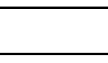








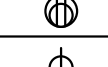





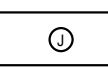











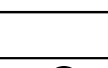


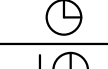





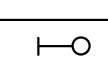


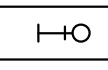


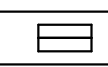


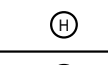





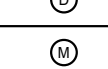





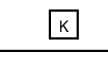





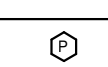


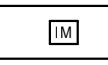








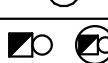






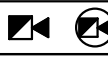





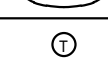


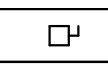








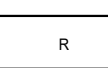


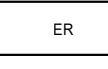












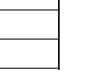


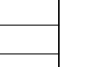


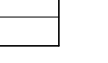








SHEET LIST	
SHEET NUMBER	SHEET NAME
E1.0	ELECTRICAL COVER SHEET
E1.1	ELECTRICAL SITE PLAN
E2.0	PARKADE LIGHTING LAYOUT
E2.1	PARKADE POWER & SYSTEMS LAYOUT
E3.0	MAIN FLOOR UNIT PLANS
E4.0	SECOND FLOOR UNIT PLANS
E5.0	ELECTRICAL DETAILS
E6.0	PANEL SCHEDULES
E7.0	ELECTRICAL SCHEDULES
E8.0	ELECTRICAL RISERS

**MUNICIPAL ADDRESS:**  
329 MARTEN STREET  
BANFF, AB

**LEGAL DESCRIPTION:**  
LOT 2, BLOCK 12,  
PLAN 87198C (L.T.O.)

**DESIGN CRITERIA:**  
ALBERTA BUILDING CODE 2014  
CANADIAN ELECTRICAL CODE 2015  
LEED SHADOW  
NATIONAL ENERGY CODE FOR BUILDINGS 2011  
BANFF DESIGN STANDARDS

LEGEND OF SYMBOLS						V6.1
LIGHTING						
	RECESSED DOWNLIGHT		SURFACE MOUNTED LINEAR LUMINAIRE ON EMERGENCY POWER		SINGLE REMOTE EMERGENCY LIGHTING HEAD - WALL MOUNT	
	SURFACE MOUNTED LUMINAIRE		WALL MOUNTED LINEAR LUMINAIRE ON EMERGENCY POWER		DOUBLE REMOTE EMERGENCY LIGHTING HEAD - WALL MOUNT	
	WALL MOUNTED LUMINAIRE		TRACK LIGHTING C/W LIGHTING HEADS AS SHOWN		SWITCH - SINGLE, TWO, THREE AND FOUR GANG	
	RECESSED WALL WASHER DOWNLIGHT		POLE MOUNTED LUMINAIRE		2 POLE SWITCH	
	RECESSED / SEMI RECESSED STEP LIGHT		LIGHTING BOLLARD		SWITCH - 3-WAY	
	RECESSED DOWNLIGHT ON EMERGENCY POWER		LIGHTING LUMINAIRE TYPE TAG		SWITCH - LOW VOLTAGE	
	SURFACE MOUNTED LUMINAIRE ON EMERGENCY POWER		DAYLIGHT HARVESTING LIGHT SENSOR		SWITCH - DIMMER SWITCH	
	WALL MOUNTED LUMINAIRE ON EMERGENCY POWER		EXIT LIGHT - CEILING (c/w ARROWS AS INDICATED)		SWITCH - MOTION SENSOR SWITCH	
	RECESSED WALL WASHER DOWNLIGHT ON EMERGENCY POWER		EXIT LIGHT - WALL (c/w ARROWS AS INDICATED)		SWITCH C/W PILOT LIGHT - SINGLE - KEY SWITCH	
	RECESSED / SEMI RECESSED STEP LIGHT ON EMERGENCY POWER		EMERGENCY LIGHTING BATTERY PACK		SWITCH - KEY SWITCH	
	RECESSED LINEAR LUMINAIRE		EMERGENCY LIGHTING BATTERY PACK C/W LIGHTING HEADS		SWITCH - MANUAL STARTER	
	SURFACE MOUNTED LINEAR LUMINAIRE		EMERGENCY LIGHTING BATTERY PACK C/W LIGHTING HEADS & EXIT LIGHT		SWITCH - TIMER SWITCH	
	WALL MOUNTED LINEAR LUMINAIRE		SINGLE REMOTE EMERGENCY LIGHTING HEAD - CEILING MOUNT		PHOTO ELECTRIC CELL	
	RECESSED LINEAR LUMINAIRE ON EMERGENCY POWER		DOUBLE REMOTE EMERGENCY LIGHTING HEAD - CEILING		OCCUPANCY SENSOR - CEILING MOUNTED / OCCUPANCY SENSOR - WALL MOUNTED	
POWER						
	SINGLE/SPECIAL PURPOSE RECEPTACLE		FLOOR MOUNTED COMPUTER DUPLEX RECEPTACLE (DEDICATED NEUTRAL)		ELECTRICAL PANELBOARD - SURFACE MOUNTED	
	DUPLEX RECEPTACLE / 20AMP T-SLOT RECEPTACLE		FLOOR BOX		ELECTRICAL PANELBOARD - RECESSED MOUNTED	
	GROUND FAULT RECEPTACLE		CEILING MOUNTED SINGLE / SPECIAL PURPOSE RECEPTACLE		TIMECLOCK	
	ARC FAULT RECEPTACLE		CEILING MOUNTED DUPLEX RECEPTACLE		CONTACTOR	
	SPLIT CIRCUIT RECEPTACLE		USB COMBINATION RECEPTACLE		CAR PLUG POST - DUPLEX	
	SWITCHED RECEPTACLE		GROUND BAR		CAR PLUG POST - DUPLEX (DOUBLE FACE)	
	FOURPLEX RECEPTACLE / 20AMP T-SLOT FOURPLEX RECEPTACLE		CEILING MOUNTED JUNCTION / SLAB BOX		CAR PLUG POST - SPLIT	
	COMPUTER DUPLEX RECEPTACLE (FED WITH A DEDICATED NEUTRAL)		WALL MOUNTED JUNCTION BOX		CAR PLUG POST - ELECTRIC VEHICLE	
	COMPUTER FOURPLEX RECEPTACLE (FED WITH A DEDICATED NEUTRAL)		FLOOR MOUNTED JUNCTION / SLAB BOX		DROP CORD - DUPLEX RECEPTACLE	
	FLOOR MOUNTED RECEPTACLE		SINGLE PHASE DIRECT CONNECTION		DROP CORD - SINGLE/SPECIAL PURPOSE RECEPTACLE	
	FLOOR MOUNTED FOURPLEX RECEPTACLE		THREE PHASE DIRECT CONNECTION		DROP CORD - 20AMP T-SLOT RECEPTACLE	
SYSTEMS						
	VOICE OUTLET		CLOCK - CEILING MOUNTED		PUSHBUTTON / PUSHBUTTON REQUEST TO EXIT (REX)	
	DATA OUTLET		CLOCK - WALL MOUNTED		INTERCOM	
	COMBINATION VOICE / DATA OUTLET		BACKBOARD		SECURITY HORN	
	TELEVISION OUTLET		NURSE CALL - STAFF STATION		SECURITY STROBE	
	COMBINATION DATA / TELEVISION OUTLET		NURSE CALL - BED STATION		EMERGENCY DOOR RELEASE	
	FLOOR MOUNTED VOICE OUTLET		NURSE CALL - LAVATORY STATION		CCTV CAMERA	
	FLOOR MOUNTED DATA OUTLET		BIX BLOCK		PTZ CCTV CAMERA	
	FLOOR MOUNTED COMBINATION VOICE / DATA OUTLET		DOOR HOLD OPEN DEVICE		MOTION SENSOR - CEILING MOUNTED	
	FLOOR MOUNTED TELEVISION OUTLET		MAGNETIC LOCK		MOTION SENSOR - WALL MOUNTED / MOTION SENSOR REQUEST TO EXIT (REX)	
	CEILING MOUNTED DATA OUTLET		DOOR STRIKE		2-WAY VOICE / PANIC	
	CEILING MOUNTED TELEVISION OUTLET		SECURITY DOOR MONITOR		CHIME	
	PAC-POLE		GLASS BREAKAGE SENSOR		VOLUME CONTROLLER	
	PA SPEAKER - CEILING MOUNTED / WALL MOUNTED / FLOOR MOUNTED		KEYPAD		MICROPHONE OUTLET	
	SPEAKER - CEILING MOUNTED / WALL MOUNTED / FLOOR MOUNTED		CARD READER			
FIRE ALARM						
	SMOKE DETECTOR		PRESSURE SWITCH		FIRE ALARM MINI HORN WITH SILENCE BUTTON	
	COMBINATION SMOKE/CARBON MONOXIDE ALARM		ISOLATION MODULE		FIRE ALARM SPEAKER - CEILING MOUNTED	
	SMOKE DETECTOR IN CEILING PLENUM		CONTROL MODULE		FIRE ALARM COMBINATION SPEAKER / STROBE - CEILING MOUNTED	
	SMOKE DETECTOR UNDER FLOOR		MONITORING MODULE, DUAL INPUT MONITORING MODULE		FIRE ALARM SPEAKER - WALL MOUNTED	
	DUCT SMOKE DETECTOR - 'SA' DENOTES SUPPLY AIR, 'RA' DENOTES RETURN AIR		SUITE AUDIBLE ISOLATOR		FIRE ALARM COMBINATION SPEAKER / STROBE - WALL MOUNTED	
	RATE OF RISE HEAT DETECTOR		WALL / CEILING MOUNTED FIRE ALARM BELL		FIRE ALARM PULLSTATION	
	FIXED HIGH TEMPERATURE 200°F HEAT DETECTOR (88°C)		WALL / CEILING MOUNTED FIRE ALARM STROBE		END OF LINE RESISTOR	
	FIXED TEMPERATURE 135°F HEAT DETECTOR (58°C)		WALL / CEILING MOUNTED FIRE ALARM HORN		FIRE PHONE	
	SPRINKLER FLOW SWITCH		WALL / CEILING MOUNTED FIRE ALARM COMBINATION BELL AND STROBE			
	SPRINKLER TAMPER SWITCH		WALL / CEILING MOUNTED FIRE ALARM COMBINATION HORN AND STROBE			
MECHANICAL						
	MOTOR		MOTOR IDENTIFICATION TAG (REFER TO MECHANICAL SCHEDULE)		FUSED DISCONNECT SWITCH	
	MOTOR C/W DISCONNECT SWITCH		THERMOSTAT		COMBINATION MAG STARTER/ DISCONNECT SWITCH	
	MOTOR C/W MANUAL STARTER		NONFUSED DISCONNECT SWITCH		MAGNETIC STARTER	
GENERAL						
	CONDUIT CONCEALED IN WALL OR CEILING		DENOTES FURNITURE MOUNTED DEVICE		DENOTES RELOCATED DEVICE	
	CONDUIT CONCEALED IN SLAB OR RUN UNDERGROUND		DENOTES UNSWITCHED LUMINAIRE (NIGHT LIGHT)		DENOTES WEATHERPROOF DEVICE	
	CONDUIT - UP		DENOTES EXISTING DEVICE TO BE REMOVED		DENOTES TAMPER RESISTANT DEVICE	
	CONDUIT - DOWN		DENOTES EXISTING DEVICE TO BE RELOCATED			

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES

Western Region

SERVICES IMMOBILIERS

Région de l'ouest

PERMIT NUMBER: P-09509  
Jul. 19 2019

ELECTRICAL CONSULTANT:

DESIGNCORE

consulting electrical engineers

100, 4723 - 1ST STREET S.W. | TEL: (403) 269-2125

CALGARY, ALBERTA, T2G 4Y8 | www.designcore.ca

PROJECT NUMBER: 16227

DO NOT SCALE

4	ISSUED FOR TENDER/BP	19/07/19
3	90% CONSTRUCTION	18/11/27
2	80% CONSTRUCTION	18/02/08
1	100% DESIGN DEVELOPMENT	17/12/13
Revision / Revision	Description / Description	Date / Date
Client / client		

Parks Canada

Parcs Canada

Project title/Titre du projet

Banff National Park

Banff, Alberta

PCA - STAFF HOUSING

329 MARTEN STREET

Approved by/Approuve par

BC

Designed by/Concept par

TR

Drawn by/Dessine par

TB

Project Manager/Administrateur de Projets

LM

Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

ELECTRICAL COVER SHEET

Project No. / No. du project

Sheet / Feuille

Revision no. / La Révision no.

E1.0

4

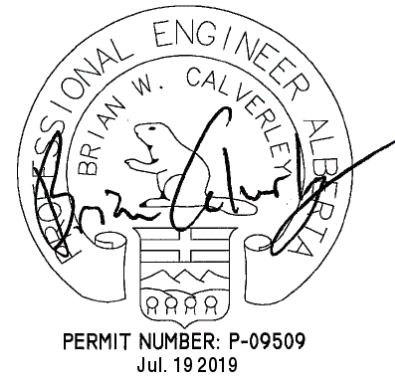












ELECTRICAL CONSULTANT:



PROJECT NUMBER: 16227

DO NOT SCALE

Revision / Révision	Description / Description	Date / Date
4	ISSUED FOR TENDER/BP	19/07/19
3	90% CONSTRUCTION	18/11/27
2	60% CONSTRUCTION	18/02/08
1	100% DESIGN DEVELOPMENT	17/12/13

Client / client



Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par  
BC

Designed by/Concept par  
TR

Drawn by/Dessine par  
TB

Project Manager/Administrateur de Projets  
LM

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

PARKADE POWER & SYSTEMS LAYOUT

Project No. / No. du  
project

Sheet / Feuille  
no

Revision no. /  
La Révision  
no

E2.1

4

1 PARKADE POWER & SYSTEMS LAYOUT  
E2.1 Scale: 1 : 75

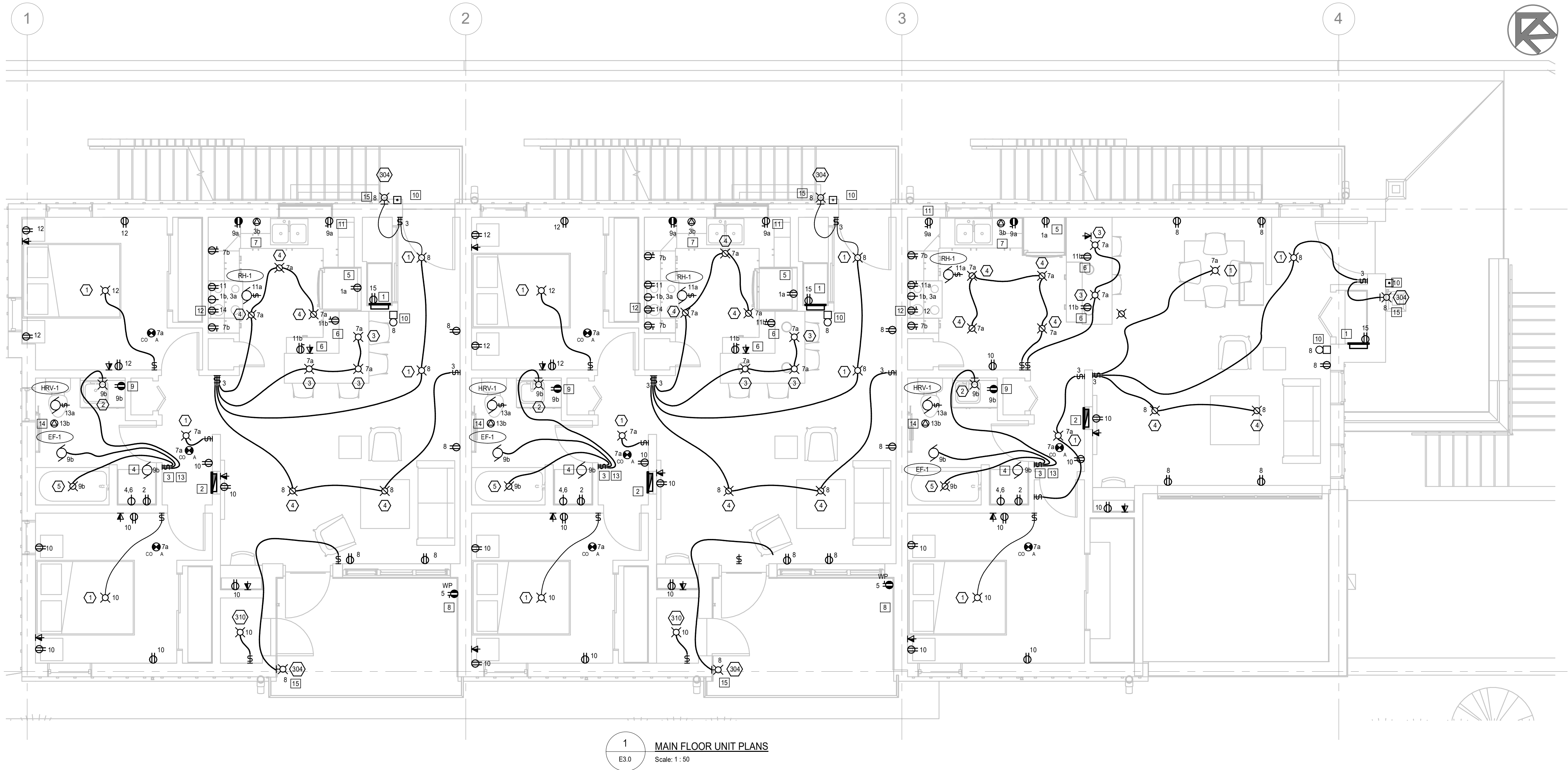
GENERAL NOTES:

- A.) REFER TO DRAWING E6.0 FOR VOLTAGE DROP TABLES FOR MAXIMUM CONDUCTOR LENGTHS. CONTRACTOR TO INCREASE CONDUCTOR SIZE AS REQUIRED.
- B.) ALL STROBES TO BE SET TO 15 CANDELA.

REFERRAL NOTES:

- 1 OVERHEAD DOOR c/w RF ANTENNA.
- 2 FORCE FLOW HEATER FF-1. COORDINATE LOCATION WITH MECHANICAL ON SITE.
- 3 PUMP P-1 THROUGH P-12 ARE LOCATED IN THE MECHANICAL ROOM. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL FOR LOCATION.
- 4 COIN2 DETECTION PANEL. CONFIRM LOCATION WITH MECHANICAL.
- 5 SEPARATE STAND-ALONE 120V C/O ALARM (ISOLATED FROM FIRE ALARM SYSTEM).
- 6 EXHAUST FAN SHALL BE INTERLOCKED WITH STORAGE ROOM LIGHTS.
- 7 PUMPS P-1 P-2 P-3 P-4 P-5 P-6 P-7 P-8 P-9 P-10 P-11 P-12, AND P-13 ARE ALL LOCATED IN THE MECHANICAL ROOM. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL FOR LOCATIONS. REFER TO MOTOR CONTROL SCHEDULE ON DRAWING E7.0 FOR DETAILS.



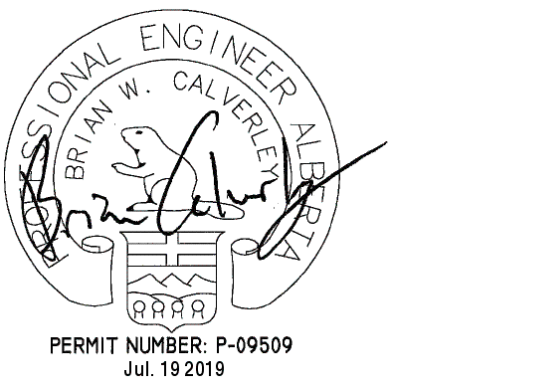


**GENERAL NOTES:**

- REFER TO INTERIOR DESIGN DRAWINGS FOR DIMENSIONING OF LUMINAIRES. DO NOT SCALE FROM ELECTRICAL DRAWINGS.
- COORDINATE MOUNTING HEIGHT OF RECEPTACLES INSTALLED ON THE KITCHEN ISLANDS.
- MOUNTING HEIGHTS ARE TO CENTRE OF DEVICE.
- IN THE LOCATIONS INDICATED, INSTALL A COMBINATION TV/DATA OUTLET COMPLETE WITH ONE COAX JACK AND ONE RJ45 CAT 6 JACK.
- REFER TO DRAWING E7.0 FOR VOLTAGE DROP TABLES FOR MAXIMUM CONDUCTOR LENGTHS. CONTRACTOR TO INCREASE CONDUCTOR SIZE AS REQUIRED.
- ALL DEVICES LOCATED ON PARTITION WALLS DIVIDING UNITS SHALL NOT BE MOUNTED BACK TO BACK, BUT SHALL BE MOUNTED A MINIMUM OF ONE (1) STUD WIDTH APART.
- RUN 3#8 NMD90 FROM UNIT ELECTRICAL PANEL TO RANGE (OR AC90 'BX').
- RUN 3#10 NMD90 FROM UNIT ELECTRICAL PANEL TO DRYER OUTLET (OR AC90 'BX').
- COORDINATE LOCATION OF ALL KITCHEN ELECTRICAL OUTLETS WITH GENERAL CONTRACTOR AND MILL/WORK CONTRACTOR PRIOR TO ROUGH-IN.
- ALL SWITCHES AND DIMMERS GANGED TOGETHER SHALL BE MOUNTED IN A MULTI-GANG BOX COMPLETE WITH ONE FACE PLATE.
- RUN ALL UNIT VOICE/DATA/TV CABLING TO THE COMM BOX. PROVIDE 120V DUPLEX RECEPTACLE WITHIN THE DISTRIBUTION BOX.
- INSTALL TAMPER RESISTANT RECEPTACLES IN ALL LOCATIONS BELOW COUNTER HEIGHT AS REQUIRED BY CURRENT C.E.C.
- PROVIDE ARC FAULT PROTECTED BREAKERS FOR RECEPTACLES AS REQUIRED BY THE CURRENT C.E.C. REFER TO PANELS SCHEDULES FOR DETAILS.
- INTERLOCK COMBINATION CO / SMOKE ALARMS SUCH THAT ALL ALARM (WITHIN A SINGLE UNIT) UPON ACTIVATION OF ANY SINGLE DEVICE, COMBINATION CO / SMOKE ALARMS TO BE 120V AND CONNECTED TO LIGHTING CIRCUIT IN EACH UNIT AS INDICATED.
- INSTALL A WEATHERPROOF "WHILE-IN-USE" COVER ON THE EXTERIOR PATIO RECEPTACLE.
- REFER TO LAYOUT DRAWINGS FOR LOCATION OF FIRE ALARM SIGNALING DEVICES.
- UTILIZE #14AWG Cu, NMD90 WITHIN SUITES FOR GENERAL PURPOSE WIRING.

**REFERRAL NOTES:**

- TELECOM CABINET SUPPLIED AND INSTALLED BY ELECTRICAL. COMPLETE WITH INTERNAL RECEPTACLE BY ELECTRICAL CONTRACTOR.
- SUITE LOAD CENTRE (PANEL BOARD).
- LIGHT SWITCHES WITHIN 1.5m OF BATH OR SHOWER TO BE GROUND FAULT PROTECTED. NOT PERMITTED WITHIN 0.5m.
- ELECTRICAL CONTRACTOR SHALL INTERLOCK DRYER BOOSTER FAN WITH DRYER INCLUDING OT RELAY, WIRING ETC.
- SUPPLY AND INSTALL RECESSED DUPLEX RECEPTACLE FOR FRIDGE.
- ISLAND COUNTER RECEPTACLES SHALL BE INSTALLED IN CABINET CHASE. REFER TO DRAWING E5.0 FOR MOUNTING HEIGHTS. ELECTRICAL CONTRACTOR TO USE ARMoured CABLE INSIDE CABINET CHASE.
- PROVIDE JUNCTION BOX WITH CIRCUIT FOR FUTURE DISHWASHER. JUNCTION BOX MUST BE ACCESSIBLE INSIDE CABINET.
- MAIN FLOOR PATIO RECEPTACLE TO BE GFCI.
- BATHROOM LIGHTS AND FANS TO BE FED FROM LOAD SIDE OF GFCI RECEPTACLE.
- CONTRACTOR TO INSTALL 120V DOORBELL WITH BUILT-IN TRANSFORMER COMPLETE WITH SIGNAL WIRE TO THE PUSHBUTTON AT ENTRANCE. COLOR TO BE CONFIRMED WITH ARCHITECT PRIOR TO INSTALLATION.
- RECEPTACLE TO BE ON LOAD SIDE OF GFCI.
- MICROWAVE RECEPTACLE TO BE INSTALLED IN CUPBOARD ABOVE RANGE HOOD.
- ELECTRICAL CONTRACTOR SHALL INSTALL A TIMER SWITCH (OPERATES AT LEAST 20 MINUTES) FOR THE BATHROOM FAN.
- ELECTRICAL CONTRACTOR TO COORDINATE LOCATION OF HRV HEAT COIL WITH MECHANICAL.
- EXTERIOR ENTRY LUMINAIRE TO BE MOUNTED AT 1800mm ABOVE ENTRY/PATIO LANDING.



ELECTRICAL CONSULTANT:

**DESIGNCORE**  
consulting electrical engineers  
100, 4723 - 1ST STREET S.W. TEL: (403) 269-2125  
CALGARY, ALBERTA, T2G 4Y8 | www.designcore.ca

PROJECT NUMBER: 16227

**DO NOT SCALE**

Revision / Revisión	Description / Description	Date / Date
4	ISSUED FOR TENDER/BP	19/07/19
3	90% CONSTRUCTION	18/11/27
2	60% CONSTRUCTION	18/02/08
1	100% DESIGN DEVELOPMENT	17/12/13

Client / client



Project title/Titre du projet

**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
BC

Designed by/Concept par  
TR

Drawn by/Dessiné par  
TB

Project Manager/Administrateur de Projets  
LM

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

MAIN FLOOR UNIT PLANS

Project No. / No. du  
project

Sheet / Feuille  
no

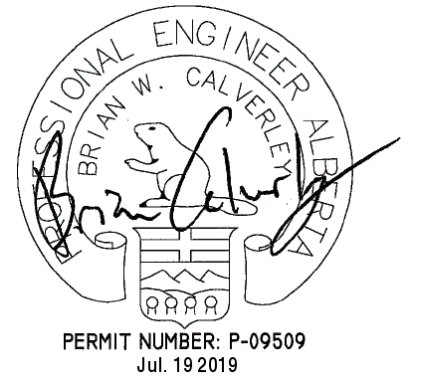
Revision no. /  
La Révision  
no

E3.0

4







ELECTRICAL CONSULTANT:

**DESIGNCORE**  
consulting electrical engineers  
100, 4723 - 1ST STREET S.W. TEL: (403) 269-2125  
CALGARY, ALBERTA, T2G 4Y8 | www.designcore.ca

PROJECT NUMBER: 16227

DO NOT SCALE

Revision / Revisión	Description / Description	Date / Date
4	ISSUED FOR TENDER/BP	19/07/19
3	90% CONSTRUCTION	18/11/27
2	60% CONSTRUCTION	18/02/08
1	100% DESIGN DEVELOPMENT	17/12/13

Client / client



Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
BC

Designed by/Concept par  
TR

Drawn by/Dessiné par  
TB

Project Manager/Administrateur de Projets  
LM

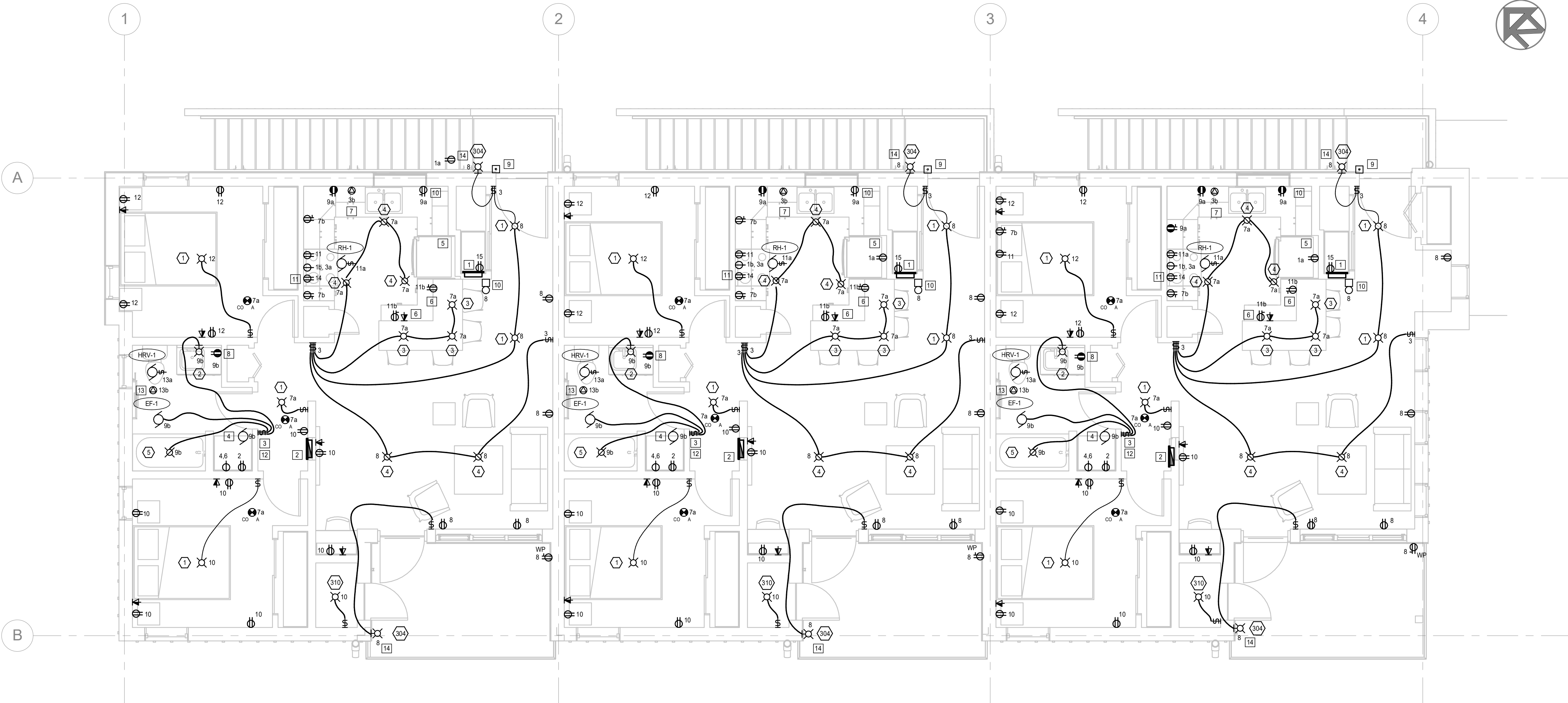
Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

SECOND FLOOR UNIT PLANS

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no
	E4.0	4



1 SECOND FLOOR UNIT PLANS  
E4.0 Scale: 1:50

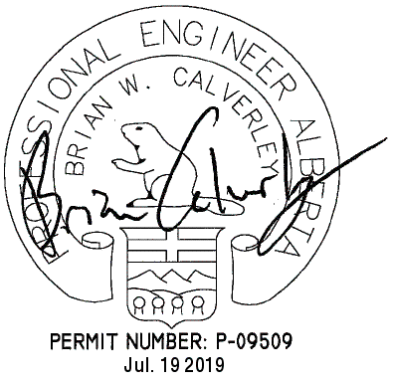
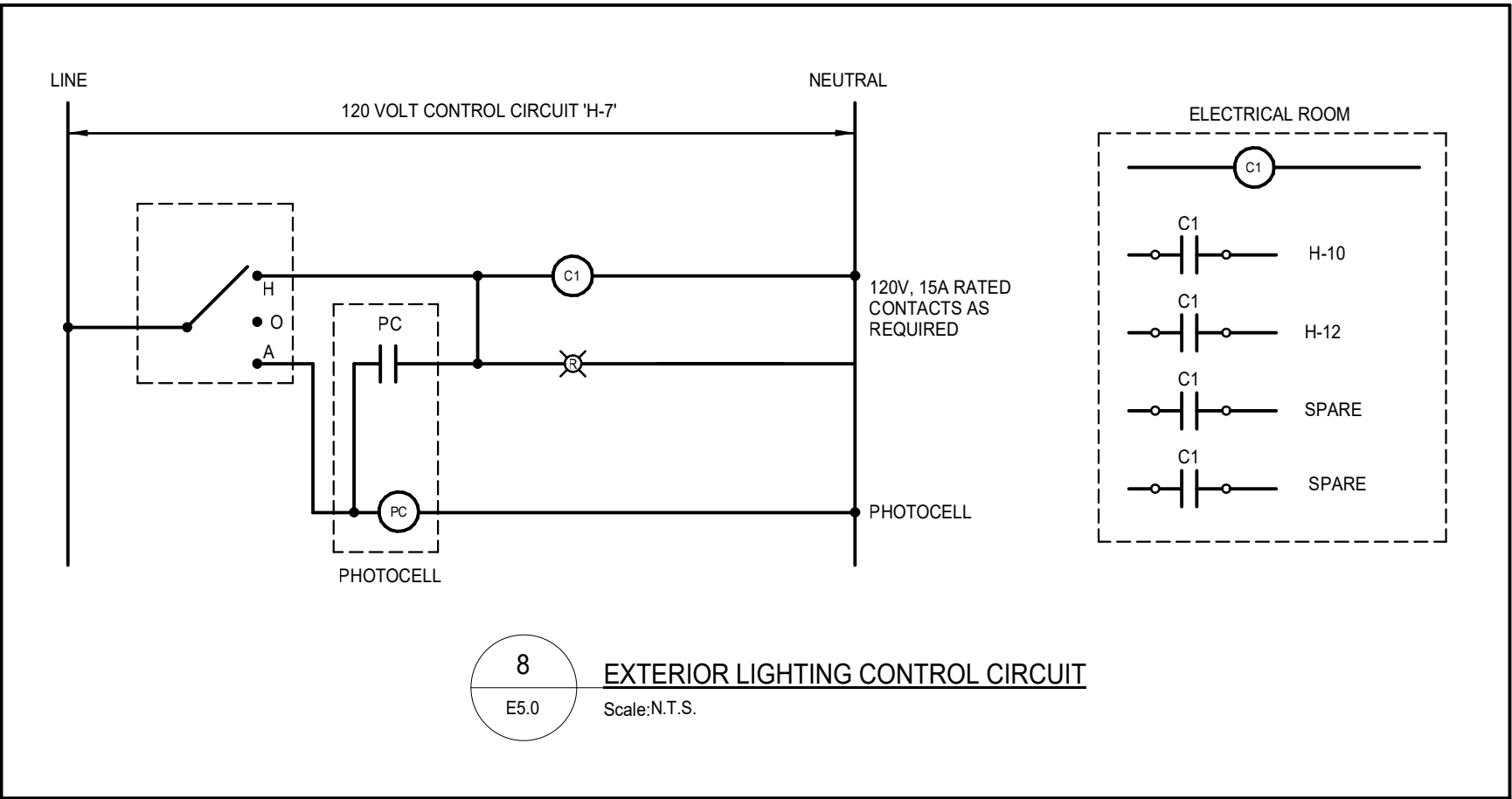
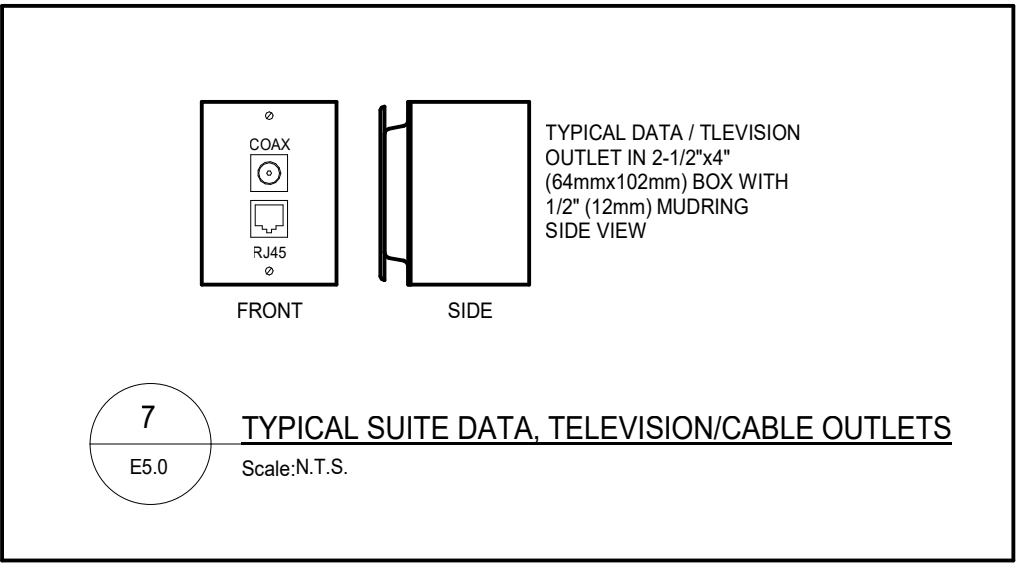
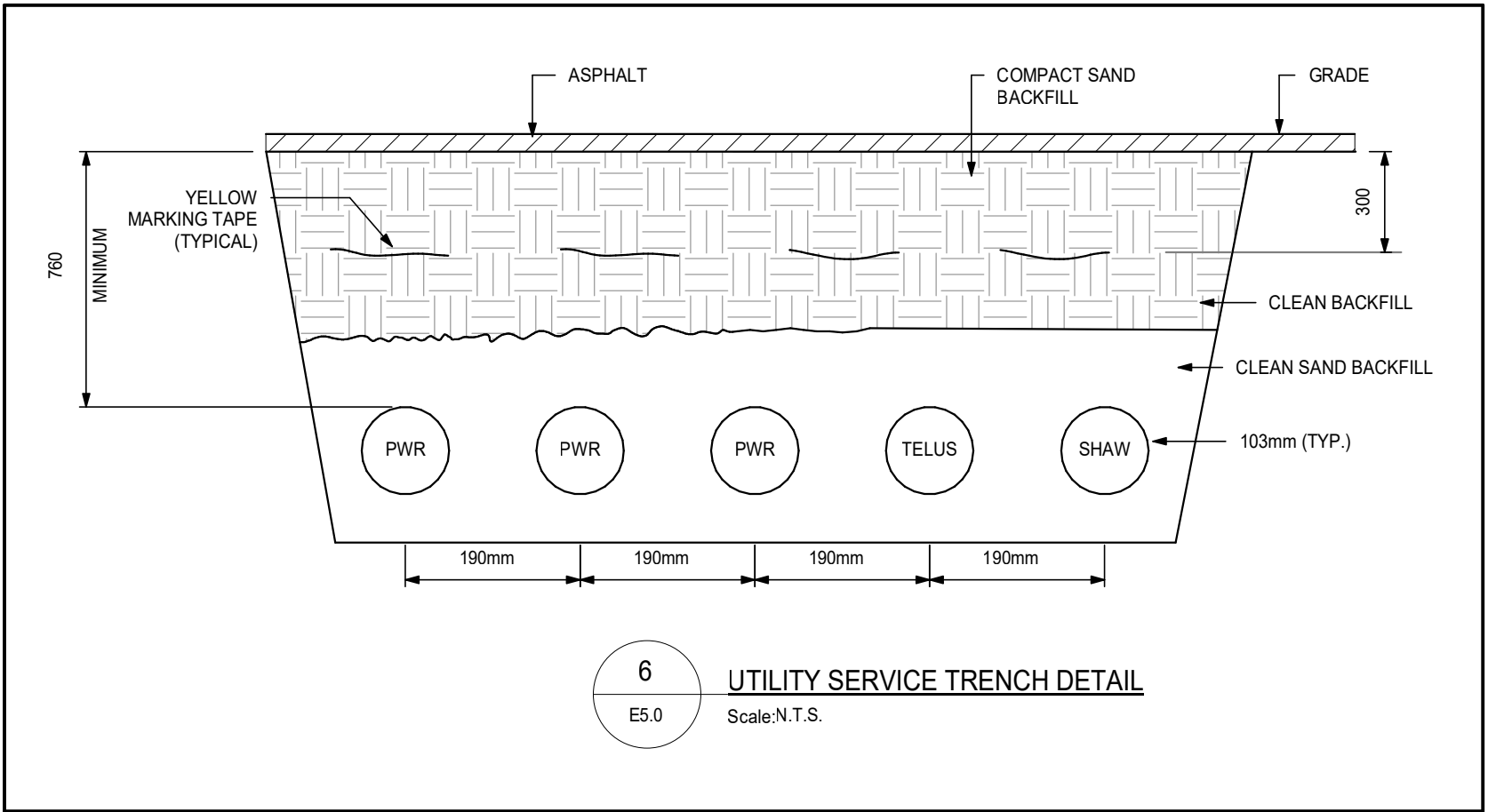
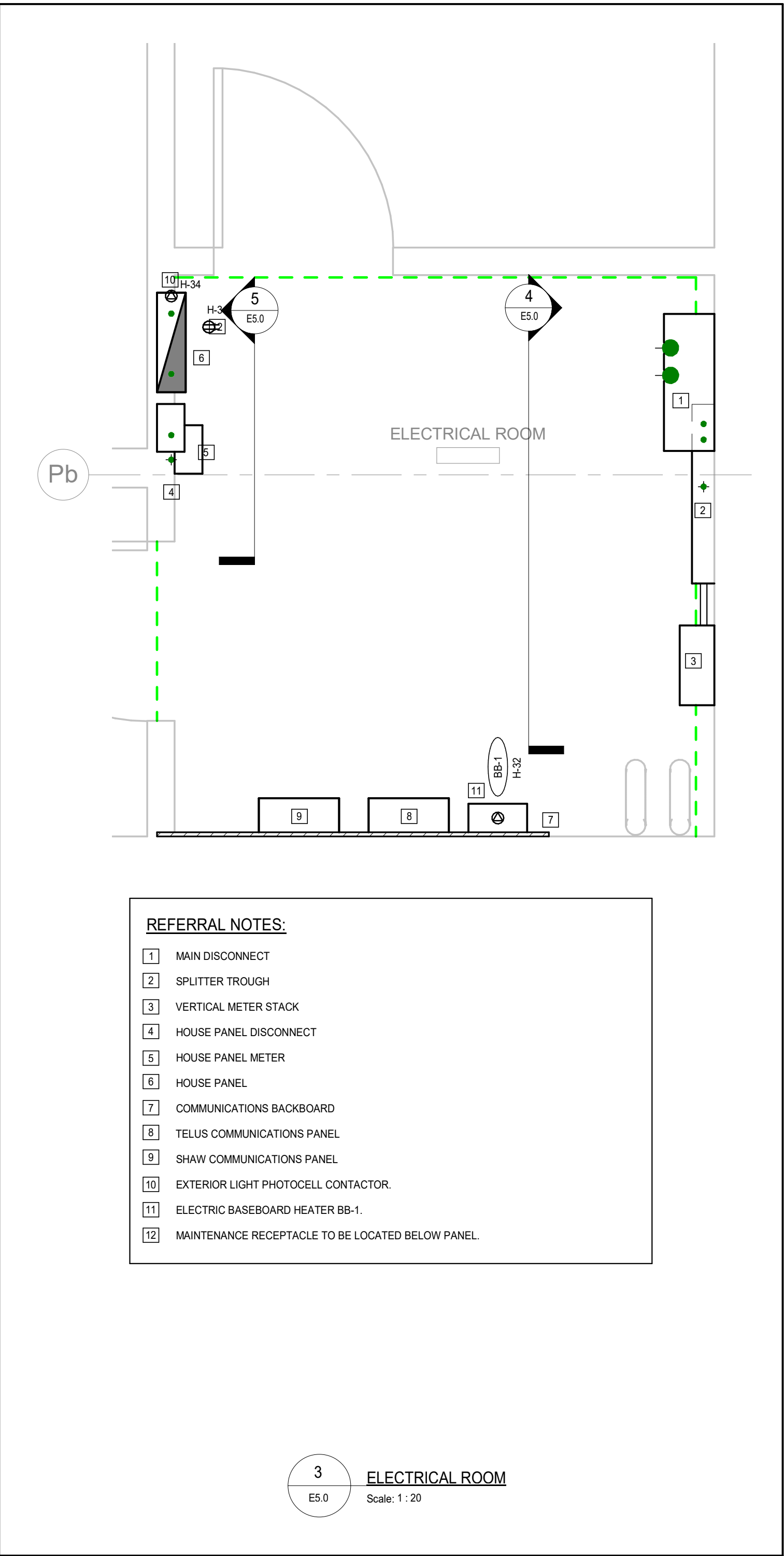
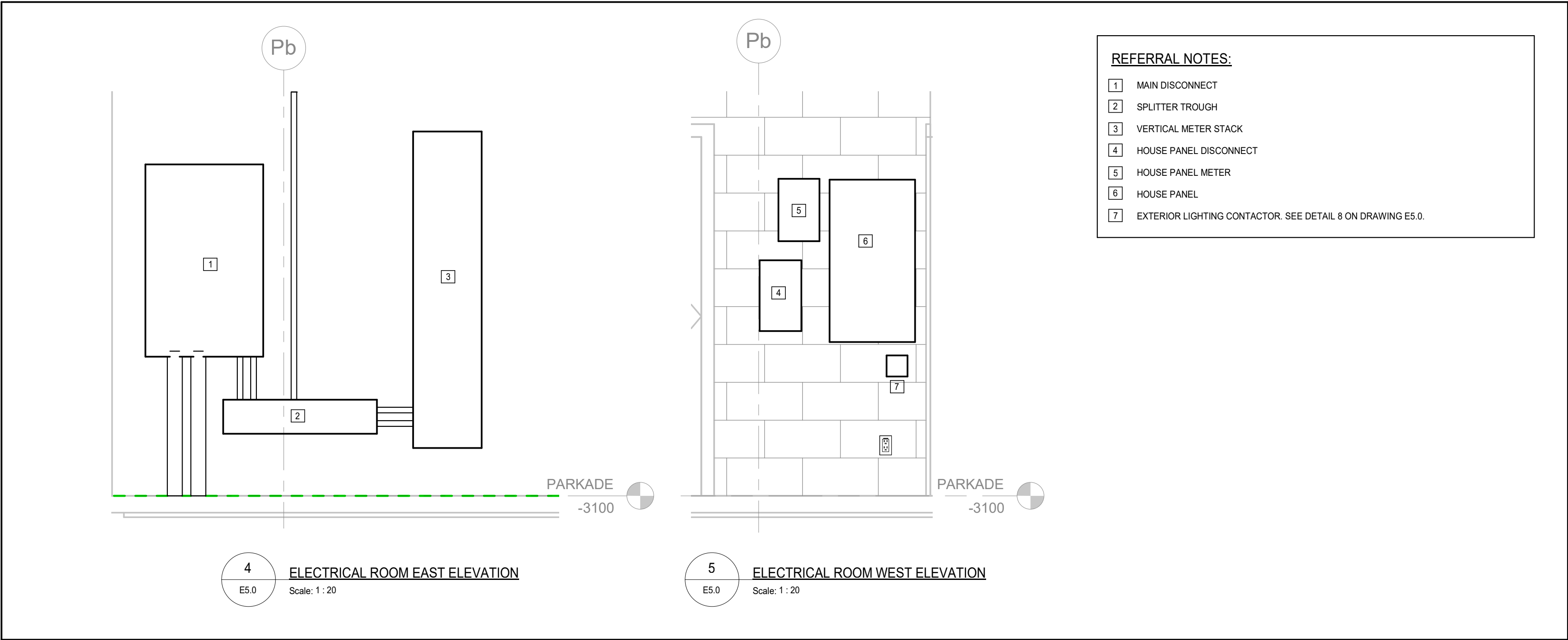
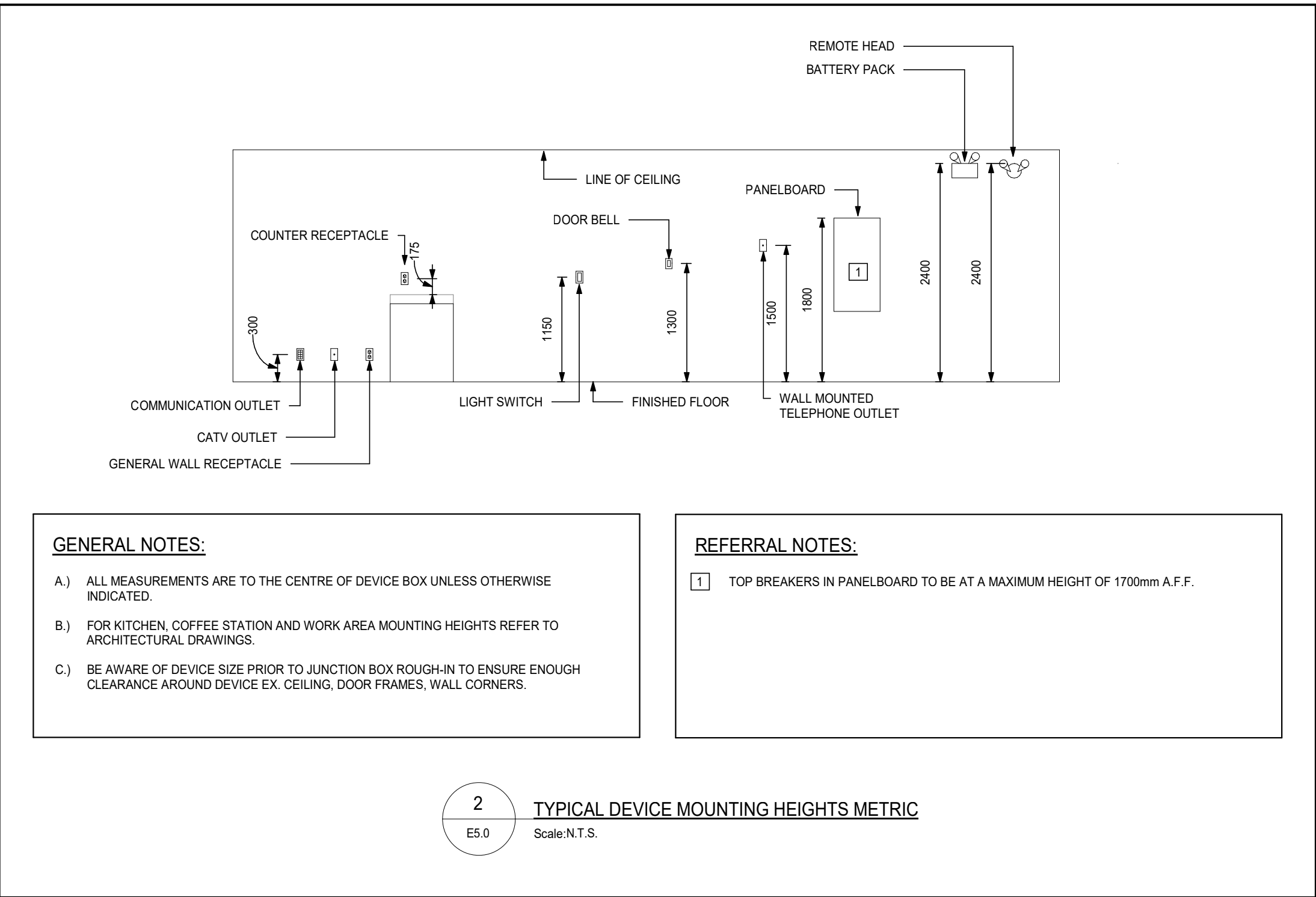
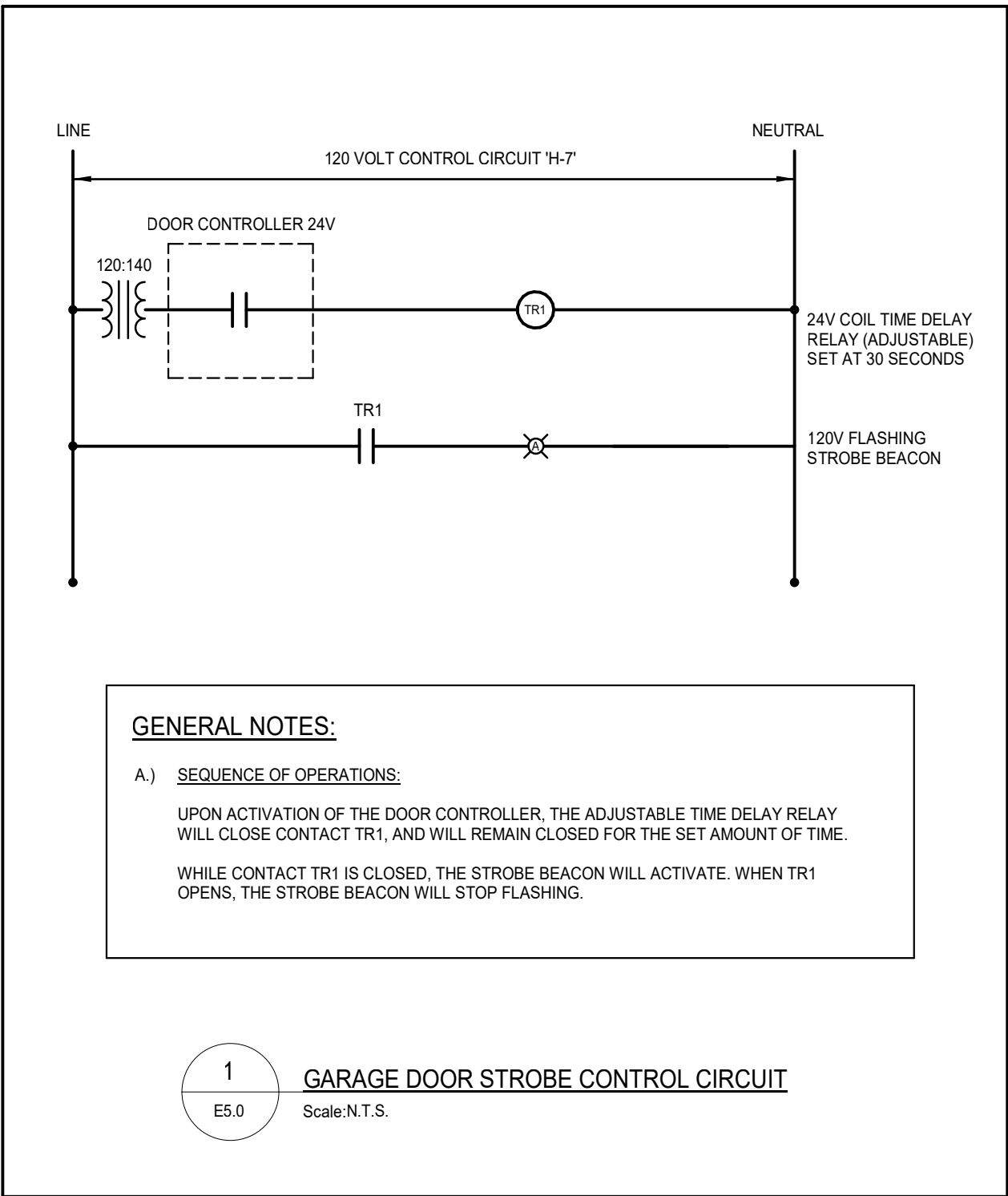
GENERAL NOTES:

- REFER TO INTERIOR DESIGN DRAWINGS FOR DIMENSIONING OF LUMINAIRES. DO NOT SCALE FROM ELECTRICAL DRAWINGS.
- COORDINATE MOUNTING HEIGHT OF RECEPTACLES INSTALLED ON THE KITCHEN ISLANDS.
- MOUNTING HEIGHTS ARE TO CENTRE OF DEVICE.
- IN THE LOCATIONS INDICATED, INSTALL A COMBINATION TV/DATA OUTLET COMPLETE WITH ONE COAX JACK AND ONE RJ45 CAT 6 JACK.
- REFER TO DRAWING E7.0 FOR VOLTAGE DROP TABLES FOR MAXIMUM CONDUCTOR LENGTHS. CONTRACTOR TO INCREASE CONDUCTOR SIZE AS REQUIRED.
- ALL DEVICES LOCATED ON PARTITION WALLS DIVIDING UNITS SHALL NOT BE MOUNTED BACK TO BACK, BUT SHALL BE MOUNTED A MINIMUM OF ONE (1) STUD WIDTH APART.
- RUN 3#8 NMD90 FROM UNIT ELECTRICAL PANEL TO RANGE (OR AC90 "BX").
- RUN 3#10 NMD90 FROM UNIT ELECTRICAL PANEL TO DRYER OUTLET (OR AC90 "BX").
- COORDINATE LOCATION OF ALL KITCHEN ELECTRICAL OUTLETS WITH GENERAL CONTRACTOR AND MILLWORK CONTRACTOR PRIOR TO ROUGH-IN.
- ALL SWITCHES AND DIMMERS GANGED TOGETHER SHALL BE MOUNTED IN A MULTI-GANG BOX COMPLETE WITH ONE FACE PLATE.
- RUN ALL UNIT VOICE/DATA/TV CABLING TO THE COMM BOX. PROVIDE 120V DUPLEX RECEPTACLE WITHIN THE DISTRIBUTION BOX.
- INSTALL TAMPER RESISTANT RECEPTACLES IN ALL LOCATIONS BELOW COUNTER HEIGHT AS REQUIRED BY CURRENT C.E.C.
- PROVIDE ARC FAULT PROTECTED BREAKERS FOR RECEPTACLES AS REQUIRED BY THE CURRENT C.E.C. REFER TO PANELS SCHEDULES FOR DETAILS.
- INTERLOCK UNIT COMBINATION CO / SMOKE ALARMS (WITHIN A SINGLE UNIT) SUCH THAT ALL ALARM UPON ACTIVATION OF ANY SINGLE DEVICE. COMBINATION CO / SMOKE ALARMS TO BE 120V AND CONNECTED TO LIGHTING CIRCUIT IN EACH UNIT AS INDICATED.
- INSTALL A WEATHERPROOF "WHILE-IN-USE" COVER ON THE EXTERIOR PATIO RECEPTACLE.
- REFER TO LAYOUT DRAWINGS FOR LOCATIONS OF FIRE ALARM SIGNALING DEVICES.
- UTILIZE #14AWG Cu. NMD90 WITHIN SUITES FOR GENERAL PURPOSE WIRING.

REFERRAL NOTES:

- TELECOM CABINET SUPPLIED AND INSTALLED BY ELECTRICAL. COMPLETE WITH INTERNAL RECEPTACLE BY ELECTRICAL CONTRACTOR.
- SUITE LOAD CENTRE (PANEL BOARD).
- LIGHT SWITCHES WITHIN 1.5m OF BATH OR SHOWER TO BE GROUND FAULT PROTECTED. NOT PERMITTED WITHIN 0.5m.
- ELECTRICAL CONTRACTOR SHALL INTERLOCK DRYER BOOSTER FAN WITH DRYER INCLUDING OT RELAY, WIRING ETC.
- SUPPLY AND INSTALL RECESSED DUPLEX RECEPTACLE FOR FRIDGE.
- ISLAND COUNTER RECEPTACLES SHALL BE INSTALLED IN CABINET CHASE. REFER TO DRAWING E5.0 FOR MOUNTING HEIGHTS. ELECTRICAL CONTRACTOR TO USE ARMoured CABLE INSIDE CABINET CHASE.
- PROVIDE JUNCTION BOX WITH CIRCUIT FOR FUTURE DISHWASHER. JUNCTION BOX MUST BE ACCESSIBLE INSIDE CABINET.
- BATHROOM LIGHTS AND FANS TO BE FED FROM LOAD SIDE OF GFCI RECEPTACLE.
- CONTRACTOR TO INSTALL 120V DOORBELL WITH BUILT-IN TRANSFORMER COMPLETE WITH SIGNAL WIRE TO THE PUSHBUTTON AT ENTRANCE. COLOR TO BE CONFIRMED WITH ARCHITECT PRIOR TO INSTALLATION.
- RECEPTACLE TO BE ON LOAD SIDE OF GFCI.
- MICROWAVE RECEPTACLE TO BE INSTALLED IN CUPBOARD ABOVE RANGE HOOD.
- ELECTRICAL CONTRACTOR SHALL INSTALL A TIMER SWITCH (OPERATES AT LEAST 20 MINUTES) FOR THE BATHROOM FAN.
- ELECTRICAL CONTRACTOR TO COORDINATE LOCATION OF HRV HEAT COIL WITH MECHANICAL.
- EXTERIOR ENTRY LUMINAIRE TO BE MOUNTED AT 1800mm ABOVE ENTRY LANDING.





Revision / Revision	Description / Description	Date / Date
4	ISSUED FOR TENDER/BP	19/07/19
3	90% CONSTRUCTION	18/11/27
2	60% CONSTRUCTION	18/02/08
1	100% DESIGN DEVELOPMENT	17/12/13





PANEL: <b>MAIN FLOOR SUITE (1 BEDROOM)</b>												
Location: <b>SUITE</b>				Volts: <b>120/240V</b>				A.I.C. Rating: <b>REFER TO SINGLE LINE</b>				
Supply From: <b>REFER TO SINGLE LINE</b>				Phase: <b>1</b>				Mains Rating: <b>REFER TO SINGLE LINE</b>				
Mounting: <b>RECESSED</b>				Wires: <b>3</b>								
				Feeders: <b>REFER TO SINGLE LINE</b>								
CIR	CIRCUIT DESCRIPTION	TRIP	QTY.	A	B	A	B	QTY.	TRIP	CIRCUIT DESCRIPTION	CIR	
1a	FRIDGE	15 A	1	800 W		1000 W		1	15 A	WASHER (AFCI)*	2a	
1b	RANGE	40 A	1	3000 W							2b	
3a					3000 W		2000 W				4a	
3b	DISHWASHER	15 A	1	1000 W				1	30A	DRYER	4b	
5a	SPACE					2000 W					6a	
5b	SPACE										6b	
7a	LIGHTS & CO/SMOKE DETECTOR	15 A	10		750 W		1100 W	10	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	8a	
7b	COUNTER RECEPTACLES	20 A	2		400 W						8b	
9a	COUNTER RECEPTACLES	20 A	2	400 W		900 W		8	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	10a	
9b	MAIN BATHROOM GFCI & LIGHTS	20 A	5	450 W							10b	
11a	HOOD FAN RH-1	15 A	1		150 W				1	15 A	MICROWAVE (AFCI)*	12a
11b	ISLAND RECEPTACLE	20 A	2		400 W						12b	
13a	HRV-1	15 A	1	150 W							14a	
13b	HRV HEATING COIL	20 A	1	1500 W							14b	
15a	COMM PANEL RECEPTACLE (AFCI)*	15 A	1		100 W						16a	
15b											16b	
17a											18a	
17b											18b	
19a											20a	
19b											20b	
21a											22a	
21b											22b	
23a											24a	
23b											24b	
				Total Load A:	10200 W							
				Total Load B:	8900 W							
				Total Load:	19100 W							
Notes:												
Remarks:												
DEAD-FRONTs ARE NOT PERMITTED IN LEIU OF ARC FAULT BREAKERS.												
* BRANCH BREAKER TO BE ARC FAULT TYPE												

Location: ELECTRICAL ROOM

Supply From:

Mounting: SURFACE

Enclosure: TYPE 1

Volts: 120/240V Single

Phases: 1

Wires: 3

Feeders: REFER TO SINGLE LINE

A.I.C. Rating: REFER TO SINGLE LINE

Mains Type:

Mains Rating: REFER TO SINGLE LINE

MCB Rating:

PANEL: H

CIR	CIRCUIT DESCRIPTION	TRIP	QTY.	A	B	A	B	QTY.	TRIP	CIRCUIT DESCRIPTION	CIR
1	UNIT HEATER UH-1	15 A	1	216 W		216 W		1	15 A	UNIT HEATER UH-2	2
3	MAINTENANCE RECEPTACLES	15 A	3		300 W		638 W	21	15 A	PARKADE LIGHTING	4
5	PARKADE RECEPTACLE	15 A	5	500 W		200 W		2	15 A	CO/NO2 DETECTION PANEL	6
7	OVER HEAD DOOR OHD-1	15 A	1		0 W		0 W	--	--	SPACE	8
9	EF-1	20 A	1	900 W		299 W		7	15 A	EXTERIOR LIGHTING	10
11					900 W		266 W	19	15 A	EXTERIOR LIGHTING	12
13	MUA-1	20 A	1	1500 W		290 W		1	20 A	P-7	14
15					1500 W		200 W	1	20 A	P-8	16
17	P-1	20 A	1	290 W		100 W		1	20 A	P-9	18
19	P-2	20 A	1		200 W		370 W	1	20 A	P-10	20
21	P-3	15 A	1	370 W		100 W		1	20 A	CP-1	22
23	P-4	15 A	1		370 W		370 W	1	15 A	P-12	24
25	P-5	15 A	1	100 W		100 W		1	15 A	BOILER B-1	26
27	P-6	15 A	1		370 W		100 W	1	15 A	BOILER B-2	28
29	WEST EXTERIOR RECEPTACLE	15 A	1	200 W		1500 W		1	20 A	FORCE FLOW HEATER FF-1	30
31	EAST EXTERIOR RECEPTACLES	15 A	1		200 W		1500 W	1	20 A	BASEBOARD HEATER BB-1	32
33	EF-2	15 A	1	0 W		100 W		1	15 A	EXTERIOR LIGHTING CONTROL	34
35	EF-3	15 A	1		0 W						36
37											38
39											40
41											42
Total Load A:				6501 W							
Total Load B:				6990 W							
TotalLoad:				13491 W							

Notes:

PANEL: <u>MAIN FLOOR SUITE (2 BEDROOM)</u>											
Location: SUITE				Volts: 120/240V				A.I.C. Rating: REFER TO SINGLE LINE			
Supply From: REFER TO SINGLE LINE				Phase: 1				Mains Rating: REFER TO SINGLE LINE			
Mounting: RECESSED				Wires: 3							
				Feeders: REFER TO SINGLE LINE							
CIR	CIRCUIT DESCRIPTION	TRIP	QTY.	A	B	A	B	QTY.	TRIP	CIRCUIT DESCRIPTION	CIR
1a	FRIDGE	15 A	1	800 W		1000 W		1	15 A	WASHER (AFCI)*	2a
1b	RANGE	40 A	1	3000 W							2b
3a					3000 W		2000 W				4a
3b	DISHWASHER	15 A	1		1000 W			1	30A	DRYER	4b
5a	OUTDOOR RECEPTACLE (AFCI)*	15 A	1	100 W		2000 W					6a
5b										6b	
7a	LIGHTS & CO/SMOKE DETECTOR	15 A	9		750 W		1100 W	11	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	8a
7b	COUNTER RECEPTACLES	20 A	2		400 W						8b
9a	COUNTER RECEPTACLES	20 A	2	400 W		900 W		9	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	10a
9b	MAIN BATHROOM GFCI & LIGHTS	20 A	5	450 W							10b
11a	HOOD FAN RH-1	15 A	1		150 W						12a
11b	ISLAND RECEPTACLE	20 A	2		400 W		500 W	5	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	12b
13a	HRV-1	15 A	1	150 W							14a
13b	HRV HEATING COIL	20 A	1	1500 W				1	15 A	MICROWAVE (AFCI)*	14b
15a	COMM PANEL RECEPTACLE (AFCI)*	15 A	1		100 W						16a
15b											16b
17a											18a
17b											18b
19a											20a
19b											20b
21a											22a
21b											22b
23a											24a
23b											24b
		Total Load A:	10300 W								
		Total Load B:	9400 W								
		Total Load:	19700 W								
Notes:											
Remarks:											
DEAD-FRONTs ARE NOT PERMITTED IN LEIU OF ARC FAULT BREAKERS.											
* BRANCH BREAKER TO BE ARC FAULT TYPE											

PANEL: SECOND FLOOR SUITE											
Location: SUITE				Volts: 120/240V				A.I.C. Rating: REFER TO SINGLE LINE			
Supply From: REFER TO SINGLE LINE				Phase: 1				Mains Rating: REFER TO SINGLE LINE			
Mounting: RECESSED				Wires: 3							
				Feeders: REFER TO SINGLE LINE							
CIR	CIRCUIT DESCRIPTION	TRIP	QTY.	A	B	A	B	QTY.	TRIP	CIRCUIT DESCRIPTION	CIR
1a	FRIDGE	15 A	1	800 W		1000 W		1	15 A	WASHER (AFCI)*	2a
1b	RANGE	40 A	1	3000 W							2b
3a					3000 W		2000 W				4a
3b	DISHWASHER	15 A	1		1000 W			1	30A	DRYER	4b
5a	SPACE					2000 W					6a
5b	SPACE										6b
7a	LIGHTS & CO/SMOKE DETECTOR	15 A	9		750 W		1200 W	12	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	8a
7b	COUNTER RECEPTACLES	20 A	2		400 W						8b
9a	COUNTER RECEPTACLES	20 A	2	400 W		900 W		9	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	10a
9b	MAIN BATHROOM GFCI & LIGHTS	20 A	5	450 W							10b
11a	HOOD FAN	15 A	1		150 W						12a
11b	ISLAND RECEPTACLE	20 A			400 W		500 W	5	15 A	GENERAL LIGHTING & RECEPTACLES (AFCI)*	12b
13a	HRV-1	15 A	1	150 W							14a
13b	HRV HEATING COIL	20 A	1	1500 W				1	15 A	MICROWAVE (AFCI)*	14b
15a	COMM PANEL RECEPTACLE (AFCI)*	15 A	1		100 W						16a
15b											16b
17a											18a
17b											18b
19a											20a
19b											20b
21a											22a
21b											22b
23a											24a
23b											24b
				Total Load A:		10200 W					
				Total Load B:		9500 W					
				Total Load:		19700 W					
Notes:											
Remarks:											
DEAD-FRONTS ARE NOT PERMITTED IN LEIU OF ARC FAULT BREAKERS.											
* BRANCH BREAKER TO BE ARC FAULT TYPE											



WATTS	CONDUCTOR	MAXIMUM CONDUCTOR DISTANCE FOR 5% VOLTAGE DROP (12V)
13W	#12AWG	50 METRES (165')
	#10AWG	76 METRES (260')
	#8AWG	126 METRES (415')
	#6AWG	201 METRES (660')
18W	#12AWG	33 METRES (110')
	#10AWG	57 METRES (190')
	#8AWG	91 METRES (300')
	#6AWG	144 METRES (475')
25W	#4AWG	231 METRES (760')
	#12AWG	25 METRES (85')
	#10AWG	41 METRES (135')
	#8AWG	65 METRES (215')
30W	#6AWG	103 METRES (340')
	#4AWG	164 METRES (540')
	#12AWG	21 METRES (71')
	#10AWG	34 METRES (112')
35W	#8AWG	54 METRES (180')
	#6AWG	86 METRES (286')
	#4AWG	138 METRES (455')
	#12AWG	18 METRES (61')
50W	#10AWG	29 METRES (97')
	#8AWG	46 METRES (154')
	#6AWG	74 METRES (245')
	#4AWG	118 METRES (390')
	#12AWG	12 METRES (42')
	#10AWG	20 METRES (68')
	#8AWG	32 METRES (108')
	#6AWG	51 METRES (170')
	#4AWG	83 METRES (275')

BREAKER	CONDUCTOR	MAXIMUM CONDUCTOR DISTANCE FOR 3% VOLTAGE DROP (120V)
15A-1P	#12AWG	24 METRES (80')
	#10AWG	39 METRES (125')
	#8AWG	62 METRES (200')
	#6AWG	99 METRES (325')
20A-1P	#12AWG	18 METRES (60')
	#10AWG	29 METRES (95')
	#8AWG	46 METRES (150')
	#6AWG	74 METRES (240')

BREAKER	CONDUCTOR	MAXIMUM CONDUCTOR DISTANCE FOR 3% VOLTAGE DROP (347V)
15A-1P	#12AWG	71 METRES (230')
	#10AWG	113 METRES (370')
20A-1P	#12AWG	53 METRES (175')
	#10AWG	85 METRES (275')

MOTOR CONTROL SCHEDULE																									
			LOCATION		LOAD							DISCONNECT AT MOTOR		STARTER		CONTROLS				CONTACT					
MOTOR DESIGNATION	DESCRIPTION	ROOM NAME	ROOM NUMBER	HORSEPOWER	FULL LOAD AMPS	KILOWATTS (kW)	VOLTAGE (V)	PHASE	FED FROM	OVERCURRENT PROTECTION	FEEDER	DISCONNECT REQUIRED	EEMAC TYPE	STARTER TYPE	EEMAC SIZE	FWD-RVS-STOP	HAND-OFF-AUTO	REMOTE START-STOP	CONTROL TRANSFORMER	PILOT LIGHT	NORMALLY OPEN	NORMALLY CLOSED	EMERGENCY POWER	REMARKS	
B-1	BOILER	MECHANICAL ROOM					120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC														
B-2	BOILER	MECHANICAL ROOM					120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC														
CP-1	DUPLEX PUMP CONTROL PANEL	MECHANICAL ROOM					120 V	1	PANEL H	45A-1P	2#10AWG-16mmC													SUPPLIED BY MECHANICAL.	
EF-1	INLINE FAN	PARKADE		1	8		240 V	1	PANEL H	20A-2P	2-#12AWG-16mmC	•	1												
EF-2	EXHAUST FAN	PARKADE STORAGE			2.1		120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1											INTERLOCKED WITH STORAGE ROOM LIGHTS	
EF-3	EXHAUST FAN	PARKADE STORAGE			2.1		120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1											INTERLOCKED WITH STORAGE ROOM LIGHTS	
MUA-1	MAKE UP AIR UNIT	PARKADE		2			240 V	1	PANEL H	20A-2P	2-#12AWG-16mmC	•	1											MOCP=20A, MCA=12.7A	
OHD-1	OVERHEAD DOOR	PARKADE					120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1												
P-1	BOILER INJECTION PUMP	MECHANICAL ROOM		1/3		0.37	120 V	1	PANEL H	20A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY BOILER CONTROLLER	
P-2	BOILER INJECTION PUMP	MECHANICAL ROOM		1/3		0.37	120 V	1	PANEL H	20A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY BOILER CONTROLLER	
P-3	IN-FLOOR HEATING	MECHANICAL ROOM				0.29	120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1											INTEGRAL VFD	
P-4	IN-FLOOR HEATING	MECHANICAL ROOM				0.29	120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1											INTEGRAL VFD	
P-5	SNOW MELT	MECHANICAL ROOM		1/6		0.197	120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY TEKMAR CONTROLLER SUPPLIED BY OTHERS.	
P-6	SNOW MELT	MECHANICAL ROOM		1/6		0.197	120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY TEKMAR CONTROLLER SUPPLIED BY OTHERS.	
P-7	DOMESTIC WATER LOOP	MECHANICAL ROOM		1/3		0.37	120 V	1	PANEL H	20A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY TEKMAR CONTROLLER SUPPLIED BY OTHERS.	
P-8	DOMESTIC WATER LOOP	MECHANICAL ROOM		1/3		0.37	120 V	1	PANEL H	20A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY TEKMAR CONTROLLER SUPPLIED BY OTHERS.	
P-9	SNOW MELT LOOP	MECHANICAL ROOM		1/3		0.37	120 V	1	PANEL H	20A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY BOILER CONTROLLER	
P-10	SNOW MELT LOOP	MECHANICAL ROOM		1/3	9.8	0.37	120 V	1	PANEL H	20A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY BOILER CONTROLLER	
P-11a	SUMP PUMP	MECHANICAL ROOM		3/4			120 V	1	CP-1	30A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY CP-1	
P-11b	SUMP PUMP	MECHANICAL ROOM		3/4			120 V	1	CP-1	30A-1P	2-#12AWG-16mmC	•	1											CONTROLLED BY CP-1	
P-12	DOMESTIC RECIRC	MECHANICAL ROOM				0.005	120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1												
UH-1	UNIT HEATER	PARKADE			1.8		120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1												
UH-2	UNIT HEATER	PARKADE			1.8		120 V	1	PANEL H	15A-1P	2-#12AWG-16mmC	•	1												

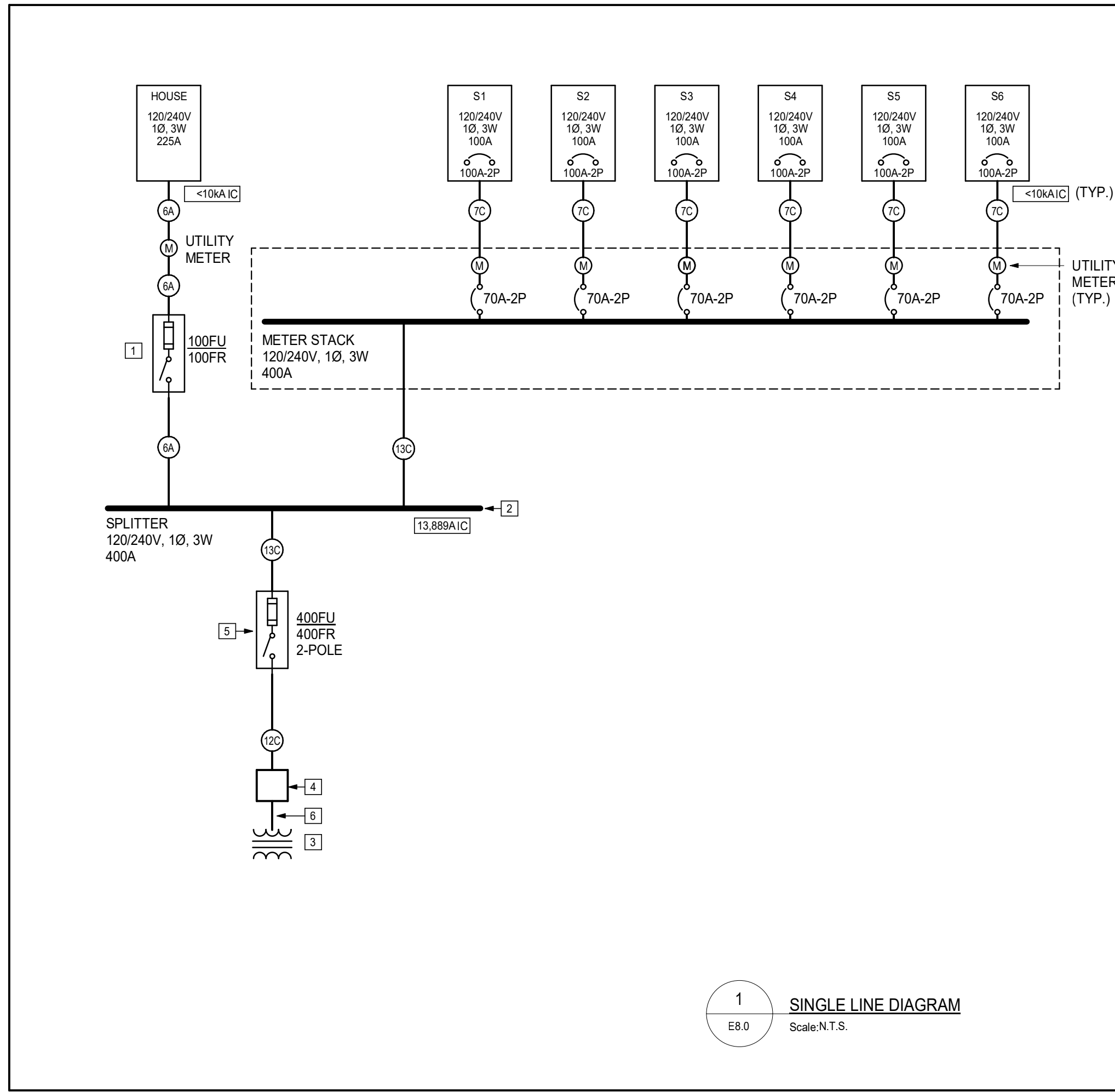
ELECTRICAL HEATER SCHEDULE																	
MOTOR DESIGNATION	DESCRIPTION	SERVICE/ LOCATION	MANUFACTURER	MODEL	KILOWATTS (kW)	VOLTAGE (V)	PHASE	PANEL	OVERCURRENT PROTECTION	FEEDER	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	WEIGHT (kg)	NORMAL POWER	NON-LIFE SAFETY EMERGENCY POWER	REMARKS
BB-1	BASEBOARD HEATER	ELECTRICAL ROOM	DIMPLEX	PCM6015W11	1.5	120 V	1	H	20A-1P	2-#12AWG-16mmC	1524	60	169	4.4	•		COMPLETE WITH ELECTRONIC THERMOSTAT BUILT IN. SUPPLIED, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
FF-1	FORCED FLOW HEATER	MECHANICAL ROOM	DAYTON	GGE5ZK68	1.5	120 V	1	H	20A-1P	2-#12AWG-16mmC	235	64	318		•		COMPLETE WITH ELECTRONIC THERMOSTAT BUILT IN. SUPPLIED, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

EXIT SIGN/BATTERY PACK SCHEDULE						
LIGHT TYPE	DESCRIPTION	LAMP	MOUNTING	VOLTAGE (V)	MANUFACTURER	REMARKS
BP#1	BATTERY PACK WITH HEADS	2 x 6W LED	UNIVERSAL	120 V	READY LITE: CAT# LDX12-362LD10	WIRE GUARD 460.0078-RL
BP#2	BATTERY PACK WITH HEADS	2 x 6W LED	UNIVERSAL	120 V	READY LITE: CAT# LDX12-362LD10	WIRE GUARD 460.0078-RL
EX1	BATTERY PACK WITH HEADS	2 x 6W LED	UNIVERSAL	120 V	READY LITE: CAT# I12L50-2LD10-ULTP12W	WIRE GUARD 460.0078-RL

OCCUPANCY SENSORS SCHEDULE					
TYPE	DESCRIPTION	MOUNTING	VOLTAGE (V)	MANUFACTURER	REMARKS
OS-1	LINE VOLTAGE CEILING MOUNTED SENSOR	SURFACE		LEVITON: CAT# O2C15-IDW	
OS-2	CEILING 360 DEGREE SENSOR	SURFACE	120V	LEVITON: CAT# O2C04-IDW	

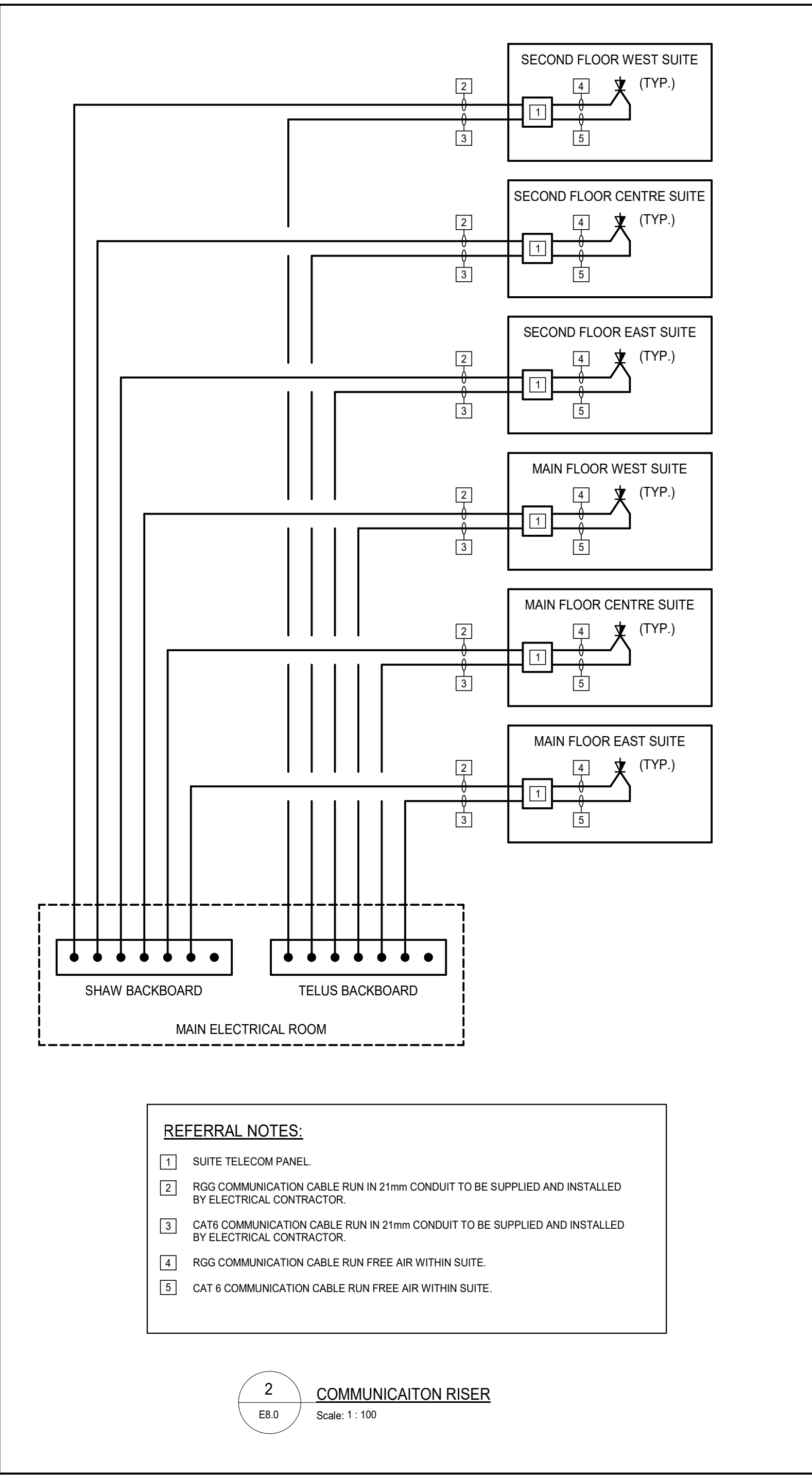
LUMINAIRE SCHEDULE						
LIGHT TYPE	DESCRIPTION	LAMP	MOUNTING	VOLTAGE (V)	MANUFACTURER	REMARKS
1	SUITE CEILING LIGHT	13.5W LED 3500K	SURFACE	120 V	METALUX: CAT# FM11WR30R	
2	SUITE BATHROOM VANITY LIGHT	24W LED 3000K	WALL	120 V	DALS: CAT# LEDVAN001-24-CH	
3	SUITE KITCHEN PENDANT LIGHT	8.5W LED 3000K	SURFACE/PENDANT	120 V	HALO: CAT# H1-CYL-AH-LPM830-AH-AH-WA	
4	SUITE CEILING LIGHT	10W LED 3000K	RECESSED	120 V	HALO: CAT# RA406930WH	REQUIRES 4" H99SICAT LED HOUSING
5	SUITE SHOWER LIGHT	8.8W LED 3000K	RECESSED	120 V	HALO: CAT# RL56WH6930	REQUIRES HST HOUSING, WET LOCATION
301A	PARKADE ENTRANCE LIGHT	40W LED 3000K	WALL	120 V	PHILIPS: CAT# 111L-16L-350-WW-G2-4-UNV-F1-BK	
301B	PARKADE ENTRANCE LIGHT	40W LED 3000K	WALL	120 V	PHILIPS: CAT# 111L-16L-550-WW-G2-4-UNV-F1-BK	
302	STEP LIGHT	11W LED 3000K	WALL	120 V	LIGMAN: CAT# ULE-40621-11W-A-W30-01-120/277V	REFER TO ARCHITECTURAL FOR MOUNTING HEIGHTS
303	BOLLARD LIGHT	13W LED 3000K	BOLLARD	120 V	LUMINIS: CAT# MA30-L1W12-R2-120V-BKT-K3 BLC	BACKLIGHT CONTROL
304	EXTERIOR WALLWASH	LED 3000K	SURFACE	120 V	LUMINIS: CAT#SY600-L1W12-1-120V-BKT-K3	
305	STROBE LIGHT	LED 4000K	PEDESTAL	120 V	FEDERAL SIGN: CAT# LP1-120A	REFER TO DETAIL 1 ON DRAWING E5.0
306	EXTERIOR DOWNLIGHT	20W LED 3000K	RECESSED	120 V	LITHONIA: CAT# LON4 30/05 LO4WR LSS 120 E210	
307	HANDRAIL LED	2W LED PER POD 3000K	HANDRAIL	120 V	KLIK: CAT# LP-###-30K-A-##-TP	ELECTRICAL CONTRACTOR TO CONFIRM RAIL SIZE AND RAIL WALL THICKNESS PRIOR TO ORDERING AND INSTALLING LED POD.
308	PARKADE CEILING MOUNT LED	19.3W LED 4000K	SURFACE	120 V	METALUX: CAT# 4SNLED-LD5-26SL-LN-UNV-L840-CD1-U	REQUIRES WIRE GUARD ACCESSORY TTW/G
309	PARKADE CEILING MOUNT LED	58W LED 4000K	SURFACE	120 V	MC CRAW-EDISON: CAT# TT-C4LED-E1-WQ	REQUIRES WIRE GUARD ACCESSORY WGSN/4FT
310	PATIO STORAGE LIGHT	12.2W LED 3000K	SURFACE	120 V	HALO: CAT# SLD606830WH	
311	EXTERIOR WALLWASH	LED 3000K	SURFACE	120 V	LUMINIS: CAT#SY600-L1W12-1-120V-BKT-MS-K3	MOTION SENSOR INCLUDED ON LIGHT





- REFERRAL NOTES:**
- DISCONNECT TO BE NO FURTHER THAN 3 METERS FROM SPLITTER AS PER CEC.
  - SPLITTER WITH PADLOCK PROVISIONS FOR UTILITY SEAL/LOCK.
  - EXISTING FORTIS POLE-TOP SINGLE PHASE TRANSFORMER.
  - NEW FORTIS PEDESTAL.
  - FUSED DISCONNECT COMBINED WITH NEUTRAL BOND KIT SUITABLE FOR SERVICE ENTRANCE.
  - INCOMING FORTIS FEEDER.

FEEDER SCHEDULE		
DESIGNATION	DESCRIPTION	AMPACITY
1A	3#12AWG RW90XLPE Cu - 1#12AWG RW90XLPE Cu GND - 16mmC	20
1B	4#12AWG RW90XLPE Cu - 1#12AWG RW90XLPE Cu GND - 21mmC	20
2A	3#10AWG RW90XLPE Cu - 1#12AWG RW90XLPE Cu GND - 21mmC	30
2B	4#10AWG RW90XLPE Cu - 1#12AWG RW90XLPE Cu GND - 21mmC	30
3A	3#8AWG RW90XLPE Cu - 1#10AWG RW90XLPE Cu GND - 21mmC	50
3B	4#8AWG RW90XLPE Cu - 1#10AWG RW90XLPE Cu GND - 27mmC	50
4A	3#6AWG RW90XLPE Cu - 1#8AWG RW90XLPE Cu GND - 27mmC	65
4B	4#6AWG RW90XLPE Cu - 1#8AWG RW90XLPE Cu GND - 35mmC	65
5A	3#4AWG RW90XLPE Cu - 1#6AWG RW90XLPE Cu GND - 35mmC	85
5B	4#4AWG RW90XLPE Cu - 1#6AWG RW90XLPE Cu GND - 35mmC	85
6A	3#3AWG RW90XLPE Cu - 1#6AWG RW90XLPE Cu GND - 35mmC	100
6B	4#3AWG RW90XLPE Cu - 1#6AWG RW90XLPE Cu GND - 41mmC	100
7A	3#2AWG RW90XLPE Cu - 1#6AWG RW90XLPE Cu GND - 41 mmC	100
7B	4#2AWG RW90XLPE Cu - 1#6AWG RW90XLPE Cu GND - 41mmC	100
7C	3#2AWG ACWU AL	90
8A	3#1AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 41mmC	100
8B	4#1AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 53mmC	100
9A	3#1/0AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 53mmC	120
9B	4#1/0AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 53mmC	120
10A	3#2/0AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 53mmC	135
10B	4#2/0AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 53mmC	135
11A	3#3/0AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 53 mmC	155
11B	4#3/0AWG RW90XLPE AL - 1#4AWG RW90XLPE AL GND - 63 mmC	155
12A	3#4/0AWG RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 63mmC	180
12B	4#4/0AWG RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 63mmC	180
12C	3 RUNS OF: (3#4/0AWG RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 103mmC) PER IEEE 835 CALCULATION	443
13A	3#250kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 63mmC	205
13B	4#250kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 78mmC	205
13C	2 RUNS OF: (3#250kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 63mmC)	410
14A	3#300kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 78mmC	230
14B	4#300kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 78mmC	230
15A	3#350kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 78mmC	250
15B	4#350kcmil RW90XLPE AL - 1#2AWG RW90XLPE AL GND - 78mmC	250
16A	3#400kcmil RW90XLPE AL - 1#1AWG RW90XLPE AL GND - 78mmC	270
16B	4#400kcmil RW90XLPE AL - 1#1AWG RW90XLPE AL GND - 78mmC	270
17A	3#500kcmil RW90XLPE AL - 1#1AWG RW90XLPE AL GND - 78mmC	310
17B	4#500kcmil RW90XLPE AL - 1#1AWG RW90XLPE AL GND - 103mmC	310
18A	3#600kcmil RW90XLPE AL - 1#1AWG RW90XLPE AL GND - 103mmC	340
18B	4#600kcmil RW90XLPE AL - 1#1AWG RW90XLPE AL GND - 103mmC	340
19A	3#750kcmil RW90XLPE AL - 1#1/0AWG RW90XLPE AL GND - 103mmC	385
19B	4#750kcmil RW90XLPE AL - 1#1/0AWG RW90XLPE AL GND - 103mmC	385



- REFERRAL NOTES:**
- SUITE TELECOM PANEL.
  - RGG COMMUNICATION CABLE RUN IN 21mm CONDUIT TO BE SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
  - CAT6 COMMUNICATION CABLE RUN IN 21mm CONDUIT TO BE SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
  - RGG COMMUNICATION CABLE RUN FREE AIR WITHIN SUITE.
  - CAT 6 COMMUNICATION CABLE RUN FREE AIR WITHIN SUITE.

**2 COMMUNICAITON RISER**  
Scale: 1 : 100

Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

REAL PROPERTY SERVICES

Western Region

SERVICES IMMOBILIERS

Région de l'ouest

PROFESSIONAL ENGINEER  
ALBERTA

BRAD W. CALVERT  
P.Eng

PERMIT NUMBER: P-99509  
Jul. 19 2019

ELECTRICAL CONSULTANT:

DESIGNCORE

consulting electrical engineers

100, 4723 - 1ST STREET S.W. | TEL: (403) 269-2125  
CALGARY, ALBERTA, T2G 4Y8 | www.designcore.ca

PROJECT NUMBER: 16227

DO NOT SCALE

4	ISSUED FOR TENDER/BP	19/07/19
3	90% CONSTRUCTION	18/11/27
2	60% CONSTRUCTION	18/02/08
1	100% DESIGN DEVELOPMENT	17/12/13
Revision / Revisión	Description / Description	Date / Date
Client / client		

Parks  
Canada

Parcs  
Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approve par  
BC

Designed by/Concept par  
TR

Drawn by/Dessine par  
TB

Project Manager/Administrateur de Projets  
LM

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
Parks Canada

Drawing title / Titre du dessin

ELECTRICAL RISERS

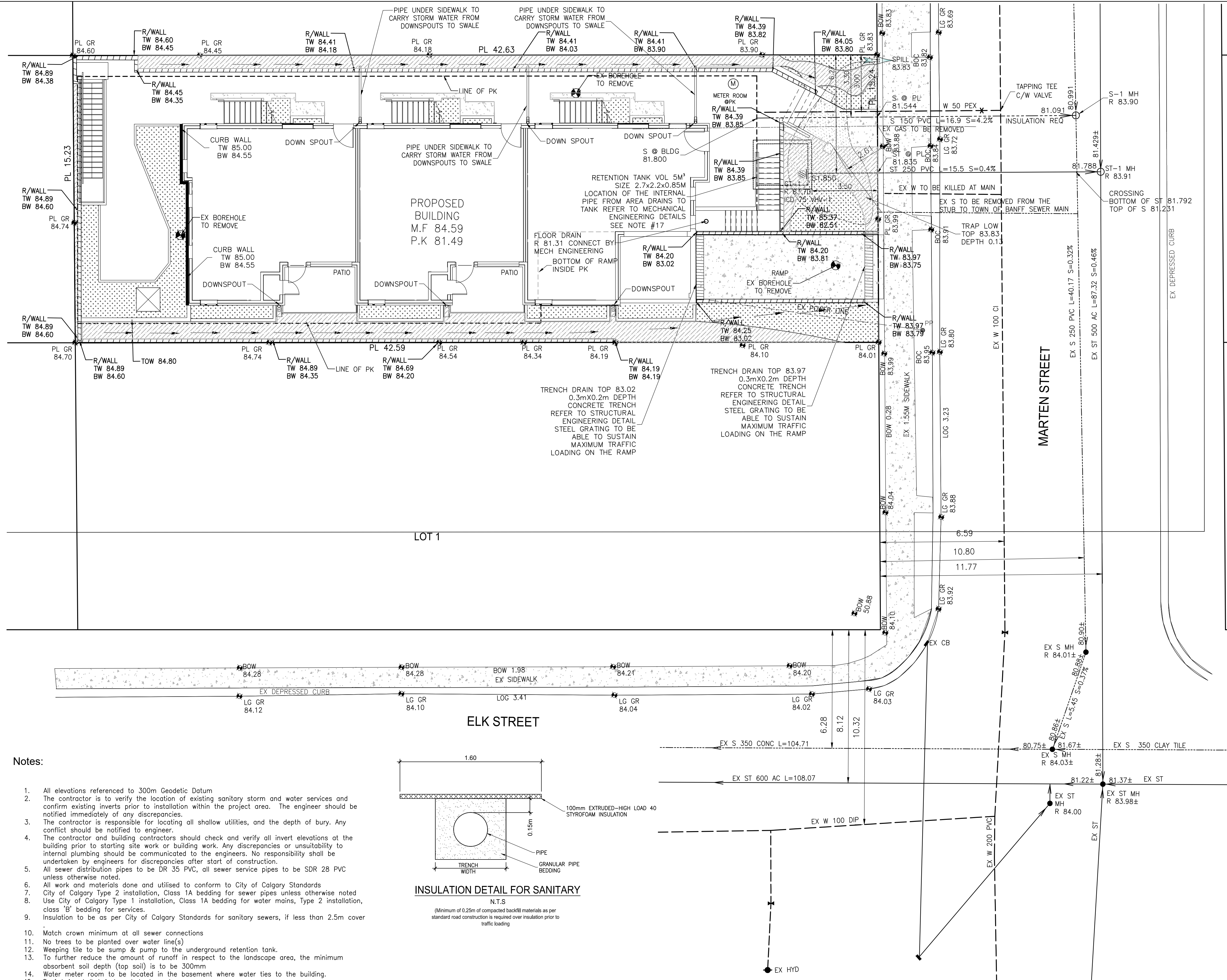
Project No. / No. du  
project

Sheet / Feuille  
E8.0

Revision no. /  
La Révision  
no  
4

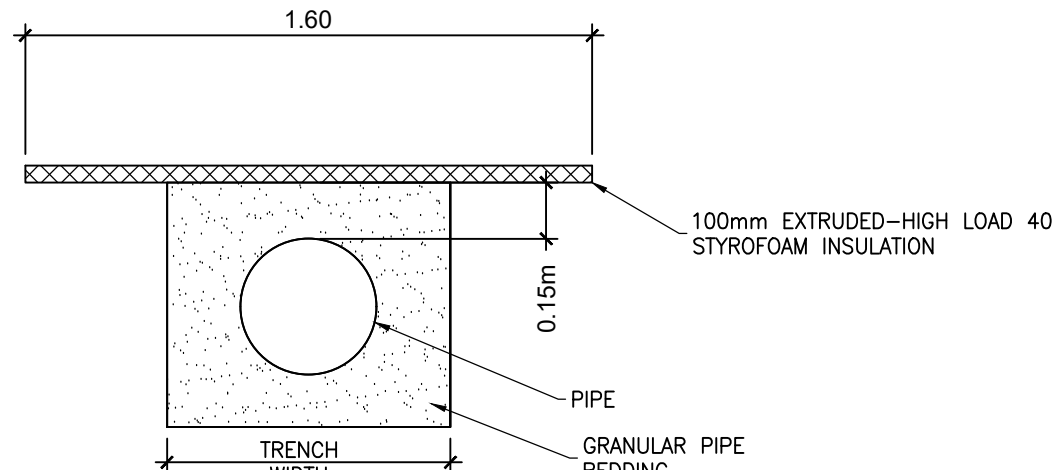
PWGSC - A1 - 841 X 594





Notes:

- All elevations referenced to 300m Geodetic Datum
- The contractor is to verify the location of existing sanitary storm and water services and confirm existing inverts prior to installation within the project area. The engineer should be notified immediately of any discrepancies.
- The contractor is responsible for locating all shallow utilities, and the depth of bury. Any conflict should be notified to engineer.
- The contractor and building contractors should check and verify all invert elevations at the building prior to starting site work or building work. Any discrepancies or unsuitability to internal plumbing should be communicated to the engineers. No responsibility shall be undertaken by engineers for discrepancies after start of construction.
- All sewer distribution pipes to be DR 35 PVC, all sewer service pipes to be SDR 28 PVC unless otherwise noted.
- All work and materials done and utilised to conform to City of Calgary Standards
- City of Calgary Type 2 installation, Class 1A bedding for sewer pipes unless otherwise noted
- Use City of Calgary Type 1 installation, Class 1A bedding for water mains, Type 2 installation, class 'B' bedding for services.
- Insulation to be as per City of Calgary Standards for sanitary sewers, if less than 2.5m cover
- Match crown minimum at all sewer connections
- No trees to be planted over water line(s)
- Weeping tile to be sump & pump to the underground retention tank.
- To further reduce the amount of runoff in respect to the landscape area, the minimum absorbent soil depth (top soil) is to be 300mm
- Water meter room to be located in the basement where water ties to the building.
- Roof drains shall drain towards landscaped areas
- Tank should be to structure engineering design and specifications and soil condition on the base and around the tank to be evaluated by geotechnical engineer.



INSULATION DETAIL FOR SANITARY

N.T.S.  
(Minimum of 0.25m of compacted backfill materials as per standard road construction is required over insulation prior to traffic loading)

LEGAL DESCRIPTION

Lots 2 Block 12  
Plan 21553 (C.L.S.R.)  
Size of Parcel: 0.065ha

MUNICIPAL ADDRESS

329 Marten Street, Banff, Alberta



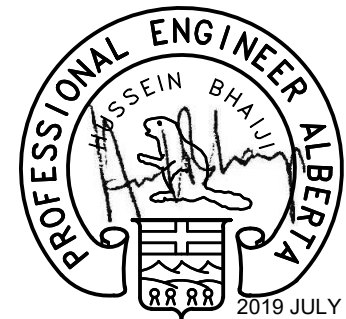
Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest

Legend:

- 83.82 FLOW DIRECTION
- EXISTING GRADE
- EXISTING FIRE HYDRANT
- EXISTING VALVE
- WATERMAIN
- SANITARY SEWER
- STORM SEWER
- EX GAS LINE
- EX ELLT
- EXISTING MANHOLE
- PROPOSED MANHOLE
- EX CATCH BASIN
- DOWNSPOUTS LOCATION
- SHRUB & PERENNIAL PLANTING BED WITH FINE WOOD CHIP MULCH APPROVED FOR USE IN BANFF NATIONAL PARK.
- 40MM RUNDLE ROCK INSTALLED TO 100MM DEPTH ON LANDSCAPE FABRIC ROCK TO BE PLACED LOOSELY I.E. NOT TO BE COMPACTED
- CONCRETE
- MF MAIN FLOOR
- PP POWER POLE
- M WATER METER LOCATION
- EMERGENCY SPILL
- GT RET.WALL



DO NOT SCALE DRAWINGS

10	ISSUED FOR TENDER / BP	19-07-19
9	REV LANDSCAPING AND ROCK HATCH	19-07-08
8	REV PLANTERS BOX GRADES AS PER LANDSCAPE COMMENT	19-04-04
7	REV DOOR GRADES AND RET WALL AS PER ARCH COMMS	19-03-22
6	99% IFC	18-12-05
5	REV AS PER NEW SITE PLAN RECEIVED ON OCT 30	18-11-08
4	ADD NOTE "REMOVE EX SAN TO THE SEWER MAIN"	18-04-05
3	ISSUE FOR 99% COMPLETION	18-03-08
2	ISSUE FOR 66% COMPLETION	18-02-08
1	DETAILED DESIGN	17-12-13

Revision/	Description/Description	Date/Date
Client/client		



Parks Canada  
Parcs Canada

Project title/Titre du projet

Banff National Park

Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuvé par

HB

Designed by/Concept par

CC

Drawn by/Dessiné par

IW

Project Manager/Administrateur de Projets

LM

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client/client

Parks Canada

Drawing title/Titre du dessin

PCA STAFF HOUSING  
329 MARTEN STREET  
SITE SERVICING PLAN

Project No./No. du  
projet

Sheet/Feuille

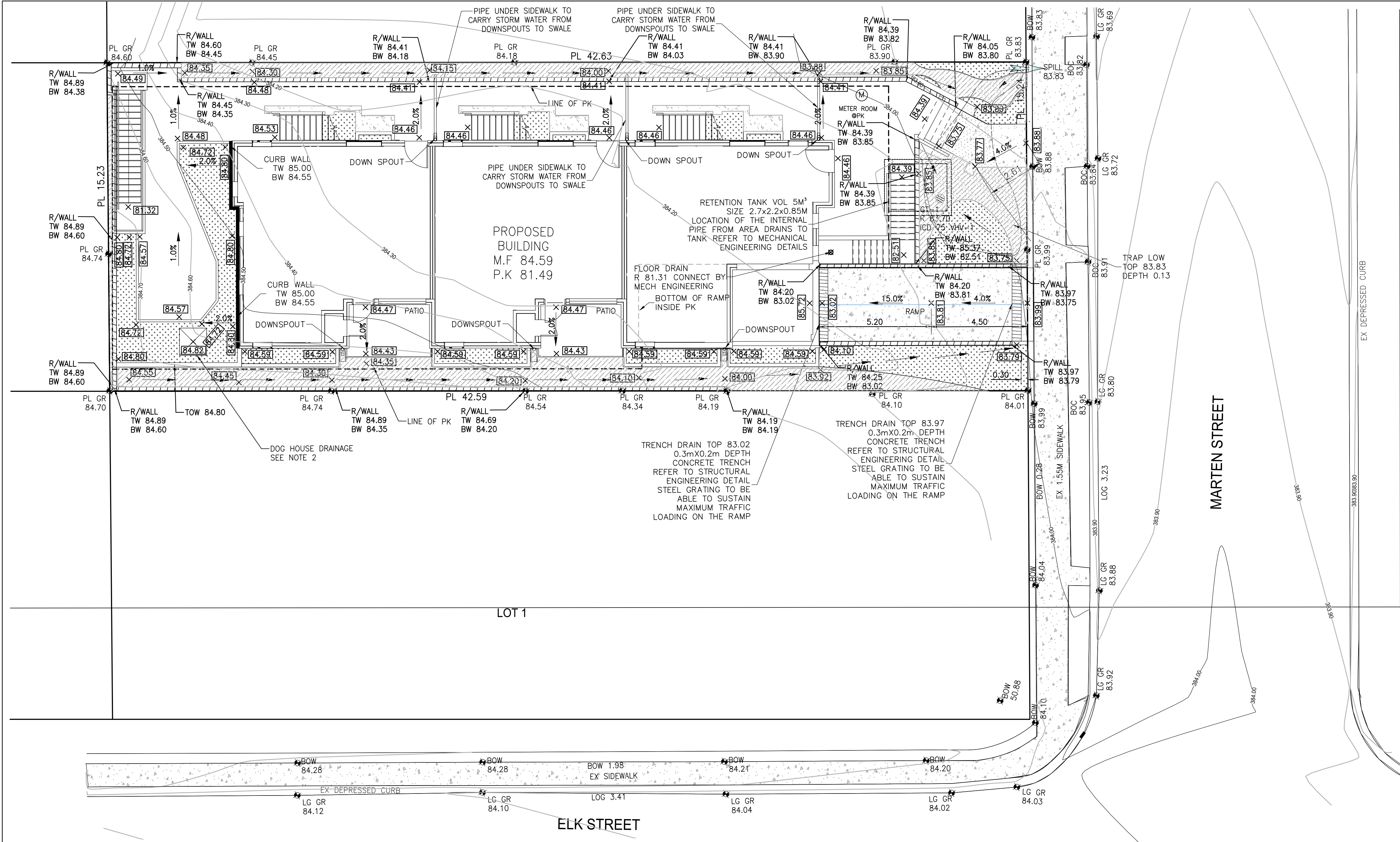
C-1

Revision no./  
La Révision  
no.

10








Notes:

1. All elevations referenced to 300m Geodetic Datum.
2. For positive drainage from the dog house, the slopes should slope away from the outside wall to the surrounding area, as shown by our design grades and on Architect drawing A6.02

LEGAL DESCRIPTION  
Lots 2 Block 12  
Plan 21553 (C.L.S.R.)  
Size of Parcel: 0.065ha

MUNICIPAL ADDRESS  
329 Marten Street, Banff, Alberta

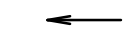


Public Works and  
Government Services  
Canada

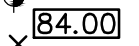
Travaux publics et  
Services gouvernementaux  
Canada

REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest

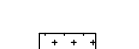
Legend:



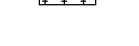
83.82




84.00



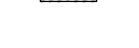
SHRUB & PERENNIAL PLANTING  
BED WITH FINE WOOD CHIP  
MULCH APPROVED FOR USE IN  
BANFF NATIONAL PARK.




40MM ROUNDE ROCK  
INSTALLED TO 100MM DEPTH ON  
LANDSCAPE FABRIC  
ROCK TO BE PLACED LOOSELY  
I.E. NOT TO BE COMPACTED




CONCRETE




MF




PP




(M)




EMERGENCY SPILL



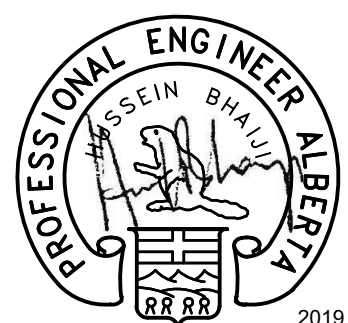
RET.WALL



DOWNSPOUTS LOCATION




STANDARD CURB



2019 JULY 19

DO NOT SCALE DRAWINGS

Revision/	Description/Description	Date/Date
10	ISSUED FOR TENDER / BP	19-07-19
9	REV LANDSCAPING AND ROCK HATCH	19-07-08
8	REV PLANTERS BOX GRADES AS PER LANDSCAPE COMMENT	19-04-04
7	REV DOOR GRADES AND RET WALL AS PER ARCH COMMENTS	19-03-22
6	99% IFC	18-12-05
5	REV AS PER NEW SITE PLAN RECEIVED ON OCT 30	18-11-26
4	ADD NOTE "REMOVE EX SAN TO THE SEWER MAIN"	18-04-05
3	ISSUE FOR 99% COMPLETION	18-03-08
2	ISSUE FOR 98% COMPLETION	18-03-08
1	DETAILED DESIGN	17-12-13



Parks  
Canada

Parcs  
Canada

Project title/Titre du projet

**Banff National Park  
Banff, Alberta**

**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuvé par  
HB

Designed by/Concept par  
CC

Drawn by/Dessiné par  
IW

Project Manager/Administrateur de Projets  
LM

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client/client  
Parks Canada

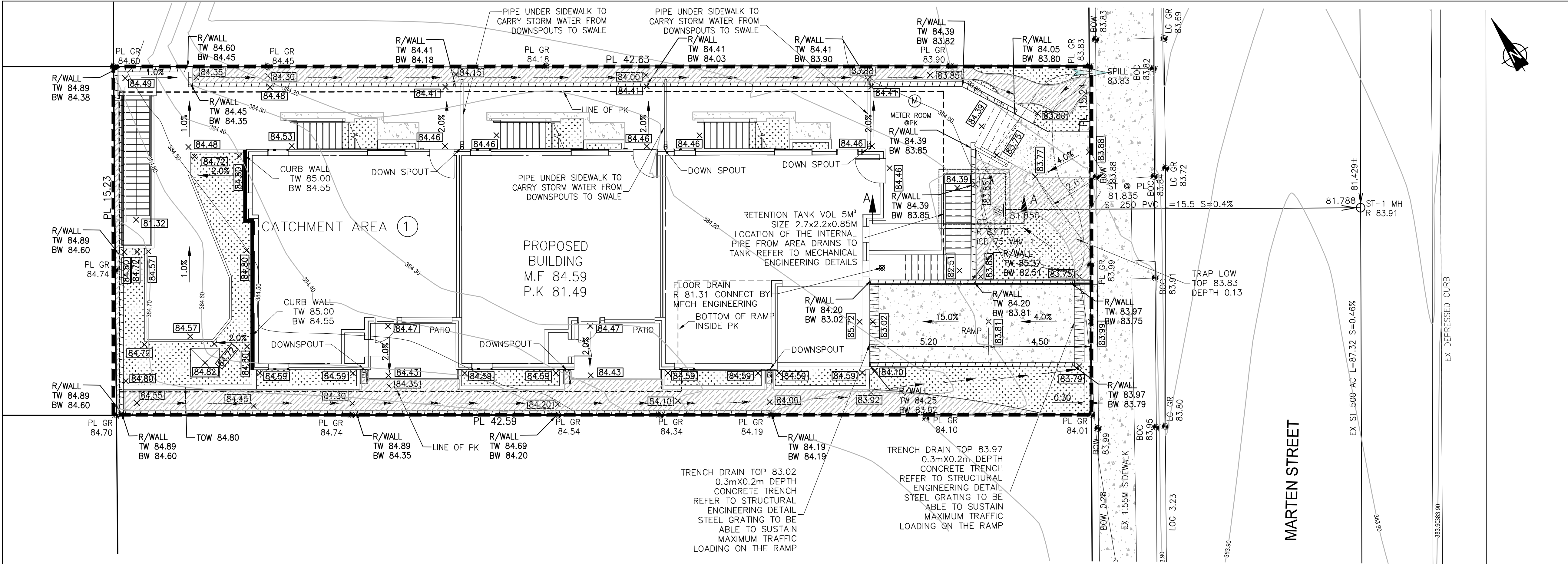
Drawing title/Titre du dessin

**PCA STAFF HOUSING  
329 MARTEN STREET  
SITE GRADING PLAN**

Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
	<b>C-2</b>	<b>10</b>







Notes:

- All elevations referenced to 300m Geodetic Datum.
- For stormwater tank cross-section, see drawing C3.

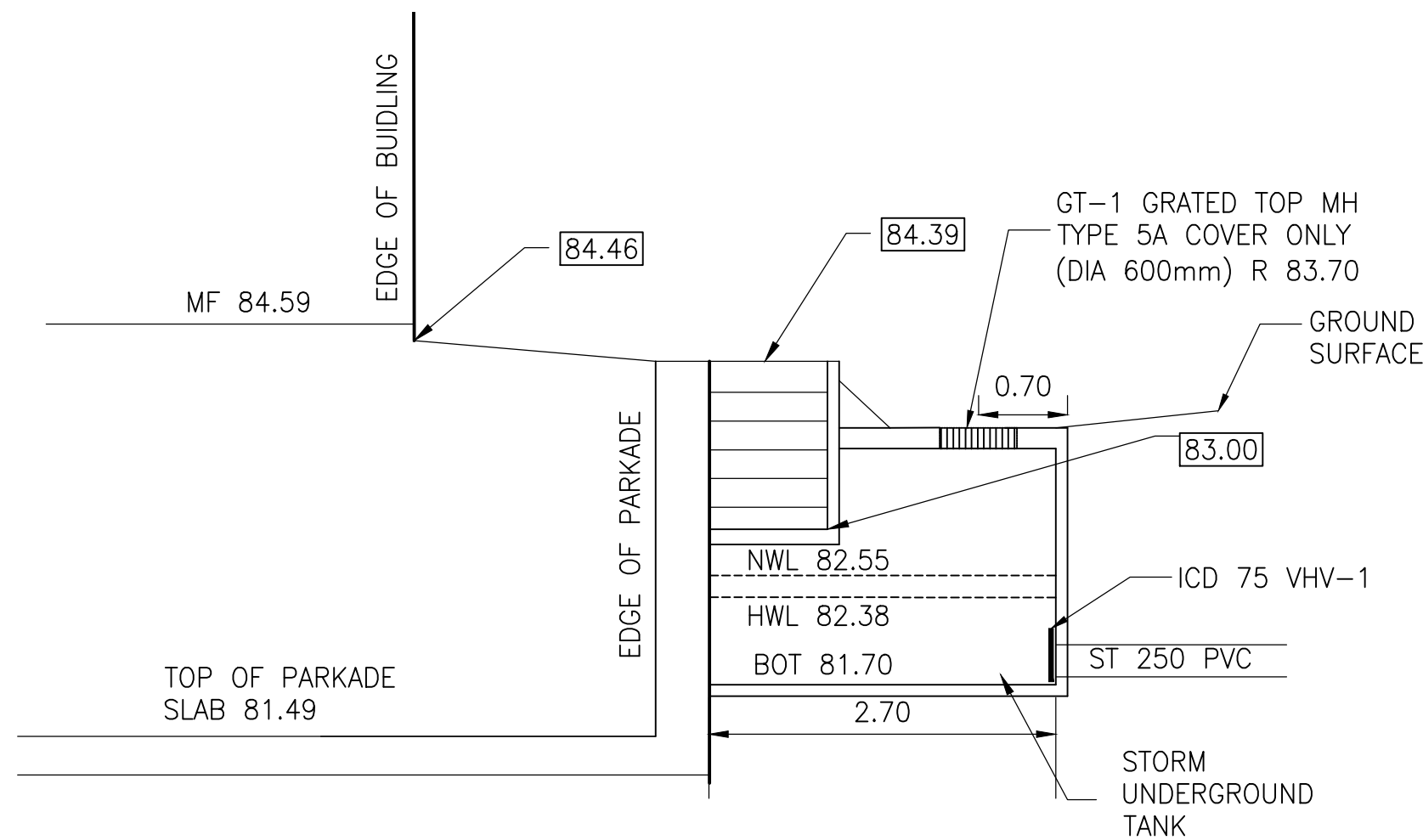
LEGAL DESCRIPTION

Lots 2 Block 12  
Plan 21553 (C.L.S.R.)  
Size of Parcel: 0.065ha

MUNICIPAL ADDRESS

329 Marten Street, Banff, Alberta

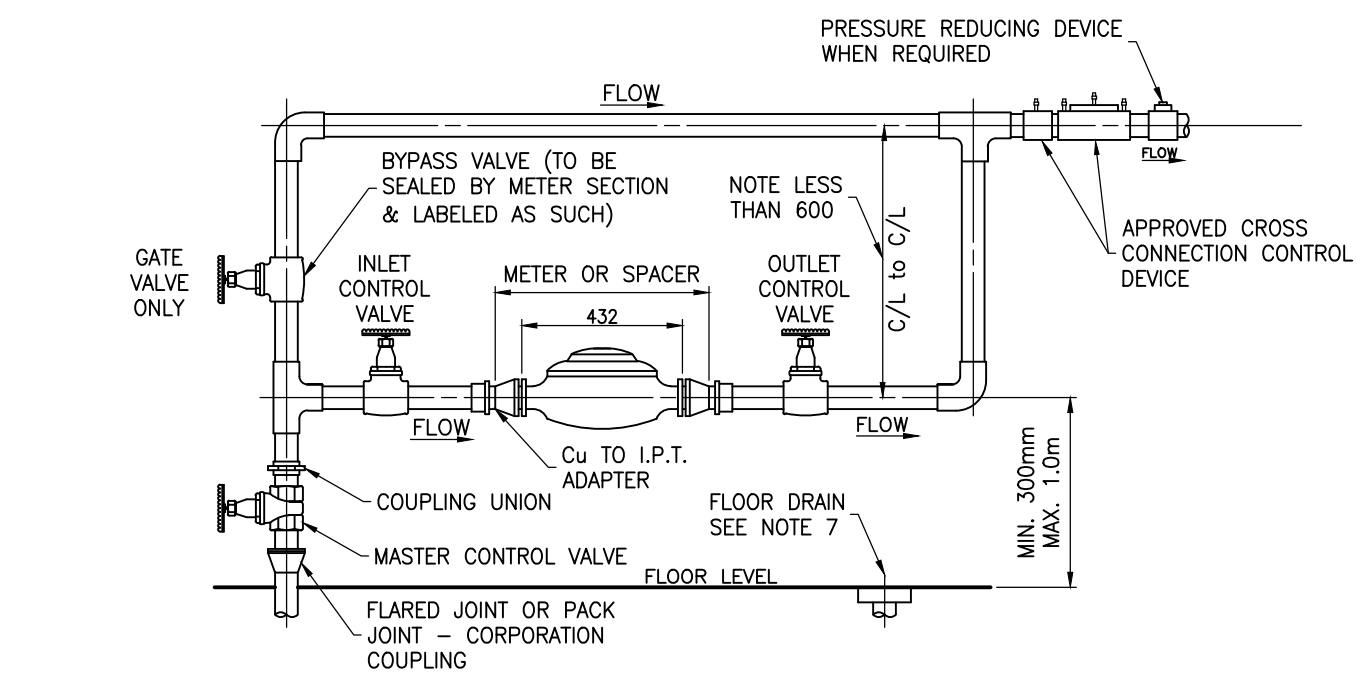
STORMWATER MANAGEMENT ANALYSIS REFER TO ATTACHED STORMWATER MANAGEMENT REPORT



SECTION A-A

1:50

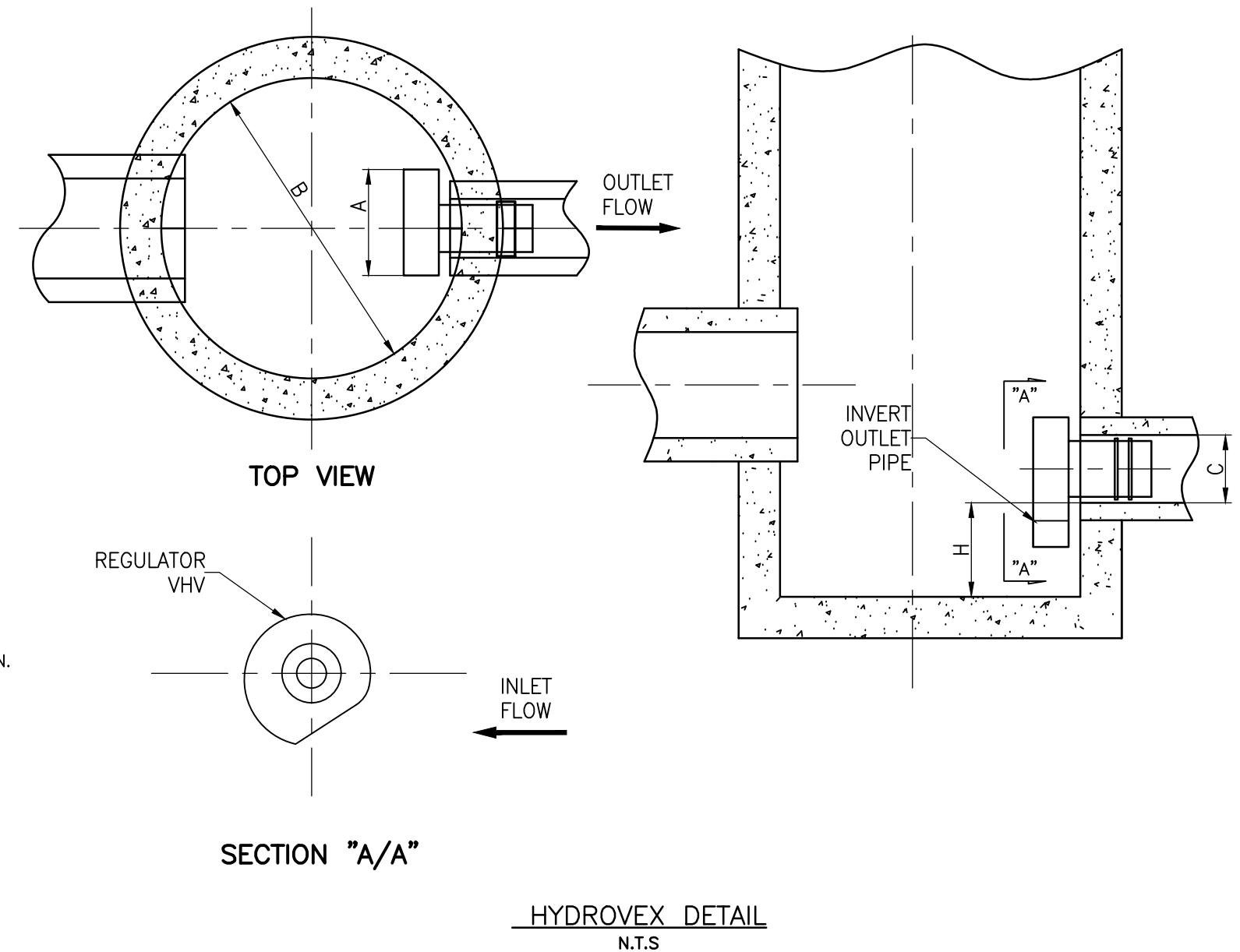
HWL - HIGH WATER LEVEL  
NWL - NORMAL WATER LEVEL



NOTES:

- PIPING ON EACH SIDE OF METER MUST BE ADEQUATELY SUPPORTED TO THE SATISFACTION OF THE WATERWORKS METER SECTION.
- PIPING FOR METER MUST BE ON A HORIZONTAL PLANE.
- MINIMUM DISTANCE OF 300mm BETWEEN ANY WALL AND A METER OR METER TREE.
- VALVES ARE REQUIRED ADJACENT TO METERS (INLET AND OUTLET SIDE).
- ALTERNATE ARRANGEMENT OF PIPING AND VALVING MUST HAVE THE APPROVAL OF THE WATERWORKS METER SECTION PRIOR TO INSTALLATION.
- THE AREA FOR 600mm IN FRONT OF THE METER SHALL BE FREE OF OBSTRUCTION TO ALLOW FOR CONVENIENT READING AND SERVICING OF THE METER. 2.0m HEADROOM MUST BE PROVIDED IN THIS AREA.
- METERS MUST BE INSTALLED IN THE MECHANICAL ROOM AND WITHIN REASONABLE DISTANCE OF A FLOOR DRAIN. IN NO CASE SHALL A METER BE INSTALLED IN A BATHROOM, BEDROOM, CRAWL SPACE, GARAGE OR UNDER A STAIRWELL. METER LOCATIONS MUST BE APPROVED BY THE WATERWORKS DIVISION.
- METER SPACERS WILL BE SUPPLIED BY CITY OF CALGARY (FOR USE WITHIN CITY LIMITS ONLY) PHONE 311.
- ALL FITTINGS AND PIPE ARE TO BE BRASS OR SOLDERED COPPER.
- SERVICE VALVES, MAIN VALVES OR ANY OTHER CITY OWNED WATERWORKS APPURTENANCES SHALL BE OPERATED BY WATERWORKS PERSONNEL ONLY.
- THE BYPASS VALVE SHALL BE A FULL PORT GATE VALVE (A BALL VALVE IS NOT ACCEPTABLE). ALL OTHER VALVES SHALL BE FULL PORT GATE OR BALL VALVES.
- AN APPROVED PREMISE ISOLATING CROSS CONNECTION CONTROL DEVICE SHALL BE INSTALLED IMMEDIATELY AFTER THE WATER METER SETTING ON ALL COMMERCIAL, INDUSTRIAL AND MULTI FAMILY RESIDENTIAL (3 UNITS OR MORE) SERVICES. FOR DOMESTIC SERVICES THAT REQUIRE A 24 HOUR UNINTERRUPTED WATER SUPPLY, A PARALLEL CROSS CONNECTION CONTROL DEVICE ARRANGEMENT (See Sheet No. 27 MUST BE INSTALLED TO FACILITATE ANNUAL TESTING & ROUTINE MAINTENANCE OF THE CROSS CONNECTION CONTROL DEVICE(S)).
- A BYPASS LINE THE SAME SIZE AS THE MAIN PIPE IS REQUIRED. BYPASS IS NOT REQUIRED FOR IRRIGATION METERS.
- WATER CONNECTIONS (ie DRAIN DOWN VALVE OR HOSE BIBB etc.) SHALL NOT BE PERMITTED BEFORE THE APPROVED CROSS CONNECTION CONTROL DEVICE. FOR INQUIRY CALL 311.
- AN APPROVED PREMISES-ISOLATING CROSS CONNECTION CONTROL DEVICE SHALL BE INSTALLED IMMEDIATELY AFTER THE WATER METER OUTLET VALVE ON ALL IRRIGATION SERVICES.

50mm WATER METER DETAIL  
N.T.S.



HYDROVEX DETAIL  
N.T.S.

\* Minimum Recommended  
Please note that the minimum clearance "h" is a function of the outlet diameter shown. If the outlet diameter increases the minimum clearance "h" will decrease.

HYDROVEX Model No.	Regulator Width A (mm)	Manhole Diameter B (mm)	Outlet Pipe * Diameter C (mm)	*Minimum Clearance H (mm)
75 VHV-1	250	600	150	150

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES

Western Region

SERVICES IMMOBILIERS

Région de l'ouest

Legend:

FLOW DIRECTION

EXISTING GRADE

DESIGN GRADE

SHRUB & PERENNIAL PLANTING BED WITH FINE WOOD CHIP MULCH APPROVED FOR USE IN BANFF NATIONAL PARK.

40MM RUNDLE ROCK INSTALLED TO 100MM DEPTH ON LANDSCAPE FABRIC. ROCK TO BE PLACED LOOSELY I.E. NOT TO BE COMPACTED

CONCRETE

MAIN FLOOR

POWER POLE

WATER METER LOCATION

EMERGENCY SPILL

RET-WALL

CATCHMENT BOUNDARY

DOWNSPOUTS LOCATION

GT

STANDARD CURB

PROFESSIONAL ENGINEER ALBERTA

2019 JULY 19

DO NOT SCALE DRAWINGS

10	ISSUED FOR TENDER / BP	19-07-19
9	REV LANDSCAPING AND ROCK HATCH	19-07-08
8	REV PLANTERS BOX GRADES AS PER LANDSCAPE COMMENT	19-04-04
7	REV DOOR GRADES AND RET WALL AS PER ARCH COMMS	19-03-22
6	99% IFC	18-12-05
5	REV AS PER NEW SITE PLAN RECEIVED ON OCT 30	18-11-08
4	ADD NOTE "REMOVE EX SAN TO THE SEWER MAIN"	18-04-05
3	ISSUE FOR 99% COMPLETION	18-03-08
2	ISSUE FOR 98% COMPLETION	18-03-08
1	DETAILED DESIGN	17-12-13

Revision/Revised  
Client/client

Parks Canada

Parcs Canada

Project title/Titre du projet

Banff National Park

Banff, Alberta

PCA - STAFF HOUSING

329 MARTEN STREET

Approved by/Approuvé par

HB

Designed by/Concept par

CC

Drawn by/Designé par

IW

Project Manager/Administrateur de Projets

LM

Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie

Client/client

Parks Canada

Drawing title/Titre du dessin

PCA STAFF HOUSING

329 MARTEN STREET

STORM WATER MANAGEMENT

PLAN & DETAILS

Project No./No. du projet

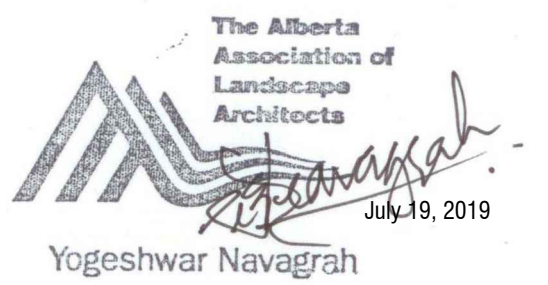
Sheet/Feuille

Revision no./La Révision no.

C-3

10





**DO NOT SCALE DRAWINGS**

5	ISSUED FOR TENDER / BP	19-07-1
4	99% CONSTRUCTION DRAWINGS	09-03-1
3	66% CONSTRUCTION DRAWINGS	09-02-1
2	100% DESIGN DEVELOPMENT	13-12-1
1	DP COMMENTS REVISIONS	19-10-1
Revision / Revision	Description / Description	Date / Da



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par  
YN

Designed by/Concept par  
YN

Drawn by/Dessine par  
MP

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'Ingénierie

Client / client

**Parks Canada**

Drawing title / Titre du dessin

COVER PAGE

Project No. / No. du

Sheet / Feuille

Révision

L0

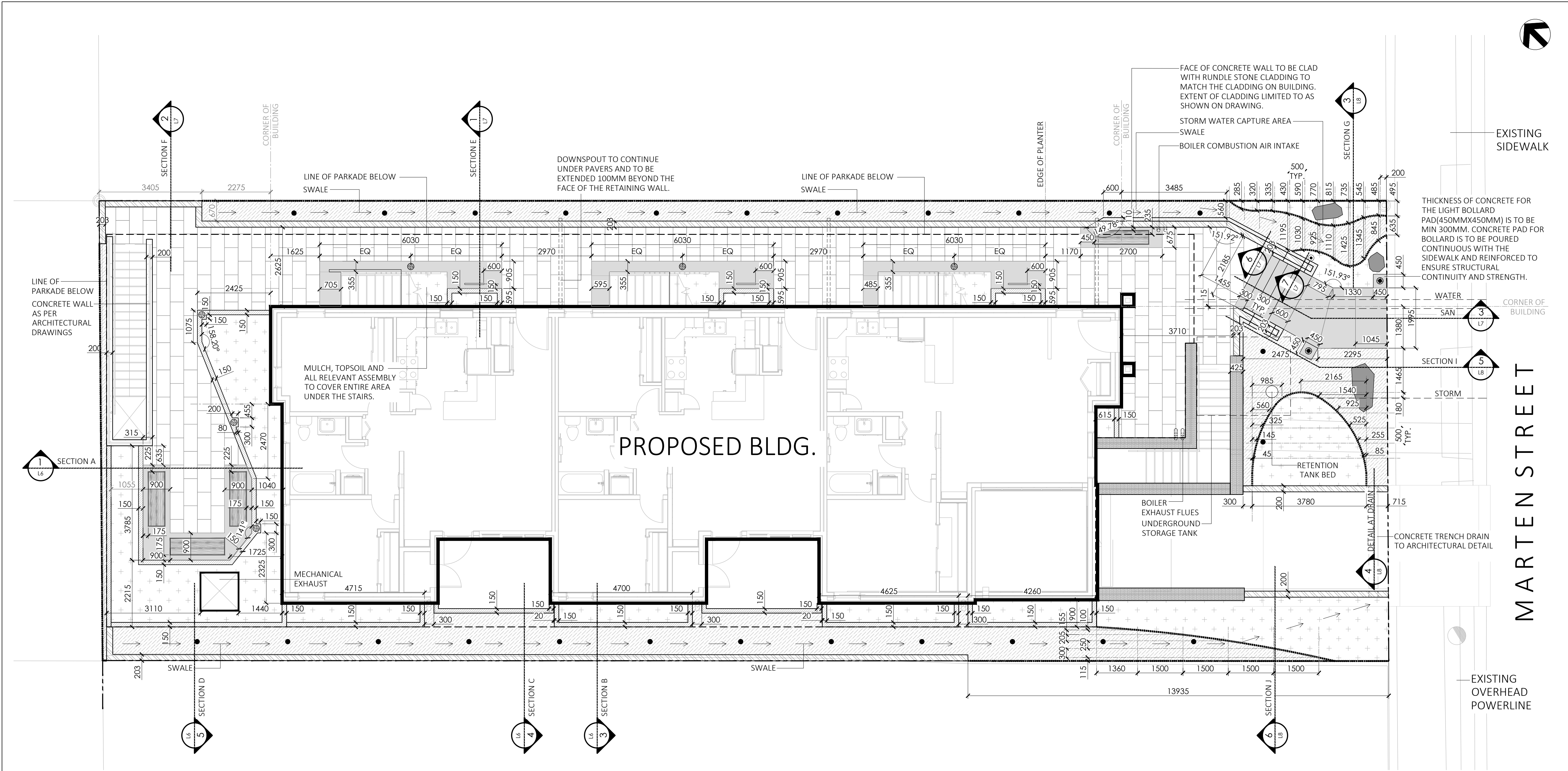
5

## LANDSCAPE CONSTRUCTION DRAWINGS

- L1. LAYOUT PLAN
- L2. PAVING & FENCE LAYOUT PLAN
- L3. PLANTING PLAN
- L4. GRADING PLAN
- L5. BENCH DETAILS
- L6. SECTIONS & DETAILS
- L7. SECTIONS & DETAILS
- L8. SECTIONS & DETAILS







## LEGEND

- 450MM X 900MM X 20MM THICK HYDRA PRESSED PORCELAIN SLABS PAVER BY ABBOTSFORD CONCRETE PRODUCTS LTD. OR APPROVED EQUIVALENT. RUNNING BOND PATTERN AS SHOWN ON DRAWING. COLOR: BLUE STONE
- ADVANCE TERMITE BAIT STATION TO BE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS AT EQUAL INTERVALS OF 10FT
- POURED IN PLACE REINFORCED CONCRETE. REGULAR GREY COLOUR, LIGHT SANDBLAST FINISH. ALL CONCRETE TO BE PROVIDED WITH 10M REBAR @ 400 EACH WAY AT MID-DEPTH.
- 203MM THICK POURED IN PLACE REINFORCED CONCRETE RETAINING WALL. REGULAR GREY COLOR, LIGHT SANDBLAST FINISH. REFER TO STRUCTURAL DRAWING S121 FOR REINFORCEMENT DETAILS.
- 150mm THICK POURED IN PLACE REINFORCED CONCRETE UPSTAND. REGULAR GREY COLOR, LIGHT SANDBLAST FINISH. REFER TO STRUCTURAL DRAWING S121 FOR REINFORCEMENT DETAILS.
- 203mm THICK POURED IN PLACE REINFORCED CONCRETE RETAINING WALL WITH STONE CLADDING TO ARCHITECTURAL DETAIL. REFER TO STRUCTURAL DRAWING S121 FOR REINFORCEMENT DETAILS.
- STONE CLAD RETAINING WALLS. REFER TO ARCHITECTURAL DRAWING A3.02 FOR WALL ELEVATIONS & DETAILS.
- SHRUB & PERENNIAL PLANTING BED WITH FINE WOOD CHIP MULCH APPROVED FOR USE IN BANFF NATIONAL PARK.
- 40MM RUNDLE ROCK INSTALLED TO 100MM DEPTH ON LANDSCAPE FABRIC. ROCK TO BE PLACED LOOSELY I.E. NOT TO BE COMPACTED
- RUNDLE STONE BOULDERS MINIMUM 1.5M L X .75M W X .8M H TO BE INSTALLED ON 150MM COMPACTED GRAVEL BASE BOULDER TO BE BURIED MINIMUM 8" BELOW FINISH GRADE
- WOOD BENCHES. REFER TO DETAIL 1-5/L5.
- PERMALOC CLEAN LINE COMMERCIAL GRADE LANDSCAPE EDGING OR APPROVED EQUIVALENT (INSTALL AS PER MANUFACTURER'S INSTRUCTIONS) SIZE: 1/8" x 4" FINISH: MILL
- LIGHT BOLLARD. TO BE MOUNT ON CONCRETE PEDESTAL ANCHORED TO PARKADE SLAB. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS.
- LIGHT BOLLARD. TO BE MOUNT ON CONCRETE PAD. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS.
- BICYCLE RACK - SURFACE MOUNT U-RACK. FINISH: POLISHED STAINLESS STEEL REFER TO DETAIL 1/L8
- RECEPTACLE FOR FESTIVAL LIGHTING MOUNTED IN STAIR WALL. REFER TO ELECTRICAL DRAWING E1.1.

## NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED;
- VERIFY ALL DIMENSIONS, ELEVATIONS AND DATUM. REPORT ANY ERRORS AND/OR DISCREPANCIES TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO CONSTRUCTION;
- DO NOT SCALE DRAWINGS;
- CONTRACTOR MUST HAVE A COPY OF THE ACCEPTED PLAN ON SITE AT ALL TIMES;
- TOPSOIL DEPTH FOR ALL PLANTING AREAS TO BE MINIMUM 300MM;
- ALL PLANTING BEDS TO BE PROVIDED WITH 75MM THICK MULCH UNLESS OTHERWISE SPECIFIED.
- SHRUB/TREE BEDS SHOULD BE GROUPED IN CONTIGUOUS/CONTINUOUS PITS/TRENCHES. TRENCHES MUST BE BACKFILLED WITH TOPSOIL AND ALLOW FOR 300 MM OF TOPSOIL ON SIDES OF ROOT BALLS. BEDS CONTAINING TREES AND SHRUBS ARE TO BE EXCAVATED TO DEPTH OF TREE ROOT BALL.
- FOR TREE PLANTING: THE BASE OF THE ROOT BALL MUST SIT ON UNDISTURBED SUB-SOIL (OPTION IS TO COMPACT BOTTOM OF HOLE TO 95% STANDARD PROCTOR DENSITY). AT THE TIME OF PLANTING CUT AWAY THE STRAPPINGS AND REMOVE THE TOP 1/3 OF THE WIRE AND BURLAP. CUT BACK THE WIRE AT BURLAP AND CUT DOWN THE SIDES OF THE BURLAP IN THREE EQUALLY SPACED LOCATIONS.
- SPECIES SUBSTITUTION ON ANY PLANS IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE DEPARTMENTAL REPRESENTATIVE.
- PLANT MATERIAL TO FOLLOW CNLA STANDARDS.
- DURING THE MAINTENANCE PERIOD THE SITE TO BE IRRIGATED BY A WATER TRUCK. DEPENDING ON WEATHER CONDITIONS, PLANTS TO BE WATERED ON A DAILY BASIS UNTIL THE INITIAL ESTABLISHMENT AND AFTER THAT ON A WEEKLY BASIS TILL THE END OF THE GROWING SEASON, WITH INTENT TO ENSURE SUCCESSFUL ESTABLISHMENT OF THE PLANTS.
- REFER TO CIVIL DRAWINGS FOR ADDITIONAL GRADES.
- ALL PLANTING LOCATIONS TO BE FIELD FITTED WITH DEPARTMENTAL REPRESENTATIVE'S APPROVAL.
- A MINIMUM DISTANCE FOR TREES TO BE PLANTED AWAY FROM THE UNDERGROUND STRUCTURE IS 1000MM.
- LANDSCAPE FABRIC TO BE DEWITT PRO 5 WEED BARRIER OR APPROVED EQUIVALENT. LANDSCAPE FABRIC SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS IN ALL AREAS AS OUTLINED IN THE DRAWINGS. LANDSCAPE FABRIC SHALL NOT BE VISIBLE UNDER MULCH OR DECORATIVE ROCK AREAS AND ALL LOOSE ENDS SHALL BE CUT OFF, TUCKED UNDER, OR OTHERWISE COVERED WITH THE SPECIFIED DEPTH OF PROPOSED LANDSCAPE FINISHING MATERIAL. LANDSCAPE FABRIC SHALL BE IN DIRECT CONTACT WITH SOIL.
- ALL LANDSCAPE CONSTRUCTION MUST CONFORM WITH THE LANDSCAPE CONSTRUCTION DRAWINGS AND SPECIFICATIONS PROVIDED.

Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

REAL PROPERTY SERVICES  
Western Region  
SERVICES IMMOBILIERS  
Région de l'ouest

The Alberta  
Association of  
Landscape  
Architects  
July 19, 2019  
Yogeshwar Navagrah

DO NOT SCALE DRAWINGS

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19-07-19
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17

Revision /  
Revision  
Client / client

Parks  
Canada

Parcs  
Canada

Project title/Titre du projet  
**Banff National Park  
Banff, Alberta**  
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par  
YN

Designed by/Concept par  
YN

Drawn by/Dessine par  
MP

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client  
**Parks Canada**

Drawing title / Titre du dessin  
**LAYOUT PLAN**

Project No. / No. du  
project

Sheet / Feuille  
**L1**

Revision no. /  
La Révision  
no.  
**5**

PWGS - A1 - 841 X 594

0 10 20 30 40 50 60 70 80 90 100mm










— EXISTING  
SIDEWALK

MARTEN STREET

EXISTING  
OVERHEAD  
POWERLINE

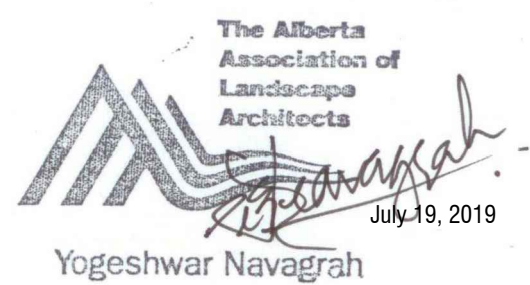
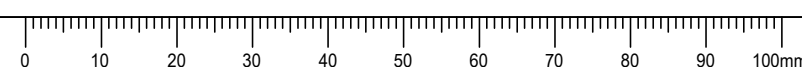
## LEGEND

## PAVERS

- |   |   |
|---|---|
|  | 450MM x 900MM x 20MM THICK HYDRA PRESSED PORCELAIN SLABS PAVED BY ABBOTSFORD CONCRETE PRODUCTS LTD. OR APPROVED EQUIVALENT. RUNNING BOND PATTERN AS SHOWN ON DRAWING. COLOR: BLUE STONE |
|  | EXTENT OF CONCRETE WALL CAP AND ROCK CLADDING. REFER TO 6-7/L7 FOR DETAILS.   |
|  | 1070MM HIGH STAINLESS STEEL GUARDRAIL MOUNTED ON RETAINING WALL. REFER TO DETAIL 4/L7.  |
|  | 100MM HIGH STAINLESS STEEL GUARDRAIL MOUNTED ON RETAINING WALL TO ARCHITECTURAL DETAIL 3/A7.11.   |
|  | 1800MM HIGH WOOD FENCE. REFER TO DETAIL 2-3/L6.   |

## NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED;
- VERIFY ALL DIMENSIONS, ELEVATIONS AND DATUM. REPORT ANY ERRORS AND/OR DISCREPANCIES TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO CONSTRUCTION;
- DO NOT SCALE DRAWINGS;
- CONTRACTOR MUST HAVE A COPY OF THE ACCEPTED PLAN ON SITE AT ALL TIMES;
- TOPSOIL DEPTH FOR ALL PLANTING AREAS TO BE MINIMUM 300MM;
- ALL PLANTING BEDS TO BE PROVIDED WITH 75MM THICK MULCH UNLESS OTHERWISE SPECIFIED.
- SHRUB/TREE BEDS SHOULD BE GROUPED IN CONTIGUOUS/CONTINUOUS PITS/TRENCHES. TRENCHES MUST BE BACKFILLED WITH TOPSOIL AND ALLOW FOR 300 MM OF TOPSOIL ON SIDES OF ROOT BALLS. BEDS CONTAINING TREES AND SHRUBS ARE TO BE EXCAVATED TO DEPTH OF TREE ROOT BALL.
- FOR TREE PLANTING: THE BASE OF THE ROOT BALL MUST SIT ON UNDISTURBED SUB-SOIL (OPTION IS TO COMPACT BOTTOM OF HOLE TO 95% STANDARD PROCTOR DENSITY). AT THE TIME OF PLANTING CUT AWAY THE STRAPPINGS AND REMOVE THE TOP 1/3 OF THE WIRE AND BURLAP. CUT BACK THE WIRE AT BURLAP AND CUT DOWN THE SIDES OF THE BURLAP IN THREE EQUALLY SPACED LOCATIONS.
- SPECIES SUBSTITUTION ON ANY PLANS IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE DEPARTMENTAL REPRESENTATIVE.
- PLANT MATERIAL TO FOLLOW CNLA STANDARDS.
- DURING THE MAINTENANCE PERIOD THE SITE TO BE IRRIGATED BY A WATER TRUCK. DEPENDING ON WEATHER CONDITIONS, PLANTS TO BE WATERED ON A DAILY BASIS UNTIL THE INITIAL ESTABLISHMENT AND AFTER THAT ON A WEEKLY BASIS TILL THE END OF THE GROWING SEASON, WITH INTENT TO ENSURE SUCCESSFUL ESTABLISHMENT OF THE PLANTS.
- REFER TO CIVIL DRAWINGS FOR ADDITIONAL GRADES.
- ALL PLANTING LOCATIONS TO BE FIELD FITTED WITH DEPARTMENTAL REPRESENTATIVE'S APPROVAL.
- A MINIMUM DISTANCE FOR TREES TO BE PLANTED AWAY FROM THE UNDERGROUND STRUCTURE IS 1000MM.
- LANDSCAPE FABRIC TO BE DEWITT PRO 5 WEED BARRIER OR APPROVED EQUIVALENT. LANDSCAPE FABRIC SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS IN ALL AREAS AS OUTLINED IN THE DRAWINGS. LANDSCAPE FABRIC SHALL NOT BE VISIBLE UNDER MULCH OR DECORATIVE ROCK AREAS AND ALL LOOSE ENDS SHALL BE CUT OFF, TUCKED UNDER, OR OTHERWISE COVERED WITH THE SPECIFIED DEPTH OF PROPOSED LANDSCAPE FINISHING MATERIAL. LANDSCAPE FABRIC SHALL BE IN DIRECT CONTACT WITH SOIL.
- ALL LANDSCAPE CONSTRUCTION MUST CONFORM WITH THE LANDSCAPE CONSTRUCTION DRAWINGS AND SPECIFICATIONS PROVIDED.



**DO NOT SCALE DRAWINGS**

5	ISSUED FOR TENDER / BP	19-07-19
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17
Revision / Revision	Description / Description	Date / Date
Client / client		



Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**

**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par

YN

Designed by/Concept par

YN

Drawn by/Dessine par

MP  
Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'Ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

PAVING & FENCE  
LAYOUT PLAN

Project No. / No. du

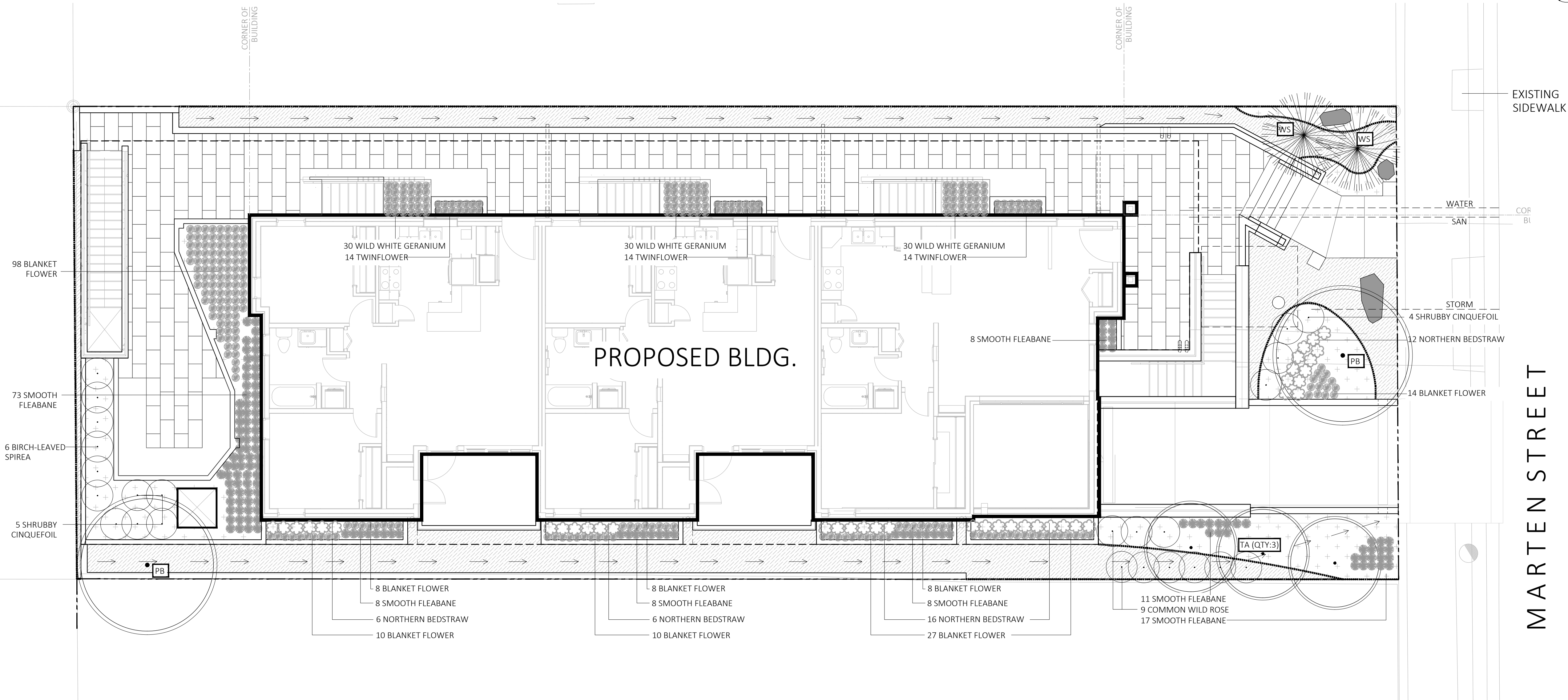
project

Sheet / Feuille

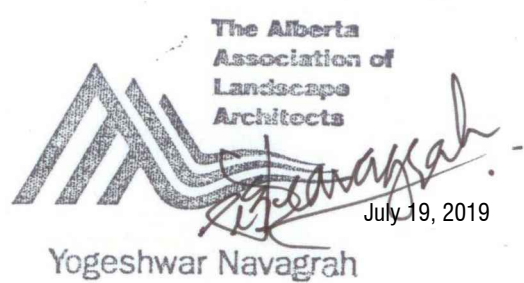
Revision no. 1

La Révision  
00





MARTEN STREET



DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
6	ISSUED FOR TENDER / BP	19-07-19
5	CLIENT REVIEW	08-08-18
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17

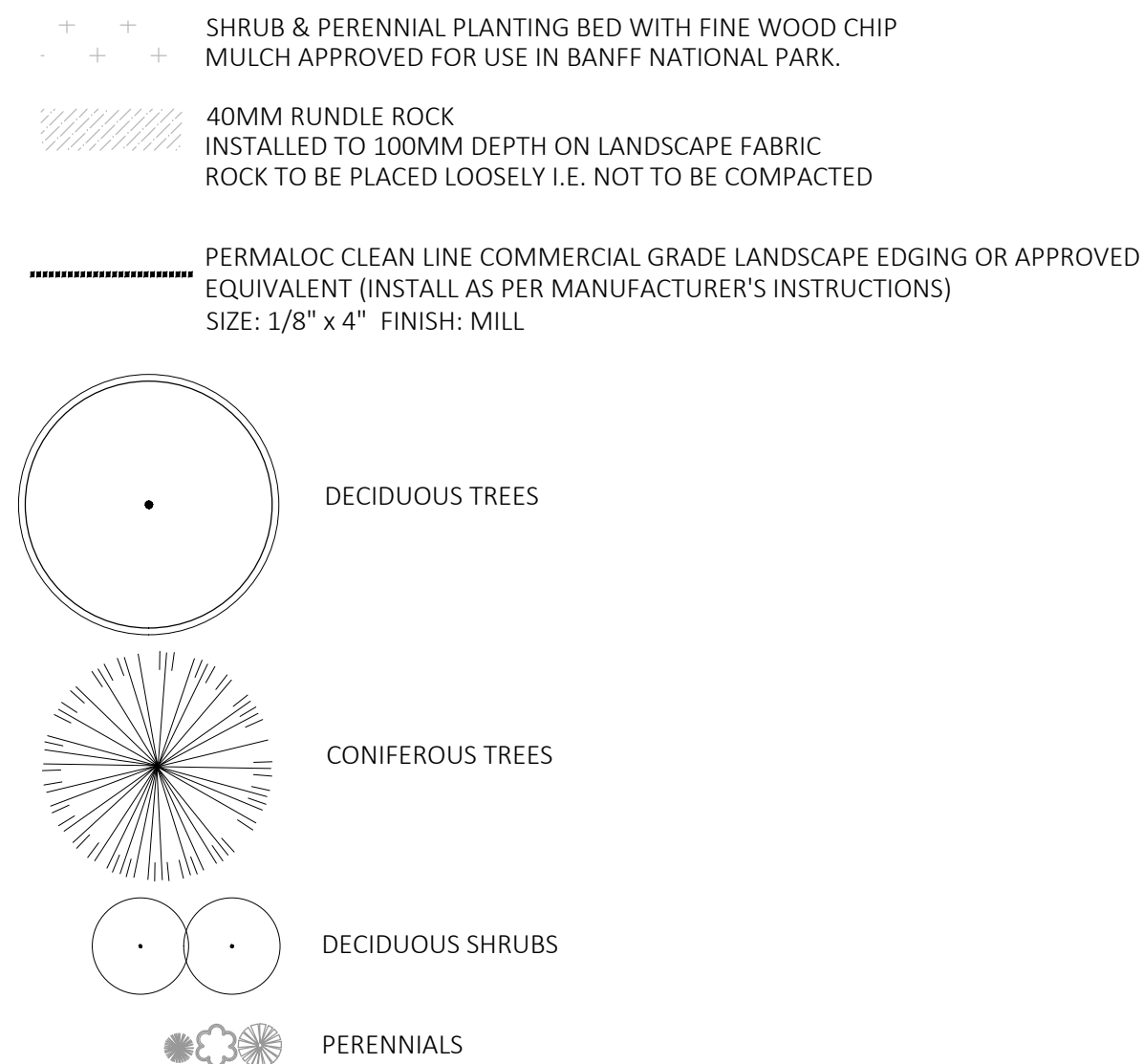


Project title/Titre du projet
<b>Banff National Park Banff, Alberta</b>
<b>PCA - STAFF HOUSING 329 MARTEN STREET</b>
Approved by/Approuve par YN
Designed by/Concept par YN
Drawn by/Dessine par MP
Project Manager/Administrateur de Projets
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie
Client / client <b>Parks Canada</b>
Drawing title / Titre du dessin

PLANTING PLAN

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
	<b>L3</b>	<b>6</b>

LEGEND

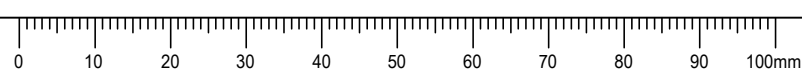


NOTES

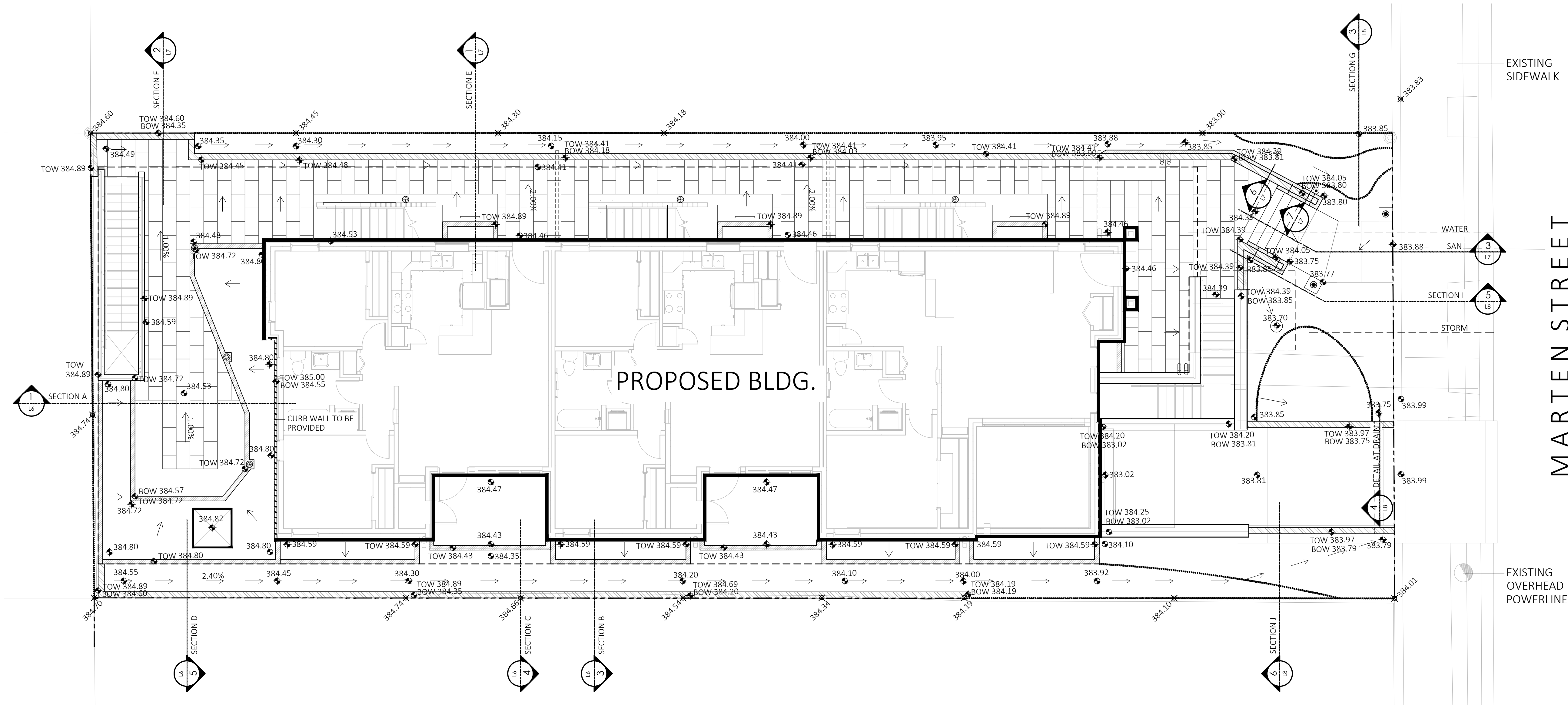
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED;
- VERIFY ALL DIMENSIONS, ELEVATIONS AND DATUM. REPORT ANY ERRORS AND/OR DISCREPANCIES TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO CONSTRUCTION;
- DO NOT SCALE DRAWINGS;
- CONTRACTOR MUST HAVE A COPY OF THE ACCEPTED PLAN ON SITE AT ALL TIMES;
- TOPSOIL DEPTH FOR ALL PLANTING AREAS TO BE MINIMUM 300MM;
- ALL PLANTING BEDS TO BE PROVIDED WITH 75MM THICK MULCH UNLESS OTHERWISE SPECIFIED.
- SHRUB/TREE BEDS SHOULD BE GROUPED IN CONTIGUOUS/CONTINUOUS PITS/TRENCHES. TRENCHES MUST BE BACKFILLED WITH TOPSOIL AND ALLOW FOR 300 MM OF TOPSOIL ON SIDES OF ROOT BALLS. BEDS CONTAINING TREES AND SHRUBS ARE TO BE EXCAVATED TO DEPTH OF TREE ROOT BALL.
- FOR TREE PLANTING: THE BASE OF THE ROOT BALL MUST SIT ON UNDISTURBED SUB-SOIL (OPTION IS TO COMPACT BOTTOM OF HOLE TO 95% STANDARD PROCTOR DENSITY). AT THE TIME OF PLANTING CUT AWAY THE STRAPPINGS AND REMOVE THE TOP 1/3 OF THE WIRE AND BURLAP. CUT BACK THE WIRE AT BURLAP AND CUT DOWN THE SIDES OF THE BURLAP IN THREE EQUALLY SPACED LOCATIONS.
- SPECIES SUBSTITUTION ON ANY PLANS IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE DEPARTMENTAL REPRESENTATIVE.
- PLANT MATERIAL TO FOLLOW CNLA STANDARDS.
- DURING THE MAINTENANCE PERIOD THE SITE TO BE IRRIGATED BY A WATER TRUCK. DEPENDING ON WEATHER CONDITIONS, PLANTS TO BE WATERED ON A DAILY BASIS UNTIL THE INITIAL ESTABLISHMENT AND AFTER THAT ON A WEEKLY BASIS TILL THE END OF THE GROWING SEASON, WITH INTENT TO ENSURE SUCCESSFUL ESTABLISHMENT OF THE PLANTS.
- REFER TO CIVIL DRAWINGS FOR ADDITIONAL GRADES.
- ALL PLANTING LOCATIONS TO BE FIELD FITTED WITH DEPARTMENTAL REPRESENTATIVE'S APPROVAL.
- A MINIMUM DISTANCE FOR TREES TO BE PLANTED AWAY FROM THE UNDERGROUND STRUCTURE IS 1000MM.
- LANDSCAPE FABRIC TO BE DEWITT PRO 5 WEED BARRIER OR APPROVED EQUIVALENT. LANDSCAPE FABRIC SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS IN ALL AREAS AS OUTLINED IN THE DRAWINGS. LANDSCAPE FABRIC SHALL NOT BE VISIBLE UNDER MULCH OR DECORATIVE ROCK AREAS AND ALL LOOSE ENDS SHALL BE CUT OFF, TUCKED UNDER, OR OTHERWISE COVERED WITH THE SPECIFIED DEPTH OF PROPOSED LANDSCAPE FINISHING MATERIAL. LANDSCAPE FABRIC SHALL BE IN DIRECT CONTACT WITH SOIL.
- ALL LANDSCAPE CONSTRUCTION MUST CONFORM WITH THE LANDSCAPE CONSTRUCTION DRAWINGS AND SPECIFICATIONS PROVIDED.

PLANT SCHEDULE

common name	latin name	size/ spread	Quantity
TOTAL TREE QTY: 07			
DECIDUOUS TREES			
PB PAPER BIRCH	BETULA PAPPYRIFERA	50MM CAL.	02
TA TREMBLING ASPEN	POPULUS TREMULOIDES	85MM CAL.	03
CONIFEROUS TREES			
WS WHITE SPRUCE BLACK HILL	PICEA GLAUCA 'DENSATA'	3000MM HT.	02
common name	latin name	size/ spread	
TOTAL SHRUBS QTY: 24			
DECIDUOUS SHRUBS			
COMMON WILD ROSE	ROSA WOODSII	600MM HT.	09
BIRCH-LEAVED SPIREA	SPIRAEA BETULIFOLIA	600MM HT.	06
SHRUBBY CINQUEFOIL	POTENTILLA FRUTICOSA	600MM HT.	09
PERENNIALS			
NORTHERN BEDSTRAW	GALIUM BOREALE	#1 POT	40
BLANKET FLOWER	GAILLARDIA	#1 POT	183
SMOOTH FLEABANE	ERIGERON GLABELLUS	#1 POT	133
TWINFLOWER	LINNAEA BOREALI	#1 POT	42
WILD WHITE GERANIUM	GERANIUM RICHARDSONII	#1 POT	90







## LEGEND

- 1096.27 EXISTING GRADES
- 1097.10 PROPOSED GRADES
- TOW 1097.10 PROPOSED TOP OF WALL GRADES
- BOW 1096.10 PROPOSED BOTTOM OF WALL GRADES
- 203MM THICK POURED IN PLACE REINFORCED CONCRETE RETAINING WALL, REGULAR GREY COLOR, LIGHT SANDBLAST FINISH. REFER TO STRUCTURAL DRAWING S121 FOR REINFORCEMENT DETAILS.
- 150mm THICK POURED IN PLACE REINFORCED CONCRETE UPSTAND, REGULAR GREY COLOR, LIGHT SANDBLAST FINISH. REFER TO STRUCTURAL DRAWING S121 FOR REINFORCEMENT DETAILS.
- 203mm THICK POURED IN PLACE REINFORCED CONCRETE RETAINING WALL WITH STONE CLADDING TO ARCHITECTURAL DETAIL. REFER TO STRUCTURAL DRAWING S121 FOR REINFORCEMENT DETAILS.
- STONE CLAD RETAINING WALLS. REFER TO ARCHITECTURAL DRAWING A3.02 FOR WALL ELEVATIONS & DETAILS.

## NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED;
- VERIFY ALL DIMENSIONS, ELEVATIONS AND DATUM. REPORT ANY ERRORS AND/OR DISCREPANCIES TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO CONSTRUCTION;
- DO NOT SCALE DRAWINGS;
- CONTRACTOR MUST HAVE A COPY OF THE ACCEPTED PLAN ON SITE AT ALL TIMES;
- TOPSOIL DEPTH FOR ALL PLANTING AREAS TO BE MINIMUM 300MM;
- ALL PLANTING BEDS TO BE PROVIDED WITH 75MM THICK MULCH UNLESS OTHERWISE SPECIFIED.
- SHRUB/TREE BEDS SHOULD BE GROUPED IN CONTIGUOUS/CONTINUOUS PITS/TRENCHES. TRENCHES MUST BE BACKFILLED WITH TOPSOIL AND ALLOW FOR 300 MM OF TOPSOIL ON SIDES OF ROOT BALLS. BEDS CONTAINING TREES AND SHRUBS ARE TO BE EXCAVATED TO DEPTH OF TREE ROOT BALL.
- FOR TREE PLANTING: THE BASE OF THE ROOT BALL MUST SIT ON UNDISTURBED SUB-SOIL (OPTION IS TO COMPACT BOTTOM OF HOLE TO 95% STANDARD PROCTOR DENSITY). AT THE TIME OF PLANTING CUT AWAY THE STRAPPINGS AND REMOVE THE TOP 1/3 OF THE WIRE AND BURLAP. CUT BACK THE WIRE AT BURLAP AND CUT DOWN THE SIDES OF THE BURLAP IN THREE EQUALLY SPACED LOCATIONS.
- SPECIES SUBSTITUTION ON ANY PLANS IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE DEPARTMENTAL REPRESENTATIVE.
- PLANT MATERIAL TO FOLLOW CNLA STANDARDS.
- DURING THE MAINTENANCE PERIOD THE SITE TO BE IRRIGATED BY A WATER TRUCK. DEPENDING ON WEATHER CONDITIONS, PLANTS TO BE WATERED ON A DAILY BASIS UNTIL THE INITIAL ESTABLISHMENT AND AFTER THAT ON A WEEKLY BASIS TILL THE END OF THE GROWING SEASON, WITH INTENT TO ENSURE SUCCESSFUL ESTABLISHMENT OF THE PLANTS.
- REFER TO CIVIL DRAWINGS FOR ADDITIONAL GRADES.
- ALL PLANTING LOCATIONS TO BE FIELD FITTED WITH DEPARTMENTAL REPRESENTATIVE'S APPROVAL.
- A MINIMUM DISTANCE FOR TREES TO BE PLANTED AWAY FROM THE UNDERGROUND STRUCTURE IS 1000MM.
- LANDSCAPE FABRIC TO BE DEWITT PRO 5 WEED BARRIER OR APPROVED EQUIVALENT. LANDSCAPE FABRIC SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS IN ALL AREAS AS OUTLINED IN THE DRAWINGS. LANDSCAPE FABRIC SHALL NOT BE VISIBLE UNDER MULCH OR DECORATIVE ROCK AREAS AND ALL LOOSE ENDS SHALL BE CUT OFF, TUCKED UNDER, OR OTHERWISE COVERED WITH THE SPECIFIED DEPTH OF PROPOSED LANDSCAPE FINISHING MATERIAL. LANDSCAPE FABRIC SHALL BE IN DIRECT CONTACT WITH SOIL.
- ALL LANDSCAPE CONSTRUCTION MUST CONFORM WITH THE LANDSCAPE CONSTRUCTION DRAWINGS AND SPECIFICATIONS PROVIDED.

MARTEN STREET

EXISTING  
SIDEWALK

EXISTING  
OVERHEAD  
POWERLINE

The Alberta  
Association of  
Landscape  
Architects

Yogeshwar Navagrah  
July 19, 2019

### DO NOT SCALE DRAWINGS

Revision / Revision / Client / client	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19-07-19
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17



Parks Canada

Project title/Titre du projet

Banff National Park  
Banff, Alberta

PCA - STAFF HOUSING  
329 MARTEN STREET

Approved by/Approuve par

YN

Designed by/Concept par

YN

Drawn by/Dessine par

MP

Project Manager/Administrateur de Projets

Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'ingénierie

Client / client

Parks Canada

Drawing title / Titre du dessin

GRADING PLAN

Project No. / No. du project	Sheet / Feuille	Revision no. / La Révision no.
---------------------------------	-----------------	--------------------------------------

L4

5





DO NOT SCALE DRAWINGS

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19-07-19
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17

Client / client	Description / Description	Date / Date
-----------------	---------------------------	-------------



Project title / Titre du projet

**Banff National Park  
Banff, Alberta**

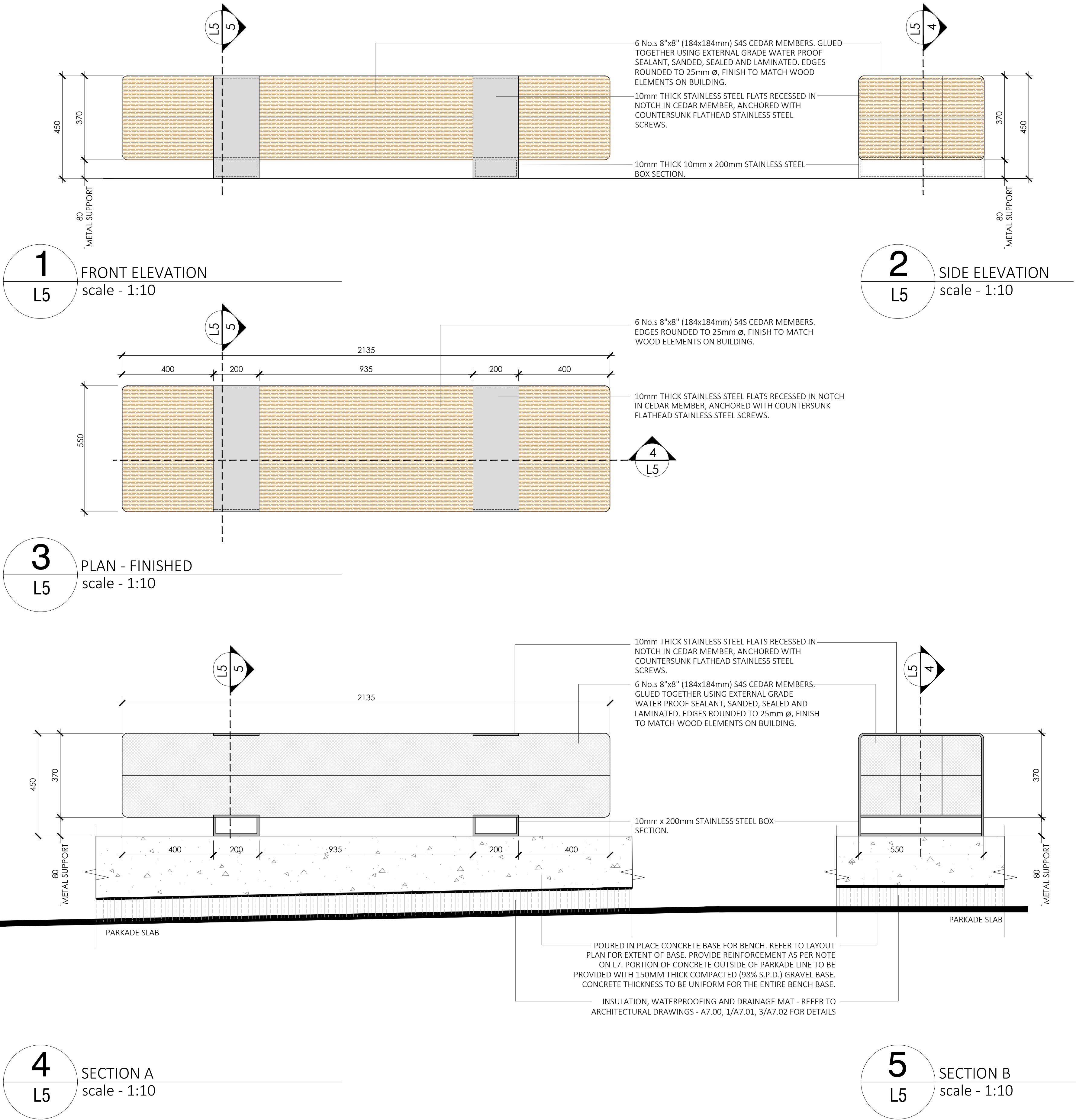
**PCA - STAFF HOUSING  
329 MARTEN STREET**

Approved by/Approuve par YN
Designed by/Concept par YN
Drawn by/Dessine par MP
Project Manager/Administrateur de Projets
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie
Client / client <b>Parks Canada</b>
Drawing title / Titre du dessin

BENCH DETAILS

Project No. / No. du project	Sheet / Feuille <b>L5</b>	Revision no. / La Révision no. <b>5</b>
---------------------------------	------------------------------	--

STRUCTURAL ENGINEER APPROVED SHOP  
DRAWINGS TO BE SUBMITTED FOR  
DEPARTMENTAL REPRESENTATIVE'S  
REVIEW CLARIFYING WELDING JOINTS,  
FASTENERS, STEEL THICKNESSES ETC.



\*\*\*STRUCTURAL ENGINEER REVIEWED AND APPROVED SHOP DRAWINGS TO BE PROVIDED FOR DEPARTMENTAL REPRESENTATIVE'S REVIEW.



**DO NOT SCALE DRAWINGS**

Revision / Révision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19-07-19
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17



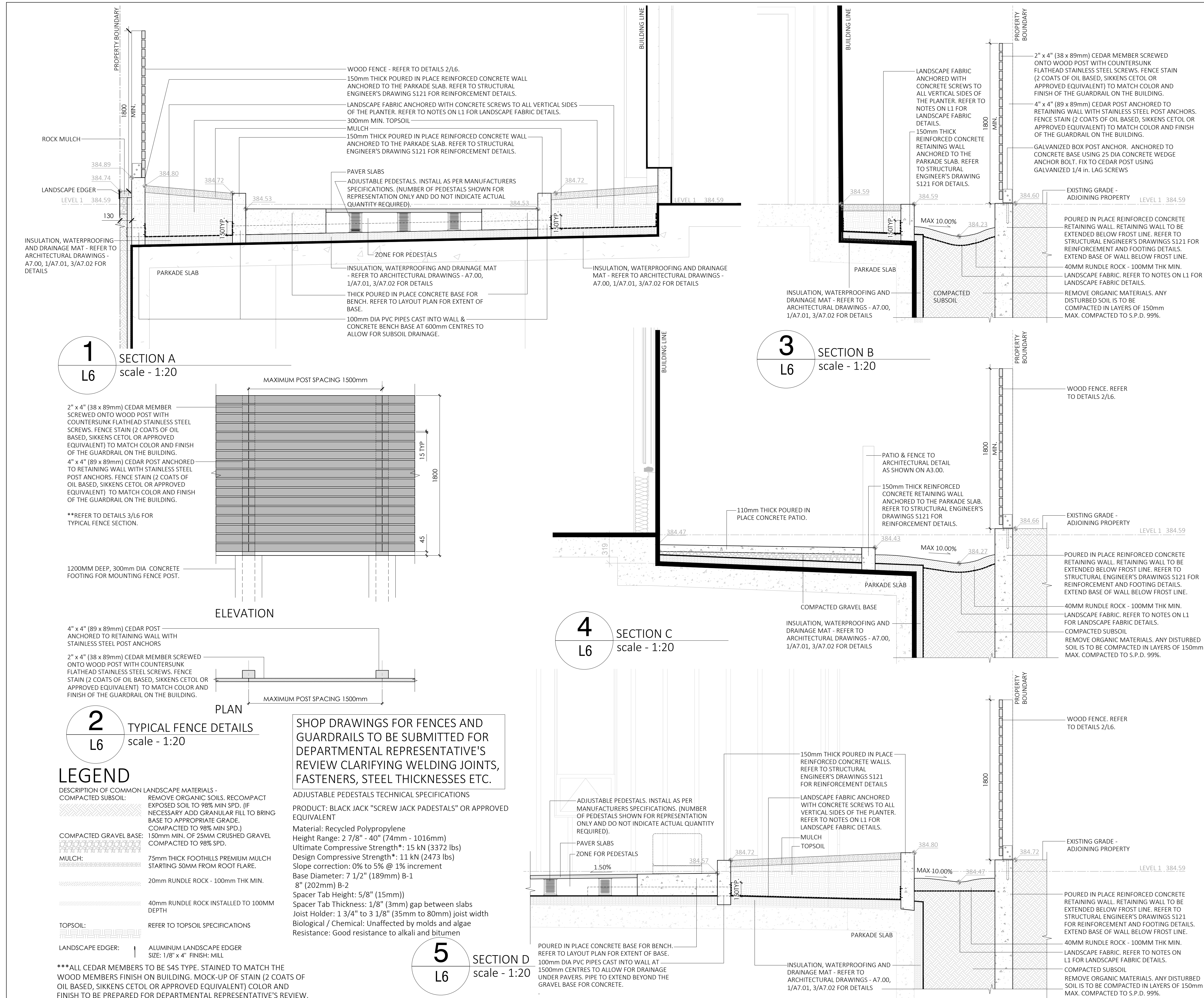
Project title/Titre du projet

**Banff National Park**  
**Banff, Alberta**  
**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuvé par YN
Designed by/Concept par YN
Drawn by/Dessiné par MP
Project Manager/Administrateur de Projets
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie
Client / client <b>Parks Canada</b>
Drawing title / Titre du dessin

**SECTIONS & DETAILS**

Project No. / No. du projet	Sheet / Feuille	Revision no. / La Révision no.
	<b>L6</b>	<b>5</b>





5  
L7

ROOTBALL

TREE BED DETAIL

scale - 1:25

**4** HANDRAIL DETAIL  
L7 scale - 1:10

## 6 CONCRETE CAPPING AND ROCK CLADDING (ONE SIDE ONLY) DETAIL

CONCRETE CAPPING AND ROCK  
CLADDING (BOTH SIDES) DETAIL  
scale - 1:10

SHOP DRAWINGS FOR FENCES AND GUARDRAILS TO BE SUBMITTED FOR DEPARTMENTAL REPRESENTATIVE'S REVIEW CLARIFYING WELDING JOINTS, FASTENERS, STEEL THICKNESSES ETC.



Parks Canada    Parcs Canada

**Banff National Park  
Banff, Alberta  
PCA - STAFF HOUSING  
329 MARTEN STREET**

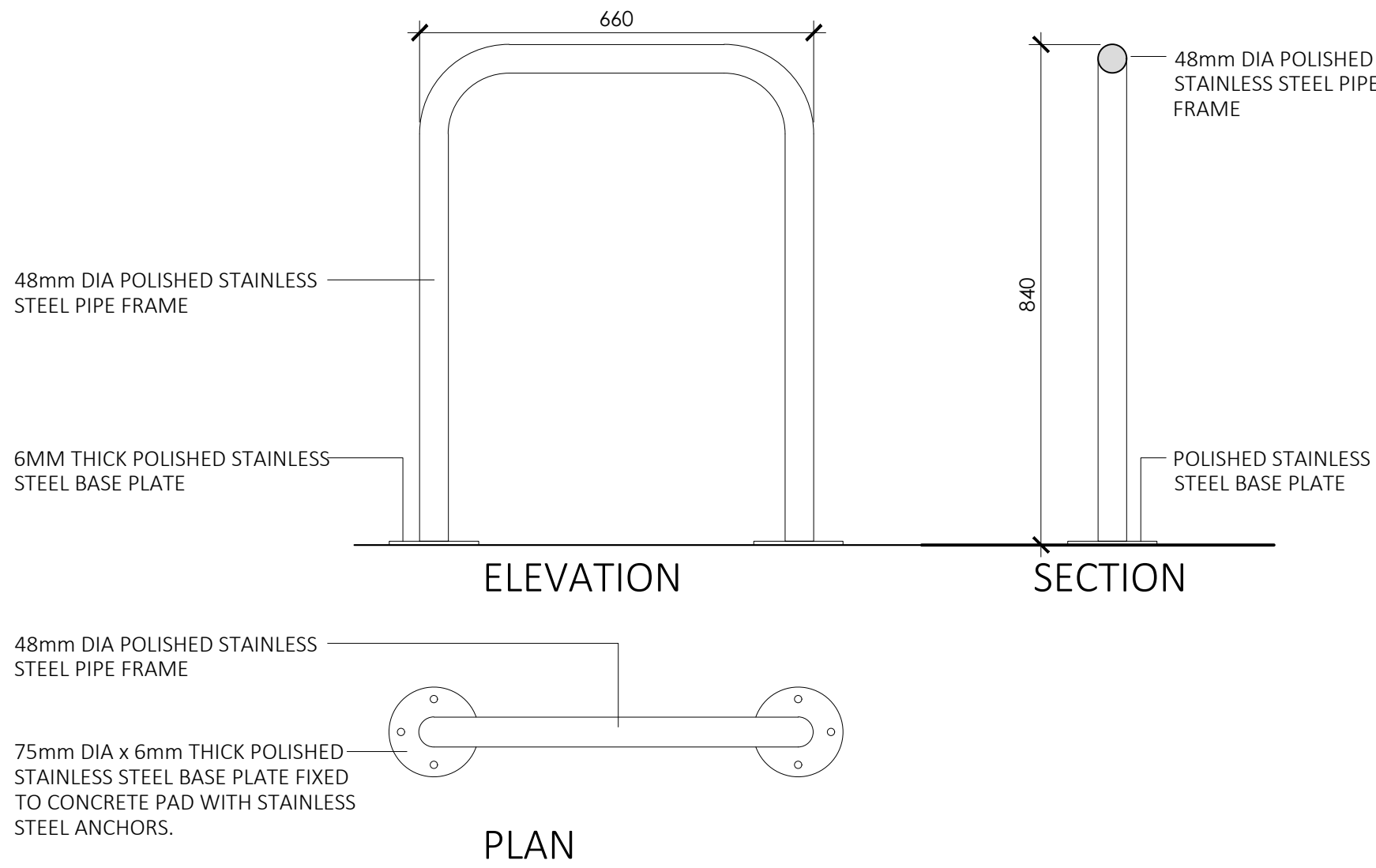
Approved by/Approuvé par	YN
Designed by/Concept par	YN
Drawn by/Dessiné par	MP
Project Manager/Administrateur de Projets	
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie	
Client / client	
<b>Parks Canada</b>	
Drawing title / Titre du dessin	

## SECTIONS & DETAILS

Project No. / No. du project	Sheet / Feuille  L7	Revision no. La Révision no. 5
---------------------------------	---------------------------	---

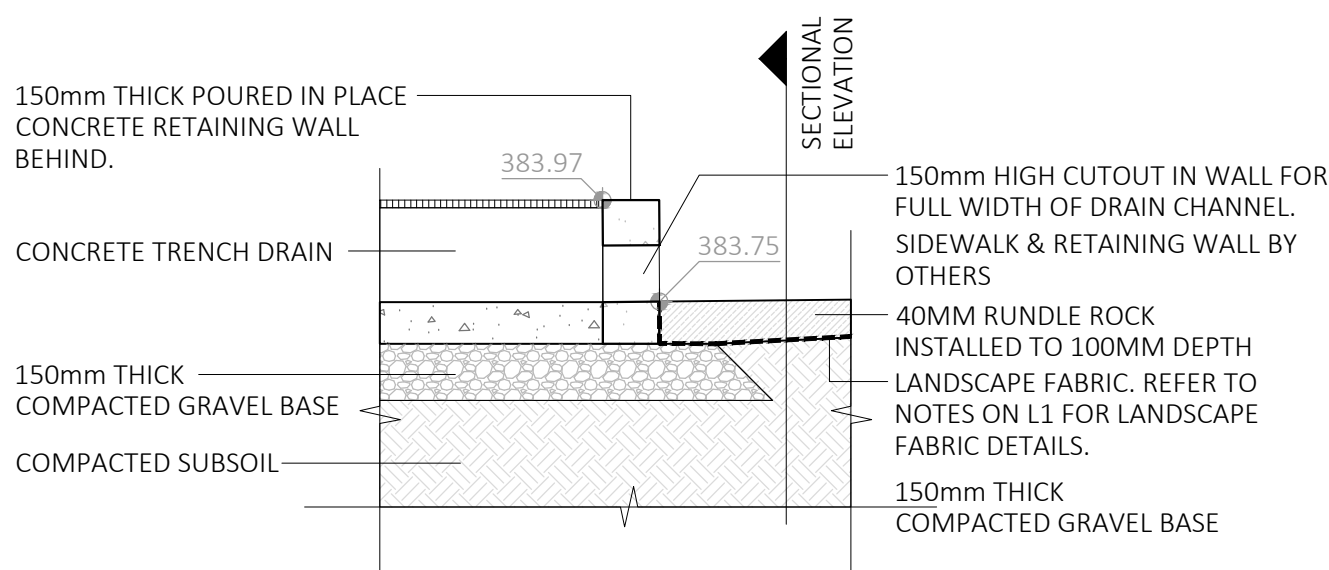






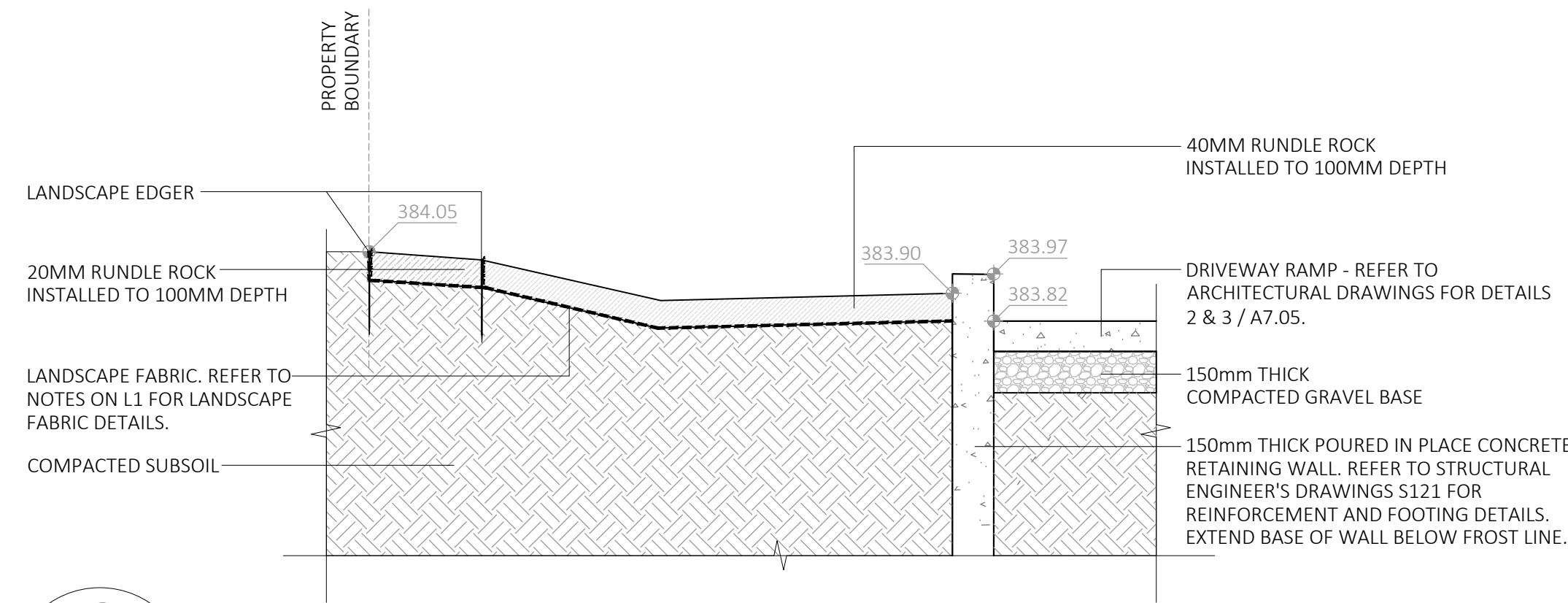
**1**  
L8

BIKE RACK DETAIL  
scale - 1:10



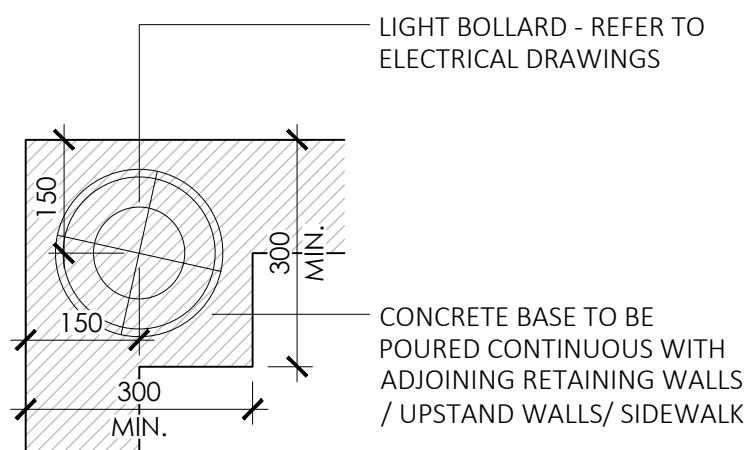
**4**  
L8

DETAIL AT DRAIN  
scale - 1:20



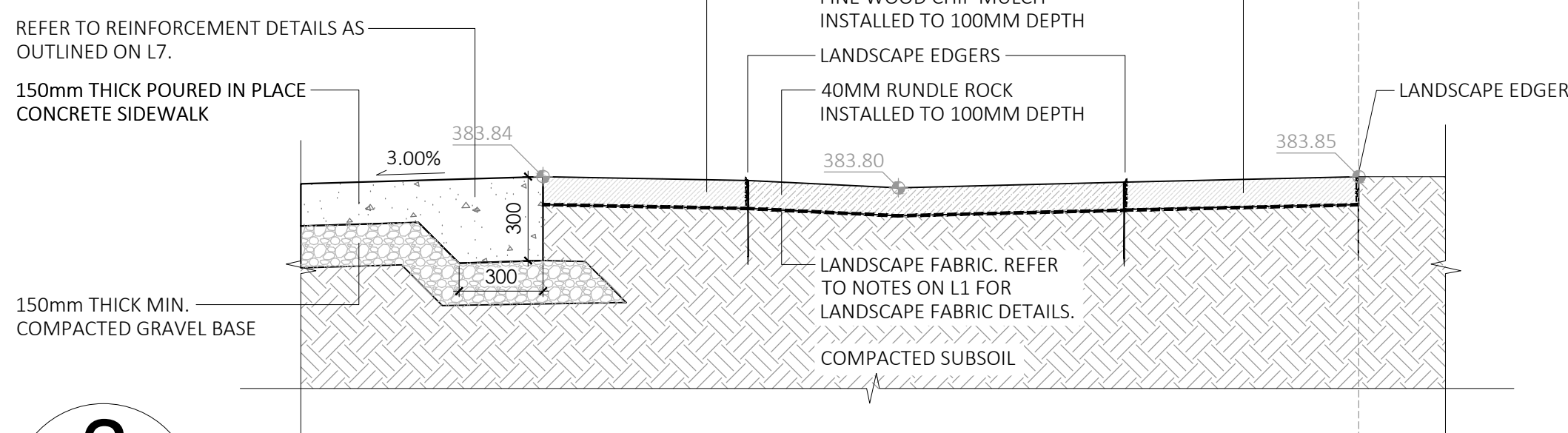
**6**  
L8

SECTION J  
scale - 1:20



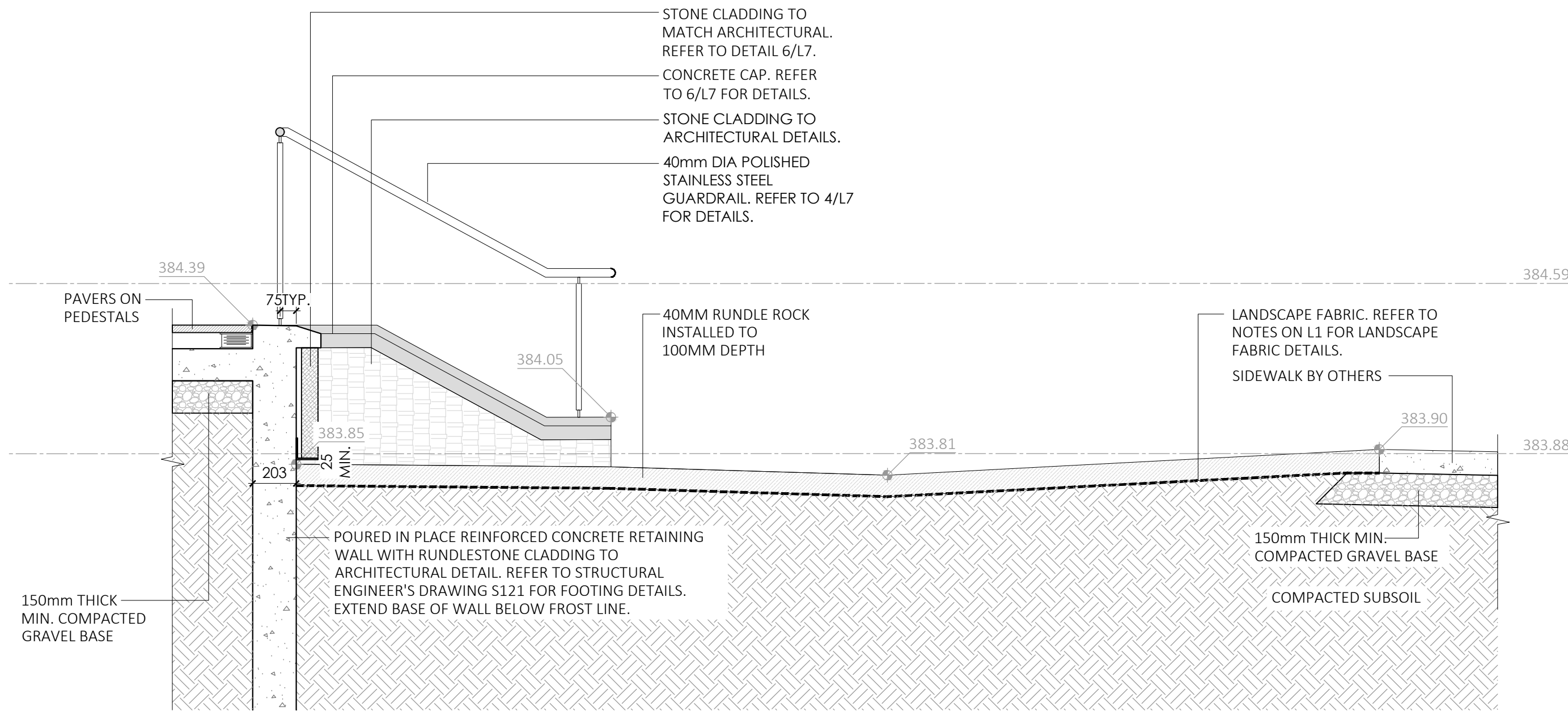
**2**  
L8

LIGHT BOLLARD SETOUT  
scale - 1:10



**3**  
L8

SECTION G  
scale - 1:20



**5**  
L8

SECTION I  
scale - 1:20

SHOP DRAWINGS FOR FENCES AND GUARDRAILS TO BE SUBMITTED FOR DEPARTMENTAL REPRESENTATIVE'S REVIEW CLARIFYING WELDING JOINTS, FASTENERS, STEEL THICKNESSES ETC.

## LEGEND

DESCRIPTION OF COMMON LANDSCAPE MATERIALS -	REMOVE ORGANIC SOILS. RECOMPACT EXPOSED SOIL TO 98% MIN SPD. (IF NECESSARY ADD GRANULAR FILL TO BRING BASE TO APPROPRIATE GRADE. COMPACTED TO 98% MIN SPD.)
COMPACTED SUBSOIL:	150mm MIN. OF 25MM CRUSHED GRAVEL COMPACTED TO 98% SPD.
COMPACTED GRAVEL BASE:	75mm THICK FOOHILLS PREMIUM MULCH STARTING 50MM FROM ROOT FLARE.
MULCH:	20mm RUNDLE ROCK - 100mm THK MIN.
TOPSOIL:	40mm RUNDLE ROCK INSTALLED TO 100MM DEPTH
LANDSCAPE EDGER:	REFER TO TOPSOIL SPECIFICATIONS
ALUMINUM LANDSCAPE EDGER SIZE: 1/8" x 4" FINISH: MILL	
***ALL CEDAR MEMBERS TO BE S4S TYPE. STAINED TO MATCH THE WOOD MEMBERS FINISH ON BUILDING. MOCK-UP OF STAIN (2 COATS OF OIL BASED, SIKKENS CETOL OR APPROVED EQUIVALENT) COLOR AND FINISH TO BE PREPARED FOR DEPARTMENTAL REPRESENTATIVE'S REVIEW.	

The Alberta Association of Landscape Architects  
Yogeshwar Navagrah  
July 19, 2019

### DO NOT SCALE DRAWINGS

Revision / Revision	Description / Description	Date / Date
5	ISSUED FOR TENDER / BP	19-07-19
4	99% CONSTRUCTION DRAWINGS	09-03-18
3	66% CONSTRUCTION DRAWINGS	09-02-18
2	100% DESIGN DEVELOPMENT	13-12-17
1	DP COMMENTS REVISIONS	19-10-17



Project title/Titre du projet  
**Banff National Park**  
**Banff, Alberta**  
**PCA - STAFF HOUSING**  
**329 MARTEN STREET**

Approved by/Approuve par YN
Designed by/Concept par YN
Drawn by/Dessine par MP
Project Manager/Administrateur de Projets
Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie
Client / client <b>Parks Canada</b>
Drawing title / Titre du dessin

### SECTIONS & DETAILS

Project No. / No. du projet	Sheet / Feuille <b>L8</b>	Revision no. / La Révision no. <b>5</b>
-----------------------------	------------------------------	---





**APPENDIX B**

**SUMMARY OF ENVIRONMENTAL WORK**



## 1. SCOPE OF WORK

- .1 This Section describes the remediation work of the Project located at 329 Marten Street, Banff AB (Lot 2, Block 12, Plan 21533 [CLSR]). The remediation includes decommissioning/abandoning existing piezometers on-site, excavating the upper 1 m of soil (inclusive of topsoil), disposing of Waste Material (contaminated soil) at an approved class 2 landfill, confirmatory sampling within the walls and base of the excavation prior to backfill activities, soil quality sampling of backfill material (topsoil/subsoil), backfilling of the excavation with subsoil salvaged from the Project where possible and/or importing clean soil from an external source and replacement and grading of topsoil. Detailed drawings are provided within Appendix A to illustrate construction limits.

## 2. ABBREVIATIONS

- .0 The *Contractor* is advised that the following abbreviations may be used in specifications:

<u>Abbreviation</u>	<u>Association</u>
AIA	Albert Institute of Agrologists
ASPB	Alberta Society of Professional Biologists
ACPA	Association of Chemical Professionals of Alberta
AEP	Alberta Environment and Parks
APEGA	Association of Professional Engineers and Geoscientists of Alberta
ASET	Association of Science and Engineering Technology Professionals in Alberta
CAPF	College of Alberta Professional Foresters
CAPFT	College of Alberta Professional Foresters Technologists
CCME	Canadian Council of the Ministry of the Environment
CEQG	Canadian Environmental Quality Guidelines (CCME, 1999 and updates)
Client	Parks Canada Agency – Banff Field Unit
CLSR	Canada Lands Survey Records
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
F1-F4	Petroleum hydrocarbon fractions F1 (C <sub>6</sub> –C <sub>10</sub> ), F2 (>C <sub>10</sub> –C <sub>16</sub> ), F3 (>C <sub>16</sub> –C <sub>34</sub> ), and F4 (>C <sub>34</sub> )
OHSC	Occupational Health and Safety Code
PAH	Polycyclic Aromatic Hydrocarbon
PHC	Petroleum Hydrocarbons (BTEX, F1-F4)
Project	329 Marten Street (Lot 2, Block 12, Plan 21533 [CLSR])
Weeds	Those listed on the <i>Weed Control Act</i> as well as any non-native species

## 3. SUBMITTALS

The following specific information shall be provided:

- .1 Backfill samples: two weeks prior to the backfill activities. Soil samples shall be collected by an *Environmental Professional* (a member in good standing with one of the following professional organizations: AIA, ASPB, ACPA, APEGA, ASET, CAPF, CAPFT) then analysed for soil texture (% sand, silt, clay), PHC, PAH, detailed salinity, CCME metals, and weeds at an accredited CALA laboratory. Samples must be submitted to the Departmental Representative providing QA/QC to the project scope for approval.
- .2 Source: *Contractor* must provide evidence of the source of all external backfill soil material to the Departmental Representative for approval (mapped location, coordinates, photos of soil pile/source). Backfill source should be relatively free of weeds.



- .3 Confirmation Samples: Immediately following excavation of Waste Material. Soil samples shall be collected by an *Environmental Professional* (as defined in Section 3.1) then analysed for soil texture PHC, PAH, detailed salinity and CCME metals at an accredited laboratory. Samples must be submitted to the Departmental Representative for review and approval.
- .4 Construction Quantity: If different than tendered quantity due to unforeseen circumstances (e.g. availability), the anticipated quantities of backfill soil will be submitted to the Departmental Representative for approval two weeks prior to backfill activities. Changes and/or substitutes to the backfill material that proceed without prior approval are completed at the risk of the Contractor.

#### 4. ENVIRONMENTAL REQUIREMENTS

- .1 Copies of necessary permits, licenses, agreements, and/or approvals must be available at the Project during excavation and backfill work (ground disturbance, crossing and proximity agreements, waste approval, etc.).
- .2 Restrict excavation activities to within the designated work space, approved access routes and approved site use plan. Adhere to municipal bylaws including, but not limited to, noise bylaws, approved days of operation for construction operations, etc.
- .3 The Contractor shall keep the construction area and facilities clean of all food and packaging and shall ensure that animal proof garbage containers are used for the disposal of food and similar waste materials that could be attractive to wildlife.
- .4 Review restricted activity dates and sensitive wildlife seasons applicable to construction-related activities prior to scheduling construction activities. Schedule construction outside of the migratory bird restricted activity dates (approximately April to August) to avoid adverse effects on nesting migratory birds and other wildlife, to the extent feasible. If construction activities occur within restricted activity dates, a nest and/or wildlife sweep will be required no more than seven (7) days prior to construction activities. Sweeps by a qualified biologist should occur two to six (2 to 6) days prior to construction (and prior to construction start up if construction has stopped for more than four (4) days) within the restricted activity dates until construction is complete or as directed by a qualified biologist. Depending on recorded occurrence of species with management concern within the vicinity of the Project, wildlife/nest sweeps may occur beyond the Project footprint to allow for potential setbacks. The *Contractor* must ensure necessary sweeps are completed and submit any reports to the Departmental Representative.
- .5 In the event that active nests, dens, burrows, etc. are found during clearing and construction activities, consultation with the appropriate regulator is required. Active nests may be subject to an appropriate buffer until the nest, den, burrow, etc., is no longer active or a permit may be granted for removal.
- .6 Report any collisions with wildlife or active nests to the Departmental Representative.
- .7 Payment for the incidentals accrued to assess restricted activity dates, sensitive wildlife seasons, nest sweep, etc. shall be incidental to the Building Construction lump sum price.



## 5. EQUIPMENT

- .1 Construction and excavation equipment must be clean and free of soil or vegetative debris before its arrival at the Project to reduce the risk of weed introduction. Any equipment that arrives dirty, will not be permitted at the Project.
- .2 Prohibit fuel storage, refuelling or servicing of equipment within the Project, except where secondary containment and/or tertiary containment is provided.
- .3 Ensure no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides or other chemicals are released onto the ground, into any storm water infrastructure.
- .4 Do not wash equipment or machinery at the Project. The decontamination area and wash pad should be reviewed by the Contractor if significant contamination is encountered, to ensure off-site areas are not contaminated. Any liability associated with off-site impacts due to the above are the sole responsibility of the Contractor.
- .5 Maintain equipment in good working condition and ensure that equipment and vehicles are free of leaks. If leaks are identified, the machine/vehicle must be removed from the Project immediately. Containment of the leaking fluid must be achieved until the removal/replacement of the equipment/vehicle occurs. Any leaked fluids must be disposed of off-site at an approved waste facility and confirmation samples of the cleaned-up area shall be collected by an *Environmental Professional* (Section 3.1), then analysed at an accredited laboratory for parameters of concern. Containment and clean-up of leaked fluid shall be at the *Contractor's* expense.

## 6. PIEZOMETER ABANDONMENT

- .1 General
  - .1 Three piezometers are present at the Project. Prior to or in conjunction with excavation and removal of Waste Material, the piezometers will be removed and abandoned in accordance with ASTM D5299/D5299M-18.. These activities must be supervised by an *Environmental Professional* (Section 3.1) who will then complete and submit records of the piezometer abandonment to the Departmental Representative.
  - .2 Payment for the piezometer abandonment shall be incidental to the Building Construction lump sum price. This payment will be full compensation for all the material, labour, equipment and any incidentals required to complete the work, including, but not limited to, *Environmental Professional* fees and low-permeability grout.

## 7. EARTHWORKS

- .1 General
  - .1 If any soil is excavated that will be reused on-site (i.e. subsoil excavated for parkade), it shall be stockpiled on-site as approved by the Departmental Representative. Removal, disposal and replacement of soils contaminated through negligence, undue care or over-excavation of the *Contractor* shall be at the *Contractor's* expense.



- .2 Salvaged or Waste Soil stockpiles shall not exceed 2 meters in height, unless directed by the Departmental Representative. The maximum allowable slope on any side of the stockpile shall be 3H:1V unless otherwise directed by the Departmental Representative. Placement of the stockpiles shall not be over top of, or within 5 meters' proximity of, any existing utility, whether underground or overheard, or prevent access to any utility manholes, poles, pull boxes, or other items of similar nature.
- .3 If soil stockpiling occurs over an extended period of time, vegetation management should occur to keep the soil piles free of weeds. Waste Material shall not be stored on-site for an extended period of time unless approved by the Departmental Representative.

.2 Topsoil Stripping

- .1 Prior to or during removal of the topsoil, average topsoil depths will be recorded, and representative samples will be collected by an *Environmental Professional* (Section 3.1) and submitted to an accredited laboratory for texture analysis (% sand, silt, clay), enabling replacement of the topsoil with a comparable material.
- .2 All topsoil within the Project will be excavated and landfilled as outlined in Section 7.3.1 Waste Material Excavation.
- .3 Removed Waste Material topsoil will be replaced with topsoil of the same texture (e.g, same % sand, silt and clay) that has been sampled by an *Environmental Professional* and analysed as per Section 3.1 at an accredited laboratory. Analytical results must be found to be compliant with the CEQG – Residential/Parkland Use, Coarse Surface Soil. Additionally, the source must be approved by the Departmental Representative.

.3 Waste Material Excavation

- .1 The waste material excavation is based on the volume contained between the ground surface (inclusive of topsoil) to 1 m below grade for the entire area (0.0649 hectares/649 m<sup>2</sup>) of the Project, or 649 m<sup>3</sup>. (Drawing A1.01) The stated volume is approximate only and despite whether the volume increases or decreases, excavation of the waste material will be completed at the per cubic metre unit prices stated in the Unit Price Table. The excavated area is to be measured/confirmed by end-area survey before and after excavation. The tendered unit rates shall also include full compensation for excavation, loading, hauling, subgrade, preparation, placement, compaction, ditch shaping, dust control, and proof rolling, and includes all labour, materials, equipment, and incidentals associated with completing the work. Excavations will adhere to the shoring and excavation specifications as outlined in the OHSC.
- .2 Following the excavation of the waste material, confirmation sampling will be completed by an *Environmental Professional* (Section 3.1). The samples will be collected in accordance with AEP and CCME standards and submitted to an accredited CALA laboratory for CCME metals, PHC, and PAH analysis. Analysis must be reviewed and approved by an *Environmental Professional* prior to backfilling of the excavation. Sub-meter GPS coordinates, photos and a site diagram will be collected by the *Environmental Professional* following sample collection.



- .3 Upon completion of excavation, stockpiles shall be trimmed to present a tidy appearance or be removed from the Project if deemed necessary by the Departmental Representative. Fences removed for purposes of entry shall be replaced, and debris resulting from the operation shall be removed and disposed of, all in a manner satisfactory to the Departmental Representative.
- .4 The *Contractor* shall conduct operations to minimize double handling of excess common material. The *Owner* will not consider additional costs for second handling from the *Contractor*, should the Departmental Representative deem the second handling as unnecessary due to poor site management.
- .5 Payment for waste material excavation shall be made in per cubic meter at the tendered unit price. The unit price bid will be full compensation for all excavation and disposing of all waste material at a Class II landfill, including, but not limited to, all materials, analysis, labour, equipment, tools and incidentals, traffic accommodation, transportation, disposal and disposal fees required to complete the Work.

.4 Common Excavation

- .1 Common Excavation means the excavating, loading, hauling, and/or on-site stockpile of materials which are surplus or unsuitable to use as determined by the Departmental Representative. This includes any surplus stripping material.
- .2 The common excavation area is based on the volume contained between the base of the Waste Material Excavation (Section 7.3.1) and the surface after excavation to the designed grades (see drawings) as measured by an end-area survey before and after excavation. The per cubic meter tendered unit rates shall also include full compensation for excavation, loading, hauling, subgrade, preparation, placement, compaction, ditch shaping, dust control, and proof rolling, and includes all labour, materials, equipment, and incidentals associated with completing the work. Excavations will adhere to the shoring and excavation specifications as outlined in the OHSC.
- .3 Upon completion of excavation, stockpiles shall be trimmed to present a tidy appearance or removed from the Project if deemed necessary by the Departmental Representative. Fences removed for purposes of entry shall be replaced, and debris resulting from the operation shall be removed and disposed of, all in a manner satisfactory to the Departmental Representative.
- .4 The *Contractor* shall conduct operations to minimize double handling of excess common material. The *Owner* will not consider additional costs for second handling from the *Contractor* should the Departmental Representative deem the second handling as unnecessary due to poor site management.
- .5 Payment for common excavation will be made in per cubic meter at the tendered unit price for common excavation. Payment volumes will be measured on the basis of the excavated and landfilled volume, as per landfill summaries.

.5 Project Subsoil Grading/Backfill

- .1 Subsoil grading will be completed as directed by the Departmental Representative (see Geotechnical Report).



- .2 Clean subsoil (>1 m below grade) may be re-used from the Project, or an external source may be utilized if required. Should an external source be used, the removed subsoil will be replaced with subsoil of the same texture (e.g, same % sand, silt and clay) that has been sampled by an *Environmental Professional* and analysed as per Section 3.1 at an accredited laboratory. Analytical results must be found to be compliant with the CEQG – Residential/Parkland Use, Coarse Surface Soil. Additionally, the source must be approved by the Departmental Representative (Section 3.2).
- .3 Payment for the backfill shall be made in per cubic meter at the tendered unit price for backfill. This payment will be full compensation for all the material, labour, equipment and any incidentals required to complete the work. Payment shall be inclusive of soil analytical testing, material hauling from stockpile or place of excavation, breaking down lumps, removal and disposal of rocks 5 cm or over in dimension, roots and stumps, preparing the excavation, placing backfill material, spreading, compaction and removal and disposal of any foreign object if present in a manner satisfactory to the Departmental Representative.

## 8. REFERENCES

ASTM D5299/D5299M-18. (2018). Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities. American Society for Testing and Materials, International.

END OF SECTION



**APPENDIX C**

**ENVIRONMENTAL IMPACT ASSESSMENT  
MITIGATIONS**



**Parks Canada 329 Marten St Townhouse (BNP-1257)**  
**Additional Mitigations**

For further clarification of the Best Management Practices outlined in the Town of Banff Model Class Screening Report (Sub-Class 1: Buildings), project-specific mitigation measures to be followed are as follows:

- Submit a project-specific **Environmental Protection Plan (EPP)** for each phase of the project (demolition, construction) to the Parks Canada Agency Environmental Surveillance Officer (PCA ESO) for review prior to the start of work. Changes to any part of an approved EPP must be reviewed by the ESO prior to implementation.

Each EPP should describe the methods that will be used to implement all mitigation measures set out by the EIA, as well as:

- **Emergency Response Plan**
  - **Spill Response Plan**
  - **Erosion and Sediment Control Plan**
  - **Construction Dewatering Plan** that includes:
    - Anticipated volume, duration, timing,
    - Locations of discharge, and
    - Process for characterising water quality for discharge.
  - **Soil Management Plan** that includes:
    - Anticipated volumes,
    - Locations of disposal, and
    - Process for characterising soil quality for disposal.
- 
- Delineate and address known contamination on site as recommended by the PCA Contaminated Sites Specialist. Any contamination found during excavation that was not previously identified must be reported to Parks Canada immediately.
  - Submit all relevant reporting (e.g., soil sampling, groundwater monitoring) to the ESO when completed.
  - Construct and maintain a rigid, wildlife-proof fence or other secure barrier around any unattended excavations.
  - Select topsoil or engineered soil medium for landscaping in consultation with the ESO and PCA Vegetation Specialist. Topsoil imports require soil analysis as per PCA Vegetation Specialist requirements prior to import. Specifications for any engineered soil medium must be reviewed by the PCA Vegetation Specialist prior to import.
  - Use the publication *Recommended Plant Species for Landscaping in Banff National Park* as a guide for all landscaping. Consult with the PCA Vegetation Specialist if species not listed by this publication are being considered for landscaping.



#### Special Considerations for Bats (Species at Risk):

- **During Bat Roosting Season** (April 1 to August 31), the presence/absence of bats in the building must be determined and confirmed within two weeks in advance of work commencing. Results must be documented and provided to the ESO. Use of acoustic monitoring equipment is recommended to supplement the initial survey if a building is suspected to be bat habitat. Presence/absence checks must be completed by a qualified individual familiar with bat ecology and bat roosts, and an inspection form is available upon request. If bats are present, Parks Canada will evaluate to determine next steps. If bats are not present, commence work within two weeks of the inspection. If more than two weeks have elapsed since the most recent inspection, another inspection must be conducted prior to the continuation of work.
  - If a bat is found while work is taking place, stop work and allow the bat to exit on its own. Ensure it has access to the outside via open door(s) and/or window(s). If bats won't exit, they return or continue to be found, contact Parks Canada who will need to evaluate whether the bat is passing through or using the location as a maternity roost or hibernation site to determine next steps.
- **Outside Bat Roosting Season** (September 1 to March 31), if bat(s) are found, contact the ESO. Parks Canada will evaluate whether or not the building is being used for hibernation.
- If dead or injured bats are found, leave them as found and notify the ESO immediately. A qualified individual should safely collect (i.e., wear gloves) dead bats to be tested for White-Nose Syndrome (WNS) as per Section 1.1.4 of the Parks Canada *Standards for Managing Bats in Protected Heritage Areas*.



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects

Activity	Potential Impacts	Mitigation Measures
<b>Pre-planning</b>		
Site investigation, including geotechnical investigation	Sensory disturbance, disturbance of archaeological resources, slope failure, sedimentation	<ul style="list-style-type: none"> <li>• Conduct Phase I Environmental Site Assessment, if not already completed for the site, and additional site surveys, test pits, bore holes etc. if necessary.</li> <li>• Minimize the time boreholes remain open in order to reduce small terrestrial wildlife mortality. Properly seal boreholes and fit PVC pipes.</li> <li>• Use existing roadways or disturbed areas for site access and travel within the site.</li> <li>• Follow appropriate excavation mitigation measures for geotechnical investigation (see mitigations for "Trenching").</li> </ul>
General planning activities specific to all building projects.	Runoff / sedimentation; soil contamination	<ul style="list-style-type: none"> <li>• Prepare an Emergency Response Plan for the worst case, i.e., heavy rainfall and runoff events, high winds, spills, fires, etc.</li> <li>• In the event of emergency operations (as defined in Section 4.11 of the MCSR), call 911. The Warden Dispatch can also be contacted (available 24 hours/day) at (403) 762-4506 or the Wardens Office at (403) 762-1470 to notify of any emergency procedures required.</li> <li>• Ensure all activities are conducted at least 30 m from waterbodies.</li> </ul>
	Dust production	<ul style="list-style-type: none"> <li>• Have a water source available to wet down exposed soil and dry areas.</li> </ul>
	Wind and water erosion	<ul style="list-style-type: none"> <li>• Prepare a satisfactory Sediment and Erosion Control Plan covering all construction and restoration periods.</li> <li>• Acquire necessary sediment control equipment (i.e., straw bales, landscaping fabric, sediment fences, etc.) and install prior to construction.</li> <li>• Extra planning should be used for areas with silty deposits (VL3 and VL4) and sloped areas with sandy deposits (see Figure 4.2).</li> </ul>
	Compaction of soils	<ul style="list-style-type: none"> <li>• Identify soils susceptible to compaction (fine textured and organic soils).</li> <li>• In sensitive areas, use equipment of low bearing weight, low PSI tires, or tracked vehicles.</li> </ul>
	Slope failure	<ul style="list-style-type: none"> <li>• Assess slope stability (based on slope length, soil texture, steepness, soil depth) and adjust activities to avoid these areas if possible. Use appropriate setbacks.</li> <li>• Pay particular attention when planning for slopes of Class 6 (15-30%) or greater, especially where soils are shallow and likely to move with disturbance.</li> </ul>
	Habitat loss and fragmentation; or encroachment on wildlife movement corridor	<ul style="list-style-type: none"> <li>• Identify wildlife habitat that may be impacted by activities and avoid sensitive areas, including wetlands.</li> <li>• Ensure only necessary vegetation is removed and delineate areas to be avoided with biodegradable flagging tape and/or temporary fences.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
Continued

Activity	Potential Impacts	Mitigation Measures
General planning activities (continued)	Sensory disturbance and mortality of wildlife	<p>When working adjacent to natural areas:</p> <ul style="list-style-type: none"> <li>According to the wildlife that may be present, schedule high noise level activities and other intrusive construction activities to avoid critical life stages (breeding, nesting, rearing, migration). Consult with Parks Canada (403-762-1416) to discuss any localized wildlife concerns.</li> <li>Confine “noise” activities to hours set out in Town of Banff Noise Bylaw.</li> <li>Consider posting wildlife signs to reduce vehicle speeds and increase driver awareness near construction areas where wildlife mortality has or is likely to occur.</li> <li>Educate workers to not harass or attract wildlife, keep the site free of food scraps, and dispose of garbage in bear proof containers.</li> </ul>
	Disturbance of archaeological resources	<ul style="list-style-type: none"> <li>Consult with Parks Canada (403-762-1416) to discuss if consultation with the Park’s archaeologist is required (see Figure 4.1).</li> <li>If it is deemed that potential archaeological sites may be subject to ground disturbance activities should be adapted to avoid them.</li> <li>Educate workers to notify site supervisor upon finding any archaeological artefacts and to stop work immediately.</li> </ul>
	Increased water and energy consumption	<ul style="list-style-type: none"> <li>Identify water and energy conservation opportunities for building design (e.g., low flow fixtures, low energy heating and lighting) and outdoor requirements (e.g., yard lighting, drip irrigation systems).</li> </ul>
	Public safety	<ul style="list-style-type: none"> <li>Outline traffic control measures and assess the need for flagging personnel.</li> <li>Call utility line companies to identify infrastructure locations (Alberta OneCall: 1-800-242-3447).</li> </ul>
	Reduced aesthetics (noise and visual)	<ul style="list-style-type: none"> <li>Evaluate the site layout, access routes and construction activities to minimize their visual impact.</li> <li>Plan work schedule to confine “noise” activities to hours set out in Town of Banff Noise Bylaw and, if possible, periods of low visitation.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
<b>Site Preparation</b>		
Clearing of vegetation	Dust production	<ul style="list-style-type: none"> <li>Wet down dry, exposed soils, particularly during windy periods.</li> <li>Ensure materials being stored or transported are covered with tarps or equivalent material.</li> </ul>
	Runoff / sedimentation	<ul style="list-style-type: none"> <li>Halt construction activity on exposed soil during events of high rainfall intensity and runoff and refer to the Sediment and Erosion Control Plan. Periodically inspect erosion control structures for effectiveness.</li> </ul>
	Wind and water erosion	<p>Particularly in areas with silty deposits (VL3 and VL4) and sloped areas with sandy deposits (Figure 4.2):</p> <ul style="list-style-type: none"> <li>Protect exposed soils with coarse granular materials, mulches, straw, or landscaping fabric along drainage pathways.</li> <li>Minimize grubbing.</li> </ul>
	Damage to adjacent vegetation, loss of native vegetation	<p>To protect undeveloped areas adjacent to development site:</p> <ul style="list-style-type: none"> <li>Minimize area cleared. Clearly mark area to be cleared with biodegradable flagging tape and/or temporary fences.</li> <li>Ensure vertical (Rocky Mountain) juniper, Douglas fir and limber pine are protected.</li> <li>For every tree removed, two native trees must be planted.</li> <li>Hoarding around trees to be retained must be installed beyond the tree's drip line prior to commencement of site work.</li> <li>A development permit from the Town of Banff Planning and Development Division (403-762-1215) is required before removing any trees.</li> <li>Ensure excavated material does not damage or bury plant material that is to be retained on the site or in adjacent areas.</li> <li>Trees are to be cut so that they fall inside the cleared perimeters.</li> <li>Care must be taken during grubbing and stripping to ensure that trees and roots on the edge of the cleared area are not disturbed.</li> <li>Grubbing and stripping may not be permitted on steep slopes to reduce the potential for erosion.</li> </ul>
	Wildlife habitat loss and fragmentation; or encroachment on wildlife movement corridor	<p>When working adjacent to all undeveloped areas and areas bordering natural habitat, especially wildlife movement corridors and natural wetlands:</p> <ul style="list-style-type: none"> <li>Clear only the minimum area required for construction activities.</li> <li>Retain vegetation barriers where possible, especially trees and shrubbery.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
Clearing of vegetation (continued)	Reduced aesthetics	<ul style="list-style-type: none"> <li>• Transport stockpiled material offsite immediately or stockpile cleared vegetation in an area out of view from public until it can be disposed of appropriately (see mitigations for "Disposal of cleared material").</li> <li>• Dispose of cleared vegetation as soon as possible.</li> </ul>
Grading and excavation	Dust production / aesthetics	<ul style="list-style-type: none"> <li>• Wet down dry, exposed soils.</li> <li>• Ensure materials being stored or transported are covered with tarps or equivalent material.</li> <li>• Minimize grading and excavation on windy days to limit dust production.</li> </ul>
	Runoff / sedimentation	<p>Halt construction activity on exposed soil during events of high rainfall intensity and runoff.</p> <ul style="list-style-type: none"> <li>• All excavations will remain free of water (see mitigations for "Dewatering").</li> <li>• Cover stockpiles of soil with polyethylene sheeting, tarps, or vegetative cover.</li> </ul> <p>Sites close to waterbodies, but not closer than 30 m:</p> <ul style="list-style-type: none"> <li>• To ensure that site run-off is minimized, control overland flow up gradient and down gradient of excavated areas by use of effective diversion ditches, bales, vegetation filter strips, or sediment traps.</li> </ul>
	Wind and water erosion	<ul style="list-style-type: none"> <li>• Particularly in areas with silty deposits (VL3 and VL4 - see Figure 4.2), and sloped areas with sandy deposits:</li> <li>• Protect exposed soils with coarse granular materials, mulches, or straw.</li> <li>• Cover stockpiles of soil with polyethylene sheeting, tarps, or vegetative cover.</li> </ul>
	Loss of topsoil and/or topsoil-subsoil mixing	<ul style="list-style-type: none"> <li>• Use separate lifts and storage of topsoil and subsoil horizons, replacing them in the same order after completion of activity, wherever practical.</li> <li>• Topsoil will be stored away from any slopes, subsoils, spoil material, construction activities and day-to-day operations.</li> </ul>
	Slope failure	<ul style="list-style-type: none"> <li>• Avoid work on steep slopes unless absolutely necessary.</li> </ul> <p>Areas with slopes of Class 6 (15-30%) or greater, especially where shallow soils overlie bedrock:</p> <ul style="list-style-type: none"> <li>• Use appropriate geo-technical control measures to stabilize slopes. Consult occupational health and safety guidelines.</li> </ul>
Disposal of cleared material	Dust production	<ul style="list-style-type: none"> <li>• Ensure cleared vegetation being stored or transported is covered with tarps or equivalent material.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
Continued

Activity	Potential Impacts	Mitigation Measures
Disposal of cleared material (continued)	Reduced aesthetics (visual)	<ul style="list-style-type: none"> <li>Minimize the time cleared vegetation remains at the work site.</li> <li>Large timber (trees larger than 15 cm DBH) shall be cut into blocks not to exceed 35 cm and stockpiled for re-use as firewood.</li> <li>Smaller trees and other woody material may be chipped and sent to the Cascade pit, or burned, if a burning permit is obtained. Dispose of diseased vegetation by burning.</li> <li>Dispose of trade waste at the Bow Valley Waste Management Commission's Class III landfill.</li> </ul>
<b>Construction</b>		
Dewatering	Sedimentation; Erosion; Damage to vegetation	<ul style="list-style-type: none"> <li>Dewatering is not permitted into any waterbody, including the Bow River and Whiskey Creek.</li> </ul> <p>Dewatering is permitted across previously disturbed vegetation or natural vegetation if the following conditions are met:</p> <ul style="list-style-type: none"> <li>Sediment controls are used (i.e., silt fences, silt bags, etc.).</li> <li>Water velocity is controlled to dissipate energy, prevent soil erosion and allow for infiltration.</li> <li>Dewatering structures are continuously monitored to ensure no damage is being done to soil or vegetation.</li> <li>As an interim measure, the Town may allow silty water to be pumped into the sanitary system. A permit is required (403-762-1215).</li> <li>Parks Canada does not allow dewatering into storm sewers unless it can be demonstrated that the proponent has the methods and equipment to limit sediment entering the receiving waterbody.</li> <li>Sediment from the traps may be used as fill on the construction site.</li> </ul>
	Damage to adjacent vegetation	<ul style="list-style-type: none"> <li>For undeveloped areas adjacent to development site, ensure water and sediment is directed away from natural areas.</li> </ul>
	Sensory disturbance and mortality of wildlife	<p>When working adjacent to natural areas:</p> <ul style="list-style-type: none"> <li>According to the wildlife that may be present, schedule, high noise level activities and other intrusive construction activities to avoid critical life stages (breeding, nesting, rearing, migration). Consult with Parks Canada (403-762-1416) to discuss any localized wildlife concerns.</li> <li>Confine "noise" activities to hours set out in Town of Banff Noise Bylaw.</li> <li>Consider posting wildlife signs to reduce vehicle speeds and increase driver awareness near construction areas where wildlife mortality has or is likely to occur.</li> <li>Educate workers to not harass or attract wildlife.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
Continued

Activity	Potential Impacts	Mitigation Measures
Construction (sandblasting)	Dust production (sand blasting)	<ul style="list-style-type: none"> <li>Minimize sandblasting.</li> <li>Confine activity to days with little or no wind and use physical barriers (e.g., shrouds, scaffold canopies) to contain dust.</li> <li>Sandblasting should only remove loose paint to provide a clean surface for the new paint to adhere to. To reduce the amount of old paint needed to be removed, the new paint to be used should be as similar in colour as possible to the existing painted surface.</li> </ul>
Construction (painting and paint stripping)	Contamination of soil and water from accidental spill of paint, stripping compounds, or thinner	<ul style="list-style-type: none"> <li>Prepare an appropriate Spill Response Plan and ensure that spill contingency equipment and measures are in place before work begins.</li> <li>Ensure paint is stored appropriately to prevent spillage.</li> <li>In the event of emergency operations (as defined in Section 4.11 of the MCSR), call 911. The Warden Dispatch can also be contacted (available 24 hours/day) at (403) 762-4506 or the Wardens Office at (403) 762-1470 to notify of any emergency procedures required.</li> <li>Waste oil based paints must be transported out of the Park in accordance with the Federal and Provincial <i>Transportation of Dangerous Goods Act</i> and Regulations.</li> <li>Dispose of contaminated materials at provincially certified disposal sites outside of the Park. No treatment of contaminated soils (e.g., bioremediation) is allowed in the Park. All applicable documentation demonstrating proper disposal should be obtained. Alternatively, use the paint exchange program in Banff.</li> </ul>
<b>Site Servicing (Subsurface)</b>		
Trenching, Utilities excavation and removal	Runoff / sedimentation	<ul style="list-style-type: none"> <li>To ensure that site run-off is minimized at times of heavy rainfall, control overland flow up gradient and down gradient of exposed areas by use of effective diversion ditches, bales, vegetation filter strips, or sediment traps.</li> </ul>
	Wind and water erosion	<p>Particularly in areas with silty deposits (VL3 and VL4) and sloped areas with sandy deposits (see Figure 4.2):</p> <ul style="list-style-type: none"> <li>Use interceptor ditches or berms (bales) up-gradient of excavation to divert overland flow around exposed soils</li> <li>Line steep ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.</li> </ul>
	Wildlife mortality	<ul style="list-style-type: none"> <li>Fence trench if it is to be left unattended overnight.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
Trenching; Utilities excavation and removal (continued)	Loss of topsoil and/or topsoil- subsoil mixing	<ul style="list-style-type: none"> <li>Wherever possible, use separate lifts and storage of topsoil and subsoil horizons, replacing them in the same order after completion of activity.</li> <li>Minimize the amount of time that the trench remains open.</li> <li>Soils will be stored away from any steep slopes, subsoils, spoil material, construction activities and day-to-day operations.</li> </ul>
	Slope failure	<ul style="list-style-type: none"> <li>Avoid work on steep slopes unless absolutely necessary. Areas with slopes of Class 6 (15-30%) or greater, especially where soils are shallow:</li> <li>Use appropriate geo-technical control measures to stabilize slopes. Consult occupational health and safety guidelines.</li> </ul>
<b><i>Decommissioning and Abandonment</i></b>		
Demolition activities / foundation removal	Dust production	<ul style="list-style-type: none"> <li>Wet down dry, exposed soils.</li> <li>Ensure fine materials being stored or transported are covered with tarps or equivalent material.</li> </ul>
	Discovery of existing soil contamination	<ul style="list-style-type: none"> <li>If any contamination is found, cease work immediately. Inform the building site supervisor and, if necessary, implement Emergency Response Plan.</li> </ul>
	Loss of topsoil and/or topsoil- subsoil mixing	<ul style="list-style-type: none"> <li>Wherever possible, use separate lifts and storage of topsoil and subsoil horizons, replacing them in the same order after completion of activity.</li> <li>Soils will be stored away from any grades, subsoils, spoil material, construction activities and day-to-day operations.</li> </ul>
<b><i>Site Reclamation or Restoration</i></b>		
Grading	Dust production	<ul style="list-style-type: none"> <li>Wet down dry, exposed soils.</li> <li>Ensure materials being stored or transported are covered with tarps or equivalent material.</li> </ul>
	Runoff / sedimentation	<ul style="list-style-type: none"> <li>Halt grading on exposed soil during events of high rainfall intensity and runoff. Consult the Sediment and Erosion Control Plan.</li> <li>Cover stockpiles of soil with polyethylene sheeting, tarps, or vegetative cover. Where possible, establishment containment structures to trap runoff.</li> </ul>
	Wind and water erosion	<p>Particularly in areas with silty deposits (VL3 and VL4) and sloped areas with sandy deposits (see Figure 4.2):</p> <ul style="list-style-type: none"> <li>Protect exposed soils with coarse granular materials, mulches, or straw along drainage pathways.</li> <li>Recontour slopes to pre-disturbance conditions.</li> </ul>
Revegetation	Runoff / sedimentation / erosion	<ul style="list-style-type: none"> <li>Initiate replanting of disturbed areas immediately after construction is completed.</li> </ul>

Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
Continued

Activity	Potential Impacts	Mitigation Measures
Revegetation (continued)	Compaction of soils	<ul style="list-style-type: none"> <li>• Cultivate affected areas before reclaiming, especially areas with fine textured or organic soils.</li> </ul>
	Weed invasion	<ul style="list-style-type: none"> <li>• Revegetate exposed areas at first opportunity.</li> <li>• Ensure topsoil is clean and weed free. If clean fill is unavailable, check on weeds or treat as needed for 3 years following landscaping and revegetation.</li> <li>• Revegetate with Parks Canada approved grass seed mix or the Town seed mix for landscape rehabilitation (see Appendix C).</li> <li>• Monitor the site to ensure appropriate weed control for two years following landscaping (applicable to construction crews only).</li> <li>• Follow Parks Canada Integrated Pest Management Plan 2.4.1 for weed control.</li> </ul>
Herbicide/fertilizer use	Contamination of soil or water	<ul style="list-style-type: none"> <li>• Accurately assess the need for chemicals during site revegetation. Use products and methods identified in Parks Canada Management Directive 2.4.1 (1985).</li> <li>• Do not use fertilizers and herbicides in areas where residue or run-off may enter a waterbody or drainage pathway.</li> <li>• Do not over water.</li> </ul>
Paving	Dust production	<ul style="list-style-type: none"> <li>• Wet down dry, exposed soils.</li> <li>• Ensure fine materials being stored or transported are covered with tarps or equivalent material.</li> </ul>
	Contamination of soil or water	<ul style="list-style-type: none"> <li>• Prepare an appropriate Spill Response Plan. In the event of emergency operations (as defined in Section 4.11 of the MCSR), call 911. The Warden Dispatch can also be contacted (available 24 hours/day) at (403) 762-4506 or the Wardens Office at (403) 762-1470 to notify of any emergency procedures required.</li> <li>• Use an environmentally friendly tack coat and do not apply if rain is in the forecast.</li> </ul>
	Noise disturbance and mortality of wildlife due to increased traffic	<p>Adjacent to natural areas.</p> <ul style="list-style-type: none"> <li>• According to the wildlife that may be present, schedule high noise level activities and other intrusive construction activities to avoid critical life stages (breeding, nesting, rearing, migration). Consult with Parks Canada (403-762-1416) to discuss any localized wildlife concerns.</li> <li>• If wildlife mortality is likely to increase due to traffic, post signs to reduce vehicle speeds and increase driver awareness.</li> <li>• Educate workers to not harass or attract wildlife.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
<b>General Activities</b>		
Materials handling / storage	Dust production	<ul style="list-style-type: none"> <li>Wet down dry, exposed soils or cover with tarps.</li> <li>Ensure materials being stored or transported are covered with tarps or equivalent material.</li> </ul>
	Damage to adjacent vegetation	<ul style="list-style-type: none"> <li>Excavated material will not be permitted to damage or bury plant material that is to be retained on the site or in adjacent areas.</li> <li>Protect undisturbed land by only stockpiling materials on heavy canvas or polypropylene tarpaulins to protect native vegetation. Excavated material should not be permitted to damage or bury plant material that is to be retained on the construction site or in adjacent areas.</li> </ul>
	Decreased aesthetics (visual) and public safety	<ul style="list-style-type: none"> <li>Materials will be stored within the confines of the work site.</li> </ul>
Equipment operation and maintenance	Decrease in ambient air quality due to emissions	<ul style="list-style-type: none"> <li>Ensure all equipment is properly tuned, free of leaks, in good operating order, and fitted with standard air emission control devices.</li> <li>Minimize idling of engines at all times.</li> </ul>
	Dust production	<ul style="list-style-type: none"> <li>Wet down dry and dusty roads.</li> <li>Do not use oil-based dust suppressants.</li> <li>Reduce speeds.</li> <li>Ensure fine materials being stored or transported are covered with tarps or equivalent material.</li> </ul>
	Contamination of soil and water from accidental spill	<ul style="list-style-type: none"> <li>Prepare an appropriate Spill Response Plan. In the event of emergency operations (as defined in Section 4.11 of the MCSR), call 911. The Warden Dispatch can also be contacted (available 24 hours/day) at (403) 762-4506 or the Wardens Office at (403) 762-1470 to notify of any emergency procedures required.</li> <li>Avoid work in high risk areas, particularly in areas of high water table, steep slopes or in close proximity to streams.</li> <li>Have spill containment equipment on-hand and ensure that all personnel are trained in their use.</li> <li>Ensure all construction equipment is free of leaks from oil, fuel or hydraulic fuels.</li> <li>The crossing of any waterbody (including wetlands) by construction equipment, or the use of such equipment within waterbodies is strictly prohibited unless prior approval has been confirmed.</li> </ul>

Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
Equipment operation and maintenance (continued)	Contamination of soil and water from accidental spill	<ul style="list-style-type: none"> <li>Designate refuelling areas at least 100 m away from any water body. Refuelling sites will be bermed with an impermeable liner to contain 125% of the anticipated fuel quantity. Any contaminated rainwater will be moved out of the park.</li> </ul>
	Contamination of soil and water from accidental spill	<ul style="list-style-type: none"> <li>Refuelling activities should not be conducted where run-off could carry contaminants into drainage pathways (including storm sewers).</li> <li>Dispose of contaminated materials at provincially certified disposal sites outside of the Park. No treatment of contaminated soils (e.g., bioremediation) is allowed in the Park. All applicable documentation demonstrating proper disposal should be obtained.</li> </ul>
	Compaction of soils	<ul style="list-style-type: none"> <li>Restrict vehicular travel and other equipment operation to the construction site and approved access routes.</li> <li>Vehicle parking will be restricted to specialized areas on the construction site.</li> <li>Minimize or halt construction traffic during wet conditions when the soil shows signs of ponding or rutting.</li> <li>In sensitive areas, if possible, use equipment which minimizes surface disturbance including low ground pressure tracks/tires, blade shoes and brush rake attachments.</li> </ul>
	Damage to adjacent vegetation	<p>Undeveloped areas adjacent to development site:</p> <ul style="list-style-type: none"> <li>Careful machine operation is required to ensure that damage to surrounding vegetation does not occur.</li> <li>Excavated material must not be permitted to bury plant material that is to be retained. Snow fences may be used to prevent excavated material escaping into the surrounding forest.</li> <li>Hoarding around trees to be retained must be installed beyond the tree's drip line prior to commencement of site work.</li> </ul>
	Weed invasion	<ul style="list-style-type: none"> <li>All construction equipment from outside Banff National Park will be steam cleaned prior to arrival to minimize the risk of introducing weeds.</li> <li>Construction equipment from outside the Park will not be washed while in the Park.</li> </ul>



Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
Equipment operation and maintenance (continued)	Sensory disturbance to wildlife	<ul style="list-style-type: none"> <li>• All undeveloped areas and areas bordering natural habitat, especially wildlife movement corridors and natural wetlands:</li> <li>• Use existing roadways, pathways and previously disturbed areas for site access and travel within the site.</li> <li>• Educate workers not to enter wildlife corridors.</li> <li>• Confine “noise” activities to hours set out in Town of Banff Noise Bylaw.</li> </ul>
	Increased traffic levels	<ul style="list-style-type: none"> <li>• Time construction activities to minimize vehicle conflicts on access roads and/or use flagging personnel.</li> </ul>
Waste management (general)	Contamination of soil and water from accidental spill or improper disposal	<ul style="list-style-type: none"> <li>• No rock, silt, cement, grout, asphalt, petroleum product, lumber, vegetation, domestic waste, or any deleterious substance shall be placed or allowed to disperse into any stream, river, pond, sewer, or other water course.</li> </ul>
	Aesthetics (visual and smell)	<ul style="list-style-type: none"> <li>• Collect all waste, store appropriately and dispose trade waste at the Bow Valley Waste Management Commission’s Class III landfill, and garbage at the Waste Transfer Station.</li> <li>• All garbage and food must be stored in bear-proof bins as per the Banff Waste Bylaw.</li> <li>• Construction sites must undergo thorough clean-up, including removal of general litter, survey stakes and flagging tape at project completion.</li> </ul>
Hazardous materials collection and handling	Contamination of soil or water	<ul style="list-style-type: none"> <li>• Prepare an appropriate Spill Response Plan. In the event of emergency operations (as defined in Section 4.11 of the MCSR), call 911. The Warden Dispatch can also be contacted (available 24 hours/day) at (403) 762-4506 or the Wardens Office at (403) 762-1470 to notify of any emergency procedures required.</li> <li>• All toxic/hazardous materials will be identified during demolition and will be handled as required under the Canadian Environmental Protection Act, Transportation of Dangerous Goods Act and Workplace Hazardous Materials Information Service.</li> <li>• Dispose of contaminated materials at provincially certified disposal sites outside of the Park. No treatment of contaminated soils (e.g., bioremediation) is allowed in the Park. All applicable documentation demonstrating proper disposal should be obtained. Alternatively, use the paint exchange program in Banff.</li> <li>• All hazardous materials and wastes will be clearly labelled with WHMIS labels and information.</li> <li>• Spill contingency plans, equipment and supplies will be present on-site at all times and employees trained in their use.</li> </ul>

Attachment 1 Sub-Class 1: Buildings: Mitigations for reducing impacts of building projects -  
*Continued*

Activity	Potential Impacts	Mitigation Measures
Hazardous materials collection and handling (continued)	Contamination of soil or water	<ul style="list-style-type: none"> <li>• All fuels, oils, lubricants and other petrochemical products will not be stored within 100 meters of any waterbody (including wetlands).</li> <li>• Do not store fuels, lubricants, solvents, paints, and other chemicals on site overnight except within construction trailers secured with lock and key. Storage should be on a bermed, impervious site (secondary containment). Permits are required from Banff National Park or Town of Banff.</li> <li>• No rock, silt, cement, grout, asphalt, petroleum product, lumber, vegetation, domestic waste, or any deleterious substance shall be placed or allowed to disperse into any stream, river, pond, storm or sanitary sewer, or other water course.</li> </ul>





Slope Class	
Symbol	% Slope
	0-5
	5-15
	15-30
	30-45
	45-70
	>70

Symbol	Ecosite
VL3	Vermilion Ecosite 3
VL4	Vermilion Ecosite 4
HD2	Hillsdale Ecosite 2
FR1	Fireside Ecosite 1
NY1X	Norquay Ecosite 1
NY3	Norquay Ecosite 3
PT1	Patricia Ecosite 1
PT5	Patricia Ecosite 5
AT1	Athabasca Ecosite 1
PR1	Panorama Ridge Ecosite 1

#### LEGEND

- Town Boundary
- == Road
- +++ Railroad
- Land Use Districts
- Ecosites
- ▲ Archaeology Site

Map Symbol Convention

Ecosite Symbol | VL3

Slope Class — 3

#### Banff Land-Use Bylaw Districts

CA Commercial	RCM Residential Central Muskral
CB Banff Springs Hotel	RCN Cougar North
CD Downtown	RCR Cougar Rabbit
CR Railway Lands	RVR Marmot Rundle
CS Commercial Service	RVS Middle Springs
CT Tunnel Mountain	RVS(e)-(f) Middle Springs II
PE Public/Institutional	RGA Glen Avenue
PS Banff Centre	RNC North Central
RR Environmental Protection	RRA Rainbow Avenue
PS Parkland	RWF River Front
PS Public Service	RSA Spray Avenue
RR Reserve	RSC Squirrel Cougar
RR Residential Reserve	RTM Tunnel Mountain
RBA Banff Avenue	RTR Tatanga Ridge
RBS Banff Springs	RVR Valley View
RCA Cave Avenue	RWB West Birch

#### Attachment 2

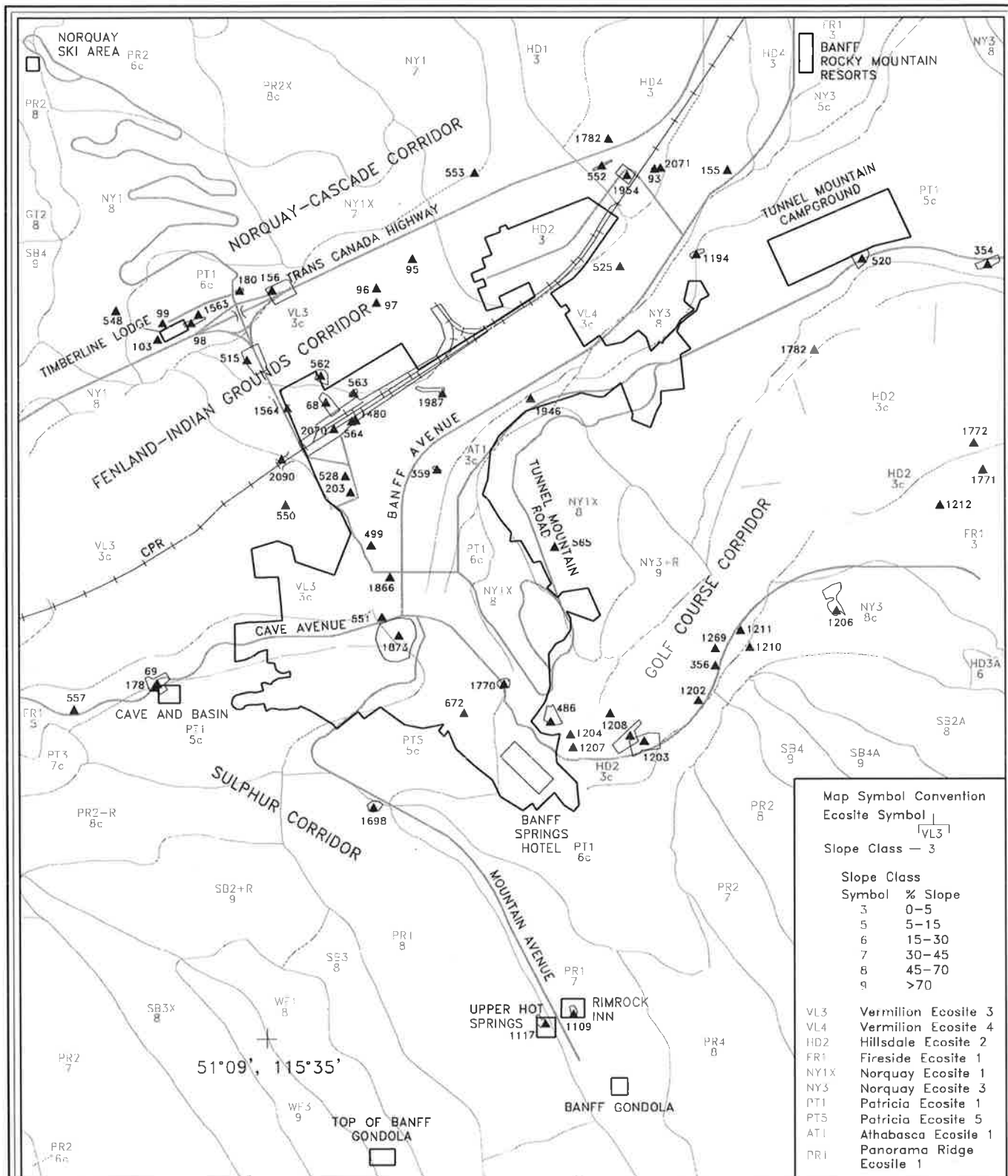
#### Ecosites, Archaeological Sites and Land Use Districts Within the Town of Banff

Scale 1:20,000

Metres

300 0 300 600 900 1200





**Map Symbol Convention**

**Ecosite Symbol** | VL3 |

**Slope Class — 3**

**Slope Class**

Symbol	% Slope
3	0-5
5	5-15
6	15-30
7	30-45
8	45-70
9	>70

VL3 Vermilion Ecosite 3  
 VL4 Vermilion Ecosite 4  
 HD2 Hillsdale Ecosite 2  
 FR1 Fireside Ecosite 1  
 NY1X Norquay Ecosite 1  
 NY3 Norquay Ecosite 3  
 PT1 Patricia Ecosite 1  
 PT5 Patricia Ecosite 5  
 AT1 Athabasca Ecosite 1  
 PRI Panorama Ridge Ecosite 1

**LEGEND**

- Local Study Area (Town of Banff and Outlying Areas)
- Road
- Railroad
- Available Wildlife Corridors
- Ecosites
- Archaeological Site and Sensitive Area

**Attachment 2**  
**Ecological Information within**  
**the Class Screening Area**  
**(Sub-Class 1)**

SOURCE: POPE (2001)

Scale 1:30,000  
 Metres

300 0 300 600 900 1200





### **Attachment 3**

#### **Potentially Sensitive Sites in the Class Screening Area**

The following represents sites that are potentially sensitive to disturbance. Considerations of these sensitivities should be included in future development plans.

##### **1. General Wetlands and Riparian Habitats**

Whiskey Creek and associated springs. Middle Springs Creek and associated springs, Bow River, Forty Mile Creek, Forty Mile/Echo/Whiskey Creek/CPR 'Y' Wetlands, Discharge zones along the toe of Sulphur Mountain, Stables Wetlands (Recreation grounds to Cave and Basin).

##### **2. Sand Dune and Beach Ridges**

Fenland, Recreation Centre lands, lands including the train station and extending into residential areas SE of the station into downtown blocks past Rundle Church. Rocky Mountain Resort/new corrals/Brewster Doughnut Area.

##### **3. Stream Levees**

Bow River, Forty Mile/Echo Creek

##### **4. Fish Spawning Sites**

Forty Mile Creek, Bow River, Whiskey Creek, CPR 'Y'

##### **5. Waterfowl Habitat**

Whiskey Creek behind Cougar Street, Bow River, Forty Mile/Echo/Whiskey Creek/CPR 'Y' Wetlands, Stable Wetlands.

##### **6. Beaver Habitat**

Potential beaver habitat should be identified and projects designed to minimize the disruption of habitat. Potential sites include the CPR 'Y' and associated lands, Whiskey Creek, Fenlands, Bow River Levees, Horse Bams/Cave and Basin Wetlands.

##### **7. Avifauna**

Some parts of the class screening area are used by breeding and migrating birds. The most significant bird habitat is the shrub/wetland area on the Bow River flood plain adjacent to the Recreation Area (Edwards 1988). Other sites should also be reviewed.

##### **8. Vegetation**

Disturbance of the following species should be avoided whenever possible:

- Limber Pine: Tunnel Mountain, Hoodoos.
- Douglas Maple: North slope of Tunnel Mountain.
- Douglas Fir: most dry forested sites.

- Aspen: various locations.
- Balsam Poplar: various locations, especially in the vicinity of stable wetlands.

## **9. Viewpoints/Viewscapes**

Surprise Corner, Bow River views, views from the Banff Springs Hotel, Mt. Norquay and Tunnel Mountain Drive.

## **10. Incidentals**

- Fossils: sites should be surveyed for the presence of fossils; known and potential sites include Norquay Road, Bow Falls outcrops. Tunnel Mountain trail, Mt. Rundle talus rocks near the climbing practice rock and the landscaping rock in the recreation grounds play areas. Any exposure/application of "Rundle Rock" should be examined for fossils.
- Glacial Deposits: evidence of glacial and periglacial activity should be preserved as interpretive features. Features include: flutings along upper Tunnel Mountain Trail; till and outwash exposure at Grizzly Street; and outwash gravels at Compound Road turnoff from Banff Avenue.
- Bedrock Exposures offer an opportunity to interpret the geologic history of Banff National Park. Potential sites include: Bow Falls areas. Tunnel Mountain, Drive rock cuts; Buffalo Street; Norquay Road; and. Vermilion Lakes Drive older stone fences.
- Historical features sites should be reviewed for potential historical/archaeological features.



## **APPENDIX D**

### **LONE PINE GEOTECHNICAL INVESTIGATIONS**

# Geotechnical Investigation

Parks Canada Agency Staff Housing  
329 Marten Street, Banff, Alberta



## **Submitted To:**

Civil Engineering Solutions Inc.  
Calgary, Alberta

## **Submitted By:**

Lone Pine Geotechnical Ltd.  
Calgary, Alberta

**Date:** March 13, 2018

**Project No:** 1051





## Table of Contents

<b>1.</b>	<b>Introduction .....</b>	<b>1</b>
<b>2.</b>	<b>Proposed Development .....</b>	<b>1</b>
2.1	Site Details.....	1
2.2	Site Geology .....	1
2.3	Project Details.....	1
<b>3.</b>	<b>Investigation Methodology.....</b>	<b>2</b>
3.1	Field Work.....	2
3.2	Laboratory Testing .....	2
<b>4.</b>	<b>Subsurface Conditions .....</b>	<b>2</b>
4.1	Soil Conditions .....	2
4.2	Groundwater Conditions .....	3
<b>5.</b>	<b>Recommendations .....</b>	<b>4</b>
5.1	Site Preparation .....	4
5.1.1	Grading .....	4
5.1.2	Compaction .....	4
5.1.3	Surface Drainage .....	4
5.1.4	Excavations .....	5
5.1.5	Shoring.....	5
5.1.6	Underground Utilities .....	5
5.2	Foundations .....	6
5.2.1	Limit States Design .....	6
5.2.2	Footings .....	7
5.2.3	Seismic Site Classification.....	8
5.3	Grade Supported Slabs.....	8
5.4	Lateral Earth Pressures .....	9
5.5	Subdrainage System.....	9
5.5.1	Weeping Tile .....	9
5.5.2	Tanking .....	10
5.6	Flatwork and Sidewalks .....	10
5.7	Concrete .....	10
5.8	Inspection and Materials Testing.....	10
<b>6.</b>	<b>Limitations .....</b>	<b>11</b>
<b>7.</b>	<b>Closure .....</b>	<b>11</b>

## List of Tables

Table 1 – General Soil Profiles.....	3
Table 2 – Groundwater Level Measurements.....	3
Table 3 – GRF Values for Shallow Foundation Design.....	6
Table 4 – Design Parameters for Footings .....	7
Table 5 – Lateral Earth Pressure Design Parameters .....	9

## Appendix A

Figure 1 – Site Location Plan
Figure 2 – Borehole Location Plan
Figure 3 – Aerial Borehole Location Plan
Figure 4 – Photographs

## Appendix B

Borehole Logs
Explanation of Terminology and Symbols



## 1. Introduction

This report summarizes the findings of the geotechnical investigation undertaken by Lone Pine Geotechnical Ltd. for the proposed building at 329 Marten Street, in Banff, Alberta. The purpose of the investigation was to assess the soil and groundwater conditions at the site and provide geotechnical recommendations for design and construction.

The scope of work for the investigation was outlined in our proposal dated February 15, 2018 (Proposal No. 1082-18-R2). Authorization to proceed with the investigation was given by Mr. Hussein Bhaiji of Civil Engineering Solutions Inc.

## 2. Proposed Development

### 2.1 Site Details

The site is located north of the intersection of Marten Street and Elk Street, in Banff, Alberta. The municipal address of the site is 329 Marten Street and the legal address is Lot 2, Block 12, Plan 6719BC. The location of the site is shown on Figure 1 in Appendix A.

The site is a 649 m<sup>2</sup> residential property. There is presently a vacant old house at the site which will be demolished to make room for the new building. The house is surrounded by a grassed yard and a wooden fence. The site is relatively flat with grades of less than 10 percent. The site is surrounded by similar residential properties to the north, west, and south, and hotels along Banff Avenue to the east. Photographs taken on February 12 and 16, 2018, are presented on Figure 4 in Appendix A.

### 2.2 Site Geology

This site, along with most of the Town of Banff, is situated in the Bow River Valley. Based on a cursory review of published geological maps and the writers experience, the river valley in the area consists of extensive deposits of alluvial sand and gravel. The proportion of sand to gravel in these deposits varies significantly, however, sand is generally predominant in near surface soils in the vicinity of this site.

### 2.3 Project Details

The proposed two storey building at the site will provide accommodation for Parks Canada Agency staff. Three housing units have been proposed on the first floor, three housing units have been proposed on the second floor, and nine parking stalls have been proposed in the parkade below the building. A sidewalk, green space, and parkade ramp have been proposed at the front of the building and an outdoor seating area has been proposed at the back of the building. The depth of the building foundation is expected to be about 2.5 to 3.0 m below existing grade.

## 3. Investigation Methodology

### 3.1 Field Work

Two boreholes were drilled at the site on February 16, 2018, using a truck mounted drilling rig operated by Great West Drilling Ltd. The boreholes were drilled to depths of 7.6 m below grade at the locations shown on Figures 2 and 3 in Appendix A.

The soils encountered in the boreholes were visually examined and logged by Lone Pine Geotechnical Ltd. in accordance with the Modified Unified Soil Classification System (MUSCS). Standard Penetration Tests (SPTs) and Dynamic Cone Penetration (DCPTs) were performed and soil samples were collected at selected depths in the boreholes.

Monitoring wells were installed in the boreholes at the completion of drilling. The groundwater levels in the wells were measured eighteen days after drilling on March 6, 2018. The ground surface elevations at the borehole locations were surveyed by Lone Pine Geotechnical Ltd. The elevations were referenced to a temporary benchmark, a gas valve near the northeast corner of the site. The temporary benchmark was assigned an arbitrary elevation of 100.00 m.

### 3.2 Laboratory Testing

Laboratory tests were performed on selected soil samples collected from the boreholes. The tests included moisture content, grain size, and sulphate concentration. The laboratory test results are presented on the borehole logs in Appendix B.

## 4. Subsurface Conditions

The detailed soil and groundwater conditions encountered in the boreholes are summarized on the borehole logs in Appendix B, along with explanations of the classification system, symbols, and terminology used on the logs.

### 4.1 Soil Conditions

The general soil profile encountered in the boreholes was surficial topsoil underlain by sand. The following is a summary of the soil types encountered:

- A 200 to 300 mm thick layer of surficial topsoil was encountered in Boreholes 1 and 2. The topsoil was organic, black, and moist.
- Fine grained sand deposits were encountered below the topsoil in Boreholes 1 and 2 and extended to depths of 3.8 and 3.0 m below grade. The sand was generally poorly graded



and contained varying proportions of silt. The SPTs in the boreholes indicated that the sand was loose to compact. Moisture contents ranged from 3 to 12 percent.

- A 1.0 m thick layer of sandy gravel was encountered at a depth of 3.0 m below grade in Borehole 2. The gravel was compact, fine grained, and poorly graded, with a moisture content of about 4 percent.
- Medium grained sand deposits were encountered at depths of 3.8 and 4.0 m below grade in Boreholes 1 and 2 and extended beyond the 7.6 m depths drilled. The sand was generally poorly graded and grey in colour. The SPTs and DCPTs in the boreholes indicated that the sand was loose to compact. Moisture contents ranged from 20 to 21 percent.

The following table summarizes the general soil profiles encountered in the boreholes:

**Table 1 – General Soil Profiles**

Borehole	Upper Sand Depth (mbg)	Gravel Depth (mbg)	Lower Sand Depth (mbg)	Borehole Depth (mbg)
1	0.2	–	3.8	7.6
2	0.3	3.0	4.0	7.6

## 4.2 Groundwater Conditions

Monitoring wells were installed in the boreholes at the completion of drilling. The groundwater levels in the wells were measured eighteen days after drilling on March 6, 2018. The following table summarizes the measurements:

**Table 2 – Groundwater Level Measurements**

Borehole	Ground Elevation* (m)	Groundwater on March 6, 2018	
		Depth (mbg)	Elevation* (m)
1	100.44	4.16	96.28
2	100.68	> 4.20	< 96.48

\* Elevations are referenced to a temporary benchmark with an assigned elevation of 100.00 m.

The groundwater level at the site will fluctuate seasonally and is expected to be highest after snowmelt and heavy rainfall during the spring and summer months. The near surface soils at the site are susceptible to perched groundwater on a seasonal basis.

## 5. Recommendations

The soil and groundwater conditions at the site are considered suitable for the proposed building. Geotechnical recommendations for design and construction are presented below.

### 5.1 Site Preparation

#### 5.1.1 Grading

All topsoil, vegetation, and deleterious materials should be removed from the areas to be developed. General engineered fill used for site grading should consist of well graded granular soil free of organics and debris. The native sand and gravel at the site is considered suitable for use as general engineered fill provided that it can be placed to the required level of compaction. Any soils imported to the site for use as fill should be approved by Lone Pine Geotechnical Ltd. prior to placement.

#### 5.1.2 Compaction

General engineered fill should be placed in uniform lifts compacted to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD). The maximum compacted lift thickness should not exceed 200 mm. The fill should be placed at a moisture content within 2 percent of the Optimum Moisture Content (OMC). Moisture conditioning (ie. drying, wetting, mixing) may be required to achieve the required level of compaction.

Backfill against the building walls should only be placed once the concrete has gained enough strength to support the lateral earth pressures exerted by the backfill. Careful attention should be paid to the compaction effort exerted on the backfill to prevent excessive pressures from developing on walls. Only light hand operated compaction equipment should be used within 1.0 m of walls.

The ability of construction equipment to achieve compaction is an important consideration. The time of year is also an important consideration. Achieving compaction during cold weather can be challenging. Fill cannot be allowed to freeze prior to placement and moisture conditioning is rarely possible during the fall and winter months. Methodology and equipment should be reviewed if cold weather compaction is proposed.

#### 5.1.3 Surface Drainage

The area surrounding the building should be graded to shed surface water away during and after construction. A grade of at least 2 percent over a distance of at least 2 m is recommended away from the building. Roof drains should discharge well clear of the building.



#### 5.1.4 Excavations

Conventional hydraulic excavators will be suitable for excavations into the native soils at the site. Temporary side slopes should be cut back to 1H:1V for excavations up to 3.5 m in depth. Flatter side slopes may be required for excavations through groundwater or deleterious soils. All temporary surcharge loads, such as stockpiles, should be kept back from the edge of excavations a distance of at least the excavation depth.

Excavations should be carefully monitored during construction and protected from the inflow of surface water. The saturation of an excavation can cause the rapid deterioration of the stability of the side slopes. If surface water inflow or groundwater seepage occurs, pumping from collector sumps is recommended.

Notwithstanding the above recommendations, all excavations must be undertaken in accordance to Alberta Occupational Health and Safety (OHS) regulations.

#### 5.1.5 Shoring

The parkade excavation at the site may require shoring depending on the depth and proximity of the excavation to the property lines. The site is suited to H-Piles with timber lagging or structural shotcrete walls. Shoring walls should be designed by a qualified engineer and constructed by a qualified contractor working under the supervision of the engineer. The design must consider the worst-case scenario pore water pressure and surcharge loading conditions.

In Alberta, the design of shoring walls is typically the responsibility of the shoring contractor. Shoring walls are commonly provided with tie-back anchors, bracing, and/or rakers to provide the required resistance to lateral earth pressures from the surrounding soils. Recommended design parameters for the determination of these pressures are provided in Section 5.4. The “At-Rest” earth pressure design parameters should be used for shoring walls supporting any adjacent building foundations or other settlement or deflection sensitive structures. Depending on the proposed shoring wall configuration, underpinning of adjacent structures may be required. If shored excavations deeper than 3.0 m are proposed, the recommendations in this section should be reviewed by Lone Pine Geotechnical Ltd. and revised if required.

#### 5.1.6 Underground Utilities

The native soils at the site are expected to provide adequate support for underground utilities. Minor deflections of utility pipes are normal and should be expected. The specified pipes should be capable of withstanding these deflections. Connections into the building should be designed to tolerate some vertical movement.

Some settlement of compacted backfill in utility trenches should be expected. All fill soils are expected to settle, even when placed to a high level of compaction. The magnitude of settlement is dependent on the thickness of fill, type of fill, density at the time of placement, moisture at the time of placement, and loading applied to the surface. The potential for differential settlement will be dependent on the variation of these factors over a given area.

The excavation recommendations in Section 5.1.4 should be followed for underground utility installations. Utility trenches should be backfilled with general engineered fill as defined in Section 5.1.1. The compaction specifications in Section 5.1.2 should be followed during backfilling.

## 5.2 Foundations

The site is suited to strip and spread footing foundations. Detailed recommendations for footings are provided below.

### 5.2.1 Limit States Design

In accordance to the National Building Code of Canada (NBCC), the use of Limit States Design (LSD) is required for the design of building foundations. The limit states of LSD are classified into two groups; the Ultimate Limit States (ULS) and the Serviceability Limit States (SLS). The ULS group is concerned with loads and resistances at the point of collapse or catastrophic failure of the structure. The SLS group is concerned with loads and resistances at the point that movements or deformations inhibit the intended use of the structure.

For the design of foundations using the ULS, the ultimate resistance values for foundation loading cases are reduced using a Geotechnical Resistance Factor (GRF). In accordance to the NBCC, the following GRF values should be used for shallow foundation design:

**Table 3 – GRF Values for Shallow Foundation Design**

Shallow Foundation Design Case	GRF
Vertical Load Resistance from Semi-Empirical Analysis	0.5
Sliding Resistance Based on Friction	0.8

For the design of foundations using the SLS, the foundation geometry and tolerable serviceability limits typically must be known to properly determine the resistance values for foundation loading cases. In certain cases, a few assumptions can be made to provide preliminary SLS resistance values.



## 5.2.2 Footings

Strip and spread footings bearing on the native sand and gravel at least 1.5 m below existing grade at the site may be designed using the net bearing resistances provided in the following table:

**Table 4 – Design Parameters for Footings**

Bearing Soil	ULS Bearing Resistance (kPa)		SLS Bearing Resistance (kPa)
	Unfactored	Factored	
Native Sand or Gravel	270	135	100

The SLS bearing resistances above are based on a maximum settlement (ie. tolerable serviceability limit) of 25 mm and are applicable to strip footings up to 1.5 m wide and spread footings up to 2.5 x 2.5 m. If larger footings are proposed, the SLS bearing resistances should be reviewed by Lone Pine Geotechnical Ltd. and revised if required. An unfactored ULS coefficient of friction of 0.43 may be used between concrete and the native sand or gravel to design footings to resist sliding.

Recommendations for the design and construction of strip and spread footings are provided below:

- For protection against the harmful effects of frost, perimeter footings in continuously heated structures should be founded at least 1.5 m below grade. Isolated exterior footings and footings in unheated structures should be founded at least 2.2 m below grade.
- All footings should bear on native, undisturbed, inorganic sand or gravel. If unsuitable soils are encountered at the footing depths during construction, they must be subcut and replaced with lean mix concrete with a minimum 56 day compressive strength of 10 MPa, or granular fill compacted to at least 100 percent of SPMDD. Filter fabric may be required between the subgrade and the granular fill. The depth and extent of the subcut should be at the discretion of the geotechnical engineer.
- Bearing surfaces should not be allowed to become disturbed, saturated, or frozen during and after construction. Footings founded on frozen soils may settle when the soils are weakened by thawing.
- If surface water inflow or groundwater seepage occurs into footing excavations during construction, ditches, sumps, and pumps should be used for dewatering.
- All bearing surfaces should be inspected by a geotechnical engineer prior to concrete placement.

### 5.2.3 Seismic Site Classification

The site classification for seismic response as defined in Table 4.1.8.4.A of the National Building Code of Canada (NBCC) is D. The classification is based on the soil conditions encountered in the boreholes and a review of published geological information.

### 5.3 Grade Supported Slabs

Grade supported floor slabs are expected to perform adequately at the site provided certain precautions are followed. Recommendations for the design and construction of floor slabs are provided below:

- Unsuitable soils on the exposed subgrade below floor slabs should be subcut and replaced with suitable fill compacted to at least 98 percent of SPMDD. The depth and extent of the subcut should be at the discretion of the geotechnical engineer.
- Grade supported floor slabs should be underlain with at least 150 mm of well graded 25 mm crushed gravel compacted to at least 98 percent of SPMDD. Other granular materials could be considered upon review by Lone Pine Geotechnical Ltd.
- Floor slabs should be dimensioned and provided with reinforcement, wire mesh, control joints, and/or saw cuts, in accordance with the structural engineer's requirements.
- Floor slabs should be constructed independently of all walls and columns to reduce the potential for structural distress due to differential movements. Service connections into the building and piping below slabs should also be designed to permit some flexibility. Non-load bearing building walls should be designed to tolerate some vertical movement.
- If heavily loaded floor slabs subjected to static loads greater than 20 kPa are proposed, the recommendations in this section should be reviewed by Lone Pine Geotechnical Ltd. and revised if required.

Minor movement between grade supported floor slabs and walls and columns is normal and should be expected. If the recommendations in this report are followed, this movement should be acceptably small. If movement absolutely cannot be tolerated, structurally supported floor slabs should be considered. The performance of structural slabs can be engineered for very strict settlement tolerances.



## 5.4 Lateral Earth Pressures

The building walls and any other retaining structures at the site should be designed to resist lateral earth pressures. Recommended design parameters for the determination of these pressures are provided in the following table:

**Table 5 – Lateral Earth Pressure Design Parameters**

Design Parameter	Soil Type	
	Native Sand or Gravel	Gravel Fill*
Coefficient of At-Rest Earth Pressure ( $k_o$ )	0.46	0.43
Coefficient of Active Earth Pressure ( $k_a$ )	0.30	0.27
Coefficient of Passive Earth Pressure ( $k_p$ )	3.39	3.69
Bulk Unit Weight ( $\gamma$ in $\text{kN/m}^3$ )	19.5	21.5

\* Design parameters for well graded 25 mm crushed gravel compacted to 98 percent of SPMDD.

The lateral earth pressure distribution behind or in front of retaining structures should be determined considering the worst-case scenario porewater pressure, surcharge loading, point loading, and seismic loading conditions.

## 5.5 Subdrainage System

A permanent subdrainage system is recommended for the building parkade. The subdrainage system should be capable of removing groundwater and/or resisting porewater pressures from the surrounding soils.

A conventional subdrainage system (weeping tile) and permanent waterproofing (tanking) should be considered. The method chosen will be influenced by several factors including the depth of the below grade area and the sensitivity of the below grade area to groundwater seepage. A conventional subdrainage system (weeping tile) should only be considered for below grade areas into which some seepage can be tolerated during the service life of the building. If seepage absolutely cannot be tolerated, permanent waterproofing (tanking) will be required. The subdrainage system should be designed by a qualified mechanical engineer.

### 5.5.1 Weeping Tile

A conventional subdrainage system (weeping tile) may be considered under the floors and around the perimeter of the building parkade. The system should be designed to remove groundwater for a selected groundwater elevation.

The weeping tile drains should consist of a minimum 150 mm diameter perforated plastic pipe surrounded by free draining washed rock. The rock should provide at least 150 mm of cover over the pipe and should be wrapped in non-woven filter fabric. The pipes should be sloped towards one or multiple collection sumps. Each sump should be equipped with pumps with outflow to the municipal storm system, subject to approval by the Town of Banff. The subdrainage system should include clean outs to allow the pipes to be flushed in the event of siltation.

### 5.5.2 Tanking

The design of permanent waterproofing (tanking) considers the below grade area of the building as a “tank” designed to fully resist groundwater seepage and porewater pressures. Waterproofing products such as water stops, geo-net, bentonite board, synthetic membranes, and mastic coatings are used to restrict seepage through walls and floors. Slab thickening, reinforcement, and anchorage are used to resist buoyant pressures below tanked floor slabs.

## 5.6 Flatwork and Sidewalks

Exterior flatwork and sidewalks should be provided with control joints to control cracking. Flatwork directly against the building should be designed to minimize differential movement between the flatwork and the building walls. This is particularly important in front of doorways. The use of rigid insulation (Dow Styrofoam HI or equivalent) may be considered below flatwork to restrict frost penetration.

## 5.7 Concrete

The concentrations of water soluble sulphates in the soil samples tested were less than 0.10 percent, which indicates a negligible potential for sulphate attack on buried concrete. Therefore, General Use (Type GU) cement will be suitable for use in concrete in contact with the soils that these samples represent. Any soils imported to the site for use as fill should be tested for water soluble sulphates.

Concrete used at the site should be chosen in accordance with CSA Standard CAN-A23.1-14. All concrete exposed to freezing temperatures should be air entrained and protected from freezing temperatures for at least 72 hours during curing.

## 5.8 Inspection and Materials Testing

Lone Pine Geotechnical Ltd. should review all geotechnical specifications pertaining to the proposed building prior to construction. Inspection and materials testing will be required during construction to verify that actual site conditions are consistent with those assumed in this report. Soil bearing inspections are recommended for strip and spread footings. Compaction testing is recommended during site grading, building construction, and underground utility installations.



Failure to provide an adequate level of inspection during construction may be a contravention of Alberta Building Code requirements. Construction should be undertaken by a qualified contractor. Inspection and materials testing should be undertaken by qualified geotechnical engineering firm, independent of the contractor. Lone Pine Geotechnical Ltd. is willing to provide these services upon request.

## 6. Limitations

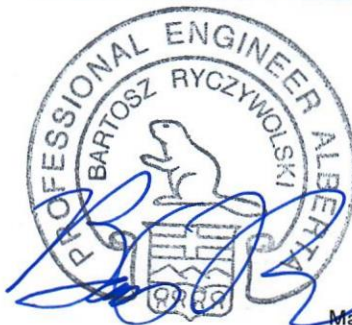
This report has been prepared for the exclusive use of Civil Engineering Solutions Inc. for the specified application to the proposed building at 329 Marten Street, in Banff, Alberta. It may not be used by any third party without the express written consent of Civil Engineering Solutions Inc. and Lone Pine Geotechnical Ltd. Any use of this report by a third party is the responsibility of such third party.

This report is based on the findings at two borehole locations, laboratory testing, and a review of available information. If different subsurface conditions or information are encountered during subsequent stages of the project, Lone Pine Geotechnical Ltd. must be notified, and the recommendations submitted should be reviewed and revised, as required. This report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty, either expressed or implied, is made. Recommendations pertaining to environmental contaminants in soil or groundwater are outside the scope of this report.

## 7. Closure

Lone Pine Geotechnical Ltd. trusts that this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully Submitted,  
**Lone Pine Geotechnical Ltd.**  
APEGA Permit to Practice P13802



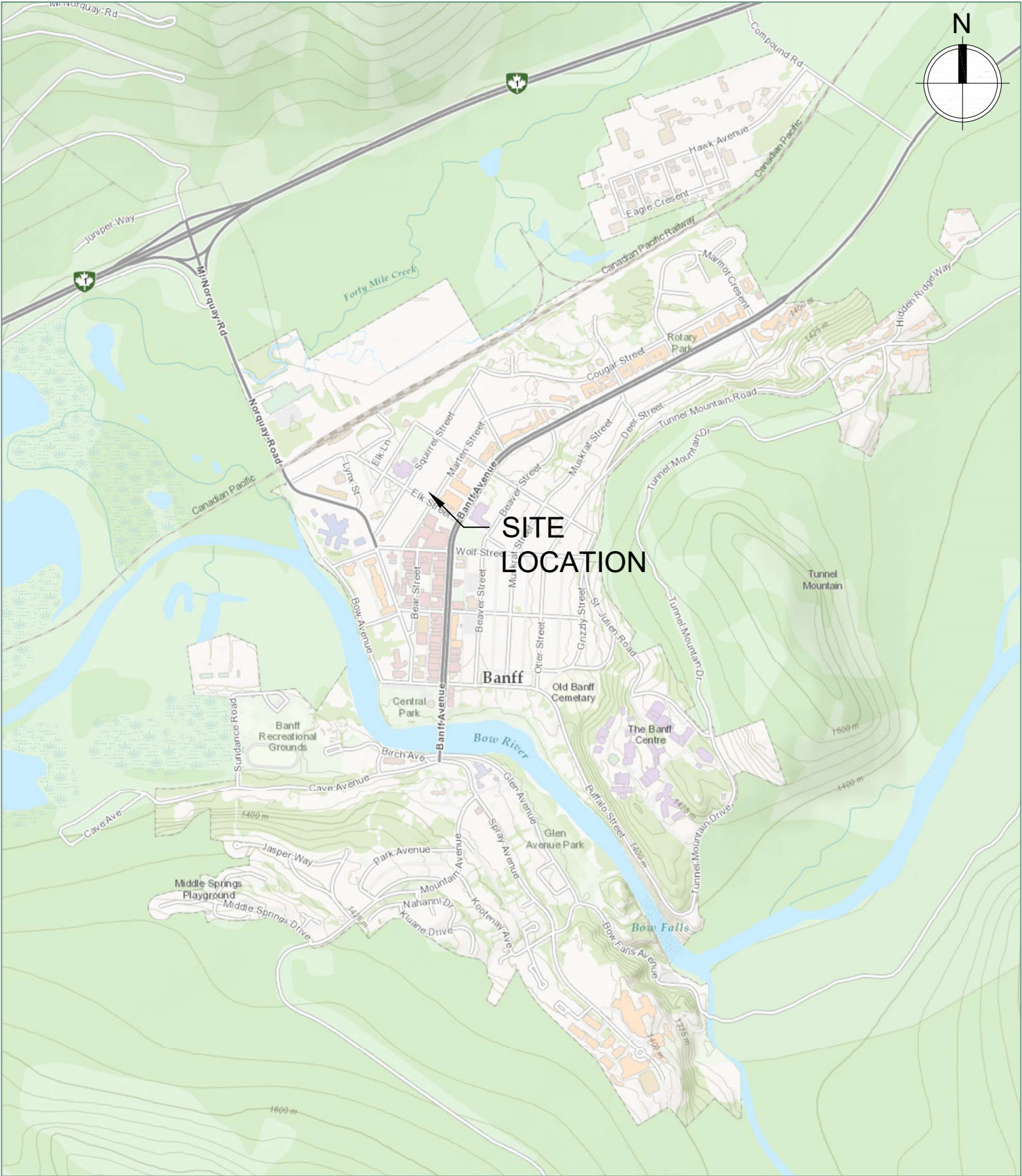
March 13, 2018


Bartek Ryczkowski, P.Eng.  
Principal Geotechnical Engineer

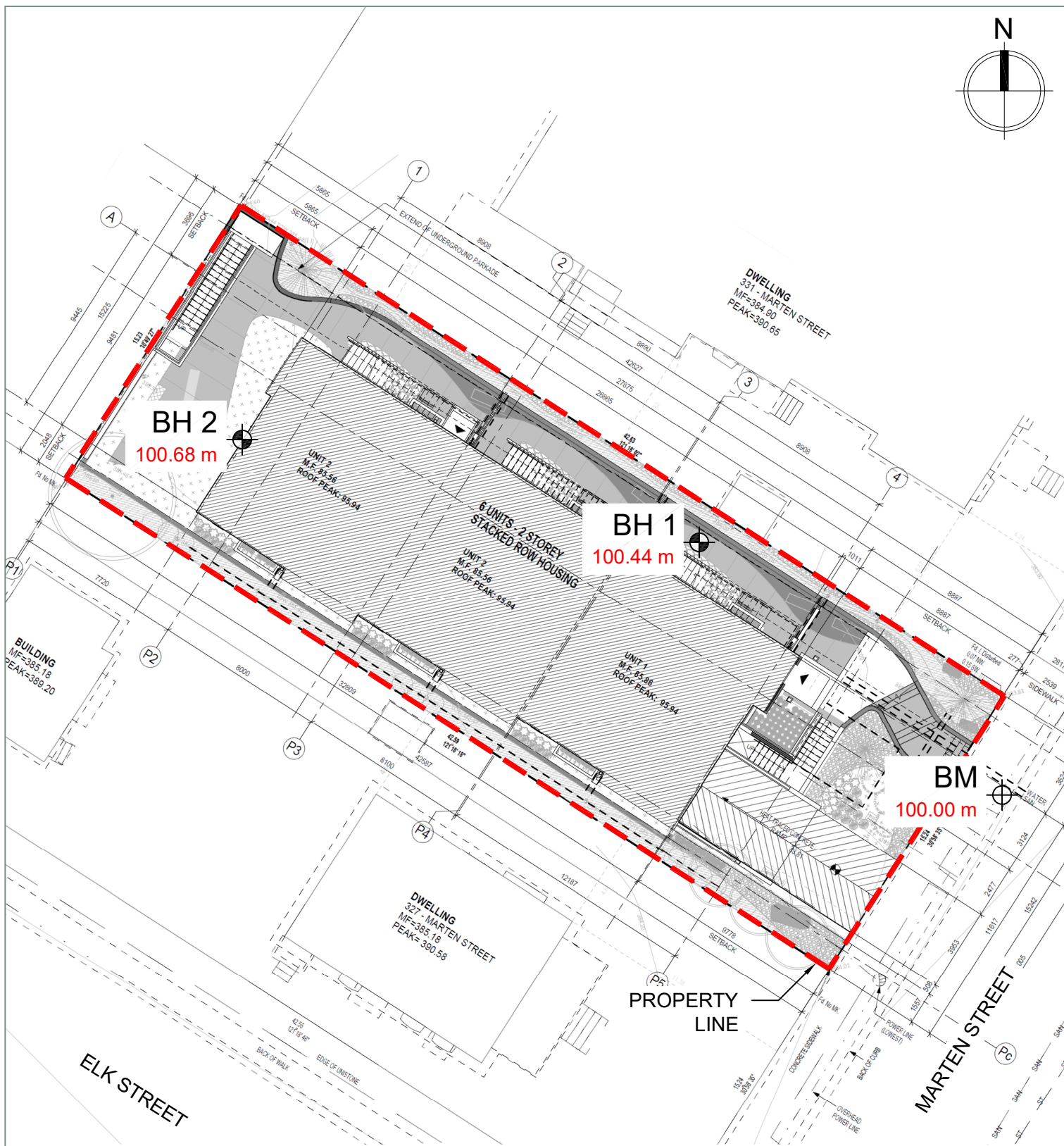
## Appendix A

- Figure 1 – Site Location Plan
- Figure 2 – Borehole Location Plan
- Figure 3 – Aerial Borehole Location Plan
- Figure 4 – Photographs





<div>CONSULTANT</div> <div> <b>LONE PINE</b> GEOTECHNICAL LTD</div>	<div>CLIENT</div> <div>CIVIL ENGINEERING SOLUTIONS INC.</div>	<div>TITLE</div> <div>SITE LOCATION PLAN</div>		
	<div>PROJECT</div> <div>GEOTECHNICAL INVESTIGATION PARKS CANADA AGENCY STAFF HOUSING 329 MARTEN STREET, BANFF, ALBERTA</div>	<div>DRAWN BY</div> <div>BR</div>	<div>REVISION NO.</div> <div>0</div>	<div>SCALE</div> <div>NTS</div>
		<div>DATE</div> <div>MAR 2018</div>	<div>PROJECT NO.</div> <div>1051</div>	<div>FIGURE NO.</div> <div>1</div>



- NOTES:**
1. ALL BOREHOLE LOCATIONS ARE APPROXIMATE.
  2. BOREHOLE ELEVATIONS ARE REFERENCED TO A TEMPORARY BENCHMARK WITH AN ASSIGNED ELEVATION OF 100.00 m.

**CONSULTANT**



**CLIENT**

CIVIL ENGINEERING SOLUTIONS INC.

**PROJECT**

GEOTECHNICAL INVESTIGATION  
PARKS CANADA AGENCY STAFF HOUSING  
329 MARTEN STREET, BANFF, ALBERTA

**TITLE**

BOREHOLE LOCATION PLAN

**DRAWN BY**

BR

**REVISION NO.**

0

**SCALE**

1:250

**DATE**

MAR 2018

**PROJECT NO.**

1051


**FIGURE NO.**

2





NOTES:  
1. ALL BOREHOLE LOCATIONS ARE APPROXIMATE.  
2. BOREHOLE ELEVATIONS ARE REFERENCED TO A TEMPORARY BENCHMARK WITH AN ASSIGNED ELEVATION OF 100.00 m.

<div>CONSULTANT</div> <div> <b>LONE PINE</b> GEOTECHNICAL LTD</div>	<div>CLIENT</div> <div>CIVIL ENGINEERING SOLUTIONS INC.</div>	<div>TITLE</div> <div>AERIAL BOREHOLE LOCATION PLAN</div>		
	<div>PROJECT</div> <div>GEOTECHNICAL INVESTIGATION PARKS CANADA AGENCY STAFF HOUSING 329 MARTEN STREET, BANFF, ALBERTA</div>	<div>DRAWN BY</div> <div>BR</div>	<div>REVISION NO.</div> <div>0</div>	<div>SCALE</div> <div>1:250</div>
		<div>DATE</div> <div>MAR 2018</div>	<div>PROJECT NO.</div> <div>1051</div>	<div>FIGURE NO.</div> <div>3</div>





PHOTOGRAPH 1:  
VACANT OLD HOUSE  
AT THE SITE



PHOTOGRAPH 2:  
GRASSED BACK YARD  
BEHIND THE HOUSE



PHOTOGRAPH 3:  
GEOTECHNICAL DRILLING  
OF BOREHOLE 2

CONSULTANT



CLIENT

CIVIL ENGINEERING SOLUTIONS INC.

TITLE

PHOTOGRAPHS

PROJECT

GEOTECHNICAL INVESTIGATION  
PARKS CANADA AGENCY STAFF HOUSING  
329 MARTEN STREET, BANFF, ALBERTA

DRAWN BY

REVISION NO.

SCALE

BR

0

NA

DATE

MAR 2018

PROJECT NO.

1051

FIGURE NO.

4



## Appendix B

### Borehole Logs Explanation of Terminology and Symbols

(Page 1 of 1)

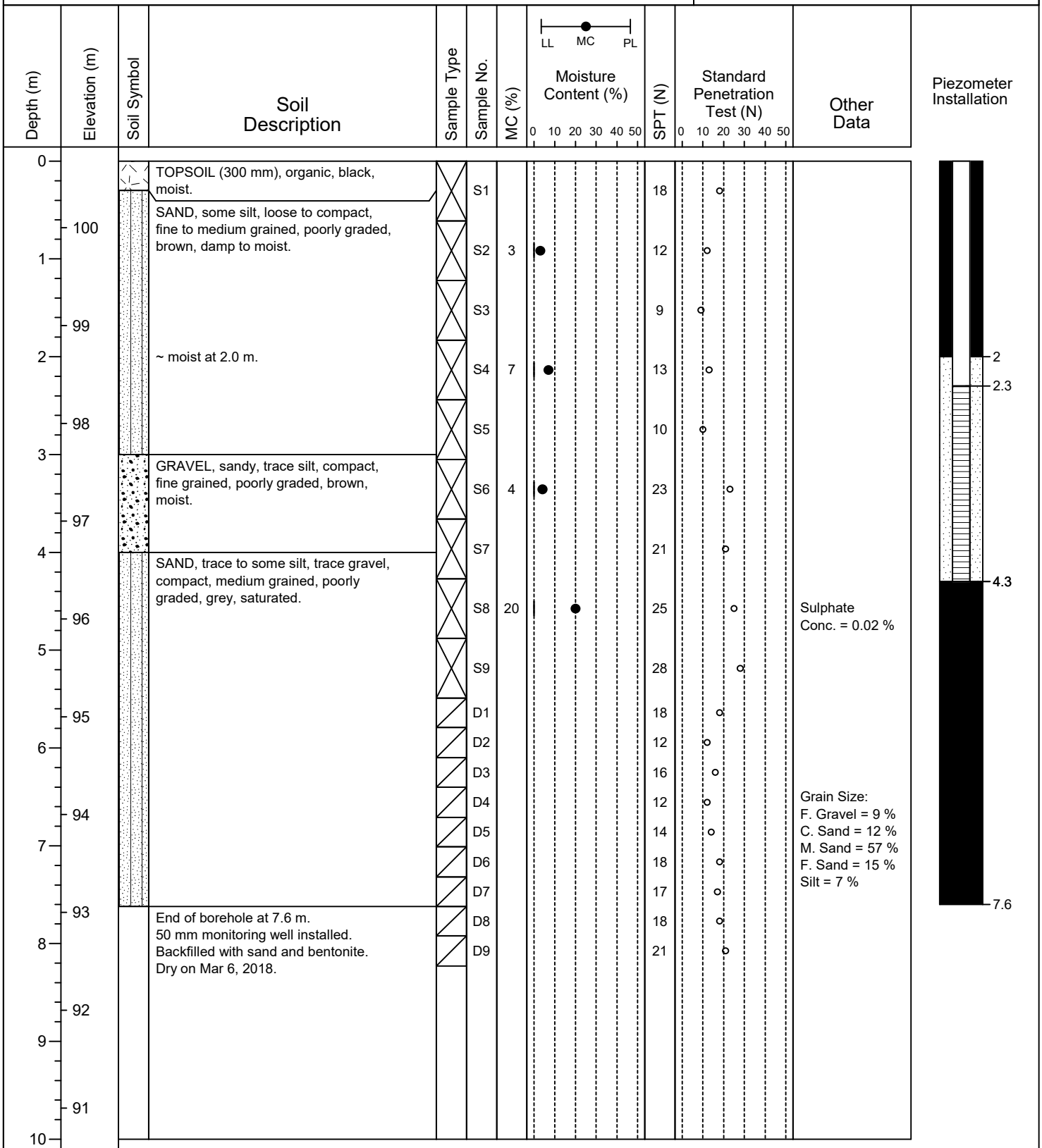
LOGGED BY: TB  
DRILLED ON: FEBRUARY 16, 2018  
GROUND ELEVATION: 100.44 m



CLIENT: CIVIL ENGINEERING SOLUTIONS INC.  
 PROJECT: PARKS CANADA AGENCY STAFF HOUSING  
 PROJECT NO: 1051  
 LOCATION: 329 MARTEN STREET, BANFF, ALBERTA  
 NOTES:

## BOREHOLE 2

(Page 1 of 1)



DRILLED BY: GREAT WEST DRILLING LTD.  
 DRILL RIG: TRUCK MOUNTED  
 DRILL METHOD: HOLLOW STEM AUGER  
 NOTES:

LOGGED BY: TB  
 DRILLED ON: FEBRUARY 16, 2018  
 GROUND ELEVATION: 100.68 m

# EXPLANATION OF TERMINOLOGY AND SYMBOLS



MODIFIED UNIFIED SOIL CLASSIFICATION SYSTEM							
MAJOR DIVISION			GROUP SYMBOL	PLOT SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE GRAINED SOILS More than 50 % retained on 75 µm sieve	GRAVELS More than 50 % of coarse fraction retained on 4.75 mm sieve	CLEAN GRAVELS	GW		Well graded gravels, gravel-sand mixtures, little or no fines	Less than 5 % passes 75 µm sieve	$C_u = D_{60} / D_{10} > 4$ $C_c = (D_{30})^2 / D_{10}D_{60} = 1 \text{ to } 3$
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting both criteria for GW
		GRAVELS WITH FINES	GM		Silty gravels, gravel-sand-silt mixtures	More than 12 % passes 75 µm sieve	Atterberg limits below A-line or plasticity index less than 4
			GC		Clayey gravels, gravel-sand-clay mixtures		Atterberg limits above A-line or plasticity index more than 7
	SANDS More than 50 % of coarse fraction passes 4.75 mm sieve	CLEAN SANDS	SW		Well graded sands, gravelly sands, little or no fines	Less than 5 % passes 75 µm sieve	$C_u = D_{60} / D_{10} > 6$ $C_c = (D_{30})^2 / D_{10}D_{60} = 1 \text{ to } 3$
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting both criteria for SW
		SANDS WITH FINES	SM		Silty sands, sand-silt mixtures	More than 12 % passes 75 µm sieve	Atterberg limits below A-line or plasticity index less than 4
			SC		Clayey sands, sand-clay mixtures		Atterberg limits above A-line or plasticity index more than 7
FINE GRAINED SOILS More than 50 % passes the 75 µm sieve	SILTS Below A-line Neg. organics	LIQUID LIMIT < 50 > 50	ML		Inorganic silts, very fine sands, silty or clayey fine sands or clayey silts of slight plasticity	<div>Soil classification is based on the plasticity chart</div> <div></div>	
			MH		Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts		
	CLAYS Above A-line Neg. organics	LIQUID LIMIT 30 - 50 > 50	CL		Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			CI		Inorganic clays of medium plasticity, silty clays		
			CH		Inorganic clays of high plasticity, fat clays		
	ORGANIC SILTS AND CLAYS Below A-line	LIQUID LIMIT < 50 > 50	OL		Organic silts and organic silty clays of low plasticity		
			OH		Organic clays of medium to high plasticity		
	HIGHLY ORGANIC SOILS			PT			

1. Boundary classification for soil with characteristics of two groups are given combined group symbols (ie. GW-GC is a well graded gravel sand mixture with clay binder between 5 % and 12 %).

2. Soil classification is in accordance with the Unified Soil Classification System (ASTM D2487) with the exception that inorganic clays of medium plasticity (CI) are recognized.



# EXPLANATION OF TERMINOLOGY AND SYMBOLS



**Grain Sizes of Soils** – The following table presents the grain size ranges for soils.

Soil	Grain Size (mm)
Boulders	> 300
Cobbles	75 – 300
Coarse Gravel	19 – 75
Fine Gravel	4.75 – 19
Coarse Sand	2.00 – 4.75
Medium Sand	0.425 – 2.00
Fine Sand	0.075 – 0.425
Silt & Clay	< 0.075

**Minor Soil Fractions** – The following descriptors are used for describing minor soil fractions on borehole logs.

Descriptor*	Example	Percentage by Weight (%)
“and”	“and gravel”	> 35
“y” adjective	“silty”	20 – 35
“some”	“some sand”	10 – 20
“trace”	“trace clay”	1 – 10

\* Descriptors not necessarily applicable for soil classification based on the plasticity chart.

**Compactness of Cohesionless Soils** – The following terms are used for describing the relative density of cohesionless soils on borehole logs.

Descriptive Term	Relative Density (%)	SPT N Value*
Very Loose	< 20	0 – 4
Loose	20 – 40	4 – 10
Compact	40 – 60	10 – 30
Dense	60 – 80	30 – 50
Very Dense	> 80	> 50

\* SPT N Value from SPT Test performed in accordance with ASTM D1586. Uncorrected for overburden pressure effects.

**Consistency of Cohesive Soils** – The following terms are used for describing the undrained shear strength of cohesive soils on borehole logs.

Descriptive Term	Undrained Shear Strength (kPa)	SPT N Value*
Very Soft	< 12	0 – 2
Soft	12 – 25	2 – 4
Firm	25 – 50	4 – 8
Stiff	50 – 100	8 – 15
Very Stiff	100 – 200	15 – 30
Hard	> 200	> 30

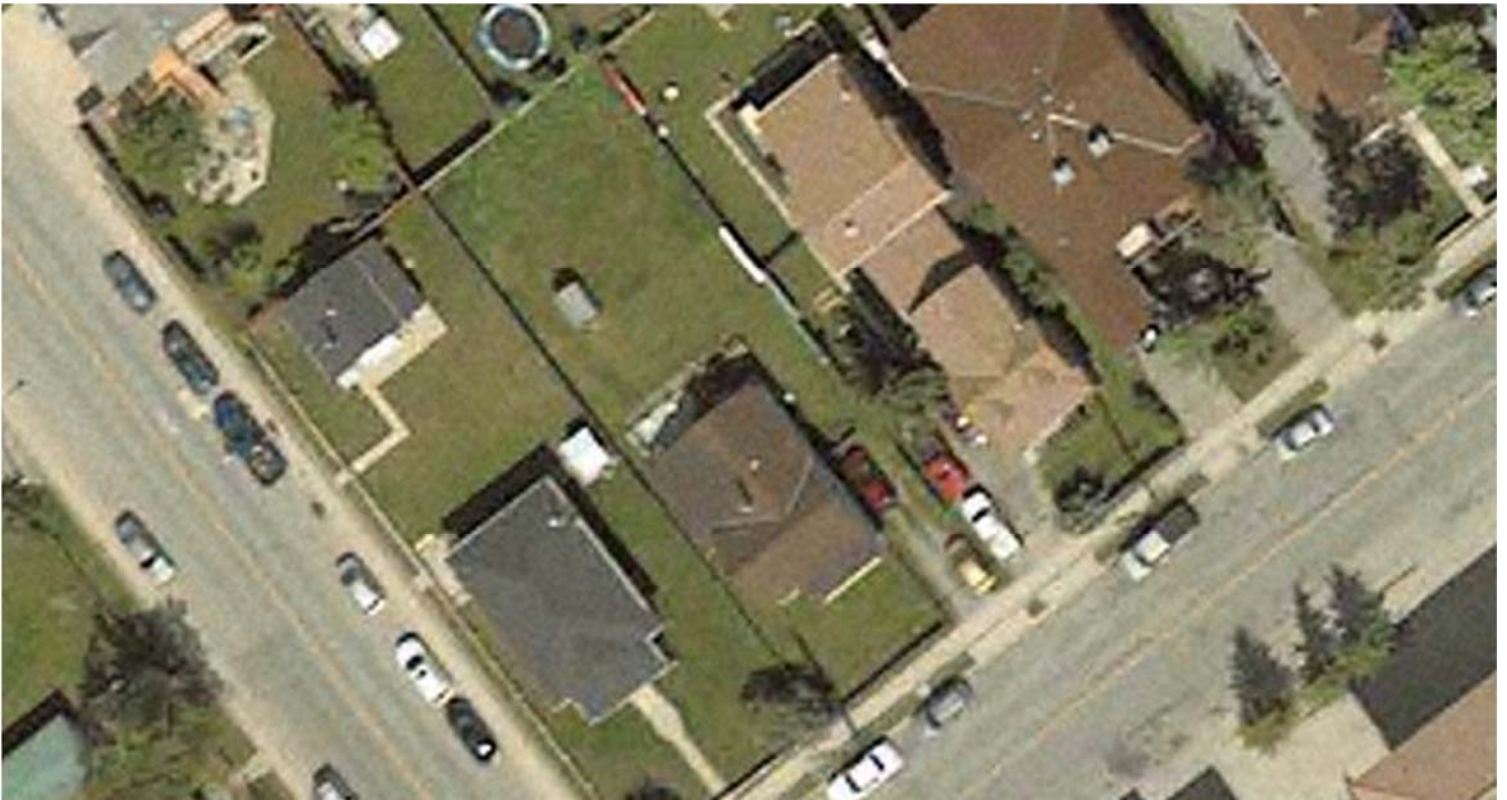
\* SPT N Value from SPT Test performed in accordance with ASTM D1586. Uncorrected for overburden pressure effects. Correlation is very approximate for cohesive soils and should be used with caution.

**APPENDIX E**

**SUPPLEMENTAL PH 2 ENVIRONMENTAL SITE  
ASSESSMENT**



# Supplemental Phase 2 Environmental Site Assessment for Parks Canada Agency at 329 Marten Street, Banff, AB



McElhanney Consulting Services Ltd.  
500, 999 8 Street SW  
Calgary, AB  
T2R 1J5

Contact: Robert Wiedemann  
Phone: 403-968-8727  
Email: [rwiedemann@mcelhanney.com](mailto:rwiedemann@mcelhanney.com)

## Executive Summary

---

The following summarizes the results of the initial and supplementary investigations conducted at 329 Marten Street, Banff, Alberta in November of 2017 and February of 2018. The objective of the assessment was to investigate each area of potential environmental concern (APEC) identified in the *Screening Level Review* conducted by Asset and Environmental Management (AEM, 2017), then vertically delineate known impacts and install monitoring wells to characterize shallow groundwater at the site. Background boreholes and/or monitoring wells were not completed during either investigation as access was limited to the fenced site boundary.

For the soil analysis, in reference the *Canadian Environmental Quality Guidelines* (CCME, 1999 and updates), a pH exceedance of 8.77 in comparison to the guideline of 8, and localized areas of lead exceedance ranging from 150 to 490 mg/kg in comparison to the guideline of 140 mg/kg were identified in proximity to the residence as well as the above ground storage tank (AST) and/or underground storage tank (UST) area. One of the above samples was identified with a zinc concentration of 200 mg/kg, equal to the guideline.

In reference to the *Canadian Soil Quality Guidelines: Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (PAHs) Environmental and Human Health Effects* (CCME, 2008b), elevated PAH concentrations including benz(a)anthracene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene, the carcinogenic PAH index of additive cancer risk (IACR), naphthalene, and phenanthrene were identified at various locations across the site, with vertical closure at 1.0 to 1.5 mbgs. Most exceedances were within an order of magnitude in comparison to the applicable guideline, with exception to naphthalene and phenanthrene at sample locations BH18-03, 0–0.5 m and BH17-07, 0.3–0.6 m, where exceedances ranged from 10 to over 60 times the guideline values.

For the groundwater analysis, in reference to *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FCSAP, 2012), routine and dissolved metal exceedances were identified including sulphate ranging from 460 to 470 mg/L in comparison to the guideline of 100 mg/L, cadmium concentrations of 0.00013 mg/L in comparison to the guideline of 0.000017 mg/L, and zinc of 0.013 mg/L in comparison to the guideline of 0.01 mg/L. Additionally, PAH exceedances including benzo(a)pyrene ranging from 0.000012 to 0.000017 mg/L in comparison to the guideline of 0.00001 mg/L, and pyrene ranging from 0.00003 to 0.000031 mg/L in comparison to the guideline value of 0.000025 mg/L, were identified. All the above noted exceedances were within one order of magnitude in comparison to the guideline. The groundwater elevation was measured at 3.8 metres below ground surface (mbgs) at monitoring well MW18-01, while the other monitoring well (MW18-02) was dry.

It is suspected that the metal and routine parameter exceedances in groundwater are the result of naturally occurring conditions. Select PAH concentrations in both soil and groundwater may also be the result of natural / background conditions, although additional information will be required to support this.

It is anticipated that the soil pH and lead exceedances, and the majority of soil PAH exceedances will be excavated at the time of redevelopment. Upon verification sampling of the excavation, the presence of residual PAH concentrations can be evaluated. If required, recommended options to manage residual PAH concentrations include a background data collection program and background literature review, a Tier 2 exposure pathway modification / elimination approach, or excavation – if the PAH concentrations are not background and cannot be justified.



## Table of Contents

---

1. Glossary of Technical Terms .....	1
2. Introduction .....	2
2.1. Objectives .....	2
3. Background Information .....	3
3.1. Site Information .....	3
3.2. Climatic Information .....	3
3.3. Site Description .....	4
4. Previous Environmental Findings .....	5
4.1. 2017: AEM Screening Level Review .....	5
5. Methodology .....	6
5.1. Safety .....	6
5.2. Soil .....	6
5.3. Groundwater .....	7
6. Field Quality Assurance / Quality Control .....	9
7. Guideline Selection .....	10
7.1. Approach .....	10
7.2. Guidelines .....	10
8. Soil Investigation Results .....	11
8.1. Site Lithology .....	11
8.2. Background Assessment .....	11
8.3. Soil Results Discussion .....	11
8.4. QA/QC .....	14
9. Groundwater Investigation Results .....	15
9.1. Monitoring Schedule .....	15
9.2. Monitoring Summary .....	15
9.3. Lateral and Vertical Flow Direction .....	15
9.4. Groundwater Velocity .....	16
9.5. Groundwater Depth .....	16
9.6. Background Assessment .....	16
9.7. Routine Parameters .....	16

9.8. Dissolved Metals .....	16
9.9. PHC and PAH.....	17
9.10. Groundwater Results Discussion .....	17
9.11. QA/QC .....	18
10. Conceptual Site Model .....	19
11. Limitations of the Assessment.....	20
12. Conclusions and Recommendations .....	21
13. Closure .....	23
14. Limitations of Report.....	24
15. References .....	26

## Tables (in-text)

---

Table 1: APEC Investigation Summary .....	13
---	----

## Tables (end of report)

---

Table 2: Soil Analytical Results - Organics

Table 3: Soil Analytical Results - Inorganics

Table 4: Groundwater Analytical Results – Organics

Table 5: Groundwater Analytical Results – Inorganics

## Figures (end of report)

---

Figure 1: Site Location Map

Figure 2: Site Diagram Showing the Soil Exceedances

Figure 3: Site Diagram Showing the Groundwater Exceedances

Figure 4: Banff Staff Housing Diagram Showing Waterbodies within 500 m

Figure 5: Banff Staff Housing Borehole Cross Section

Figure 6: 329 Marten Street Conceptual Site Model



## Appendices

---

Appendix A – Local Water Well Search

Appendix B – Site Photographs

Appendix C – Borehole Logs

Appendix D – Certificates of Analysis and Chain of Custody

## 1. Glossary of Technical Terms

---

AEP:	Alberta Environment and Parks
APEC:	Area of potential environmental concern
AST:	Above ground storage tank
BTEX:	Benzene, toluene, ethylbenzene and xylenes
CCME:	Canadian Council of Ministers of the Environment
CoPC:	Contaminants of potential concern
CSM:	Conceptual site model
dS/m:	Deci-siemens per metre
DUA	Domestic use aquifer
EC:	Electrical conductivity
ESA:	Environmental site assessment
FAL	Freshwater aquatic life
F1–F4	Petroleum hydrocarbon fractions F1 (C <sub>6</sub> –C <sub>10</sub> ), F2 (>C <sub>10</sub> –C <sub>16</sub> ), F3 (>C <sub>16</sub> –C <sub>34</sub> ), and F4 (>C <sub>34</sub> )
IACR	Index of additive cancer risk
mbgs:	Metres below ground surface
MDL:	Method detection limit
PAH:	Polycyclic aromatic hydrocarbon
PHC:	Petroleum hydrocarbon
QA/QC:	Quality assurance / quality control
RPD:	Relative percent difference
SAR:	Sodium adsorption ratio
Tier 1:	CCME Generic Numerical Guidelines
UST:	Underground storage tank
VOC:	Volatile organic compound



## 2. Introduction

---

Parks Canada Agency (Parks Canada) retained McElhanney Consulting Services Ltd. (McElhanney) to conduct a Supplemental Phase 2 environmental site assessment (ESA) at 329 Marten Street (the site), located in Banff, Alberta (Figure 1). The purpose of the Supplemental Phase 2 ESA was to vertically delineate soil impacts identified in the 2017 Phase 2 ESA and install groundwater monitoring wells to characterize the shallow groundwater. The initial investigation was conducted in November 2017, while the supplemental investigation was conducted in February 2018. Groundwater development was completed in March 2018 and groundwater sampling was completed in May 2018. In the supplemental soil investigation two additional boreholes were advanced to vertically delineate known soil exceedances, then both were completed as monitoring wells. The results from both soil investigations and the groundwater characterization are summarized in this report.

### 2.1. Objectives

The objective of the site assessments included the following:

- Investigation of each area of potential environmental concern (APEC) identified in the Asset and Environmental Management Screening Level Review (AEM, 2017) to confirm the presence or absence of contamination in November 2017. Advancement of two additional boreholes in February 2018 to delineate known soil exceedances.
- Collection of soil and groundwater samples for analysis at an accredited laboratory.
- Consideration of the site management strategy, and subsequent use of the generic environmental quality guidelines (CCME Tier 1).
- Presentation of a preliminary conceptual site model (CSM) for the contamination sources, migration pathways, receptors and exposure mechanisms.
- Preparation of a summary report to current regulatory standards.

## 3. Background Information

### 3.1. Site Information

<b>Legal address</b>	Lot 2, Block 12, Plan 21553 (CLSR)/Plan 6719BC (LTO)
<b>Civic address</b>	329 Marten Street, Banff, AB
<b>UTM coordinates (center of property)</b>	11U 599825 E; 5670838 N
<b>Dimensions and area of property</b>	15.23 m x 42.63 m; 0.0649 ha
<b>Municipal zoning</b>	Cougar/Rabbit Residential District
<b>Municipal services and utility plans</b>	Natural gas, municipal water and municipal sanitary services are present underground, entering the site from Marten Street (Figure 2). A power line also enters the site from Marten Street. Storm water drains are present on the adjacent street.
<b>Surface water and groundwater use</b>	Surface water in the area is used for wildlife watering and recreation. Records indicate drinking water for the Town of Banff is supplied from deep groundwater wells (Town of Banff, 2018).
<b>Building plans and dimensions</b>	A single-family dwelling was present at the site, relocated from the Bankhead mine site town in the early 1900's (AEM, 2017). The house measured approximately 1166.35 square feet, had 3 bedrooms with 2 baths, and a semi-finished basement. It had minor renovations with two additions in the late 1990's, with a sun room and a mud room built on southwest and southeast sides, respectively. The single-family dwelling (Figure 2 and 3) was demolished in March of 2018, and a multi-residence structure is scheduled to be rebuilt at this address.
<b>Current owners</b>	Parks Canada Agency (AEM, 2017).

### 3.2. Climatic Information

<b>Weather station</b>	Banff, Alberta (Government of Canada, 2018)
<b>Annual range in monthly temperature</b>	26.6°C to -32.6°C (59.2 °C range)
<b>Annual range in monthly precipitation</b>	Low of 0 mm to high of 193.8 mm (193.8 mm range)
<b>Seasonal variation in precipitation: 130-year average</b>	January to March – 27.16 mm April to June – 50.27 mm July to September – 47.57 mm October to December – 33.37 mm



### 3.3. Site Description

<b>Site uses for property and surrounding area</b>	The site and surrounding properties to the northeast, northwest and southwest are residential. The area to the southeast is commercial. A residence was located at the front of the site and a greenhouse was present in the backyard, historically covering approximately 40% of the site area. Evidence suggested a fuel storage tank may have been present on the northwest corner of the house. Additionally, records suggest a fuel shed was present in the backyard. Additionally, mounded soil was identified in the backyard and was suspected to be the location of a waste burial pit (AEM, 2017); or potentially backfill of an unknown quality.
<b>Topography and surface water drainage</b>	The site is located on a fluvial plane with relatively flat landscape. Generally, the site drains towards the northeast corner, with the highest elevation located along the backyard fence line. Overall, surface water drainage in the area is to Marten Street, where it enters the storm water drainage system.
<b>Natural Subregion</b>	The site is located within a valley of the Montane Natural Subregion.
<b>Regional soil types</b>	Eutric Brunisols, of the Athabasca Ecozone, which occur in the Montane Ecoregion of Banff and Jasper National Parks. These soils occur on calcareous, coarse-textured glaciofluvial material. In the valleys of the Montane Natural Subregion, Eutric Brunisols are the dominant soil type on fluvial and glaciofluvial deposits (W.D. Holland & G.M. Coen, 1982).
<b>Surficial geology</b>	The surface geology consists mostly of fluvial deposits, including poorly to well sorted, stratified to massive sand, gravel, silt, clay, and organic sediments (AGS, 2013b).
<b>Bedrock geology</b>	The bedrock geology is from the Belly River Group, consisting of fine to coarse grained sandstone; grey to brown carbonaceous siltstone; coal of marginal marine to non-marine origin (AGS, 2013a).
<b>Surface water bodies within 500 m</b>	There are 2 surface water bodies located within 500 m of the site (Figure 4). The Bow River is located approximately 432 m southwest, Whiskey Creek is located approximately 422 m north. The site is not considered within the flood hazard area (Alberta Government, 2018).
<b>Residences and water well information within 1 km</b>	The site is situated within a residential area, and there are six domestic water wells within 1000 m of the site (AEP, 2017). The closest water well (Well ID:356382) is located 172 m southeast of the site, although there is no data available for the well. The next closest water well (Well ID: 405928 and 405930) is located 330 m southwest of the site and was completed at 18.59 mbgs (Appendix A).

## 4. Previous Environmental Findings

---

### 4.1. 2017: AEM Screening Level Review

In 2017, Asset and Environmental Management conducted a Screening Level Review (AEM, 2017). The report listed the following APECs, where soil sampling was recommended and potential impacts to soil or groundwater could be expected:

- Lead paint, exterior walls of residence.
- Above ground storage tank (AST) and/or and underground storage tank (UST) on northeast side of residence where fill ports/vent pipes are present.
- Fuel shed, reportedly formerly located in the backyard.
- Fill material mounded or potential landfill in the backyard along the northwest fence line.



## 5. Methodology

---

### 5.1. Safety

All personnel followed the safe work practices outlined in McElhanney's Health, Safety and Environment policies. Prior to the field work, all ground disturbance protocols were completed within the McElhanney standard operating procedure in conjunction with the ground disturbance information and requests from the client.

### 5.2. Soil

#### 5.2.1. Soil Sampling

The investigation was conducted, and samples were collected with a manual sampling device in November 2017, and a drilling rig equipped with split spoon and hollow stem in February 2018. Discrete soil samples were collected from each sample interval for field screening and submission for analysis. The sampling device was cleaned between each sample interval and care was taken to minimize cross-contamination of each sample depth. Soil descriptions and visual observations were recorded for each auger flight.

The collection of soil samples was conducted in accordance with the *Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment*, Volumes 1-4 (CCME, 2016). Selected soil samples were preserved in laboratory-supplied containers and submitted to an accredited third-party laboratory for chemical analysis. Samples being submitted for volatile organic compounds (VOCs) were stabilized in methanol directly in the field. Samples submitted for other organic analyses were jarred in such a way to minimize headspace. Soil samples for inorganic parameters were placed in sample bags. All soil samples were appropriately labelled and transferred to laboratory custody within the appropriate holding time. During transport, samples were maintained at the appropriate temperature for the analysis.

Field screening results, site characteristics and visual observations assisted with the determination of potential impacts, the maximum depth of investigation, and the selection of soil samples submitted for laboratory analysis. Where appropriate, field screening consisted of the following:

- VOC measurement with an RKI Eagle™ portable gas monitor calibrated with hexane and methane elimination

#### 5.2.2. Soil Analysis

Each APEC was characterized for the appropriate contaminants of potential concern (CoPCs), including the following:

- Salinity and general inorganic parameters, including soil pH, electrical conductivity (EC), sodium adsorption ratio (SAR), chloride, sulphate, sodium, magnesium, calcium and potassium.
- Soil texture, 75-micron sieve analysis.

- Regulated metals, including antimony, arsenic, barium, beryllium, boron (hot water soluble and saturated paste), cadmium, chromium (total and hexavalent), cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, tin, uranium, vanadium and zinc.
- Petroleum hydrocarbons (PHCs), including benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX), and hydrocarbon fractions F1 to F4
- Carcinogenic and non-carcinogenic polycyclic aromatic hydrocarbons (PAHs)

## 5.3. Groundwater

### 5.3.1. Groundwater Monitoring Well Installation

Monitoring wells were completed in open boreholes using 52 mm inner diameter (ID) Schedule 40 PVC pipe. The screened sections of PVC pipe were constructed using 52 mm ID No. 020 slot Schedule 40 PVC. Plain sections of pipe were threaded onto the screened sections and the entire string lowered across a water-bearing interval to the desired depth of completion. High grade silica 10/20 sand was added to the annulus to approximately 0.3 m above the top of the well screen.

A primary watertight seal was placed above the sand pack to 0.5 m below ground surface using high quality bentonite chips. This seal ensured hydraulic isolation between the ground surface, other water-bearing zones, and the well screen. The bentonite chips were hydrated with distilled water during chip placement for proper hydration.

Prior to completion, a 150-mm diameter 1.5 m-long steel protective casing, with a lockable cap was inserted into the open hole to approximately 0.7 mbgs to allow for visual monitoring well identification and to prevent unauthorized access or damage to the well. Due to both the geotechnical and Phase 2 investigation sampling, drill cutting material was limited and residual amounts were either mounded around the steel protector to direct surface water runoff away from the monitoring well or left on-site to be removed at the time of excavation.

On March 7, 2018, MW18-01 was converted to a flush-mount monitoring well to allow for better equipment access. Soil cuttings were shoveled away from outer edge of the steel casing and left on-site for removal at the time of excavation, and the protective casing was removed. The PVC stickup was cut to approximately 6" below ground level and an 8" diameter flush-mount protective steel casing was installed.

### 5.3.2. Groundwater Sampling Procedures

Monitoring wells were developed in March 2018 to ensure unrestricted movement of the groundwater through the monitoring well. Monitoring wells were purged prior to sampling to obtain representative samples of the groundwater formation. Purging and sampling were accomplished by a high-purge (bailer) method. Sampling of the monitoring wells was completed on May 30, 2018.

When using the high-purge method, bailers were used to purge three well volumes of standing water, until the well was dry, or until all measured field indicator parameters stabilized (whichever came first). The well was then allowed to recover before sampling.

Field indicator parameters (field pH, temperature, EC, DO, and ORP) were measured prior to purging and at the time of sampling using a YSI multi-parameter probe.



### 5.3.3. Groundwater Sample Collection and Analysis

Groundwater samples were collected directly from the designated sampling device (bailer) into sterile containers supplied by an accredited third-party laboratory. Samples submitted for organic analyses were sealed in such a way as to minimize or eliminate headspace. All groundwater samples were appropriately labelled and transferred to the laboratory the day of sample collection. During transport, samples were stored in ice-packed coolers. Sample filtering was completed at the laboratory upon receipt.

## 6. Field Quality Assurance / Quality Control

---

To minimize the risk of cross-contamination, sampling equipment in contact with soil or groundwater was sanitized and wiped clean between each location. Where possible, the completion of boreholes and installation of monitoring wells was planned to work from uncontaminated or minimally contaminated areas to the most contaminated areas.

Groundwater monitoring wells were sampled from the least contaminated to most contaminated. Disposable equipment was used where possible to further minimize the risk of cross-contamination. Bailers were dedicated to each well and left in place throughout the duration of the project. Groundwater equipment that was used in more than one well was rinsed with distilled water, then wiped down between each well. If petroleum hydrocarbons or other organic contaminants were known or suspected to be in a given well, the equipment was first wiped down with a mixture of Alconox and water, and then rinsed with distilled water between each well.

A sample duplicate was collected for QA/QC purposes in both soil and groundwater. Additionally, a trip blank supplied by the laboratory was submitted for analysis at the time of groundwater sampling.



## 7. Guideline Selection

---

### 7.1. Approach

Federal guidelines can be applied at three different tiers. For the evaluation of this site the Tier 1 approach, or the direct application of generic numerical values, was applied (FCSAP, 2013).

Where contaminant levels exceed the Tier 1 guidelines, Tier 2 (modification of Tier 1 values based on site-specific conditions) or Tier 3 (development of site-specific remediation objectives) can be considered. If federal guidelines are unavailable for a contaminant of concern, provincial guidelines can be applied (FCSAP, 2013).

### 7.2. Guidelines

#### 7.2.1. Soil

The following soil guidelines were applied.

- *Canadian Environmental Quality Guidelines* (CCME, 1999 and updates)
- *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) In Soil* (CCME, 2008a)
- *Canadian Soil Quality Guidelines Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (PAHs) Environmental and Human Health Effects* (CCME, 2008b)

#### 7.2.2. Groundwater

The following groundwater guidelines were applied

- *Federal Contaminated Sites Action Plan; Guideline Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FCSAP, 2012)

#### 7.2.3. Guideline Categories

Based on the current land use, site lithology, soil textural analysis, and sample locations, the following guideline categories were applied:

- Land Use: Residential / Parkland
- Soil Type: Coarse
- Soil Depth: Surface soil

#### 7.2.4. Background Groundwater Quality

For the calculation of water quality guidelines for the protection of freshwater aquatic life (FAL), aluminum is pH dependent, while copper, nickel and lead are water hardness dependent. As surface water or background water quality data was not available in this assessment, a pH of >6.5 was used for aluminum, and the default guidelines for unknown water hardness values were used for copper, nickel and lead.

## 8. Soil Investigation Results

---

Below is a summary of the 2017 and 2018 Phase 2 ESA results. As a supplement to the previous investigation (MCSL, 2017), boreholes were advanced to vertically delineate PAH and metals impacts identified in the 2017 Phase 2 ESA and to characterize groundwater quality at the site. During the 2017 ESA, boreholes around the former residential building were approximately placed at even distances in attempt to capture the potential lead impacts, with one borehole (BH17-07) placed to investigate the suspected former storage tank location. Sample locations in the backyard were targeted to the suspected fuel storage shed and potential landfill areas. Visual observations, soil lithology characteristics and field screening were utilized to determine the sampled intervals.

In November 2017, the investigation was completed with a manual sampling device. In February 2018, two additional boreholes were advanced with a drilling rig equipped with split spoon and hollow stem. The 2018 boreholes were used to vertically delineate the soil impacts identified in the 2017 Phase 2 ESA and each was subsequently completed as a monitoring well.

The methods for the soil sampling are included in Section 5. Both the current and historic borehole locations and soil exceedances are included in Figure 2, site photographs are included in Appendix B, and the borehole logs are included in Appendix C. The soil analytical results are summarized in Tables 2 and 3, and the laboratory reports are included in Appendix D. To note, method detection limits (MDL) were below the appropriate guideline value for all parameters.

### 8.1. Site Lithology

Soils were logged using the Unified Soil Classification System (Raymond, 1997). In the backyard, topsoil was described as silt with sand to 0.2 meters below ground surface (mbgs) and silty sand to 0.4 mbgs. In proximity to the residence and driveway plus in the monitoring well locations, the typical lithology from surface to approximately 0.5 mbgs was classified as a silt with sand to 0.5-0.7 mbgs. Thereafter, the site was underlain by poorly graded sand or sand with silt to the maximum investigation depth of 6 mbgs. Soil cross-sections are presented in Figure 5. Based on the 75-micron sieve analysis, the site was classified as coarse grained; however, an increase in fine material was present in the upper 0.5 m of the soil profile. The soil borehole logs are presented in Appendix C.

### 8.2. Background Assessment

No background samples were collected during either of the Phase 2 ESA investigations, access was limited to within the fenced property boundary. Off-site access was not granted at the time of the investigations.

### 8.3. Soil Results Discussion

APECs identified by AEM (2017) were investigated in November 2017 and vertical delineation of known impacts was completed in February 2018. The CoPCs investigated during the November 2017 investigation are listed in Section 5. In the February 2018 investigation the primary CoPCs were PAHs and lead. A summary of the locations and exceedances is provided below in Tables 1, 2 and Figure 2. The analytical and investigation results are discussed below.

- In reference the *Canadian Environmental Quality Guidelines* (CCME, 1999 and updates):



- The measured pH value of 8.77 was marginally above the guideline range of 6 to 8 m in soil sample BH18-01 (1.0 to 1.5 m).
- All soil samples had EC and SAR values below the CCME guidelines of 2 dS/m and 5, respectively.
- Localized areas of lead exceedance were measured in three samples at BH17-06 (0–0.15 m), BH17-07 (0–0.15 m), and BH17-08 (0.3–0.6 m) with concentrations ranging from 150 to 490 mg/kg in comparison to the guideline of 140 mg/kg. The exceedances were identified in proximity to the residence as well as the above ground storage tank (AST) and/or underground storage tank (UST) area.
- BH17-07 (0–0.15 m) was identified with a zinc concentration of 200 mg/kg, equal to the guideline.
- As documented in the borehole logs, paint flakes were identified in the upper 0–0.15 m interval in boreholes BH17-06, BH17-07, BH17-08, BH17-09 and BH17-10.
- Based on field observations, the source location and soil analytical results, it is suspected the lead exceedances are limited to the near proximity area of the former residence.
- In reference to the *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) In Soil* (CCME, 2008a), for the November 2017 investigation at 0 to 1.0 mbgs, the following is summarized:
  - All benzene analysis was below the applicable guideline of 0.03 mg/kg.
  - All toluene analysis was below the applicable guideline of 0.37 mg/kg.
  - All ethylbenzene analysis was below the applicable guideline of 0.082 mg/kg.
  - All xylenes analysis was below the applicable guideline of 11 mg/kg.
  - All F1-BTEX analysis was below the applicable guideline of 30 mg/kg.
  - All F2 analysis was below the applicable guideline of 150 mg/kg.
  - All F3 analysis was below the applicable guideline of 300 mg/kg.
  - All F4 analysis was below the applicable guideline of 2800 mg/kg.
  - As such, analysis of these parameters was not completed or required during the February 2018 investigation.
- In reference to the *Canadian Soil Quality Guidelines: Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (PAHs) Environmental and Human Health Effects* (CCME, 2008b), the following PAH exceedances were identified, with vertical closure at 1.0 to 1.5 mbgs:
  - Benz(a)anthracene at BH18-01 (0–0.5 m) with a concentration of 3.7 mg/kg in comparison to the guideline of 1 mg/kg.
  - Benzo(k)fluoranthene at BH18-01 (0–0.5 m) with a concentration of 1.6 mg/kg in comparison to the guideline of 1 mg/kg.
  - Indeno(1,2,3-c,d)pyrene at BH18-01 (0–0.5 m) with a concentration of 2.3 mg/kg in comparison to the guideline of 1 mg/kg.

- The cumulative carcinogenic PAH index of additive cancer risk (IACR) at BH17-01, BH17-03, BH17-06, BH17-07, BH18-01 and BH18-02, with values ranging from 1.037 to 64.03 mg/kg in comparison to the guideline of 1 mg/kg.
- Naphthalene at BH17-07 (0.3–0.6 m) and BH18-01 (0–0.5 m) with concentrations ranging from 0.022 to 0.13 mg/kg in comparison to the guideline of 0.013 mg/kg.
- Phenanthrene at BH17-07 (0.3–0.6 m) and BH18-01 (0–0.5 m) with concentrations ranging from 0.83 to 2.3 mg/kg in comparison to the guideline of 0.046 mg/kg.
- The majority of PAH exceedances were within one order of magnitude of the applicable guidelines, with exception to the PAH IACR, naphthalene and phenanthrene at sample locations BH18-03 (0–0.5 m) and BH17-07 (0.3–0.6 m), where exceedances ranged from 10 to over 60 times the guideline values.
- Lateral PAH closure was not achieved in any direction as off-site investigation would be required, and access had not been granted for these investigations.

**Table 1: APEC Investigation Summary**

Area	Boreholes	Parameter Exceedances	Maximum Concentration, (Guideline), and Depth	Vertical Closure Depth (m)
Lead paint, exterior walls of residence	BH17-06, BH17-08, BH17-09, BH17-10	Lead, PAH	Lead: 490 mg/kg (140 mg/kg) at 0-0.15 m IACR: 1.56 mg/kg (1 mg/kg) at 0.6-1.0 m	No vertical closure (>0.3-0.6)
AST and/or UST on northeast side of residence	BH17-07, MW18-01	pH, Lead, PAH	pH: 8.77 (6–8) at 1.0-1.5 m Lead: 390 mg/kg (140 mg/kg) at 0-0.15 m Benz(a)anthracene: 3.7 mg/kg (1 mg/kg) at 0-0.5 m Benzo(k)fluoranthene: 1.6 mg/kg (1 mg/kg) at 0-0.5 m Indeno(1,2,3-c,d)pyrene: 2.3 (1 mg/kg) at 0-0.5 m IACR: 64 mg/kg (1 mg/kg) at 0-0.5 m Naphthalene: 0.13 mg/kg (0.013 mg/kg) at 0-0.5 m Phenanthrene: 2.3 mg/kg (0.046 mg/kg) at 0-0.5 m	1.0-1.5 for PAH parameters; 0.3-0.6 for metals; >1.0 for pH
Fuel shed	BH17-02, BH17-05, MW18-02	PAH	IACR: 2.24 mg/kg (1 mg/kg) at 0-0.5 m Phenanthrene: 0.083 (0.046 mg/kg) at 0-0.5 m	0.5-1.0
Fill material mounded or potential landfill in the backyard along the northwest fence line	BH17-01, BH17-03, BH17-04	PAH	IACR: 1.95 mg/kg (1 mg/kg) at 0-0.5 m	0.5-1.0



## 8.4. QA/QC

The analysis was performed by Maxxam Analytics (Maxxam). Maxxam is accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted in the analytical reports, procedures used by Maxxam are based on recognized provincial, federal or US methods. Maxxam completed all necessary laboratory duplicates, method blanks, surrogate and matrix spikes and standard or certified reference materials.

Analytical hold times were in compliance for each sample, all samples were maintained at appropriate temperature, and standard chain of custody protocols were adhered to for each sampling event. Analytical data was tabled directly from the electronic file provided by the laboratory, which was processed with third-party database software to eliminate the risk of transcription errors.

In both analytical reports, several parameters in the quality assurance report did not have the matrix spike or duplicate relative percent difference (RPD) calculated. For the matrix spike, the relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample collection). For the RPD, the concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation. On some of the PAH parameters, the recovery or RPD for the parameter was outside the control limits. Regardless of the above, the overall quality control complied with the acceptability criteria.

A duplicate sample was collected for soil sample BH18-02 (0-50 cm). The duplicate associated with BH18-02 was reviewed and the appropriate relative percent difference (RPD) was calculated. RPD values with a variance range greater than 35% for inorganics and 50% for organics are considered to be a potential data quality issue when applied to sample concentrations that are less than five times the method detection limit (MDL). With respect to the BH18-02 duplicate, only one parameter, Phenanthrene, was found to be outside the acceptable range criteria stated above. In this particular case, the phenanthrene duplicate was found to exceed the applicable guideline while the parent sample did not. Three additional samples collected below the 0-50 cm interval were all found to be non-detect, and so despite the poor quality of sample confidence in the upper topsoil, it is believed that vertical closure was still achieved. None of the QA/QC issues identified had a material affect on the reliability of the data presented within this report.

## 9. Groundwater Investigation Results

To assess groundwater conditions on-site, two boreholes were completed as shallow screened monitoring wells (MW18-01 and MW18-02) in February 2018. A geotechnical well located in the front yard was of an unknown depth and screen interval, and therefore was not utilized for this portion of the investigation.

Methods for the groundwater sampling and assessment are included in Section 5, and the monitoring well locations with groundwater analytical exceedances are shown in Figure 3. The analytical data is summarized in Tables 4 and 5, the monitoring well logs are included in Appendix C, and the laboratory reports are included in Appendix D.

Groundwater monitoring was conducted on May 30, 2018. Monitoring well MW18-02 was dry; therefore, no analytical data was available. Groundwater samples from MW18-01 were analyzed for select parameters including routine water potability, BTEX, PHC F1–F2, PAH and dissolved metals. To note, method detection limits (MDL) were at or below the appropriate guideline value for all parameters with the exception of cadmium.

### 9.1. Monitoring Schedule

<b>Monitoring Frequency:</b>	Not determined
<b>Initial Sampling Event:</b>	May 30, 2018
<b>No. of Sampling Events to Date:</b>	1

### 9.2. Monitoring Summary

<b>No. of Monitoring Wells:</b>	2
<b>No. of Monitoring Wells Sampled:</b>	1
<b>No. of Groundwater Bearing Zones:</b>	1
<b>Decommissioned Well(s):</b>	None
<b>Characterization Well(s):</b>	MW18-01 and MW18-02
<b>Down-gradient Well(s):</b>	None
<b>Background Well(s):</b>	None

### 9.3. Lateral and Vertical Flow Direction

Two monitoring wells were installed at the site, MW18-01 and MW18-02; therefore, the direction and gradient of shallow groundwater flow cannot be determined. Based on site characteristics the assumed direction of groundwater flow is to the southwest and/or south, towards the Bow River. Nested wells were not installed at the site and therefore, vertical groundwater flow cannot be determined.



## 9.4. Groundwater Velocity

Hydraulic conductivity testing was not completed at either monitoring well, and in addition to the unknown gradient, the average linear flow velocity cannot be determined.

## 9.5. Groundwater Depth

The measured depth to shallow groundwater in monitoring well MW18-01 was 3.8 mbgs (screened at 2.2 to 4.2 m). Monitoring well MW18-02 (screened at 2.1 to 4.1 m) was dry during the 2018 spring sampling event. Sampling was completed during spring freshet to assess and characterize the high-water table.

## 9.6. Background Assessment

No background monitoring wells were installed at the site.

## 9.7. Routine Parameters

In reference to *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FCSAP, 2012), the following was noted in regard to routine parameters. A summary of the routine groundwater parameters is provided in Table 5.

- Sulphate concentrations at MW18-01 ranged from 460–470 mg/L, exceeding the guideline of 100 mg/L.
- All chloride concentrations were below the guideline value of 120 mg/L.
- All nitrate (as N) and nitrate (as NO<sub>3</sub><sup>-</sup>) were below the guideline values of 0.6 mg/L and 13 mg/L, respectively.
- The above noted exceedances were within one order of magnitude in comparison to the guideline.

In the absence of any known salinity / chloride impact, it is suspected that the sulphate concentrations are the result of naturally occurring conditions.

## 9.8. Dissolved Metals

In reference to *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FCSAP, 2012), the following was noted in regard to dissolved metals. A summary of the groundwater metal parameters is provided in Table 5.

- Cadmium concentrations of 0.000013 mg/L at MW18-01 exceeded the guideline of 0.000017 mg/L. To note, the cadmium value for the trip blank was non-detect (<0.00002 mg/L), but above the guideline value as well.
- Zinc concentrations of 0.013 mg/L at MW18-01 exceeded the guideline of 0.1 mg/L.
- The above noted exceedances were within one order of magnitude in comparison to the guideline.

Cadmium is a natural, usually minor constituent of surface and groundwater. Cadmium in soils is derived from both natural and anthropogenic sources. Natural sources include underlying bedrock or transported parent

material such as glacial till and alluvium. Anthropogenic sources include sewage sludge, manure and phosphate fertiliser application (ICdA, 2009).

Zinc is a common component of Alberta tills (Pawluk & Bayrock, 1969), particularly in the northwestern portion of the province, where deposits of lead-sulphide (ZnS) minerals are common in the nearby parent rock (Bednarski, 2001); (Plouffe, Paulen, & Smith, 2006). ZnBr<sub>2</sub>, zinc carbonate (ZnCO<sub>3</sub>), and iron carbonate (FeCO<sub>3</sub>) are used to scavenge sulphide (S<sup>2-</sup> as H<sub>2</sub>S) from drilling mud and precipitate it as insoluble sulphides (Schlumberger, 2010); (Luppens & Wilson, 1992); (Ray, Randall, & Parker, 1979).

In the absence of a specific source of impact, and in consideration of background groundwater geochemistry summarized above, it is suspected that the cadmium and zinc exceedances are the result of naturally occurring conditions.

## 9.9. PHC and PAH

In reference to *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FCSAP, 2012), the following was noted in regard to the PHC and PAH parameters. A summary of the groundwater PHC and PAH data is provided in Table 4.

- Benz(a)pyrene concentrations ranging from 0.000012 to 0.000017 mg/L at MW18-01 exceeded the guideline of 0.00001 mg/L.
- Pyrene concentrations ranging from 0.00003 to 0.000031 mg/L at MW18-01 exceeded the guideline of 0.000025 mg/L.
- All PHC concentrations were below the applicable guidelines.
- The above noted exceedances were within one order of magnitude in comparison to the guideline.

## 9.10. Groundwater Results Discussion

Elevated routine, metal and PAH parameters were identified in monitoring well MW18-01 (screened at 2.2 to 4.2 m, located along the north boundary of the site), while monitoring well MW18-02 (screened at 2.1 to 4.1 m, located within the suspected fuel shed area), was dry at the time of sampling. As such, the extent of the groundwater exceedances has not been determined.

It should be noted however, that in the absence of salinity (chloride) impact and in reference to the background geochemistry summarized in Section 9.8, the salinity and metal exceedances in groundwater are suspected to be the result of naturally occurring conditions. Although not confirmed, select PAH exceedances in groundwater may be the result of background conditions as well. Both natural and man-made sources of PAH contamination are well documented. Anthropogenically, atmospheric transport and deposition of PAH contamination is widespread globally due to the combustion of fuel and coal (Laflamme & Hites, 1978). Additionally, natural sources of PAH in sediments result from forest fires, volcanic eruptions, and plant or microbial metabolism (CCME, 2008b). To confirm whether PAH concentrations at the site are the result of background conditions, background data should be collected and reviewed.



## 9.11. QA/QC

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA. All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Samples were filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling. Dissolved sulphate detection limits were raised due to dilution to bring the analyte within the calibration range. The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

A duplicate sample was collected for MW18-01 for QA/QC purposes at the time of sampling in addition to a trip blank. The duplicate sample was reviewed and the appropriate RPD values were calculated. RPD values in groundwater with a variance range greater than 25% for inorganics and 45% for organics are considered to be a potential data quality issue when applied to sample concentrations that are less than five times the MDL. With respect to the MW18-01 duplicate, all of the parameters tested were found to be within the acceptable range as stated above, indicating a high confidence with respect to QA/QC.

## 10. Conceptual Site Model

---

Exceedances were identified in both soil and groundwater for salinity and routine parameters, metals, and PAHs. Of most concern are the lead exceedances in soil and the PAH exceedances in soil and groundwater. A conceptual site model (CSM) to illustrate the relevant impacts, exposure pathways, and receptors is provided in Figure 6.

The land use for the site and surrounding area is residential / parkland, and potential receptors are both human and ecological. Human receptors include residents, occupants and the public of various ages (toddler to adult) and health condition as well as construction works and site maintenance personnel. Primary human exposure pathways include direct soil contact, soil ingestion, and vapour inhalation (outdoor or in residence / below ground in a parking garage or basement), and potable water ingestion. Construction workers and site maintenance personnel may face additional exposure if working in open excavations or trenches. In terms of volatilization and future vapour risk, the greatest concern is from the PAH parameters of naphthalene and phenanthrene, both identified in the near soil surface. Ecological receptors include soil invertebrates and vegetation, burrowing animals, surrounding wildlife and avian species, as well as freshwater aquatic species at potential points of contaminant discharge. Primary ecological exposure pathways include direct soil contact, soil and food ingestion, and surface water / freshwater aquatic life exposure and aquatic species toxicity.

At the site topsoil was described as silt with sand to 0.2 mbgs and silty sand to 0.4 mbgs. In proximity to the residence and driveway plus in the monitoring well locations, the typical lithology from surface to approximately 0.5 mbgs was classified as a silt with sand to 0.5-0.7 mbgs. Thereafter, the site was underlain by poorly graded sand or sand with silt to the maximum investigation depth of 6 mbgs.

The majority of the PAH and metal exceedances are within the unsaturated zone (surface soil to a maximum depth of 1.0 mbgs). Shallow groundwater was encountered at 3.8 mbgs in monitoring well MW18-01 in the spring. Monitoring well MW18-02 (screened at 2.1 to 4.1 m) was dry. It is assumed that shallow groundwater depths fluctuate across the site, at depths of 3.8 m and greater. Groundwater gradient and velocity is not known.

For the identified metal exceedances, vertical and lateral delineation was not achieved but exceedances remain localized in proximity to the residence. Vertical PAH closure was achieved at 1.0 to 1.5 mbgs, within the unsaturated zone. Lateral PAH closure was not achieved as the investigation was limited to the fenced site boundary.

Once released to the environment, PAH and metal constituents will adsorb onto soil particles. As a result of their relatively low mobility and solubility, as well as the soil lithology and deep groundwater table, a minimal amount of vertical and lateral migration is anticipated. Lead impacts will likely remain localized in proximity to the residence. PAH concentrations, which could be the result of background conditions may be ubiquitous within the shallow soil lithology of the area. Both anthropogenic (fuel combustion) and natural (forest fire) sources of PAH contamination are both widespread and common (CCME, 2008b), however, additional background data collection, forensic analysis, and/or a background literature review would be required to support this.



## 11. Limitations of the Assessment

---

The following limitations are noted for this assessment, and should be considered upon evaluating the results:

- The lack of a background (undisturbed) location and associated soil and groundwater chemistry limits the evaluation of background conditions, specifically relating to the elevated PAH parameters.
- Lateral delineation for PAH was not achieved in any direction as a result of access being limited to within the fenced site boundary.

## 12. Conclusions and Recommendations

---

The following summarizes the results of the initial and supplementary investigations conducted at 325 Marten Street, Banff, Alberta in November 2017 and February 2018. The objective of the assessments was to investigate each APEC identified in the initial *Screening Level Review* (AEM, 2017).

### General

- In the backyard, topsoil was described as silt with sand to 0.2 mbgs and silty sand to 0.4 mbgs. In proximity to the residence and driveway plus in the monitoring well locations, the typical lithology from surface to approximately 0.5 mbgs was classified as a silt with sand to 0.5–0.7 mbgs. Thereafter, the site was underlain by poorly graded sand or sand with silt to the maximum investigation depth of 6 mbgs. Based on the 75-micron sieve analysis, the site was classified as coarse grained; however, an increase in fine material was present in the upper 0.5 m of the soil profile.
- Background boreholes and/or monitoring wells were not completed since access was limited to within the fenced site boundaries during both investigations.

### Soil

- The measured pH value of 8.77 was marginally above the guideline range of 6 to 8 m in soil sample BH18-01 (1.0 to 1.5 m).
- No EC or SAR exceedances were identified in comparison to the CCME guidelines of 2 dS/m and 5, respectively.
- No BTEX or PHC F1–F4 exceedances were identified in comparison to the applicable CCME guidelines.
- Localized areas of lead exceedances were measured in three samples collected in proximity to the residence (BH17-06 and BH17-07 at 0–0.15 mbgs, and BH17-08 (0.3–0.6 mbgs)) and the AST and/or UST area located northeast side of the residence. Vertical metal delineation was not achieved below 0.3 to 0.6 mbgs. Based on field observations, source location and soil analytical results (BH18-01/MW18-01), it is suspected the lead exceedances are limited to the near proximity area of the former residence.
- Elevated PAH parameters including benz(a)anthracene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene, naphthalene, and phenanthrene as well as the IACR values were above applicable federal guidelines. Peak PAH concentrations were measured in the AST and/or UST area located northeast side of the residence and vertical closure was achieved at 1.0 to 1.5 mbgs. Lateral closure was not achieved in any direction as a result of the fenced site boundary.

### Groundwater

- The groundwater elevation of MW18-01 was measured at 3.8 mbgs in the spring sampling event, while MW18-02 was dry.
- Routine chemistry and metal concentrations were below the applicable guidelines with the exception of sulphate, cadmium and zinc. Although background groundwater chemistry was not available for comparison, it is suspected that each of these exceedances is the result of naturally occurring conditions.



- PHC and PAH concentrations were below the applicable guidelines with the exception of benzo(a)pyrene (0.000012 to 0.000017 mg/L) and pyrene (0.00003 to 0.000031 mg/L).

## Summary

In summary, exceedances were identified for pH, lead and various PAHs in soil, and routine parameters, various metals and PAH parameters in groundwater. It is suspected that the metal and routine parameters in groundwater are the result of naturally occurring conditions. The PAH concentrations in both soil and groundwater may be the result of background conditions, and additional background data and/or a background literature review is recommended to support this, if required (see below).

In soil, the pH, lead and PAH impacts were identified within the unsaturated zone. As a result of the low mobility and solubility of these constituents in combination with the increase in fine-grained material within the upper soil lithology and deep groundwater table, it is estimated that there will be minimal vertical or lateral migration. In terms of volatilization and future vapour risk, the greatest concern is from the PAH parameters of naphthalene and phenanthrene, both identified in the near soil surface.

It is anticipated that the soil pH and lead exceedances, and the majority of soil PAH exceedances will be excavated at the time of redevelopment. Upon verification sampling of the excavation, the presence of residual PAH concentrations can be evaluated. If required, recommended options to manage residual PAH concentrations include a background data collection program and background literature review, additional analysis to determine if the PAH source is biogenic or petrogenic (i.e. alkylated PAH analysis), a Tier 2 exposure pathway modification / elimination approach, or additional excavation if the PAH concentrations are not background and cannot be justified.

## 13. Closure

---

We trust that this report meets your requirements. If you have any questions or concerns regarding this assessment, please contact undersigned at 403-968-8727 or [rwiedemann@mcelhanney.com](mailto:rwiedemann@mcelhanney.com).

Sincerely,

McElhanney Consulting Services Ltd.



Report completed and soil assessment reviewed by:  
Robert Wiedemann, M.Env.Sc., P.Ag., P.Geo  
Senior Geoscientist



## 14. Limitations of Report

---

This report was prepared by McElhanney Consulting Services Ltd. ("McElhanney") for the exclusive use of Parks Canada Agency (the Client), and may not be reproduced or distributed in whole or in part without the prior written consent of McElhanney or used or relied upon in whole or in part by a party other than mentioned in this Limitations. Any unauthorized use of this report, or any part hereof, by a third party, or any reliance on or decisions to be made based on it, are at the sole risk of such third parties. McElhanney accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, in whole or in part.

**Standard of Care and Disclaimer of Warranties.** This study and report have been prepared in accordance with generally accepted engineering and scientific judgments, principles and practices. McElhanney expressly disclaims any and all warranties in connection with this report including, without limitation, any warranty that this report and the associated site investigation work has uncovered all potential environmental liabilities associated with the subject property.

**Investigation and Subsurface Risks.** The environmental characterization data was collected in general accordance with the standards and methods identified in the document by experienced professionals. Subsurface conditions between boreholes, monitoring wells, and sampling locations have been based, by necessity, on assumptions of what exists between the actual locations sampled or investigated, and may vary significantly from actual site conditions. Interpretations of groundwater levels and flow direction are based on water level measurements at selected monitoring well locations and are expected to fluctuate. Borehole and monitoring well observations indicate the approximate subsurface conditions at those locations only. Even a comprehensive sampling and testing program, implemented in accordance with appropriate equipment by experienced personnel, may fail to detect certain conditions. Actual conditions may vary significantly between the points investigated and all persons making use of this report should be aware of, and accept, this risk. Subsurface sampling may result in unavoidable contamination of certain subsurface areas not known to be previously contaminated such as, but not limited to, a geologic formation, the groundwater or other hydrous body. McElhanney is not responsible for such contamination.

**Information from Client and Third Parties.** McElhanney has relied in good faith on information provided by the Client and third parties noted in this report and has assumed such information to be accurate, complete, reliable, non-fringing, and fit for the intended purpose without independent verification. McElhanney accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions or errors in information provided by third parties or for omissions, misstatements or fraudulent acts of persons interviewed.

**Independent Judgments.** McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land.

**Effect of Changes.** All evaluations and conclusions stated in this report are based on facts, observations, site specific details, legislation and regulations as they existed at the time of the investigation. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. Regulatory statutes are also subject to change and interpretation, which may change over time. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or

possible changes) as to the site or regulatory requirements upon which this report was based, or b) new information is discovered in the future during site excavations, building demolition or other activities, or c) additional subsurface investigations or testing conducted by others.



## 15. References

---

- AEM. (2017). *Screening Level Review*. Asset and Environmental Management.
- AEP. (2017, December 7). *Alberta Water Well Information Database*. Retrieved June 6, 2017, from Alberta Environment and Parks: <http://aep.alberta.ca/water/reports-data/alberta-water-well-information-database/>
- AGS. (2013a). *Alberta Geological Survey Map 600. Bedrock Geology of Alberta. Scale: 1:1,000,000*. Edmonton, AB: Alberta Geological Survey.
- AGS. (2013b). *Alberta Geological Survey Map 601. Surficial Geology of Alberta. Scale: 1:1,000,000*. Edmonton, AB: Alberta Geological Survey.
- Alberta Government. (2018, June 18). *Draft Banff Bow Flood Hazard Map 01*. Retrieved from Alberta Environment and Parks Flood Hazard Identification Program: <http://aep.alberta.ca/water/programs-and-services/flood-hazard-identification-program/draft-flood-hazard-studies/default.aspx>
- Bednarski, J. M. (2001). Drift Composition and Surficial Geology of the Trutch Map Area (94G). *Drift Composition and Surficial Geology of the Trutch Map Area (94G), Northeastern British Columbia*. Geological Survey of Canada Open File D3815.
- CCME. (1999 and updates). *Canadian Environmental Quality Guidelines*. Winnipeg, MB.: Canadian Council of Ministers of the Environment.
- CCME. (2008a). *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) In Soil*. Winnipeg, MB.: Canadian Council of Ministers of the Environment.
- CCME. (2008b). *Canadian Soil Quality Guidelines. Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (Environmental and Human Health Effects). Scientific Supporting Document*. Canadian Council of Ministers of the Environment.
- CCME. (2016). *Guidance Manual for the Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment*. Volumes 1-4: Canadian Council of Ministers of the Environment.
- FCSAP. (2012). *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites*. Federal Contaminated Sites Action Plan.
- FCSAP. (2013). *FCSAP Advisory Bulletin: Can Provincial/Territorial Guidelines be Applied in Lieu of Existing Federal Guidelines?* Federal Contaminated Sites Action Plan.
- Government of Canada. (2018, 06 14). *Canadian Climate Normals: 1981-2010*. Retrieved from [http://climate.weather.gc.ca/climate\\_normals/index\\_e.html](http://climate.weather.gc.ca/climate_normals/index_e.html)
- ICdA. (2009). *Level of Cadmium in the Environment*. Brussels, Belgium: International Cadmium Association (ICdA).
- Laflamme, R. E., & Hites, R. A. (1978). The Global Distribution of PAH in Recent Sediments. *Geochemica et Cosmochimica Acta*, 45: 2359-2367.
- Luppens, J. A., & Wilson, S. E. (1992). Manual on Drilling, Sampling, and Analysis of Coal. In R. W. Stanton, *Joint Task Group on Core Sampling*. American Society for Testing and Materials (ASTM).
- MCSL. (2017). *Phase 2 Environmental Site Assessment for Parks Canada Agency at 329 Marten Street, Banff, AB*. Calgary: McElhanney Consulting Services Ltd. .

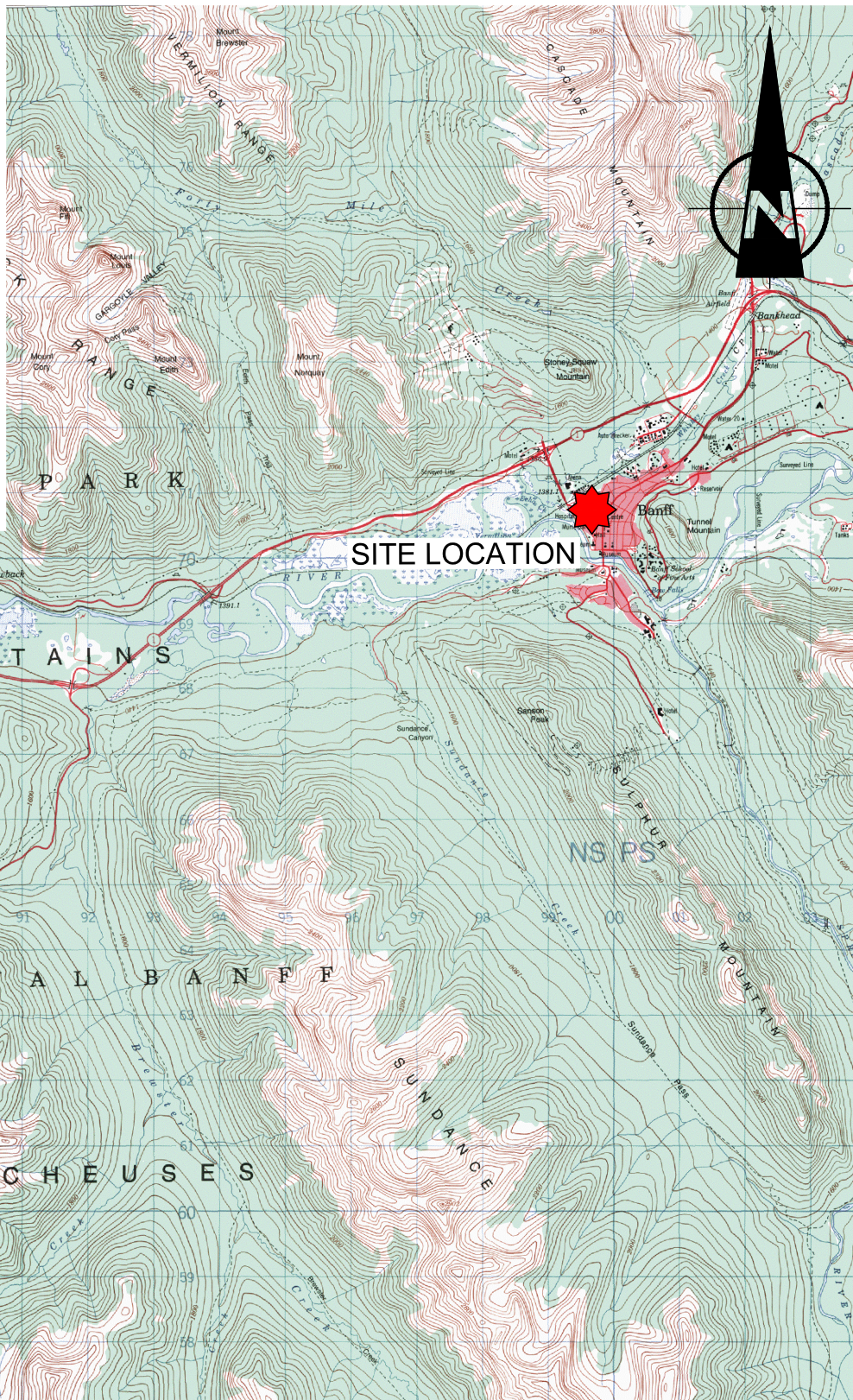
- Pawluk, S., & Bayrock, L. A. (1969). *Some Characteristics and Physical Properties of Alberta Tills*. Research Council of Alberta.
- Plouffe, A., Paulen, R. C., & Smith, I. R. (2006). *Indicator Mineral Content and Geochemistry of Glacial Sediments from Northwest Alberta (NTS84L, M): New Opportunities for Mineral Exploration*. Alberta Energy and Utilities Board and Alberta Geological Survey.
- Ray, J. D., Randall, B. V., & Parker, J. C. (1979). Use of Reactive Iron Oxide to Remove H<sub>2</sub>S from Drilling Fluid. *Journal of Petroleum Technology*, 797-801.
- Raymond, P. G. (1997). *Unified Soil Classification System*. Geotechnical Engineering.
- Schlumberger. (2010). Zinc Bromide. In Schlumberger, *Oilfield Glossary*.
- Town of Banff. (2018, June 16). *Drinking Water*. Retrieved from <http://banff.ca/index.aspx?NID=420>
- W.D. Holland & G.M. Coen. (1982). *Ecological (Biophysical) Land Classification Of Banff and Jasper National Parks* (Vol. II: Soil and Vegetation Resources). Edmonton, AB: Alberta Institute of Pedology. Retrieved from [http://sis.agr.gc.ca/cansis/publications/surveys/ab/ab44/ab44-v2\\_report.pdf](http://sis.agr.gc.ca/cansis/publications/surveys/ab/ab44/ab44-v2_report.pdf)



## Figures

---





THIS DRAWING AND DESIGN IS THE PROPERTY OF McELHANNEY CONSULTING SERVICES LTD. (McELHANNEY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF McELHANNEY. McELHANNEY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN. THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION. McELHANNEY, ITS EMPLOYEES, SUBCONSULTANTS AND AGENTS WILL NOT BE LIABLE FOR ANY LOSSES OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO, THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, SUPPLIERS, CONSULTANTS AND STAKEHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT McELHANNEY'S PRIOR WRITTEN CONSENT. INFORMATION ON EXISTING UNDERGROUND FACILITIES MAY NOT BE COMPLETE OR ACCURATE, McELHANNEY, ITS EMPLOYEES AND DIRECTORS ARE NOT RESPONSIBLE NOR LIABLE FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES, CABLES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. PRIOR TO CONSTRUCTION CONTRACTOR SHALL EXPOSE LOCATIONS OF ALL EXISTING FACILITIES BY HAND DIGGING OR HYDROVAC AND ADVISE THE ENGINEER OF POTENTIAL CONFLICTS.

MAP REFERENCE: 82004 (CANMATRIX)



**McElhanney**

McElhanney Consulting Services Ltd.

PARKS CANADA AGENCY  
TOWN OF BANFF

SITE LOCATION MAP

DATE: Nov 21, 2017

DRAWN: AL

PROJECT No.: 2531-13507

CHECKED: AP

REPORT TYPE & YEAR: Phase 2 2017

FILENAME: 2531-13507-SLM

FIGURE:

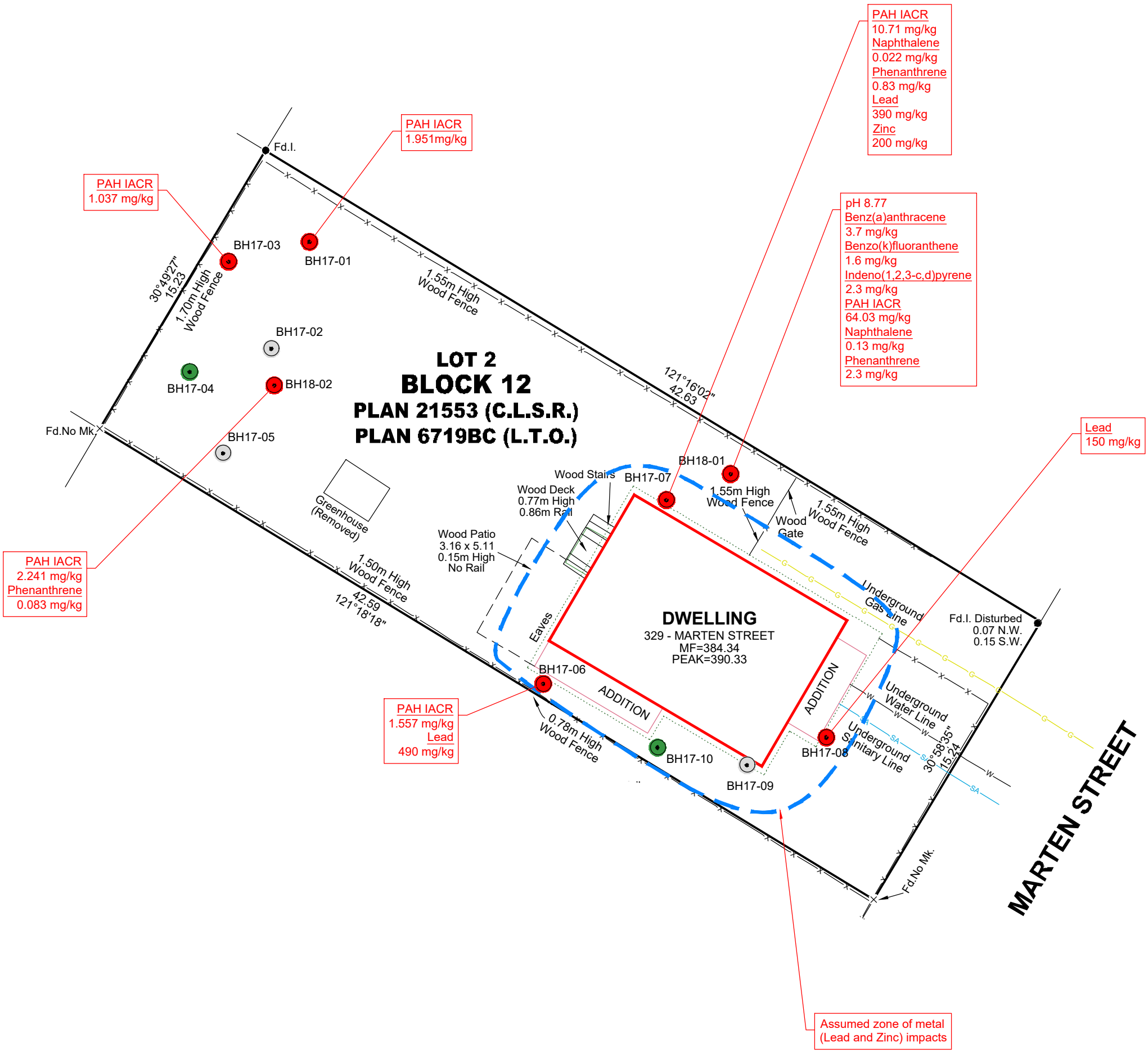
1

0 1000 2000 4000m

Scale 1 : 100 000



Plotted: September 13, 2018, 10:37:27 Filename: G:\Projects\2511\_00183\_00329\_Martin St ESA\9. Environmental Services\430\_Figured\2511-1567\_2017 PH2.dwg FIG 2



LEGEND

⊙

BOREHOLE

●

EXCEEDS APPLICABLE SOIL GUIDELINES

●

WITHIN APPLICABLE SOIL GUIDELINES

●

NOT SAMPLED

0

2.5

5

10m

Scale 1 : 200

N

NOTES

•

ALL LOCATIONS ARE APPROXIMATE.

THIS DRAWING AND DESIGN IS THE PROPERTY OF McELHANNEY CONSULTING SERVICES LTD. (McELHANNEY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF McELHANNEY. McELHANNEY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN. THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION. McELHANNEY, ITS EMPLOYEES, SUBCONSULTANTS AND AGENTS WILL NOT BE LIABLE FOR ANY LOSSES OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO, THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, SUPPLIERS, CONSULTANTS AND STAKEHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT McELHANNEY'S PRIOR WRITTEN CONSENT. INFORMATION ON EXISTING UNDERGROUND FACILITIES MAY NOT BE COMPLETE OR ACCURATE. McELHANNEY, ITS EMPLOYEES AND DIRECTORS ARE NOT RESPONSIBLE NOR LIABLE FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES, CABLES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. PRIOR TO CONSTRUCTION CONTRACTOR SHALL EXPOSE LOCATIONS OF ALL EXISTING FACILITIES BY HAND DIGGING OR HYDROVAC AND ADVISE THE ENGINEER OF POTENTIAL CONFLICTS.

McElhanney

McElhanney Consulting Services Ltd.

CLIENT:

PARKS CANADA AGENCY  
TOWN OF BANFF  
(BANFF NATIONAL PARK)

PROJECT:

SITE DRAGRAM SHOWING  
SOIL EXCEEDANCES  
LOT 2, BLOCK 12, PLAN 21553 (C.L.S.R.)

DATE: September 13, 2018

DRAWN: JKR

FIGURE:

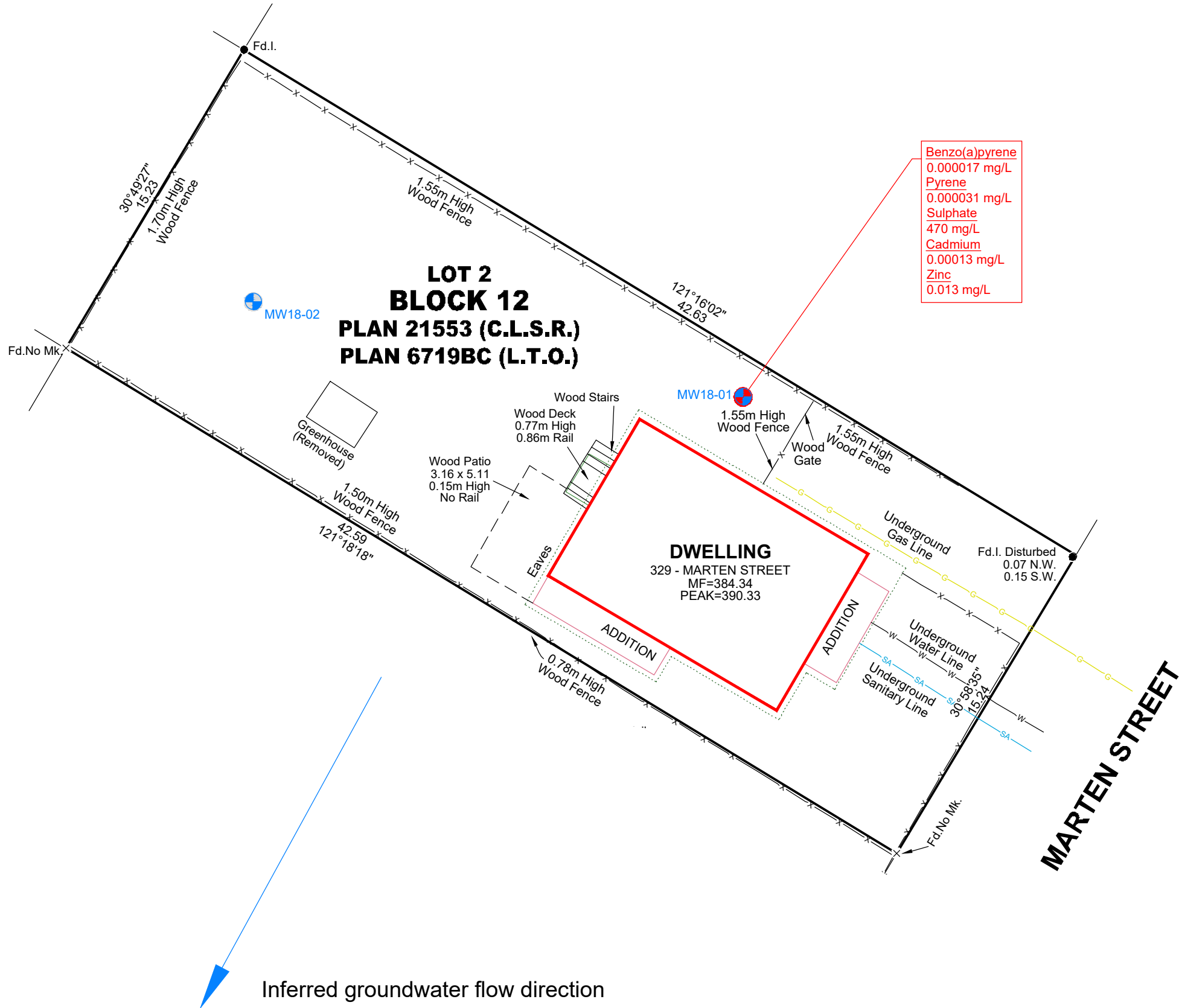
PROJECT No.: 2531-13507

CHECKED: AP

REPORT TYPE & YEAR: Phase 2 2017

FILENAME: 2531-13507\_2017 PH2

2



LEGEND

MONITORING WELL

EXCEEDS APPLICABLE GROUNDWATER GUIDELINES

NOT SAMPLED

02.5510

Scale 1 : 200

N

NOTES

ALL LOCATIONS ARE APPROXIMATE.

THIS DRAWING AND DESIGN IS THE PROPERTY OF McELHANNEY CONSULTING SERVICES LTD. (McELHANNEY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF McELHANNEY. McELHANNEY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN. THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION. McELHANNEY, ITS EMPLOYEES, SUBCONSULTANTS AND AGENTS WILL NOT BE LIABLE FOR ANY LOSSES OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO, THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, SUPPLIERS, CONSULTANTS AND STAKEHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT McELHANNEY'S PRIOR WRITTEN CONSENT. INFORMATION ON EXISTING UNDERGROUND FACILITIES MAY NOT BE COMPLETE OR ACCURATE. McELHANNEY, ITS EMPLOYEES AND DIRECTORS ARE NOT RESPONSIBLE NOR LIABLE FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES, CABLES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. PRIOR TO CONSTRUCTION CONTRACTOR SHALL EXPOSE LOCATIONS OF ALL EXISTING FACILITIES BY HAND DIGGING OR HYDROVAC AND ADVISE THE ENGINEER OF POTENTIAL CONFLICTS.

McElhanney

McElhanney Consulting Services Ltd.

CLIENT:

PARKS CANADA AGENCY  
TOWN OF BANFF  
(BANFF NATIONAL PARK)

PROJECT:

SITE DIAGRAM SHOWING  
GROUNDWATER EXCEEDANCES  
LOT 2, BLOCK 12, PLAN 21553 (C.L.S.R.)

DATE: September 13, 2018

DRAWN: JKR

FIGURE:

PROJECT No.: 2531-13507

CHECKED: AP

3

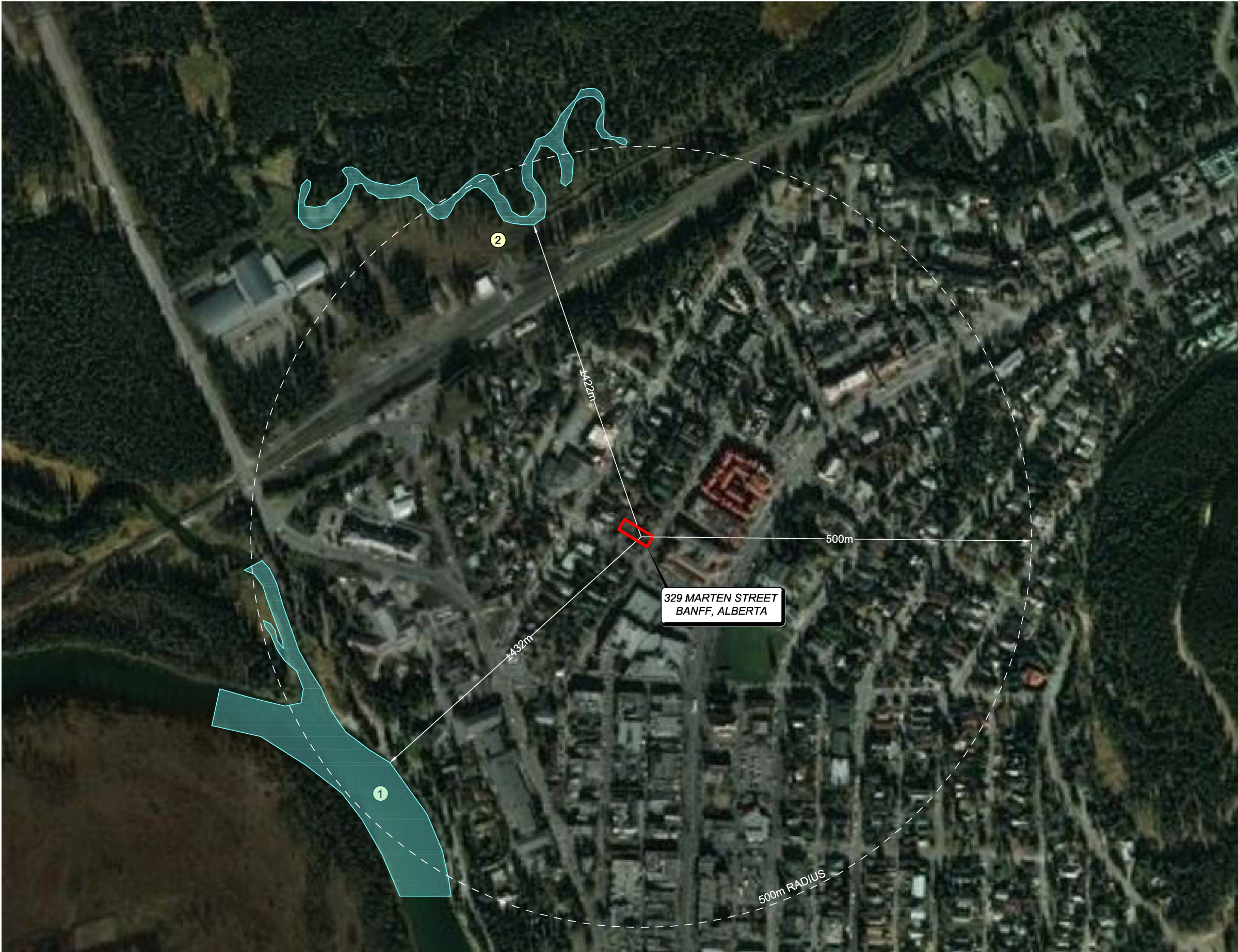
REPORT TYPE & YEAR: Phase 2 2017

FILENAME: 2531-13507\_2017\_PH2

Printed: September 13, 2018, 10:01:28 AM Name: G:\Projects\2531\2531-13507\00\2531-13507\_2017\_PH2.dwg FIG 3



Filename: C:\BANKING\ENVIRONMENTAL\B31-13507\_2017 PH2\2018-13507\_2017 PH2 (000.dwg)FIG1



LEGEND

WATERBODY

1

WATERBODY NUMBER

050100200m

Scale 1 : 5000

NOTES

- ALL LOCATIONS ARE APPROXIMATE.

THIS DRAWING AND DESIGN IS THE PROPERTY OF MCELHANNEY CONSULTING SERVICES LTD. (MCELHANNEY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF MCELHANNEY. MCELHANNEY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN. THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION. MCELHANNEY, ITS EMPLOYEES, SUBCONSULTANTS AND AGENTS WILL NOT BE LIABLE FOR ANY LOSSES OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO, THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, SUPPLIERS, CONSULTANTS AND STAKEHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT MCELHANNEY'S PRIOR WRITTEN CONSENT. INFORMATION ON EXISTING UNDERGROUND FACILITIES MAY NOT BE COMPLETE OR ACCURATE. MCELHANNEY, ITS EMPLOYEES AND DIRECTORS ARE NOT RESPONSIBLE NOR LIABLE FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES, CABLES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. PRIOR TO CONSTRUCTION CONTRACTOR SHALL EXPOSE LOCATIONS OF ALL EXISTING FACILITIES BY HAND DIGGING OR HYDROVAC AND ADVISE THE ENGINEER OF POTENTIAL CONFLICTS.

McElhanney

McElhanney Consulting Services Ltd.

CLIENT:

PARKS CANADA AGENCY  
TOWN OF BANFF  
(BANFF NATIONAL PARK)

PROJECT:

BANFF STAFF HOUSING  
DIAGRAM SHOWING  
WATERBODIES WITHIN 500m  
LOT 2, BLOCK 12, PLAN 21553 (C.L.S.R.)

DATE: June 13, 2018

DRAWN: AL/SL

FIGURE:

PROJECT No.: 2531-13507

CHECKED: AP

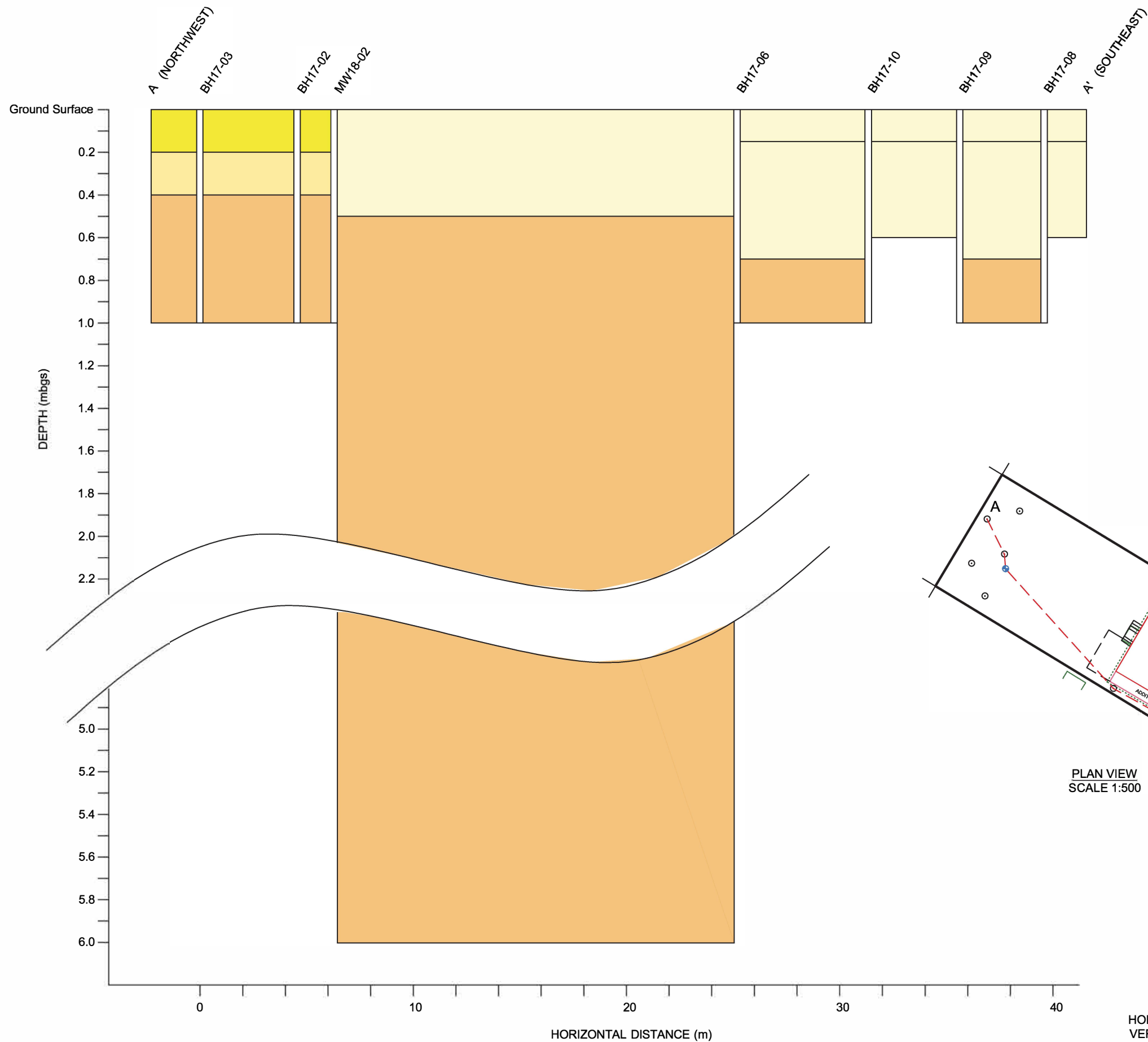
REPORT TYPE & YEAR: Phase 2 2017

FILENAME: 2531-13507\_2017 PH2

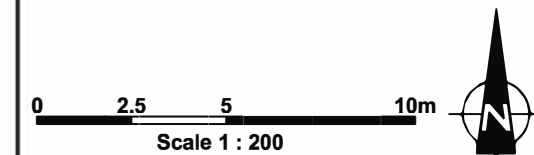
4



Plotted: June 13, 2018 - 12:44:22 - Filename: C:\DRAWING\ENVIRONMENTAL\2531-13507\_2017 PH2\2531-13507\_2017 PH2.dwg FIG 4 Cross Section



LEGEND	
	DELINEATION BOREHOLE
	MONITORING WELL
	SANDY SILT / SANDY SILT WITH GRAVEL
	SILT WITH SAND
	SILTY SAND
	POORLY GRADED SAND WITH SILT



**NOTES**

- ALL LOCATIONS ARE APPROXIMATE.

THIS DRAWING AND DESIGN IS THE PROPERTY OF McELHANNEY CONSULTING SERVICES LTD. (McELHANNEY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF McELHANNEY. McELHANNEY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN. THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION. McELHANNEY, ITS EMPLOYEES, SUBCONSULTANTS AND AGENTS WILL NOT BE LIABLE FOR ANY LOSSES OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO, THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, SUPPLIERS, CONSULTANTS AND STAKEHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT McELHANNEY'S PRIOR WRITTEN CONSENT. INFORMATION ON EXISTING UNDERGROUND FACILITIES MAY NOT BE COMPLETE OR ACCURATE. McELHANNEY, ITS EMPLOYEES AND DIRECTORS ARE NOT RESPONSIBLE NOR LIABLE FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES, CABLES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. PRIOR TO CONSTRUCTION CONTRACTOR SHALL EXPOSE LOCATIONS OF ALL EXISTING FACILITIES BY HAND DIGGING OR HYDROVAC AND ADVISE THE ENGINEER OF POTENTIAL CONFLICTS.

**McElhanney**  
McElhanney Consulting Services Ltd.

CLIENT:

**PARKS CANADA AGENCY**  
**TOWN OF BANFF**  
**(BANFF NATIONAL PARK)**

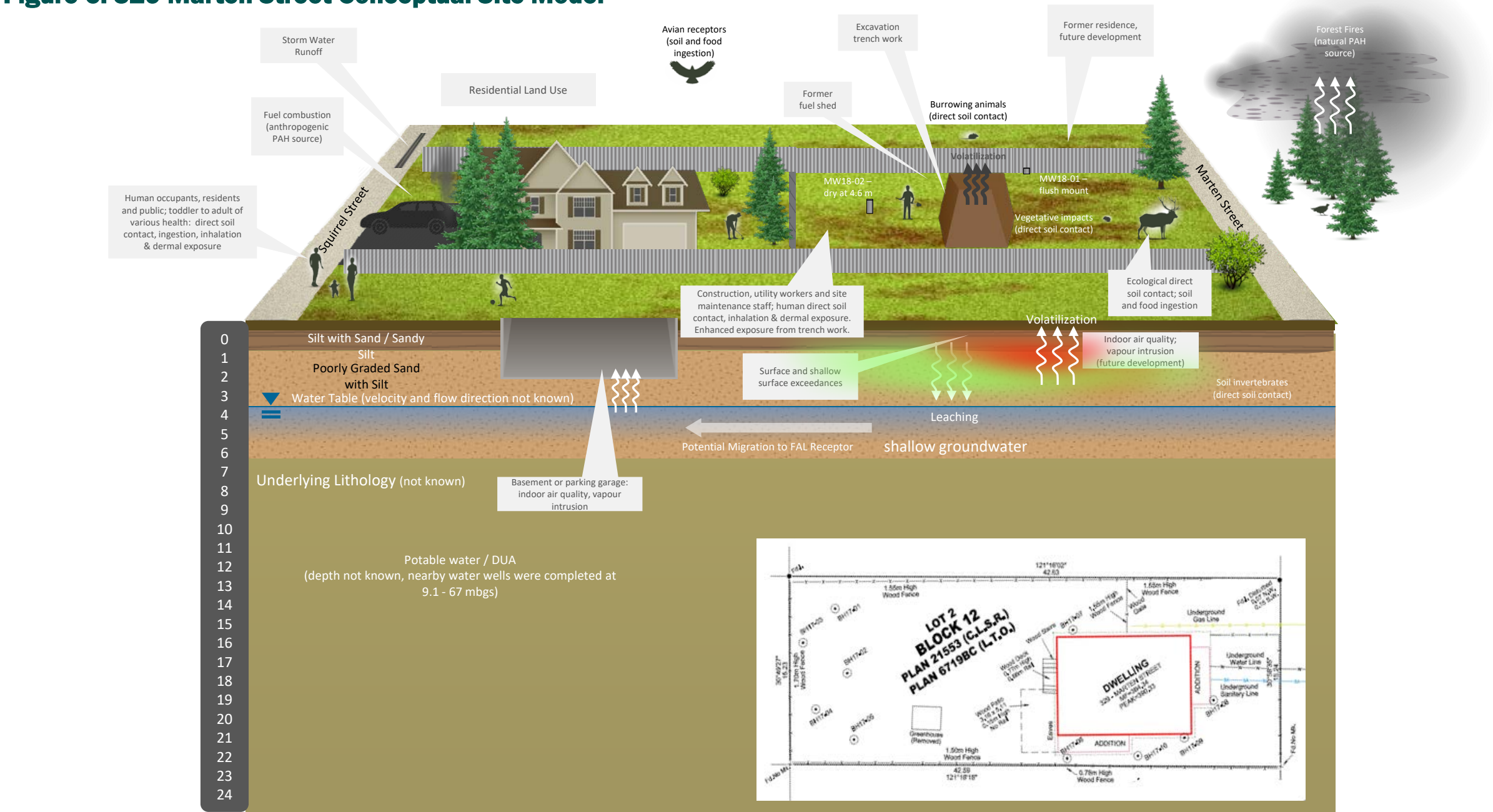
PROJECT:

**BANFF STAFF HOUSING**  
**BOREHOLE CROSS SECTION**  
**LOT 2, BLOCK 12, PLAN 21553 (C.L.S.R.)**

DATE: June 13, 2018	DRAWN: AL/SL	FIGURE: <b>5</b>
PROJECT No.: 2531-13507	CHECKED: GP	
REPORT TYPE & YEAR: Phase 2 2017		
FILENAME: 2531-13507 Cross Section		



### Figure 6: 329 Marten Street Conceptual Site Model



## Tables

---





Table 3: Soil Analytical Results - Inorganic

				Inorganics					Soluble Ions						Size		Metals																											
				pH (Lab)	EC (Lab)	SAR	Saturation	Moisture	Sodium	Potassium	Calcium	Magnesium	Chloride	Sulphate	% >75um	Grain Size	Antimony	Arsenic	Barium	Beryllium	Boron	Boron (Saturated Paste Extract)	Boron (Hot Water Soluble)	Cadmium	Chromium (Total)	Chromium (hexavalent)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc					
EQL			0.02		0.3	0.95	0.49	0.57	0.38	1.9	1.9	0.2	0.2	0.5	1	1	0.4	0.038	0.1	0.1	0.05	1	0.08	0.5	1	0.5	0.05	0.4	1	0.5	0.2	0.1	1	0.2	1	0.2	1	10						
CSQG Residential/Parkland Use Coarse Surface Soil				6-8	2	5									20	12	500	4				10	64	0.4	50	63	140	6.6	10	45	1	20	1	50	23	130	200							

Location	Depth (cm)	Date (d-m-y)	Lab ID	7.58	0.67	0.33	38	5.7	5.5	4.4	43	7.5	4.3	6.4	71	C	<0.5	2.8	120	<0.4	0.085	0.22	0.76	0.32	7	<0.08	3.2	6.7	27	<0.05	0.85	9.5	<0.5	<0.2	<0.1	2.9	0.46	7.7	46
BH17-01	0-50	18-Nov-17	SM9112	7.58	0.67	0.33	38	5.7	5.5	4.4	43	7.5	4.3	6.4	71	C	<0.5	2.8	120	<0.4	0.085	0.22	0.76	0.32	7	<0.08	3.2	6.7	27	<0.05	0.85	9.5	<0.5	<0.2	<0.1	2.9	0.46	7.7	46
BH17-01	50-100	18-Nov-17	SM9113	-	-	-	-	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH17-03	0-50	18-Nov-17	SM9116	7.37	0.89	0.37	63	16	11	43	77	15	13	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH17-04	0-50	18-Nov-17	SM9118	7.28	0.79	0.23	57	14	6	20	73	11	15	14	-	-	<0.5	2.6	130	<0.4	0.087	0.15	1.1	0.36	11	<0.08	3.5	8	27	0.095	0.63	9.9	<0.5	<0.2	<0.1	3.3	0.38	11	66
BH17-04	50-100	18-Nov-17	SM9119	-	-	-	-	5.1	-	-	-	-	-	-	73	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH17-06	0-15	18-Nov-17	SM9123	-	-	-	74	30	-	-	-	-	-	-	-	-	0.8	9	440	0.6	0.56	0.75	3.7	0.62	21	<0.08	4.7	24	490	0.33	0.88	11	<0.5	0.22	<0.1	22	0.77	15	120
BH17-06	60-100	18-Nov-17	SM9125	-	-	-	-	9.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH17-07	0-15	18-Nov-17	SM9126	-	-	-	62	21	-	-	-	-	-	-	-	-	<0.5	3.5	250	0.45	0.15	0.24	1.5	1	13	<0.08	4.4	18	390	0.2	0.78	12	<0.5	<0.2	<0.1	5.5	0.62	11	200
BH17-07	30-60	18-Nov-17	SM9127	7.45	0.39	0.39	44	7.1	5.4	1.7	30	1.9	4.8	6.3	-	-	<0.5	3.2	69	<0.4	0.12	0.28	0.48	0.22	9.7	<0.08	4.4	7.6	35	<0.05	0.63	12	<0.5	<0.2	<0.1	1	0.36	12	51
BH17-08	0-15	18-Nov-17	SM9129	-	-	-	66	21	-	-	-	-	-	-	-	-	<0.5	2.9	76	<0.4	0.074	0.11	1.2	0.75	16	<0.08	4	14	92	0.081	1	12	<0.5	0.22	<0.1	2.5	0.47	9.2	72
BH17-08	30-60	18-Nov-17	SM9130	-	-	-	55	20	-	-	-	-	-	-	-	-	<0.5	3.3	120	<0.4	0.066	0.12	0.37	0.33	13	<0.08	4.2	9	150	0.067	0.63	12	<0.5	<0.2	<0.1	3.4	0.37	12	97
BH17-10	0-15	18-Nov-17	SM9133	-	-	-	49	12	-	-	-	-	-	-	-	-	<0.5	3.5	120	<0.4	0.12	0.25	1.4	0.97	18	<0.08	3.7	14	91	0.18	2.1	14	<0.5	0.28	0.18	3	0.63	11	97
BH18-01	0-50	16-Feb-18	SZ0843	-	-	-	69	25	-	-	-	-	-	-	-	-	<0.5	3.1	150	<0.4	0.4	0.58	-	0.42	8.5	<0.08	2.8	9.3	120	0.066	0.82	9.1	<0.5	<0.2	<0.1	3.1	0.47	9.4	59
BH18-01	100-150	16-Feb-18	SZ0845	8.77	-	-	32	8.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH18-01	300-350	16-Feb-18	SZ0849	-	-	-	-	4.3	-	-	-	-	-	-	89	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18-02	0-50	16-Feb-18	SZ0855	-	-	-	79	32	-	-	-	-	-	-	44	F	<0.5	3.4	63	<0.4	0.18	0.23	-	0.57	14	<0.08	4.2	11	21	0.075	1.8	14	<0.5	<0.2	0.13	1.4	0.52	11	63
BH18-02 DUP	0-50	16-Feb-18	SZ0866	-	-	-	78	32	-	-	-	-	-	-	-	-	<0.5	3.9	67	<0.4	0.14	0.18	-	0.69	16	<0.08	4.5	12	23	0.073	2.1	16	<0.5	0.21	0.16	1.9	0.53	12	67
BH18-02	50-100	16-Feb-18	SZ0856	-	-	-	-	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH18-02	100-150	16-Feb-18	SZ0857	-	-	-	-	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH18-02	300-350	16-Feb-18	SZ0861	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Value

= Exceeds CCME Residential/Parkland Coarse Surface Soil Guideline Values

Value

= Value less than Detection Limit

Value

= Detection Limit is Greater than CCME Residential/Parkland Coarse Surface Soil Guideline Values

If all guidelines are exceeded, the highlight colour will correspond to the least stringent guideline

**GUIDELINES**

CEQG: Canadian Environmental Quality Guidelines (CCME, 1999 and updates)



Table 4: Groundwater Analytical Results - Organic

			Hydrocarbons									Phenols	Carcinogenic PAH											PAH														
			Benzene	Toluene	Ethylbenzene	Xylenes	F1 (C6-C10)	F1 (C6-C10)-BTX	F2 (C10-C16)	Total Hydrocarbons (C6-C50)	Total Hydrocarbons (C6-C50+)	1-Methylnaphthalene	Benzo(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo(b,j)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Indeno(1,2,3-c,d)pyrene	Carcinogenic PAHs (as B(a)P TPE)	Carcinogenic PAHs IACR (Fine Soil Calc)	Carcinogenic PAHs IACR (Coarse Soil Calc)	Carcinogenic PAHs IACR (CCME Soil Calc)	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Acridine	Anthracene	Benzo(c)phenanthrene	Benzo(e)pyrene	Fluoranthene	Fluorene	Naphthalene	Perylene	Phenanthrene	Pyrene	Quinoline
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.0004	0.0004	0.0004	0.00089	0.1	0.1	0.1		0.0001	0.0000085	0.0000075	0.0000085	0.0000085	0.0000085	0.0000085	0.0000075	0.0000085					0.0001	0.0001	0.0001	0.00005	0.00001	0.00005	0.00005	0.00001	0.00005	0.00001	0.00005	0.00001	0.00005	0.00002	0.0002
Fed Interim GW, Residential Parkland, Coarse			0.14	0.083	11	3.9	0.81		1.3			0.000018	0.00001	0.00017	0.00048	0.00048	0.0001	0.00026	0.00021						0.0058	0.046	0.00005	0.000012			0.00004	0.003	0.0011		0.00005	0.00004	0.0034	
Location			Date (d-m-y)			Lab ID																																
Trip Blank			30-May-18			B841800_2018/05/30_TRIP BLANK			<0.0004 <0.0004 <0.0004 <0.00089 <0.1 <0.1 <0.1 - - <0.0001 <0.0000085 <0.0000075 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.0000085 <0.																													

**Value** = Exceeds FCSAP Interim Groundwater Residential/Parkland Coarse Soil Guideline Values  
**Value** = Value less than Detection Limit  
**Value** = Detection Limit is Greater than FCSAP Interim Groundwater Residential/Parkland Coarse Soil Guideline Values  
If all guidelines are exceeded, the highlight colour will correspond to the least stringent guideline

**GUIDELINES**  
FCSAP: Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites

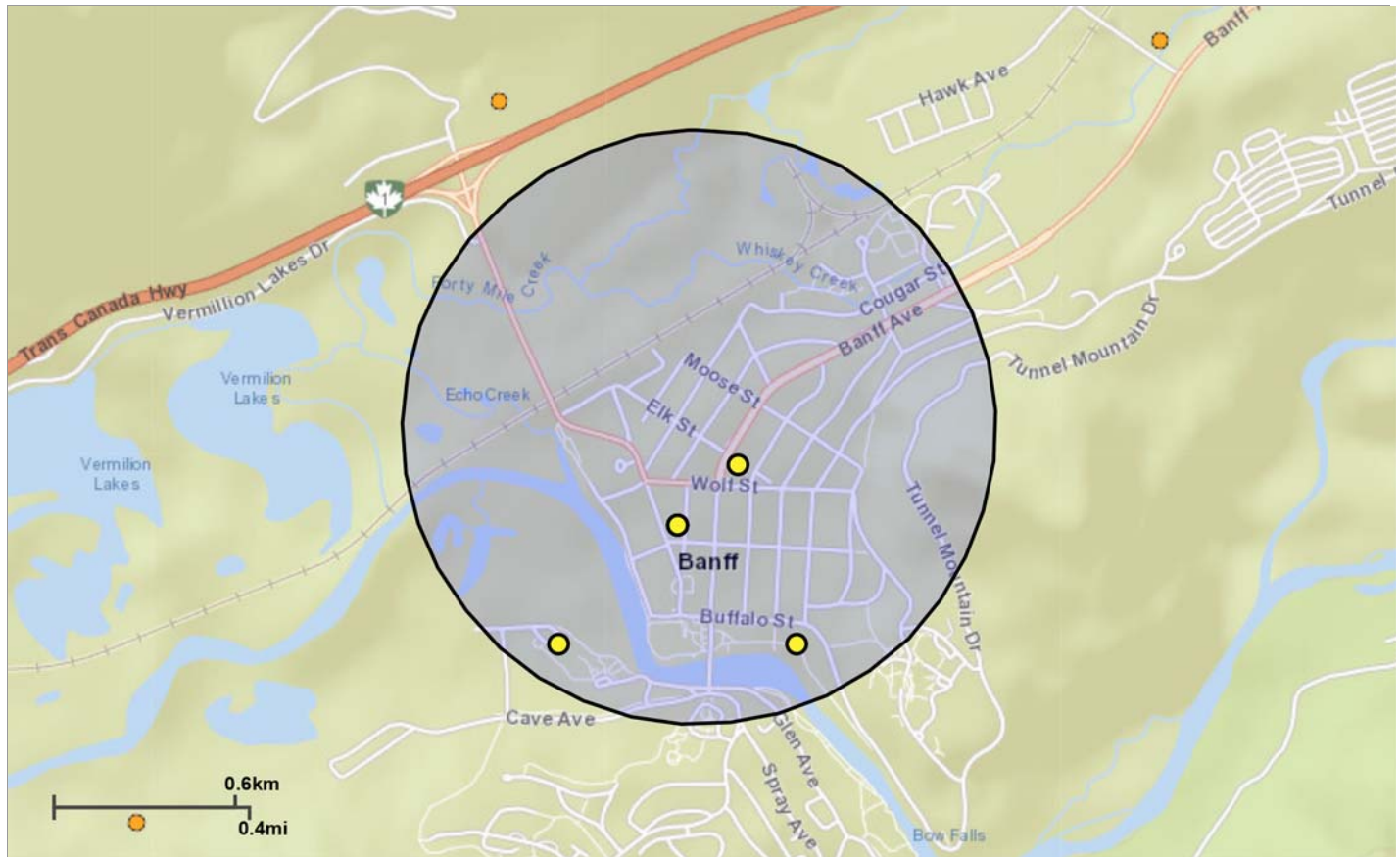
Protection of freshwater aquatic life guidelines were calculated using average values from MW18-01.  
pH: 7.67  
Hardness: 890 mg/L  
Chloride: 33 mg/L





## **Appendix A – Local Water Well Search**

---



### 329 Marten Street, Banff Water Well Map

#### Projection

Web Mercator (Auxillary Sphere)

#### Datum

WGS 84

#### Date

6/20/2018, 9:03:04 AM

#### Legend

● Groundwater Drilling Report

◆ Baseline Water Well Report

<http://groundwater.alberta.ca/waterwells/d/>

Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

© 2009 Government of Alberta

© Government of Alberta | Esri, HERE, Garmin, NGA, USGS, NPS





# Reconnaissance Report

[View in Imperial](#)

[Export to Excel](#)

## Groundwater Wells

Please click the water Well ID to generate the Water Well Drilling Report.

Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIAM (cm)
<a href="#">349937</a>	SE	35	25	12	5	AARON DRILLING INC.	1996-10-02	67.06	New Well-Abandoned	Domestic		4		PARKS CAN	10.67		0.00
<a href="#">356382</a>	10	35	25	12	5	UNKNOWN DRILLER		9.14	Chemistry	Domestic				BREWSTER'S B.B.Q. RESTAURANT			0.00
<a href="#">370257</a>	SW	35	25	12	5	M&M DRILLING CO. LTD.	1993-09-16	51.21	New Well	Domestic & Stock		8		WARNER GUIDING & OUTFITTING	0.91	90.92	0.00
<a href="#">405928</a>		35	25	12	5	KRIEGER DRILLING LTD.	1985-04-09	18.59	New Well	Domestic		8		BANFF SPRINGS HOTEL	13.41	113.65	16.84
<a href="#">405929</a>		35	25	12	5	UNKNOWN DRILLER		0.00	Chemistry	Domestic				PTARMIGAN INN #WHIRLPOOL			0.00
<a href="#">405930</a>		35	25	12	5	KRIEGER DRILLING LTD.	1988-03-23	18.29	New Well	Domestic		3		BANFF SPRINGS GOLF COURSE	14.94	113.65	16.84



# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 349937  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric
Owner Name		Address		Town		Province		Country	Postal Code	
PARKS CAN		552 220 4 AVE SE, CALGARY							T2G 4X3	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
	SE	35	25	12	5					
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					
_____ m from					Latitude 51.173545 Longitude -115.566943					Elevation _____ m
_____ m from					How Location Obtained					How Elevation Obtained
					Field					Survey-Air

Drilling Information	
Method of Drilling	Type of Work
Rotary	Plugged 1996/10/01
Proposed Well Use	Plugged with Bentonite Product
Domestic	Amount _____
	New Well-Abandoned

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
0.30		Topsoil	
1.83		Gravel & Boulders	
6.10		Brown Clay & Rocks	
67.06		Gray Clay & Rocks	

Yield Test Summary			Measurement in Metric
Recommended Pump Rate			0.00 L/min
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
1996/10/02		10.67	

Well Completion			Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date
67.06 m		1996/10/01	1996/10/02
Borehole			
Diameter (cm)	From (m)	To (m)	
0.00	0.00	67.06	
Surface Casing (if applicable)		Well Casing/Liner	
Size OD :	0.00 cm	Size OD :	0.00 cm
Wall Thickness :	0.000 cm	Wall Thickness :	0.000 cm
Bottom at :	0.00 m	Top at :	0.00 m
		Bottom at :	0.00 m
Perforations			
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)
			Hole or Slot Interval(cm)
Perforated by			
Annular Seal Bentonite Chips/Tablets			
Placed from 0.00 m to 67.06 m			
Amount _____			
Other Seals			
Type		At (m)	
Screen Type			
Size OD : 0.00 cm			
From (m)	To (m)	Slot Size (cm)	
Attachment _____			
Top Fittings _____		Bottom Fittings _____	
Pack			
Type _____		Grain Size _____	
Amount _____			

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
AARON DRILLING INC.	Date approval holder signed





# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 349937  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric	
Owner Name		Address			Town		Province		Country	Postal Code	
PARKS CAN		552 220 4 AVE SE, CALGARY								T2G 4X3	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	SE	35	25	12	5						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from					Latitude 51.173545 Longitude -115.566943					Elevation _____ m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Field					Survey-Air	

Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____										
Rate _____ L/min										
Is Flow Control Installed _____										
Describe _____										
Recommended Pump Rate		0.00 L/min		Pump Installed _____		Depth _____ m				
Recommended Pump Intake Depth (From TOC)		0.00 m		Type _____		Make _____		H.P. _____		
Model (Output Rating) _____										
Did you Encounter Saline Water (>4000 ppm TDS) _____				Depth _____ m		Well Disinfected Upon Completion _____				
Gas _____				Depth _____ m		Geophysical Log Taken _____				
Submitted to ESRD _____										
Sample Collected for Potability _____										Submitted to ESRD _____
Additional Comments on Well										

Yield Test			Taken From Ground Level	Measurement in Metric
			Depth to water level	
Test Date	Start Time	Static Water Level		
1996/10/02	12:00 AM	10.67 m		
			Drawdown (m)	Elapsed Time
				Minutes:Sec
				Recovery (m)
Method of Water Removal				
Type Bailer & Air				
Removal Rate _____ L/min				
Depth Withdrawn From 67.06 m				
If water removal period was < 2 hours, explain why				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
AARON DRILLING INC.	Date approval holder signed







# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 356382  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1990/07/13

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric
Owner Name	Address		Town		Province		Country		Postal Code	
BREWSTER'S B.B.Q. RESTAURANT	BANFF NATIONAL PARK									
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
10	35	25	12	5						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					
_____ m from					Latitude 51.178969		Longitude -115.569821		Elevation _____ m	
_____ m from					How Location Obtained		How Elevation Obtained			
Not Verified					Not Obtained					
Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____										Is Flow Control Installed _____
Rate _____ L/min										Describe _____
Recommended Pump Rate _____ L/min										Pump Installed _____ Depth _____ m
Recommended Pump Intake Depth (From TOC) _____ m										Type _____ Make _____ H.P. _____
										Model (Output Rating) _____
Did you Encounter Saline Water (>4000 ppm TDS) _____										Depth _____ m Well Disinfected Upon Completion _____
Gas _____										Depth _____ m Geophysical Log Taken _____
										Submitted to ESRD _____
Additional Comments on Well _____										Sample Collected for Potability _____ Submitted to ESRD _____

Yield Test			Taken From Ground Level	Measurement in Metric
Test Date	Start Time	Static Water Level		
		m		
Method of Water Removal				
Type _____				
Removal Rate _____ L/min				
Depth Withdrawn From _____ m				
If water removal period was < 2 hours, explain why _____				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner Date approval holder signed
UNKNOWN DRILLER	



# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 370257  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1993/10/14

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric
Owner Name		Address		Town		Province		Country	Postal Code	
WARNER GUIDING & OUTFITTING		P.O. BOX 2280 BANFF							T0L 0C0	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
	SW	35	25	12	5			5137HO		
Measured from Boundary of				GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from				Latitude 51.173545 Longitude -115.578452				Elevation _____ m		
_____ m from				How Location Obtained				How Elevation Obtained		
				Not Verified				Not Obtained		

Drilling Information	
Method of Drilling	Type of Work
Rotary	New Well
Proposed Well Use	
Domestic & Stock	

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
0.61		Gravelly Till	
10.67		Gray Silty Clay	
38.10		Gray Clay	
45.72		Gravel	
47.55		Sandy Gravel	
48.77		Gravel	
50.90		Dirty Gravel	
51.21		Gravel	

Yield Test Summary			Measurement in Metric
Recommended Pump Rate			68.19 L/min
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
1993/09/16	90.92	0.91	

Well Completion			Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date
51.21 m		1993/09/14	1993/09/16
Borehole			
Diameter (cm)	From (m)	To (m)	
0.00	0.00	51.21	
Surface Casing (if applicable)		Well Casing/Liner	
		Steel	
Size OD :	0.00 cm	Size OD :	13.97 cm
Wall Thickness :	0.000 cm	Wall Thickness :	0.620 cm
Bottom at :	0.00 m	Top at :	0.00 m
		Bottom at :	44.20 m
Perforations			
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)
41.45	43.59	0.318	25.40
Perforated by Torch			
Annular Seal Bentonite Chips/Tablets			
Placed from 0.00 m to 6.10 m			
Amount			
Other Seals			
Type		At (m)	
Screen Type			
Size OD : 0.00 cm			
From (m)	To (m)	Slot Size (cm)	
Attachment			
Top Fittings		Bottom Fittings	
Pack			
Type		Grain Size	
Amount			

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
M&M DRILLING CO. LTD.	Date approval holder signed





# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 370257  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1993/10/14

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric
Owner Name WARNER GUIDING & OUTFITTING		Address P.O. BOX 2280 BANFF		Town		Province		Country	Postal Code T0L 0C0	
Location	1/4 or LSD SW	SEC 35	TWP 25	RGE 12	W of MER 5	Lot	Block	Plan 5137HO	Additional Description	
Measured from Boundary of _____ m from _____ m from				GPS Coordinates in Decimal Degrees (NAD 83) Latitude 51.173545 Longitude -115.578452 Elevation _____ m How Location Obtained Not Verified				How Elevation Obtained Not Obtained		
Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm Is Artesian Flow _____ Rate _____ L/min										Is Flow Control Installed _____ Describe _____
Recommended Pump Rate		68.19 L/min		Pump Installed		Depth		m		
Recommended Pump Intake Depth (From TOC)		36.58 m		Type		Make		H.P.		
Model (Output Rating)										
Did you Encounter Saline Water (>4000 ppm TDS) _____ Gas _____				Depth _____ m Depth _____ m		Well Disinfected Upon Completion _____ Geophysical Log Taken _____ Submitted to ESRD _____				
Sample Collected for Potability _____ Submitted to ESRD _____										
Additional Comments on Well DRILLER REPORT HARD WATER, TDS 500.										

Yield Test			Taken From Ground Level Depth to water level	Measurement in Metric
Test Date 1993/09/16	Start Time 12:00 AM	Static Water Level 0.91 m	Drawdown (m)	Elapsed Time Minutes:Sec
Method of Water Removal Type Bailer			Recovery (m)	
Removal Rate 90.92 L/min				
Depth Withdrawn From 38.40 m				
If water removal period was < 2 hours, explain why				

Water Diverted for Drilling		
Water Source	Amount Taken L	Diversion Date & Time

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER	Certification No 1
Company Name M&M DRILLING CO. LTD.	Copy of Well report provided to owner Date approval holder signed



# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 405928  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1985/05/09

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric	
Owner Name		Address			Town		Province		Country	Postal Code	
BANFF SPRINGS HOTEL		P.O. BOX 960 BANFF								T0L 0C0	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
		35	25	12	5						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from					Latitude 51.177161 Longitude -115.572698					Elevation _____ m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Not Verified					Not Obtained	

Drilling Information	
Method of Drilling	Type of Work
Rotary	New Well
Proposed Well Use	
Domestic	

Formation Log			Measurement in Metric	
Depth from ground level (m)	Water Bearing	Lithology Description		
0.61		Clayey Topsoil		
3.66		Sand & Boulders		
7.92		Coarse Grained Gravel		
8.84		Sand		
10.06		Medium Grained Gravel		
11.28		Sand		
15.54		Coarse Grained Gravel		
18.59		Rocks		

Yield Test Summary			Measurement in Metric	
Recommended Pump Rate			45.46 L/min	
Test Date	Water Removal Rate (L/min)	Static Water Level (m)		
1985/04/09	113.65	13.41		

Well Completion			Measurement in Metric	
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
18.59 m		1985/04/09	1985/04/09	
Borehole				
Diameter (cm)	From (m)	To (m)		
0.00	0.00	18.59		
Surface Casing (if applicable)		Well Casing/Liner		
Steel				
Size OD :	16.84 cm	Size OD :	0.00 cm	
Wall Thickness :	0.478 cm	Wall Thickness :	0.000 cm	
Bottom at :	17.68 m	Top at :	0.00 m	
		Bottom at :	0.00 m	
Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
Perforated by				
Annular Seal Driven				
Placed from 0.00 m to 17.68 m				
Amount				
Other Seals				
Type		At (m)		
Screen Type				
Size OD : 0.00 cm				
From (m)	To (m)	Slot Size (cm)		
Attachment				
Top Fittings		Bottom Fittings		
Pack				
Type	Grain Size			
Amount				

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
KRIEGER DRILLING LTD.	Date approval holder signed





# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 405928  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1985/05/09

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric
Owner Name		Address		Town		Province		Country	Postal Code	
BANFF SPRINGS HOTEL		P.O. BOX 960 BANFF							T0L 0C0	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
		35	25	12	5					
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					
_____ m from					Latitude 51.177161 Longitude -115.572698					Elevation _____ m
_____ m from					How Location Obtained					How Elevation Obtained
					Not Verified					Not Obtained

Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____										Is Flow Control Installed _____
Rate _____ L/min										Describe _____
Recommended Pump Rate		45.46 L/min		Pump Installed Yes		Depth _____ m				
Recommended Pump Intake Depth (From TOC)		16.76 m		Type SUB		Make _____		H.P. 1/2		
										Model (Output Rating) _____
Did you Encounter Saline Water (>4000 ppm TDS) _____				Depth _____ m		Well Disinfected Upon Completion _____				
Gas _____				Depth _____ m		Geophysical Log Taken _____				
										Submitted to ESRD _____
Additional Comments on Well _____										Sample Collected for Potability _____ Submitted to ESRD _____

Yield Test			Taken From Ground Level	Measurement in Metric
			Depth to water level	
Test Date	Start Time	Static Water Level		
1985/04/09	12:00 AM	13.41 m		
			Drawdown (m)	Elapsed Time
				Minutes:Sec
				Recovery (m)
Method of Water Removal				
Type Air				
Removal Rate		113.65 L/min		
Depth Withdrawn From		17.07 m		
If water removal period was < 2 hours, explain why				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
KRIEGER DRILLING LTD.	Date approval holder signed



GIC Well ID	405929
GoA Well Tag No.	
Drilling Company Well ID	
Date Report Received	1988/06/22

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric
Owner Name	Address				Town	Province	Country	Postal Code		
PTARMIGAN INN #WHIRLPOOL	BANFF									
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
	35		25	12	5					
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					
_____ m from					Latitude <u>51.177161</u>		Longitude <u>-115.572698</u>		Elevation _____ m	
_____ m from					How Location Obtained		How Elevation Obtained			
					Not Verified		Not Obtained			

Drilling Information	
<b>Method of Drilling</b> Unknown	<b>Type of Work</b> Chemistry
<b>Proposed Well Use</b> Domestic	

Formation Log		Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description

Yield Test Summary		Measurement in Metric
Recommended Pump Rate		L/min
Test Date	Water Removal Rate (L/min)	Static Water Level (m)

Well Completion		Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date
		End Date
<b>Borehole</b>		
Diameter (cm)	From (m)	To (m)
0.00	0.00	0.00
<b>Surface Casing (if applicable)</b>		<b>Well Casing/Liner</b>
Size OD :	0.00 cm	Size OD :
		0.00 cm
Wall Thickness :	0.000 cm	Wall Thickness :
		0.000 cm
Bottom at :	0.00 m	Top at :
		0.00 m
		Bottom at :
		0.00 m
<b>Perforations</b>		
From (m)	To (m)	Diameter or Slot Width (cm)
		Slot Length (cm)
		Hole or Slot Interval(cm)
Perforated by		
<b>Annular Seal</b>		
Placed from	0.00 m	to 0.00 m
Amount		
Other Seals		
Type	At (m)	
<b>Screen Type</b>		
Size OD :	0.00 cm	
From (m)	To (m)	Slot Size (cm)
Attachment		
Top Fittings	Bottom Fittings	
<b>Pack</b>		
Type	Grain Size	
Amount		

<b>Contractor Certification</b> <i>Name of Journeyman responsible for drilling/construction of well</i> UNKNOWN NA DRILLER  <i>Company Name</i> UNKNOWN DRILLER		<i>Certification No</i> 1  <i>Copy of Well report provided to owner</i> <i>Date approval holder signed</i>
--	--	---





# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 405929  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1988/06/22

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric	
Owner Name		Address		Town		Province		Country		Postal Code	
PTARMIGAN INN #WHIRLPOOL		BANFF									
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
		35	25	12	5						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from					Latitude 51.177161 Longitude -115.572698					Elevation _____ m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Not Verified					Not Obtained	

Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____										
Rate _____ L/min										
Is Flow Control Installed _____										
Describe _____										
Recommended Pump Rate		_____ L/min		Pump Installed _____		Depth _____ m				
Recommended Pump Intake Depth (From TOC)		_____ m		Type _____		Make _____		H.P. _____		
						Model (Output Rating)		_____		
Did you Encounter Saline Water (>4000 ppm TDS) _____				Depth _____ m		Well Disinfected Upon Completion _____				
Gas _____				Depth _____ m		Geophysical Log Taken _____				
						Submitted to ESRD _____				
				Sample Collected for Potability _____		Submitted to ESRD _____				
Additional Comments on Well										

Yield Test			Taken From Ground Level	Measurement in Metric
Test Date	Start Time	Static Water Level		
		m		
Method of Water Removal				
Type _____				
Removal Rate _____ L/min				
Depth Withdrawn From _____ m				
If water removal period was < 2 hours, explain why				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
UNKNOWN DRILLER	Date approval holder signed



# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 405930  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1988/04/21

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric	
Owner Name		Address		Town		Province		Country		Postal Code	
BANFF SPRINGS GOLF COURSE		BANFF									
Location		1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
			35	25	12	5					
Measured from Boundary of						GPS Coordinates in Decimal Degrees (NAD 83)					
_____ m from						Latitude 51.177161		Longitude -115.572698		Elevation _____ m	
_____ m from						How Location Obtained		How Elevation Obtained			
						Not Verified		Not Obtained			

Drilling Information	
Method of Drilling	Type of Work
Rotary	New Well
Proposed Well Use	
Domestic	

Formation Log			Yield Test Summary			Well Completion		
Measurement in Metric			Measurement in Metric			Measurement in Metric		
Depth from ground level (m)	Water Bearing	Lithology Description						
0.30		Stoney Topsoil						
15.85		Wet Gravel						
18.29		Coarse Grained Gravel						
Recommended Pump Rate	45.46 L/min							
Test Date	Water Removal Rate (L/min)	Static Water Level (m)						
1988/03/23	113.65	14.94						
Borehole								
Diameter (cm)	From (m)	To (m)						
0.00	0.00	18.29						
Surface Casing (if applicable)		Well Casing/Liner						
Steel								
Size OD :	16.84 cm	Size OD :	0.00 cm					
Wall Thickness :	0.478 cm	Wall Thickness :	0.000 cm					
Bottom at :	16.46 m	Top at :	0.00 m					
		Bottom at :	0.00 m					
Perforations								
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)				
Annular Seal								
Puddled Clay								
Placed from	0.00 m to 16.46 m							
Amount								
Other Seals								
Type	At (m)							
Screen Type								
Stainless Steel								
Size OD :	12.70 cm							
From (m)	To (m)	Slot Size (cm)						
16.46	17.98	0.064						
Attachment Telescoped								
Top Fittings	Neoprene (Figure K)	Bottom Fittings	Bail					
Pack								
Type	Grain Size							
Amount	0.00							

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
KRIEGER DRILLING LTD.	Date approval holder signed





# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 405930  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1988/04/21

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Identification and Location										Measurement in Metric	
Owner Name		Address		Town		Province		Country		Postal Code	
BANFF SPRINGS GOLF COURSE		BANFF									
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
		35	25	12	5						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from					Latitude 51.177161 Longitude -115.572698					Elevation _____ m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Not Verified					Not Obtained	

Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____										
Rate _____ L/min										
Is Flow Control Installed _____										
Describe _____										
Recommended Pump Rate _____ 45.46 L/min										
Pump Installed _____										
Depth _____ m										
Recommended Pump Intake Depth (From TOC) _____ 0.00 m										
Type _____										
Make _____										
H.P. _____										
Model (Output Rating) _____										
Did you Encounter Saline Water (>4000 ppm TDS) _____										
Depth _____ m										
Well Disinfected Upon Completion _____										
Gas _____										
Depth _____ m										
Geophysical Log Taken _____										
Submitted to ESRD _____										
Sample Collected for Potability _____										
Submitted to ESRD _____										
Additional Comments on Well _____										

Yield Test			Taken From Ground Level	Measurement in Metric
			Depth to water level	
Test Date	Start Time	Static Water Level		
1988/03/23	12:00 AM	14.94 m		
			Drawdown (m)	Recovery (m)
			Elapsed Time	
			Minutes:Sec	
Method of Water Removal				
Type Air				
Removal Rate 113.65 L/min				
Depth Withdrawn From 15.24 m				
If water removal period was < 2 hours, explain why				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
KRIEGER DRILLING LTD.	Date approval holder signed

## Appendix B – Site Photographs

---





Photo 1: November 2017. Viewing BH17-01 to BH17-05, located in the backyard.



Photo 2: November 2017. Viewing BH17-06, located on southwest corner of house.



Photo 3: November 2017. Viewing BH17-07, located on northwest wall. Potential fuel tank valve seen on wall above BH17-07.



Photo 4: November 2017. Viewing BH17-08 to BH17-10, located near front exterior walls of the house.





Photo 5: February 2018. Drilling activities and monitoring well installations.



Photo 2: March 2018. Monitoring well development.

## Appendix C – Borehole Logs

---





McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-01**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m

**EASTING** 599817

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670851

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES** \_\_\_\_\_

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	SILT WITH SAND, brown (7.5YR 5/3), dry, loose, low plasticity, non-cohesive.			
			SM	SILTY SAND, light yellowish brown (10YR 6/4), dry, loose, low plasticity, non-cohesive.	0-0.5	0	
0.5			SP-SM	POORLY-GRADED SAND WITH SILT, light brownish gray (10YR 6/2), dry, loose, non plastic, non-cohesive, unoxidized, leached, free-flowing.	0.5-1.0	20	
1.0							

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.



McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-02**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m

**EASTING** 599814

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670852

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES** \_\_\_\_\_

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	SILT WITH SAND, brown (7.5YR 5/3), dry, loose, low plasticity, non-cohesive.			
			SM	SILTY SAND, light yellowish brown (10YR 6/4), dry, loose, low plasticity, non-cohesive.	0-0.5	0	
0.5			SP-SM	POORLY-GRADED SAND WITH SILT, light brownish gray (10YR 6/2), dry, loose, non plastic, non-cohesive, unoxidized, leached, free-flowing.	0.5-1.0	0	
1.0							

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.





McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-03**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m

**EASTING** 599814

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670852

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES**

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	SILT WITH SAND, brown (7.5YR 5/3), dry, loose, low plasticity, non-cohesive.			
			SM	SILTY SAND, light yellowish brown (10YR 6/4), dry, loose, low plasticity, non-cohesive.	0-0.5	0	
0.5			SP-SM	POORLY-GRADED SAND WITH SILT, light brownish gray (10YR 6/2), dry, loose, non plastic, non-cohesive, unoxidized, leached, free-flowing.	0.5-1.0	0	
1.0							

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.



McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-04**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m

**EASTING** 599814

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670852

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES** \_\_\_\_\_

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	<b>SILT WITH SAND</b> , dark brown (7.5YR 3/2), moist, firm, medium plasticity, cohesive, topsoil, prismatic. Ground surface very rough.			
			ML	<b>SILT WITH SAND</b> , reddish brown (5YR 3/3), dry, firm, low plasticity, cohesive, mottling, reduced, unleached, prismatic. Disturbed - woody debris in profile.	0-0.5	0	
0.5			ML	<b>SILT</b> , pinkish gray (7.5YR 6/2), dry, firm, non plastic, non-cohesive, oxidized, leached. Disturbed.			
1.0			SP-SM	<b>POORLY-GRADED SAND WITH SILT</b> , light brownish gray (10YR 6/2), dry, loose, non plastic, non-cohesive, reduced, leached, granular, free-flowing. No disturbance.	0.5-1.0	0	

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.





McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-05**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 0.88 m

**EASTING** 599814

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670852

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES** \_\_\_\_\_

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	<b>SILT WITH SAND</b> , brown (7.5YR 5/3), dry, loose, low plasticity, non-cohesive.			
			SM	<b>SILTY SAND</b> , light yellowish brown (10YR 6/4), dry, loose, low plasticity, non-cohesive.	0-0.5	0	
0.5			SP- SM	<b>POORLY-GRADED SAND WITH SILT</b> , light brownish gray (10YR 6/2), dry, loose, non plastic, non-cohesive, unoxidized, leached, free-flowing.	0.5-0.8	0	

Bottom of hole at 0.88 m.



McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-06**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency  
**PROJECT NUMBER** 2531 13507 00  
**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m  
**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes  
**NOTES**

**PROJECT NAME** 329 Marten St.  
**PROJECT LOCATION** 329 Marten St. Banff AB  
**EASTING** 599826  
**NORTHING** 5670835  
**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "  
**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	<b>SANDY SILT WITH GRAVEL</b> , very dark gray (10YR 3/1), moist, firm, medium plasticity, cohesive, gleying, jointing, reduced, unleached, platy. Disturbed, paint flakes.	0-0.15	0	
			ML	<b>SANDY SILT</b> , very dark greenish gray (10G 3/1), moist, firm, medium plasticity, cohesive, gleying, reduced, unleached. Massive, disturbed.	0.3-0.6	0	
0.5			SP-SM	<b>POORLY-GRADED SAND WITH SILT</b> , reddish brown (5YR 4/4), moist, loose, non plastic, non-cohesive, mottling, oxidized, leached, singular, medium/coarse-grained. Disturbed.	0.6-1.0	0	
1.0							

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.





McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-07**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency  
**PROJECT NUMBER** 2531 13507 00  
**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m  
**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes  
**NOTES**

**PROJECT NAME** 329 Marten St.  
**PROJECT LOCATION** 329 Marten St. Banff AB  
**EASTING** 599832  
**NORTHING** 5680843  
**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "  
**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

DEPTH (m)	GRAPHIC LOG	MUNSELL TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
		ML	<b>SANDY SILT WITH GRAVEL</b> , very dark gray (10YR 3/1), moist, firm, medium plasticity, cohesive, gleying, jointing, reduced, unleached, platy. Disturbed, paint flakes.	0-0.15	0	
		ML	<b>SANDY SILT</b> , very dark greenish gray (10G 3/1), moist, firm, medium plasticity, cohesive, gleying, reduced, unleached. Massive, disturbed.	0.3-0.6	0	
0.5						
		SP-SM	<b>POORLY-GRADED SAND WITH SILT</b> , reddish brown (5YR 4/4), moist, loose, non plastic, non-cohesive, mottling, oxidized, leached, singular, medium/coarse-grained. Disturbed.	0.6-1.0	0	
1.0						

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.



McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-08**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 0.60 m

**EASTING** 599842

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670827

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES** \_\_\_\_\_

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	<b>SANDY SILT WITH GRAVEL</b> , very dark gray (10YR 3/1), moist, firm, medium plasticity, cohesive, gleying, jointing, reduced, unleached, platy. Disturbed, paint flakes.	0-0.15	0	
			ML	<b>SANDY SILT</b> , very dark greenish gray (10G 3/1), moist, firm, medium plasticity, cohesive, gleying, reduced, unleached. Massive, disturbed.	0.3-0.6	0	

Bottom of hole at 0.60 m.





McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-09**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 1.00 m

**EASTING** 599839

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670826

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES**

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	<b>SANDY SILT WITH GRAVEL</b> , very dark gray (10YR 3/1), moist, firm, medium plasticity, cohesive, gleying, jointing, reduced, unleached, platy. Disturbed, paint flakes.	0-0.15	0	
0.5			ML	<b>SANDY SILT</b> , very dark greenish gray (10G 3/1), moist, firm, medium plasticity, cohesive, gleying, reduced, unleached. Massive, disturbed.	0.3-0.6	0	
1.0			SP- SM	<b>POORLY-GRADED SAND WITH SILT</b> , reddish brown (5YR 4/4), moist, loose, non plastic, non-cohesive, mottling, oxidized, leached, singular, medium/coarse-grained. Disturbed.			

STANDARD BH (SAMPLE/VOC/ELEV) 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 5/2/18

Bottom of hole at 1.00 m.



McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB T2G 0Y4  
Telephone: 403-262-5042

**BH17-10**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St.

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** November 18, 2017 **TOTAL DEPTH** 0.60 m

**EASTING** 599835

**DRILLING CONTRACTOR** McElhanney Consulting Services Ltd. (MCSL)

**NORTHING** 5670829

**DRILLING METHOD** Hand Auger

**GROUND ELEVATION** N/A **BH DIAMETER** 2.00 "

**LOGGED BY** A.Peardon **CHECKED BY** R.Hoinkes

**T.O.C. ELEVATION** N/A **WELL DIAMETER** N/A

**NOTES** \_\_\_\_\_

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE COLLECTED	VOC READING (ppm)	ELEVATION (masl)
			ML	<b>SANDY SILT WITH GRAVEL</b> , very dark gray (10YR 3/1), moist, firm, medium plasticity, cohesive, gleying, jointing, reduced, unleached, platy. Disturbed, paint flakes.	0-0.15	0	
			ML	<b>SANDY SILT</b> , very dark greenish gray (10G 3/1), moist, firm, medium plasticity, cohesive, gleying, reduced, unleached. Massive, disturbed.	0.3-0.6	0	

Bottom of hole at 0.60 m.





McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB Canada T2G 0Y4

**BH18-01**

**MW18-01**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St. Piezometer Development

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** February 16, 2018 **TOTAL DEPTH** 6.00 m

**EASTING** 599834.12

**DRILLING CONTRACTOR** Greatwest Drilling

**NORTHING** 5670841.23

**DRILLING METHOD**

**GROUND ELEVATION** 100.44 masl **BH DIAMETER** 6.00 "

**LOGGED BY** J.Brown **CHECKED BY** R. Hoinkes

**T.O.C. ELEVATION** N/A masl **WELL DIAMETER** 2.00"

**NOTES** Flush Mounted Well

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE ANALYZED	VOC READING (ppm)	WELL CONSTRUCTION DETAILS	ELEVATION (masl)
0.5			SM	<b>SILTY SAND</b> , brown (10YR 4/3), dry, soft, Topsoil. @ 0.1 m Colour change to gray (10YR 5/1). Material medium dense. Gravel present. @ 0.5 m Colour change to yellowish brown (10YR 5/4). Material stiff. Few coal. High sand percentage. Fine-medium sand.	0.0-0.5		Backfilled	100.0
1.0								
1.5			SP-SM	<b>POORLY-GRADED SAND WITH SILT</b> , yellowish brown (10YR 5/4), dry, loose, medium-coarse sand, coarsening with depth.	1.0-1.5		Bentonite Seal	99.0
2.0								
2.5				@ 2.0 m Colour change to dark yellowish brown (10YR 4/2). Material moist. Increasing moisture and darkening colour with depth. Coarse sand.				98.0
3.0								
3.5					3.0-3.5		Sand Pack Screen 2.2 - 4.2	97.0
4.0				@ 3.7 m Colour change to dark gray. Material wet. Saturated. Coarse sand from 3.7-4.0 m. @ 4.0 m Material soft. Fine sand and silt from 4.0-4.2 m. @ 4.2 m Material loose. Coarse sand. Saturated.				96.0
4.5								
5.0								
5.5							Backfilled	95.0
6.0				@ 5.7-5.8 m Pocket of very fine sand and silt.				

Bottom of hole at 6.00 m.

STANDARD BH - 1 MW (SAMPLE/VOC/ELEV) 2018 GINT FILE 329 MARTEN ST.GPJ GINT STD CANADA LAB.GDT 6/19/18



McElhanney Consulting Services Ltd.  
100, 402 - 11 Avenue SE  
Calgary, AB Canada T2G 0Y4

**BH18-02**

**MW18-02**

PAGE 1 OF 1

**CLIENT** Parks Canada Agency

**PROJECT NAME** 329 Marten St. Piezometer Development

**PROJECT NUMBER** 2531 13507 00

**PROJECT LOCATION** 329 Marten St. Banff AB

**DRILLING DATE** February 16, 2018 **TOTAL DEPTH** 6.00 m

**EASTING** 599812.66

**DRILLING CONTRACTOR** Greatwest Drilling

**NORTHING** 5670845.4

**DRILLING METHOD**

**GROUND ELEVATION** 100.68 masl **BH DIAMETER** 6.00 "

**LOGGED BY** J.Brown **CHECKED BY** R. Hoinkes

**T.O.C. ELEVATION** N/A masl **WELL DIAMETER** 2.00"

**NOTES**

DEPTH (m)	GRAPHIC LOG	MUNSELL	TEXTURE	MATERIAL DESCRIPTION	SAMPLE ANALYZED	VOC READING (ppm)	WELL CONSTRUCTION DETAILS	ELEVATION (masl)
0.5			ML	<b>SANDY SILT</b> , very dark grayish brown (10YR 3/2), dry, firm, Topsoil. Compacted.	0.0-0.5		Backfilled	
1.0			SP-SM	<b>POORLY-GRADED SAND WITH SILT</b> , yellowish brown (10YR 5/6), dry, firm to soft, Few clay. Fine to medium sand.	0.5-1.0			100.0
1.5				@ 1.3 m Colour change to brown (10YR 4/3). Material loose. Medium-coarse sand.	1.0-1.5		Bentonite Seal	99.0
2.0				@ 1.9 m Colour change to dark gray (10YR 4/1).				
2.5				@ 2.3 m Material moist.				98.0
3.0				@ 3.0 m Some gravel up to 3 cm. Increased moisture.	3.0-3.5		Sand Pack Screen 2.1 - 4.1	97.0
3.5				@ 3.3 m Material stiff, wet.				
4.0								
4.5				@ 4.2 m Material saturated, loose to stiff.				96.0
5.0							Backfilled	
5.5								95.0
6.0								

Bottom of hole at 6.00 m.



## **Appendix D – Certificates of Analysis and Chain of Custody**

---

Your Project #: 2531-13507-00

**Attention:AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
Unit #1 - 125 Industrial Road  
Sparwood, BC  
CANADA V0B 2G1

Your C.O.C. #: 541567-01-01 1of3, 541567-01-01 2of3, 541567-01-01 3of3

**Report Date: 2017/11/28**  
Report #: R2483226  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B7A2783**

**Received: 2017/11/19, 10:54**

Sample Matrix: Soil  
# Samples Received: 12

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Analytical Method</b>
Boron (Hot Water Soluble)	8	2017/11/24	2017/11/24	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	6	N/A	2017/11/22	AB SOP-00039	CCME CWS/EPA 8260c m
Cation/EC Ratio	4	N/A	2017/11/27	AB WI-00065	Auto Calc
Chloride (Soluble)	4	2017/11/24	2017/11/26	AB SOP-00033 / AB SOP-00020	SM 22-4500-Cl-E m
Hexavalent Chromium (2)	8	2017/11/27	2017/11/27	AB SOP-00063	SM 22 3500-Cr B m
Conductivity @25C (Soluble)	4	2017/11/25	2017/11/26	AB SOP-00033 / AB SOP-00004	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in soil) (3)	6	2017/11/21	2017/11/21	AB SOP-00036	CCME PHC-CWS m
Elements by ICPMS - Soils	8	2017/11/24	2017/11/27	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance (as Cations/Anions Ratio)	4	N/A	2017/11/21	AB WI-00065	Auto Calc
Sum of Cations, Anions	4	N/A	2017/11/27	AB WI-00065	Auto Calc
Moisture	12	N/A	2017/11/21	AB SOP-00002	CCME PHC-CWS m
Index of Additive Cancer Risk (4)	6	N/A	2017/11/22	AB SOP-00003	Auto Calc
Benzo[a]pyrene Equivalency	6	N/A	2017/11/22	AB SOP-00003	Auto Calc
PAH in Soil by GC/MS	6	2017/11/21	2017/11/21	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
pH @25C (1:2 Calcium Chloride Extract)	4	2017/11/24	2017/11/24	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Particle Size by Sieve (75 micron)	2	N/A	2017/11/23	AB SOP-00022	ASTM D6913-17 m
Sodium Adsorption Ratio	4	N/A	2017/11/27	AB WI-00065	Auto Calc
Soluble Ions	9	2017/11/24	2017/11/25	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste	8	2017/11/24	2017/11/24	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	1	2017/11/24	2017/11/25	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Boron Calculation	8	N/A	2017/11/27	AB WI-00065	Auto Calc

Your Project #: 2531-13507-00

**Attention:AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
Unit #1 - 125 Industrial Road  
Sparwood, BC  
CANADA V0B 2G1

Your C.O.C. #: 541567-01-01 1of3, 541567-01-01 2of3, 541567-01-01 3of3

**Report Date: 2017/11/28**

Report #: R2483226

Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B7A2783**

**Received: 2017/11/19, 10:54**

Sample Matrix: Soil  
# Samples Received: 12

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Analytical Method</b>
Soluble Ions Calculation	4	N/A	2017/11/21	AB WI-00065	Auto Calc
Theoretical Gypsum Requirement (5)	4	N/A	2017/11/27	AB WI-00065	Auto Calc

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: 2531-13507-00

**Attention:AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
Unit #1 - 125 Industrial Road  
Sparwood, BC  
CANADA V0B 2G1

Your C.O.C. #: 541567-01-01 1of3, 541567-01-01 2of3, 541567-01-01  
3of3

**Report Date: 2017/11/28**  
Report #: R2483226  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B7A2783**

**Received: 2017/11/19, 10:54**

- (1) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.
- (2) Some soil samples may react with the Cr(VI) spike reducing it to Cr(III). These samples are highly unlikely to contain native hexavalent chromium. Thus a failed spike recovery does not invalidate a negative result on the native sample.
- (3) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
- (4) Index of Additive Cancer Risk, (C) denotes coarse, (F) denotes fine.
- (5) TGR calculation is based on a theoretical SAR of 4. Salt Contamination and Assessment and remediation guideline 2001 recommended SAR is ranging 4-8. TGR is reported in tonnes/ha.

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jennifer Stephenson, B.Sc, Technical Specialist

Email: jstephenson@maxxam.ca

Phone# (403) 291-3077

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 BTEX AND F1-F4 IN SOIL (VIALS)

<b>Maxxam ID</b>		SM9112		SM9113			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-01 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-01 @ 50-100 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Ext. Pet. Hydrocarbon</b>							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	N/A	<10	N/A	10	8836620
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	N/A	<50	N/A	50	8836620
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	N/A	<50	N/A	50	8836620
Reached Baseline at C50	mg/kg	Yes	N/A	Yes	N/A	N/A	8836620
<b>Physical Properties</b>							
Moisture	%	5.7	+/- 0.49	2.4	+/- 0.30	0.30	8836716
<b>Field Preserved Volatiles</b>							
Benzene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836866
Toluene	mg/kg	<0.020	N/A	<0.020	N/A	0.020	8836866
Ethylbenzene	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836866
Xylenes (Total)	mg/kg	<0.040	N/A	<0.040	N/A	0.040	8836866
m & p-Xylene	mg/kg	<0.040	N/A	<0.040	N/A	0.040	8836866
o-Xylene	mg/kg	<0.020	N/A	<0.020	N/A	0.020	8836866
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	<10	N/A	10	8836866
F1 (C6-C10)	mg/kg	<10	N/A	<10	N/A	10	8836866
<b>Surrogate Recovery (%)</b>							
1,4-Difluorobenzene (sur.)	%	100	N/A	97	N/A	N/A	8836866
4-Bromofluorobenzene (sur.)	%	102	N/A	102	N/A	N/A	8836866
D10-o-Xylene (sur.)	%	97	N/A	94	N/A	N/A	8836866
D4-1,2-Dichloroethane (sur.)	%	87	N/A	99	N/A	N/A	8836866
O-TERPHENYL (sur.)	%	93	N/A	97	N/A	N/A	8836620
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 BTEX AND F1-F4 IN SOIL (VIALS)

<b>Maxxam ID</b>		SM9116		SM9119			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-03 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-04 @ 50-100 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Ext. Pet. Hydrocarbon</b>							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	N/A	<10	N/A	10	8836620
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	N/A	<50	N/A	50	8836620
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	N/A	<50	N/A	50	8836620
Reached Baseline at C50	mg/kg	Yes	N/A	Yes	N/A	N/A	8836620
<b>Physical Properties</b>							
Moisture	%	16	+/- 1.2	5.1	+/- 0.45	0.30	8836770
<b>Field Preserved Volatiles</b>							
Benzene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836866
Toluene	mg/kg	<0.020	N/A	<0.020	N/A	0.020	8836866
Ethylbenzene	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836866
Xylenes (Total)	mg/kg	<0.040	N/A	<0.040	N/A	0.040	8836866
m & p-Xylene	mg/kg	<0.040	N/A	<0.040	N/A	0.040	8836866
o-Xylene	mg/kg	<0.020	N/A	<0.020	N/A	0.020	8836866
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	<10	N/A	10	8836866
F1 (C6-C10)	mg/kg	<10	N/A	<10	N/A	10	8836866
<b>Surrogate Recovery (%)</b>							
1,4-Difluorobenzene (sur.)	%	100	N/A	99	N/A	N/A	8836866
4-Bromofluorobenzene (sur.)	%	99	N/A	103	N/A	N/A	8836866
D10-o-Xylene (sur.)	%	105	N/A	100	N/A	N/A	8836866
D4-1,2-Dichloroethane (sur.)	%	87	N/A	89	N/A	N/A	8836866
O-TERPHENYL (sur.)	%	98	N/A	99	N/A	N/A	8836620
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable							



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 BTEX AND F1-F4 IN SOIL (VIALS)

<b>Maxxam ID</b>		SM9125		SM9127			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 2of3		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-06 @ 60-100 CM</b>	<b>MU</b>	<b>BH17-07 @ 30-60 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Ext. Pet. Hydrocarbon</b>							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	N/A	<10	N/A	10	8836620
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	N/A	<50	N/A	50	8836620
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	N/A	<50	N/A	50	8836620
Reached Baseline at C50	mg/kg	Yes	N/A	Yes	N/A	N/A	8836620
<b>Physical Properties</b>							
Moisture	%	9.4	+/- 0.72	7.1	+/- 0.58	0.30	8836770
<b>Field Preserved Volatiles</b>							
Benzene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836866
Toluene	mg/kg	<0.020	N/A	<0.020	N/A	0.020	8836866
Ethylbenzene	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836866
Xylenes (Total)	mg/kg	<0.040	N/A	<0.040	N/A	0.040	8836866
m & p-Xylene	mg/kg	<0.040	N/A	<0.040	N/A	0.040	8836866
o-Xylene	mg/kg	<0.020	N/A	<0.020	N/A	0.020	8836866
F1 (C6-C10) - BTEX	mg/kg	<10	N/A	<10	N/A	10	8836866
F1 (C6-C10)	mg/kg	<10	N/A	<10	N/A	10	8836866
<b>Surrogate Recovery (%)</b>							
1,4-Difluorobenzene (sur.)	%	101	N/A	100	N/A	N/A	8836866
4-Bromofluorobenzene (sur.)	%	104	N/A	101	N/A	N/A	8836866
D10-o-Xylene (sur.)	%	100	N/A	95	N/A	N/A	8836866
D4-1,2-Dichloroethane (sur.)	%	95	N/A	87	N/A	N/A	8836866
O-TERPHENYL (sur.)	%	96	N/A	93	N/A	N/A	8836620
RDL = Reportable Detection Limit							
MU = Measurement Uncertainty							
N/A = Not Applicable							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 REGULATED METALS - SOILS (SOIL)

<b>Maxxam ID</b>		SM9123			SM9126			
<b>Sampling Date</b>		2017/11/18			2017/11/18			
<b>COC Number</b>		541567-01-01 2of3			541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-06 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>BH17-07 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Calculated Boron (B)	mg/kg	0.56	N/A	0.074	0.15	N/A	0.062	8835809
<b>Elements</b>								
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	<0.080	N/A	0.080	8843744
<b>Soluble Parameters</b>								
Soluble Boron (B)	mg/L	0.75	+/- 0.17	0.10	0.24	+/- 0.12	0.10	8842636
Saturation %	%	74	+/- 5.8	N/A	62	+/- 4.8	N/A	8841211
<b>Elements</b>								
Total Antimony (Sb)	mg/kg	0.80	+/- <RDL	0.50	<0.50	N/A	0.50	8843665
Total Arsenic (As)	mg/kg	9.0	+/- 1.6	1.0	3.5	+/- <RDL	1.0	8843665
Total Barium (Ba)	mg/kg	440	+/- 65	1.0	250	+/- 37	1.0	8843665
Total Beryllium (Be)	mg/kg	0.60	+/- <RDL	0.40	0.45	+/- <RDL	0.40	8843665
Total Cadmium (Cd)	mg/kg	0.62	+/- 0.084	0.050	1.0	+/- 0.12	0.050	8843665
Total Chromium (Cr)	mg/kg	21	+/- 4.0	1.0	13	+/- 2.6	1.0	8843665
Total Cobalt (Co)	mg/kg	4.7	+/- 0.76	0.50	4.4	+/- 0.71	0.50	8843665
Total Copper (Cu)	mg/kg	24	+/- 3.9	1.0	18	+/- 3.0	1.0	8843665
Total Lead (Pb)	mg/kg	490	+/- 82	0.50	390	+/- 65	0.50	8843665
Total Mercury (Hg)	mg/kg	0.33	+/- 0.12	0.050	0.20	+/- 0.12	0.050	8843665
Total Molybdenum (Mo)	mg/kg	0.88	+/- 0.46	0.40	0.78	+/- 0.45	0.40	8843665
Total Nickel (Ni)	mg/kg	11	+/- 2.2	1.0	12	+/- 2.3	1.0	8843665
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8843665
Total Silver (Ag)	mg/kg	0.22	+/- <RDL	0.20	<0.20	N/A	0.20	8843665
Total Thallium (Tl)	mg/kg	<0.10	N/A	0.10	<0.10	N/A	0.10	8843665
Total Tin (Sn)	mg/kg	22	+/- 4.7	1.0	5.5	+/- 1.3	1.0	8843665
Total Uranium (U)	mg/kg	0.77	+/- <RDL	0.20	0.62	+/- <RDL	0.20	8843665
Total Vanadium (V)	mg/kg	15	+/- 4.2	1.0	11	+/- 3.2	1.0	8843665
Total Zinc (Zn)	mg/kg	120	+/- 11	10	200	+/- 19	10	8843665
RDL = Reportable Detection Limit								
MU = Measurement Uncertainty								
N/A = Not Applicable								

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 REGULATED METALS - SOILS (SOIL)

<b>Maxxam ID</b>		SM9129			SM9130			
<b>Sampling Date</b>		2017/11/18			2017/11/18			
<b>COC Number</b>		541567-01-01 2of3			541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-08 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>BH17-08 @ 30-60 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Calculated Boron (B)	mg/kg	0.074	N/A	0.066	0.066	N/A	0.055	8835809
<b>Elements</b>								
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	<0.080	N/A	0.080	8843744
<b>Soluble Parameters</b>								
Soluble Boron (B)	mg/L	0.11	+/- 0.12	0.10	0.12	+/- 0.12	0.10	8842636
Saturation %	%	66	+/- 5.2	N/A	55	+/- 4.3	N/A	8841211
<b>Elements</b>								
Total Antimony (Sb)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8843665
Total Arsenic (As)	mg/kg	2.9	+/- <RDL	1.0	3.3	+/- <RDL	1.0	8843665
Total Barium (Ba)	mg/kg	76	+/- 11	1.0	120	+/- 17	1.0	8843665
Total Beryllium (Be)	mg/kg	<0.40	N/A	0.40	<0.40	N/A	0.40	8843665
Total Cadmium (Cd)	mg/kg	0.75	+/- 0.094	0.050	0.33	+/- 0.063	0.050	8843665
Total Chromium (Cr)	mg/kg	16	+/- 3.1	1.0	13	+/- 2.6	1.0	8843665
Total Cobalt (Co)	mg/kg	4.0	+/- 0.64	0.50	4.2	+/- 0.68	0.50	8843665
Total Copper (Cu)	mg/kg	14	+/- 2.2	1.0	9.0	+/- 1.5	1.0	8843665
Total Lead (Pb)	mg/kg	92	+/- 16	0.50	150	+/- 25	0.50	8843665
Total Mercury (Hg)	mg/kg	0.081	+/- 0.11	0.050	0.067	+/- 0.11	0.050	8843665
Total Molybdenum (Mo)	mg/kg	1.0	+/- 0.47	0.40	0.63	+/- 0.45	0.40	8843665
Total Nickel (Ni)	mg/kg	12	+/- 2.3	1.0	12	+/- 2.3	1.0	8843665
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8843665
Total Silver (Ag)	mg/kg	0.22	+/- <RDL	0.20	<0.20	N/A	0.20	8843665
Total Thallium (Tl)	mg/kg	<0.10	N/A	0.10	<0.10	N/A	0.10	8843665
Total Tin (Sn)	mg/kg	2.5	+/- <RDL	1.0	3.4	+/- 1.0	1.0	8843665
Total Uranium (U)	mg/kg	0.47	+/- <RDL	0.20	0.37	+/- <RDL	0.20	8843665
Total Vanadium (V)	mg/kg	9.2	+/- 2.7	1.0	12	+/- 3.4	1.0	8843665
Total Zinc (Zn)	mg/kg	72	+/- <RDL	10	97	+/- <RDL	10	8843665
RDL = Reportable Detection Limit								
MU = Measurement Uncertainty								
N/A = Not Applicable								



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 REGULATED METALS - SOILS (SOIL)

<b>Maxxam ID</b>		SM9133			
<b>Sampling Date</b>		2017/11/18			
<b>COC Number</b>		541567-01-01 3of3			
	<b>UNITS</b>	<b>BH17-10 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Calculated Boron (B)	mg/kg	0.12	N/A	0.049	8835809
<b>Elements</b>					
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	8843744
<b>Soluble Parameters</b>					
Soluble Boron (B)	mg/L	0.25	+/- 0.13	0.10	8842636
Saturation %	%	49	+/- 3.8	N/A	8841211
<b>Elements</b>					
Total Antimony (Sb)	mg/kg	<0.50	N/A	0.50	8843665
Total Arsenic (As)	mg/kg	3.5	+/- <RDL	1.0	8843665
Total Barium (Ba)	mg/kg	120	+/- 18	1.0	8843665
Total Beryllium (Be)	mg/kg	<0.40	N/A	0.40	8843665
Total Cadmium (Cd)	mg/kg	0.97	+/- 0.11	0.050	8843665
Total Chromium (Cr)	mg/kg	18	+/- 3.6	1.0	8843665
Total Cobalt (Co)	mg/kg	3.7	+/- 0.60	0.50	8843665
Total Copper (Cu)	mg/kg	14	+/- 2.2	1.0	8843665
Total Lead (Pb)	mg/kg	91	+/- 15	0.50	8843665
Total Mercury (Hg)	mg/kg	0.18	+/- 0.12	0.050	8843665
Total Molybdenum (Mo)	mg/kg	2.1	+/- 0.57	0.40	8843665
Total Nickel (Ni)	mg/kg	14	+/- 2.8	1.0	8843665
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	8843665
Total Silver (Ag)	mg/kg	0.28	+/- <RDL	0.20	8843665
Total Thallium (Tl)	mg/kg	0.18	+/- <RDL	0.10	8843665
Total Tin (Sn)	mg/kg	3.0	+/- <RDL	1.0	8843665
Total Uranium (U)	mg/kg	0.63	+/- <RDL	0.20	8843665
Total Vanadium (V)	mg/kg	11	+/- 3.2	1.0	8843665
Total Zinc (Zn)	mg/kg	97	+/- <RDL	10	8843665
RDL = Reportable Detection Limit					
MU = Measurement Uncertainty					
N/A = Not Applicable					

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 METALS & SALINITY IN SOIL (SOIL)

<b>Maxxam ID</b>		SM9112			SM9118			
<b>Sampling Date</b>		2017/11/18			2017/11/18			
<b>COC Number</b>		541567-01-01 1of3			541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-01 @ 0-50 CM</b>	<b>MU</b>	<b>RDL</b>	<b>BH17-04 @ 0-50 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Anion Sum	meq/L	0.67	N/A	N/A	1.3	N/A	N/A	8836089
Cation Sum	meq/L	8.2	N/A	N/A	9.3	N/A	N/A	8836089
Cation/EC Ratio	N/A	12	N/A	0.10	12	N/A	0.10	8836087
Ion Balance	N/A	12	N/A	0.010	7.4	N/A	0.010	8836088
Calculated Calcium (Ca)	mg/kg	43	N/A	0.57	73	N/A	0.86	8836028
Calculated Magnesium (Mg)	mg/kg	7.5	N/A	0.38	11	N/A	0.57	8836028
Calculated Sodium (Na)	mg/kg	5.5	N/A	0.95	6.0	N/A	1.4	8836028
Calculated Potassium (K)	mg/kg	4.4	N/A	0.49	20	N/A	0.75	8836028
Calculated Boron (B)	mg/kg	0.085	N/A	0.038	0.087	N/A	0.057	8835809
Calculated Chloride (Cl)	mg/kg	4.3	N/A	1.9	15	N/A	2.9	8836028
Calculated Sulphate (SO4)	mg/kg	6.4	N/A	1.9	14	N/A	2.9	8836028
<b>Elements</b>								
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	<0.080	N/A	0.080	8843744
<b>Soluble Parameters</b>								
Soluble Boron (B)	mg/L	0.22	+/- 0.12	0.10	0.15	+/- 0.12	0.10	8842636
Soluble Chloride (Cl)	mg/L	11	+/- <RDL	5.0	26	+/- <RDL	5.0	8842903
Soluble Conductivity	dS/m	0.67	+/- 0.088	0.020	0.79	+/- 0.10	0.020	8842923
Soluble (CaCl2) pH	pH	7.58	+/- 0.225	N/A	7.28	+/- 0.216	N/A	8841181
Sodium Adsorption Ratio	N/A	0.33	N/A	0.10	0.23	N/A	0.10	8836092
Soluble Calcium (Ca)	mg/L	110	+/- 22	1.5	130	+/- 25	1.5	8842636
Soluble Magnesium (Mg)	mg/L	20	+/- 3.2	1.0	19	+/- 3.0	1.0	8842636
Soluble Sodium (Na)	mg/L	14	+/- 3.1	2.5	10	+/- 2.7	2.5	8842636
Soluble Potassium (K)	mg/L	12	+/- 1.6	1.3	34	+/- 3.5	1.3	8842636
Saturation %	%	38	+/- 2.9	N/A	57	+/- 4.5	N/A	8841211
Soluble Sulphate (SO4)	mg/L	17	+/- 6.2	5.0	25	+/- 7.5	5.0	8842636
Theoretical Gypsum Requirement	tonnes/ha	<0.20	N/A	0.20	<0.20	N/A	0.20	8836094
<b>Elements</b>								
Total Antimony (Sb)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8843665
Total Arsenic (As)	mg/kg	2.8	+/- <RDL	1.0	2.6	+/- <RDL	1.0	8843665
Total Barium (Ba)	mg/kg	120	+/- 18	1.0	130	+/- 19	1.0	8843665
Total Beryllium (Be)	mg/kg	<0.40	N/A	0.40	<0.40	N/A	0.40	8843665
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable								

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 METALS & SALINITY IN SOIL (SOIL)

Maxxam ID		SM9112			SM9118			
Sampling Date		2017/11/18			2017/11/18			
COC Number		541567-01-01 1of3			541567-01-01 1of3			
	UNITS	BH17-01 @ 0-50 CM	MU	RDL	BH17-04 @ 0-50 CM	MU	RDL	QC Batch
Total Cadmium (Cd)	mg/kg	0.32	+/- 0.063	0.050	0.36	+/- 0.065	0.050	8843665
Total Chromium (Cr)	mg/kg	7.0	+/- 1.6	1.0	11	+/- 2.2	1.0	8843665
Total Cobalt (Co)	mg/kg	3.2	+/- 0.51	0.50	3.5	+/- 0.57	0.50	8843665
Total Copper (Cu)	mg/kg	6.7	+/- 1.1	1.0	8.0	+/- 1.3	1.0	8843665
Total Lead (Pb)	mg/kg	27	+/- 4.6	0.50	27	+/- 4.5	0.50	8843665
Total Mercury (Hg)	mg/kg	<0.050	N/A	0.050	0.095	+/- 0.11	0.050	8843665
Total Molybdenum (Mo)	mg/kg	0.85	+/- 0.46	0.40	0.63	+/- 0.45	0.40	8843665
Total Nickel (Ni)	mg/kg	9.5	+/- 1.9	1.0	9.9	+/- 2.0	1.0	8843665
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8843665
Total Silver (Ag)	mg/kg	<0.20	N/A	0.20	<0.20	N/A	0.20	8843665
Total Thallium (Tl)	mg/kg	<0.10	N/A	0.10	<0.10	N/A	0.10	8843665
Total Tin (Sn)	mg/kg	2.9	+/- <RDL	1.0	3.3	+/- <RDL	1.0	8843665
Total Uranium (U)	mg/kg	0.46	+/- <RDL	0.20	0.38	+/- <RDL	0.20	8843665
Total Vanadium (V)	mg/kg	7.7	+/- 2.3	1.0	11	+/- 3.1	1.0	8843665
Total Zinc (Zn)	mg/kg	46	+/- <RDL	10	66	+/- <RDL	10	8843665
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable								



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 METALS & SALINITY IN SOIL (SOIL)

<b>Maxxam ID</b>		SM9127			
<b>Sampling Date</b>		2017/11/18			
<b>COC Number</b>		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-07 @ 30-60 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Anion Sum	meq/L	0.60	N/A	N/A	8836089
Cation Sum	meq/L	4.3	N/A	N/A	8836089
Cation/EC Ratio	N/A	11	N/A	0.10	8836087
Ion Balance	N/A	7.2	N/A	0.010	8836088
Calculated Calcium (Ca)	mg/kg	30	N/A	0.66	8836028
Calculated Magnesium (Mg)	mg/kg	1.9	N/A	0.44	8836028
Calculated Sodium (Na)	mg/kg	5.4	N/A	1.1	8836028
Calculated Potassium (K)	mg/kg	1.7	N/A	0.58	8836028
Calculated Boron (B)	mg/kg	0.12	N/A	0.044	8835809
Calculated Chloride (Cl)	mg/kg	4.8	N/A	2.2	8836028
Calculated Sulphate (SO4)	mg/kg	6.3	N/A	2.2	8836028
<b>Elements</b>					
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	8843744
<b>Soluble Parameters</b>					
Soluble Boron (B)	mg/L	0.28	+/- 0.13	0.10	8842636
Soluble Chloride (Cl)	mg/L	11	+/- <RDL	5.0	8842903
Soluble Conductivity	dS/m	0.39	+/- 0.056	0.020	8842923
Soluble (CaCl2) pH	pH	7.45	+/- 0.221	N/A	8841181
Sodium Adsorption Ratio	N/A	0.39	N/A	0.10	8836092
Soluble Calcium (Ca)	mg/L	67	+/- 13	1.5	8842636
Soluble Magnesium (Mg)	mg/L	4.3	+/- <RDL	1.0	8842636
Soluble Sodium (Na)	mg/L	12	+/- 2.8	2.5	8842636
Soluble Potassium (K)	mg/L	3.9	+/- <RDL	1.3	8842636
Saturation %	%	44	+/- 3.4	N/A	8841211
Soluble Sulphate (SO4)	mg/L	14	+/- 5.8	5.0	8842636
Theoretical Gypsum Requirement	tonnes/ha	<0.20	N/A	0.20	8836094
<b>Elements</b>					
Total Antimony (Sb)	mg/kg	<0.50	N/A	0.50	8843665
Total Arsenic (As)	mg/kg	3.2	+/- <RDL	1.0	8843665
Total Barium (Ba)	mg/kg	69	+/- 10	1.0	8843665
Total Beryllium (Be)	mg/kg	<0.40	N/A	0.40	8843665
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### AT1 METALS & SALINITY IN SOIL (SOIL)

<b>Maxxam ID</b>		SM9127			
<b>Sampling Date</b>		2017/11/18			
<b>COC Number</b>		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-07 @ 30-60 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
Total Cadmium (Cd)	mg/kg	0.22	+/- 0.058	0.050	8843665
Total Chromium (Cr)	mg/kg	9.7	+/- 2.0	1.0	8843665
Total Cobalt (Co)	mg/kg	4.4	+/- 0.71	0.50	8843665
Total Copper (Cu)	mg/kg	7.6	+/- 1.3	1.0	8843665
Total Lead (Pb)	mg/kg	35	+/- 5.9	0.50	8843665
Total Mercury (Hg)	mg/kg	<0.050	N/A	0.050	8843665
Total Molybdenum (Mo)	mg/kg	0.63	+/- 0.45	0.40	8843665
Total Nickel (Ni)	mg/kg	12	+/- 2.4	1.0	8843665
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	8843665
Total Silver (Ag)	mg/kg	<0.20	N/A	0.20	8843665
Total Thallium (Tl)	mg/kg	<0.10	N/A	0.10	8843665
Total Tin (Sn)	mg/kg	1.0	+/- <RDL	1.0	8843665
Total Uranium (U)	mg/kg	0.36	+/- <RDL	0.20	8843665
Total Vanadium (V)	mg/kg	12	+/- 3.4	1.0	8843665
Total Zinc (Zn)	mg/kg	51	+/- <RDL	10	8843665
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SOIL SALINITY 4 (SOIL)

<b>Maxxam ID</b>		SM9116			
<b>Sampling Date</b>		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-03 @ 0-50 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Anion Sum	meq/L	1.0	N/A	N/A	8836089
Cation Sum	meq/L	11	N/A	N/A	8836089
Cation/EC Ratio	N/A	12	N/A	0.10	8836087
Ion Balance	N/A	10	N/A	0.010	8836088
Calculated Calcium (Ca)	mg/kg	77	N/A	0.95	8836028
Calculated Magnesium (Mg)	mg/kg	15	N/A	0.63	8836028
Calculated Sodium (Na)	mg/kg	11	N/A	1.6	8836028
Calculated Potassium (K)	mg/kg	43	N/A	0.82	8836028
Calculated Chloride (Cl)	mg/kg	13	N/A	3.2	8836028
Calculated Sulphate (SO4)	mg/kg	13	N/A	3.2	8836028
<b>Soluble Parameters</b>					
Soluble Chloride (Cl)	mg/L	21	+/- <RDL	5.0	8842905
Soluble Conductivity	dS/m	0.89	+/- 0.11	0.020	8842965
Soluble (CaCl2) pH	pH	7.37	+/- 0.219	N/A	8841587
Sodium Adsorption Ratio	N/A	0.37	N/A	0.10	8836092
Soluble Calcium (Ca)	mg/L	120	+/- 23	1.5	8842631
Soluble Magnesium (Mg)	mg/L	24	+/- 3.8	1.0	8842631
Soluble Sodium (Na)	mg/L	17	+/- 3.3	2.5	8842631
Soluble Potassium (K)	mg/L	69	+/- 6.7	1.3	8842631
Saturation %	%	63	+/- 4.9	N/A	8841575
Soluble Sulphate (SO4)	mg/L	21	+/- 6.8	5.0	8842631
Theoretical Gypsum Requirement	tonnes/ha	<0.20	N/A	0.20	8836094
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### CCME REGULATED METALS - SOILS (SOIL)

<b>Maxxam ID</b>		SM9112		SM9118		SM9123			
<b>Sampling Date</b>		2017/11/18		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 1of3		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-01 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-04 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-06 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Elements</b>									
Soluble (Hot water) Boron (B)	mg/kg	0.76	+/- 0.16	1.1	+/- 0.22	3.7	+/- 0.72	0.10	8841652
RDL = Reportable Detection Limit									
MU = Measurement Uncertainty									

<b>Maxxam ID</b>		SM9126		SM9127		SM9129			
<b>Sampling Date</b>		2017/11/18		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 2of3		541567-01-01 2of3		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-07 @ 0-15 CM</b>	<b>MU</b>	<b>BH17-07 @ 30-60 CM</b>	<b>MU</b>	<b>BH17-08 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Elements</b>									
Soluble (Hot water) Boron (B)	mg/kg	1.5	+/- 0.31	0.48	+/- 0.11	1.2	+/- 0.24	0.10	8841652
RDL = Reportable Detection Limit									
MU = Measurement Uncertainty									

<b>Maxxam ID</b>		SM9130		SM9133					
<b>Sampling Date</b>		2017/11/18		2017/11/18					
<b>COC Number</b>		541567-01-01 2of3		541567-01-01 3of3					
	<b>UNITS</b>	<b>BH17-08 @ 30-60 CM</b>	<b>MU</b>	<b>BH17-10 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>		

<b>Elements</b>									
Soluble (Hot water) Boron (B)	mg/kg	0.37	+/- 0.10	1.4	+/- 0.29	0.10	8841652		
RDL = Reportable Detection Limit									
MU = Measurement Uncertainty									

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### RESULTS OF CHEMICAL ANALYSES OF SOIL

<b>Maxxam ID</b>		SM9112		SM9119			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-01 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-04 @ 50-100 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>							
Sieve - Pan	%	29	+/- 3.0	27	+/- 2.8	0.20	8837850
Sieve - #200 (>0.075mm)	%	71	+/- 14	73	+/- 14	0.20	8837850
Grain Size	%	COARSE	N/A	COARSE	N/A	0.20	8837850
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### PHYSICAL TESTING (SOIL)

<b>Maxxam ID</b>		SM9118		SM9123		SM9126			
<b>Sampling Date</b>		2017/11/18		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 2of3		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-04 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-06 @ 0-15 CM</b>	<b>MU</b>	<b>BH17-07 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>									
Moisture	%	14	+/- 1.0	30	+/- 2.1	21	+/- 1.5	0.30	8836716
RDL = Reportable Detection Limit									
MU = Measurement Uncertainty									

<b>Maxxam ID</b>		SM9129		SM9130		SM9133			
<b>Sampling Date</b>		2017/11/18		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 2of3		541567-01-01 2of3		541567-01-01 3of3			
	<b>UNITS</b>	<b>BH17-08 @ 0-15 CM</b>	<b>MU</b>	<b>BH17-08 @ 30-60 CM</b>	<b>MU</b>	<b>BH17-10 @ 0-15 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>									
Moisture	%	21	+/- 1.5	20	+/- 1.4	12	+/- 0.88	0.30	8836716
RDL = Reportable Detection Limit									
MU = Measurement Uncertainty									



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		SM9112		SM9113			
Sampling Date		2017/11/18		2017/11/18			
COC Number		541567-01-01 1of3		541567-01-01 1of3			
	UNITS	BH17-01 @ 0-50 CM	MU	BH17-01 @ 50-100 CM	MU	RDL	QC Batch
<b>Polycyclic Aromatics</b>							
Index of Additive Cancer Risk (C)	N/A	0.34	N/A	0.12	N/A	0.10	8836090
Acenaphthene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Benzo[a]pyrene equivalency	mg/kg	0.15	N/A	0.051	N/A	0.0071	8835068
Index of Additive Cancer Risk (F)	N/A	0.66	N/A	0.22	N/A	0.10	8836090
Acenaphthylene	mg/kg	0.015 (1)	+/- <RDL	<0.0050	N/A	0.0050	8836617
Acridine	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836617
Anthracene	mg/kg	0.016 (1)	+/- 0.0070	0.011	+/- 0.0050	0.0040	8836617
Benzo(a)anthracene	mg/kg	0.10 (1)	+/- 0.049	0.038	+/- 0.018	0.0050	8836617
Benzo(b&j)fluoranthene	mg/kg	0.15 (1)	+/- 0.085	0.049	+/- 0.028	0.0050	8836617
Benzo(k)fluoranthene	mg/kg	0.048 (1)	+/- 0.019	0.016	+/- 0.0066	0.0050	8836617
Benzo(g,h,i)perylene	mg/kg	0.063 (1)	+/- 0.027	0.019	+/- 0.0082	0.0050	8836617
Benzo(c)phenanthrene	mg/kg	0.014 (2)	+/- <RDL	<0.0050	N/A	0.0050	8836617
Benzo(a)pyrene	mg/kg	0.096 (1)	+/- 0.039	0.032	+/- 0.013	0.0050	8836617
Benzo[e]pyrene	mg/kg	0.071 (1)	+/- 0.025	0.023	+/- 0.0082	0.0050	8836617
Chrysene	mg/kg	0.093 (1)	+/- 0.039	0.036	+/- 0.015	0.0050	8836617
Dibenz(a,h)anthracene	mg/kg	0.016 (1)	+/- <RDL	0.0059	+/- <RDL	0.0050	8836617
Fluoranthene	mg/kg	0.17 (1)	+/- 0.10	0.073	+/- 0.043	0.0050	8836617
Fluorene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Indeno(1,2,3-cd)pyrene	mg/kg	0.074 (1)	+/- 0.032	0.022	+/- 0.0096	0.0050	8836617
1-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
2-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Naphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Phenanthrene	mg/kg	0.043 (1)	+/- 0.017	0.043	+/- 0.017	0.0050	8836617
Perylene	mg/kg	0.021 (1)	+/- 0.0067	0.0067	+/- <RDL	0.0050	8836617
Pyrene	mg/kg	0.13 (1)	+/- 0.064	0.055	+/- 0.027	0.0050	8836617
Quinoline	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836617
<b>Surrogate Recovery (%)</b>							
D10-ANTHRACENE (sur.)	%	83	N/A	90	N/A	N/A	8836617
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable (1) Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results. (2) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high. Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

<b>Maxxam ID</b>		SM9112		SM9113			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-01 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-01 @ 50-100 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
D8-ACENAPHTHYLENE (sur.)	%	80	N/A	88	N/A	N/A	8836617
D8-NAPHTHALENE (sur.)	%	73	N/A	82	N/A	N/A	8836617
TERPHENYL-D14 (sur.)	%	83	N/A	90	N/A	N/A	8836617
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		SM9116		SM9119			
Sampling Date		2017/11/18		2017/11/18			
COC Number		541567-01-01 1of3		541567-01-01 1of3			
	UNITS	BH17-03 @ 0-50 CM	MU	BH17-04 @ 50-100 CM	MU	RDL	QC Batch
<b>Polycyclic Aromatics</b>							
Index of Additive Cancer Risk (C)	N/A	0.18	N/A	<0.10	N/A	0.10	8836090
Acenaphthene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Benzo[a]pyrene equivalency	mg/kg	0.082	N/A	0.029	N/A	0.0071	8835068
Index of Additive Cancer Risk (F)	N/A	0.34	N/A	0.12	N/A	0.10	8836090
Acenaphthylene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Acridine	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836617
Anthracene	mg/kg	0.0095	+/- 0.0042	<0.0040	N/A	0.0040	8836617
Benzo(a)anthracene	mg/kg	0.051	+/- 0.024	0.019	+/- 0.0093	0.0050	8836617
Benzo(b&j)fluoranthene	mg/kg	0.080	+/- 0.045	0.028	+/- 0.016	0.0050	8836617
Benzo(k)fluoranthene	mg/kg	0.025	+/- 0.0099	0.0090	+/- <RDL	0.0050	8836617
Benzo(g,h,i)perylene	mg/kg	0.036	+/- 0.015	0.012	+/- 0.0055	0.0050	8836617
Benzo(c)phenanthrene	mg/kg	0.0069 (1)	+/- <RDL	<0.0050	N/A	0.0050	8836617
Benzo(a)pyrene	mg/kg	0.053	+/- 0.022	0.019	+/- 0.0078	0.0050	8836617
Benzo[e]pyrene	mg/kg	0.041	+/- 0.015	0.014	+/- 0.0052	0.0050	8836617
Chrysene	mg/kg	0.049	+/- 0.020	0.019	+/- 0.0078	0.0050	8836617
Dibenz(a,h)anthracene	mg/kg	0.0091	+/- <RDL	<0.0050	N/A	0.0050	8836617
Fluoranthene	mg/kg	0.084	+/- 0.049	0.032	+/- 0.019	0.0050	8836617
Fluorene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Indeno(1,2,3-cd)pyrene	mg/kg	0.040	+/- 0.017	0.014	+/- 0.0062	0.0050	8836617
1-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
2-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Naphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Phenanthrene	mg/kg	0.034	+/- 0.014	0.015	+/- 0.0061	0.0050	8836617
Perylene	mg/kg	0.011	+/- <RDL	<0.0050	N/A	0.0050	8836617
Pyrene	mg/kg	0.069	+/- 0.034	0.026	+/- 0.013	0.0050	8836617
Quinoline	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836617
<b>Surrogate Recovery (%)</b>							
D10-ANTHRACENE (sur.)	%	92	N/A	85	N/A	N/A	8836617
D8-ACENAPHTHYLENE (sur.)	%	91	N/A	85	N/A	N/A	8836617
D8-NAPHTHALENE (sur.)	%	84	N/A	77	N/A	N/A	8836617
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable (1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.							



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

<b>Maxxam ID</b>		SM9116		SM9119			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 1of3		541567-01-01 1of3			
	<b>UNITS</b>	<b>BH17-03 @ 0-50 CM</b>	<b>MU</b>	<b>BH17-04 @ 50-100 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
TERPHENYL-D14 (sur.)	%	93	N/A	85	N/A	N/A	8836617
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		SM9125		SM9127			
Sampling Date		2017/11/18		2017/11/18			
COC Number		541567-01-01 2of3		541567-01-01 2of3			
	UNITS	BH17-06 @ 60-100 CM	MU	BH17-07 @ 30-60 CM	MU	RDL	QC Batch
<b>Polycyclic Aromatics</b>							
Index of Additive Cancer Risk (C)	N/A	0.27	N/A	1.8	N/A	0.10	8836090
Acenaphthene	mg/kg	<0.0050	N/A	0.064	+/- 0.011	0.0050	8836617
Benzo[a]pyrene equivalency	mg/kg	0.11	N/A	0.85	N/A	0.0071	8835068
Index of Additive Cancer Risk (F)	N/A	0.52	N/A	3.5	N/A	0.10	8836090
Acenaphthylene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8836617
Acridine	mg/kg	<0.010	N/A	0.016	+/- <RDL	0.010	8836617
Anthracene	mg/kg	0.0085	+/- <RDL	0.19	+/- 0.085	0.0040	8836617
Benzo(a)anthracene	mg/kg	0.091	+/- 0.044	0.65	+/- 0.31	0.0050	8836617
Benzo(b&j)fluoranthene	mg/kg	0.12	+/- 0.068	0.78	+/- 0.43	0.0050	8836617
Benzo(k)fluoranthene	mg/kg	0.038	+/- 0.015	0.25	+/- 0.098	0.0050	8836617
Benzo(g,h,i)perylene	mg/kg	0.043	+/- 0.018	0.30	+/- 0.13	0.0050	8836617
Benzo(c)phenanthrene	mg/kg	0.013 (1)	+/- <RDL	0.086 (1)	+/- 0.011	0.0050	8836617
Benzo(a)pyrene	mg/kg	0.063	+/- 0.026	0.55	+/- 0.22	0.0050	8836617
Benzo[e]pyrene	mg/kg	0.058	+/- 0.021	0.37	+/- 0.13	0.0050	8836617
Chrysene	mg/kg	0.090	+/- 0.037	0.54	+/- 0.23	0.0050	8836617
Dibenz(a,h)anthracene	mg/kg	0.013	+/- <RDL	0.089	+/- 0.018	0.0050	8836617
Fluoranthene	mg/kg	0.15	+/- 0.086	1.3	+/- 0.77	0.0050	8836617
Fluorene	mg/kg	<0.0050	N/A	0.050	+/- 0.018	0.0050	8836617
Indeno(1,2,3-cd)pyrene	mg/kg	0.049	+/- 0.021	0.34	+/- 0.15	0.0050	8836617
1-Methylnaphthalene	mg/kg	<0.0050	N/A	0.0058	+/- <RDL	0.0050	8836617
2-Methylnaphthalene	mg/kg	<0.0050	N/A	0.0096	+/- <RDL	0.0050	8836617
Naphthalene	mg/kg	<0.0050	N/A	0.022	+/- 0.0079	0.0050	8836617
Phenanthrene	mg/kg	0.023	+/- 0.0092	0.83	+/- 0.33	0.0050	8836617
Perylene	mg/kg	0.013	+/- <RDL	0.12	+/- 0.039	0.0050	8836617
Pyrene	mg/kg	0.12	+/- 0.058	0.99	+/- 0.48	0.0050	8836617
Quinoline	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8836617
<b>Surrogate Recovery (%)</b>							
D10-ANTHRACENE (sur.)	%	90	N/A	90	N/A	N/A	8836617
D8-ACENAPHTHYLENE (sur.)	%	88	N/A	87	N/A	N/A	8836617
D8-NAPHTHALENE (sur.)	%	82	N/A	83	N/A	N/A	8836617
RDL = Reportable Detection Limit							
MU = Measurement Uncertainty							
N/A = Not Applicable							
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.							

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

<b>Maxxam ID</b>		SM9125		SM9127			
<b>Sampling Date</b>		2017/11/18		2017/11/18			
<b>COC Number</b>		541567-01-01 2of3		541567-01-01 2of3			
	<b>UNITS</b>	<b>BH17-06 @ 60-100 CM</b>	<b>MU</b>	<b>BH17-07 @ 30-60 CM</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
TERPHENYL-D14 (sur.)	%	90	N/A	91	N/A	N/A	8836617
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable							



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### GENERAL COMMENTS

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

Results relate only to the items tested.

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

## QUALITY ASSURANCE REPORT

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8836617	D10-ANTHRACENE (sur.)	2017/11/21	85	50 - 130	91	50 - 130	95	%				
8836617	D8-ACENAPHTHYLENE (sur.)	2017/11/21	86	50 - 130	94	50 - 130	95	%				
8836617	D8-NAPHTHALENE (sur.)	2017/11/21	80	50 - 130	86	50 - 130	88	%				
8836617	TERPHENYL-D14 (sur.)	2017/11/21	86	50 - 130	94	50 - 130	99	%				
8836620	O-TERPHENYL (sur.)	2017/11/21	92	60 - 130	92	60 - 130	104	%				
8836866	1,4-Difluorobenzene (sur.)	2017/11/22	98	60 - 130	96	60 - 130	101	%				
8836866	4-Bromofluorobenzene (sur.)	2017/11/22	103	60 - 130	105	60 - 130	103	%				
8836866	D10-o-Xylene (sur.)	2017/11/22	97	60 - 130	97	60 - 130	100	%				
8836866	D4-1,2-Dichloroethane (sur.)	2017/11/22	90	60 - 130	98	60 - 130	91	%				
8836617	1-Methylnaphthalene	2017/11/22	88	50 - 130	94	50 - 130	<0.0050	mg/kg	NC	50		
8836617	2-Methylnaphthalene	2017/11/22	87	50 - 130	94	50 - 130	<0.0050	mg/kg	NC	50		
8836617	Acenaphthene	2017/11/22	87	50 - 130	92	50 - 130	<0.0050	mg/kg	NC	50		
8836617	Acenaphthylene	2017/11/22	87	50 - 130	92	50 - 130	<0.0050	mg/kg	119 (1)	50		
8836617	Acridine	2017/11/22	68	50 - 130	69	50 - 130	<0.010	mg/kg	12	50		
8836617	Anthracene	2017/11/22	88	50 - 130	92	50 - 130	<0.0040	mg/kg	134 (1)	50		
8836617	Benzo(a)anthracene	2017/11/22	106	50 - 130	103	50 - 130	<0.0050	mg/kg	134 (1)	50		
8836617	Benzo(a)pyrene	2017/11/22	102	50 - 130	100	50 - 130	<0.0050	mg/kg	129 (1)	50		
8836617	Benzo(b&j)fluoranthene	2017/11/22	98	50 - 130	99	50 - 130	<0.0050	mg/kg	129 (1)	50		
8836617	Benzo(c)phenanthrene	2017/11/22	91	50 - 130	98	50 - 130	<0.0050	mg/kg	136 (1)	50		
8836617	Benzo(g,h,i)perylene	2017/11/22	94	50 - 130	97	50 - 130	<0.0050	mg/kg	125 (1)	50		
8836617	Benzo(k)fluoranthene	2017/11/22	88	50 - 130	92	50 - 130	<0.0050	mg/kg	129 (1)	50		
8836617	Benzo[e]pyrene	2017/11/22	92	50 - 130	93	50 - 130	<0.0050	mg/kg	130 (1)	50		
8836617	Chrysene	2017/11/22	98	50 - 130	94	50 - 130	<0.0050	mg/kg	127 (1)	50		
8836617	Dibenz(a,h)anthracene	2017/11/22	89	50 - 130	101	50 - 130	<0.0050	mg/kg	130 (1)	50		
8836617	Fluoranthene	2017/11/22	106	50 - 130	103	50 - 130	<0.0050	mg/kg	138 (1)	50		
8836617	Fluorene	2017/11/22	87	50 - 130	93	50 - 130	<0.0050	mg/kg	NC	50		
8836617	Indeno(1,2,3-cd)pyrene	2017/11/22	96	50 - 130	96	50 - 130	<0.0050	mg/kg	127 (1)	50		
8836617	Naphthalene	2017/11/22	84	50 - 130	89	50 - 130	<0.0050	mg/kg	35	50		
8836617	Perylene	2017/11/22	77	50 - 130	79	50 - 130	<0.0050	mg/kg	129 (1)	50		
8836617	Phenanthrene	2017/11/22	90	50 - 130	93	50 - 130	<0.0050	mg/kg	142 (1)	50		
8836617	Pyrene	2017/11/22	100	50 - 130	101	50 - 130	<0.0050	mg/kg	137 (1)	50		

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8836617	Quinoline	2017/11/22	109	50 - 130	108	50 - 130	<0.010	mg/kg	NC	50		
8836620	F2 (C10-C16 Hydrocarbons)	2017/11/21	92	60 - 130	93	70 - 130	<10	mg/kg	NC	40		
8836620	F3 (C16-C34 Hydrocarbons)	2017/11/21	91	60 - 130	90	70 - 130	<50	mg/kg	NC	40		
8836620	F4 (C34-C50 Hydrocarbons)	2017/11/21	86	60 - 130	86	70 - 130	<50	mg/kg	NC	40		
8836716	Moisture	2017/11/21					<0.30	%	0.70	20		
8836770	Moisture	2017/11/21					<0.30	%	2.1	20		
8836866	Benzene	2017/11/22	98	60 - 140	109	60 - 130	<0.0050	mg/kg	NC	50		
8836866	Ethylbenzene	2017/11/22	100	60 - 140	106	60 - 130	<0.010	mg/kg	NC	50		
8836866	F1 (C6-C10) - BTEX	2017/11/22					<10	mg/kg	NC	30		
8836866	F1 (C6-C10)	2017/11/22	103	60 - 140	119	60 - 130	<10	mg/kg	NC	30		
8836866	m & p-Xylene	2017/11/22	102	60 - 140	111	60 - 130	<0.040	mg/kg	NC	50		
8836866	o-Xylene	2017/11/22	100	60 - 140	107	60 - 130	<0.020	mg/kg	NC	50		
8836866	Toluene	2017/11/22	99	60 - 140	108	60 - 130	<0.020	mg/kg	NC	50		
8836866	Xylenes (Total)	2017/11/22					<0.040	mg/kg	NC	50		
8837850	Sieve - #200 (>0.075mm)	2017/11/23							0.30	30	102	75 - 125
8837850	Sieve - Pan	2017/11/23							0.80	30	99	75 - 125
8841181	Soluble (CaCl2) pH	2017/11/24			99	97 - 103			0	N/A	99	98 - 102
8841211	Saturation %	2017/11/24							4.9	12	101	75 - 125
8841575	Saturation %	2017/11/25							4.3	12	99	75 - 125
8841587	Soluble (CaCl2) pH	2017/11/24			100	97 - 103			0.13	N/A	99	98 - 102
8841652	Soluble (Hot water) Boron (B)	2017/11/24	97	75 - 125	98	80 - 120	<0.10	mg/kg	5.2	35		
8842631	Soluble Calcium (Ca)	2017/11/25	88	75 - 125	93	80 - 120	<1.5	mg/L	2.7	30	79	75 - 125
8842631	Soluble Magnesium (Mg)	2017/11/25	93	75 - 125	95	80 - 120	<1.0	mg/L	2.3	30	84	75 - 125
8842631	Soluble Potassium (K)	2017/11/25	89	75 - 125	91	80 - 120	<1.3	mg/L	3.1	30	82	75 - 125
8842631	Soluble Sodium (Na)	2017/11/25	79	75 - 125	89	80 - 120	<2.5	mg/L	5.6	30	79	75 - 125
8842631	Soluble Sulphate (SO4)	2017/11/25					<5.0	mg/L	3.7	30	81	75 - 125
8842636	Soluble Boron (B)	2017/11/25	97	75 - 125	96	80 - 120	<0.10	mg/L	2.7	30		
8842636	Soluble Calcium (Ca)	2017/11/25	92	75 - 125	93	80 - 120	<1.5	mg/L	10	30	90	75 - 125
8842636	Soluble Magnesium (Mg)	2017/11/25	95	75 - 125	95	80 - 120	<1.0	mg/L	1.8	30	93	75 - 125
8842636	Soluble Potassium (K)	2017/11/25	91	75 - 125	91	80 - 120	<1.3	mg/L	17	30	90	75 - 125
8842636	Soluble Sodium (Na)	2017/11/25	88	75 - 125	88	80 - 120	<2.5	mg/L	8.0	30	86	75 - 125



Maxxam Job #: B7A2783  
Report Date: 2017/11/28

# QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8842636	Soluble Sulphate (SO4)	2017/11/25					<5.0	mg/L	8.0	30	89	75 - 125
8842903	Soluble Chloride (Cl)	2017/11/26	105	75 - 125	103	80 - 120	<5.0	mg/L	28	30	88	75 - 125
8842905	Soluble Chloride (Cl)	2017/11/26	109	75 - 125	104	80 - 120	<5.0	mg/L	11	30	91	75 - 125
8842923	Soluble Conductivity	2017/11/26			100	90 - 110	<0.020	dS/m	13	20	110	75 - 125
8842965	Soluble Conductivity	2017/11/26			100	90 - 110	<0.020	dS/m	2.6	20	105	75 - 125
8843665	Total Antimony (Sb)	2017/11/27	90	75 - 125	105	80 - 120	<0.50	mg/kg	NC	30		
8843665	Total Arsenic (As)	2017/11/27	98	75 - 125	109	80 - 120	<1.0	mg/kg	7.5	30	100	53 - 147
8843665	Total Barium (Ba)	2017/11/27	NC	75 - 125	106	80 - 120	<1.0	mg/kg	31	35	113	80 - 119
8843665	Total Beryllium (Be)	2017/11/27	97	75 - 125	111	80 - 120	<0.40	mg/kg	NC	30		
8843665	Total Cadmium (Cd)	2017/11/27	100	75 - 125	110	80 - 120	<0.050	mg/kg	7.6	30		
8843665	Total Chromium (Cr)	2017/11/27	103	75 - 125	109	80 - 120	<1.0	mg/kg	3.2	30	93	59 - 141
8843665	Total Cobalt (Co)	2017/11/27	94	75 - 125	110	80 - 120	<0.50	mg/kg	3.1	30	92	58 - 142
8843665	Total Copper (Cu)	2017/11/27	91	75 - 125	107	80 - 120	<1.0	mg/kg	1.6	30	96	83 - 117
8843665	Total Lead (Pb)	2017/11/27	97	75 - 125	110	80 - 120	<0.50	mg/kg	22	35	108	79 - 121
8843665	Total Mercury (Hg)	2017/11/27	93	75 - 125	110	80 - 120	<0.050	mg/kg	31	35		
8843665	Total Molybdenum (Mo)	2017/11/27	104	75 - 125	109	80 - 120	<0.40	mg/kg	1.8	35		
8843665	Total Nickel (Ni)	2017/11/27	92	75 - 125	107	80 - 120	<1.0	mg/kg	6.1	30	99	79 - 121
8843665	Total Selenium (Se)	2017/11/27	97	75 - 125	114	80 - 120	<0.50	mg/kg	NC	30		
8843665	Total Silver (Ag)	2017/11/27	96	75 - 125	109	80 - 120	<0.20	mg/kg	NC	35		
8843665	Total Thallium (Tl)	2017/11/27	99	75 - 125	111	80 - 120	<0.10	mg/kg	NC	30		
8843665	Total Tin (Sn)	2017/11/27	107	75 - 125	116	80 - 120	<1.0	mg/kg	NC	35		
8843665	Total Uranium (U)	2017/11/27	99	75 - 125	98	80 - 120	<0.20	mg/kg	1.2	30		
8843665	Total Vanadium (V)	2017/11/27	111	75 - 125	109	80 - 120	<1.0	mg/kg	1.3	30	96	79 - 121
8843665	Total Zinc (Zn)	2017/11/27	100	75 - 125	111	80 - 120	<10	mg/kg	2.7	30	100	79 - 121

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8843744	Hex. Chromium (Cr 6+)	2017/11/27	105	75 - 125	108	80 - 120	<0.080	mg/kg	NC	35		
<p>N/A = Not Applicable</p> <p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference &lt;= 2x RDL).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p>												

Maxxam Job #: B7A2783  
Report Date: 2017/11/28

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: AP

### VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



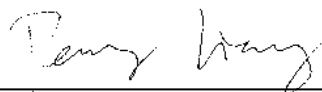
---

Dennis Ngundu, B.Sc., P.Chem., QP, Supervisor, Organics



---

Janet Gao, B.Sc., QP, Supervisor, Organics



---

Harry (Peng) Liang, Senior Analyst



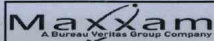
---

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.





Maxxam Analytics International Corporation o/a Maxxam Analytics  
4000 19th N.E. Calgary, Alberta Canada T2E 6P6 Tel: (403) 291-3077 Toll-free: 800-563-6266 Fax: (403) 291-9468 www.maxxam.ca

# CHAIN OF CUSTODY RECORD

Page 1 of 3

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name: #12506 McElhanney Consulting Services Ltd.	Company Name: HCSL	Quotation #: P.O. #:	Maxxam Job #:	Project: 2531-13507-00		Bottle Order #:	
Attention: Amanda Peardon	Attention: Amanda Peardon	Project Name:	COC #:		Project Manager:		
Address: 500, 999 8 Street SW	Address:	Site #:	C#541567-01-01		Jennifer Stephenson		
Calgary AB T2R 1J5	Tel: 403-815-7644	Sampled By: A. Peardon					
Tel: (403) 262-5042 x	Fax:						
Email: apeardon@mcelhanney.com	Email: apeardon@mcelhanney.com						
Regulatory Criteria: <input checked="" type="checkbox"/> ATI <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Other		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)		Turnaround Time (TAT) Required: Please provide advance notice for rush projects	
				Metals Field Filtered? (Y/N)		Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests are > 5 days - contact your Project Manager for details	
				AT/COCME METALS PACEDON-OR-PHHS BTEX, FI-FA SALINITY TEXTURE (SIEVE) HOLD		Job Specific Rush TAT (if applies to entire submission) Date Required: Rush Confirmation Number:	
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM						# of Bottles	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix		Comments	
1	BH17-01 0-50 cm	11/11/18		Soil	✓	✓	5
2	BH17-01 50-100 cm				✓	✓	5
3	BH17-02 0-50 cm						1
4	BH17-02 0-50 cm						1
5	BH17-03 0-50 cm				✓	✓	5
6	BH17-03 50-100 cm					✓	1
7	BH17-04 0-50 cm				✓	✓	1
8	BH17-04 50-100 cm					✓	5
9	BH17-05 0-50 cm					✓	1
10	BH17-05 50-80 cm					✓	1
* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time
Amanda Peardon		11/11/19	10:52am	Kate Lovett		2017/11/19	10:54
						# jars used and not submitted	
						Time Sensitive	
						Temperature (°C) on Receipt	11/3/2
						Custody Seal Intact on Cooler?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
						White: Maxxam	Yellow: Client

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

\* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

\*\* ALL SAMPLES ARE HELD FOR 60 DAYS AFTER SAMPLE RECEIPT, FOR SPECIAL REQUESTS CONTACT YOUR PROJECT MANAGER

19-Nov-17 10:54  
Customer Service Alberta  
B7A2783

KLX INS-0001

Maxxam Analytics International Corporation o/a Maxxam Analytics

<b>INVOICE TO:</b>		<b>REPORT TO:</b>		<b>PROJECT INFORMATION:</b>		<b>Laboratory Use Only:</b>	
Company Name: #12506 McElhanney Consulting Services Ltd.		Company Name:		Quotation #:		Maxxam Job #:	
Attention: Amanda Peardon		Attention:		P.O. #:		Bottle Order #:	
Address: 500, 999 8 Street SW		Address: See pg. 1		Project: 2531-13507-00		COC #:	
Calgary AB T2R 1J5				Project Name:		Project Manager:	
Tel: (403) 262-5042 x		Tel:		Site #:		Jennifer Stephenson	
Fax:		Fax:		Sampled By:		C#541567-01-01	
Email: apeardon@mcelhanney.com		Email:					

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:			
<input checked="" type="checkbox"/> ATI <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Other				Metals Field Filtered ? (Y/N) ATII/CCME METALS CHENNON-CAR PARTS BTEX, FI-F4 SALINITY TEXTURE (SIEVE) HOLD										Please provide advance notice for rush projects Regular (Standard) TAT: <input checked="" type="checkbox"/> (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests are > 5 days - contact your Project Manager for details Job Specific Rush TAT (if applies to entire submission) Date Required: <input type="checkbox"/> Rush Confirmation Number: (call lab for #)			
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM														# of Bottles		Comments	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	ATII/CCME METALS	CHENNON-CAR PARTS	BTEX, FI-F4	SALINITY	TEXTURE (SIEVE)	HOLD						
1	BH17-06 0-15cm	17/11/18		Soil	✓	✓										1	
2	BH17-06 30-60cm										✓					1	
3	BH17-06 60-100cm						✓	✓								5	
4	BH17-07 0-15cm				✓											1	
5	BH17-07 30-60cm				✓		✓	✓	✓							5	
6	BH17-07 60-100cm										✓					1	
7	BH17-08 0-15cm				✓											1	
8	BH17-08 30-60cm				✓						✓					1	
9	BH17-09 0-15cm										✓					1	
10	BH17-09 30-60cm										✓					1	

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)		Time		RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)		Time		# jars used and not submitted		Laboratory Use Only	
Amanda Peardon		17/11/19		10:52		Katch Laett		20/11/19		10:54				Time Sensitive <input type="checkbox"/> Temperature (°C) on Receipt: 11/3/2 Custody Seal Intact on Cooler? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
 \* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.  
 \*\* ALL SAMPLES ARE HELD FOR 60 DAYS AFTER SAMPLE RECEIPT, FOR SPECIAL REQUESTS CONTACT YOUR PROJECT MANAGER

19-Nov-17 10:54  
Customer Service Alberta  
B7A2783

KL.V INS-0001



INVOICE TO:				REPORT TO:		PROJECT INFORMATION:				Laboratory Use Only:							
<b>Company Name:</b> #12506 McElhanney Consulting Services Ltd.				<b>Company Name:</b>		<b>Quotation #:</b>				<b>Maxxam Job #:</b>	<b>Bottle Order #:</b>						
<b>Attention:</b> Amanda Peardon				<b>Attention:</b>		<b>P.O.#:</b>				B7A2783 							
<b>Address:</b> 500, 999 8 Street SW Calgary AB T2R 1J5				<b>Address:</b>		<b>Project:</b> 2531-13507-00											
<b>Tel:</b> (403) 262-5042 x <b>Fax:</b>				<b>Tel:</b> <b>Fax:</b>		<b>Project Name:</b>				<b>COC #:</b>							
<b>Email:</b> apeardon@mcelhanney.com				<b>Email:</b>		<b>Site #:</b>				C#541567-01-01							
						<b>Sampled By:</b>				<b>Turnaround Time (TAT) Required:</b>							
<b>Regulatory Criteria:</b> <input checked="" type="checkbox"/> ATI <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Other				<b>Special Instructions</b>		ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Metals Field Filtered ? (Y/N) As follows: METALS CARCINOGENIC PAHs BTEX, FI-F4 SALINITY TEXTURE(SIEVE) HOLD								Please provide advance notice for rush projects <b>Regular (Standard) TAT:</b> (will be applied if Rush TAT is not specified). Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests are > 5 days - contact your Project Manager for details <input checked="" type="checkbox"/> <b>Job Specific Rush TAT (if applies to entire submission)</b> Date Required: _____ Rush Confirmation Number: _____ <small>(call lab for #)</small>			
														Turnaround Time (TAT) Required: _____			
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM																	
	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix							# of Bottles	Comments				
1		BH17-10 0-15cm	17/11/18		Soil	✓						1					
2		BH17-10 30-60cm								✓		1					
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
<b>* RELINQUISHED BY: (Signature/Print)</b>			<b>Date: (YY/MM/DD)</b>	<b>Time</b>	<b>RECEIVED BY: (Signature/Print)</b>			<b>Date: (YY/MM/DD)</b>	<b>Time</b>	<b># Jars used and not submitted</b>	<b>Laboratory Use Only</b>						
Amanda Peardon			17/11/19	10:52	Kate Lovett			2017/11/19	10:54		Time Sensitive <input type="checkbox"/>	Temperature (°C) on Receipt 11/3/2	Custody Seal Intact on Cooler? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
<p><small>* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.</small></p> <p><small>* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.</small></p> <p><small>* AFTER SAMPLES HAVE BEEN RECEIVED, PROJECT MANAGERS CONTACT YOUR PROJECT MANAGER.</small></p>																	



Your Project #: 2531-13507-00  
Your C.O.C. #: M063635, M063636, M063637

**Attention: AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
500, 999 8 Street SW  
Calgary, AB  
Canada T2R1J5

**Report Date: 2018/02/22**

Report #: R2519129

Version: 1 - Final

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B812095**

**Received: 2018/02/17, 10:35**

Sample Matrix: Soil  
# Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX in Leachates by HS GC/MS/FID (1)	1	2018/02/20	2018/02/21	AB SOP-00039	EPA 8260c m
Chloride (Soluble)	1	2018/02/21	2018/02/22	AB SOP-00033 / AB SOP-00020	SM 22-4500-Cl-E m
Hexavalent Chromium (2)	3	2018/02/21	2018/02/21	AB SOP-00063	SM 22 3500-Cr B m
Flash Point	1	N/A	2018/02/20	AB SOP-00062	ASTM D3828-16a/ A m
ICPMS Metals on TCLP Leachate (1)	1	2018/02/22	2018/02/22	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	3	2018/02/21	2018/02/22	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	6	N/A	2018/02/18	AB SOP-00002	CCME PHC-CWS m
Moisture	1	N/A	2018/02/21	AB SOP-00002	CCME PHC-CWS m
Benzo[a]pyrene Equivalency	6	N/A	2018/02/21	AB SOP-00003	Auto Calc
Benzo[a]pyrene Equivalency	1	N/A	2018/02/22	AB SOP-00003	Auto Calc
PAH in Soil by GC/MS	6	2018/02/17	2018/02/20	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
PAH in Soil by GC/MS	1	2018/02/20	2018/02/21	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
Free Liquid (Paint filter)	1	N/A	2018/02/20	AB SOP-00047	EPA 9095B R2 m
TCLP pH Measurements	1	2018/02/21	2018/02/22	AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:1 extract, solid waste)	1	2018/02/22	2018/02/22	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Particle Size by Sieve (75 micron)	2	N/A	2018/02/22	AB SOP-00022	ASTM D6913-17 m
Soluble Ions	3	2018/02/20	2018/02/21	AB SOP-00033 / AB SOP-00042	EPA 200.7 CFR 2012 m
Soluble Paste	3	2018/02/20	2018/02/21	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	1	2018/02/21	2018/02/21	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Boron Calculation	3	N/A	2018/02/21	AB WI-00065	Auto Calc
Hydrocarbon by IR (Mineral oil & grease)	1	2018/02/21	2018/02/22	CAL SOP-00096	SM 22 5520 C m

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your Project #: 2531-13507-00  
Your C.O.C. #: M063635, M063636, M063637

**Attention: AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
500, 999 8 Street SW  
Calgary, AB  
Canada T2R1J5

**Report Date: 2018/02/22**

Report #: R2519129

Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B812095**

**Received: 2018/02/17, 10:35**

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Samples were extracted as per EPA 1311 unless otherwise noted in the report.

(2) Some soil samples may react with the Cr(VI) spike reducing it to Cr(III). These samples are highly unlikely to contain native hexavalent chromium. Thus a failed spike recovery does not invalidate a negative result on the native sample.

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jennifer Stephenson, B.Sc, Technical Specialist

Email: jstephenson@maxxam.ca

Phone# (403) 291-3077

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### AT1 REGULATED METALS - SOILS (SOIL)

<b>Maxxam ID</b>		SZ0843			SZ0855			
<b>Sampling Date</b>		2018/02/16			2018/02/16			
<b>COC Number</b>		M063635			M063636			
	<b>UNITS</b>	<b>BH18-01 (0-50 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>BH18-02 (0-50 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Calculated Boron (B)	mg/kg	0.40	N/A	0.069	0.18	N/A	0.079	8913490
<b>Elements</b>								
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	<0.080	N/A	0.080	8915808
<b>Soluble Parameters</b>								
Soluble Boron (B)	mg/L	0.58	+/- 0.15	0.10	0.23	+/- 0.12	0.10	8915851
Saturation %	%	69	+/- 5.3	N/A	79	+/- 6.2	N/A	8914401
<b>Elements</b>								
Total Antimony (Sb)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8915894
Total Arsenic (As)	mg/kg	3.1	+/- <RDL	1.0	3.4	+/- <RDL	1.0	8915894
Total Barium (Ba)	mg/kg	150	+/- 22	1.0	63	+/- 9.4	1.0	8915894
Total Beryllium (Be)	mg/kg	<0.40	N/A	0.40	<0.40	N/A	0.40	8915894
Total Cadmium (Cd)	mg/kg	0.42	+/- 0.069	0.050	0.57	+/- 0.079	0.050	8915894
Total Chromium (Cr)	mg/kg	8.5	+/- 1.8	1.0	14	+/- 2.8	1.0	8915894
Total Cobalt (Co)	mg/kg	2.8	+/- <RDL	0.50	4.2	+/- 0.68	0.50	8915894
Total Copper (Cu)	mg/kg	9.3	+/- 1.5	1.0	11	+/- 1.8	1.0	8915894
Total Lead (Pb)	mg/kg	120	+/- 21	0.50	21	+/- 3.6	0.50	8915894
Total Mercury (Hg)	mg/kg	0.066	+/- 0.11	0.050	0.075	+/- 0.11	0.050	8915894
Total Molybdenum (Mo)	mg/kg	0.82	+/- 0.46	0.40	1.8	+/- 0.54	0.40	8915894
Total Nickel (Ni)	mg/kg	9.1	+/- 1.8	1.0	14	+/- 2.8	1.0	8915894
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	<0.50	N/A	0.50	8915894
Total Silver (Ag)	mg/kg	<0.20	N/A	0.20	<0.20	N/A	0.20	8915894
Total Thallium (Tl)	mg/kg	<0.10	N/A	0.10	0.13	+/- <RDL	0.10	8915894
Total Tin (Sn)	mg/kg	3.1	+/- <RDL	1.0	1.4	+/- <RDL	1.0	8915894
Total Uranium (U)	mg/kg	0.47	+/- <RDL	0.20	0.52	+/- <RDL	0.20	8915894
Total Vanadium (V)	mg/kg	9.4	+/- 2.7	1.0	11	+/- 3.2	1.0	8915894
Total Zinc (Zn)	mg/kg	59	+/- <RDL	10	63	+/- <RDL	10	8915894
RDL = Reportable Detection Limit								
MU = Measurement Uncertainty								
N/A = Not Applicable								



Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### AT1 REGULATED METALS - SOILS (SOIL)

<b>Maxxam ID</b>		SZ0866			
<b>Sampling Date</b>		2018/02/16			
<b>COC Number</b>		M063637			
	<b>UNITS</b>	<b>DUP A</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Calculated Boron (B)	mg/kg	0.14	N/A	0.078	8913490
<b>Elements</b>					
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	8915808
<b>Soluble Parameters</b>					
Soluble Boron (B)	mg/L	0.18	+/- 0.12	0.10	8915851
Saturation %	%	78	+/- 6.0	N/A	8914401
<b>Elements</b>					
Total Antimony (Sb)	mg/kg	<0.50	N/A	0.50	8915894
Total Arsenic (As)	mg/kg	3.9	+/- <RDL	1.0	8915894
Total Barium (Ba)	mg/kg	67	+/- 10	1.0	8915894
Total Beryllium (Be)	mg/kg	<0.40	N/A	0.40	8915894
Total Cadmium (Cd)	mg/kg	0.69	+/- 0.089	0.050	8915894
Total Chromium (Cr)	mg/kg	16	+/- 3.1	1.0	8915894
Total Cobalt (Co)	mg/kg	4.5	+/- 0.72	0.50	8915894
Total Copper (Cu)	mg/kg	12	+/- 2.0	1.0	8915894
Total Lead (Pb)	mg/kg	23	+/- 3.9	0.50	8915894
Total Mercury (Hg)	mg/kg	0.073	+/- 0.11	0.050	8915894
Total Molybdenum (Mo)	mg/kg	2.1	+/- 0.57	0.40	8915894
Total Nickel (Ni)	mg/kg	16	+/- 3.1	1.0	8915894
Total Selenium (Se)	mg/kg	<0.50	N/A	0.50	8915894
Total Silver (Ag)	mg/kg	0.21	+/- <RDL	0.20	8915894
Total Thallium (Tl)	mg/kg	0.16	+/- <RDL	0.10	8915894
Total Tin (Sn)	mg/kg	1.9	+/- <RDL	1.0	8915894
Total Uranium (U)	mg/kg	0.53	+/- <RDL	0.20	8915894
Total Vanadium (V)	mg/kg	12	+/- 3.4	1.0	8915894
Total Zinc (Zn)	mg/kg	67	+/- <RDL	10	8915894
RDL = Reportable Detection Limit					
MU = Measurement Uncertainty					
N/A = Not Applicable					

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### BASIC CLASS II LANDFILL PACKAGE (SOIL)

<b>Maxxam ID</b>		SZ0845			
<b>Sampling Date</b>		2018/02/16			
<b>COC Number</b>		M063635			
	<b>UNITS</b>	<b>BH18-01 (100-150 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Soluble Parameters</b>					
Soluble (1:1) pH	pH	8.77	+/- 0.222	N/A	8916727
<b>Physical Properties</b>					
Closed Cup Flash Point	deg. C	>61	N/A	N/A	8914929
Free Liquid	N/A	PASS	N/A	N/A	8914932
<b>Elements</b>					
Leachable Antimony (Sb)	mg/L	<1.0	N/A	1.0	8916954
Leachable Arsenic (As)	mg/L	<0.50	N/A	0.50	8916954
Leachable Barium (Ba)	mg/L	<1.0	N/A	1.0	8916954
Leachable Beryllium (Be)	mg/L	<0.50	N/A	0.50	8916954
Leachable Boron (B)	mg/L	<1.0	N/A	1.0	8916954
Leachable Cadmium (Cd)	mg/L	<0.10	N/A	0.10	8916954
Leachable Chromium (Cr)	mg/L	<0.50	N/A	0.50	8916954
Leachable Cobalt (Co)	mg/L	<1.0	N/A	1.0	8916954
Leachable Copper (Cu)	mg/L	<1.0	N/A	1.0	8916954
Leachable Iron (Fe)	mg/L	<1.0	N/A	1.0	8916954
Leachable Lead (Pb)	mg/L	<0.50	N/A	0.50	8916954
Leachable Mercury (Hg)	mg/L	<0.020	N/A	0.020	8916954
Leachable Nickel (Ni)	mg/L	<0.50	N/A	0.50	8916954
Leachable Selenium (Se)	mg/L	<0.10	N/A	0.10	8916954
Leachable Silver (Ag)	mg/L	<0.50	N/A	0.50	8916954
Leachable Thallium (Tl)	mg/L	<0.50	N/A	0.50	8916954
Leachable Uranium (U)	mg/L	<0.20	N/A	0.20	8916954
Leachable Vanadium (V)	mg/L	<1.0	N/A	1.0	8916954
Leachable Zinc (Zn)	mg/L	<1.0	N/A	1.0	8916954
Leachable Zirconium (Zr)	mg/L	<1.0	N/A	1.0	8916954
<b>Volatiles</b>					
Leachable (ZH) Benzene	ug/L	<10	N/A	10	8915056
Leachable (ZH) Toluene	ug/L	<10	N/A	10	8915056
Leachable (ZH) Ethylbenzene	ug/L	<10	N/A	10	8915056
Leachable (ZH) o-Xylene	ug/L	<10	N/A	10	8915056
Leachable (ZH) m & p-Xylene	ug/L	<20	N/A	20	8915056
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### BASIC CLASS II LANDFILL PACKAGE (SOIL)

<b>Maxxam ID</b>		SZ0845			
<b>Sampling Date</b>		2018/02/16			
<b>COC Number</b>		M063635			
	<b>UNITS</b>	<b>BH18-01 (100-150 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
Leachable (ZH) Xylenes (Total)	ug/L	<20	N/A	20	8915056
<b>Surrogate Recovery (%)</b>					
Leachable (ZH) 1,4-Difluorobenzene (sur.)	%	103	N/A	N/A	8915056
Leachable (ZH) 4-Bromofluorobenzene (sur.)	%	98	N/A	N/A	8915056
Leachable (ZH) D4-1,2-Dichloroethane (sur.)	%	106	N/A	N/A	8915056
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					



Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### RESULTS OF CHEMICAL ANALYSES OF SOIL

<b>Maxxam ID</b>		SZ0845		SZ0849		SZ0855			
<b>Sampling Date</b>		2018/02/16		2018/02/16		2018/02/16			
<b>COC Number</b>		M063635		M063635		M063636			
	<b>UNITS</b>	<b>BH18-01 (100-150 CM)</b>	<b>MU</b>	<b>BH18-01 (300-350 CM)</b>	<b>MU</b>	<b>BH18-02 (0-50 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Misc. Inorganics</b>									
Leachable Initial pH of Sample	pH	9.19	+/- 0.195	N/A	N/A	N/A	N/A	N/A	8916154
Leachable pH after HCl	pH	5.29	+/- 0.296	N/A	N/A	N/A	N/A	N/A	8916154
Leachable Final pH of Leachate	pH	5.55	+/- 0.121	N/A	N/A	N/A	N/A	N/A	8916154
<b>Misc. Organics</b>									
Total Petroleum Hydrocarbon	mg/kg	<50	N/A	N/A	N/A	N/A	N/A	50	8915354
<b>Soluble Parameters</b>									
Soluble Chloride (Cl)	mg/L	11	+/- <RDL	N/A	N/A	N/A	N/A	5.0	8916904
Saturation %	%	32	+/- 2.5	N/A	N/A	N/A	N/A	N/A	8915480
<b>Physical Properties</b>									
Sieve - Pan	%	N/A	N/A	11	+/- 1.1	56	+/- 5.7	0.20	8915952
Sieve - #200 (>0.075mm)	%	N/A	N/A	89	+/- 18	44	+/- 8.7	0.20	8915952
Grain Size	%	N/A	N/A	COARSE	N/A	FINE	N/A	0.20	8915952
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable									

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### PHYSICAL TESTING (SOIL)

<b>Maxxam ID</b>		SZ0843			SZ0845			
<b>Sampling Date</b>		2018/02/16			2018/02/16			
<b>COC Number</b>		M063635			M063635			
	<b>UNITS</b>	<b>BH18-01 (0-50 CM)</b>	<b>MU</b>	<b>QC Batch</b>	<b>BH18-01 (100-150 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>								
Moisture	%	25	+/- 1.8	8913526	8.4	+/- 0.66	0.30	8915250
RDL = Reportable Detection Limit								
MU = Measurement Uncertainty								

<b>Maxxam ID</b>		SZ0849		SZ0855		SZ0857			
<b>Sampling Date</b>		2018/02/16		2018/02/16		2018/02/16			
<b>COC Number</b>		M063635		M063636		M063636			
	<b>UNITS</b>	<b>BH18-01 (300-350 CM)</b>	<b>MU</b>	<b>BH18-02 (0-50 CM)</b>	<b>MU</b>	<b>BH18-02 (100-150 CM)</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>									
Moisture	%	4.3	+/- 0.40	32	+/- 2.2	5.5	+/- 0.48	0.30	8913526
RDL = Reportable Detection Limit									
MU = Measurement Uncertainty									

<b>Maxxam ID</b>		SZ0861		SZ0866				
<b>Sampling Date</b>		2018/02/16		2018/02/16				
<b>COC Number</b>		M063636		M063637				
	<b>UNITS</b>	<b>BH18-02 (300-350 CM)</b>	<b>MU</b>	<b>DUP A</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>	
<b>Physical Properties</b>								
Moisture	%	10	+/- 0.77	32	+/- 2.3	0.30	8913526	
RDL = Reportable Detection Limit								
MU = Measurement Uncertainty								

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		SZ0843			SZ0845			
Sampling Date		2018/02/16			2018/02/16			
COC Number		M063635			M063635			
	UNITS	BH18-01 (0-50 CM)	MU	QC Batch	BH18-01 (100-150 CM)	MU	RDL	QC Batch
<b>Polycyclic Aromatics</b>								
Acenaphthene	mg/kg	0.12	+/- 0.021	8913212	<0.0050	N/A	0.0050	8914785
Benzo[a]pyrene equivalency	mg/kg	5.0	N/A	8913486	<0.0071	N/A	0.0071	8913486
Acenaphthylene	mg/kg	0.033	+/- <RDL	8913212	<0.0050	N/A	0.0050	8914785
Acridine	mg/kg	0.069	+/- <RDL	8913212	<0.010	N/A	0.010	8914785
Anthracene	mg/kg	0.59	+/- 0.26	8913212	<0.0040	N/A	0.0040	8914785
Benzo(a)anthracene	mg/kg	3.7	+/- 1.8	8913212	<0.0050	N/A	0.0050	8914785
Benzo(b&j)fluoranthene	mg/kg	4.7	+/- 2.6	8913212	<0.0050	N/A	0.0050	8914785
Benzo(k)fluoranthene	mg/kg	1.6	+/- 0.62	8913212	<0.0050	N/A	0.0050	8914785
Benzo(g,h,i)perylene	mg/kg	1.8	+/- 0.77	8913212	<0.0050	N/A	0.0050	8914785
Benzo(c)phenanthrene	mg/kg	0.52 (1)	+/- 0.068	8913212	<0.0050	N/A	0.0050	8914785
Benzo(a)pyrene	mg/kg	3.2	+/- 1.3	8913212	<0.0050	N/A	0.0050	8914785
Benzo[e]pyrene	mg/kg	2.3	+/- 0.82	8913212	<0.0050	N/A	0.0050	8914785
Chrysene	mg/kg	2.8	+/- 1.2	8913212	<0.0050	N/A	0.0050	8914785
Dibenz(a,h)anthracene	mg/kg	0.54	+/- 0.11	8913212	<0.0050	N/A	0.0050	8914785
Fluoranthene	mg/kg	5.5	+/- 3.2	8913212	<0.0050	N/A	0.0050	8914785
Fluorene	mg/kg	0.13	+/- 0.047	8913212	<0.0050	N/A	0.0050	8914785
Indeno(1,2,3-cd)pyrene	mg/kg	2.3	+/- 1.0	8913212	<0.0050	N/A	0.0050	8914785
1-Methylnaphthalene	mg/kg	0.038	+/- <RDL	8913212	<0.0050	N/A	0.0050	8914785
2-Methylnaphthalene	mg/kg	0.068	+/- 0.030	8913212	<0.0050	N/A	0.0050	8914785
Naphthalene	mg/kg	0.13	+/- 0.048	8913212	<0.0050	N/A	0.0050	8914785
Phenanthrene	mg/kg	2.3	+/- 0.93	8913212	<0.0050	N/A	0.0050	8914785
Perylene	mg/kg	0.65	+/- 0.21	8913212	<0.0050	N/A	0.0050	8914785
Pyrene	mg/kg	4.3	+/- 2.1	8913212	<0.0050	N/A	0.0050	8914785
Quinoline	mg/kg	0.024	+/- <RDL	8913212	<0.010	N/A	0.010	8914785
<b>Surrogate Recovery (%)</b>								
D10-ANTHRACENE (sur.)	%	82	N/A	8913212	96	N/A	N/A	8914785
D8-ACENAPHTHYLENE (sur.)	%	92	N/A	8913212	100	N/A	N/A	8914785
D8-NAPHTHALENE (sur.)	%	80	N/A	8913212	90	N/A	N/A	8914785
TERPHENYL-D14 (sur.)	%	94	N/A	8913212	107	N/A	N/A	8914785
RDL = Reportable Detection Limit								
MU = Measurement Uncertainty								
N/A = Not Applicable								
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.								



Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		SZ0849		SZ0855		SZ0857			
Sampling Date		2018/02/16		2018/02/16		2018/02/16			
COC Number		M063635		M063636		M063636			
	UNITS	BH18-01 (300-350 CM)	MU	BH18-02 (0-50 CM)	MU	BH18-02 (100-150 CM)	MU	RDL	QC Batch

#### Polycyclic Aromatics

Acenaphthene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Benzo[a]pyrene equivalency	mg/kg	<0.0071	N/A	0.16	N/A	<0.0071	N/A	0.0071	8913486
Acenaphthylene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Acridine	mg/kg	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	8913212
Anthracene	mg/kg	<0.0040	N/A	0.011	+/- 0.0050	<0.0040	N/A	0.0040	8913212
Benzo(a)anthracene	mg/kg	<0.0050	N/A	0.10	+/- 0.051	<0.0050	N/A	0.0050	8913212
Benzo(b&j)fluoranthene	mg/kg	<0.0050	N/A	0.16	+/- 0.086	<0.0050	N/A	0.0050	8913212
Benzo(k)fluoranthene	mg/kg	<0.0050	N/A	0.048	+/- 0.019	<0.0050	N/A	0.0050	8913212
Benzo(g,h,i)perylene	mg/kg	<0.0050	N/A	0.058	+/- 0.025	<0.0050	N/A	0.0050	8913212
Benzo(c)phenanthrene	mg/kg	<0.0050	N/A	0.014 (1)	+/- <RDL	<0.0050	N/A	0.0050	8913212
Benzo(a)pyrene	mg/kg	<0.0050	N/A	0.11	+/- 0.043	<0.0050	N/A	0.0050	8913212
Benzo[e]pyrene	mg/kg	<0.0050	N/A	0.070	+/- 0.025	<0.0050	N/A	0.0050	8913212
Chrysene	mg/kg	<0.0050	N/A	0.089	+/- 0.037	<0.0050	N/A	0.0050	8913212
Dibenz(a,h)anthracene	mg/kg	<0.0050	N/A	0.017	+/- <RDL	<0.0050	N/A	0.0050	8913212
Fluoranthene	mg/kg	<0.0050	N/A	0.14	+/- 0.082	0.0058	+/- <RDL	0.0050	8913212
Fluorene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	N/A	0.073	+/- 0.032	<0.0050	N/A	0.0050	8913212
1-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
2-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Naphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Phenanthrene	mg/kg	<0.0050	N/A	0.042	+/- 0.017	<0.0050	N/A	0.0050	8913212
Perylene	mg/kg	<0.0050	N/A	0.017	+/- 0.0057	<0.0050	N/A	0.0050	8913212
Pyrene	mg/kg	<0.0050	N/A	0.12	+/- 0.057	<0.0050	N/A	0.0050	8913212
Quinoline	mg/kg	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	8913212

#### Surrogate Recovery (%)

D10-ANTHRACENE (sur.)	%	93	N/A	89	N/A	88	N/A	N/A	8913212
D8-ACENAPHTHYLENE (sur.)	%	102	N/A	96	N/A	96	N/A	N/A	8913212
D8-NAPHTHALENE (sur.)	%	86	N/A	81	N/A	81	N/A	N/A	8913212
TERPHENYL-D14 (sur.)	%	99	N/A	95	N/A	94	N/A	N/A	8913212

RDL = Reportable Detection Limit

MU = Measurement Uncertainty

N/A = Not Applicable

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		SZ0861		SZ0866			
Sampling Date		2018/02/16		2018/02/16			
COC Number		M063636		M063637			
	UNITS	BH18-02 (300-350 CM)	MU	DUP A	MU	RDL	QC Batch
<b>Polycyclic Aromatics</b>							
Acenaphthene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Benzo[a]pyrene equivalency	mg/kg	<0.0071	N/A	0.17	N/A	0.0071	8913486
Acenaphthylene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Acridine	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8913212
Anthracene	mg/kg	<0.0040	N/A	0.021	+/- 0.0093	0.0040	8913212
Benzo(a)anthracene	mg/kg	<0.0050	N/A	0.13	+/- 0.061	0.0050	8913212
Benzo(b&j)fluoranthene	mg/kg	0.0058	+/- <RDL	0.17	+/- 0.093	0.0050	8913212
Benzo(k)fluoranthene	mg/kg	<0.0050	N/A	0.052	+/- 0.021	0.0050	8913212
Benzo(g,h,i)perylene	mg/kg	<0.0050	N/A	0.065	+/- 0.028	0.0050	8913212
Benzo(c)phenanthrene	mg/kg	<0.0050	N/A	0.017 (1)	+/- <RDL	0.0050	8913212
Benzo(a)pyrene	mg/kg	<0.0050	N/A	0.11	+/- 0.045	0.0050	8913212
Benzo[e]pyrene	mg/kg	<0.0050	N/A	0.078	+/- 0.028	0.0050	8913212
Chrysene	mg/kg	<0.0050	N/A	0.10	+/- 0.043	0.0050	8913212
Dibenz(a,h)anthracene	mg/kg	<0.0050	N/A	0.018	+/- <RDL	0.0050	8913212
Fluoranthene	mg/kg	<0.0050	N/A	0.19	+/- 0.11	0.0050	8913212
Fluorene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0050	N/A	0.073	+/- 0.032	0.0050	8913212
1-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
2-Methylnaphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Naphthalene	mg/kg	<0.0050	N/A	<0.0050	N/A	0.0050	8913212
Phenanthrene	mg/kg	<0.0050	N/A	0.083	+/- 0.033	0.0050	8913212
Perylene	mg/kg	<0.0050	N/A	0.019	+/- 0.0061	0.0050	8913212
Pyrene	mg/kg	<0.0050	N/A	0.15	+/- 0.075	0.0050	8913212
Quinoline	mg/kg	<0.010	N/A	<0.010	N/A	0.010	8913212
<b>Surrogate Recovery (%)</b>							
D10-ANTHRACENE (sur.)	%	92	N/A	86	N/A	N/A	8913212
D8-ACENAPHTHYLENE (sur.)	%	100	N/A	94	N/A	N/A	8913212
D8-NAPHTHALENE (sur.)	%	85	N/A	80	N/A	N/A	8913212
TERPHENYL-D14 (sur.)	%	98	N/A	93	N/A	N/A	8913212
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable (1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.							

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### GENERAL COMMENTS

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

Results relate only to the items tested.



Maxxam Job #: B812095  
Report Date: 2018/02/22

## QUALITY ASSURANCE REPORT

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8913212	D10-ANTHRACENE (sur.)	2018/02/20	77	50 - 130	87	50 - 130	92	%				
8913212	D8-ACENAPHTHYLENE (sur.)	2018/02/20	86	50 - 130	93	50 - 130	95	%				
8913212	D8-NAPHTHALENE (sur.)	2018/02/20	79	50 - 130	85	50 - 130	86	%				
8913212	TERPHENYL-D14 (sur.)	2018/02/20	88	50 - 130	96	50 - 130	100	%				
8914785	D10-ANTHRACENE (sur.)	2018/02/21	93	50 - 130	85	50 - 130	90	%				
8914785	D8-ACENAPHTHYLENE (sur.)	2018/02/21	99	50 - 130	90	50 - 130	93	%				
8914785	D8-NAPHTHALENE (sur.)	2018/02/21	84	50 - 130	82	50 - 130	84	%				
8914785	TERPHENYL-D14 (sur.)	2018/02/21	98	50 - 130	95	50 - 130	99	%				
8915056	Leachable (ZH) 1,4-Difluorobenzene (sur.)	2018/02/21	102	50 - 140	105	50 - 140	102	%				
8915056	Leachable (ZH) 4-Bromofluorobenzene (sur.)	2018/02/21	95	50 - 140	95	50 - 140	97	%				
8915056	Leachable (ZH) D4-1,2-Dichloroethane (sur.)	2018/02/21	108	50 - 140	98	50 - 140	103	%				
8913212	1-Methylnaphthalene	2018/02/20	86	50 - 130	90	50 - 130	<0.0050	mg/kg	NC	50		
8913212	2-Methylnaphthalene	2018/02/20	82	50 - 130	85	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Acenaphthene	2018/02/20	88	50 - 130	93	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Acenaphthylene	2018/02/20	85	50 - 130	89	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Acridine	2018/02/20	55	50 - 130	63	50 - 130	<0.010	mg/kg	NC	50		
8913212	Anthracene	2018/02/20	74	50 - 130	82	50 - 130	<0.0040	mg/kg	NC	50		
8913212	Benzo(a)anthracene	2018/02/20	107	50 - 130	110	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Benzo(a)pyrene	2018/02/20	97	50 - 130	104	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Benzo(b&j)fluoranthene	2018/02/20	101	50 - 130	105	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Benzo(c)phenanthrene	2018/02/20	101	50 - 130	105	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Benzo(g,h,i)perylene	2018/02/20	87	50 - 130	100	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Benzo(k)fluoranthene	2018/02/20	98	50 - 130	104	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Benzo[e]pyrene	2018/02/20	89	50 - 130	96	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Chrysene	2018/02/20	94	50 - 130	104	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Dibenz(a,h)anthracene	2018/02/20	100	50 - 130	110	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Fluoranthene	2018/02/20	91	50 - 130	95	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Fluorene	2018/02/20	93	50 - 130	98	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Indeno(1,2,3-cd)pyrene	2018/02/20	103	50 - 130	108	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Naphthalene	2018/02/20	79	50 - 130	83	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Perylene	2018/02/20	75	50 - 130	85	50 - 130	<0.0050	mg/kg	NC	50		

Maxxam Job #: B812095  
Report Date: 2018/02/22

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8913212	Phenanthrene	2018/02/20	85	50 - 130	91	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Pyrene	2018/02/20	89	50 - 130	94	50 - 130	<0.0050	mg/kg	NC	50		
8913212	Quinoline	2018/02/20	109	50 - 130	103	50 - 130	<0.010	mg/kg	NC	50		
8913526	Moisture	2018/02/18					<0.30	%	0.11	20		
8914401	Saturation %	2018/02/21							2.7	12	103	75 - 125
8914785	1-Methylnaphthalene	2018/02/22	NC	50 - 130	88	50 - 130	<0.0050	mg/kg	27	50		
8914785	2-Methylnaphthalene	2018/02/22	NC	50 - 130	83	50 - 130	<0.0050	mg/kg	41	50		
8914785	Acenaphthene	2018/02/22	100	50 - 130	91	50 - 130	<0.0050	mg/kg	15	50		
8914785	Acenaphthylene	2018/02/22	100	50 - 130	87	50 - 130	<0.0050	mg/kg	26	50		
8914785	Acridine	2018/02/22	NC	50 - 130	60	50 - 130	<0.010	mg/kg	17	50		
8914785	Anthracene	2018/02/22	85	50 - 130	80	50 - 130	<0.0040	mg/kg	2.2	50		
8914785	Benzo(a)anthracene	2018/02/22	118	50 - 130	109	50 - 130	<0.0050	mg/kg	18	50		
8914785	Benzo(a)pyrene	2018/02/22	116	50 - 130	106	50 - 130	<0.0050	mg/kg	23	50		
8914785	Benzo(b&j)fluoranthene	2018/02/22	108	50 - 130	105	50 - 130	<0.0050	mg/kg	22	50		
8914785	Benzo(c)phenanthrene	2018/02/22	108	50 - 130	103	50 - 130	<0.0050	mg/kg	13	50		
8914785	Benzo(g,h,i)perylene	2018/02/22	96	50 - 130	101	50 - 130	<0.0050	mg/kg	18	50		
8914785	Benzo(k)fluoranthene	2018/02/22	99	50 - 130	104	50 - 130	<0.0050	mg/kg	NC	50		
8914785	Benzo[e]pyrene	2018/02/22	100	50 - 130	96	50 - 130	<0.0050	mg/kg	23	50		
8914785	Chrysene	2018/02/22	100	50 - 130	102	50 - 130	<0.0050	mg/kg	10	50		
8914785	Dibenz(a,h)anthracene	2018/02/22	108	50 - 130	110	50 - 130	<0.0050	mg/kg	25	50		
8914785	Fluoranthene	2018/02/22	107	50 - 130	98	50 - 130	<0.0050	mg/kg	9.5	50		
8914785	Fluorene	2018/02/22	121	50 - 130	96	50 - 130	<0.0050	mg/kg	15	50		
8914785	Indeno(1,2,3-cd)pyrene	2018/02/22	121	50 - 130	107	50 - 130	<0.0050	mg/kg	17	50		
8914785	Naphthalene	2018/02/22	NC	50 - 130	81	50 - 130	<0.0050	mg/kg	16	50		
8914785	Perylene	2018/02/22	86	50 - 130	85	50 - 130	<0.0050	mg/kg	14	50		
8914785	Phenanthrene	2018/02/22	NC	50 - 130	89	50 - 130	<0.0050	mg/kg	17	50		
8914785	Pyrene	2018/02/22	102	50 - 130	97	50 - 130	<0.0050	mg/kg	16	50		
8914785	Quinoline	2018/02/22	83	50 - 130	106	50 - 130	<0.010	mg/kg	6.5	50		
8914929	Closed Cup Flash Point	2018/02/20							NC	35		
8914932	Free Liquid	2018/02/20							NC	25		
8915056	Leachable (ZH) Benzene	2018/02/21	83	70 - 130	87	70 - 130	<10	ug/L	NC	30		

Maxxam Job #: B812095  
Report Date: 2018/02/22

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8915056	Leachable (ZH) Ethylbenzene	2018/02/21	81	70 - 130	89	70 - 130	<10	ug/L	NC	30		
8915056	Leachable (ZH) m & p-Xylene	2018/02/21	80	70 - 130	88	70 - 130	<20	ug/L	NC	30		
8915056	Leachable (ZH) o-Xylene	2018/02/21	83	70 - 130	91	70 - 130	<10	ug/L	NC	30		
8915056	Leachable (ZH) Toluene	2018/02/21	84	70 - 130	90	70 - 130	<10	ug/L	NC	30		
8915056	Leachable (ZH) Xylenes (Total)	2018/02/21					<20	ug/L	NC	30		
8915250	Moisture	2018/02/21					<0.30	%	2.5	20		
8915354	Total Petroleum Hydrocarbon	2018/02/22	97	70 - 130	93	70 - 130	<50	mg/kg	NC	50	89	47 - 135
8915480	Saturation %	2018/02/21							5.0	12	98	75 - 125
8915808	Hex. Chromium (Cr 6+)	2018/02/21	100	75 - 125	101	80 - 120	<0.080	mg/kg	NC	35		
8915851	Soluble Boron (B)	2018/02/21	95	75 - 125	96	80 - 120	<0.10	mg/L				
8915894	Total Antimony (Sb)	2018/02/22	79	75 - 125	92	80 - 120	<0.50	mg/kg	NC	30		
8915894	Total Arsenic (As)	2018/02/22	86	75 - 125	95	80 - 120	<1.0	mg/kg	0.84	30	102	53 - 147
8915894	Total Barium (Ba)	2018/02/22	NC	75 - 125	93	80 - 120	<1.0	mg/kg	7.0	35	97	80 - 119
8915894	Total Beryllium (Be)	2018/02/22	81	75 - 125	91	80 - 120	<0.40	mg/kg	NC	30		
8915894	Total Cadmium (Cd)	2018/02/22	85	75 - 125	94	80 - 120	<0.050	mg/kg	3.0	30		
8915894	Total Chromium (Cr)	2018/02/22	102	75 - 125	95	80 - 120	<1.0	mg/kg	3.2	30	97	59 - 141
8915894	Total Cobalt (Co)	2018/02/22	86	75 - 125	97	80 - 120	<0.50	mg/kg	4.1	30	96	58 - 142
8915894	Total Copper (Cu)	2018/02/22	85	75 - 125	95	80 - 120	<1.0	mg/kg	2.9	30	97	83 - 117
8915894	Total Lead (Pb)	2018/02/22	87	75 - 125	98	80 - 120	<0.50	mg/kg	1.1	35	111	79 - 121
8915894	Total Mercury (Hg)	2018/02/22	81	75 - 125	90	80 - 120	<0.050	mg/kg	6.9	35		
8915894	Total Molybdenum (Mo)	2018/02/22	89	75 - 125	97	80 - 120	<0.40	mg/kg	6.1	35		
8915894	Total Nickel (Ni)	2018/02/22	84	75 - 125	93	80 - 120	<1.0	mg/kg	7.1	30	103	79 - 121
8915894	Total Selenium (Se)	2018/02/22	85	75 - 125	97	80 - 120	<0.50	mg/kg	NC	30		
8915894	Total Silver (Ag)	2018/02/22	86	75 - 125	95	80 - 120	<0.20	mg/kg	NC	35		
8915894	Total Thallium (Tl)	2018/02/22	88	75 - 125	100	80 - 120	<0.10	mg/kg	9.1	30		
8915894	Total Tin (Sn)	2018/02/22	89	75 - 125	96	80 - 120	<1.0	mg/kg	0.58	35		
8915894	Total Uranium (U)	2018/02/22	90	75 - 125	99	80 - 120	<0.20	mg/kg	11	30		
8915894	Total Vanadium (V)	2018/02/22	116	75 - 125	95	80 - 120	<1.0	mg/kg	9.3	30	103	79 - 121
8915894	Total Zinc (Zn)	2018/02/22	NC	75 - 125	93	80 - 120	<10	mg/kg	5.5	30	100	79 - 121
8915952	Sieve - #200 (>0.075mm)	2018/02/22							6.2	30	102	75 - 125
8915952	Sieve - Pan	2018/02/22							0.92	30	99	75 - 125



Maxxam Job #: B812095  
Report Date: 2018/02/22

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8916154	Leachable Final pH of Leachate	2018/02/22			100	97 - 103			0.16	N/A		
8916154	Leachable Initial pH of Sample	2018/02/22			100	97 - 103			0.11	N/A		
8916154	Leachable pH after HCl	2018/02/22			100	97 - 103			4.6	N/A		
8916727	Soluble (1:1) pH	2018/02/22			100	97 - 103			2.8	N/A	99	98 - 102
8916904	Soluble Chloride (Cl)	2018/02/22	104	75 - 125	99	80 - 120	<5.0	mg/L	NC	30	100	75 - 125
8916954	Leachable Antimony (Sb)	2018/02/22	95	75 - 125	93	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Arsenic (As)	2018/02/22	97	75 - 125	93	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Barium (Ba)	2018/02/22	95	75 - 125	93	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Beryllium (Be)	2018/02/22	86	75 - 125	85	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Boron (B)	2018/02/22	81	75 - 125	83	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Cadmium (Cd)	2018/02/22	98	75 - 125	93	80 - 120	<0.10	mg/L	NC	35		
8916954	Leachable Chromium (Cr)	2018/02/22	98	75 - 125	92	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Cobalt (Co)	2018/02/22	97	75 - 125	94	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Copper (Cu)	2018/02/22	94	75 - 125	92	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Iron (Fe)	2018/02/22	93	75 - 125	98	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Lead (Pb)	2018/02/22	97	75 - 125	95	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Mercury (Hg)	2018/02/22	91	75 - 125	84	80 - 120	<0.020	mg/L	NC	35		
8916954	Leachable Nickel (Ni)	2018/02/22	93	75 - 125	91	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Selenium (Se)	2018/02/22	96	75 - 125	94	80 - 120	<0.10	mg/L	NC	35		
8916954	Leachable Silver (Ag)	2018/02/22	97	75 - 125	92	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Thallium (Tl)	2018/02/22	99	75 - 125	96	80 - 120	<0.50	mg/L	NC	35		
8916954	Leachable Uranium (U)	2018/02/22	98	75 - 125	96	80 - 120	<0.20	mg/L	NC	35		
8916954	Leachable Vanadium (V)	2018/02/22	100	75 - 125	95	80 - 120	<1.0	mg/L	NC	35		
8916954	Leachable Zinc (Zn)	2018/02/22	93	75 - 125	93	80 - 120	<1.0	mg/L	NC	35		

Maxxam Job #: B812095  
Report Date: 2018/02/22

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8916954	Leachable Zirconium (Zr)	2018/02/22	114	75 - 125	106	80 - 120	<1.0	mg/L	NC	35		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

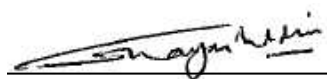
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference  $\leq 2 \times \text{RDL}$ ).

Maxxam Job #: B812095  
Report Date: 2018/02/22

McElhanney Consulting Services Ltd.  
Client Project #: 2531-13507-00  
Sampler Initials: JAB

### VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics



Rahul Suryawanshi, Organics – Senior Analyst



Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company: #12506 McElhannay	Company: MCSL	Quotation #:	<input type="checkbox"/> 5 - 7 Days Regular (Most analyses)				
Contact Name: Amanda Pearson	Contact Name: Amanda Pearson	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS				
Address: 500 999 8th Ave SE	Address:	Project #: 2531-13507-00	Rush TAT (Surcharges will be applied)				
SW Calgary AB		Site Location:	<input type="checkbox"/> Same Day <input checked="" type="checkbox"/> 2 Days				
Phone: 403-262-8442	Phone: 403-815-7644	Site #:	<input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days				
Email: apearson@mcelhannay.ca	Email:	Sampled By: JAB	Date Required:				
Copies:	Copies:		Rush Confirmation #:				

Laboratory Use Only				Analysis Requested														Regulatory Criteria							
Seal Present	YES	NO	Cooler ID	Depot Reception				BTEX F1	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals	Mercury	Total	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PAHs	ATI Metals	HOLD - DO NOT ANALYZE	<input checked="" type="checkbox"/> AT1			
Seal Intact			Temp																			<input type="checkbox"/> VOC	<input type="checkbox"/> Diss	<input type="checkbox"/> Dissolved	<input type="checkbox"/> Drinking Water
Cooling Media																									<input type="checkbox"/> D50 (Drilling Waste)
																									<input type="checkbox"/> Saskatchewan
Seal Present	YES	NO	Cooler ID																			<input type="checkbox"/> Other:			
Seal Intact			Temp																						
Cooling Media																									

Sample Identification		Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	Analysis Requested														Regulatory Criteria	
1	BH18-01	0-50	18/2/16	PM 5:13	3																	
2		50-100			2																	
3		100-150			3																	
4		150-200			2																	
5		200-250			3																	
6		250-300			2																	
7		300-350			3																	
8		350-400			2																	
9		400-450			2																	
10		450-500			3																	

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
Jeff Brown	18/2/17	10:33	Kate Lovett	2018/02/17	10:35	8812095

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company: _____		Company: _____		Quotation #: _____		<input type="checkbox"/> 5 - 7 Days Regular (Most analyses)	
Contact Name: _____		Contact Name: _____		P.O. #/ AFE#: _____		<b>PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS</b>	
Address: _____		Address: _____		Project #: _____		<b>Rush TAT (Surcharges will be applied)</b> <input type="checkbox"/> Same Day <input checked="" type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days	
Phone: _____		Phone: _____		Site Location: _____		Date Required: _____	
Email: _____		Email: _____		Site #: _____		Rush Confirmation #: _____	
Copies: _____		Copies: _____		Sampled By: _____			

Laboratory Use Only				Analysis Requested														Regulatory Criteria					
Seal Present	YES	NO	Cooler ID	Depot Reception				BTEX F1	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals	Total	Mercury	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PAHs	Metals AT1	HOLD - DO NOT ANALYZE	<input checked="" type="checkbox"/> AT1 <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Drinking Water <input type="checkbox"/> D50 (Drilling Waste) <input type="checkbox"/> Saskatchewan <input type="checkbox"/> Other:	
Seal Intact			Temp																				
Cooling Media																							
Seal Present	YES	NO	Cooler ID					# of containers	BTEX F1	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals	Total	Mercury	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PAHs	Metals AT1	HOLD - DO NOT ANALYZE	Special Instructions
Seal Intact			Temp																				
Cooling Media																							
Seal Present	YES	NO	Cooler ID					# of containers	BTEX F1	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals	Total	Mercury	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PAHs	Metals AT1	HOLD - DO NOT ANALYZE	Special Instructions
Seal Intact			Temp																				
Cooling Media																							

Sample Identification		Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# of containers	BTEX F1	BTEX F1-F2	BTEX F1-F4	Routine Water	Regulated Metals	Total	Mercury	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	PAHs	Metals AT1	HOLD - DO NOT ANALYZE	Special Instructions
1	BH18-01	500-550	18/12/16	4 PM	Soil	2															X
2	"	550-600		↓		2															X
3	BH18-02	0-50		AM		3									X			XX			
4		50-100				2															X
5		100-150				2												X			
6		150-200				2															X
7		200-250				2															X
8		250-300				2															X
9		300-350				2												X			
10		350-400				2															X

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Maxxam Job #
<i>[Signature]</i> Jeff Brown	18/12/17	10:33	<i>[Signature]</i> Kate Lovett	2018/02/17	10:35	8812095



AB FCD-00331/7



Your Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Your C.O.C. #: M091496

**Attention: AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
500, 999 8 Street SW  
Calgary, AB  
Canada T2R1J5

**Report Date: 2018/06/06**

Report #: R2565269

Version: 1 - Final

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B841800**

**Received: 2018/05/30, 16:37**

Sample Matrix: Water  
# Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO <sub>3</sub> ,HCO <sub>3</sub> ,OH	3	N/A	2018/06/03	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	3	N/A	2018/06/05	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	3	N/A	2018/06/05	AB SOP-00039	Auto Calc
Cadmium - low level CCME - Dissolved	3	N/A	2018/06/03	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	3	N/A	2018/06/05	AB SOP-00020	SM 22-4500-Cl-E m
Conductivity @25C	3	N/A	2018/06/03	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1)	3	2018/06/04	2018/06/04	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Hardness	3	N/A	2018/06/04	AB WI-00065	Auto Calc
Elements by ICP-Dissolved-Lab Filtered (2)	3	N/A	2018/06/02	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS-Dissolved-Lab Filtered (2)	3	N/A	2018/06/02	AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	3	N/A	2018/06/03	AB WI-00065	Auto Calc
Sum of cations, anions	3	N/A	2018/06/04	AB WI-00065	Auto Calc
Nitrate and Nitrite	3	N/A	2018/06/05	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	3	N/A	2018/06/05	AB WI-00065	Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	3	N/A	2018/06/02	AB SOP-00023	SM 23 4110 B m
Benzo[a]pyrene Equivalency (3)	3	N/A	2018/06/05	AB SOP-00003	Auto Calc
PAH in Water by GC/MS	3	2018/06/04	2018/06/05	AB SOP-00037 / AB SOP-00003	EPA 3510C/8270E m
pH @25°C (4)	3	N/A	2018/06/03	AB SOP-00005	SM 22 4500-H+B m
Sulphate by Automated Colourimetry	3	N/A	2018/06/05	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	3	N/A	2018/06/06	AB WI-00065	Auto Calc

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Your Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Your C.O.C. #: M091496

**Attention: AMANDA PEARDON**

McElhanney Consulting Services Ltd.  
500, 999 8 Street SW  
Calgary, AB  
Canada T2R1J5

**Report Date: 2018/06/06**

Report #: R2565269

Version: 1 - Final

## **CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B841800**

**Received: 2018/05/30, 16:37**

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Silica gel clean up employed.

(2) Samples were filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling. Dissolved > Total Imbalance: Whenever applicable, Dissolved > Total for any parameter that falls within method uncertainty for duplicates is likely equivalent. If RPD is >20% samples were reanalyzed and confirmed.

(3) B[a]P TPE is calculated using 1/2 of the RDL for non detect results as per Alberta Environment instructions. This protocol may not apply in other jurisdictions.

(4) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Maxxam endeavours to analyze samples as soon as possible after receipt.

## **Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Leanne Cameron, C.E.T., Senior Project Manager

Email: LCameron@maxxam.ca

Phone# (403) 291-3077

=====

This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### AT1 BTEX AND F1-F2 IN WATER (WATER)

Maxxam ID		TN6107		TN6108		TN6109			
Sampling Date		2018/05/30 14:00		2018/05/30 14:15		2018/05/30 14:30			
COC Number		M091496		M091496		M091496			
	UNITS	MW18-01	MU	MW17-18	MU	TRIP BLANK	MU	RDL	QC Batch
<b>Ext. Pet. Hydrocarbon</b>									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9008349
<b>Volatiles</b>									
Benzene	ug/L	<0.40	N/A	<0.40	N/A	<0.40	N/A	0.40	9007505
Toluene	ug/L	<0.40	N/A	<0.40	N/A	<0.40	N/A	0.40	9007505
Ethylbenzene	ug/L	<0.40	N/A	<0.40	N/A	<0.40	N/A	0.40	9007505
m & p-Xylene	ug/L	<0.80	N/A	<0.80	N/A	<0.80	N/A	0.80	9007505
o-Xylene	ug/L	<0.40	N/A	<0.40	N/A	<0.40	N/A	0.40	9007505
Xylenes (Total)	ug/L	<0.89	N/A	<0.89	N/A	<0.89	N/A	0.89	9006995
F1 (C6-C10) - BTEX	ug/L	<100	N/A	<100	N/A	<100	N/A	100	9006995
F1 (C6-C10)	ug/L	<100	N/A	<100	N/A	<100	N/A	100	9007505
<b>Surrogate Recovery (%)</b>									
1,4-Difluorobenzene (sur.)	%	100	N/A	98	N/A	107	N/A	N/A	9007505
4-Bromofluorobenzene (sur.)	%	96	N/A	98	N/A	86	N/A	N/A	9007505
D4-1,2-Dichloroethane (sur.)	%	96	N/A	105	N/A	111	N/A	N/A	9007505
O-TERPHENYL (sur.)	%	93	N/A	98	N/A	94	N/A	N/A	9008349
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable									



Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### ROUTINE + DISS. REG. METALS – LAB FILT (WATER)

Maxxam ID		TN6107		TN6108			
Sampling Date		2018/05/30 14:00		2018/05/30 14:15			
COC Number		M091496		M091496			
	UNITS	MW18-01	MU	MW17-18	MU	RDL	QC Batch
<b>Calculated Parameters</b>							
Anion Sum	meq/L	18	N/A	18	N/A	N/A	9006950
Cation Sum	meq/L	19	N/A	20	N/A	N/A	9006950
Hardness (CaCO <sub>3</sub> )	mg/L	890	N/A	910	N/A	0.50	9007078
Ion Balance (% Difference)	%	3.8	N/A	4.6	N/A	N/A	9007050
Dissolved Nitrate (NO <sub>3</sub> )	mg/L	0.12	N/A	0.16	N/A	0.044	9007053
Nitrate plus Nitrite (N)	mg/L	0.028	N/A	0.035	N/A	0.014	9007055
Dissolved Nitrite (NO <sub>2</sub> )	mg/L	<0.033	N/A	<0.033	N/A	0.033	9007053
Calculated Total Dissolved Solids	mg/L	1100	N/A	1100	N/A	10	9007086
<b>Misc. Inorganics</b>							
Conductivity	uS/cm	1500	+/- 39	1500	+/- 39	2.0	9011014
pH	pH	7.67	+/- 0.0760	7.67	+/- 0.0760	N/A	9011007
<b>Low Level Elements</b>							
Dissolved Cadmium (Cd)	ug/L	0.13	+/- 0.054	0.13	+/- 0.055	0.020	9006922
<b>Anions</b>							
Alkalinity (PP as CaCO <sub>3</sub> )	mg/L	<1.0	N/A	<1.0	N/A	1.0	9011004
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	360	+/- 27	360	+/- 27	1.0	9011004
Bicarbonate (HCO <sub>3</sub> )	mg/L	440	+/- 6.8	440	+/- 6.8	1.0	9011004
Carbonate (CO <sub>3</sub> )	mg/L	<1.0	N/A	<1.0	N/A	1.0	9011004
Hydroxide (OH)	mg/L	<1.0	N/A	<1.0	N/A	1.0	9011004
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	460 (1)	+/- 40	470 (1)	+/- 41	5.0	9013600
Dissolved Chloride (Cl)	mg/L	33	+/- 2.3	33	+/- 2.3	1.0	9013598
<b>Nutrients</b>							
Dissolved Nitrite (N)	mg/L	<0.010	N/A	<0.010	N/A	0.010	9009728
Dissolved Nitrate (N)	mg/L	0.028	+/- <RDL	0.035	+/- <RDL	0.010	9009728
<b>Lab Filtered Elements</b>							
Dissolved Aluminum (Al)	mg/L	<0.0030	N/A	<0.0030	N/A	0.0030	9010307
Dissolved Antimony (Sb)	mg/L	<0.00060	N/A	<0.00060	N/A	0.00060	9010307
Dissolved Arsenic (As)	mg/L	0.00039	+/- <RDL	0.00038	+/- <RDL	0.00020	9010307
Dissolved Barium (Ba)	mg/L	0.076	+/- <RDL	0.078	+/- <RDL	0.010	9010549
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### ROUTINE + DISS. REG. METALS – LAB FILT (WATER)

Maxxam ID		TN6107		TN6108			
Sampling Date		2018/05/30 14:00		2018/05/30 14:15			
COC Number		M091496		M091496			
	UNITS	MW18-01	MU	MW17-18	MU	RDL	QC Batch
Dissolved Beryllium (Be)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9010307
Dissolved Boron (B)	mg/L	0.24	+/- 0.024	0.24	+/- 0.025	0.020	9010549
Dissolved Calcium (Ca)	mg/L	260	+/- 27	270	+/- 27	0.30	9010549
Dissolved Chromium (Cr)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9010307
Dissolved Cobalt (Co)	mg/L	0.0023	+/- <RDL	0.0023	+/- <RDL	0.00030	9010307
Dissolved Copper (Cu)	mg/L	0.00053	+/- 0.00022	0.00058	+/- 0.00022	0.00020	9010307
Dissolved Iron (Fe)	mg/L	<0.060	N/A	<0.060	N/A	0.060	9010549
Dissolved Lead (Pb)	mg/L	<0.00020	N/A	<0.00020	N/A	0.00020	9010307
Dissolved Lithium (Li)	mg/L	<0.020	N/A	<0.020	N/A	0.020	9010549
Dissolved Magnesium (Mg)	mg/L	56	+/- 3.6	57	+/- 3.7	0.20	9010549
Dissolved Manganese (Mn)	mg/L	1.2	+/- 0.078	1.2	+/- 0.080	0.0040	9010549
Dissolved Molybdenum (Mo)	mg/L	0.0042	+/- 0.0010	0.0043	+/- 0.0011	0.00020	9010307
Dissolved Nickel (Ni)	mg/L	0.0077	+/- 0.00066	0.0077	+/- 0.00066	0.00050	9010307
Dissolved Phosphorus (P)	mg/L	<0.10	N/A	<0.10	N/A	0.10	9010549
Dissolved Potassium (K)	mg/L	4.8	+/- <RDL	4.9	+/- <RDL	0.30	9010549
Dissolved Selenium (Se)	mg/L	0.00071	+/- <RDL	0.00080	+/- <RDL	0.00020	9010307
Dissolved Silicon (Si)	mg/L	5.5	+/- 1.0	5.6	+/- 1.1	0.10	9010549
Dissolved Silver (Ag)	mg/L	<0.00010	N/A	<0.00010	N/A	0.00010	9010307
Dissolved Sodium (Na)	mg/L	27	+/- 2.7	27	+/- 2.7	0.50	9010549
Dissolved Strontium (Sr)	mg/L	0.98	+/- 0.096	1.0	+/- 0.098	0.020	9010549
Dissolved Sulphur (S)	mg/L	140	+/- 9.6	140	+/- 9.6	0.20	9010549
Dissolved Thallium (Tl)	mg/L	<0.00020	N/A	<0.00020	N/A	0.00020	9010307
Dissolved Tin (Sn)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9010307
Dissolved Titanium (Ti)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9010307
Dissolved Uranium (U)	mg/L	0.012	+/- 0.0011	0.012	+/- 0.0011	0.00010	9010307
Dissolved Vanadium (V)	mg/L	<0.0010	N/A	<0.0010	N/A	0.0010	9010307
Dissolved Zinc (Zn)	mg/L	0.013	+/- <RDL	0.013	+/- <RDL	0.0030	9010307
RDL = Reportable Detection Limit							
MU = Measurement Uncertainty							
N/A = Not Applicable							

Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### ROUTINE + DISS. REG. METALS – LAB FILT (WATER)

<b>Maxxam ID</b>		TN6109			
<b>Sampling Date</b>		2018/05/30 14:30			
<b>COC Number</b>		M091496			
	<b>UNITS</b>	<b>TRIP BLANK</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Anion Sum	meq/L	0.0000	N/A	N/A	9007080
Cation Sum	meq/L	0.0020	N/A	N/A	9007080
Hardness (CaCO <sub>3</sub> )	mg/L	<0.50	N/A	0.50	9007078
Ion Balance (% Difference)	%	NC	N/A	N/A	9007050
Dissolved Nitrate (NO <sub>3</sub> )	mg/L	<0.044	N/A	0.044	9007053
Nitrate plus Nitrite (N)	mg/L	<0.014	N/A	0.014	9007055
Dissolved Nitrite (NO <sub>2</sub> )	mg/L	<0.033	N/A	0.033	9007053
Calculated Total Dissolved Solids	mg/L	<10	N/A	10	9007086
<b>Misc. Inorganics</b>					
Conductivity	uS/cm	2.2	+/- <RDL	2.0	9010997
pH	pH	5.70	+/- 0.0565	N/A	9010996
<b>Low Level Elements</b>					
Dissolved Cadmium (Cd)	ug/L	<0.020	N/A	0.020	9006922
<b>Anions</b>					
Alkalinity (PP as CaCO <sub>3</sub> )	mg/L	<1.0	N/A	1.0	9010994
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	<1.0	N/A	1.0	9010994
Bicarbonate (HCO <sub>3</sub> )	mg/L	<1.0	N/A	1.0	9010994
Carbonate (CO <sub>3</sub> )	mg/L	<1.0	N/A	1.0	9010994
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	9010994
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	<1.0	N/A	1.0	9013600
Dissolved Chloride (Cl)	mg/L	<1.0	N/A	1.0	9013598
<b>Nutrients</b>					
Dissolved Nitrite (N)	mg/L	<0.010	N/A	0.010	9009728
Dissolved Nitrate (N)	mg/L	<0.010	N/A	0.010	9009728
<b>Lab Filtered Elements</b>					
Dissolved Aluminum (Al)	mg/L	<0.0030	N/A	0.0030	9010307
Dissolved Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	9010307
Dissolved Arsenic (As)	mg/L	<0.00020	N/A	0.00020	9010307
Dissolved Barium (Ba)	mg/L	<0.010	N/A	0.010	9010549
Dissolved Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	9010307
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					



Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### ROUTINE + DISS. REG. METALS – LAB FILT (WATER)

<b>Maxxam ID</b>		TN6109			
<b>Sampling Date</b>		2018/05/30 14:30			
<b>COC Number</b>		M091496			
	<b>UNITS</b>	<b>TRIP BLANK</b>	<b>MU</b>	<b>RDL</b>	<b>QC Batch</b>
Dissolved Boron (B)	mg/L	<0.020	N/A	0.020	9010549
Dissolved Calcium (Ca)	mg/L	<0.30	N/A	0.30	9010549
Dissolved Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	9010307
Dissolved Cobalt (Co)	mg/L	<0.00030	N/A	0.00030	9010307
Dissolved Copper (Cu)	mg/L	<0.00020	N/A	0.00020	9010307
Dissolved Iron (Fe)	mg/L	<0.060	N/A	0.060	9010549
Dissolved Lead (Pb)	mg/L	<0.00020	N/A	0.00020	9010307
Dissolved Lithium (Li)	mg/L	<0.020	N/A	0.020	9010549
Dissolved Magnesium (Mg)	mg/L	<0.20	N/A	0.20	9010549
Dissolved Manganese (Mn)	mg/L	<0.0040	N/A	0.0040	9010549
Dissolved Molybdenum (Mo)	mg/L	<0.00020	N/A	0.00020	9010307
Dissolved Nickel (Ni)	mg/L	<0.00050	N/A	0.00050	9010307
Dissolved Phosphorus (P)	mg/L	<0.10	N/A	0.10	9010549
Dissolved Potassium (K)	mg/L	<0.30	N/A	0.30	9010549
Dissolved Selenium (Se)	mg/L	<0.00020	N/A	0.00020	9010307
Dissolved Silicon (Si)	mg/L	<0.10	N/A	0.10	9010549
Dissolved Silver (Ag)	mg/L	<0.00010	N/A	0.00010	9010307
Dissolved Sodium (Na)	mg/L	<0.50	N/A	0.50	9010549
Dissolved Strontium (Sr)	mg/L	<0.020	N/A	0.020	9010549
Dissolved Sulphur (S)	mg/L	<0.20	N/A	0.20	9010549
Dissolved Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	9010307
Dissolved Tin (Sn)	mg/L	<0.0010	N/A	0.0010	9010307
Dissolved Titanium (Ti)	mg/L	<0.0010	N/A	0.0010	9010307
Dissolved Uranium (U)	mg/L	<0.00010	N/A	0.00010	9010307
Dissolved Vanadium (V)	mg/L	<0.0010	N/A	0.0010	9010307
Dissolved Zinc (Zn)	mg/L	<0.0030	N/A	0.0030	9010307
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable					

Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		TN6107		TN6108		TN6109			
Sampling Date		2018/05/30 14:00		2018/05/30 14:15		2018/05/30 14:30			
COC Number		M091496		M091496		M091496			
	UNITS	MW18-01	MU	MW17-18	MU	TRIP BLANK	MU	RDL	QC Batch
<b>Polycyclic Aromatics</b>									
Benzo[a]pyrene equivalency	ug/L	0.025	N/A	0.019	N/A	<0.010	N/A	0.010	9007038
Acenaphthene	ug/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9008342
Acenaphthylene	ug/L	<0.10	N/A	<0.10	N/A	<0.10	N/A	0.10	9008342
Acridine	ug/L	<0.050	N/A	<0.050	N/A	<0.050	N/A	0.050	9008342
Anthracene	ug/L	<0.010	N/A	<0.010	N/A	<0.010	N/A	0.010	9008342
Benzo(a)anthracene	ug/L	0.013	+/- <RDL	0.0086	+/- <RDL	<0.0085	N/A	0.0085	9008342
Benzo(b&j)fluoranthene	ug/L	0.021	+/- 0.011	0.014	+/- 0.0086	<0.0085	N/A	0.0085	9008342
Benzo(k)fluoranthene	ug/L	<0.0085	N/A	<0.0085	N/A	<0.0085	N/A	0.0085	9008342
Benzo(g,h,i)perylene	ug/L	<0.0085	N/A	<0.0085	N/A	<0.0085	N/A	0.0085	9008342
Benzo(c)phenanthrene	ug/L	<0.050	N/A	<0.050	N/A	<0.050	N/A	0.050	9008342
Benzo(a)pyrene	ug/L	0.017	+/- 0.0081	0.012	+/- <RDL	<0.0075	N/A	0.0075	9008342
Benzo[e]pyrene	ug/L	<0.050	N/A	<0.050	N/A	<0.050	N/A	0.050	9008342
Chrysene	ug/L	0.015	+/- <RDL	0.013	+/- <RDL	<0.0085	N/A	0.0085	9008342
Dibenz(a,h)anthracene	ug/L	<0.0075	N/A	<0.0075	N/A	<0.0075	N/A	0.0075	9008342
Fluoranthene	ug/L	0.032	+/- 0.013	0.034	+/- 0.014	<0.010	N/A	0.010	9008342
Fluorene	ug/L	<0.050	N/A	0.054	+/- <RDL	<0.050	N/A	0.050	9008342
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	N/A	<0.0085	N/A	<0.0085	N/A	0.0085	9008342
1-Methylnaphthalene	ug/L	0.30	+/- <RDL	0.22	+/- <RDL	<0.10	N/A	0.10	9008342
2-Methylnaphthalene	ug/L	0.73	+/- 0.23	0.56	+/- 0.18	<0.10	N/A	0.10	9008342
Naphthalene	ug/L	0.69	+/- 0.48	0.47	+/- 0.47	<0.10	N/A	0.10	9008342
Phenanthrene	ug/L	0.13	+/- 0.051	0.20	+/- 0.070	<0.050	N/A	0.050	9008342
Perylene	ug/L	<0.050	N/A	<0.050	N/A	<0.050	N/A	0.050	9008342
Pyrene	ug/L	0.030	+/- <RDL	0.031	+/- <RDL	<0.020	N/A	0.020	9008342
Quinoline	ug/L	<0.20	N/A	<0.20	N/A	<0.20	N/A	0.20	9008342
<b>Surrogate Recovery (%)</b>									
D10-ANTHRACENE (sur.)	%	102	N/A	108	N/A	108	N/A	N/A	9008342
D8-ACENAPHTHYLENE (sur.)	%	92	N/A	99	N/A	92	N/A	N/A	9008342
D8-NAPHTHALENE (sur.)	%	79	N/A	81	N/A	70	N/A	N/A	9008342
TERPHENYL-D14 (sur.)	%	110	N/A	127	N/A	107	N/A	N/A	9008342
RDL = Reportable Detection Limit MU = Measurement Uncertainty N/A = Not Applicable									

Maxxam Job #: B841800  
Report Date: 2018/06/06

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### GENERAL COMMENTS

The estimate of uncertainty has been reported as an expanded uncertainty and calculated using a coverage factor of 2, which gives a level of confidence of 95%.

Results relate only to the items tested.



Maxxam Job #: B841800  
Report Date: 2018/06/06

## QUALITY ASSURANCE REPORT

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9007505	1,4-Difluorobenzene (sur.)	2018/06/01	107	50 - 140	103	50 - 140	101	%		
9007505	4-Bromofluorobenzene (sur.)	2018/06/01	96	50 - 140	94	50 - 140	93	%		
9007505	D4-1,2-Dichloroethane (sur.)	2018/06/01	87	50 - 140	90	50 - 140	87	%		
9008342	D10-ANTHRACENE (sur.)	2018/06/04	96	50 - 130	95	50 - 130	108	%		
9008342	D8-ACENAPHTHYLENE (sur.)	2018/06/04	87	50 - 130	84	50 - 130	97	%		
9008342	D8-NAPHTHALENE (sur.)	2018/06/04	63	50 - 130	60	50 - 130	73	%		
9008342	TERPHENYL-D14 (sur.)	2018/06/04	98	50 - 130	97	50 - 130	114	%		
9008349	O-TERPHENYL (sur.)	2018/06/04	94	60 - 140	94	60 - 140	93	%		
9007505	Benzene	2018/06/05	100	50 - 140	99	60 - 130	<0.40	ug/L	NC	30
9007505	Ethylbenzene	2018/06/05	99	50 - 140	100	60 - 130	<0.40	ug/L	NC	30
9007505	F1 (C6-C10)	2018/06/05	78	60 - 140	92	60 - 140	<100	ug/L	NC	30
9007505	m & p-Xylene	2018/06/05	107	50 - 140	109	60 - 130	<0.80	ug/L	NC	30
9007505	o-Xylene	2018/06/05	98	50 - 140	99	60 - 130	<0.40	ug/L	NC	30
9007505	Toluene	2018/06/05	98	50 - 140	99	60 - 130	<0.40	ug/L	NC	30
9008342	1-Methylnaphthalene	2018/06/04	84	50 - 130	73	50 - 130	<0.10	ug/L	28	30
9008342	2-Methylnaphthalene	2018/06/04	79	50 - 130	67	50 - 130	<0.10	ug/L	28	30
9008342	Acenaphthene	2018/06/04	89	50 - 130	85	50 - 130	<0.10	ug/L	NC	30
9008342	Acenaphthylene	2018/06/04	89	50 - 130	84	50 - 130	<0.10	ug/L	NC	30
9008342	Acridine	2018/06/04	83	50 - 130	82	50 - 130	<0.050	ug/L	NC	30
9008342	Anthracene	2018/06/04	80	50 - 130	79	50 - 130	<0.010	ug/L	NC	30
9008342	Benzo(a)anthracene	2018/06/04	103	50 - 130	100	50 - 130	<0.0085	ug/L	NC	30
9008342	Benzo(a)pyrene	2018/06/04	91	50 - 130	92	50 - 130	<0.0075	ug/L	NC	30
9008342	Benzo(b&j)fluoranthene	2018/06/04	93	50 - 130	92	50 - 130	<0.0085	ug/L	NC	30
9008342	Benzo(c)phenanthrene	2018/06/04	97	50 - 130	93	50 - 130	<0.050	ug/L	NC	30
9008342	Benzo(g,h,i)perylene	2018/06/04	90	50 - 130	91	50 - 130	<0.0085	ug/L	NC	30
9008342	Benzo(k)fluoranthene	2018/06/04	98	50 - 130	96	50 - 130	<0.0085	ug/L	NC	30
9008342	Benzo[e]pyrene	2018/06/04	91	50 - 130	91	50 - 130	<0.050	ug/L	NC	30
9008342	Chrysene	2018/06/04	101	50 - 130	98	50 - 130	<0.0085	ug/L	NC	30
9008342	Dibenz(a,h)anthracene	2018/06/04	94	50 - 130	96	50 - 130	<0.0075	ug/L	NC	30
9008342	Fluoranthene	2018/06/04	102	50 - 130	99	50 - 130	<0.010	ug/L	NC	30
9008342	Fluorene	2018/06/04	92	50 - 130	88	50 - 130	<0.050	ug/L	NC	30

Maxxam Job #: B841800  
Report Date: 2018/06/06

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9008342	Indeno(1,2,3-cd)pyrene	2018/06/04	95	50 - 130	97	50 - 130	<0.0085	ug/L	NC	30
9008342	Naphthalene	2018/06/04	76	50 - 130	64	50 - 130	<0.10	ug/L	17	30
9008342	Perylene	2018/06/04	84	50 - 130	85	50 - 130	<0.050	ug/L	NC	30
9008342	Phenanthrene	2018/06/04	90	50 - 130	88	50 - 130	<0.050	ug/L	0.40	30
9008342	Pyrene	2018/06/04	99	50 - 130	96	50 - 130	<0.020	ug/L	NC	30
9008342	Quinoline	2018/06/04	96	50 - 130	97	50 - 130	<0.20	ug/L	NC	30
9008349	F2 (C10-C16 Hydrocarbons)	2018/06/04	100	60 - 130	97	70 - 130	<0.10	mg/L	NC	30
9009728	Dissolved Nitrate (N)	2018/06/02	104	80 - 120	104	80 - 120	<0.010	mg/L	1.1	20
9009728	Dissolved Nitrite (N)	2018/06/02	104	80 - 120	100	80 - 120	<0.010	mg/L	1.5	20
9010307	Dissolved Aluminum (Al)	2018/06/02	98	80 - 120	100	80 - 120	<0.0030	mg/L	NC	20
9010307	Dissolved Antimony (Sb)	2018/06/02	96	80 - 120	93	80 - 120	<0.00060	mg/L	NC	20
9010307	Dissolved Arsenic (As)	2018/06/02	95	80 - 120	93	80 - 120	<0.00020	mg/L	NC	20
9010307	Dissolved Beryllium (Be)	2018/06/02	95	80 - 120	94	80 - 120	<0.0010	mg/L	NC	20
9010307	Dissolved Chromium (Cr)	2018/06/02	94	80 - 120	92	80 - 120	<0.0010	mg/L	NC	20
9010307	Dissolved Cobalt (Co)	2018/06/02	93	80 - 120	91	80 - 120	<0.00030	mg/L	5.9	20
9010307	Dissolved Copper (Cu)	2018/06/02	90	80 - 120	91	80 - 120	<0.00020	mg/L	16	20
9010307	Dissolved Lead (Pb)	2018/06/02	91	80 - 120	92	80 - 120	<0.00020	mg/L	NC	20
9010307	Dissolved Molybdenum (Mo)	2018/06/02	98	80 - 120	94	80 - 120	<0.00020	mg/L	0.87	20
9010307	Dissolved Nickel (Ni)	2018/06/02	92	80 - 120	90	80 - 120	<0.00050	mg/L	1.4	20
9010307	Dissolved Selenium (Se)	2018/06/02	96	80 - 120	93	80 - 120	<0.00020	mg/L	5.7	20
9010307	Dissolved Silver (Ag)	2018/06/02	94	80 - 120	91	80 - 120	<0.00010	mg/L	NC	20
9010307	Dissolved Thallium (Tl)	2018/06/02	92	80 - 120	92	80 - 120	<0.00020	mg/L	NC	20
9010307	Dissolved Tin (Sn)	2018/06/02	99	80 - 120	95	80 - 120	<0.0010	mg/L	NC	20
9010307	Dissolved Titanium (Ti)	2018/06/02	99	80 - 120	93	80 - 120	<0.0010	mg/L	NC	20
9010307	Dissolved Uranium (U)	2018/06/02	93	80 - 120	92	80 - 120	<0.00010	mg/L	2.6	20
9010307	Dissolved Vanadium (V)	2018/06/02	96	80 - 120	91	80 - 120	<0.0010	mg/L	NC	20
9010307	Dissolved Zinc (Zn)	2018/06/02	95	80 - 120	93	80 - 120	<0.0030	mg/L	8.7	20
9010549	Dissolved Barium (Ba)	2018/06/02	97	80 - 120	94	80 - 120	<0.010	mg/L		
9010549	Dissolved Boron (B)	2018/06/02	101	80 - 120	98	80 - 120	<0.020	mg/L		
9010549	Dissolved Calcium (Ca)	2018/06/02	106	80 - 120	103	80 - 120	<0.30	mg/L	NC	20
9010549	Dissolved Iron (Fe)	2018/06/02	101	80 - 120	98	80 - 120	<0.060	mg/L	NC	20

Maxxam Job #: B841800  
Report Date: 2018/06/06

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9010549	Dissolved Lithium (Li)	2018/06/02	98	80 - 120	94	80 - 120	<0.020	mg/L		
9010549	Dissolved Magnesium (Mg)	2018/06/02	104	80 - 120	101	80 - 120	<0.20	mg/L	NC	20
9010549	Dissolved Manganese (Mn)	2018/06/02	105	80 - 120	104	80 - 120	<0.0040	mg/L	NC	20
9010549	Dissolved Phosphorus (P)	2018/06/02	104	80 - 120	98	80 - 120	<0.10	mg/L		
9010549	Dissolved Potassium (K)	2018/06/02	102	80 - 120	96	80 - 120	<0.30	mg/L	NC	20
9010549	Dissolved Silicon (Si)	2018/06/02	97	80 - 120	89	80 - 120	<0.10	mg/L		
9010549	Dissolved Sodium (Na)	2018/06/02	98	80 - 120	94	80 - 120	<0.50	mg/L	NC	20
9010549	Dissolved Strontium (Sr)	2018/06/02	95	80 - 120	94	80 - 120	<0.020	mg/L		
9010549	Dissolved Sulphur (S)	2018/06/02					<0.20	mg/L		
9010994	Alkalinity (PP as CaCO <sub>3</sub> )	2018/06/03					<1.0	mg/L	NC	20
9010994	Alkalinity (Total as CaCO <sub>3</sub> )	2018/06/03			96	80 - 120	<1.0	mg/L	1.8	20
9010994	Bicarbonate (HCO <sub>3</sub> )	2018/06/03					<1.0	mg/L	1.8	20
9010994	Carbonate (CO <sub>3</sub> )	2018/06/03					<1.0	mg/L	NC	20
9010994	Hydroxide (OH)	2018/06/03					<1.0	mg/L	NC	20
9010996	pH	2018/06/03			100	97 - 103			0.13	N/A
9010997	Conductivity	2018/06/03			99	90 - 110	<2.0	uS/cm	0	10
9011004	Alkalinity (PP as CaCO <sub>3</sub> )	2018/06/03					<1.0	mg/L	NC	20
9011004	Alkalinity (Total as CaCO <sub>3</sub> )	2018/06/03			96	80 - 120	<1.0	mg/L	NC	20
9011004	Bicarbonate (HCO <sub>3</sub> )	2018/06/03					<1.0	mg/L	NC	20
9011004	Carbonate (CO <sub>3</sub> )	2018/06/03					<1.0	mg/L	NC	20
9011004	Hydroxide (OH)	2018/06/03					<1.0	mg/L	NC	20
9011007	pH	2018/06/03			100	97 - 103			0.60	N/A
9011014	Conductivity	2018/06/03			100	90 - 110	<2.0	uS/cm	NC	10
9013598	Dissolved Chloride (Cl)	2018/06/05	104	80 - 120	102	80 - 120	<1.0	mg/L	NC	20



Maxxam Job #: B841800  
Report Date: 2018/06/06

## QUALITY ASSURANCE REPORT(CONT'D)

McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9013600	Dissolved Sulphate (SO4)	2018/06/05	110	80 - 120	105	80 - 120	<1.0	mg/L	NC	20
<p>N/A = Not Applicable</p> <p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference &lt;= 2x RDL).</p>										

Maxxam Job #: B841800  
Report Date: 2018/06/06

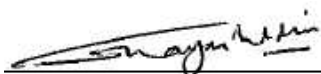
McElhanney Consulting Services Ltd.  
Client Project #: 25311350700  
Site Location: 329 MARTEN ST.  
Sampler Initials: JAB

### VALIDATION SIGNATURE PAGE

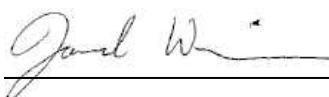
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



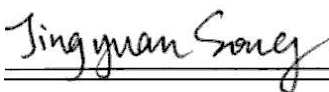
Dennis Ngundu, B.Sc., P.Chem., QP, Supervisor, Organics



Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics



Jared Wiseman, B.Sc., P.Chem., QP, Senior Analyst, Organics



Jingyuan Song, QP, Organics – Senior Analyst

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required	
Company: <u>Parks</u>		Company: <u>MCSL</u>		Quotation #:		<input checked="" type="checkbox"/> 5-7 Days Regular (Most analyses)	
Contact Name:		Contact Name: <u>Amanda Pearson</u>		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address:		Address:		Project #: <u>329 Marten St.</u>		Rush TAT (Surcharges will be applied)	
Phone:		Phone: <u>403-930-7804</u>		Site Location: <u>2531 1350700</u>		<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days	
Email:		Email: <u>apeardon@mcclhenny.com</u>		Site #:		Date Required:	
Copies:		Copies:		Sampled By: <u>SAIB</u>		Rush Confirmation #:	

Laboratory Use Only				Analysis Requested												Regulatory Criteria																																					
<table border="1"> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp <u>8 7 10</u></td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> </table>				Seal Present	YES	NO	Cooler ID	Seal Intact			Temp <u>8 7 10</u>	Cooling Media				Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media				Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media				Depot Reception # of containers: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX F1 <input type="checkbox"/> BTEX F1-F2 <input type="checkbox"/> BTEX F1-F4 <input type="checkbox"/> Routine Water <input checked="" type="checkbox"/> Diss <input type="checkbox"/> Dissolved <input type="checkbox"/> Mercury Total <input type="checkbox"/> Salinity 4 <input type="checkbox"/> Sieve (75 micron) <input type="checkbox"/> Texture (% Sand, Silt, Clay) <input type="checkbox"/> Basic Class II Landfill <input checked="" type="checkbox"/> PAH's												<input checked="" type="checkbox"/> AT1 <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Drinking Water <input type="checkbox"/> D50 (Drilling Waste) <input type="checkbox"/> Saskatchewan <input type="checkbox"/> Other:	
Seal Present	YES	NO	Cooler ID																																																		
Seal Intact			Temp <u>8 7 10</u>																																																		
Cooling Media																																																					
Seal Present	YES	NO	Cooler ID																																																		
Seal Intact			Temp																																																		
Cooling Media																																																					
Seal Present	YES	NO	Cooler ID																																																		
Seal Intact			Temp																																																		
Cooling Media																																																					
Sample Identification				Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	HOLD - DO NOT ANALYZE												Special Instructions																																	
1	Mw 18-01	-	18/5/30	14:00	GW	8	X	X	X									Metals not filtered preservative rinsed																																			
2	Mw 17-18	-	18/5/30	14:15	GW	8	X	X	X																																												
3	Trip Blank	-	18/5/30	14:30	GW	8	X	X	X																																												
4																																																					
5																																																					
6																																																					
7																																																					
8																																																					
9																																																					
10																																																					

Please indicate Filtered, Preserved or Both (F, P, F/P)						Maxxam Job #	
Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)		
<u>Jeff Brown</u>	<u>18/5/30</u>	<u>16:33</u>	<u>Ashlee L. Jasmine</u>	<u>2018/05/30</u>	<u>16:37</u>	<u>B841800</u>	

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at [www.maxxam.ca/terms](http://www.maxxam.ca/terms)