



March 6, 2024

VIA EMAIL

Timothy Pidduck
General Manager
Crowe Valley Conservation Authority
70 Hughes Lane
Marmora, ON K0K 2M0

Re: 30 MacKenzie Road Opinion Letter – Floodline Assessment
Peer Review

Mr. Pidduck:

Thank you for retaining EXP Services, Inc. (EXP) to conduct a peer review of an Opinion Letter – Floodline Assessment (“Letter”) prepared by Jewell Engineering on August 4, 2023 for 30 MacKenzie Road in Marmora, Ontario. The purpose of the peer review is to assess the analysis methodology and conclusions against industry standards and the Crowe Valley Conservation Authority’s (CVCA) mandate to control flooding.

The current home at 30 MacKenzie Road is a 625.5 sq ft home with a 286 sq ft deck. The home is located, at its closest, approximately 4.8 meters from the edge of the water on Crowe Lake. The existing home is currently within the CVCA 100-year flood line regulations limit. The regulatory water surface elevation (RWSE) from the CVCA is 183.88m (CGVD28).

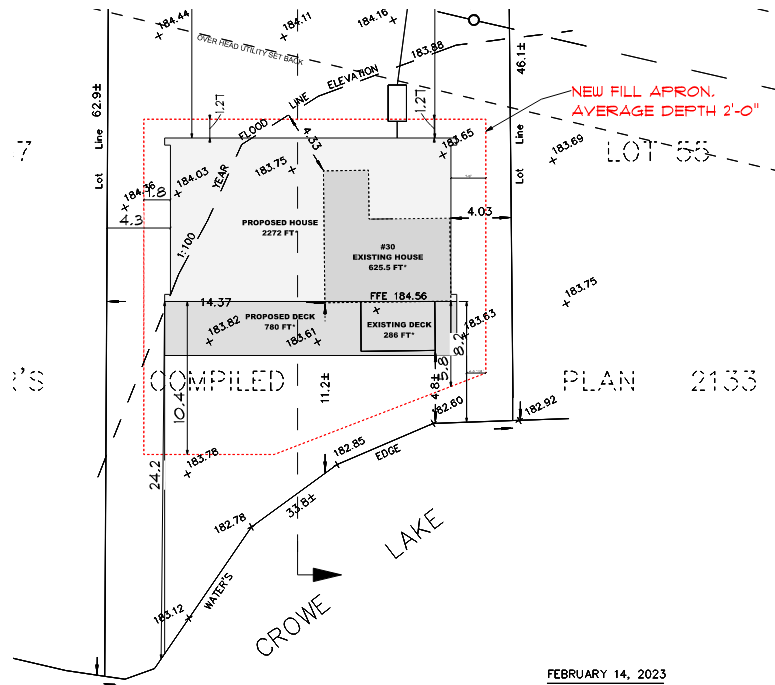
The existing home is located within the flood fringe of Crowe River. The flood fringe is generally defined as the portion of the floodway. For this application on a lake, I am also interpreting this as the area outside the main conveyance area that is covered in slow-moving or standing water.

The presented information does not report the finished floor elevation (FFE) of the existing structure. Whether it is below the RWSE or not, the structure is exposed to the risk associated with the 1% Annual Exceedance Probability (AEP). The 1% AEP has a one in a hundred chance of being exceeded in any year. Should this happen, the structure may experience flood damage.

The homeowner proposes constructing a 2,272 ft² house with a 780 ft² deck. The new structure is to have a finished floor elevation (FFE) of 184.56m. The southern wall of the home will be oriented in the same location as the existing structure (Figure 1). Figure 1 is taken from an exhibit prepared by Watson Land Surveyors, Ltd (Appendix A).

It should be noted that the existing structure removes some storage capacity from Crowe Lake. The proposed grading will decrease the amount of storage available from the lake.

Figure 1: Proposed Site



In the Letter’s Existing Conditions section, a comparison was made between existing grades and regulatory water level and the proposed grades. The statement that the regulatory water level is an overage of 0.4m above the existing grade within the proposed grading limit. Exhibit 1 in Appendix B shows a maximum water surface elevation (WSE) of 0.27m, within the proposed fill limits.

The section also indicates that the average fill on the plan is 0.6m. Exhibit 2 in Appendix B indicates the fill depths greater than 0.80m, also within the proposed fill limits. An accurate accounting of the proposed fill is important to the CVCA, as the long term caretakers of their regulatory area. Their concern is not just the flood risk to the current property and its incremental changes, but the long term effects of filling in the floodplain.

Analysis Methodology

The following section will review the Assessment of Potential Impacts to Storage and Conveyance section of the Opinion Letter. The letter considers Conveyance and Storage.

Conveyance

The conveyance section correctly defines ineffective flow as areas where HEC-RAS presents areas where flow is not being conveyed. HEC-RAS includes information in wetted perimeter calculations but are not considered in conveyance calculations.

There is a note indicating that if the home was included in an HEC-RAS cross-section, it would be minuscule in comparison to the larger conveyance area of a cross-section through Crowe Lake. I agree with this assertion. However, the home would be represented in the HEC-RAS model as a blocked obstruction, not as an ineffective flow area.

Fill within the Floodplain

The storage section begins with a characterization of the total footprint area of the proposed building and deck to be 335m² within the existing floodplain limits and is used as the basis of calculation. It is not clear where this area was derived, because the total area of the proposed home and deck is approximately 283.5m².

Equation 1 estimates the volume of fill below the regulatory WSE as 134m³ using the following three (3) factors.

- Total footprint area of the proposed building and deck replacement (335m²).
- The regulatory floodline elevation from CVCA (183.88m).
- An average elevation difference between the regulatory WSE and existing ground with the fill area of the existing floodplain (183.48m).

As mentioned above, there are discrepancies in the proposed footprint area and average elevation difference from the regulatory WSE and existing ground. Additionally, the permit application indicates a fill volume of 123.4m³ added to site.

A more current method of determining the amount of fill would be to use the existing survey as a topographic base surface. Then build a polygon representing the home and porch and apply reasonable slopes to meet the existing grade. This operation is generally conducted on a platform such as AutoDesk Civil 3D but can also be accomplished within a various CAD And GIS software package.

This methodology would provide a more accurate measurement of the fill within the floodplain.

Active Storage in Crowe Lake

This section also uses a simplified “soda can” method (Equation 2) to estimate the active storage of Crowe Lake. This assumes that the depth of the active storage from the regulatory elevation (183.88m) to the lowest elevation on the lakefrontage of the property (182.6m) is applied vertically against the planimetric area of the lake.

This method does not consider the volume of water from the edge of the lake to the flood fringe on the banks. This would add to the active storage volume and would not change the conclusion of the section.

Conclusions

EXP has identified some deficiencies in the method and approach applied in the letter. Chiefly, a more robust method for determining the fill in the floodplain. While the overall conclusions presented in the Letter may not

change with more accurate calculation methods, it is important for the CVCA to understand the impacts on individual lots as well as the cumulative effects of infill to the floodplain.

Our recommendations are:

1. Provide an accurate estimation of total fill and fill in the floodplain.
2. Add to the site exhibit:
 - a. Add the new RWSE contours resulting from the proposed fill.
 - b. Accurate limits of where the fill meets the existing grade.
3. Update the fill value in the permitting documents.

Sincerely,

William Burmeister, P.Eng., PE, PMP, GISP, CFM
Director | Water Resources

EXP Services Inc.

Appendices



**Appendix A:
Site Plan – Watson Land Surveyors**

DRAWING SCHEDULE

COVER PAGE - SITE PLAN_ 1
 GENERAL NOTES_ 2
 CRAWLSPACE PLAN_ 3
 MAIN FLOOR PLAN_ 4
 BUILDING SECTION_ 5
 ELEVATIONS_ 6
 OBC DETAILS_ 7
 OBC DETAILS CONTINUED_ 8

SKETCH for BUILDING PERMIT APPLICATION

METRIC SCALE 1 : 250

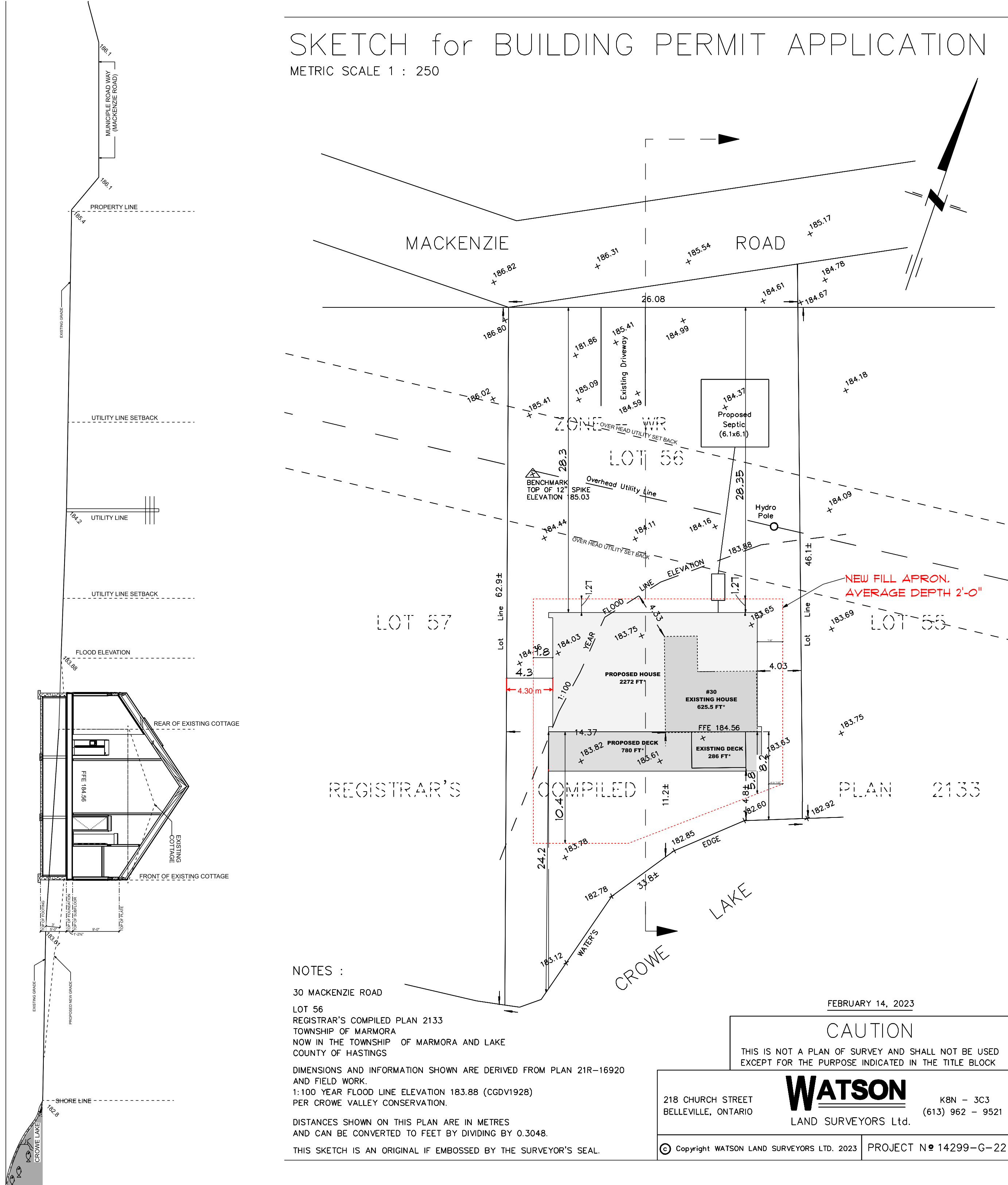
SCALE: As Noted
 DRAWN BY:
 DATE: Thursday, May 4, 2023

SES DRAFTING AND DESIGN
 PHONE: 613.827.3957
 EMAIL: scottstewart@sympatico.ca
 PO Box 248
 Stirling
 Ontario
 K0K 3E0



Brian Facey
 PHONE: 416-863-4262
 FAX: brianfacey@gmail.com
 30 MacKenzie Road
 Marmora / Lake
 Ontario

COVER PAGE - SITE PLAN
 I HAVE REVIEWED AND TAKE RESPONSIBILITY FOR THESE DESIGNS UNDER THE REQUIREMENTS OF THE O.B.C.
 QUALIFIED DESIGNER SCOTT E. STEWART BCIN #33398 FIRM #36114



SITE SECTION
 SCALE: NOT TO SCALE

NOTES :
 30 MACKENZIE ROAD
 LOT 56
 REGISTRAR'S COMPILED PLAN 2133
 TOWNSHIP OF MARMORA
 NOW IN THE TOWNSHIP OF MARMORA AND LAKE
 COUNTY OF HASTINGS
 DIMENSIONS AND INFORMATION SHOWN ARE DERIVED FROM PLAN 21R-16920
 AND FIELD WORK.
 1:100 YEAR FLOOD LINE ELEVATION 183.88 (CGDV1928)
 PER CROWE VALLEY CONSERVATION.
 DISTANCES SHOWN ON THIS PLAN ARE IN METRES
 AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.
 THIS SKETCH IS AN ORIGINAL IF EMBOSSED BY THE SURVEYOR'S SEAL.

FEBRUARY 14, 2023

CAUTION
 THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED
 EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK

WATSON
 LAND SURVEYORS Ltd.
 218 Church Street
 Belleville, Ontario
 K8N - 3C3
 (613) 962 - 9521

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**Appendix B:
Depth Exhibits**

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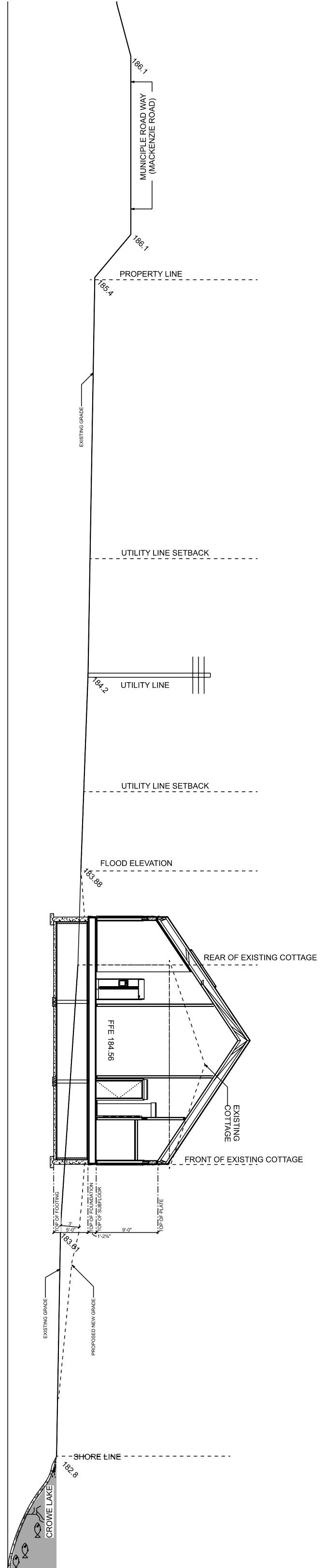
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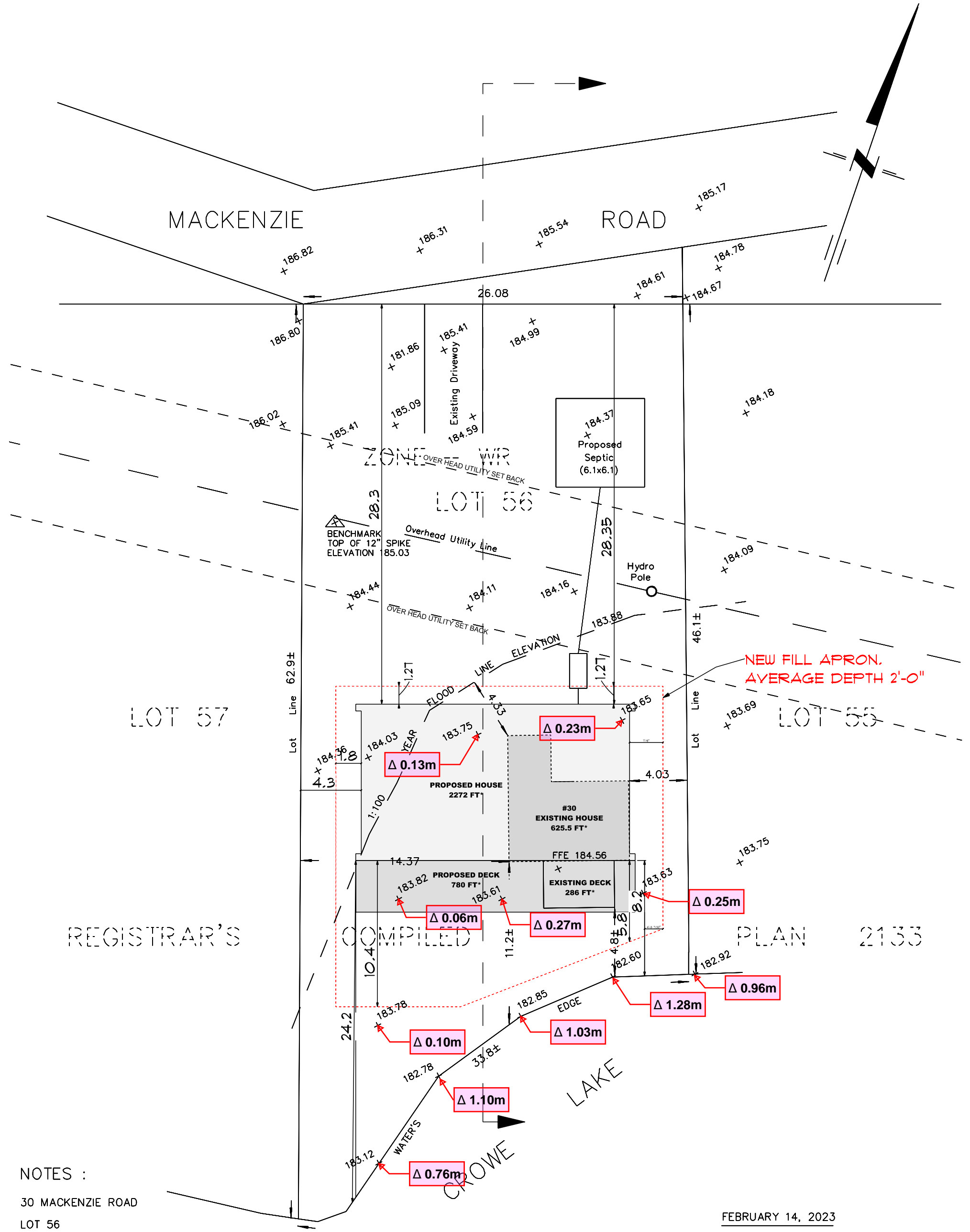
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Brian Facey
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 FAX: brianfacey@gmail.com
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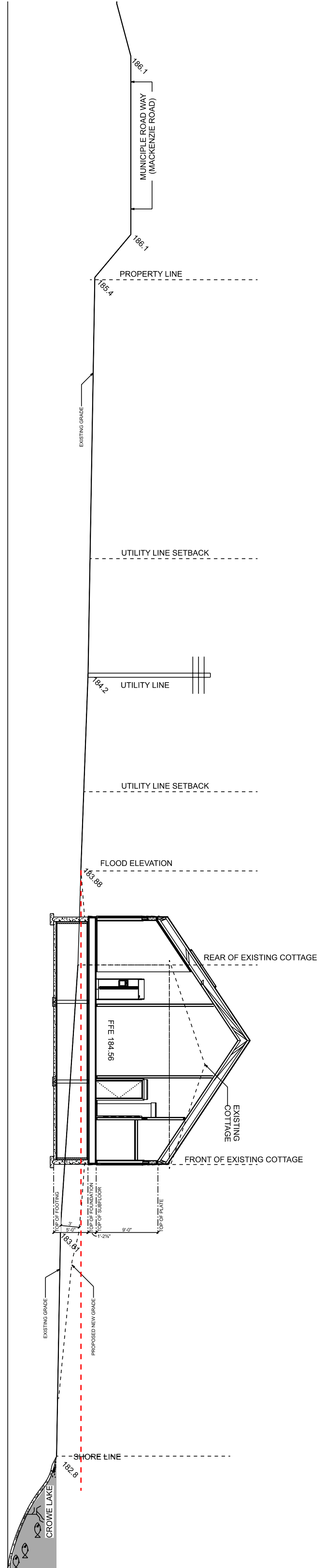
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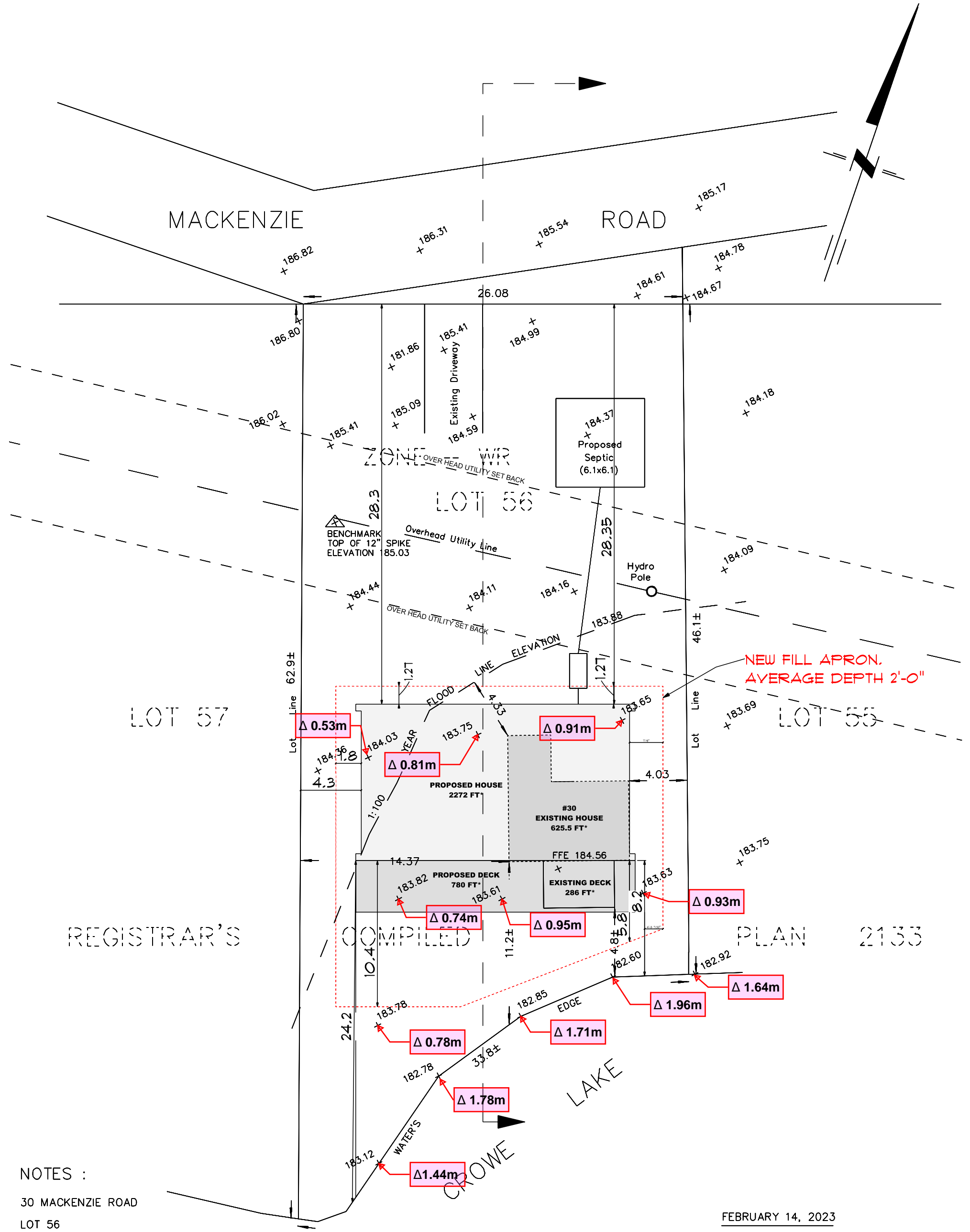
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EXHIBIT 2: DEPTH FROM FINISHED FLOOR ELEVATION