MUNICIPAL PLANNING COMMISSION AGENDA
SUMMER VILLAGE OF BIRCHCLIFF
SUMMER VILLAGES ADMINISTRATION OFFICE
NOVEMBER 24, 2022 @ 1:00 P.M.

A. CALL TO ORDER

B. ADOPTION OF AGENDA

C. DEVELOPMENT ITEMS

1) 101 Birchcliff Road

D. ADJOURNMENT

Summer Village of Birchcliff – Municipal Planning Commission

Agenda Item

November 24, 2022

101 Birchcliff Road (Lot 3A, Block 2, Plan 8020413)

Development Permit Application

Background:

An application was submitted by the homeowner of 101 Birchcliff Road (Lot 3A, Block 2, Plan 8020413) in the Summer Village of Birchcliff for escarpment stabilization including retaining walls and stairs in a concrete structure. This property is in the R1 District (Lakeshore Residential).

The development proposed will take place on the escarpment of the property. Currently, there is a set of stairs and wood platforms leading down to the lake that encroaches onto the neighbouring property. This will be removed and replaced with the proposed retaining walls and a new set of steel stairs. 14 trees will be removed from the escarpment to be replaced with a proposed “living roof” and a natural deep-rooted grass area below the retaining wall. The structure proposed consists of concrete retaining walls and a staircase. Below the top concrete slab is a void that will be closed in with a treated wood wall. The stairs require steel supports and will be made out of wood treads. No provincial approvals are required for the development.

Discussion:

This application is before MPC for the following reasons:

- Mechanized Excavation, Stripping, and Grading are listed as a discretionary use; therefore, the decision must come from the Municipal Planning Commission.
- Land located below the top of the bank/top of the escarpment should be in a natural state, a variance is required.

Recommendation:

After reviewing the application and all relevant planning documents, it is the recommendation of administration to approve the application for the escarpment development. The Municipal Development Plan 6.3.4 states “Birchcliff recognizes that remedial actions may be necessary from time to time, and the village strongly desires that banks abutting the shoreline remain as natural as possible to retain natural ecosystems.” The shoreline and bank measures appear necessary according to the geotechnical report in order to retain the bank and ensure the house remains stable. In discussion with the engineer who conducted the geotechnical report this proposed development is complex and required due to the proximity of the existing dwelling to the

slope and in order to retain the bank and the dwelling. The concrete structure is required to be constructed as explained in the geotechnical report. Adjacent landowners have been notified and no response has been received.

Conditions:

If approved, Administration would recommend the following conditions:

- Completions Deposit of $5,000.00.
- Deep-rooted vegetation to be planted according to the landscaping plan and wherever possible around the retaining wall structure. The geotechnical report states the slopes outside of the new retaining wall structure must be kept well-vegetated at all times.
- Surface drainage and roof water must be discharged on the ground surface and kept away from the developed slope and the new retaining wall structure. No water is permitted to discharge below grade.
- No fill or excavated material may be placed at the top of the slope with the exception of any designed retaining wall.
- The finished site grade should be properly sloped to direct all surface water from the structures and sloped areas. A minimum grade slope of 3% is advised at this site.
- All backfill soil against the foundation walls must be moderately compacted to 95% Standard Proctor Maximum Dry Density (SPMDD). This site must be properly sloped to direct water away from all structures.
- Site inspections by a qualified structural engineer are to be completed at time of retaining wall construction, soil compaction, site grading, subsurface drainage and all structural components must be done for maintaining the stability of the slope during and after construction. Confirmation of these inspections shall be submitted to administration once completed.
- Escarpment work to be completed in accordance with all other geotechnical report recommendations.

Authorities:

For a discretionary use in any district:

- The Municipal Planning Commission may approve an application for a Development Permit:
    - With or without conditions;
    - Based on the merits of the proposed development, including its relationship to any approved statutory plan, non-statutory plan, or approved policy, affecting the site;
    - Where the proposed development conforms in every respect to this Land Use Bylaw; or

- May refuse an application for a development permit based on the merits of the proposed development, even though it meets the requirements of the Land Use Bylaw; or
- Subject to provisions of section 2.4 (2), the Municipal Planning Commission shall refuse an application for a development permit if the proposed development does not conform in every respect to the Land Use Bylaw.

The MPC may:

- Grant a variance to reduce the requirements of any use of the LUB and that use will be deemed to comply with LUB.
- Approve application even though the proposed development does not comply or is a non-conforming building if:
    - It would not unduly interfere with the amenities of the neighborhood, or
    - Materially interfere with or affect the use, enjoyment, or value of neighboring parcels of land, And
    - It conforms with the use prescribed for that land or building in the bylaw.
- Consider a Variance only where warranted by the merits or the proposed development and in response to irregular lot lines, parcel shapes or site characteristics which create difficulties in siting structures within the required setback or in meeting the usual bylaw requirements, except there shall be no variance for Parcel Coverage or Building Height.

Decision:

In order to retain transparency of the Commission, Administration recommends one of the following:

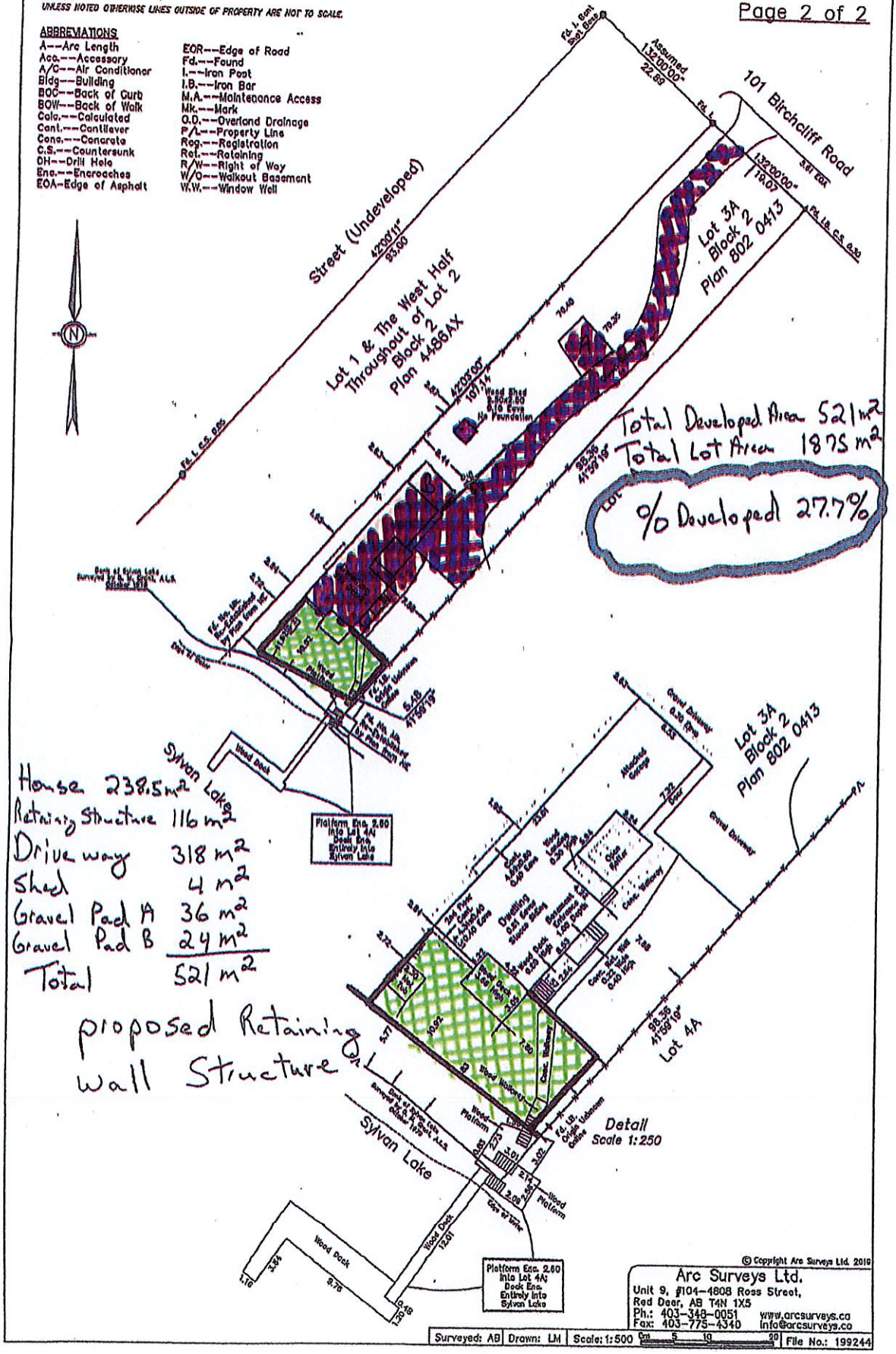
1. Approve the application with or without conditions *(Section 642 of the MGA),* or
2. Deny the application stating reasons why *(Section 642(4) of the MGA).*

ALBERTA LAND SURVEYOR'S REAL PROPERTY REPORT

NOTE:
UNLESS NOTED OTHERWISE LINES OUTSIDE OF PROPERTY ARE NOT TO SCALE.

ABBREVIATIONS

A--Arc Length
Acc.--Accessory
A/C--Air Conditioner
Bldg--Building
BOC--Back of Curb
BOW--Back of Walk
Calc.--Calculated
Cant.--Cantilever
Conc.--Concrete
C.S.--Countersunk
DH--Drill Hole
Enc.--Encroaches
EOA--Edge of Asphalt
EOR--Edge of Road
Fd.--Found
I.--Iron Post
I.B.--Iron Bar
M.A.--Maintenance Access
Mk.--Mark
O.D.--Overland Drainage
P/L--Property Line
Reg.--Registration
Ret.--Retaining
R/W--Right of Way
W/O--Walkout Basement
W.W.--Window Well



Arc Surveys Ltd.
Unit 9, #104-4808 Ross Street,
Red Deer, AB T4N 1X5
Ph.: 403-348-0051 www.arcsurveys.ca
Fax: 403-775-4340 info@arcsurveys.ca

Surveyed: AB | Drawn: LM | Scale: 1:500 | File No.: 199244

Proposed Development for demolition September 13,2022

Demolition of existing stair structure will be required. The operation will be carried out in the winter months when many people are not occupying there summer cabins. Existing wood will be hauled away and disposed of as required. Land will be reclaimed as per engineered drawings with new piles and stair case installed.

Thank you

[redacted]

Neighbouring Slopes . September 13,2022

The work being performed on the bank at 101 Birchcliff Road will not affect the neighbouring slopes. Side retaining walls will be installed to ensure the work done to the bank will not affect either neighbour. Side retaining walls are designed to hold the land back from going to the side as well as the main retaining wall holding the land back from the lake.

Thank you

[redacted]

Letter Of Intent. September 13 ,2022

Our intention is to remove the existing stair case down to the lakeshore, and replace with new retaining walls and staircase to stabilize the lakeshore.

Thank you

[redacted]

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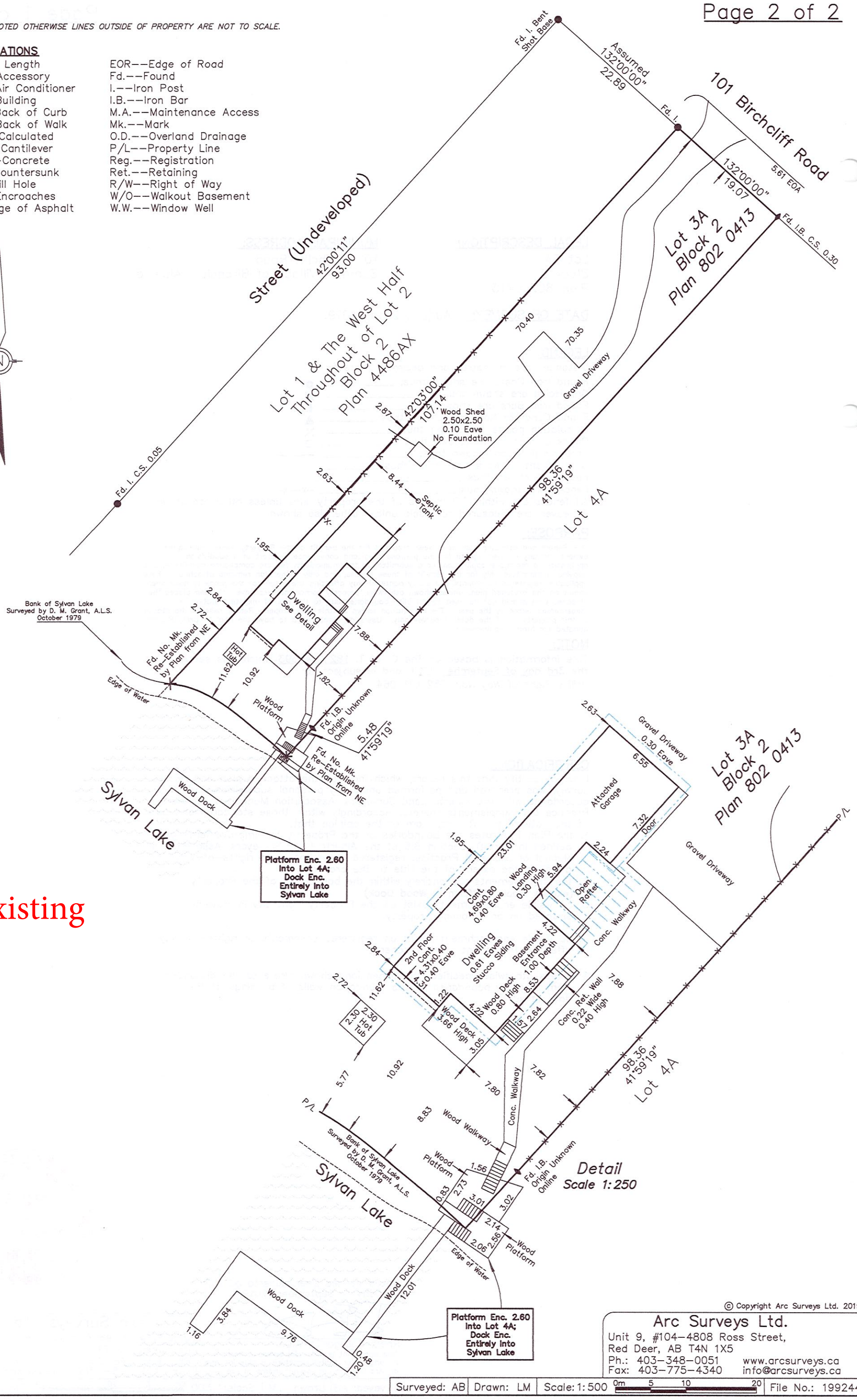

Existing

Detail
Scale 1:250

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GENERAL NOTES

1. ALL CODES REFERENCES ARE TO BE THE LATEST VERSION AT THE DATE OF ISSUE
2. DESIGN IS BASED ON THE PARTS OF THE NATIONAL BUILDING CODE 2019 - ALBERTA EDITION
3. READ THESE DESIGN NOTES IN CONJUNCTION WITH THE CONTRACT SPECIFICATIONS AND ALL OTHER CONTRACT DOCUMENTS
4. OBTAIN ENGINEER'S APPROVAL BEFORE CUTTING, BORING OR SLEEVING LOAD BEARING MEMBERS UNLESS NOTED OTHERWISE
5. THE STRUCTURAL DRAWINGS ARE FOR THE COMPLETED PROJECT. STABILITY OF THE EXISTING AND NEW STRUCTURE DURING CONSTRUCTION REMAINS THE RESPONSIBILITY OF THE CONTRACTOR OR TRADE CONTRACTOR
6. REVIEW ALL DRAWINGS AND CHECK DIMENSIONS PRIOR TO IMPLEMENTING THE WORK. REPORT ANY DISCREPANCIES TO THE CONSULTANT FOR CLARIFICATION BEFORE PROCEEDING
7. COORDINATE PLACEMENT AND LOCATION OF ITEMS BY SUBTRADES. RELEVANT TRADES SHALL REVIEW PRIOR TO ERECTION AND/OR INSTALLATION
8. NOTIFY THE ENGINEER A MINIMUM OF 2 BUSINESS DAYS PRIOR TO ANY REQUIRED SITE REVIEWS

EXISTING STRUCTURES

1. THE STRUCTURAL DESIGN IS BASED ON INFORMATION GATHERED FROM LIMITED VISUAL OBSERVATION AT SITE AND SITE SURVEY
2. VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS ON SITE PRIOR TO IMPLEMENTING AFFECTED WORK
3. NOTIFY THE CONSULTANT OF ANY SITE CONDITIONS THAT DIFFER FROM THE CONTRACT DOCUMENTS OR THE ISSUED DRAWINGS
4. SHORE AND UNDERPIN EXCAVATIONS AS REQUIRED TO PREVENT DISTURBANCE TO ADJACENT STRUCTURES, STREETS, SIDEWALKS AND UTILITIES
5. EXCAVATION AND USE OF SHORING IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE EXISTING STRUCTURE AND SLAB-ON-GRADE IS NOT DISTURBED DURING INSTALLATION OF NEW FOUNDATIONS

DELEGATED DESIGN

1. PORTIONS OF THE CERTIFIED DRAWINGS DELEGATED TO THE CONTRACTOR AND/OR TRADE CONTRACTOR RETAIN A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA TO COMPLETE THE DESIGN
2. SUBMIT SHOP DRAWINGS FOR COMPONENTS REQUIRING DELEGATED DESIGN UNDER THE SEAL AND SIGNATURE OF THE ENGINEER RESPONSIBLE FOR THE DESIGN
3. THE SUBMITTER RESPONSIBLE FOR THE DESIGN IS ALSO RESPONSIBLE FOR REVIEW OF FABRICATION AND INSTALLATION OF THE COMPONENTS UPON COMPLETION OF THE WORK. CERTIFY IN WRITING TO THE CONSULTANT THAT SUCH REVIEW HAS BEEN COMPLETED
4. ALL DELEGATED DESIGN SHOP DRAWINGS MUST BE REVIEWED PRIOR TO FABRICATION AND INSTALLATION
5. THE FOLLOWING COMPONENTS REQUIRE DELEGATED DESIGN
   a. CONCRETE MIX DESIGNS
   b. STRUCTURAL STEEL TO STEEL CONNECTIONS
   c. SHEET METAL DECK

FOUNDATION AND GEOTECHNICAL NOTES

1. RETAINING WALL DESIGN IS BASED ON THE GEOTECHNICAL INVESTIGATION SOILS REPORT NUMBER 1018 BIRCHCLIFF B345 PREPARED BY EBA ENGINEERING CONSULTANTS LTD. ENTITLED GEOTECHNICAL INVESTIGATION PROPOSED RESIDENCE STRUCTURE 101 BIRCHCLIFF ROAD, SUMMER VILLAGE OF BIRCHCLIFF, ALBERTA AND DATED SEPTEMBER 6, 2022. CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OUTLINED IN THIS REPORT THROUGHOUT CONSTRUCTION. ENSURE THAT THE RECOMMENDATIONS OUTLINED IN THE REPORT (AND ADDENDUM, IF CREATED) ARE READ AND UNDERSTOOD PRIOR TO COMMENCING WITH FOUNDATION WORK
2. THE PROFESSIONAL GEOTECHNICAL ENGINEER IS TO REVIEW THE STRUCTURAL DESIGN NOTES AND DRAWINGS TO ENSURE COMPLIANCE WITH ASSUMPTIONS MADE IN THE SITE CONDITIONS
3. PROTECT EXCAVATIONS FOR FOOTINGS AND CONCRETE SLABS FROM RAIN, SNOW, FREEZING TEMPERATURES, STANDING WATER, LOSS OF MOISTURE AND DEGRADATION BY APPROVED METHODS
4. STRIP FOOTINGS AS SHOWN WITH A FACTORED BEARING CAPACITY OF 150kPa
5. FOUNDATION BEARING STATUS WALLS HAVE BEEN DESIGNED BASED ON THE FOLLOWING SOIL DATA
   - ENGINEERED FILL — density = 21.0 kN/m³, γ_R = 0.55
   - A. FOUNDATION AND RETAINING WALLS HAVE BEEN DESIGNED BASED ON A SURFACE SURCHARGE LOAD OF 2.4 kPa
   - B. FOUNDATION AND RETAINING WALLS HAVE BEEN DESIGNED ASSUMING AN EFFECTIVE DRAINAGE SYSTEMS PROVIDED BEHIND THE WALLS
6. SUBGRADE
   a. SHOP FILL MATERIAL TO CONSIST OF BRAIN ROCK MECHANICALLY VIBRATED IN MAX LIFTS OF 250mm
   b. ANY SOFT SUBGRADE SOIL IS TO BE REMOVED AND REPLACED WITH BRAIN ROCK MECHANICALLY VIBRATED IN MAX LIFTS OF 250mm

DESIGN LOADS

1. CLIMATIC INFORMATION - REFER TO TABLE BELOW
2. SNOW INFORMATION - REFER TO TABLE BELOW
3. DESIGN LOADS - REFER TO TABLE BELOW
4. LATERAL LOADS
   a. LATERAL LOADS FROM WIND AND SEISMIC LOADS ARE RESISTED BY THE FOLLOWING COMBINATION OF ELEMENTS: CONCRETE END WALLS
   b. FORCE MODIFICATION FACTORS - REFER TO TABLE BELOW
5. CONSTRUCTION LOADS SHALL NOT EXCEED THE LOADS NOTED ON THE DRAWINGS
6. RAIN PONDING LOADS HAVE BEEN CALCULATED BASED ON ROOF SLOPES, PARAPETS, AND SCUPPERS ASSUMING THAT DRAINS ARE ACCIDENTALLY BLOCKED FOR A PERIOD OF 24 HOURS
7. UNLESS NOTED OTHERWISE, THE LOADS NOTED IN TABLES AND ON DRAWINGS ARE UNFACTORED
8. WHERE PERMISSIBLE, LIVE LOADS HAVE BEEN REDUCED IN ACCORDANCE WITH THE NATIONAL BUILDING CODE 2019 - ALBERTA EDITION

DESIGN LOADS	
STORAGE FLOOR	
SUPERIMPOSED DEAD LOAD *	1.5 kPa
LIVE LOAD **	4.8 kPa
CONCENTRATED LIVE LOAD ***	9 kN
ROOFS	
SUPERIMPOSED DEAD LOAD *	2.8 kPa
SNOW LOAD **	1.5 kPa
LIVE LOAD ***	1.0 kPa
CONCENTRATED LIVE LOAD ***	4.5 kN

* SUPERIMPOSED DEAD LOADS ARE ADDITIONAL LOADS APPLIED TO THE SELF WEIGHT OF THE STRUCTURE. THE SELF WEIGHT TYPICALLY INCLUDES ALL CONCRETE ELEMENTS INCLUDING LIGHTWEIGHT CONCRETE TOPPING, STRUCTURAL STEEL BEAMS, JOISTS, AND/OR DECKING FASTENED TO THE JOISTS

** SNOW ACCUMULATION LOADS AND RAIN PONDING LOADS ARE TO BE CONSIDERED WHERE THERE ARE NON-UNIFORM ROOF SHAPES AND/OR ELEVATIONS

*** THE UNIFORMLY LIVE AND OF THE CONCENTRATED LIVE LOAD TO BE APPLIED TO THE APPLICABLE STRUCTURAL ELEMENTS TO DETERMINE WHICH PRODUCES THE MOST CRITICAL EFFECT (REFER TO ABC # 4.5.1.1). TO ACCOMMODATE MISCELLANEOUS SUSPENDED ITEMS, BE SURE ELEMENTS TO SUPPORT AN ADDITIONAL LIVE LOAD OF 1.0 kPa AT ANY POINT ALONG THE SPAN (ACROSS THE TOP OR BOTTOM CHORD).

CONCRETE REINFORCEMENT

1. REINFORCING STEEL TO CONFORM TO CSA G30.18 GRADE 400
2. DO NOT WELD REINFORCEMENT UNLESS APPROVED IN WRITING BY THE ENGINEER. REINFORCEMENT TO BE WELDED TO CONFORM TO CSA G30.18, GRADE 400W, WELDED ONLY PERFORMED BY A WORKMAN CERTIFIED TO CSA W186-M1990

CAST-IN-PLACE REINFORCED CONCRETE

1. CONTROLLED CONCRETE - REFER TO TABLE BELOW
2. SUPPLY CONTROLLED CONCRETE IN ACCORDANCE WITH CSA-A23.1/A23.2
3. CONCRETE MATERIALS, QUALITY, MIXED, PLACING, FORMWORK AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA A23.1
4. USE TYPE GU CEMENT FOR ALL CONCRETE UNLESS NOTED OTHERWISE IN CONTROLLED CONCRETE TABLE
5. MAXIMUM FLY ASH CONTENT NOT TO EXCEED 25% OF THE TOTAL CEMENTITIOUS MATERIAL EXCEPT AS FOLLOWS
   a. CONCRETE FOR FOOTINGS, PILES, COLUMNS, WALLS, GRADE BEAMS: MAXIMUM 50%
   b. CONCRETE WITH EXPOSURE CLASSES C-1, C-1 AND C-2: MAXIMUM 15%
   c. EXPOSED CONCRETE FLOORS: MAXIMUM 15%
6. LIMIT CHLORIDE CONTENT OF FLY ASH TO LESS THAN 0.2% FOR CONCRETE WITH EXPOSURE CLASSES S-1, S-2 AND S-3
7. NOTIFY CONSULTANT 2 BUSINESS DAYS PRIOR TO CONCRETE POURS TO ALLOW FOR REVIEW OF REINFORCEMENT
8. DO NOT USE ADMIXTURES CONTAINING CALCIUM CHLORIDE
9. FOR FLOOR SLABS DESIGN THE CONCRETE MIX WITH AGGREGATE GRADING AND WATER TO CEMENTITIOUS MATERIALS RATIO TO MINIMIZE SHRINKAGE

CONTROLLED CONCRETE						
CONCRETE ELEMENT	EXPOSURE CLASS	MIN (MPa) @ #DAYS	MAX AGGREGATE SIZE (mm)	AIR CONTENT CATEGORY	MAX W/C RATIO	CEMENT TYPE
EXTERIOR CONCRETE						
SLAB ON GRADE	C-2	32 @ 28	20	1	0.45	GU
FOOTINGS, WALLS	F-1/S-2	30 @ 28	20	1/2	0.45	HS
CONCRETE TOPPING ON DECK	F-1	35 @ 28	20	1	0.5	GU

SLAB-ON-GRADE CONSTRUCTION

1. THE CONTRACTOR IS TO ENSURE THAT THE GEOTECHNICAL ENGINEER IS ON SITE TO INSPECT THE SLAB SUBGRADE AND WATER CONDITIONS PRIOR TO ANY CONCRETE BEING PLACED TO DETERMINE WHETHER OR NOT THE EXPOSED SUBGRADE IS ACCEPTABLE AND TO DETERMINE IF FURTHER EXCAVATION, FILL OR COMPACTION IS REQUIRED. ALL SUBGRADE MATERIAL AND SUBBASE GRAVEL AND OTHER COMPACTION ARE REVIEWED, TESTED AND APPROVED BY THE GEOTECHNICAL ENGINEER
2. ANY FILL AND POOR MATERIAL SHOULD BE REMOVED FROM THE BUILDING AREA. THE EXPOSED SUBGRADE SHOULD BE PROOF ROLLED AND COMPACTED TO A DENSITY OF 98% STANDARD PROCTOR MAXIMUM DRY DENSITY
3. ALL SLABS ARE TO BE SUPPORTED ON MIN 150mm THICK, WELL GRADED GRAVEL BASE, COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY. SOFT SPOTS ARE TO BE FILLED WITH GRAVEL (MAXIMUM SIZE OF 150mm) AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY
4. PROVIDE 6 mm WWF x 20% SLAB THICKNESS DEPTH SAW CUT CONTROL JOINTS AT MAX 4.5 m CENTERS EACH WAY, UNLESS NOTED OTHERWISE
5. SAW CUT CONTROL JOINTS ARE TO BE FILLED WITH FLEXIBLE JOINT CAULKING
6. JOINTS SHALL BE SAW CUT NO LATER THAN 12 HOURS AFTER CONCRETE HAS BEEN POURED
7. ALL EXTERIOR DOORWAYS TO BE MINIMUM 150 THICK AND REINFORCED WITH 10M @ 300 c/c ALL DOWELS TO BE COATED WITH A BOND BREAKER TO PREVENT CONCRETE FROM BONDING TO DOWEL

STRUCTURAL STEEL

1. STEEL GRADES - REFER TO TABLE BELOW
2. STEEL PAINT REQUIREMENTS - REFER TO TABLE BELOW
3. DESIGN, FABRICATION, ERECTION AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA-S16 AND THE OHS CODE OF ALBERTA AND CANADIAN INSTITUTE OF STEEL CONSTRUCTION
4. STEEL TO BE FABRICATED AND ERECTED BY A SHOP CERTIFIED BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA W47.1 DIVISION 1 OR 2 AS ONLY
5. SUBMIT SHOP DRAWINGS SHOWING ALL STRUCTURAL STEEL MEMBERS FOR REVIEW PRIOR TO FABRICATION
6. WELDING TO CONFORM TO CSA W59.
7. WELDING IS TO BE PERFORMED BY STEEL ONLY BY A SHOP CERTIFIED TO CSA W47.1 (W190) WITH FIELD REINFORCEMENT CONFORMING TO CSA G40.20 GRADE 400W
8. ALL WELDED CONNECTIONS NOT SHOWN TO BE A MINIMUM 6 mm (1/4") FILLET WELD ALL AROUND
9. ALL EXPOSED EDGES TO BE CONTINUOUS GR AND ALL EXPOSED WELDS SMOOTH FINISHING PAINTED STEEL
10. SUPPLY STEEL WITH PROPERTIES NOTED IN STEEL GRADES TABLE
11. PROVIDE A MINIMUM OF 2 BOLTS IN BOLTED CONNECTIONS
12. ALL BOLTED CONNECTIONS TO BE SNUG TIGHTENED NON-PRETENSIONED BOLTS. ALL BOLTED CONNECTIONS TO BE PRE-TENSIONED HIGH STRENGTH BOLTS, UNLESS NOTED OTHERWISE ON THE DRAWINGS
13. DO NOT SPLICE MATERIAL WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER. WHERE GRANTED, A COMPLETE NON-DESTRUCTIVE EXAMINATION SHALL BE MANDATORY AND PAID FOR BY THE SUB-CONTRACTOR AND/OR TRADE CONTRACTOR
14. PREPARE AND FINISH SURFACE AS FOLLOWS
    a. CLEAN, PREPARE AND PRIME ALL STRUCTURAL STEEL AND ANCHOR PLATES. DO NOT PRIME ANCHOR BOLTS OR SURFACES IN CONTACT WITH CONCRETE
    b. ALL STRUCTURAL STEEL TO BE FINISH PRIMED AND EXPOSED TO VIEW AT TOP COAT. TO BE CLEANED AND PAINTED TO 2A ENVIRONMENT. CONFIRM COMPATIBILITY BETWEEN PAINT AND PRIMER
    c. ROUGH FIELD WELDS, CONNECTIONS AND ABRASIONS TO MATCH SHOP PRIMER
    d. FOR FURTHER FINISH INFORMATION REFER TO STEEL PAINT REQUIREMENT TABLE BELOW

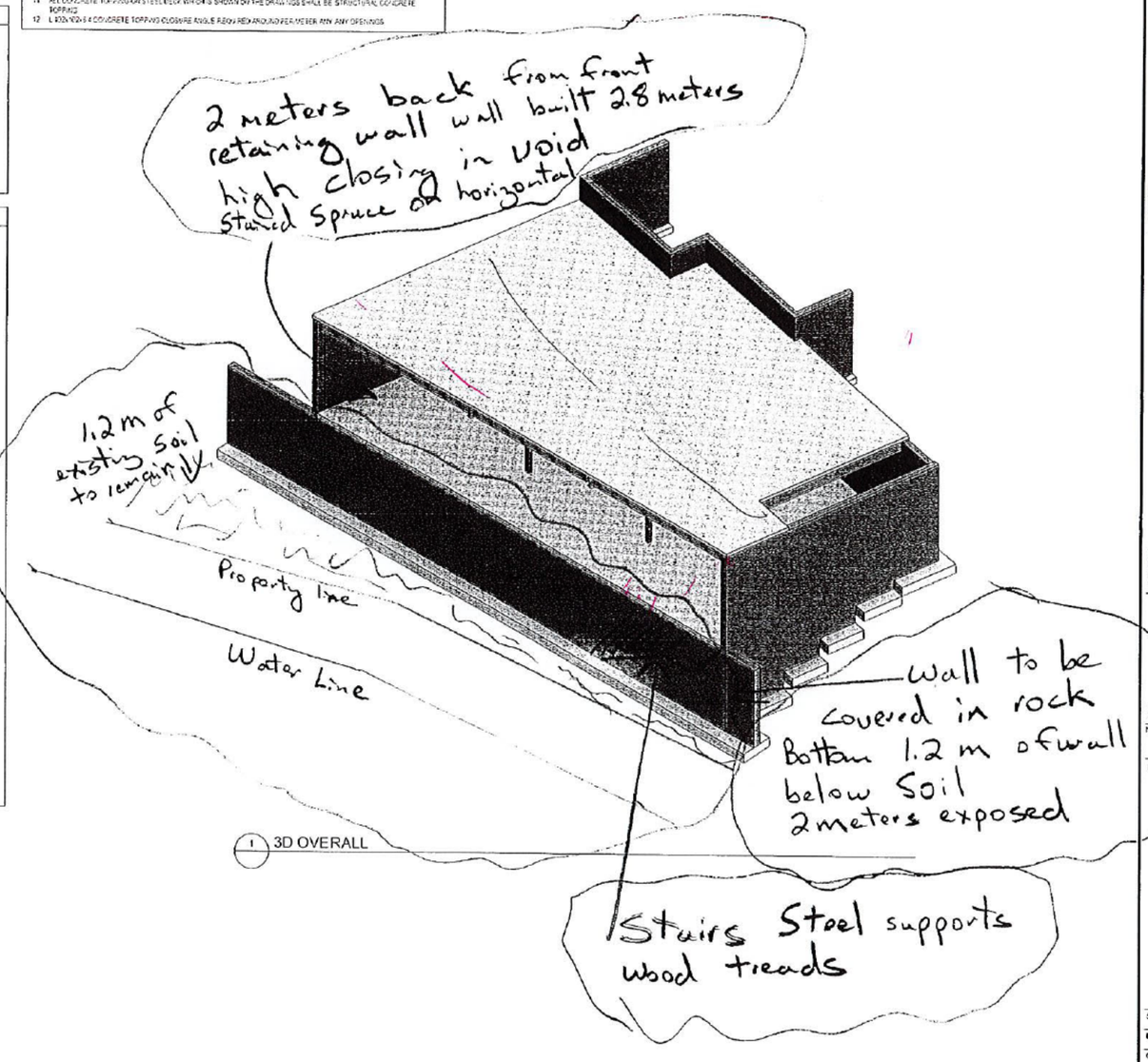
STEEL GRADES	
MEMBER TYPE	GRADE
ROLLED W-SHAPES, TEES	CSA G40.21 350W
WELDED WIDE FLANGE SECTIONS	CSA G40.21 350W
HOLLOW STRUCTURAL SECTIONS	CSA G40.21 350W, CLASS C
OTHER STRUCTURAL SHAPES AND PLATES	CSA G40.21 300W
BOLTS	ASTM A325
ANCHOR RODS	ASTM F554 GRADE 36
THREADED ROD	ASTM A36

STEEL PAINT REQUIREMENTS	
ZONE - ENVIRONMENT SYSTEM	PAINTING & PREPARATION REQUIREMENTS
2A - PREDOMINANTLY WET BY FRESH WATER (INCLUDES CONDENSATION) OR FRAQUENT SPRAY OR FREQUENT IMMERSION	65 TO 90 MICROMETER PHOSPHATED ZINC PRIMER OVER SP6 COMMERCIAL BLAST CLEANING. 75-100 MICROMETER FIELD TOP COAT OF HIGH BUILD VINYL OR EPOXY

STEEL CLEANING REQUIREMENTS	
SPECIFICATION - SUBJECT	CLEANING REQUIREMENTS
SP6 - COMMERCIAL BLAST CLEANING	BLAST CLEAN EACH UNIT AT LEAST TWO TYPES OF ESCH ELEMENT OF SURFACE AREA IS FREE OF ALL VISIBLE RESIDUES (FOR RATHER SEVERE CONDITIONS OF EXPOSURE)

METAL DECK

1. DESIGN, FABRICATION, ERECTION AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA-S136
2. WELDING TO CONFORM TO CSA-S16.55. PLATE WASHERS MAY BE ELIMINATED ONLY IF WELDERS OR WELDING OPERATORS HAVE BEEN CERTIFIED BY THE CANADIAN WELDING BUREAU IN ACCORDANCE WITH QUALIFIED PROCEDURES FOR WELDING METAL DECK
3. SHEET STEEL TO CONFORM TO ASTM A653/A653M, GRADE A STRUCTURAL QUALITY GRADE 230 **OR (340)**
4. METAL ROOF DECK
   a. UNLESS NOTED OTHERWISE ON PLAN/ELEVATION: 38mm DEEP FINISHED ZINC-COATED STEEL IN ACCORDANCE WITH CSSBI MP1. FLUTES SPACED AT 150mm MAXIMUM ON CENTRE. MINIMUM THICKNESS BEFORE GALVANIZING TO BE 0.76mm GALVANIZED WITH ZINC COATING OF **Z275** AS DESIGNATED BY ASTM A653/A653M-08
   b. UNLESS NOTED OTHERWISE ON PLAN/ELEVATION: LIMIT ALLOWABLE DEFLECTION OF METAL ROOF DECK TO THE FOLLOWING
      - LIVE LOAD - SPAN/360
      - TOTAL LOAD - SPAN/240
5. THE METAL DECKING ACT AS A DIAPHRAGM FOR THE DISTRIBUTION OF WIND AND SEISMIC FORCES TO THE LATERAL LOAD RESISTING ELEMENTS
6. BASE METAL THICKNESS OF DECKING INDICATED ABOVE AND/OR ON DRAWINGS, IS MINIMUM TO SATISFY DEFLECTION REQUIREMENTS. INCREASE THICKNESS AS REQUIRED TO SUPPORT GRAVITY LOADS AND TO SATISFY DEFLECTION LIMITS ABOVE
7. UNLESS NOTED OTHERWISE, FASTEN ALL COMPOSITE METAL FLOOR DECK TO SUPPORTING ELEMENTS AS FOLLOWS
   a. 20 mm Ø FUSION WELDS IN **EVERY** FLUTE OVER BEARING AT THE DECK SPAN
   b. 20 mm Ø FUSION WELDS @ 300 mm o.c. AROUND THE PERIMETER AND RAW EDGES IN ADDITIONAL MEMBERS PARALLEL TO THE DECK SPAN
   c. SIDE LAP CONNECTION: **MELT 5 SIDE OF WIDTH SIDELAP CONNECTOR** FOR OVERLAPPING JOINTS AND FOR INTERLOCKING JOINTS @ 150mm o.c.
8. DECK NOTES TO BE CONTINUOUS OVER AT LEAST THREE SUPPORTS WHERE STRUCTURAL FRAMING PERMITS
9. PROVIDE 65x65x6 ANGLE TO SUPPORT ALL EDGES OF DECK. PROVIDE CLOSURE STRIPS AS REQUIRED FOR UNSUPPORTED FLUTE EDGES
10. PROVIDE 150x90x6 ANGLE TO SUPPORT DECK EDGES AT ALL OPENINGS UP TO 400mm. FOR LARGER OPENINGS REFER TO TYPICAL DETAILS
11. ALL CONCRETE TOPPING ON STEEL DECK WHERE IS SHOWN ON THE DRAWINGS SHALL BE STRUCTURAL CONCRETE TOPPING
12. LOCATION OF CONCRETE TOPPING CLOSURE ANGLE REQUIRED AROUND PERIMETER AND ANY OPENINGS



1 3D OVERALL

RK ENGINEERING

PROJECT
RESIDENCE
LAKE HOUSE CONCRETE RETAINING STRUCTURE
101 BIRCHCLIFF ROAD
SUMMER VILLAGE OF BIRCHCLIFF
LOT 3A, BLOCK 2, PLAN 802 0413

DRAWING
DESIGN NOTES AND SCHEDULES

No	DATE	ISSUED FOR	BY
2	2022-09-14	BUILDING PERMIT	
1	2022-09-06	75% REVIEW	

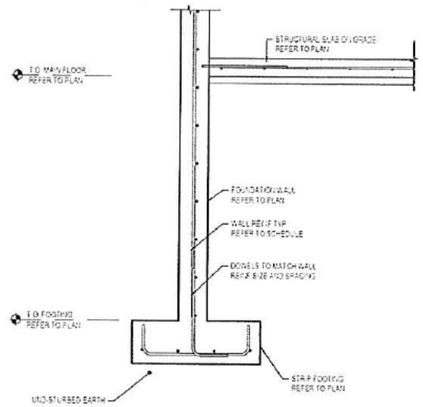
Revisions & Issues

SEAL

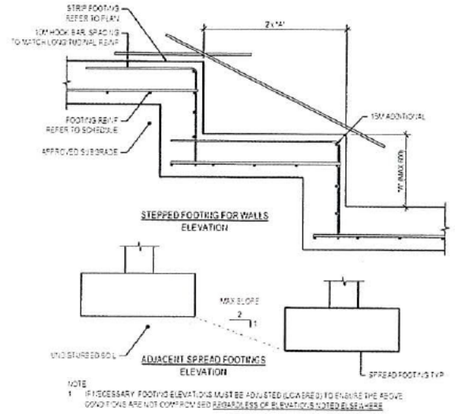
PROFESSIONAL ENGINEER ALBERTA AMIT KLAPPER
2022-09-14

SCALE	1 : 1
DRAWN	RK
CHECKED	RK
01/16/22	2022-01

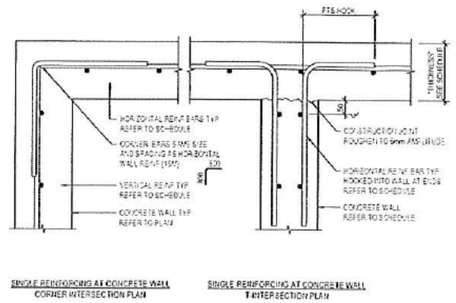
S0



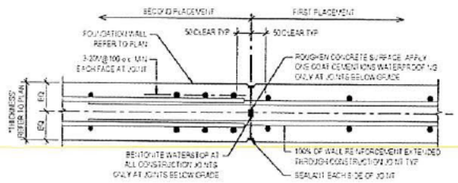
1 TYP EXTERIOR FOUNDATION WALL
1 : 20



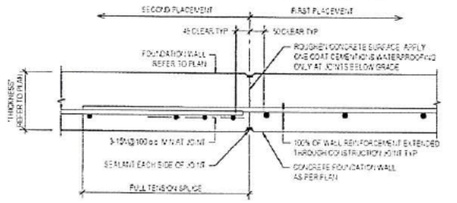
2 TYP CONCRETE FOOTINGS
1 : 20



3 TYP CONCRETE WALL SINGLE REINFORCEMENT
1 : 10

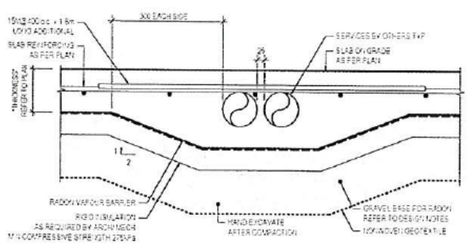


DOUBLE REINFORCEMENT LAYER - PLAN VIEW



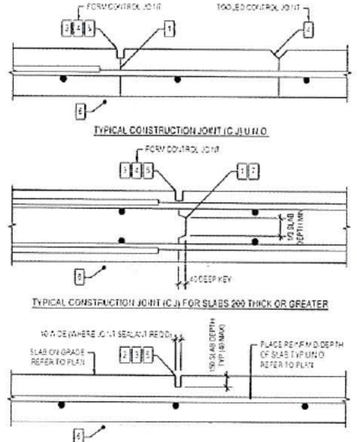
SINGLE REINFORCEMENT LAYER - PLAN VIEW

4 TYP CONCRETE WALL VERTICAL CONSTRUCTION JOINTS
1 : 10



THICKENING AROUND SHALLOW MECHANICAL SERVICES

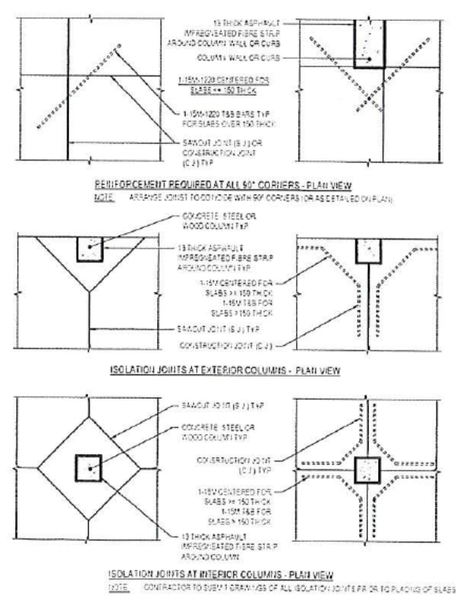
5 TYP SLAB-ON-GRADE THICKENING
1 : 10



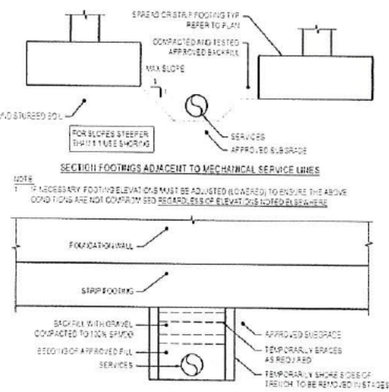
1 PROVIDE C.J. AS SHOWN, BUT NEVER EXCEED 24m O.C. CONSTRUCTION JOINT (C.J.) MAY BE LOCATED AT S.J. LOCATIONS
CONTRACTOR TO PROVIDE C.J. & S.J. LAYOUT FOR REVIEW TO THE CONSULTANT PRIOR TO SLAB PLACEMENT
2 PROVIDE S.J. AS SHOWN, BUT NEVER EXCEED 4.5m O.C. CUT S.J. A MAXIMUM OF 12 HRS AFTER PLACING SLAB
CONTRACTOR TO PROVIDE C.J. & S.J. LAYOUT FOR REVIEW TO THE CONSULTANT PRIOR TO SLAB PLACEMENT
3 C.J. AND S.J. PATTERNS MUST BE COORDINATED WITH CERAMIC QUARRY TILE (OR SIMILAR FINISH) PATTERN JOINTS
4 TOOL OR FORM ALL C.J. ON EXPOSED SLAB ON GRADE CONCRETE FLOORS
5 JOINT SEALANT REQUIRED FOR ALL EXPOSED FLOORS AND FOR FLOORING WITH CERAMIC TILE, QUARRY TILE, AND OTHER
SIMILAR FINISHES WITH JOINT PATTERNS THROUGH THE FINISH. JOINT SEALANT NOT REQUIRED WITH CARPET FINISH. FOR
EXTERIOR CONDITIONS USE SELF-LEVELLING KNOT FAST POLYURETHANE SEALANT.
6 SUBGRADE PER SPECIFICATIONS.
7 CONTINUOUS KEY

NOTES:
a REFER TO ISOLATION JOINT DETAILS FOR JOINT LAYOUT AROUND STRUCTURAL ELEMENTS
b JOINTS SHALL BE SAWCUT NOT LATER THAN 12 HOURS AFTER CONCRETE HAS BEEN POURED

6 TYP S.O.G. CONSTRUCTION & SAWCUT CONTROL JOINTS
N.T.S.



7 TYP ISOLATION JOINT DETAILS
N.T.S



8 TYP SERVICE LINES AT FOOTING LOCATION
1 : 20

RK ENGINEERING

PROJECT
RESIDENCE
[redacted]
LAKE HOUSE CONCRETE
RETAINING STRUCTURE
101 BIRCHCLIFF ROAD
SUMMER VILLAGE OF BIRCHCLIFF
LOT 15A, BLOCK 2, PLAN 1922 0413

DRAWING
TYPICAL DETAILS

No.	DATE	ISSUED FOR	BY
2	2022-09-14	BUILDING PERMIT	
1	2022-09-06	TSS REVIEW	

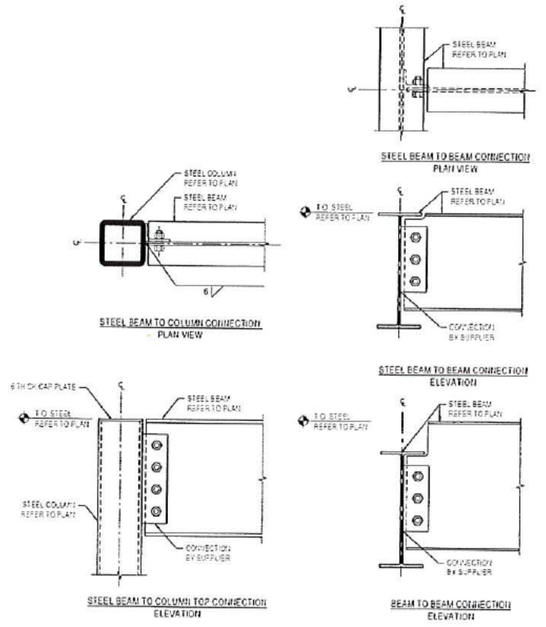
Revisions & Issues

SEAL

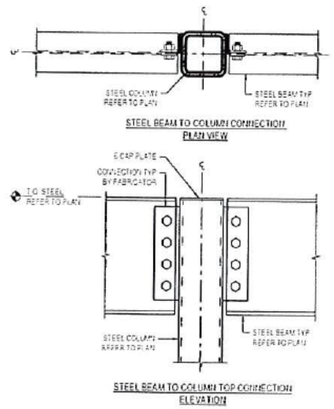
2022-09-14

SCALE	As indicated
DRAWN	RK
CHECKED	RK
09/05/22	2022-01

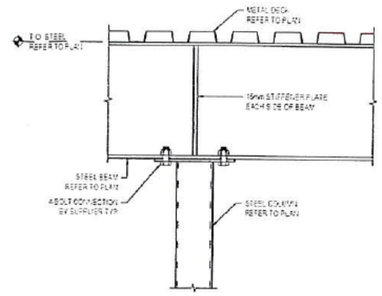
S1



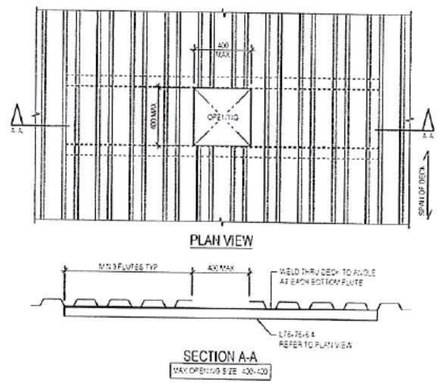
1 TYP STEEL BEAM END CONNECTION DETAILS
1 : 10



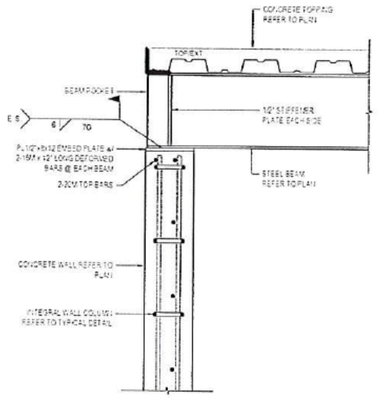
2 TYP STEEL BEAMS TO COLUMN DETAIL
1 : 10



3 TYP BEAM OVER COLUMN CONNECTION
1 : 10

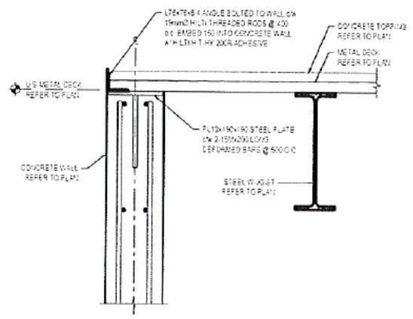


4 TYP SMALL OPENING THRU METAL DECK
1 : 20

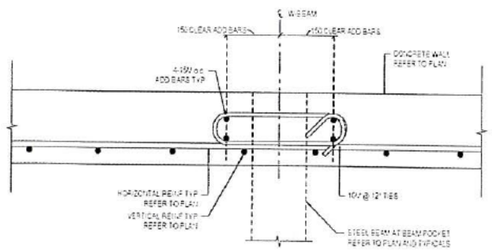


CONDITION B
JOISTS PERPENDICULAR TO WALL

5 TYP ICF WALL STEEL BEAM POCKET
1 : 12



6 TYP W-SECTION ROOF JOIST TO CONCRETE WALL
1 : 10



7 TYP INTEGRAL WALL COLUMN UNDER POCKETED BEAMS AND COLUMNS
1 : 8

RK ENGINEERING

PROJECT
RESIDENCE
LAKE HOUSE CONCRETE
RETAINING STRUCTURE
101 BIRCHCLIFF ROAD
SUMMER VILLAGE OF BIRCHCLIFF
LOT 3A, BLOCK 2, PLAN 002 0413

DRAWING
TYPICAL DETAILS

No	DATE	ISSUED FOR	BY
2	2022-09-14	BUILDING PERMIT	
1	2022-09-09	TBN REVIEW	

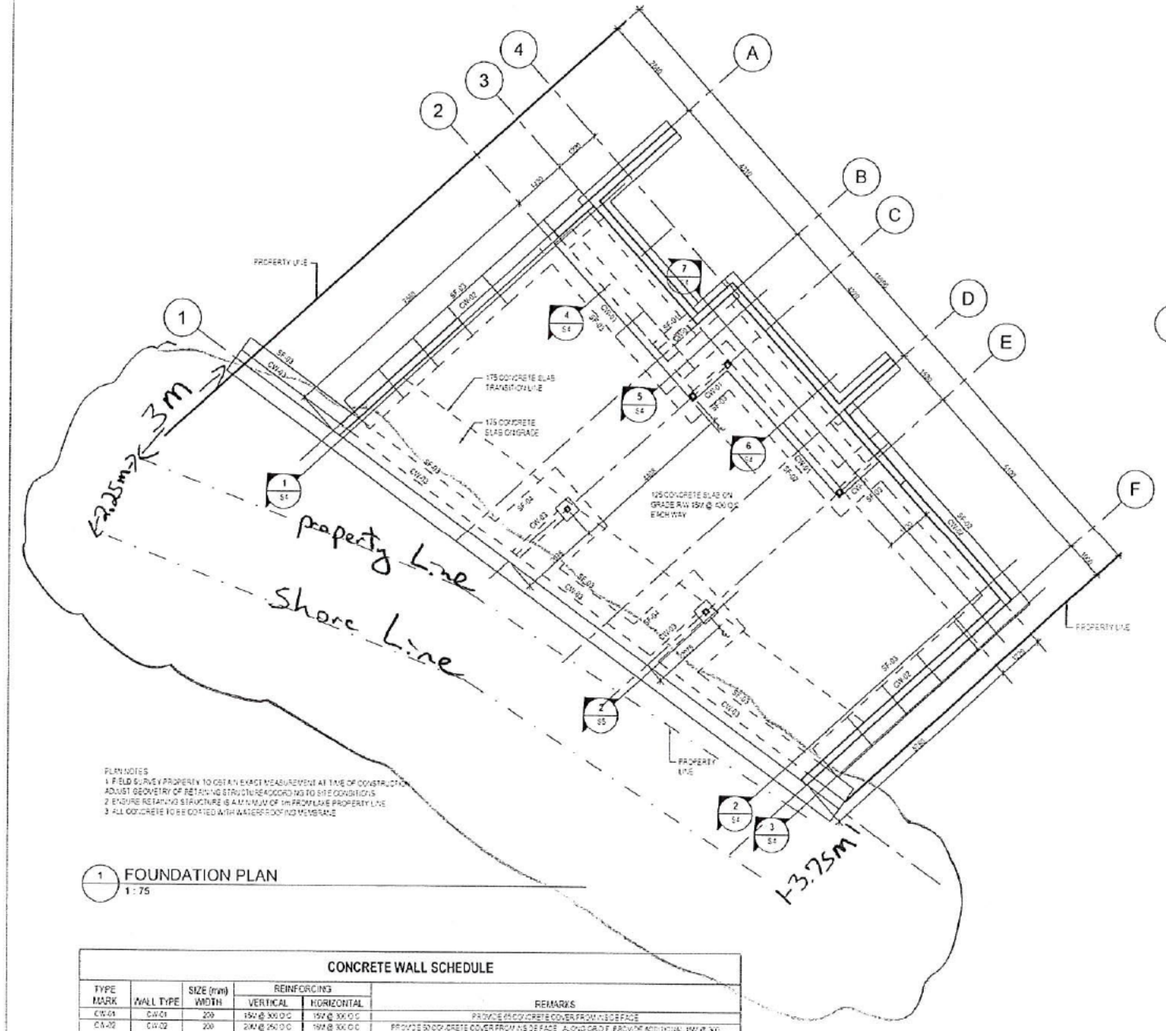
Revisions & Issues

SEAL

PROFESSIONAL ENGINEER ALBERTA
2022-09-14

SCALE	As indicated
DRAWN	RK
CHECKED	RK
09/06/22	2022-01

S2



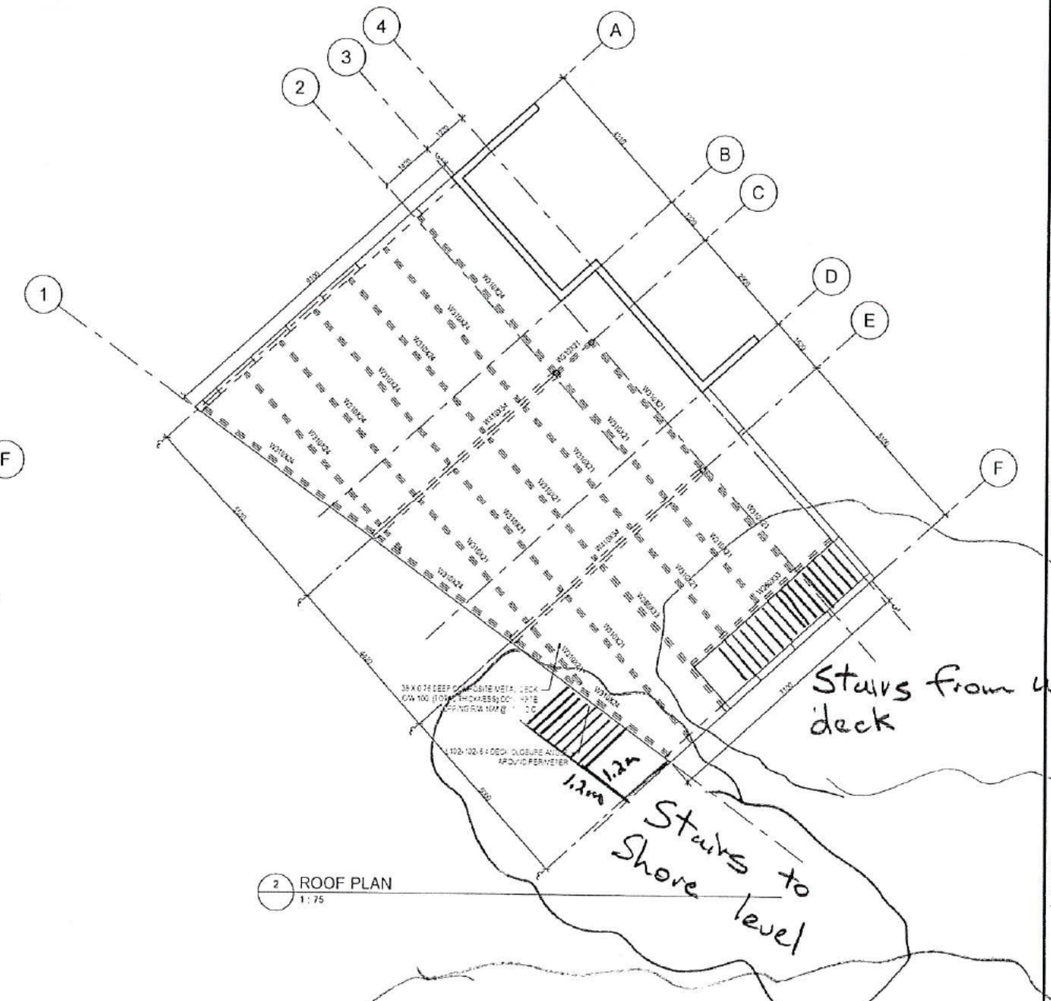
1 FOUNDATION PLAN
1 : 75

CONCRETE WALL SCHEDULE

TYPE MARK	WALL TYPE	SIZE (mm) WIDTH	REINFORCING VERTICAL	REINFORCING HORIZONTAL	REMARKS
CW-01	CW-01	200	15M @ 300 O.C	15M @ 300 O.C	PROVIDE 65MM CONCRETE COVER FROM INSIDE FACE
CW-02	CW-02	200	20M @ 250 O.C	15M @ 300 O.C	PROVIDE 50MM CONCRETE COVER FROM INSIDE FACE ALONG GRADE. PROVIDE ADDITIONAL 15M @ 300 HORIZONTAL BARS EXTENDING FROM CORNER 80 1200 PAST THE FLOOR OPENING
CW-03	CW-03	250	20M @ 200 O.C EACH FACE	20M @ 200 O.C EACH FACE	PROVIDE 50 CONCRETE COVER EACH FACE

CONCRETE STRIP FOOTING SCHEDULE

TYPE MARK	SIZE (mm) WIDTH	LENGTH	DEPTH	REINFORCING CONTINUOUS	REINFORCING TRANSVERSE	REMARKS
SF-01	600		300	3-15M	15M @ 300 O.C	
SF-02	800		300	4-15M	15M @ 250 O.C	
SF-03	1000		300	5-15M	15M @ 250 O.C	
SF-04	2000		300	5-15M	20M @ 250 O.C	



2 ROOF PLAN
1 : 75

Stairs to be Steel Stringers wood treads

RK ENGINEERING

PROJECT
RESIDENCE
LAKE HOUSE CONCRETE RETAINING STRUCTURE
101 BIRCHCLIFF ROAD
SUMMER VILLAGE OF BIRCHCLIFF
LOT 3A, BLOCK 2, PLAN 802 0413

DRAWING
PLANS & SECTIONS

No.	DATE	ISSUED FOR	BY
2	2022-09-14	BUILDING PERMIT	
1	2022-09-06	75% REVIEW	

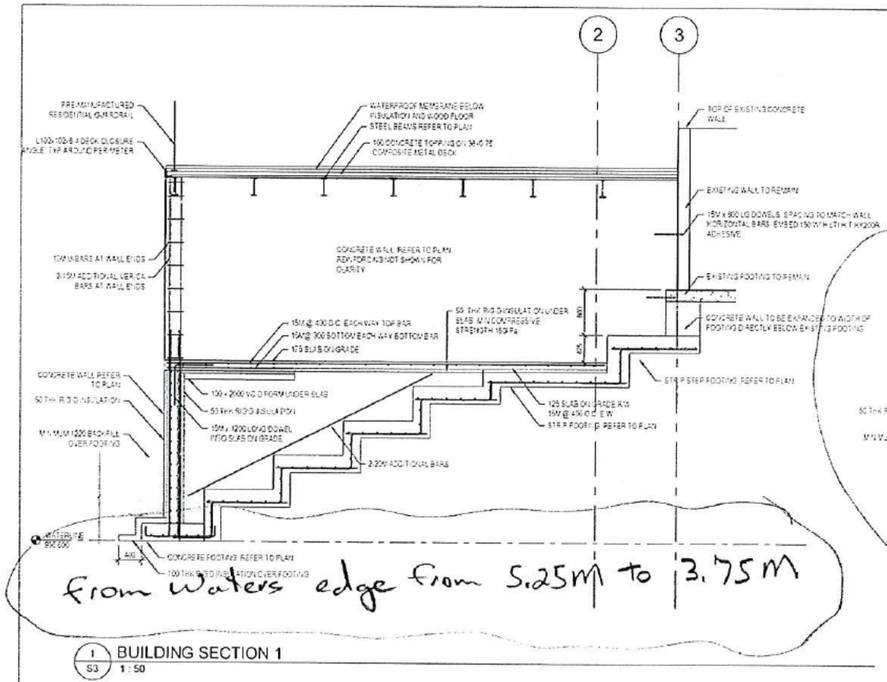
Revisions & Issues

SEAL

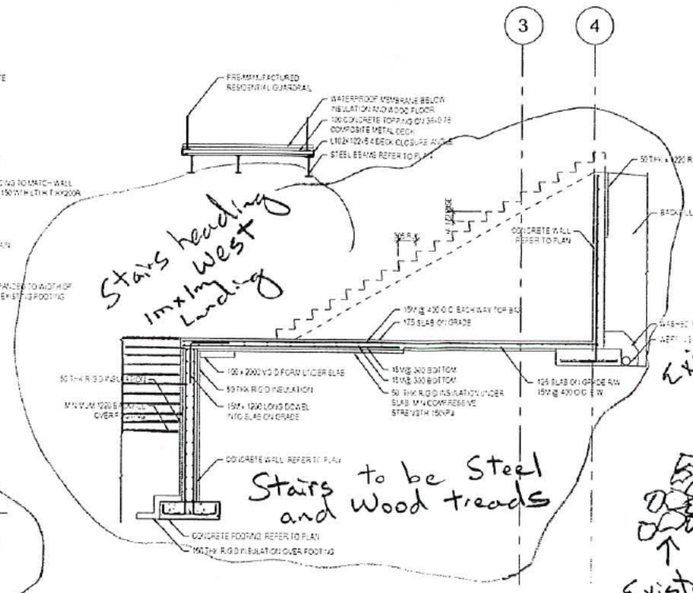
PROFESSIONAL ENGINEER ALBERTA
2022-09-14

SCALE	1 : 75
DRAWN	RK
CHECKED	RK
01/02/22	2022-01

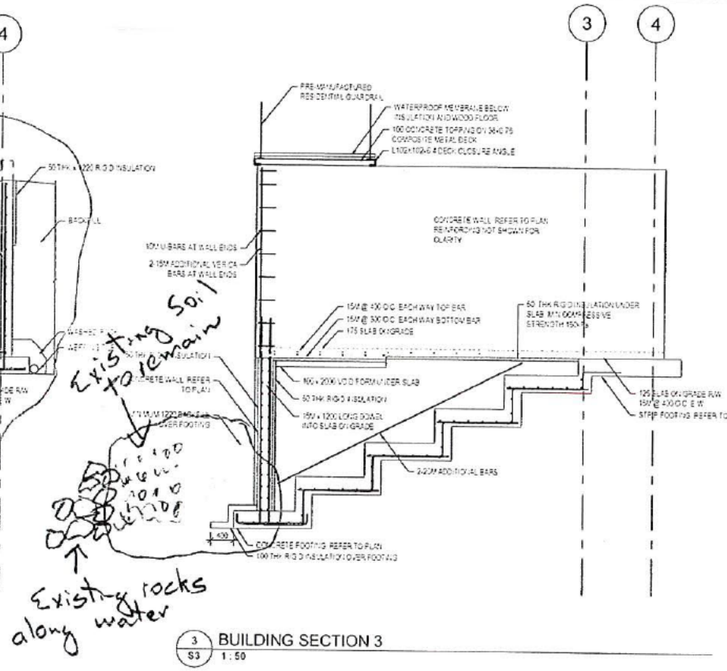
S3



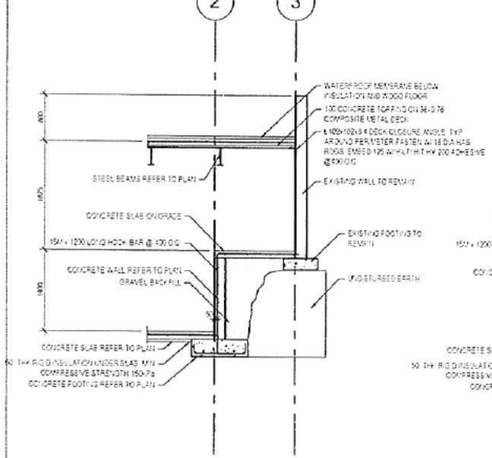
1 S3 BUILDING SECTION 1
1 : 50



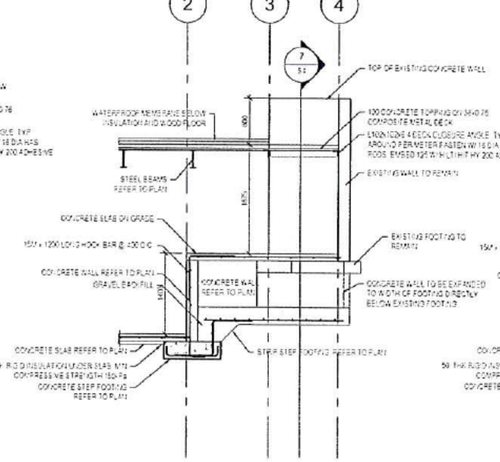
2 S3 BUILDING SECTION 2
1 : 50



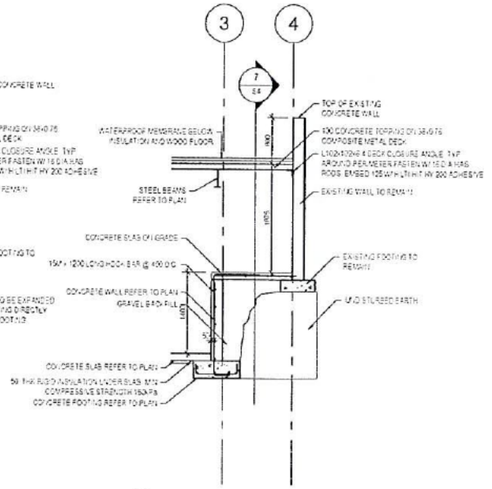
3 S3 BUILDING SECTION 3
1 : 50



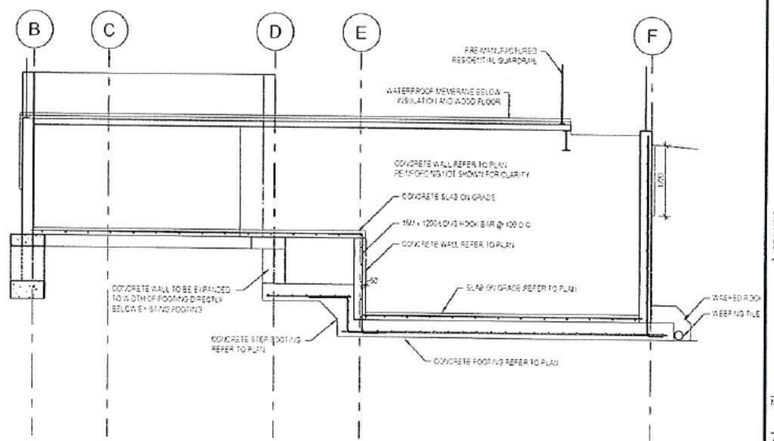
4 S3 BUILDING SECTION 4
1 : 50



5 S3 BUILDING SECTION 5
1 : 50



6 S3 BUILDING SECTION 6
1 : 50



7 S3 BUILDING SECTION 7
1 : 50

RK ENGINEERING

PROJECT
RESIDENCE
[redacted]
LAKE HOUSE CONCRETE RETAINING STRUCTURE
101 BIRCHCLIFF ROAD
SUMMER VILLAGE OF BIRCHCLIFF
LOT 3A, BLOCK 2, PLAN 822 2413

DRAWING
BUILDING SECTIONS

No	DATE	ISSUED FOR	BY
2	2022-09-14	BUILDING PERMIT	
1	2022-08-06	75% REVIEW	

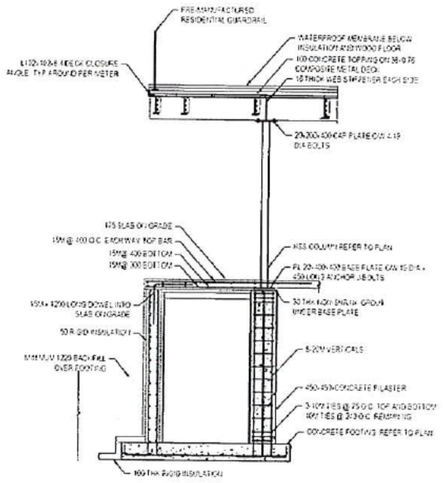
Revisions & Issues

SEAL

PROFESSIONAL ENGINEER ALBERTA
RANDY KLASSEN
2022-09-14
PERMIT TO PRACTICE RK 21130

SCALE	1 : 50
DRAWN	RK
CHECKED	RK
08/24/22	2022-01

S4



2 / S3 BUILDING SECTION 9
1 : 50

RK ENGINEERING

RESIDENCE
[redacted]
LAKE HOUSE CONCRETE
RETAINING STRUCTURE
101 BIRCHCLIFF ROAD
SUMMER VILLAGE OF BIRCHCLIFF
LOT 3A, BLOCK 2, PLAN 802 0413

PROJECT

BUILDING SECTIONS

DRAWING

2 2022-09-14 BUILDING PERMIT
1 2022-09-06 ISSUED FOR REVIEW
No. DATE ISSUED FOR BY
Revisions & Issues

SEAL

PROFESSIONAL ENGINEER ALBERTA
RANDY KLASSEN
2022-09-16

SCALE 1 : 50
DRAWN RK
CHECKED RK
08/24/22 2022-01

S5

LIF EXPOSURE CLASSES S-1, S-2 AND S-3.
ALLOW FOR REVIEW OF REINFORCEMENT.

ING AND WATER TO CEMENTING MATERIALS

	AIR CONTENT CATEGORY	MAX W/C RATIO	CEMENT TYPE
	1	0.45	GU
	1/2	0.45	HS
	1	0.5	GU

N SITE TO INSPECT THE SLAB SUBGRADE
ERMINE WHETHER OR NOT THE EXPOSED
FILL OR COMPACTION IS REQUIRED. ALL
E REVIEWED, TESTED AND APPROVED BY

G AREA. THE EXPOSED SURFACE SHOULD
CTOR MAXIMUM DRY DENSITY.
VEL BASE, COMPACTED TO 98% STANDARD
AVEL IN MAXIMUM LIFTS OF 150 mm. AND

TS AT MAX 4.5 m CENTERS EACH WAY.

IG.
S BEEN POURED.
TH 10M @ 300 o.c. ALL SIDEWALKS IN
D WITH HILTI HIT HY-200.

CONFORM TO CSA-S16 AND THE CISC

DIAN WELDING BUREAU TO THE

EVIEW PRIOR TO FABRICATION.

6-M1990 WITH REINFORCEMENT

WELD ALL AROUND.
TH, INCLUDING PAINTED STEEL.

ALL BOLTED CONNECTIONS TO USE
RAWINGS.
E, WHERE GRANTED, A COMPLETE
US-CONTRACTOR AND/OR TRADE-

S, DO NOT PRIME ANCHOR BOLTS OR

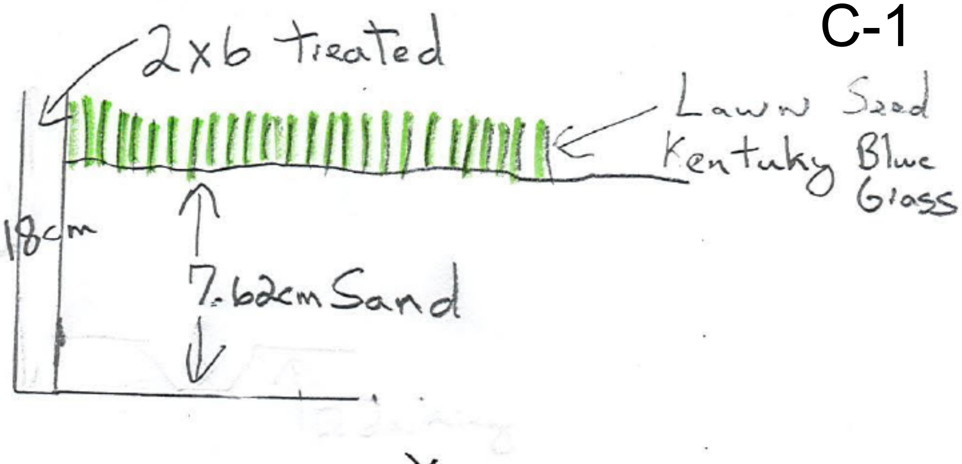
TOP COAT, TO BE CLEANED AND
NO PRIMER,
TOP PRIMER,
TABLE BELOW.

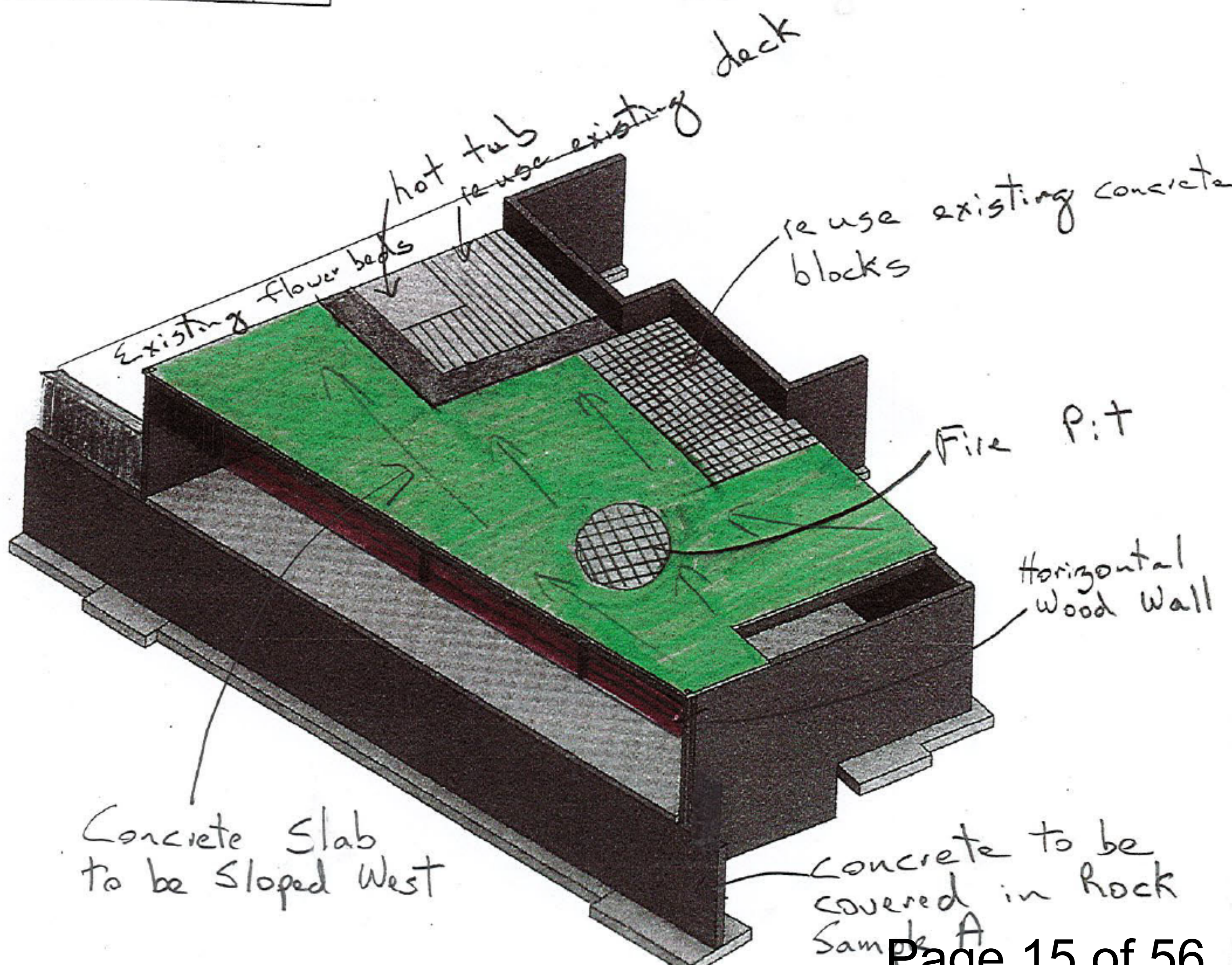
GRADE
SC

TION REQUIREMENTS
WC PRIMER OVER SP6;
5-100 MICROMETER FIELD TOP
POXY.

QUIREMENTS
TWO THIRDS OF EACH
EE OF ALL VISIBLE RESIDUES.
OF EXPOSURE.)

4. METAL ROOF DECK
   a. UNLESS NOTED OTHERWISE ON DRAWINGS - 38mm DEEP PREFORMED ZINC COATED STEEL IN ACCORDANCE WITH CSSBI 10M. FLUTES SPACED AT 150mm MAXIMUM ON CENTRE. MINIMUM THICKNESS BEFORE GALVANIZING TO BE 0.76mm. GALVANIZED WITH ZINC COATING OF 227G AS DESIGNATED BY ASTM A653/A653M-09.
   b. UNLESS NOTED OTHERWISE, LIMIT ALLOWABLE DEFLECTION FOR METAL ROOF DECK TO THE FOLLOWING
      - LIVE LOAD - SPAN/360
      - TOTAL LOAD - SPAN/240
5. THE METAL DECK(S) ACT AS A DIAPHRAGM FOR THE DISTRIBUTION OF WIND AND SEISMIC FORCES TO THE LATERAL LOAD RESISTING ELEMENTS.
6. BASE METAL THICKNESS OF DECK(S) INDICATED ABOVE AND/OR ON DRAWINGS, IS MINIMUM TO SATISFY DIAPHRAGM REQUIREMENTS. INCREASE THICKNESS AS REQUIRED TO SUPPORT GRAVITY LOADS AND TO SATISFY DEFLECTION LIMITS ABOVE.
7. UNLESS NOTED OTHERWISE, FASTEN ALL COMPOSITE METAL FLOOR DECK TO SUPPORTING ELEMENTS AS FOLLOWS:
   a. 20 mm Ø FUSION WELDS IN *EVERY* FOR MEMBERS PERPENDICULAR TO THE DECK SPAN.
   b. 20 mm Ø FUSION WELDS @ 300 mm o.c. AROUND THE PERIMETER AND ANY LONGITUDINAL MEMBERS PARALLEL TO THE DECK SPAN.
   c. SIDE LAP CONNECTION: *HILTI S-SLC-01 M HWH SIDELAP CONNECTOR* FOR OVERLAPPING JOINTS, AND FOR INTERLOCKING JOINTS @ *150mm o.c.*
8. DECK UNITS TO BE CONTINUOUS OVER AT LEAST THREE SUPPORTS WHERE STRUCTURAL FRAMING PERMITS.
9. PROVIDE L64x64x5.4 ANGLE TO SUPPORT ALL EDGES OF DECK. PROVIDE CLOSURE STRIPS AS REQUIRED FOR UNSUPPORTED FLUTE EDGES.
10. PROVIDE L76x76x9.4 ANGLE TO SUPPORT DECK EDGES AT ALL OPENINGS UP TO 400 mm. FOR LARGER OPENINGS, REFER TO TYPICAL DETAILS.
11. ALL CONCRETE TOPPING ON STEEL DECK WHICH IS SHOWN ON THE DRAWINGS SHALL BE STRUCTURAL CONCRETE TOPPING.
12. L 102x102x6.4 CONCRETE TOPPING CLOSURE ANGLE REQUIRED AROUND PERIMETER ANY ANY OPENINGS.



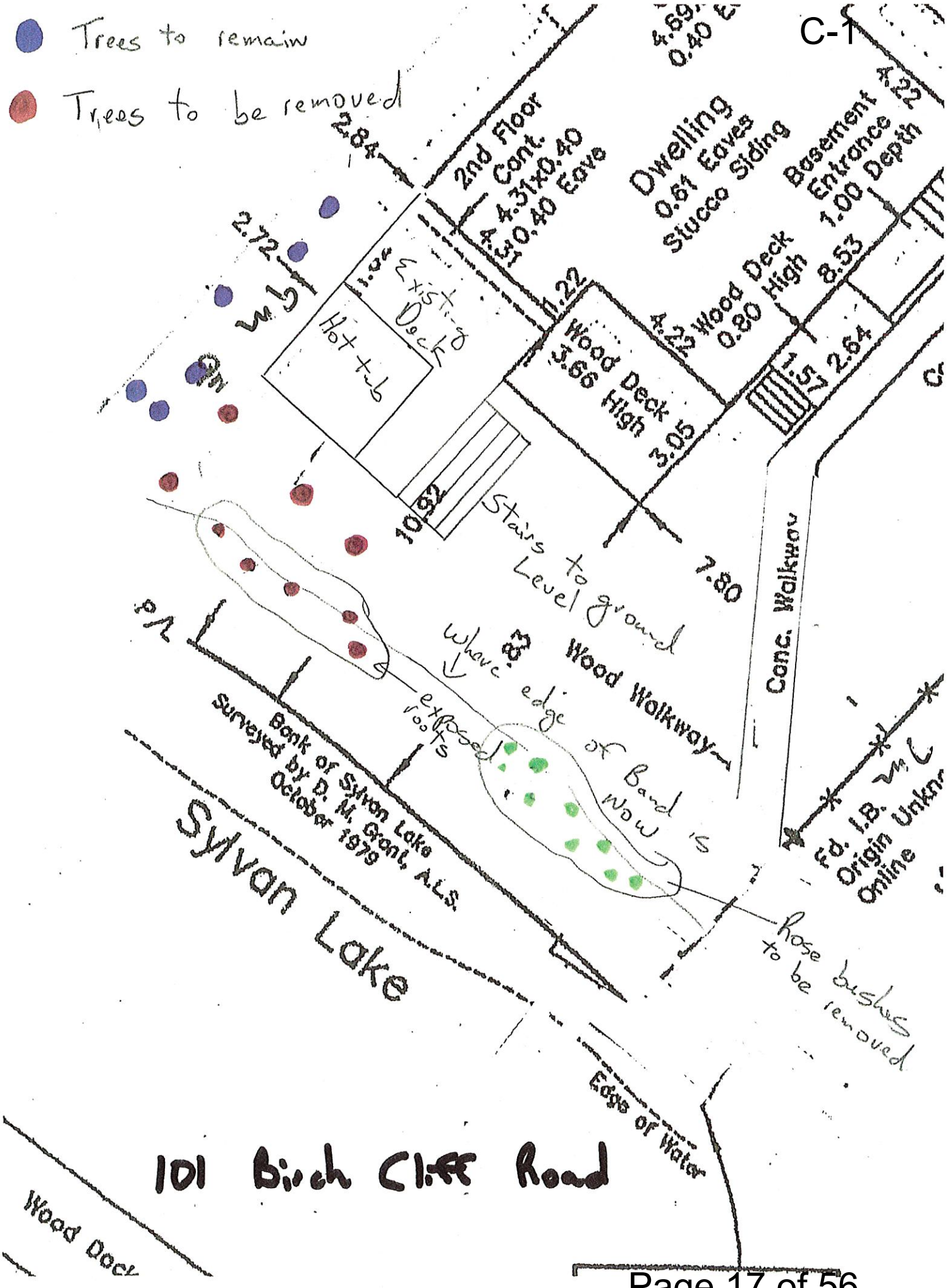


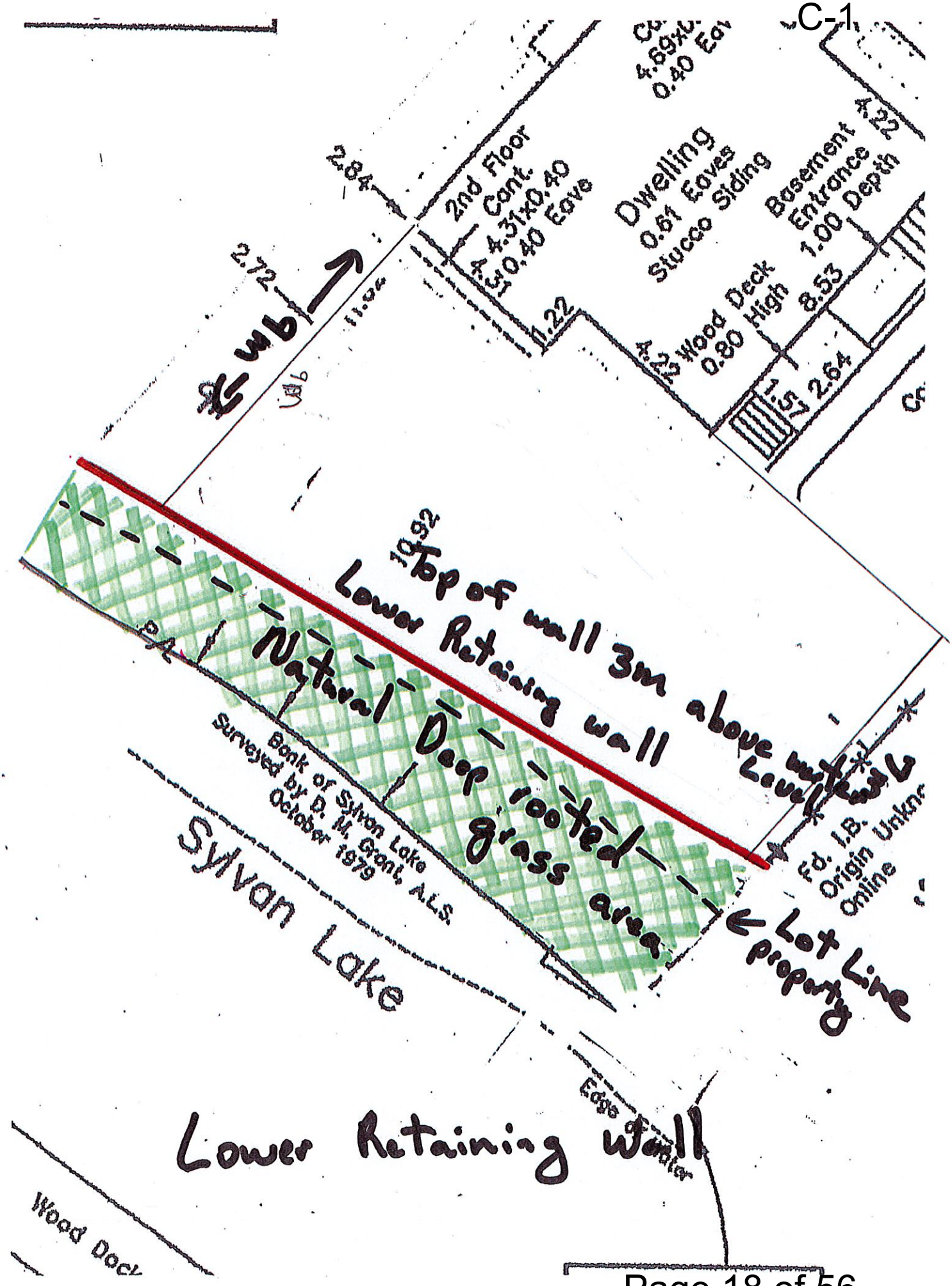
RESIDENCE

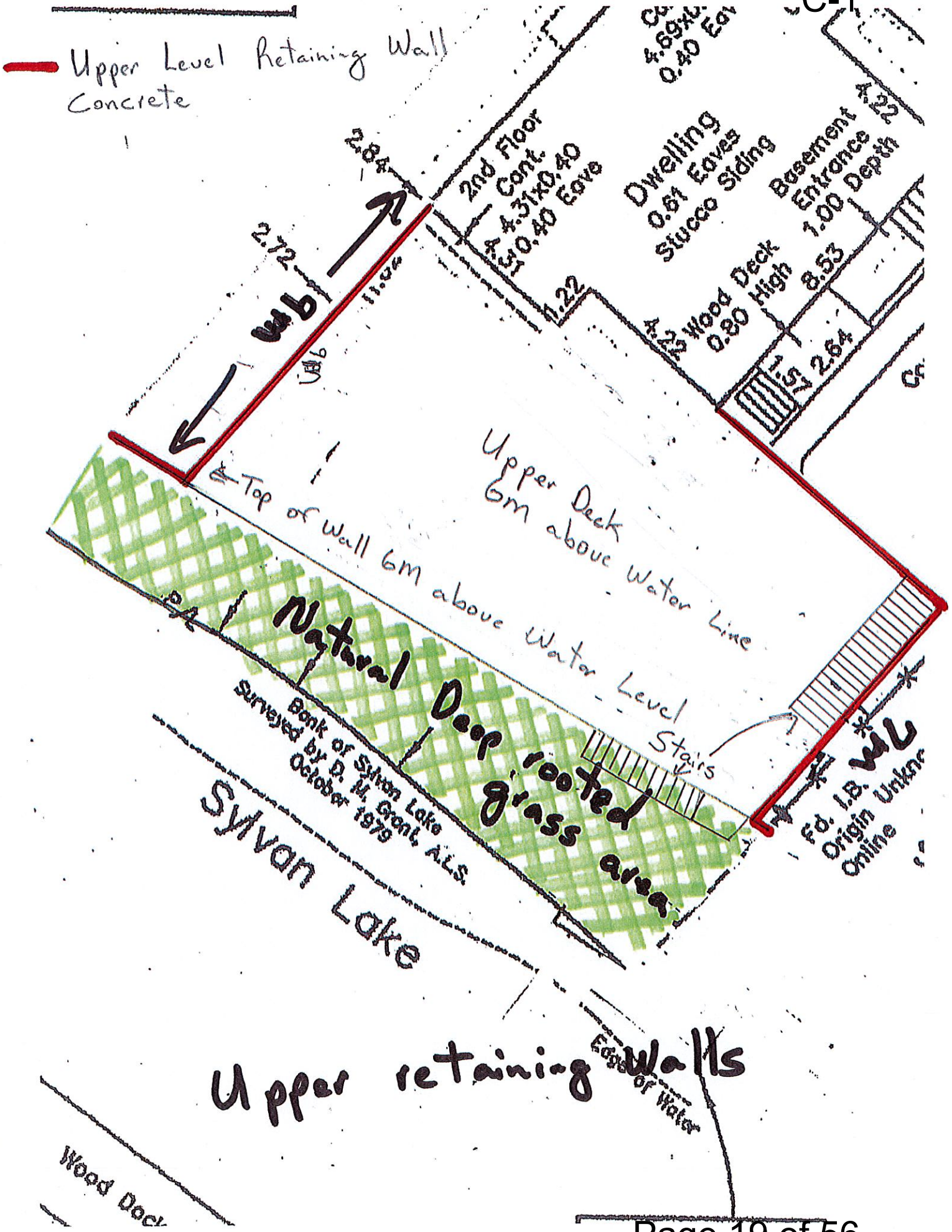
[redacted]

No. DATE
Revisi


Sample A


Trees to remain
Trees to be removed
2nd Floor Cont. 4.31x0.40 Eave
Dwelling 0.61 Eaves Stucco Siding
Basement Entrance 1.00 Depth
Existing Deck
Hot tub
Wood Deck 0.80 High
Wood Deck 3.66 High
Stairs to Level ground
Wood Walkway
Conc. Walkway
Bank of Sylvan Lake surveyed by D. M. Grant, A.L.S. October 1979
Sylvan Lake
Whave edge of Band is now
exposed roots
Fd. I.B. Origin Unknown Online
Rose bushes to be removed
Edge of Water
101 Birch Cliff Road
Wood Dock


2nd Floor
Cont.
4.31x0.40
0.40 Eave
Dwelling
0.61 Eaves
Stucco Siding
Basement
Entrance
1.00 Depth
2.84
2.72
Wood Deck
0.80 High
8.53
0.22
2.64
10.92
Top of wall 3m above Lower Retaining wall
Natural Deep rooted Grass area
Bank of Sylvan Lake
Surveyed by D. M. Grant, A.L.S.
October 1979
Sylvan Lake
Lot Line
property
Fd. I.B.
Origin Unkn
Online
Edge of Water
Lower Retaining Wall
Wood Dock


Upper Level Retaining Wall
Concrete
2nd Floor
Cont.
4.31x0.40
4.31x0.40 Eave
Dwelling
0.61 Eaves
Stucco Siding
Basement
Entrance
1.00 Depth
4.32
2.84
2.72
11.04
UWL
0.22
4.42
Wood Deck
0.80 High
8.53
2.64
Upper Deck
6M above Water Line
Top of Wall 6M above Water Level
Stairs
Natural Deep rooted grass area
Bank of Sylvan Lake
Surveyed by D. M. Grant, A.L.S.
October 1979
Sylvan Lake
WL
Fd. I.B.
Origin Unkno
Online
Upper retaining Walls
Edge of Water
Wood Dock

Smith Dow & Associates Ltd.

- Foundation and Geotechnical Engineering
- Soil Investigation and Site Assessment
- Slope Stability Reports
- Environmental Audits
- Material Testing: Soil, Asphalt, and Concrete

Proposed Slope Stabilization and Retaining Wall Structure
101 Birchcliff Road
Summer Village of Birchcliff, Alberta

File No: 101 Birchcliff Road

September 8, 2022

4632 - 62 Street, Red Deer, Alberta T4N 6T3 Phone : (403) 343 - 6888 Fax: (403) 341 - 4710

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September 8, 2022

[redacted]
Sylvan Lake, Alberta

File No: 101 Birchcliff Road

Attn: [redacted]

Re: Proposed Slope Stabilization and Retaining Wall Structures
101 Birchcliff Road
Summer Village of Birchcliff, Alberta

As informed the cost of slope stabilization by means of using driven H steel piles with wood lagging and tiebacks is prohibitive. In addition, it is more difficult to install the driven H steel piles.

An alternative approach to stabilize the slope is to remove section of the slope and reshape it to improve the slope stability. The section of the slope removed will be replaced with a retaining wall structure consisting of two retaining walls joined together by perpendicular stripped concrete footings, concrete slab and a concrete roof to stabilize the slope and existing structure. (see proposed diagram)

As excavation of section of the slope will be close to the existing house, two additional test holes (see Drawing #1) were opened close to the existing house to reveal general soil conditions in the house area. Hole #1 was directly beneath the deck at the back of the house. Hole #2 was close to the stairs on the northwest corner of the house.

The intent of opening the two test holes in a very restricted area was to observe the general soil conditions especially the fill material thickness and type of foundation soil supporting the existing structure.

The purpose of this investigation was to determine the general extent and nature of the subsurface materials encountered along with some basic engineering properties of the subsurface soil. Environmental studies are beyond the scope of this report.

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Subsurface Features

A) Subsoil Conditions

The soil profiles, as logged at the borehole locations, are shown on drawing No.'s 2 and 3 inclusive, Appendix A. Results of field and laboratory tests are shown on the borehole logs.

The soil profile at the two test hole areas close to the existing house consisted of fill material and native clay till. The geotechnical report should be read in conjunction with information provided in the attached soil logs.

Fill Material

Fill material, ranging from 1.3 to 2.3 meters thick, was found at hole #2 and #1 respectively. The fill was a mixture of clay, silt, and some sand. The fill at the test hole locations appeared in a firm state.

The fill material is unsuitable as foundation material to support any structural load of the retaining wall structure. Exterior flatworks, brick / stonework, etc. resting on the on-site fill soil could experience some differential movement. Any fill material placed near the slope crest will reduce the stability of the slope with the existing slope parameters. All excavated soil during construction of the new retaining wall structure must be moved from the sloped portion of the property.

Clay Till

Native clay till was encountered beneath the fill material. It extended to the bottom of the test holes. The olive brown colored native clay soil was primarily stiff in consistency. The native clay till was characterized with white mineral deposits, stones to pebbles, rusting, grey streaks, coal specks and bedrock fragments. Damp interlayers were noted at occasional elevations within the native clay deposit at borehole #2 only. No damp interlayers were noticed at borehole #1 area.

The on-site clayey soil with a plastic index of about 19.6% can be classified as inorganic clay with medium plasticity. The clayey soil has a medium potential to swell when in contact with water. It is imperative penetration of surface and subsurface water (such as pipe leakage) into the native clay subgrade soil should be prohibited. All subsurface plumbing work must be completed to the highest standard to prevent leaking. Any leakage could cause undesirable movement of the slab or exterior flatworks and reduce the stability of the slope.

B) Stability of Slope

Field observation revealed the southwest facing slope appeared to have apparent signs of erosion within the subject property at the time of site drilling. Though groundwater or seepage was not directly noticed on the slope surface neighboring the building site, the potential of seepage or springs cannot be wholly discounted of under all circumstances.

In order to minimize slope erosion and to maintain the stability of the slope, driven steel piles with wood lagging retaining wall structure was initially proposed. Due to the relatively steep site conditions, construction cost is expensive and difficult to install. An alternative approach is to remove portion of the slope, re-shape it to reduce some load and replace the excavated portion with a concrete retaining wall structure resting on a footing system.

Slope stability analyses were carried out using the slope computer program (Geostudio) to evaluate the stability of the existing southwest facing slope profile in its current state. As well, the stability of the slope was assessed after removing portions of the slope and replacement with a new retaining wall structure resting on a footing. The slope stability analyses were to determine the factors of safety (FS) for various slip planes through compelling development features.

The slope factors of safety (FS) based on the proposed slope retaining wall configurations constructed throughout from the slope crest were analyzed.

The following conservatively assumed soil parameters were used:

Soil Type	Unit Weight (kN/m3)	Cohesive Strength (kPa)	Angle of Internal Friction (degree)
Topsoil / Organic	15	0	10
Native Clayey Soil	20	10	32
Bedrock	22	0	50

Essentially, a factor of safety (FS) of less than 1 indicates that failure is expected. Given the possibility of soil variation, groundwater fluctuation, erosion and other factors, slopes with FS ranging between 1.0 and 1.3 are considered to be marginally stable. A "long term" stable slope to have a calculated FS of at least 1.5 is required for structures constructed at or near the slope.

On account of the present slope configuration, existing vegetation and decking structures on the slope, the stability of the slope based on the cross-sectional profiles from Compass Geomatics were analyzed under the following conditions.

a) The first stage of the slope stability analysis was under "normal" groundwater conditions and existing slope parameters found in cross-sectional profiles #1 and #2.

   The first stage of the slope stability analyses of the existing slope profiles confirms a long-term factor of safety (F.S.) of 1.417 for cross section #1 and 1.758 for cross section #2. This means the existing parameters of the slope near cross section of hole #2 crest is deemed stable. The F.S.'s of 1.758 exceed the minimum required FS of 1.5. Whereas the slope cross section along hole #1 is on a borderline of F.S. = 1.417 which is less than the minimum requirement of F.S. of 1.5. Proper retaining wall structure should be provided to protect the slope surface.

b) The second stage of slope stability analysis was under the assumption of simulated high groundwater level utilizing the cross-sectional profiles #1 and #2.

   The second stage of the slope stability assessment also confirmed a long-term factor of safety (F.S.) of 1.196 for cross section #1 and 1.552 for cross section #2. The F.S. of 1.196 reveal that the cross-sectional profile #1 is only marginally stable. Under these conditions, the cross-sectional profile #2 exceeds the minimum required FS = 1.5.

c) The third stage of slope stability analysis is using the cross-sectional profile #1 with the proposed slope modifications by removing a portion of the slope and replacing it with a concrete retaining wall structure supported by footings.

   The analysis reveals a factor of safety (F.S.) of 2.020 can be obtained. This means the construction of an engineered retaining wall structures about 1.2 meters from the existing building increases the factor of safety to over 1.5. The F.S. of 2.020 exceed the minimum required FS of 1.5. The new engineered retaining wall structure should be maintained at least one meter inside of the property line.

d) The final stage of slope stability analysis is using the cross-sectional profile #1 with the proposed slope modifications and construction of an engineered retaining wall structure about 1.2 meters from the existing house. As well, an addition of a simulated high groundwater table is considered in the analysis.

   The final stage of the slope stability analysis with the proposed slope modifications and an engineered retaining wall structure and simulated high water level reveals a factor of safety (F.S.) of 2.020 can still be maintained. The F.S. of 2.020 exceed the minimum required FS of 1.5.

In order to maintain the stability of the slope, it is imperative the following should be adhered to:

a) Two concrete retaining walls will be required to maintain the stability of the slope and the existing house.

b) The first retaining wall in the upper slope with continuous strip footing will be constructed immediately south and parallel to the existing building footing. A minimum horizonal distance of about 1.2 meters should be maintained from the existing house to minimize potential undermining of the existing building foundation soil.

c) The second concrete retaining wall in the lower slope will be roughly about 3 meters or more within the property line. The continuous strip footing of the second concrete retaining wall will be about the lake water level. Properly installed styrofoam SM insulation is necessary on any footing less than 2.3 meters of soil coverage to prevent heaving of footing foundation.

d) It is our understanding the two concrete retaining walls will be properly connected by two continuous strip footings with walls on the east and west side to add more lateral support for the concrete retaining walls structure. For added lateral support for the retaining wall structure, foundation walls, concrete roof and a concrete slab will be part of the new structure.

e) All concrete footings, retaining walls & roof and all structural components must be properly designed by a qualified structural engineer.

f) All backfill soil against the foundation walls must be moderately compacted to 95% Standard Proctor Maximum Dry Density (SPMDD). The site must be properly slopped to direct water away from all structures.

g) The following sections regarding recommendations for retaining wall construction parameters, soil compaction, the slope developments, site grading, subsurface drainage, and different stages of site inspections as required must also be adhered to for maintaining the stability of the slope during and after construction.

Recommendations

A) Footings

1) Footings can be considered as a foundation for the proposed retaining wall structure.

2) All footings must be directly supported by the firm to stiff natural clay till deposit and extended to depths of about 1.6 meters below the existing grade are preferred.

Footings may be designed based on the following factored resistance (KPa) values.

Footing Depth Below Existing Grade (meters)	Ultimate Resistance (KPa)	Factored Resistance (KPa)	SLS (KPa)
Native Clay	220	110	70

The ultimate resistance values in this table are only based on semi-empirical data, therefore the factored resistance or serviceability bearing resistance should be used for the footing design. The "factored" resistance has been calculated by reducing the ultimate resistance values above by a geotechnical resistance factor of 0.5, in accordance with the building code.

3) The native silty clay soil could be sensitive to vibration. It will lose its soil bearing strength when subject to vibration from excavation equipment, walking traffic and water penetration-presumably surface runoff, precipitation, or groundwater. Extra care must be exercised during footing construction to minimize disturbance of foundation soil.

4) All excavation and footing construction in the vicinity of the existing building must proceed with caution to prevent undermining of adjacent foundation and structure.

5) Site classification for seismic site response is D for this specific site.

6) If construction is carried out during the winter, the foundation excavation must be protected against freezing of the subsoil at the footing grade. Under no circumstances shall concrete be placed on frozen soil.

7) Footings beneath exterior walls of heated portions of the building should have a minimum of 1.6 meters of soil cover, while footings in any unheated areas should be at least 2.3 meters of soil cover.

8) All side slopes of temporary excavations must be braced or cutback to conform with the Occupational Health & Safety Regulations.

9) All footing excavations must be inspected by our representative to verify the continuity of soil and that the recommended soil bearing capacity has been achieved.

B) Floor Slab

Grade-supported floor slabs may be supported by compacted base gravel or radon rock as required and properly prepared subgrade soil. The following procedures are recommended:

1) Remove all questionable fill material, topsoil & organic matter to expose the native clay.

2) Upon completion of site stripping and over-excavation, the exposed excavated bottom must be inspected by our personnel for approval.

3) Compact the exposed native clay or inorganic soil to at least 95% Standard Proctor Maximum Dry Density (S.P.M.D.D.). Any soft areas detected should be removed and replaced with low plastic clay or non-plastic granular soil and compacted to 95% S.P.M.D.D.

4) The final 200 millimeters must be base gravel or radon rock, as required. All crushed base gravel / rock backfill material must be compacted to a minimum of 98% Standard Proctor Maximum Dry Density.

5) All gravel must be uniformly compacted to at least 98 % Standard Proctor Maximum Dry Density (S.P.M.D.D.). All gravel shall also follow the following specification or our engineer's approval.

BASE GRAVEL	
Sieve Size	% Passing by weight
19.00mm	100
12.50mm	70-100
4.75mm	40-60
1.18mm	25-45
0.30mm	10-25
0.075mm	2-12

PITRUN GRAVEL	
Sieve Size	% Passing by weight
150.00mm	100
75.00mm	80-100
25.00mm	50-85
4.75mm	20-60
0.075mm	2-15

6) Compaction tests must be performed during backfill operations to verify the percentage of compaction achieved and if any additional compaction is required.

7) All slabs should be reinforced and cast independently of all building components. As well, interior partitions, etc. should be designed to permit re-leveling should it be susceptible to change in level. Concrete block walls or foundation systems supported by slab-on-grade are not recommended. If the building is unheated, differential movement, deflection and cracking of the slab could occur.

8) Foundation soil supporting the underground utility installation must be adequately compacted to 95 % Standard Proctor Maximum Dry Density to minimize soil movement. The underground pipes must be properly designed to allow ground movement to prevent damage of pipes.

9) All slab subgrade soil and granular fill material must be permanently protected from snow, excessive drying, rain and the ingress of free water, during and after the construction period to prevent any foundation movement.

10) All utility trenches bases must be uniformly compacted to a minimum of 98 % Standard Proctor Maximum Dry Density. As well, the trench backfill must be inorganic and compacted to 98% Standard Proctor Maximum Dry Density.

11) Adequate subsurface drainage system must be installed to prevent any potential water seepage below the concrete slab from surface and all subsurface locations. This includes all fill locations, possible spring areas and / or varying water table elevations / locations, etc

C) Soil Lateral Pressure

Due to current slope configurations, soil parameters and erosion noted near the slope, construction of a retaining structure is needed to ensure the long-term stability of the slope.

1) All retaining walls must be properly designed by a qualified structural engineer to ensure they can withstand the following anticipated soil lateral pressures and over-burden load.

2) The lateral pressures are dependent on the soil type behind the wall, the wall orientation, exposure to frost action, the slope of the backfill away from the wall, and the compactive effort used.

3) For the general case of a permanent vertical wall with horizontal backfill, lateral earth pressures may be computed using the following equation:

$$P = KQ + KrH$$

Where:

P = Lateral earth pressure at depth H below ground level (kPa)
Q = Surcharge loading at the ground surface (kPa)
K = Coefficient of lateral earth pressure
r = Total unit weight of soil backfill compacted to at least 95% Standard Proctor Maximum Dry Density (kN/m^3)
H = depth below ground level (meters)

3) Recommended designed values for these parameters will depend on the type of backfill used. Recommended designed values are given in the table below:

Lateral Earth Pressure Parameter		
Type of Backfill	**Total Unit Weight (kN/m^3)**	**Coefficient of Lateral Earth Pressure K**
Free draining material (40mm Rock)	21	0.4
Clay	20	0.7

The values given above are for backfill compacted to 95 % Standard Proctor Maximum Dry Density. If the density of the backfill is increased, the lateral pressures acting on the wall should be reviewed.

The following should also be considered in the wall design:

1) Prior to the placement of drain rock between the retaining wall and slope, a layer of geotextile filter cloth should be placed to completely wrap around the drain rock, including the top to prevent fine material from contaminating the draining medium.

2) Applicable surcharge loading should be applied if applicable.

3) It is imperative that proper steps be taken to prevent any water that infiltrates the backfill soil from accumulating behind the wall. If water is allowed to permeate the soil behind the wall, large additional pressures will be applied to the wall. The drain rock surface should be covered with approximately 300 millimeters of compacted clay to prevent water from seeping into the draining medium.

D) Ground Water Drainage

a) Around Retaining Wall Structure Perimeters

An adequate and properly designed permanent subdrainage system including weeping tile drain is recommended for the new retaining wall structure. The weeping tile should be placed around the outside perimeter of the new structure walls to allow drainage of local groundwater and water trapped in backfill; and to reduce the hydrostatic pressures against foundation walls and floor slabs.

a) Backfill Soil Compaction

In general, compaction of backfill soil in the following areas are advised to minimize seepage from the surface and surrounding areas.

1) All backfill soil along the perimeters of the foundation walls must be uniformly compacted in 300-millimeter lifts. Each lift should be moderately compacted to 95% S.P.M.D.D. During compaction, caution must be exercised to prevent any damage to the foundation walls.

2) All backfill soil within the utility trenches must be properly compacted in 300-millimeter lifts to 95% S.P.M.D.D. As well, proper measures must be provided to prevent water from the surrounding areas seeping into the building and the subject property.

3) Any other excavated areas must also be properly re-compacted to 95% S.P.M.D.D.

4) Properly designed wing walls should be provided to prevent erosion of the backfill soil around the retaining wall structure.

b) Compaction Tests

Compaction tests must be conducted at each lift of backfill soil of about 300-millimeters to ensure proper compaction has been achieved and warrant if additional compaction testing is required.

c) Site Grading

Proper site grading must be provided to direct all surface runoff away from the buildings and the property.

In providing subsurface drainage and soil compaction, one should note these will only minimize on-site fill soil differential movement. Any exterior flatworks, brick works, fences, etc. supported by the on-site fill material could still experience some differential movement, deflection, or cracking. These are due to the thickness, quality, and compactness of variable fill material across the site. As well, the potential presence of undetected organic fill material within the on-site fill soil could be a contributing factor.

E) General Slope Recommendations

The following general recommendations apply to maintain the stability of the slope during and after construction at this site.

1) In order to reduce the possibility of surficial sloughing, the slopes outside of the new retaining wall structure must be kept well vegetated at all times. The factor of safety of a slope will increase slightly as vegetation is maintained on the slope surface to protect the subgrade soil from weathering.

2) The native soil could be susceptible to erosion. Surface drainage and roof water must be discharged on the ground surface and kept away from the developed slope and the new retaining structure. No water is permitted to discharge below grade as that could cause erosion and potential slope failure.

3) All underground services should be installed to the highest standards to minimize the risk of seepage infiltration into the slope area due to leaking water.

4) No fill or excavated material may be placed at the top of the slope with the exception of any designed retaining wall.

5) Automatic sprinkler system, ornamental fountains, other water retaining structure are prohibited.

6) The finished site grade should be properly sloped to direct all surface water from the structures and sloped areas. A minimum grade slope of 3% is advised at this site.

F) Foundation Concrete

A water soluble sulphate concentration test were completed on one soil samples randomly collected from a selected borehole locations indicated a water soluble concentration of 0.046%. In accordance with current CSA standards, the degree of sulphate exposure may be considered negligible and the use of sulphate resistant hydraulic cement is not required for concrete in contact with local soil. It is advisable water soluble sulphate concentration tests should be completed on any imported fill to verify the sulphate resistant requirements for concrete elements in contact with fill material.

Concrete element exposed to de-icing salts or other substances containing chlorides should be designed in accordance with an exposed concrete classification pertaining to concrete exposed to chloride attack. As well, subsurface concrete could be subject in seasonal saturated conditions. Air-entrainment should be incorporated into any concrete elements that are exposed to freeze-thaw to enhance its durability. In accordance with Clause 4.1.1.1 of CSA A23.1-19, where more than one exposure condition applies to concrete elements, the concrete shall be designed to meet the highest specified 28 day compressive strength, the lowest water-to-cementing materials ratio, the highest range in air content, and the most stringent cement type requirement.

G) Construction Monitoring

The engineering design recommendations presented in this report are based on the assumption that an adequate level of inspection will be provided during construction and that all construction will be carried out by a qualified contractor experienced in construction.

- For footing and slab construction - verification of the footing soil bearing strength and the quality of the slab sub grade soil.
- Concrete testing - to confirm quality of the concrete.
- Soil compaction testing - to confirm the specified compaction standards have been achieved.

Soil

Closure

This report is based on the findings at the borehole locations. Should conditions encountered during construction appear to be different from those shown by the test holes, this office should be notified immediately so that we may reassess our recommendations on the basis of the new findings. Recommendations presented herein may not be valid if an adequate level of inspection is not provided during construction or if relevant building code requirements are not met.

Soil conditions, by their nature, can be highly variable across a construction site. The placement of fill during and prior to construction activities on a site can contribute to variable near surface soil conditions. A contingency should be included in the construction budget to allow for the possibility of variations in soil conditions, which may result in modification of the design, and / or changes in construction procedures.

This report has been prepared for the exclusive use of [redacted] and their agents, for specific application to the development at 101 Birchcliff Road, Summer Village of Birchcliff, Alberta. Any use that a third party makes of this report, or any reliance or decisions based on this report, are the sole responsibility of those parties. It has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty is made, either expressed or implied.

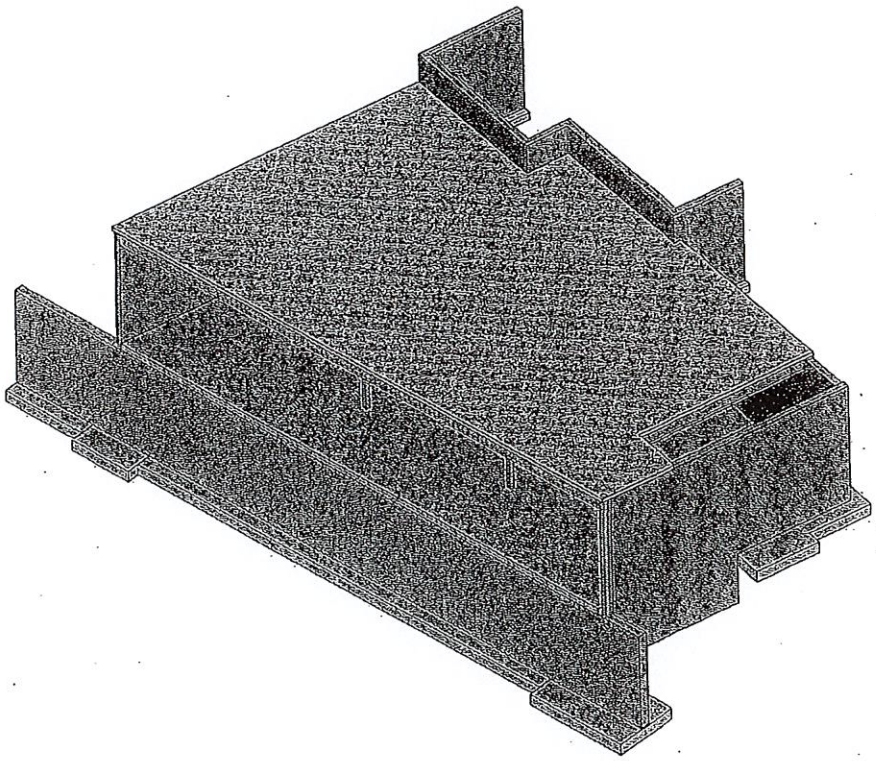
Sincerely,
Smith Dow and Associates Ltd. (Red Deer)

Philip Kwong

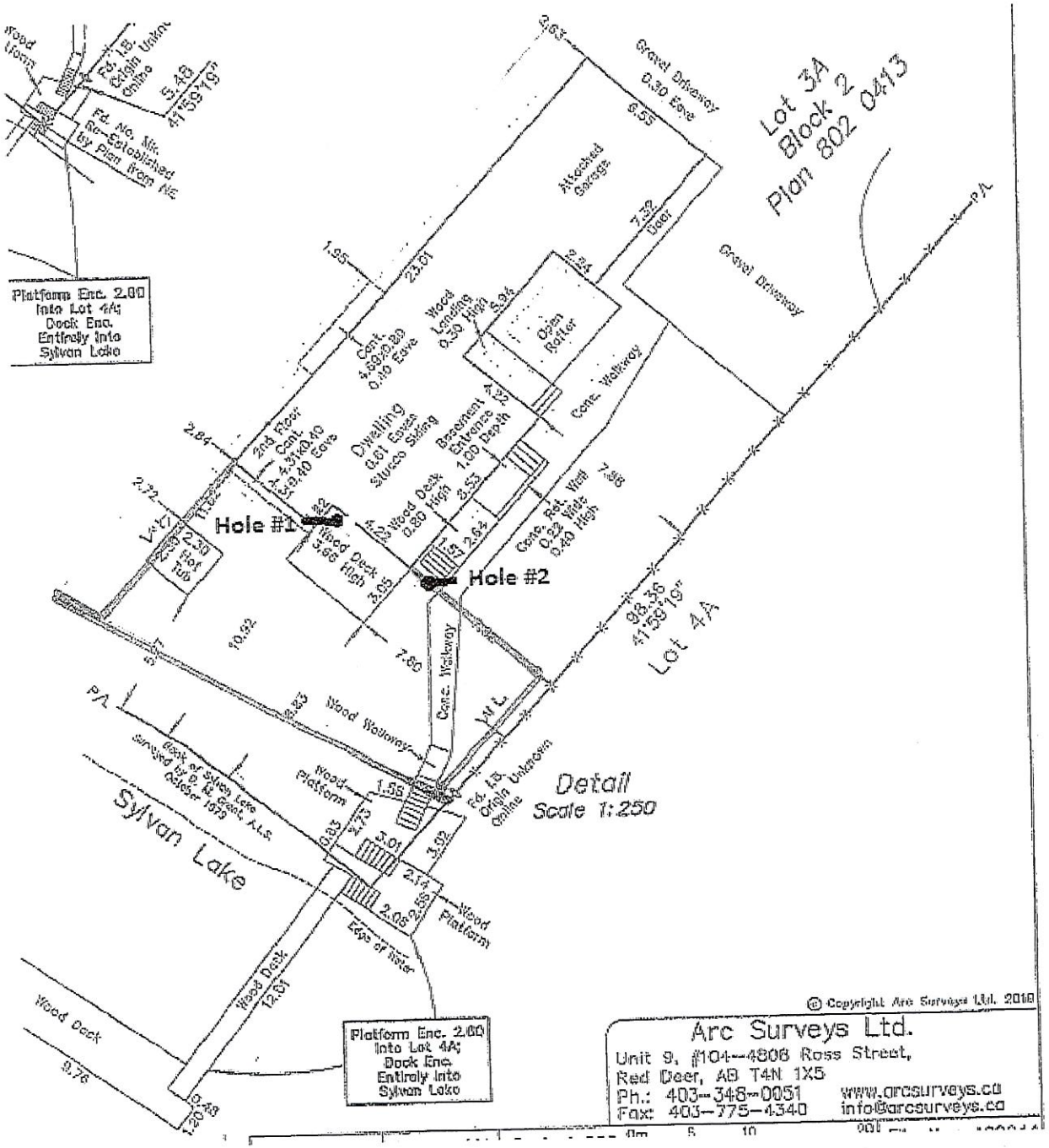
Philip Kwong (P.Eng)

PROFESSIONAL ENGINEER ALBERTA
C.H. PHILIP KWONG

APPENDIX-A



Proposed concrete retaining wall structure


Lot 3A
Block 2
Plan 802 0413
Lot 4A
Gravel Driveway
Attached Garage
Dwelling
Hole #1
Hole #2
Wood Deck
Cone. Walkway
Wood Walkway
Wood Platform
Sylvan Lake
Detail
Scale 1:250
Platform Enc. 2.00 into Lot 4A; Dock Enc. Entirely into Sylvan Lake
Arc Surveys Ltd.
Unit 9, #104-4806 Ross Street,
Red Deer, AB T4N 1X5
Ph.: 403-348-0051
Fax: 403-775-4340
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info@arcsurveys.ca
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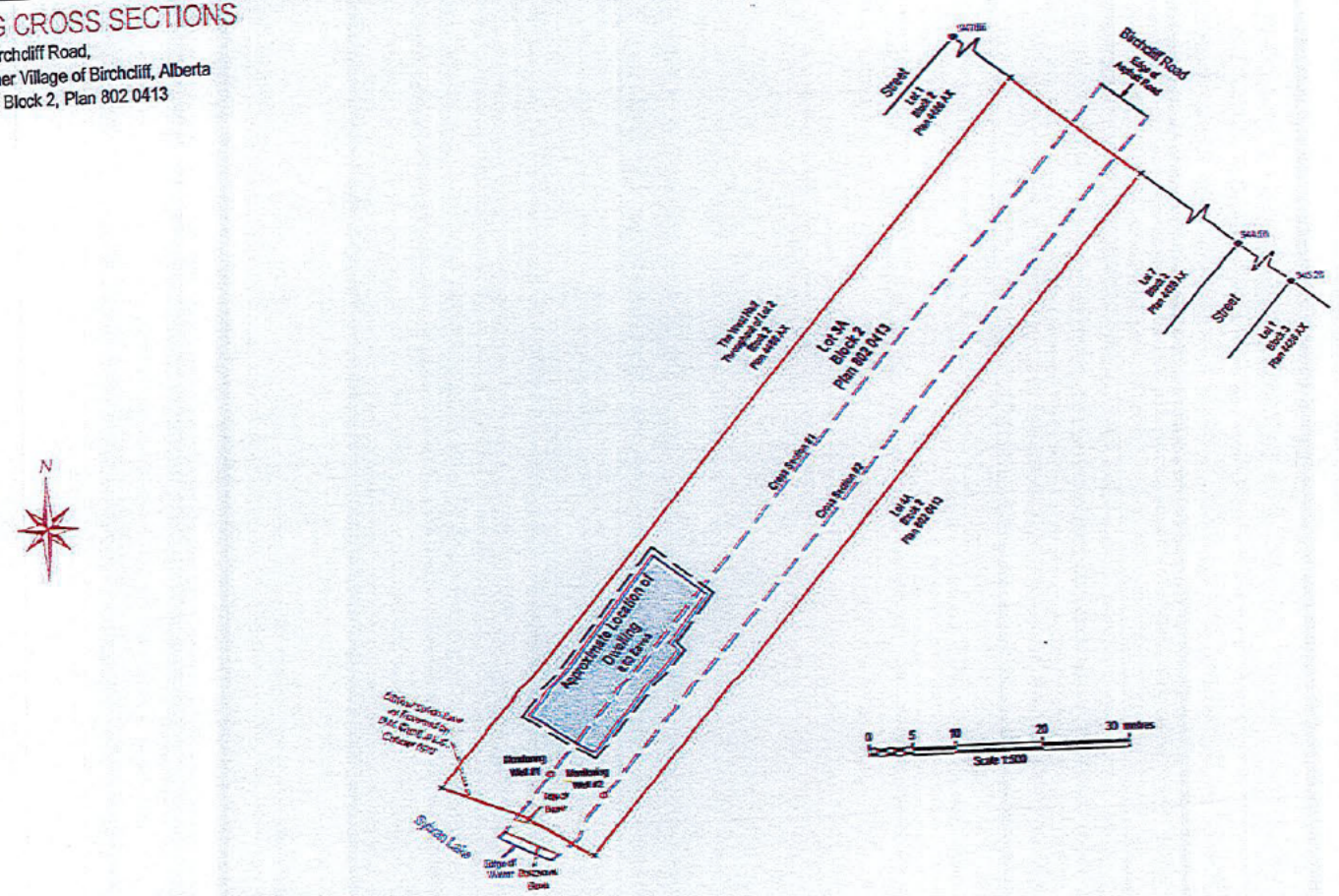
PLAN SHOWING CROSS SECTIONS

Civic Address: 101 Birchcliff Road,
Summer Village of Birchcliff, Alberta

Legal Description: Lot 3A, Block 2, Plan 802 0413



COMPASS Geomatics Ltd.

ALBERTA LAND SURVEYORS' ASSOCIATION
PERMIT NUMBER P266
Compass Geomatics Ltd.

COMPASS DWG: 01407-21-MISC-R0 SURVEYED BY: CH

REVISION SUMMARY
Original Issue (11/10/22) DR/PC

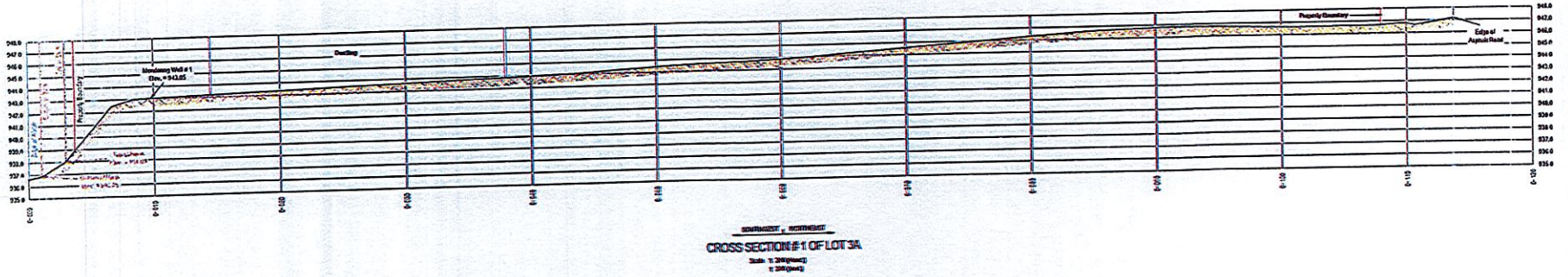
CLIENT [redacted]

REV. 0 PAGE 1 of 3

PLAN SHOWING CROSS SECTION # 1

Civic Address: 101 Birchcliff Road,
Summer Village of Birchcliff, Alberta

Legal Description: Lot 3A, Block 2, Plan 802 0413



CROSS SECTION # 1 OF LOT 3A

COMPASS Geomatics Ltd.
11-4616 63rd Street
Red Deer, Alberta Tel# 873
Office (403) 350-0011 Fax (403) 350-0114
www.compassgeomatics.ca

ALBERTA LAND SURVEYORS' ASSOCIATION
PERMIT NUMBER
P266
Compass Geomatics Ltd.

REVISION SUMMARY

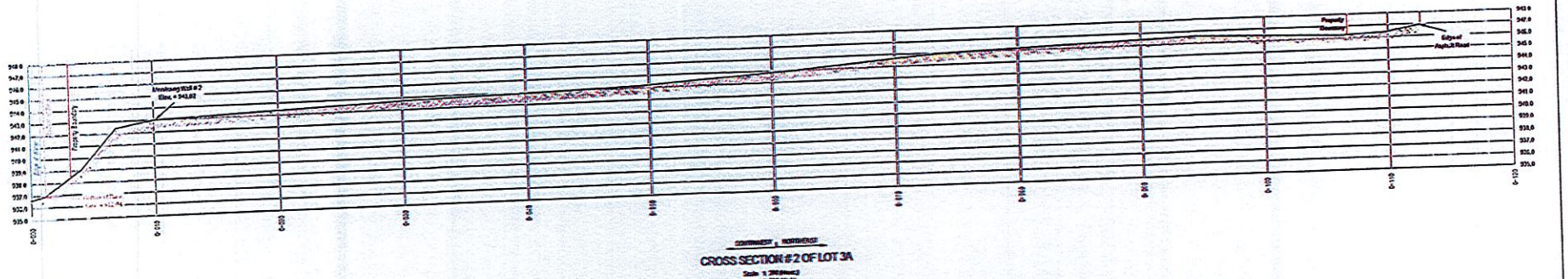
- ORIGINAL ISSUE (11/09/21) DR/PC

SCALE: 1:200
PAGE: 2 of 2

PLAN SHOWING CROSS SECTION # 2

Civic Address: 101 Birchcliff Road,
Summer Village of Birchcliff, Alberta

Legal Description: Lot 3A, Block 2, Plan 802 0413



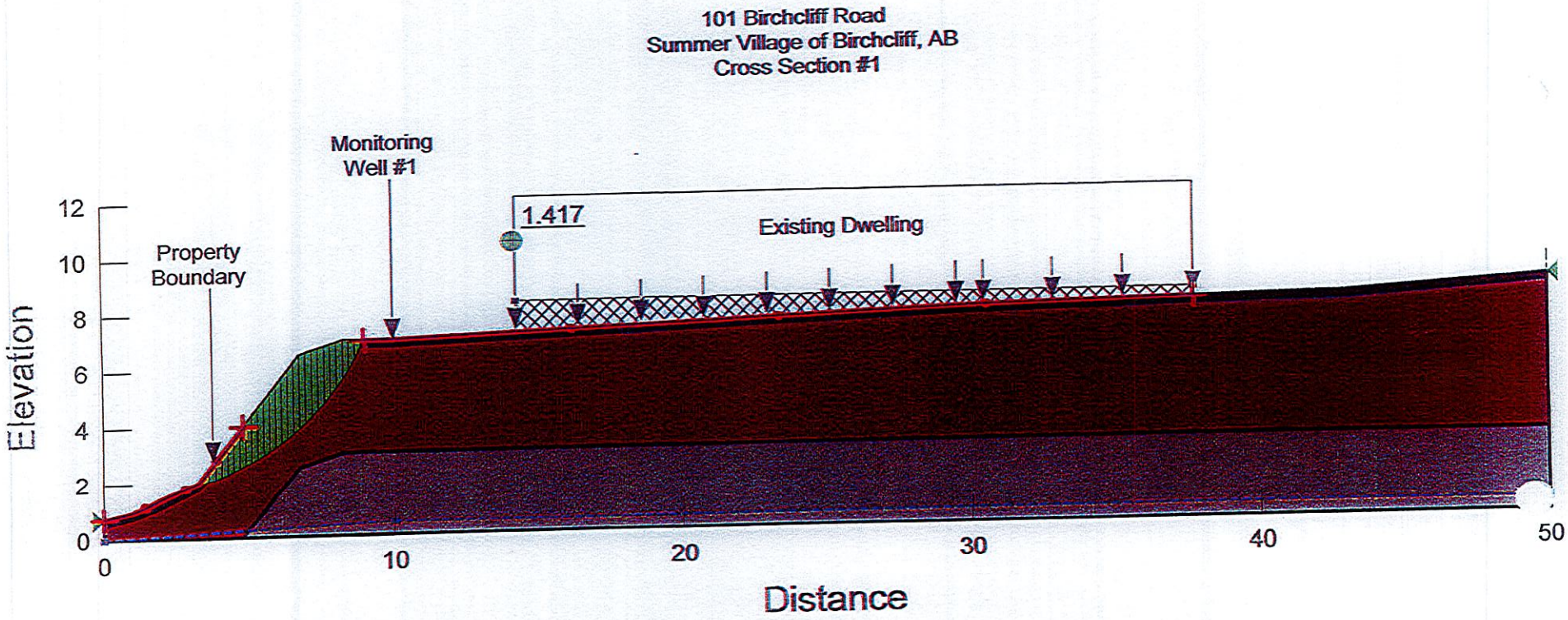
CROSS SECTION # 2 OF LOT 3A

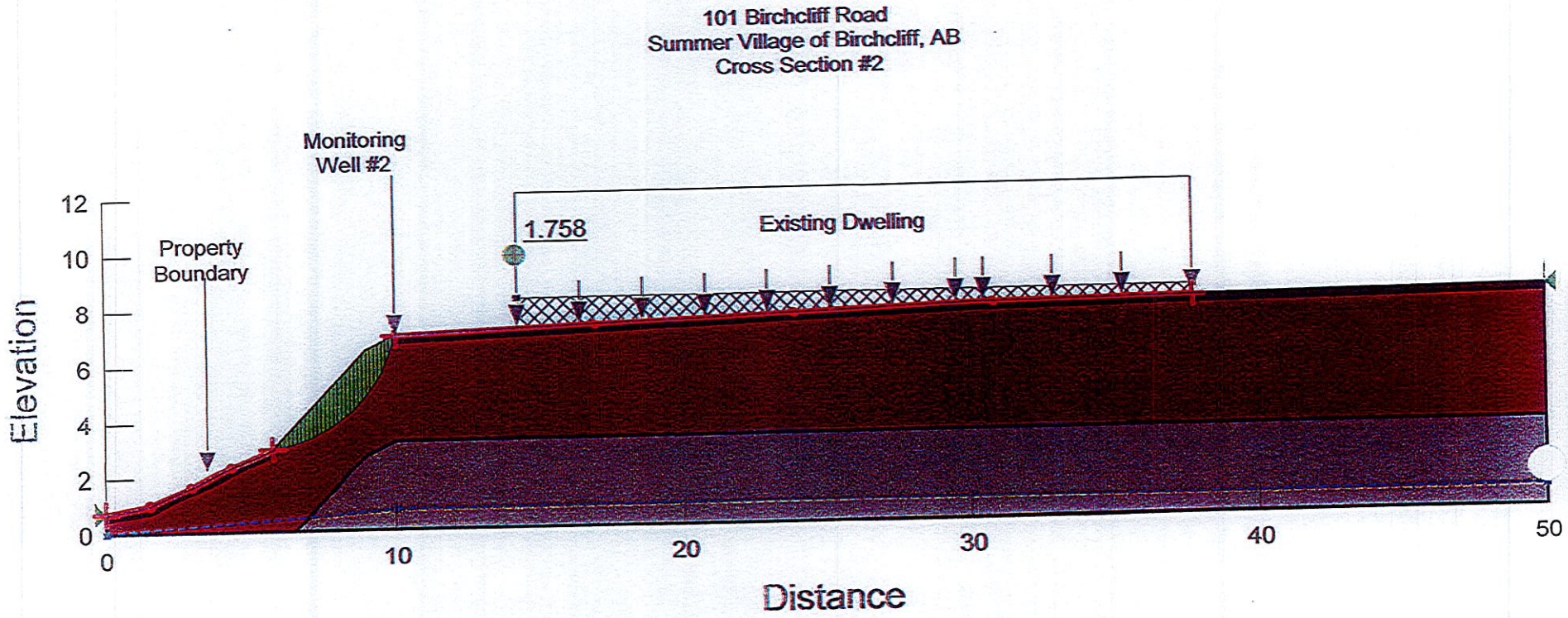
REVISION SUMMARY

ORIGINAL ISSUE (11/09/21) DRP/C

COMPASS Geomatics Ltd.

ALBERTA LAND SURVEYORS' ASSOCIATION
FIRM # MEMBER
P266
Compass Geomatics Ltd.


101 Birchcliff Road
Summer Village of Birchcliff, AB
Cross Section #1
Monitoring Well #1
1.417
Existing Dwelling
Property Boundary
Elevation
12
10
8
6
4
2
0
0
10
20
30
40
50
Distance


101 Birchcliff Road
Summer Village of Birchcliff, AB
Cross Section #2
Monitoring
Well #2
1.758
Existing Dwelling
Property
Boundary
Elevation
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10
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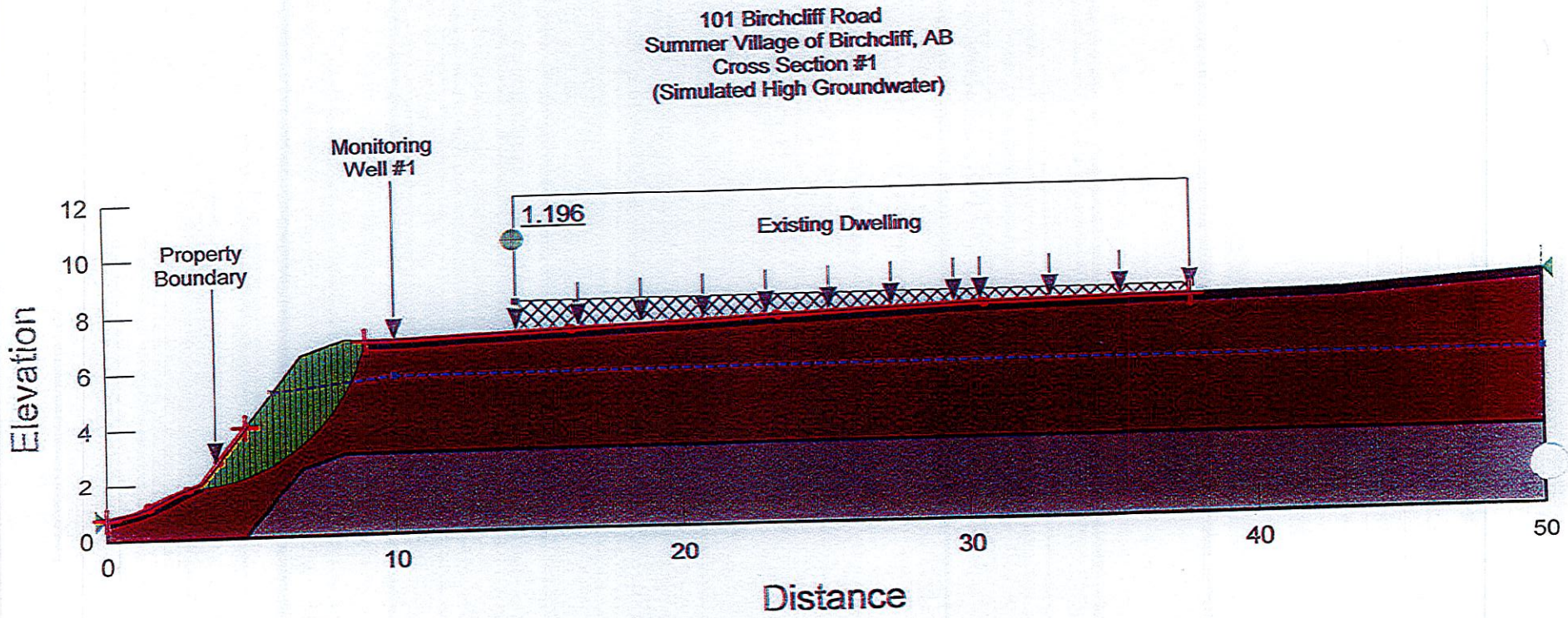
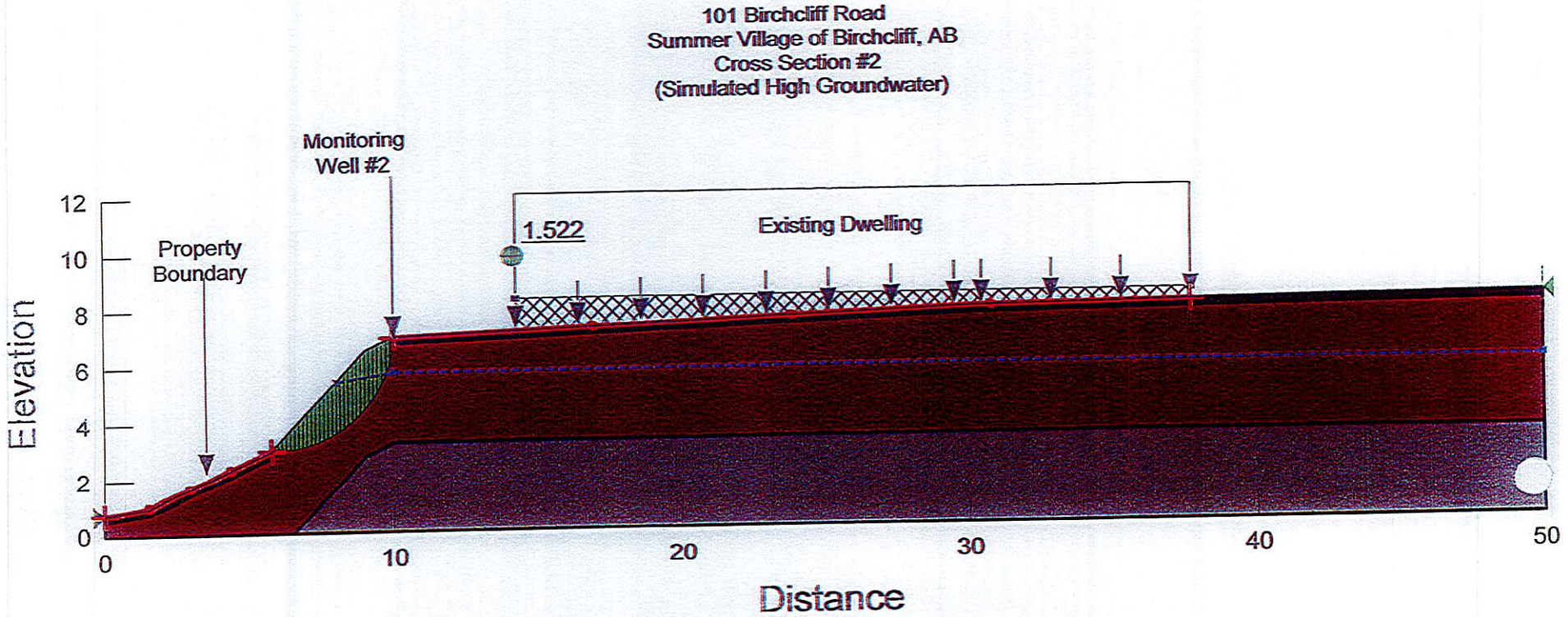
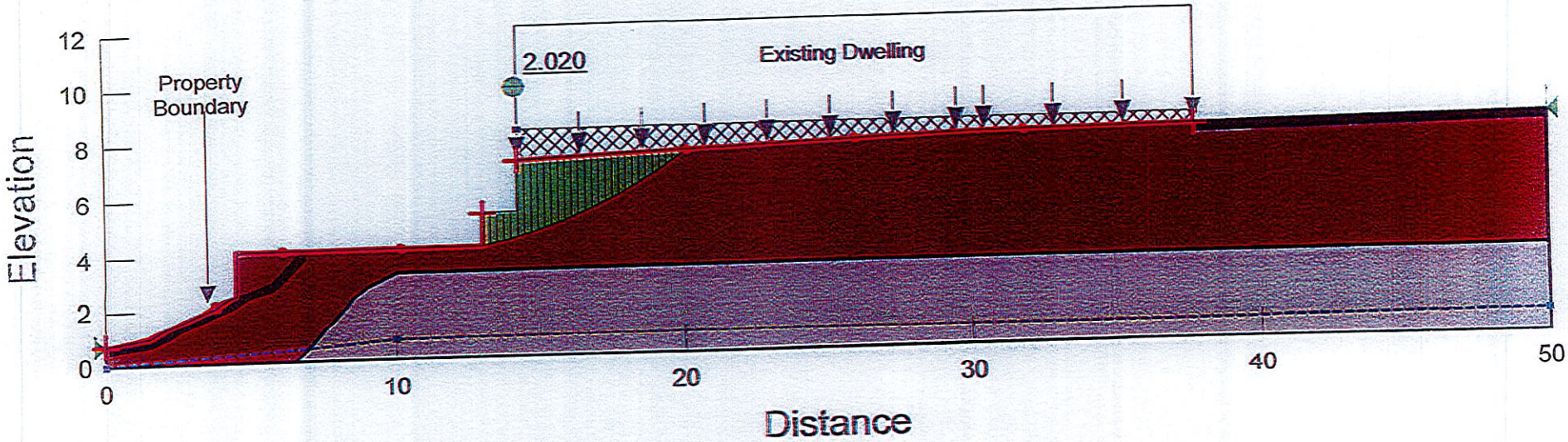
4
2
0
0
10
20
30
40
50
Distance

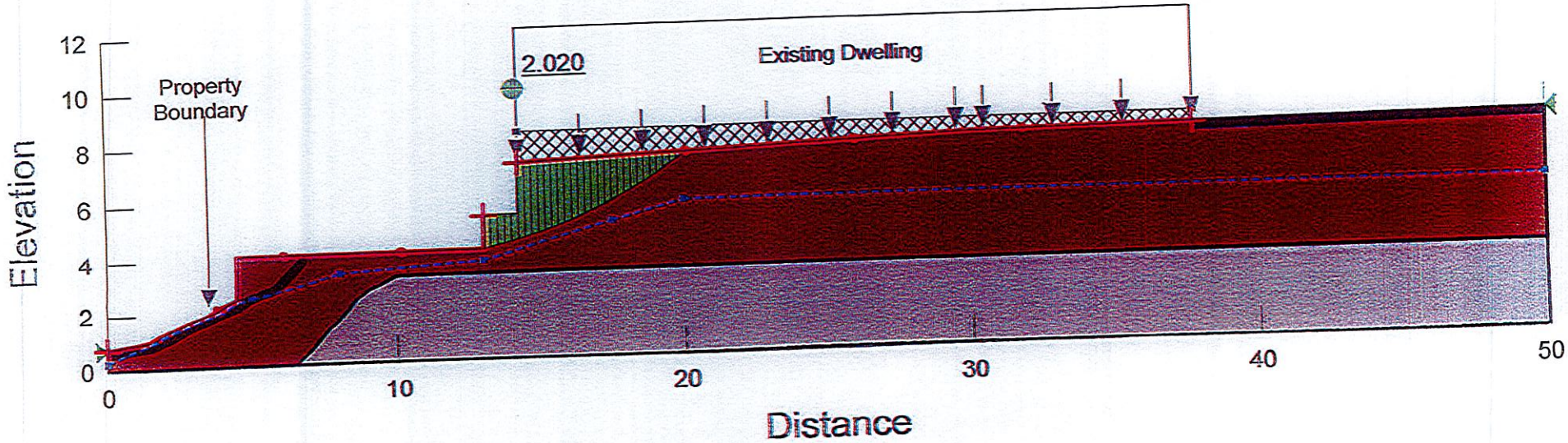

101 Birchcliff Road
Summer Village of Birchcliff, AB
Cross Section #1
(Simulated High Groundwater)
Monitoring Well #1
1.196
Existing Dwelling
Property Boundary
Elevation
12
10
8
6
4
2
0
0
10
20
30
40
50
Distance


101 Birchcliff Road
Summer Village of Birchcliff, AB
Cross Section #2
(Simulated High Groundwater)
Monitoring Well #2
Property Boundary
1.522
Existing Dwelling
Elevation
12
10
8
6
4
2
0
0
10
20
30
40
50
Distance

101 Birchcliff Road
Summer Village of Birchcliff, AB
Cross Section - 1
(Modified Slope)



101 Birchcliff Road
Summer Village of Birchcliff, AB
Cross Section 1
(Modified Slope and High
Simulated Groundwater)



SMITH DOW & ASSOCIATES LTD.
-------Engineering Consultants-------

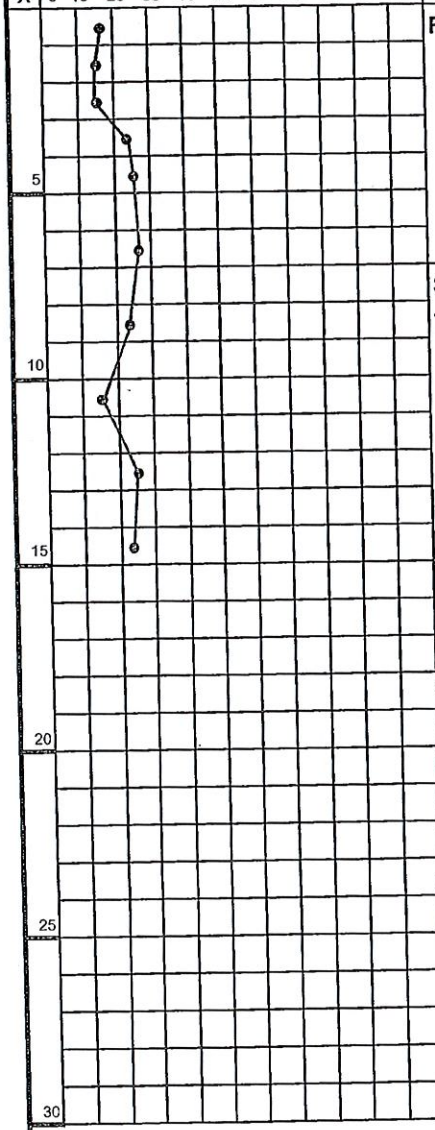
Project: 101 Birchcliff Road
Sumer Village of Birchcliff

DWN	HB	CKD	MK	DATE	August 9, 2022	FILE #		HOLE	1

STRENGTH----------
MOISTURE----------
PENETRATION----------

▲ DATUM
● GROUND ELEV-

▲	100	200	300	400	500
●	10	20	30	40	50
X	0 10 20 30 40 50 60 70 80 90 100				



CLASSIFICATION		SYMBOL	TEST DATA	SAMPLE	Depth feet	Depth meters
Fill	sand with silt, non-plastic, olive/tan				1	
	silty clay, non-plastic to low plastic				2	
	topsoil / coal traces				3	
	loose, low plastic				4	1
	compact				5	
	tan				6	
	loose, silty, slightly sandy				7	2
Silty Clay	olive/brown				8	
Till	low plastic, stiff				9	
	bedrock fragments				10	3
	white mineral traces				11	
	bedrock pieces				12	
	low plastic, stiff				13	4
	olive brown				14	
	white mineral deposits				15	
	End of Hole				16	5
					17	
					18	
					19	6
					20	
					21	
					22	7
					23	
					24	
					25	
					26	8
					27	
					28	
					29	
					30	9

FILL	CLAY	TILL	Q - Unconfirmed Strength, kN/m2
TOPSOIL	PEAT	COAL	d - Dry Unit Weight, kN/m3
SAND	GRAVEL	WATER	S - Sulphate Concentration, %
SILT	SILTSTONE	LIMITS	N - Penetration Resistance, blows

Tube	/
Penetrometer	X
No Recovery	

TEST HOLE LOG AND LAB DATA

DWG # 2

SMITH DOW & ASSOCIATES LTD.
-------Engineering Consultants-------

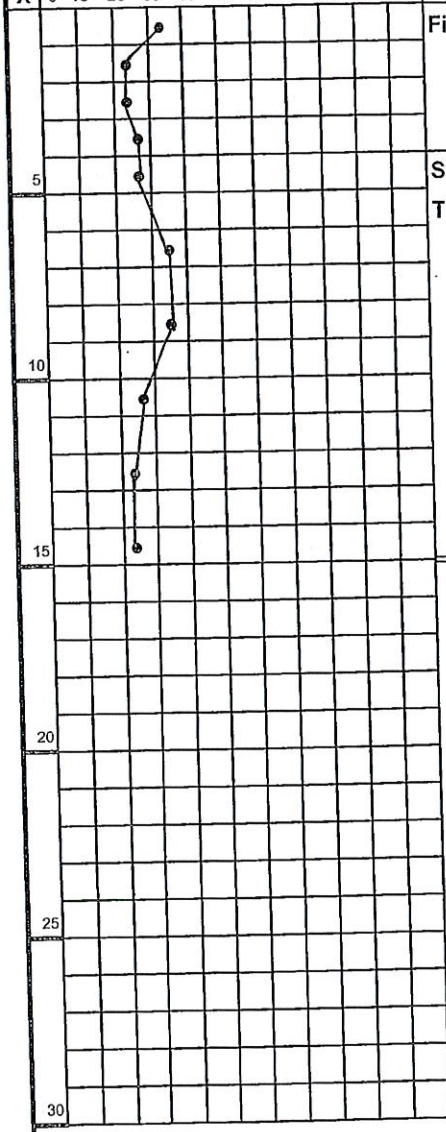
Project: 101 Birchcliff Road
Sumer Village of Birchcliff

DWN	HB	CKD	MK	DATE	August 9, 2022	FILE #	HOLE	2

STRENGTH----------
MOISTURE----------
PENETRATION----------

▲ DATUM
● GROUND ELEV-
X

▲ 100 200 300 400 500
● 10 20 30 40 50
X 0 10 20 30 40 50 60 70 80 90 100



CLASSIFICATION		SYMBOL	TEST DATA	SAMPLE	Depth feet	Depth meters
Fill	compact to loose, silt with sand				1	
	tan/brown, non-plastic to low plastic				2	
	loose, low plastic				3	
	silt with clay, tan to olive brown				4	1
Silty Clay	firm to stiff				5	
Till	olive/brown, low to medium plastic				6	
	low plastic, rust specks, pebbles				7	2
	stiff				8	
	bedrock fragments				9	
	pebbles				10	3
	damp to moist, low plastic				11	
	stiff				12	
	moist				13	4
	olive brown				14	
					15	
					16	5
					17	
					18	
					19	6
					20	
					21	
					22	7
					23	
					24	
					25	
					26	8
					27	
					28	
					29	
					30	9

FILL	CLAY	TILL	Q - Unconfirmed Strength, kN/m2
TOPSOIL	PEAT	COAL	d - Dry Unit Weight, kN/m3
SAND	GRAVEL	WATER	S - Sulphate Concentration, %
SILT	SILTSTONE	LIMITS	N - Penetration Resistance, blows

Tube	/
Penetrometer	X
No Recovery	

TEST HOLE LOG AND LAB DATA

DWG # 3

JUL 2 6 2022

JUL 2 6 2022

JUL 2 6 2022