September 15, 2017 **BDC1148**

Ms. Marilyn Steinberg
Property Owner - 22 Hawthorne Avenue
1425 Doctor Penfield Avenue,
Montreal, Quebec
H3G 2V1

Mr. David Cutler
Victor Ages Vallance LLP
112 Lisgar St.
Ottawa, Ontario
K1Y 0N1

Dear Ms. Steinberg and Mr. Cutler:

Initial Remedial Excavation - Hybrid Approach
22-24 Hawthorne Avenue, Ottawa, Ontario

1 INTRODUCTION

CM3 Environmental Inc. (CM3) was retained by Ms. Marilyn Steinberg (client) to provide environmental consulting services with respect to a fuel oil release at 22 Hawthorne Avenue, Ottawa, Ontario (site or subject property). CM3 completed a delineation assessment on the property, provided in the CM3 report "*Oil Spill Delineation, 22 Hawthorne Avenue, Ottawa, Ontario*" dated May 12, 2017. Remedial options were provided in CM3's report "*Remedial Option Evaluation, 22 Hawthorne Avenue, Ottawa, Ontario*" dated May 25, 2017. CM3 met with the client on July 20, 2017 to review and discuss remedial options for the affected properties. A revised remedial approach was developed based on the discussions, with the overall goal of removing and/or reducing of soil and groundwater impacts at the site to meet Ontario Ministry of Environment and Climate Change (MOECC) site condition standards (SCS). In support of the revised remedial approach, it was determined that further environmental soil testing, a geotechnical assessment and a structural support plan would be required. This report provides a summary of the remedial approach and the findings of the supplemental investigations. The subject property location is provided on **Figure 1** and the Site Plan is provided as **Figure 2**.

2 HYBRID REMEDIAL APPROACH

During the July 20, 2017 meeting, CM3 and the client discussed the remedial options for the affected properties. The CM3 Remedial Options report presented two general approaches with one being a full excavation and the second being *in situ* remediation. It was determined at the meeting that a hybrid approach involving an initial remedial excavation to remove most heavily contaminated soil followed by a secondary remediation technique to address the remaining contamination would be the most practical and cost effective approach. The goal of the initial excavation is the removal of all contaminated soil in excess of the MOECC Standards from the subject property to the most practical extent while supporting the 22 Hawthorne building. The secondary remediation technique would be determined based on the outcome of the initial remedial excavation and may include, but not be limited to:

- Risk Assessment: In general terms, a risk assessment would be used to develop site specific standards and demonstrate that the property in the post initial remedial excavation condition would be suitable for its intended use as an urban residential dwelling.
- *In situ* Remediation: *in situ* Remediation would involve some form of oxidant injections and/or the operation of an *in situ* remediation system to treat the remaining post initial excavation contamination to the generic MOECC SCS.
- Further Excavation: Additional excavation would involve the removal of more soil outside of the initial excavation as required to meet the MOECC SCS. This would likely involve further structural and/or geotechnical consultation.

The secondary remediation will be assessed and selected based on the approach that is determined to be the most practical following the excavation. The selection of the secondary remediation will be based on the cost, ease of implementation (i.e. less disruptive) and the estimated timeframe to achieve the remedial goals.

3 SUPPLEMENTAL INVESTIGATIONS

In order to proceed with the hybrid approach and start the initial remedial excavation it was suggested by CM3 at the July 20, 2017 meeting that further environmental soil testing, a geotechnical assessment and a structural support plan would be required to undertake the initial excavation work. This information was compiled by CM3 to prepare a general scope of work for the initial soil excavation for pricing by remediation contractors.

3.1 Environmental Soil Investigation

The soil investigation included the advancement of six boreholes on August 3 and 4, 2017. Boreholes BH1 through BH6 were advanced in the basement of 22 Hawthorne to delineate the horizontal and vertical extents of the petroleum impacts related to the fuel oil spill. All boreholes were advanced using an electric jackhammer and split spoon samplers supplied and operated by CCC geotechnical and Environmental Drilling (CCC) from Ottawa, Ontario, under supervision of CM3 personnel. Soil samples were collected continuously from grade to a maximum depth of 3.4 metres below grade (mbg) at each borehole using a 60 cm long, 5.1 cm diameter split spoon sampler. The split spoon sampling equipment was washed and rinsed between each sample interval and borehole location to prevent cross-contamination.

Soil samples were logged at the time of drilling for grain size, colour, moisture content, and visual or olfactory evidence of impacts. Each soil sample was split in the field for screening and/or possible laboratory analysis. Soil samples collected for field screening of combustible vapour analysis were placed in a polyethylene bag. Soil samples collected for possible laboratory analysis were placed in one 40 mL vial (approximately 5 grams of soil) containing methanol preservative for BTEX and PHCs F1 analysis and one 120 mL glass jar for PHCs F2-F4 analysis. The vials and jarred samples were placed into an iced chilled cooler for shipment to the laboratory for analysis.

The stratigraphy below 22 Hawthorne was determined based on the borehole logging. In general, concrete was present at grade (top of basement floor), underlain by 0.25 metres of sandy gravel fill. Clay was present below the gravel fill to the maximum depth of investigation at 3.4 m below the concrete floor slab. The site stratigraphy is provided on the borehole logs (**Appendix A**).

Combustible vapour concentrations were measured from the bag sample headspace using an RKI Eagle combustible vapour meter calibrated to hexane. In general, the boreholes showed relatively low combustible vapour concentrations of 0-75 parts per million (ppm). Borehole BH3 showed a vapour concentration of 50 to 75 ppm at 0.3 to 2.1 m below the concrete floor slab. The vapour concentrations at boreholes BH5 and BH6 were 40-60 ppm at depth of 0.3 to 1.5 m below the floor slab. The combustible vapour concentrations are provided on the borehole logs (**Appendix A**).

A total of eight borehole soil samples were submitted for laboratory analysis of BTEX and PHCs F1-F4 fractions. Soil samples BH2 SA1, BH3 SA1, BH4 SA1, BH5 SA2 and BH6 SA1 showed concentrations of BTEX and/or PHCs F1, F2 and/or F3 fraction above the MOECC Table 3 SCS. Samples BH1 SA1, BH3 SA4 and BH6 SA3 showed non-detectable and/or BTEX and PHCs concentrations in compliance with the MOECC Table 3 SCS. The borehole soil sample analytical results are summarized in **Table 1**. The borehole soil quality is provided on **Figure 3** for the recent and previous soil testing at the property by CM3. The laboratory reports are provided in **Appendix B**.

3.2 Initial Excavation Soil Volumes

The planned area of excavation was based on the soil testing results to date with the intent of removing the contaminated soil to the most practical extent. To allow for the safe excavation of the maximum extent of contaminated soil, the building at 22 Hawthorne will be structurally supported and sheet piles will be installed at the north and south extents of the proposed excavations. The structural Support and sheet pile details are described in section 4 – Geotechnical Assessment. The planned area of excavation is provided on **Figure 4**. A description of each area is provided below and summarized on **Table 2**.

- **Area IA**. Approximately 5 metres wide from the interior wall dividing 20 and 22 Hawthorne and 6.7 metres long and to a depth of approximately 5 meters below grade or 3.7 metres below the concrete floor slab. The excavation will be sloped (to the east) at a 1 to 1 ratio from the interior wall for a distance of 3.7 metres from the wall then to a full depth of 3.7 below the floor slab for the remaining 1.3 metres of the width. The excavation will be extended to the sheet pile at the north wall of the building. The total soil volume is approximately 80 cubic metres or 160 metric tonnes. It is likely that the segregation of potentially clean from contaminated soil will not be achievable in this area.

- **Area IB**. Approximately 3.4 metres wide from the interior wall dividing 20 and 22 Hawthorne and 5 metres long and to a depth of approximately 4.7 meters below grade or 3.4 metres below the concrete floor slab. The excavation will be sloped (to the east) at a 1 to 1 ratio from the interior wall for a distance of 3.4 metres from the wall. The excavation will be extended to the sheet pile at the south wall of the building. The total soil volume is approximately 30 cubic

metres or 60 metric tonnes. It is likely that the segregation of potentially clean from contaminated soil will not be likely be achievable in this area.

- **Area OA**. The full width of the driveway between 22 and 24 Hawthorne (approximately 3.6 metres) and 6.7 metres long. The excavation would be to an approximate depth of 4.9 metres below grade and sloped one to one from the base of the footing at 24 Hawthorne (assumed to be 1.3 metres below grade) and extended to meet excavation Area IA. The excavation will be extended to the sheet pile at the north wall of the building. It is expected that the soil from grade to a depth of 1.3 metres (footing depth) has not been contaminated by the fuel release at 22 Hawthorne. This material should be stockpiled on-site and tested by CM3 to determine the soil quality and possible re-use. It is estimated that there is approximately 35 cubic meters or 70 metric tonnes of soil that has not been impacted by the release and 50 cubic metres or 100 metric tonnes of soil that has been contaminated by the fuel release.

- **Area OB**. The full width of the driveway between 22 and 24 Hawthorne (approximately 3.6 metres) and 5 metres long. The excavation would be to an approximate depth of 4.9 metres below grade and sloped one to one from the base of the footing at 24 Hawthorne (assumed to be 1.3 metres below grade) and extended to meet excavation Area OC. It is expected that the soil from grade to a depth of 0.5 metres has not been contaminated by the fuel release at 22 Hawthorne. This material should be stockpiled on-site and tested by CM3 to determine the soil quality and possible re-use. It is estimated that there is approximately 10 cubic meters or 20 metric tonnes of soil that has not been impacted by the release and 50 cubic metres or 100 metric tonnes of soil that has been contaminated by the fuel release.

- **Area OC**. This is the immediate area of the release. It is approximately 2 meters wide and 5 metres long and is expected to be contaminated to a depth of approximately 5 metres. Excavation Area OC will be extended to the boundaries of Area IB and OB. CM3 has estimated that there is approximately 50 cubic meters or 100 metric tonnes of contaminated soil in this area.

The total volume of contaminated soil in the initial excavation area is expected to be 260 cubic metres (520 metric tonnes). The volume of non-contaminated soil in the driveway to be removed and stockpiled is expected to be 45 cubic metres (90 metric tonnes), as shown on **Table 2**.

Please note that these estimates do not include any concrete floors, concrete walls or driveway finishes (asphalt) that will have to be removed and disposed of in order to complete the work. Additionally, CM3 is recommending that for budgeting purposes that a soil tonnage of **750 metric tonnes** be used to account for:

1. Unforeseen ground conditions that are inherent in any below grade work;

2. Possible saturation of the excavated material with water that render it unfit for re-use and/or denser that a 2 metric tonnes per cubic meter ratio, thus resulting in a higher than anticipated contaminated soil tonnage; and

3. The actual practicality of segregating possibly clean from contaminated soil within a complex, congested and active constriction site.

3.3 Geotechnical Assessment

CM3 retained the services of Geoseismic Engineering (Geoseismic) from Ottawa, Ontario to complete a geotechnical assessment in support of the planned excavation work and future permit applications. The assessment was conducted on August 2-3, 2017 and the report was issued on August 11, 2017. A copy of the report is provided in **Appendix C**.

3.4 Structural Assessment

CM3 retained the services of Daley Ferraro and Associates (DFA) from Ottawa, Ontario to complete a structural assessment and structural plan in support of the planned excavation work and future permit applications. The structural plan was issued on August 3, 2017. A copy of the report is provided in **Appendix D**.

4 INITIAL EXCAVATION SCOPE OF WORK

The scope of work for the initial excavation is generally outlined below:

1. Remediation contractor will apply and obtain all municipal, provincial and regulatory agency permits prior to starting work;

2. Remediation contractor to review and record surface finishes in work area (asphalt, landscaping, decks, building entrances, etc.) that will likely be removed or affected by excavation work and to provide consultant with list of items and quantities prior to starting work;

3. Remediation contractor to install excavation supports as per structural plan and geotechnical assessment;

4. Remediation contractor to ensure building and work area are secure and safe during the completion of the work;

5. Remediation contractor to remove and dispose of 520 to 750 metric tonnes of petroleum contaminated soil from the site. Consultant to assist with landfill disposal arrangements. Remediation contractor to allow consultant time to sample soil so that consultant can use soil quality data to direct contractor and document that soil contamination is related to the December 2016 fuel release at 22 Hawthorne;

6. Remediation contractor to attempt to segregate and stockpile on-site up to 90 metric tonnes of potentially clean soil for testing and classification by consultant for possible future on-site use;

7. Remediation contractor to supply material and backfill excavation as per the DFA structural Plan;

8. Remediation contractor to provide groundwater control and treatment as required during the completion of the work, (estimated quantity of 5,000 litres per day);

9. Remediation contractor to reinstate building as per structural plan, current building code and permits; and

10. Remediation contractor to reinstate property to pre-work conditions.

5 CLOSING

This report has been prepared and the work described in this report has been undertaken by CM3 Environmental Inc. (CM3) for Ms. Marilyn Steinberg. It is intended for the sole and exclusive use of Ms. Marilyn Steinberg and her authorized agents for the purpose(s) set out in this report. Any use of, reliance on, or decision made based on this report by any person other than Ms. Marilyn Steinberg for any purpose, or by Ms. Marilyn Steinberg for a purpose other than the purpose(s) set out in this report, is the sole responsibility of such person, or Ms. Marilyn Steinberg. CM3 and Ms. Marilyn Steinberg make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expense, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

Nothing in this report is intended to constitute or provide a legal opinion. In addition, revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

The work undertaken by CM3 for this report and any conclusions or recommendations made in this report reflect CM3's judgement based on the site conditions observed at the time of the site inspection on the date(s) set out in this report, on information available at the time of preparation of this report, on the interpretation of data collected from the field investigation and on the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in the report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site; substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. CM3 expresses no warranty with respect to the accuracy of the analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

As the evaluation and conclusions reported herein do not preclude the existence of other chemical compounds and/or that variations of conditions within the site may be possible, this report should be used for informational purposes only and should absolutely not be construed as a comprehensive hydrogeological or chemical characterization of the site. If site conditions change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than by Ms. Marilyn Steinberg as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of CM3.

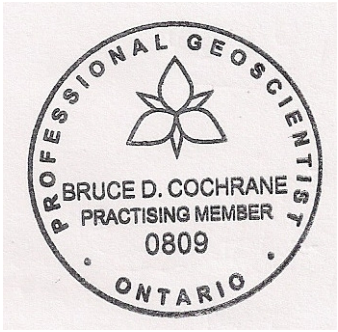
We trust that the above is satisfactory for your purposes at this time. Should you have any questions or concerns, please contact the undersigned.

Respectfully submitted,

CM3 Environmental Inc.

Karl Bilyj, P.Geo., QP
Geoscientist

Bruce Cochrane, P.Geo., QP, EP
Principal

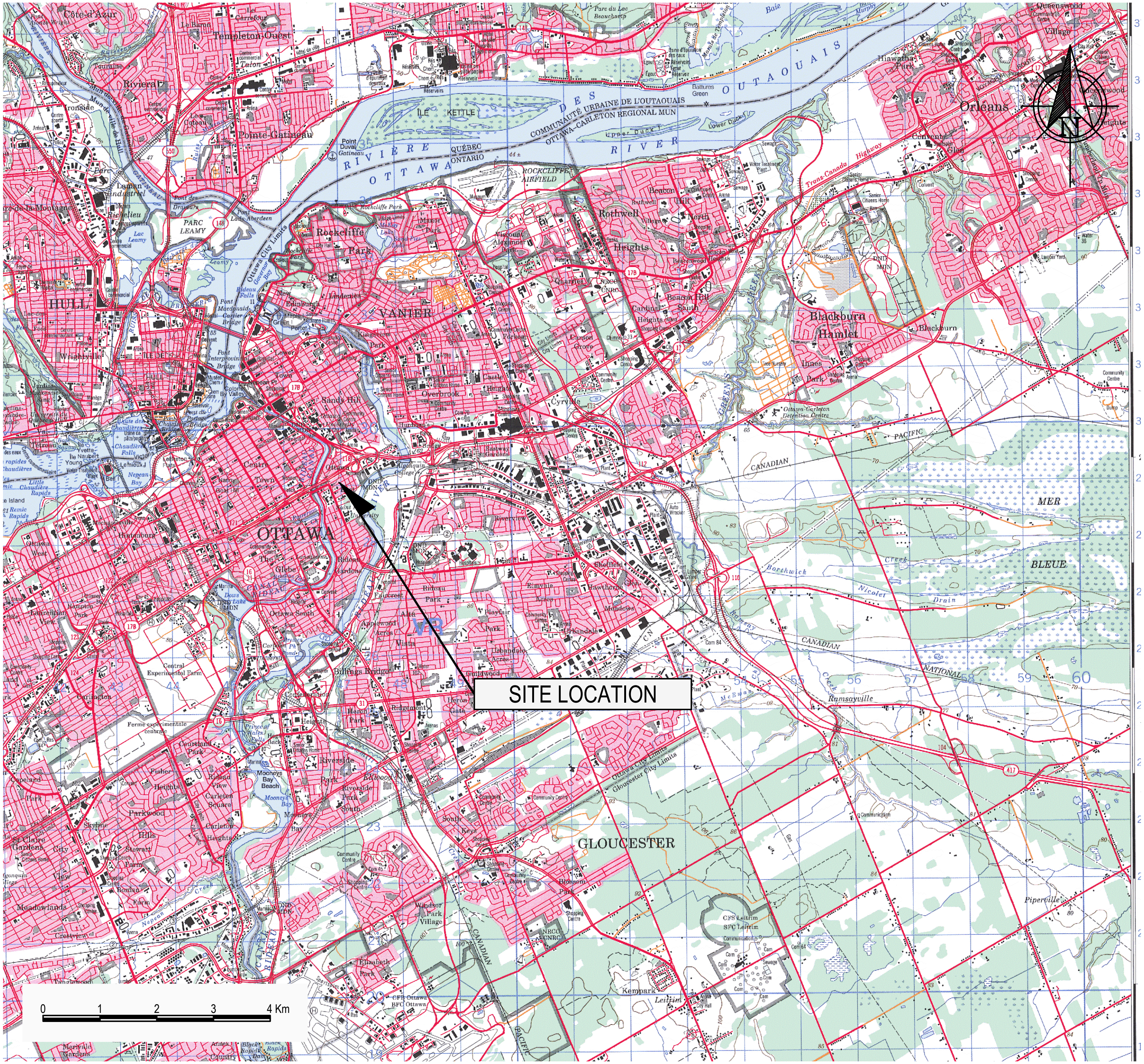


FIGURES

Initial Excavation Plan

22 Hawthorne Avenue, Ottawa, Ontario

BDC1148



CM3 ENVIRONMENTAL
5710 AKINS ROAD, OTTAWA, ON
K2S 1B8

MARILYN STEINBERG

INITIAL SOIL REMEDIATION
22 HAWTHORNE AVENUE
OTTAWA, ON

SITE LOCATION

Project: BDC1148	Drawn By: MWM
Date: SEP 2017	Reviewed By: BDC
Scale: AS SHOWN	Figure: 1

HAWTHORNE AVE

MW8
MW13
MW7
MW10
MW9
BH2
BH1
BH14
MW3
20 HAWTHORNE
22 HAWTHORNE
12 HAWTHORNE
BH4
BH3
BH15
24 HAWTHORNE
MW4
MW2
MW11
MW12
BH6
BH5
MW1
MW5
MW6
DECK
BH16

LEGEND

- PROPERTY BOUNDARY (APPROX.)
- DOMESTIC SUPPLY WELL
- BOREHOLE
- MONITORING WELL

Scale 1:100

0 1 2 3 4

(Approx. When plotted 11x17)

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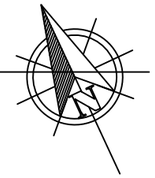
MARILYN STEINBERG

INITIAL SOIL REMEDIATION
22 HAWTHORNE AVENUE
OTTAWA, ON

SITE PLAN

Project:	Drawn By:
BDC1148	MWM
Date:	Reviewed By:
SEP 2017	BDC
Scale:	Figure:
1:100	2

HAWTHORNE AVE



SAMPLE	MW13 SA1
DEPTH	1.8 TO 2.4
PHC F1	<7
PHC F2	<4
PHC F3	22

MW13

MW8

SAMPLE	MW8 SA5
DEPTH	2.13 TO 2.74
PHC F1	<7
PHC F2	<4
PHC F3	<8

MW7

SAMPLE	MW7 SA7	MW7 SA7
DEPTH	3.4 TO 3.7	3.7 TO 4
PHC F1	<7	<7
PHC F2	<4	<4
PHC F3	<8	<8

SAMPLE	MW10 SA7
DEPTH	3.4 TO 3.96
PHC F1	<7
PHC F2	<4
PHC F3	<8

MW10

MW9

SAMPLE	MW9 SA5
DEPTH	2.13 TO 2.74
PHC F1	<7
PHC F2	<4
PHC F3	<8

BH2

SAMPLE	BH2 SA1
DEPTH	0.3 TO 0.9
PHC F1	<7
PHC F2	433
PHC F3	217

BH1

BH14

SAMPLE	BH1 SA1
DEPTH	0.3 TO 0.9
PHC F1	<7
PHC F2	<4
PHC F3	<8

MW3

SAMPLE	MW3 SA8
DEPTH	3.96 TO 4.6
PHC F1	<7
PHC F2	<4
PHC F3	24

20 HAWTHORNE

22 HAWTHORNE

12 HAWTHORNE

24 HAWTHORNE

BH4

SAMPLE	BH4 SA1
DEPTH	0.3 TO 0.9
PHC F1	<7
PHC F2	619
PHC F3	287

BH3

SAMPLE	BH3 SA1	BH3 SA4
DEPTH	0.3 TO 0.9	2.1 TO 2.7
PHC F1	563	<7
PHC F2	4680	22
PHC F3	2090	9

BH15

SAMPLE	BH15 SA2
DEPTH	2.4 TO 3
PHC F1	253
PHC F2	1980
PHC F3	966

SAMPLE	MW11 SA8
DEPTH	3.96 TO 4.6
PHC F1	<7
PHC F2	558
PHC F3	274

MW11

MW12

SAMPLE	MW12 SA5
DEPTH	2.13 TO 2.74
PHC F1	<7
PHC F2	<4
PHC F3	<8

MW4

SAMPLE	MW4 SA7
DEPTH	3.4 TO 3.96
PHC F1	<7
PHC F2	<4
PHC F3	<8

SAMPLE	MW2 SA2	MW2 SA6
DEPTH	0.6 TO 1.2	3.1 TO 3.7
PHC F1	2660	259
PHC F2	30200	14100
PHC F3	12400	5810

MW2

SAMPLE	BH6 SA1	BH6 SA3
DEPTH	0.3 TO 0.9	1.5 TO 2.1
PHC F1	<7	<7
PHC F2	1220	<4
PHC F3	551	<8

BH6

BH5

MW1

SAMPLE	MW1 SA4
DEPTH	1.8 TO 2.4
PHC F1	<7
PHC F2	<4
PHC F3	<8

SAMPLE	BH5 SA2
DEPTH	0.9 TO 1.5
PHC F1	<7
PHC F2	190
PHC F3	91

MW5

SAMPLE	MW5 SA6
DEPTH	2.74 TO 3.4
PHC F1	<7
PHC F2	<4
PHC F3	40

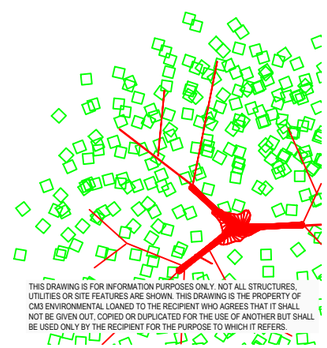
DECK

MW6

SAMPLE	MW6 SA5
DEPTH	2.13 TO 2.74
PHC F1	<7
PHC F2	<4
PHC F3	<8

BH16

SAMPLE	BH16 SA4
DEPTH	1.8 TO 2.4
PHC F1	<7
PHC F2	<4
PHC F3	<8



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LEGEND

- PROPERTY BOUNDARY (APPROX.)
- DOMESTIC SUPPLY WELL
- BOREHOLE
- MONITORING WELL
- BH/ MW SOIL SAMPLE BTEX AND PHCs NOT DETECTED
- BH/ MW SOIL SAMPLE BTEX AND/OR PHCs < MOECC TABLE 3 SCS
- BH/ MW SOIL SAMPLE BTEX AND/OR PHCs > MOECC TABLE 3 SCS

	PARAMETER	MOECC TABLE 3 SCS
F1	PHCs F1	55
F2	PHCs F2	98
F3	PHCs F3	300

ALL CONCENTRATIONS IN ppb (µg/g)
168 – CONCENTRATION EXCEEDS MOECC TABLE 3 SCS
ALL DEPTHS IN METERS

Scale 1:100

0 1 2 3 4

(Approx. When plotted 11x17)

cm3 environmental

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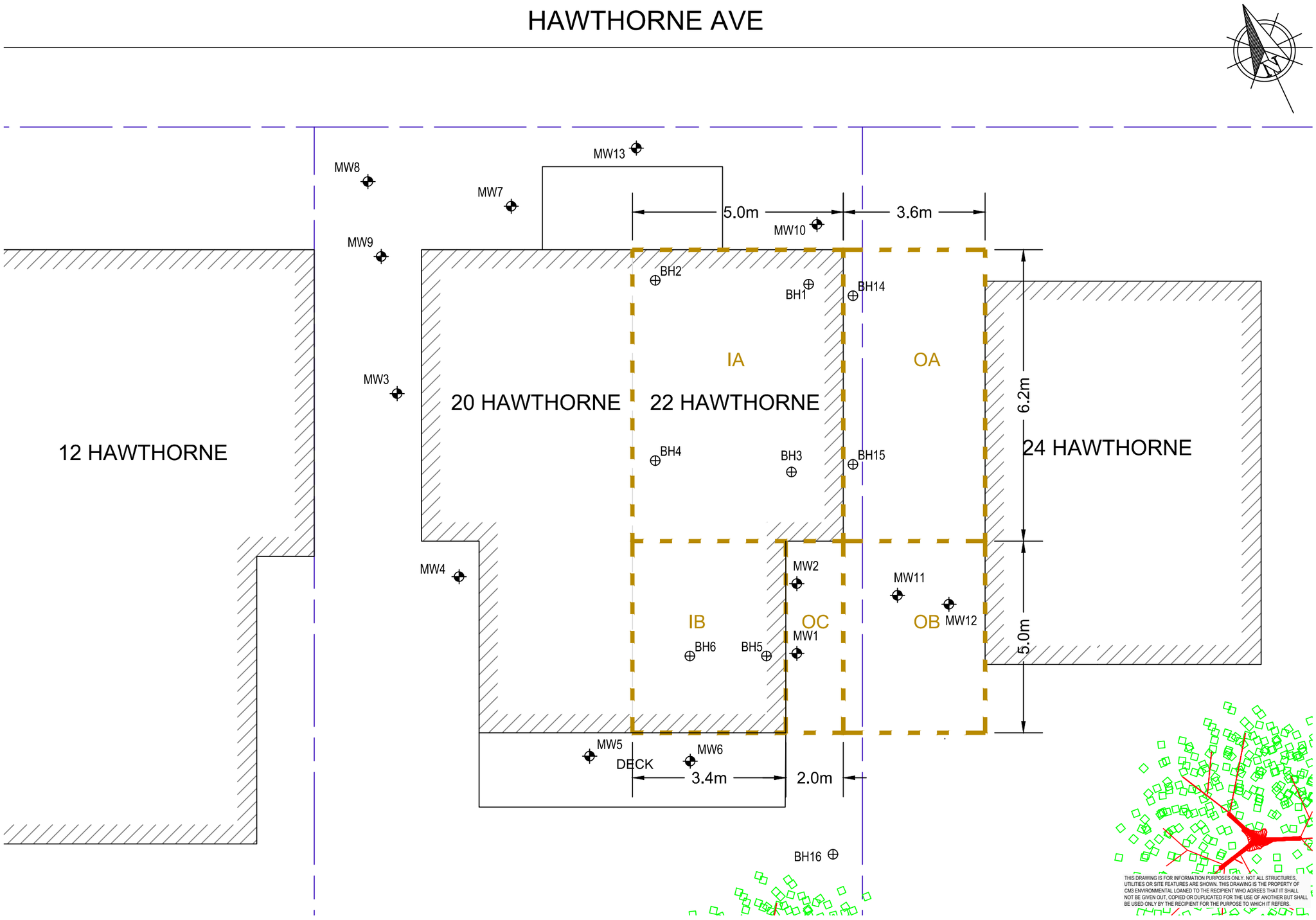
MARILYN STEINBERG

INITIAL SOIL REMEDIATION
22 HAWTHORNE AVENUE
OTTAWA, ON

SOIL IMPACTS

Project: BDC1148	Drawn By: MWM
Date: SEP 2017	Reviewed By: BDC
Scale: 1:100	Figure: 3



LEGEND

- PROPERTY BOUNDARY (APPROX.)
- DOMESTIC SUPPLY WELL
- BOREHOLE
- MONITORING WELL
- PLANNED AREAS OF EXCAVATION

Scale 1:100

0 1 2 3 4

(Approx. When plotted 11x17)

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MARILYN STEINBERG

INITIAL SOIL REMEDIATION
22 HAWTHORNE AVENUE
OTTAWA, ON

INITIAL EXCAVATION PLAN

Project:	Drawn By:
BDC1148	MWM
Date:	Reviewed By:
SEP 2017	BDC
Scale:	Figure:
1:100	4

TABLES

Initial Excavation Plan

22 Hawthorne Avenue, Ottawa, Ontario

BDC1148

Table 1:
Summary of Soil Analytical Results
BTEX and Petroleum Hydrocarbons F1 to F4 Fractions (ug/g or ppm)
20, 22 and 24 Hawthorne Avenue, Ottawa
BDC1148

Sample ID	Date	Depth (m)	Benzene	Ethyl Benzene	Toluene	m,p-Xylene	o-Xylene	Xylene (Total)	PHC F1 (C6-C10)	PHC F2 (C10-C16)	PHC F3 (C16-C34)	PHC F4 (>C34)
MOECC Standards Table		**MDL (ug/g)**	0.02	0.05	0.05	0.05	0.05	0.05	7	4	8	6
Reg 153/04 (2011)-Table 3 Residential, coarse			**0.21**	**2**	**2.3**	**NV**	**NV**	**3.1**	**55**	**98**	**300**	**2800**
MW1 SA4	22-Dec-16	1.8 to 2.4	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW2 SA2	22-Dec-16	0.6 to 1.2	***0.54***	***13.0***	***11.2***	49.6	27.1	***76.7***	***2,660***	***30,200***	***12,400***	<120
MW2 SA6	22-Dec-16	3.1 to 3.7	0.02	0.73	0.63	2.84	1.62	***4.46***	***259***	***14,100***	***5,810***	<60
MW3 SA8	20-Mar-17	3.96 to 4.6	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	24	12
MW4 SA7	20-Mar-17	3.4 to 3.96	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW5 SA6	21-Mar-17	2.74 to 3.4	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	40	33
MW6 SA5	21-Mar-17	2.13 to 2.74	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW7 SA7 TOP	21-Mar-17	3.4 to 3.7	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW7 SA7 BTM	21-Mar-17	3.7 to 4	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW8 SA5	22-Mar-17	2.13 to 2.74	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW9 SA5	22-Mar-17	2.13 to 2.74	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW10 SA7	22-Mar-17	3.4 to 3.96	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
MW11 SA8	23-Mar-17	3.96 to 4.6	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	***558***	274	<6
MW12 SA5	23-Mar-17	2.13 to 2.74	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
Under Asphalt	23-Mar-17	0 to 0.3	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	173	279
MW13 SA1	5-Apr-17	1.8 to 2.4	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	22	<6
BH15 SA2	5-Apr-17	2.4 to 3	<0.02	<0.05	<0.05	0.27	0.05	0.32	***253***	***1,980***	***966***	<6
BH16 SA4	5-Apr-17	1.8 to 2.4	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
Kanellos Boreholes January 2017												
BH1 SS1	10-Jan-17	0 to 0.6	<0.02	0.25	0.28	1.20	0.60	1.80	***168***	***2,760***	***1,310***	<6
BH2 SS2	10-Jan-17	0.6 to 1.2	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	11	***255***	163	<6
BH3 SS2	10-Jan-17	0.6 to 1.2	<0.02	<0.05	<0.05	0.20	0.11	0.32	33	***313***	187	<6
BH4 SS1	11-Jan-17	0 to 0.6	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	23	***197***	112	<6
BH5 SS2	11-Jan-17	0.6 to 1.2	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	40	41	<6
BH6 SS3	11-Jan-17	1.2 to 1.8	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	***76***	***1,410***	***799***	<6
BH6 SS6	11-Jan-17	3.1 to 3.6	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	33	***364***	189	<6
Boreholes August 2017												
BH1 SA1	3-Aug-17	0.3 to 0.90	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6
BH2 SA1	3-Aug-17	0.3 to 0.90	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	***433***	217	<6
BH3 SA1	4-Aug-17	0.3 to 0.90	0.02	1.68	0.62	7.68	4.73	***12.40***	***563***	***4,680***	***2,090***	<6
BH3 SA4	4-Aug-17	2.1 to 2.7	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	22	9	<6
BH4 SA1	4-Aug-17	0.3 to 0.90	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	***619***	287	<6
BH5 SA2	4-Aug-17	0.9 to 1.5	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	***190***	91	<6
BH6 SA1	4-Aug-17	0.3 to 0.90	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	***1,220***	***551***	<6
BH6 SA3	4-Aug-17	1.5 to 2.1	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<7	<4	<8	<6

Notes:

ppm - All concentrations provided in parts per million (micrograms per gram - ug/g)

"<" - Less than detection limits indicated (refer to laboratory report)

NV - No standard listed

MOECC Standards Table - Standards from the Ontario Ministry of Environment and Climate Change (MOECC) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA (April 15, 2011) Reg 153/04 (2011)-Table 3 Residential, coarse

Bold / Italics - Indicates exceedance of MOECC Table Standards

Table 2:
Summary of Soil Volumes and Tonnage
20, 22 and 24 Hawthorne Avenue, Ottawa
BDC1148

Area	Clean Soil		Contaminated Soil	
	m^3	MT	m^3	MT
IA	0	0	80	160
IB	0	0	30	60
OA	35	70	50	100
OB	10	20	50	100
OC	0	0	50	100
Totals	**45**	**90**	**260**	**520**

Notes:
m^3 - cubic meters
MT - metric tonnes

Appendix A

Borehole Records

Initial Excavation Plan

22 Hawthorne Avenue, Ottawa, Ontario

BDC1148

CM³ JOB NO: BDC1148

CLIENT: **Marilyn Steinberg**
PROJECT: **BDC1148**
22 Hawthorne Avenue
Ottawa, Ontario

BOREHOLE LOG

BOREHOLE NO: BH1
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					CONCRETE					
					sandy GRAVEL grey, dry					
					CLAY hard, low plasticity, wet at 1.52m, grey, dry					
		BH1SA1				0				
1		BH1SA2				0				1.0
		BH1SA3				0				
2		BH1SA4				0				2.0
					CLAY high plasticity					
3		BH1SA5				5				3.0
					End of borehole at 3.4 m					

DRILLING METHOD: Pionjar Portable Drilling

Notes: SPLIT SPOON

DRILL DATE: August 3, 2017 LOGGED BY: SC

BOREHOLE LOG

CM³ JOB NO: BDC1148

CLIENT: **Marilyn Steinberg**
PROJECT: **BDC1148**
22 Hawthorne Avenue
Ottawa, Ontario

BOREHOLE NO: BH2
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					CONCRETE					
					sandy GRAVEL					
					CLAY hard, low plasticity, wet at 0.91m, med plasticity at 1.52m, grey, dry					
		BH2SA1				5				
1		BH2SA2				0				1.0
		BH2SA3				0				
2										2.0
					End of borehole at 2.1 m					

DRILLING METHOD: Pionjar Portable Drilling

Notes: SPLIT SPOON

DRILL DATE: August 3, 2017 LOGGED BY: SC

BOREHOLE LOG

CM³ JOB NO: BDC1148

CLIENT: **Marilyn Steinberg**
PROJECT: **BDC1148**
22 Hawthorne Avenue
Ottawa, Ontario

BOREHOLE NO: BH3
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					CONCRETE					
					sandy GRAVEL					
		BH3SA1			**CLAY** hard, low plasticity, odour at 0.91m, grey, moist	75				
1		BH3SA2				35				1.0
		BH3SA3			**sandy CLAY** hard, low plasticity, odour at 1.52m, grey, moist	50				
2		BH3SA4			**clay** firm, low plasticity, grey, moist	0				2.0
					End of borehole at 2.7 m					

ORGANIC VAPOUR LEVEL (ppmv) scale: 1 | 10 | 100 | 1000

DRILLING METHOD: Pionjar Portable Drilling

Notes: SPLIT SPOON

DRILL DATE: August 4, 2017 LOGGED BY: SC

BOREHOLE LOG

CLIENT: **Marilyn Steinberg**
PROJECT: **BDC1148**
22 Hawthorne Avenue
Ottawa, Ontario

CM³ JOB NO: BDC1148

BOREHOLE NO: BH4

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					CONCRETE					
					sandy GRAVEL					
					CLAY hard, low plasticity, grey, moist					
		BH4SA1				10				
1		BH4SA2				0				1.0
		BH4SA3				0				
2					End of borehole at 2.1 m					2.0

DRILLING METHOD: Pionjar Portable Drilling

Notes: SPLIT SPOON

DRILL DATE: August 4, 2017 LOGGED BY: SC

BOREHOLE LOG

CM³ JOB NO: BDC1148

CLIENT: **Marilyn Steinberg**
PROJECT: **BDC1148**
22 Hawthorne Avenue
Ottawa, Ontario

BOREHOLE NO: BH5
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**CONCRETE**					0
					sandy GRAVEL					
					clay hard, low plasticity, wet at 0.91m, odour at 0.91m., grey, moist					
		BH5SA1				5				
1		BH5SA2				60				1.0
		BH5SA3				0				
2		BH5SA4				0				2.0
					End of borehole at 2.7 m					

DRILLING METHOD: Pionjar Portable Drilling

Notes: SPLIT SPOON

DRILL DATE: August 4, 2017 LOGGED BY: SC

BOREHOLE LOG

CM³ JOB NO: BDC1148

CLIENT: **Marilyn Steinberg**
PROJECT: **BDC1148**
22 Hawthorne Avenue
Ottawa, Ontario

BOREHOLE NO: BH6
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0					**CONCRETE**					0
					sandy GRAVEL					
					clay hard, low plasticity, grey, moist					
		BH6SA1				40				
1		BH6SA2				10				1.0
		BH6SA3				0				
2					End of borehole at 2.1 m					2.0

DRILLING METHOD: Pionjar Portable Drilling

Notes: SPLIT SPOON

DRILL DATE: August 4, 2017 LOGGED BY: SC

Appendix B

Laboratory Reports

Initial Excavation Plan

22 Hawthorne Avenue, Ottawa, Ontario

BDC1148

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Certificate of Analysis

CM3 Environmental Inc.

5710 Akins Road
Ottawa, ON K2S 1B8
Attn: Bruce Cochrane

Client PO: Hawthorne
Project: BDC1148
Custody: 38429

Report Date: 8-Aug-2017
Order Date: 3-Aug-2017

Order #: 1731433

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1731433-01	BH1 SA1
1731433-02	BH2 SA1

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	4-Aug-17	6-Aug-17
PHC F1	CWS Tier 1 - P&T GC-FID	4-Aug-17	6-Aug-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	4-Aug-17	5-Aug-17
Solids, %	Gravimetric, calculation	8-Aug-17	8-Aug-17

Certificate of Analysis
Client: CM3 Environmental Inc.
Client PO: Hawthorne

Report Date: 08-Aug-2017
Order Date: 3-Aug-2017
Project Description: BDC1148

	Client ID:	BH1 SA1	BH2 SA1	-	-
	Sample Date:	03-Aug-17	03-Aug-17	-	-
	Sample ID:	1731433-01	1731433-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	69.2	69.4	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	96.7%	97.0%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	433	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	217	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.13*		*ug/g*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	16	8	ug/g dry	ND			0.0	30	
F4 PHCs (C34-C50)	20	6	ug/g dry	ND			0.0	30	
Physical Characteristics									
% Solids	93.4	0.1	% by Wt.	94.4			1.1	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*7.97*		*ug/g dry*		*97.7*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	174	7	ug/g		87.0	80-120			
F2 PHCs (C10-C16)	95	4	ug/g	ND	103	60-140			
F3 PHCs (C16-C34)	232	8	ug/g	ND	122	60-140			
F4 PHCs (C34-C50)	171	6	ug/g	ND	135	60-140			
Volatiles									
Benzene	3.77	0.02	ug/g		94.3	60-130			
Ethylbenzene	3.46	0.05	ug/g		86.5	60-130			
Toluene	4.22	0.05	ug/g		106	60-130			
m,p-Xylenes	7.97	0.05	ug/g		99.7	60-130			
o-Xylene	4.39	0.05	ug/g		110	60-130			
Surrogate: Toluene-d8	*5.55*		*ug/g*		*69.4*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Certificate of Analysis

CM3 Environmental Inc.

5710 Akins Road
Ottawa, ON K2S 1B8
Attn: Bruce Cochrane

Client PO: Hawthorne
Project: BDC1148
Custody: 38431

Report Date: 9-Aug-2017
Order Date: 4-Aug-2017

Order #: 1731499

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1731499-01	BH6SA3
1731499-02	BH6SA1
1731499-03	BH5SA2
1731499-04	BH4SA1
1731499-05	BH3SA1
1731499-06	BH3SA4

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	4-Aug-17	7-Aug-17
PHC F1	CWS Tier 1 - P&T GC-FID	4-Aug-17	7-Aug-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	4-Aug-17	5-Aug-17
Solids, %	Gravimetric, calculation	8-Aug-17	8-Aug-17

Certificate of Analysis
Client: CM3 Environmental Inc.
Client PO: Hawthorne

Report Date: 09-Aug-2017
Order Date: 4-Aug-2017
Project Description: BDC1148

	Client ID:	BH6SA3	BH6SA1	BH5SA2	BH4SA1
	Sample Date:	04-Aug-17	04-Aug-17	04-Aug-17	04-Aug-17
	Sample ID:	1731499-01	1731499-02	1731499-03	1731499-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	59.4	65.3	61.7	66.6
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	99.9%	97.7%	88.8%	94.0%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	1220	190	619
F3 PHCs (C16-C34)	8 ug/g dry	<8	551	91	287
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

	Client ID:	BH3SA1	BH3SA4	-	-
	Sample Date:	04-Aug-17	04-Aug-17	-	-
	Sample ID:	1731499-05	1731499-06	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	74.6	56.8	-	-
Volatiles					
Benzene	0.02 ug/g dry	0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	1.68	<0.05	-	-
Toluene	0.05 ug/g dry	0.62	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	7.68	<0.05	-	-
o-Xylene	0.05 ug/g dry	4.73	<0.05	-	-
Xylenes, total	0.05 ug/g dry	12.4	<0.05	-	-
Toluene-d8	Surrogate	95.2%	86.9%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	563	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	4680	22	-	-
F3 PHCs (C16-C34)	8 ug/g dry	2090	9	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.13*		*ug/g*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	10	8	ug/g dry	ND			0.0	30	
F4 PHCs (C34-C50)	9	6	ug/g dry	ND			0.0	30	
Physical Characteristics									
% Solids	91.4	0.1	% by Wt.	93.7			2.4	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*7.97*		*ug/g dry*		*97.7*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	174	7	ug/g		87.0	80-120			
F2 PHCs (C10-C16)	113	4	ug/g	ND	111	60-140			
F3 PHCs (C16-C34)	251	8	ug/g	ND	120	60-140			
F4 PHCs (C34-C50)	189	6	ug/g	ND	135	60-140			
Volatiles									
Benzene	3.77	0.02	ug/g		94.3	60-130			
Ethylbenzene	3.46	0.05	ug/g		86.5	60-130			
Toluene	4.22	0.05	ug/g		106	60-130			
m,p-Xylenes	7.97	0.05	ug/g		99.7	60-130			
o-Xylene	4.39	0.05	ug/g		110	60-130			
Surrogate: Toluene-d8	*5.55*		*ug/g*		*69.4*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

Appendix C

Geotechnical Report

Initial Excavation Plan

22 Hawthorne Avenue, Ottawa, Ontario

BDC1148

Subsurface Investigation Report

22 Hawthorne Avenue Ottawa, ON K1S 0B1

Abstract

This report presents the findings of a subsurface investigation completed within the 22 Hawthorne Avenue parcel, in the City of Ottawa, ON, K1S 0B1, and issue recommendations for a proposed Removal of Contaminated Soils and New Foundation for Existing Dwelling. It consists on a qualified interpretation of the subsurface conditions at boreholes from information compiled from field sampling and testing and a subsequent laboratory testing program of soils. The information reviewed also includes readily available geologic information from the Geological Survey of Canada (GSC) and local climate data from Environment Canada.

Yuri Mendez M. Eng., P. Eng.

Report number: 28-Cm3[1]
August 11, 2017.

Geoseismic Engineering

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[1]For the account of Cm3 Environmental Inc. as per email dated July 27, 2017 and field discussions

Report 28-Cm3
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Contents

1 Sampling and Testing

The field and laboratory program set out in our email dated July 27, 2017 and field discussions, was guided by the following standards:

- ASTM D 420-98 Standard Guide to Site Characterization for Engineering Design and Construction Purposes,
- ASTM D5434 - 12 Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock,
- ASTM D1586 - 11 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils,
- ASTM D 2216-98 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass,
- ASTM D2573 - 08 Standard Test Method for Field Vane Shear Test in Cohesive Soil.

The program also included an elevation survey referenced to a temporary benchmark (TBM), a laboratory review of samples recovered from the field and one sample submitted to a local laboratory for soluble ions concentration, PH and resistivity.

The test hole locations are shown in the test-hole location plan in figure 1 in page 6. The laboratory testing, soil sampling and field testing at each location are shown in the soil profile testing and sampling logs (BH) in the appendices.

Note that all references to elevations in this report are referenced to an elevation of 100 m assigned arbitrarily to the manhole (MH) located on the front of 22 Hawthorne (TBM) shown the Test Hole Locations Plan in fig. 1 in page 6.

2 Physical Settings, Strata and Topography

The site consist on the nearly flat 22 Hawthorne Avenue residential parcel in the City of Ottawa, ON. The site surface slopes gradually upward from Hawthorne Ave. Figure 1 in page 6 shows a plan view of the site displaying the approximate borehole locations, elevations and depth. Figure 2 in page 6 presents a schematic site cross section including some borehole data.

The geology data base by Belanger J. R. 1998 suggests 25 to 50 m of overburden soils underlain by shale bedrock at this site.

2.1 Surface and Subsurface Materials

The site surface is in majority covered with asphalt and the 22 Hawthorne semi-detached residential dwelling. The arrangement of strata found in our investigation is shown in the borehole logs in appendix A. The schematic cross section

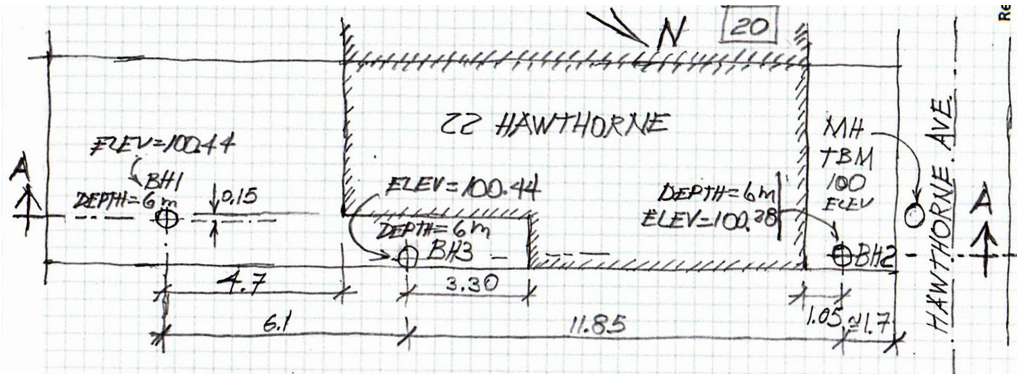

Figure 1: Test hole Locations Plan

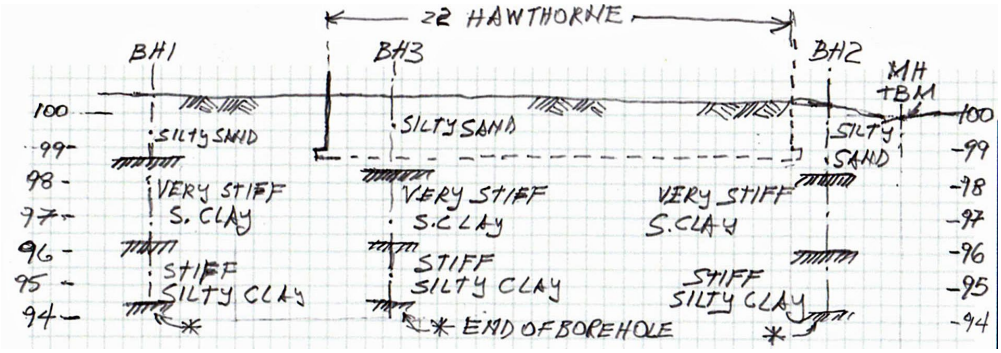

Figure 2: Schematic Cross Section A-A

A-A shown in Fig. 2 in page 6 presents rough details regarding the geometry, depth and strata found during this investigation at the borehole locations.

Generally, the site is underlain by loose to compact brown sand with silt extending to depths ranging between 1.8 and 2.0 m. This silty sand layer is underlain by a very stiff brown silty clay crust extending to a depth of approximately 4.2 m which in turn is underlain by stiff sensitive silty clay having shear strength between 57 and 96 kPa to the 6 m depth of investigation. Refer to the borehole logs in appendix A for specific and accurate details at each location.

2.2 Groundwater and Moisture

At this site there have been measurements of water levels in numerous test holes completed by Cm3 on April 12, 2017. These measurements suggest the water table depth within 1.5 to 2.6 m depth. However, at this site a silty sand layer overlain a very stiff brown crust of silty clay which provides a very impervious layer under the permeable sand. The water level measured close to the upper side of the very stiff clay crust may be indicative of water that is perched above the highly impervious clay crust. Sensitive clay sites in Ottawa, having the conditions encountered at this site, typically have a near surface, relatively thin layer (1 to 3 m) of very stiff brown clay (referred to as crust) underlain by gray soft to stiff clays. In this case the clay crust is overlain by silty sand. The transition of color and stiffness between brown crust and gray clay is indicative of water table.

At this site, the near surface crust was found to extend to approximately 4.2 m depth and followed by stiff silty clay. *The findings of this investigation strongly suggests that the permanent water table is located at approximately 4.2 m depth as evidenced from the transition of stiffness found consistently at this depth.*

Moisture contents vary above the ground water table. Water contents are shown in the borehole logs in appendix A.

3 Recommendations

The following set of the recommendations result from sampling and testing outlined in section 1 and from evaluation and assessments completed at Geoseismic engineering.

3.1 Bearing Capacity

Bearing capacity at this site is highly dependent on depth and geometry of foundations. Spread footings are best placed at shallow depths (within the very stiff brown silty clay crust) for greater bearing capacity.

3.1.1 Strip and/or Pad Footings

Shallow strip footings up to 1 m wide or pad footings up to 2 m wide placed on undisturbed soils at elevation 97.2 m and above shown in cross section A-A in figure 2 in page 6 can be design using the following bearing capacity at Under Side of Foundation (USF):

- 150 kPa at service limit (SLS).
- 220 kPa for factored loads (ULS).

Shallow strip footings up to 1.5 m wide or pad footings up to 3 m wide placed on undisturbed soils below elevation 97.2 m and shown in cross section A-A in figure 2 in page 6 can be design using the following bearing capacity at Under Side of Foundation (USF):

- 100 kPa at service limit (SLS).
- 150 kPa for factored loads (ULS).

3.2 Settlements

For the footing loads provided above building settlements for foundations on undisturbed soils are not to exceed limiting values of 25 mm and 20 mm total and differential settlements respectively at this site.

3.3 Frost Protection for Foundations

Shallow foundations in section 3.1.1 are considered to be frost protected when placed at sufficient depth to prevent supporting soils from freezing. Foundations in the perimeter of heated buildings where snow is not cleared are considered frost protected at 1.5 m depth (as having a soil cover of 1.5 m). Foundations away from heated buildings or in areas where snow is cleared, need to be at about 1.8 m depth to be frost protected. On the alternative frost protection can be provided by using foundation insulation for shallower foundations.

3.4 Foundation Wall Damproofing and Drainage

Appendix C.1 presents page 2 of NRC Construction Evaluation Reports CCMC 12658-R showing damproofing and foundation wall drainage system details satisfying the provisions under OBC 2012 and suitable for the conditions found at this site. Other available similar systems having the components shown in CCMC 12658-R may be used. Foundation drainage must be provided to daylight or a positive outlet, or sump.

3.5 Roadbed Soils and Pavement Structure

Roadbed denotes the materials beneath pavement structures. The term pavement is used to denote the layered structure that forms a road carriageway or vehicle parking. The general quality of the near surface undisturbed soil to serve as foundation for pavement structure at this site are to be considered fair, as defined in the AASHTO Guide for Design of Pavement Structures (AASHTO 1993), however, the pavement structures provided in section 3.5.1 assumes that the roadbed soils are very poor.

3.5.1 Standard Pavement Structures

For parking lots standard pavement structure cross sections placed on native soils or engineered roadbed at this site may consist of 300 mm of OPSS granular B, 150 mm of OPSS Granular A and up to 50 mm of asphalt. This thicknesses will vary depending on expected traffic at different locations.

3.6 Excavations, Open Cuts, Trenches, Safety and Shoring

Typically, the main concern when excavating soils or rock is the stability of the sides of excavations. The stability of the sides is achieved by either cutting the sides to safe slopes or by providing shoring. It is also an issue of safety because of imminent hazards to the safety of workers and to property. As such, excavations are governed by the provisions in the Occupational Health and Safety Act of Ontario (O. Reg. 213/91). The application of O. Reg. 213/91 requires a classification of soils in one or several of four types (type I to type IV). At this site for all excavations soils can be considered type II under O. Reg. 213/91. As such, the following key aspects of O. Reg. 213/91 are applicable to this site:

- Safe open cut is 1 vertical to 1 horizontal.
- Within 1.2 m of the bottom of open cut areas or trenches, the soil can be cut vertical.

Where the safe open cut is not provided, either the shoring systems described in O. Reg. 213/91 or engineered shoring systems need be used.

Note also that since excavation and safety are usually in control of the contractor, *shoring design and construction is done by the contractor*. The information in section 3.6.2 can be used for the design of shoring according to the findings of this investigation.

3.6.1 Construction and Excavation Along Adjacent Structures and Property Boundaries

Significant concerns regarding safety and property damage result from excavations along adjacent structures and as such subject to O. Reg. 213/91. Along

with the provisions of O. Reg. 213/91 note that excavation depths below the founding depth of adjacent structures will not take place, unless:

- Lateral support is provided to soils by cutting the slope to 1 horizontal to 1 vertical or
- lateral support is provided by shoring.

It is also recommended that the edge of open cuts providing minimum lateral support at the edge of foundations be offset at least 0.3 m from the edge of foundations.

3.6.2 Shoring

Based on geotechnical assessments, the following information can be used for the design of shoring at this site:

- The average unit weight of soils can be considered to be $17.5kN/m^3$
- A friction angle of 32 degrees could be used for soils above elevation 96 shown in the cross section 2 in page 6.
- The corrected[2] undrained shear strength below elevation 96 is estimated to be 48 kPa estimated with the worst shear strength.
- Based on geological mapping information it appears unlikely that the bedrock is at depth less than 20 m at this site.
- The assessments in section 2.2 strongly suggest that the water table is close to elevation 96 shown in fig. 2 in page 6.

3.7 Water Inflow Within Excavations and Water Takings

Water inflow within excavations in soils is influence by the depth of excavations relative to the water table and flow behaviour of water in soils as controlled by the permeability of soils. Silty clays in Ottawa, having the conditions encountered at this site are generally of low permeability. As such, water inflow is expected to be low and controllable by pumping from open sumps.

3.7.1 Water Takings and Permits

Water takings from the environment, including groundwater in excavations, are regulated under Ontario Water Resources Act, R.S.O. 1990, c. O.40. (OWRA). The OWRA is enforced by the Ministry of Environment (MOE). Under the OWRA. a Permit to Take Water (PTTW) is required for pumping from excavations exceeding 400 cubic meters per day. Along with the consideration of

[2]Bjerrum's field vane correction at estimated 30 to 35% plasticity

ground water from excavations, PTTW applications require in addition the consideration of precipitation. The excavations at this site are subject to OWRA and this section is intended to provide criteria indicative of whether a PTTW may be required or not.

Based on precipitation data in Ottawa, for sites where individual excavations area is less than 2.000 square meters (approximately 30 by 67 m) to a depth above the water table, pumping from excavations is not expected to exceed the threshold of 400 cubic meters per day. These are the conditions expected for the proposed development so that *the requirement of a PTTW may not apply to the proposed development.*

3.8 Underground Corrosion

For the resistivity, PH and soluble ions concentrations found at this site and shown in the Paracel Laboratories certificate of analysis in appendix B.1, the soils are mildly corrosive. Resistivity, PH and soluble ions testing was completed in a representative sample at a 1.5 m depth in BH3. After Romanoff (1957)[3], the following corrosion rates can be used:

1. For carbon steel:
   - 16 μm/year for the first 2 years,
   - 12 μm/year, thereafter.
2. For galvanized metal:
   - 3.6 μm/year for the first 2 years,
   - 2.25 μm/year until depletion of zinc,
   - 12 μm/year for carbon steel.

3.9 Potential of Sulphate Attack to Concrete

For the sulphate content less than 0.1% in soil encountered at this site, there are no restrictions to the cement type which can be used for underground structures. This refers to restrictions associated with sulphate attack only.

3.10 Special Issues or Concerns

Our investigation did not reveal special concerns for the proposed development, such as slope stability, liquefaction, organic materials, etc.

[3]Romanoff's work for the U. S. National Bureau of Standards is authoritative in underground corrosion

3.11 Construction Recommendations for Stripping, Excavation to Undisturbed Soils, Fill Placement and Compaction

Appendix D presents recommended geotechnical guidelines for stripping, excavation to undisturbed soils, fill placement, compacted lifts thicknesses for equipment type and compaction for different placements.

Appendices

A Borehole Logs

Report 28-Cm3
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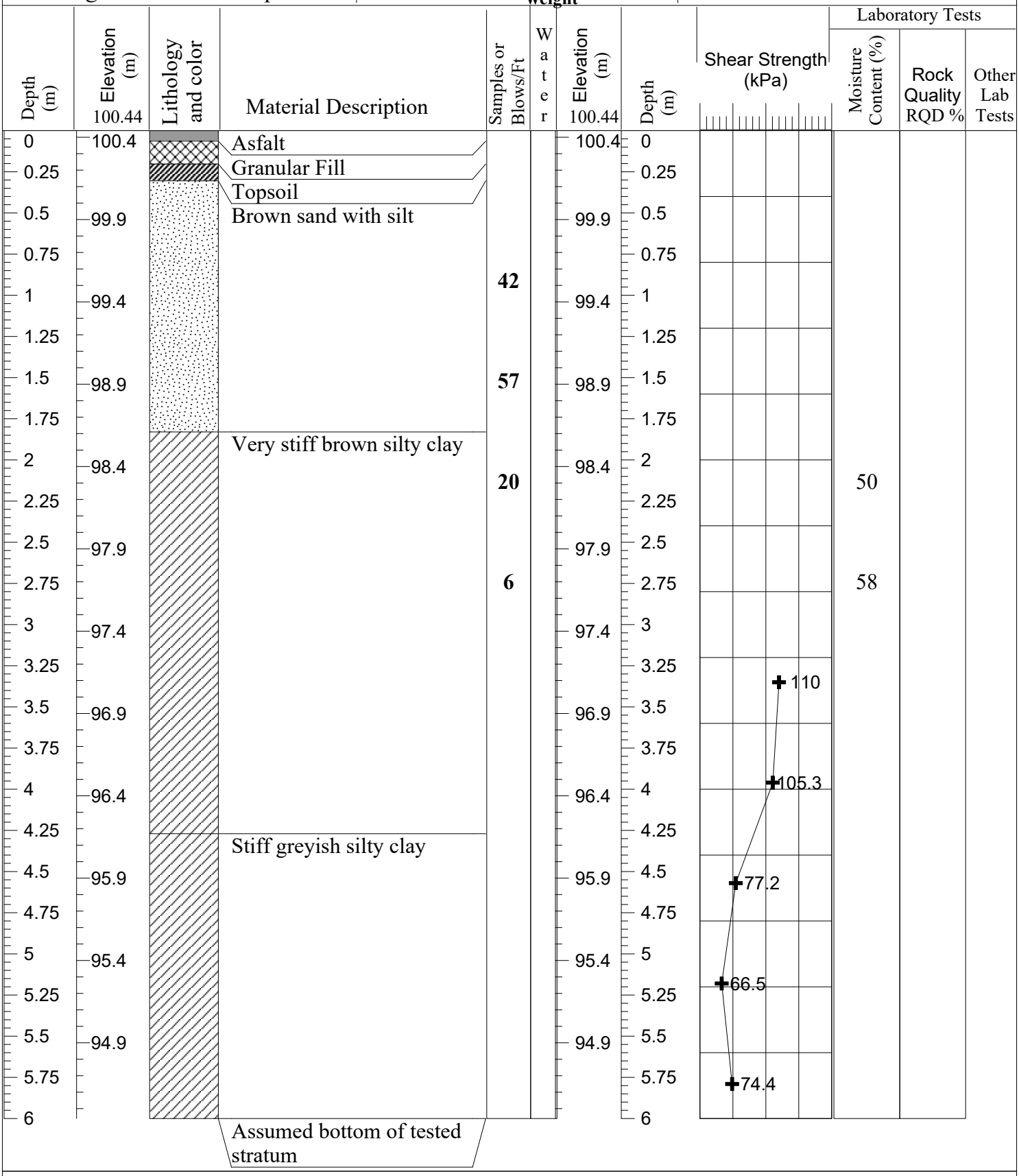
Project: **Removal of Contaminated Soils**		Geoseismic Geotechnical Engineering
Location: **22 Hawthorne Ave., Ottawa**	Client: **Cm3 Environmental**	**Test Hole No.: BH1 of 3**
Job No.: **28-Cm3**	Test Hole Type: **Rotary 3"dia.**	Date: **August 02 and 03, 2017**
3" casing and continuous spoons.	SPT Hammer Type: **Manual 1/3 weight**	Logged By: **Yuri Mendez**



S = Sample for lab review and moisture content

▼ Measured water level

Project: **Removal of Contaminated Soils**		Geoseismic Geotechnical Engineering
Location: **22 Hawthorne Ave., Ottawa**	Client: **Cm3 Environmental**	**Test Hole No.: BH2 of 3**
Job No.: **28-Cm3**	Test Hole Type: **Rotary 3" dia.**	Date: **August 02 and 03, 2017**
3" casing and continuous spoons.	SPT Hammer Type: **Manual 1/3 weight**	Logged By: **Yuri Mendez**

Depth (m)	Elevation (m) 100.28	Lithology and color	Material Description	Samples or Blows/Ft	Water	Elevation (m) 100.28	Depth (m)	Shear Strength (kPa)	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Rock Quality RQD %	Laboratory Tests: Other Lab Tests
0	100		Topsoil			100	0				
0.25			Brown sand with silt.				0.25				
0.5							0.5				
0.75	99.5		Inferred silty sand			99.5	0.75				
1							1				
1.25	99					99	1.25				
1.5							1.5				
1.75	98.5					98.5	1.75				
2			Brown silty sand				2				
2.25	98		Very stiff brown silty clay	12		98	2.25		51		
2.5							2.5				
2.75	97.5			20		97.5	2.75		53		
3							3				
3.25	97			12		97	3.25		65		
3.5							3.5				
3.75	96.5					96.5	3.75				
4							4	109.6			
4.25	96		Stiff greyish silty clay			96	4.25				
4.5							4.5	69.2	72		
4.75	95.5					95.5	4.75				
5							5				
5.25	95					95	5.25	57.3	72		
5.5							5.5				
5.75	94.5					94.5	5.75	63			
6			Assumed bottom of tested stratum				6				

S = Sample for lab review and moisture content

▼ Measured water level

Project: **Removal of Contaminated Soils**		Geoseismic Geotechnical Engineering
Location: **22 Hawthorne Ave., Ottawa**	Client: **Cm3 Environmental**	**Test Hole No.: BH3 of 3**
Job No.: **28-Cm3**	Test Hole Type: **Rotary 3" dia.**	Date: **August 02 and 03, 2017**
3" casing and continuous spoons.	SPT Hammer Type: **Manual 1/3 weight**	Logged By: **Yuri Mendez**

Depth (m)	Elevation (m) 100.44	Lithology and color	Material Description	Samples or Blows/Ft	Water	Elevation (m) 100.44	Depth (m)	Shear Strength (kPa)	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Rock Quality RQD %	Laboratory Tests: Other Lab Tests
0	100.4		Topsoil			100.4	0				
0.25			Fill: Sandstone boulder				0.25				
			Topsoil								
0.5	99.9		Fill: Brown sand with silt and trace sandstone gravel			99.9	0.5				
0.75			Brown sand with silt				0.75				
1	99.4		Inferred brown sand with silt			99.4	1				
1.25			Brownish sand with silt				1.25				
1.5	98.9			51		98.9	1.5				
1.75							1.75				
2	98.4		Very stiff brown silty clay	26		98.4	2		52		
2.25							2.25				
2.5	97.9					97.9	2.5				
2.75				8			2.75		65		
3	97.4					97.4	3				
3.25							3.25	141.2			
3.5	96.9					96.9	3.5				
3.75							3.75				
4	96.4					96.4	4	101	61		
4.25			Stiff greyish silty clay				4.25				
4.5	95.9					95.9	4.5	66.8			
4.75							4.75				
5	95.4					95.4	5				
5.25							5.25	82.7			
5.5	94.9					94.9	5.5				
5.75							5.75	96			
6			Assumed bottom of tested stratum				6				

S = Sample for lab review and moisture content

▼ Measured water level

Report 28-Cm3
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Appendix

B Resistivity, PH and Soluble Salts Test

Certificate of Analysis
Client: Geoseismic
Client PO:

Report Date: 08-Aug-2017
Order Date: 3-Aug-2017
Project Description: 22 Hawthorne

	Client ID:	BH3-SS2	-	-	-
	Sample Date:	03-Aug-17	-	-	-
	Sample ID:	1731356-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	71.0	-	-	-
General Inorganics					
pH	0.05 pH Units	7.33	-	-	-
Resistivity	0.10 Ohm.m	50.7	-	-	-
Anions					
Chloride	5 ug/g dry	31	-	-	-
Sulphate	5 ug/g dry	72	-	-	-

Appendix

C Foundation Drainage

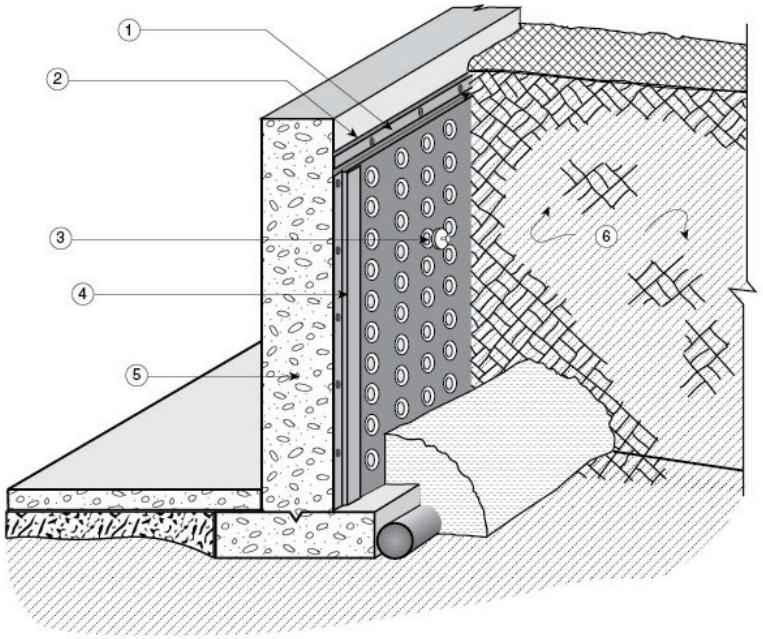


Figure 1. "Cosella-Dörken DELTA®-MS and DELTA®-MS CLEAR Dampproofing Membranes" – face in contact with the soil

1. **termination bar**
2. **caulking (behind membrane)**
3. **fastener**
4. **mould strip**
5. **concrete foundation**
6. **backfill**

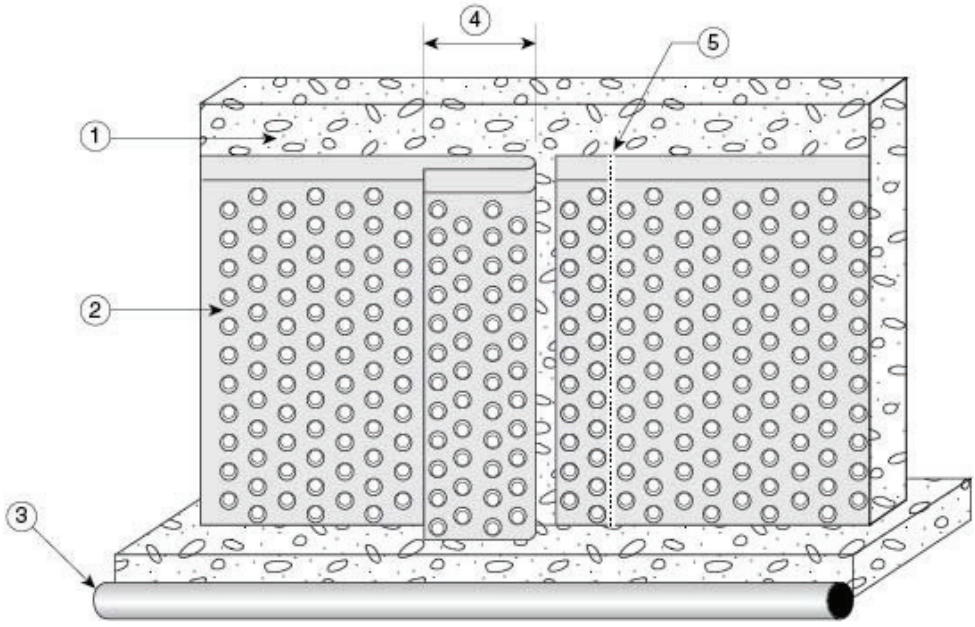


Figure 2. "Cosella-Dörken DELTA®-MS and DELTA®-MS CLEAR Dampproofing Membranes" – face in contact with the wall

1. **concrete foundation**
2. **membrane**
3. **drainage tile**
4. **minimum 6" overlap**
5. **caulking**

Appendix

D Construction Recommendations for Stripping, Excavation to Undisturbed Soils, Fill Placement and Compaction

In the event that any of the following recommendations conflict with municipal and or provincial specifications, the most restrictive applies. For the case when products involving ground conditions are used, the manufacturers specifications take precedence.

D.1 Striping

Topsoil and existing fill must be removed from the perimeter of all proposed structures, including retaining wall, buildings, pavement, parking areas and earth or fill banks for grading.

D.2 Excavation to Undisturbed Soil Surface

All soil surfaces in which to commence construction for all structures are to be preserved in undisturbed condition (Undisturbed Soil Surface (USS)). Where rainy weather and/or equipment operation and/or labours make impractical or difficult the preservation of USS a working-leveling granular pad may be used. Use the compaction requirements and materials for trench foundation (stabilization).

Except as otherwise indicated for select borrow materials at this site, reinstatement of excavated soil is not allowed. When excavation exceeds the depth of the proposed USS, a granular pad using the material and compaction requirements for trench foundation will be used.

It can be assumed that it is impractical to conduct excavations to an even USS. In such case a granular pad not less than 150mm thick must be used to remedy for irregularities caused by the operation of equipment.

D.3 Fill Placement

D.3.1 Compacted Lifts Thicknesses Equipment and Passes

Compacted lifts for non cohesive soils or specified granular will not exceed 200 mm and 150 mm for cohesive soils. For specified granulars, subject to test trials a maximum compacted lift of 300 mm may be accepted provided vibratory compaction equipment rated at 60,000 lb-f (27,300 kg-f) of dynamic force is used.

For road construction passes are to overlap by 300 mm for full coverage.

Where non vibratory pneumatic compactors with ballast an tire pressure of 100 psi (7 kg/cm2) are used (9 or 13 ply) the compacted lift thicknesses will not exceed 150 mm for granular and 120 mm for cohesive soils.

For services and culvert trenches, when using rammers and light vibratory plates weighing less than 115 kg (250 lbs) the compacted lift thicknesses will not exceed 100 and 125 mm respectively. For heavier trench equipment the compacted lifts for non cohesive soils or specified granular will not exceed 200 mm and 150 mm for cohesive soils.

No heavy equipment will be operated above the crown of pipes or culverts unless 1.2 m of fill has been placed or the subgrade elevation has been reached.

For all trenches below the water table, trench foundation not less than 200 mm will be provided as per materials and specification in Table 1 in page 25.

Materials lift placement beneath foundations, slabs or any placement not specified above must abide to the above specifications as they relate to the equipment being used.

D.3.2 Compaction Guide for Passes and Level of Compaction

The contents of this section are provided as guidelines for construction. The resulting compaction densities and compacted lift thicknesses can only be verified by actual testing and field trials respectively.

For equipment passes the contractor may consider not less than 6, 7 or 8 passes for 90, 95 or 100 % Proctor Standard compaction.

For granular materials loose lifts may be approximately 150, 175 and 235 mm for compacted lift thicknesses 125, 150 and 200 mm respectively.

For cohesive materials loose lifts may be approximately 125 and 190 mm for compacted lift thicknesses 100 and 150 mm respectively.

D.4 Compaction General

Table 1 in page 25 presents Proctor Standard (PS) compaction requirements for specified placement and materials.

D.5 Compaction Specific

D.5.1 Compaction Along Basement Walls and Retaining Walls

The consolidation zone is defined as the zone within 0.9 m of the exterior edge of basements or the interior edge of retaining walls. Only very light compaction is to be applied within the consolidation zone. Compaction along the consolidation zone could be conducted in 125 mm compacted lifts using 1 to 2 passes of light vibratory equipment.

D.5.2 Compaction Quality Control

Provide moisture density relationships for Standard Proctor compaction for the proposed materials and source. Conduct one in situ test at randomly selected

Material Placement	Material Description	% PS
Base	OPSS 1010 Granular A	100
Subbase	OPSS 1010 Granular B Type II	100
Subgrade	Cohesionless (with 12 % or less fines) and 100% passing 106 mm sieve	95
	Cohesive	95
Backfill for trenches under pavement	Cohesionless (with 12 % or less fines) and 100% passing 106 mm sieve.	95
	Cohesive	95
Under sidewalks top 200 mm	Any OPSS 1010 Granular specification for which 100% passes the 26.5 mm sieve the 26.5 mm sieve	95
	Cohesive	95
Under foundations	Any OPSS 1010 Granular specification for which 100% passes the 106 mm sieve except Granular B Type I	95
Backfill under slabs on grade	Cohesionless (with 12 % or less fines) and 100% passing 106 mm sieve.	100
	Cohesive	95
Top 100 mm under slabs	Crushed stone 9.5 to 19 mm (use one or several sizes).	90
Pipe bedding and cover (150 mm for bedding to 150 mm above the crown)	Any OPSS 1010 Granular specification for which 100% passes the 26.5 mm sieve	95
Trench foundation (stabilization minimum 200 mm)	Any OPSS 1010 Granular specification for which 100% passes the 106 mm sieve except Granular B Type I	95
Backfill for non building, non traffic and/or non parking areas	Cohesionless (with 12 % or less fines) and 100% passing 106 mm sieve	90
	Cohesive	90
Placement not specified above	Cohesionless (with 12% or less fines) and 100% passing 106 mm sieve	95
	Cohesive	95

Table 1: Proctor Standard (PS) compaction requirements for specified placement and materials.

locations per 60 m3 of fill. This is approximately one test, each 300 m2 of lift in place. Nuclear or non-nuclear density probes testing can be used.

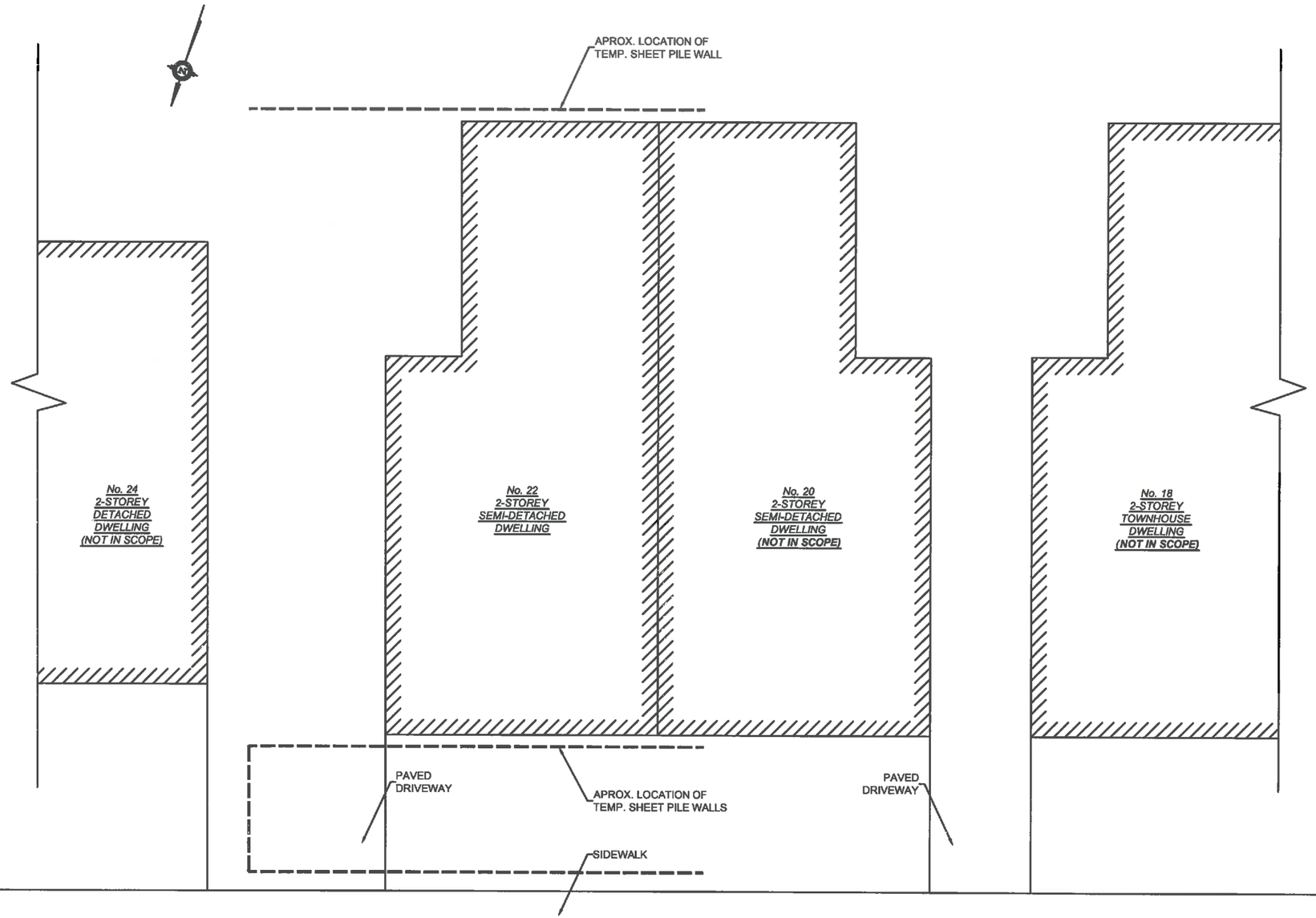
Appendix C

Structural Plan

Initial Excavation Plan

22 Hawthorne Avenue, Ottawa, Ontario

BDC1148



SITE PLAN
SCALE: AS SHOWN

HAWTHORNE AVE

10' 5' 0 10' 20' 50'

dfa
DFA Engineering Services Inc.
3544 Innes Road
Ottawa, Ontario
K1C 1T1
(613) 837-1235

PROFESSIONAL STAMP

NOTES:

1. DIMENSIONS ARE APPROXIMATE AND SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE. REPORT ANY DISCREPANCY TO THE ENGINEER;
2. ALL WORK TO CONFORM TO OBC 2012 AND GOOD CONSTRUCTION PRACTICE;
3. INSTALLATION OF SHORING IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. SHORING SHALL BE INSTALLED PRIOR TO UNDERPINNING AND REMOVAL OF BEARING ELEMENTS;
4. OIL CONTAMINATION DELINEATION BY OTHERS;
5. THIS IS NOT A SURVEYED DRAWING.

REVISIONS

No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
SITE PLAN

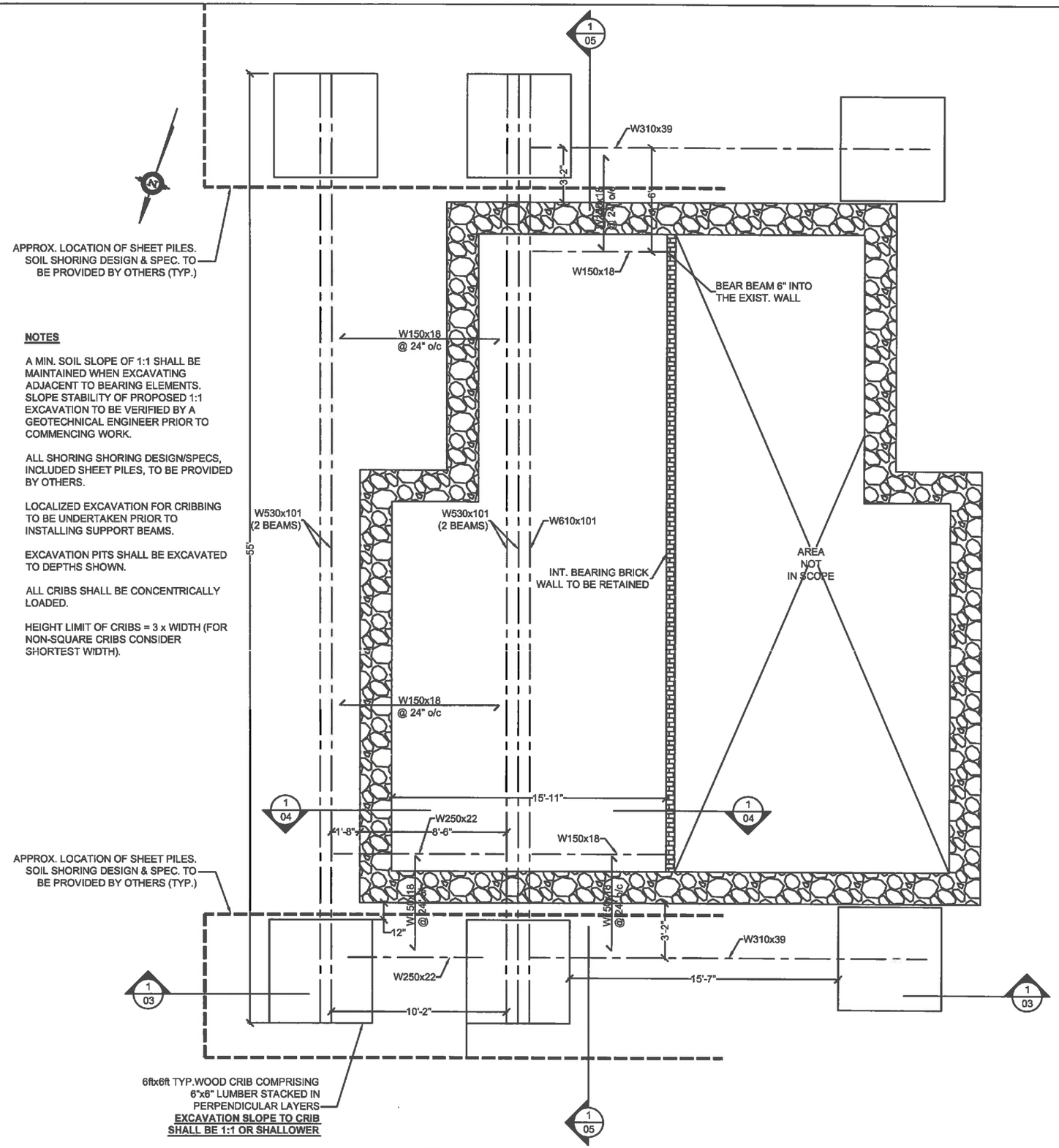
SCALE
AS SHOWN

DRAWN BY
HM

REVIEWED BY
HM

DATE
3 AUGUST 2017

DRAWING NO.
DFA17-174C-01



SHORING LAYOUT
SCALE: 5/32" = 1'-0"

NOTES

A MIN. SOIL SLOPE OF 1:1 SHALL BE MAINTAINED WHEN EXCAVATING ADJACENT TO BEARING ELEMENTS. SLOPE STABILITY OF PROPOSED 1:1 EXCAVATION TO BE VERIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO COMMENCING WORK.

ALL SHORING SHORING DESIGN/SPECS, INCLUDED SHEET PILES, TO BE PROVIDED BY OTHERS.

LOCALIZED EXCAVATION FOR CRIBBING TO BE UNDERTAKEN PRIOR TO INSTALLING SUPPORT BEAMS.

EXCAVATION PITS SHALL BE EXCAVATED TO DEPTHS SHOWN.

ALL CRIBS SHALL BE CONCENTRICALLY LOADED.

HEIGHT LIMIT OF CRIBS = 3 x WIDTH (FOR NON-SQUARE CRIBS CONSIDER SHORTEST WIDTH).

dfa
DFA Engineering Services Inc.
3544 Innes Road
Ottawa, Ontario
K1C 1T1
(613) 837-1235

PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
H. MANKAL
100150480
17/8/17
PROVINCE OF ONTARIO

NOTES:

1. DIMENSIONS ARE APPROXIMATE AND SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE. REPORT ANY DISCREPANCY TO THE ENGINEER;
2. ALL WORK TO CONFORM TO OBC 2012 AND GOOD CONSTRUCTION PRACTICE;
3. INSTALLATION OF SHORING IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. SHORING SHALL BE INSTALLED PRIOR TO UNDERPINNING AND REMOVAL OF BEARING ELEMENTS;
4. OIL CONTAMINATION DELINEATION BY OTHERS;
5. THIS IS NOT A SURVEYED DRAWING.

REVISIONS

No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
SHORING LAYOUT

SCALE
5/32" = 1'-0"

DRAWN BY
HM

REVIEWED BY
HM

DATE
3 AUGUST 2017

DRAWING NO.
DFA17-174C-02

NOTES

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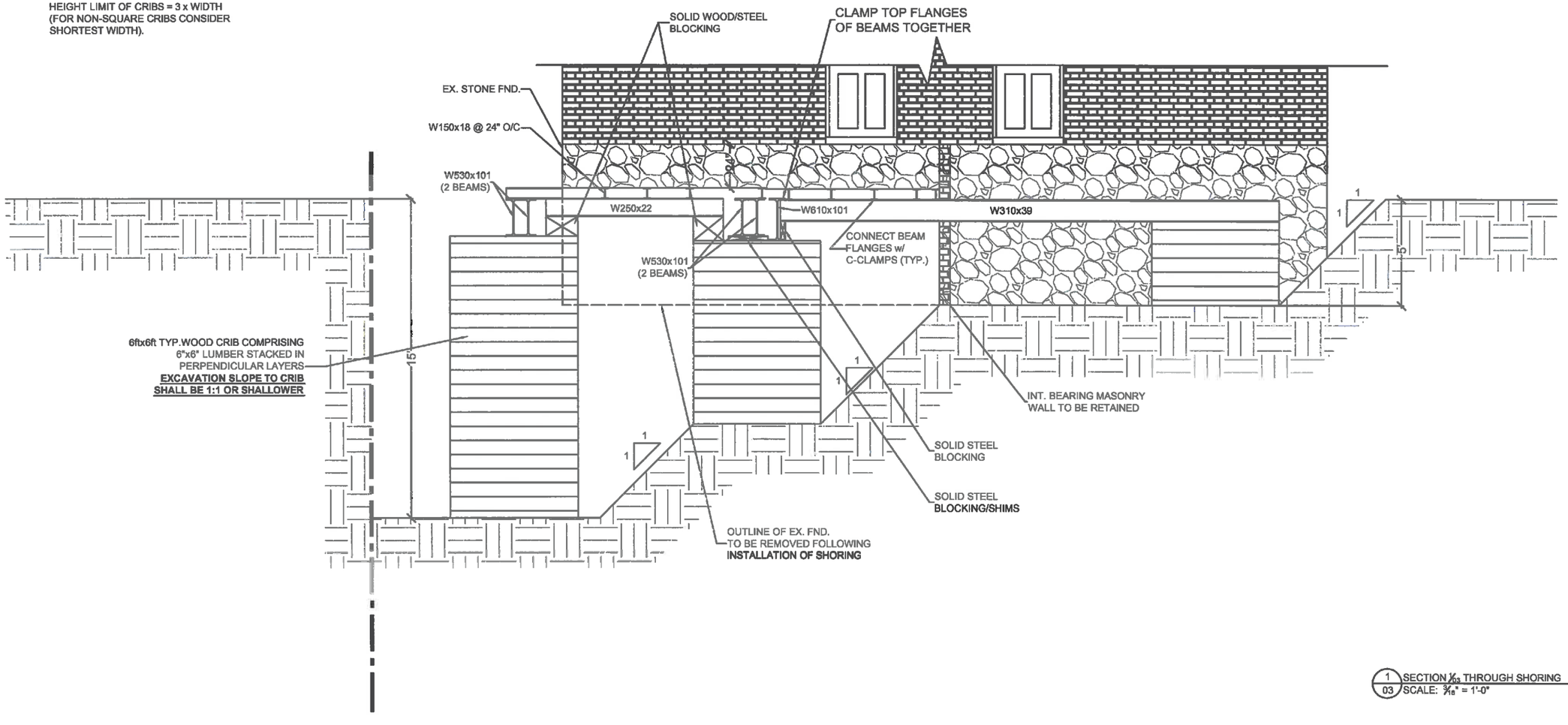
HEIGHT LIMIT OF CRIBS = 3 x WIDTH (FOR NON-SQUARE CRIBS CONSIDER SHORTEST WIDTH).



1/03 SECTION 1/03 THROUGH SHORING
SCALE: 3/16" = 1'-0"

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REVISIONS		
No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
SECTION 1/03 THROUGH SHORING

SCALE
3/16" = 1'-0"

DRAWN BY
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HM

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DRAWING NO.
DFA17-174C-03

NOTES

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EXCAVATION PITS SHALL BE EXCAVATED TO DEPTHS SHOWN.

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HEIGHT LIMIT OF CRIBS = 3 x WIDTH (FOR NON-SQUARE CRIBS CONSIDER SHORTEST WIDTH).

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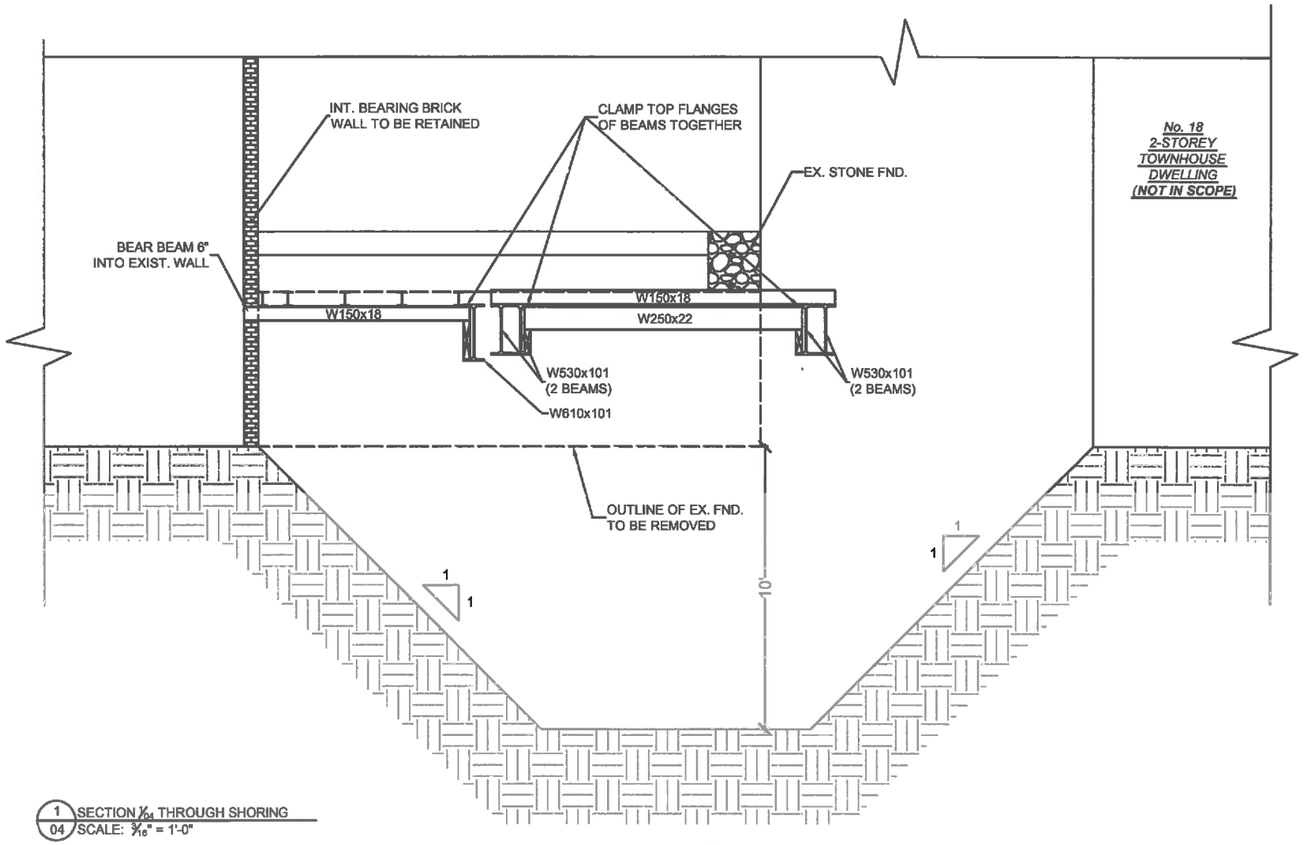

1/04 SECTION 1/64 THROUGH SHORING
SCALE: 3/16" = 1'-0"

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REVISIONS

No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
SECTION 1/64 THROUGH SHORING

SCALE
3/16" = 1'-0"

DRAWN BY
HM

REVIEWED BY
HM

DATE
3 AUGUST 2017

DRAWING NO.
DFA17-174C-04

NOTES

A MIN. SOIL SLOPE OF 1:1 SHALL BE MAINTAINED WHEN EXCAVATING ADJACENT TO BEARING ELEMENTS. SLOPE STABILITY OF PROPOSED 1:1 EXCAVATION TO BE VERIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO COMMENCING WORK.

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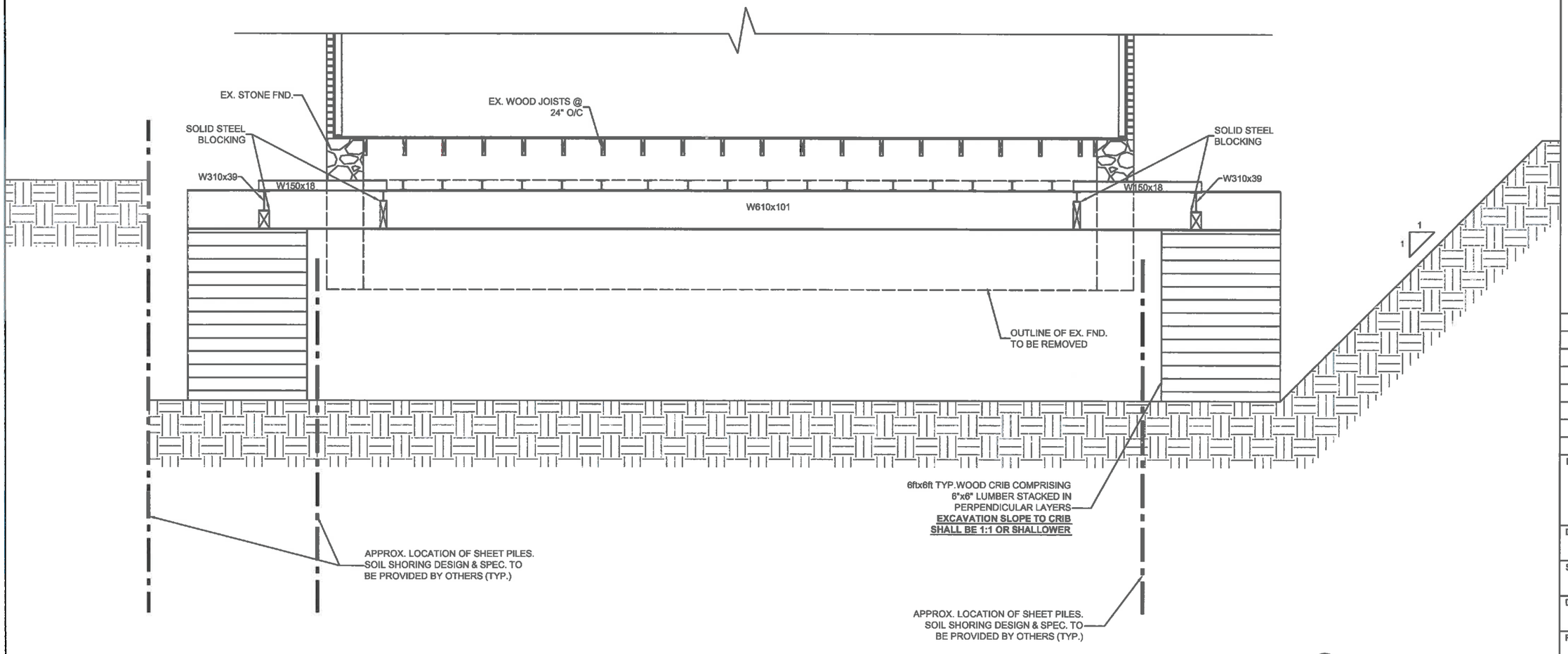

1/05 SECTION 1/05 THROUGH SHORING
SCALE: 3/16" = 1'-0"

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4. OIL CONTAMINATION DELINEATION BY OTHERS;
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REVISIONS		
No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
SECTION 1/05 THROUGH SHORING

SCALE
3/16" = 1'-0"

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REVIEWED BY
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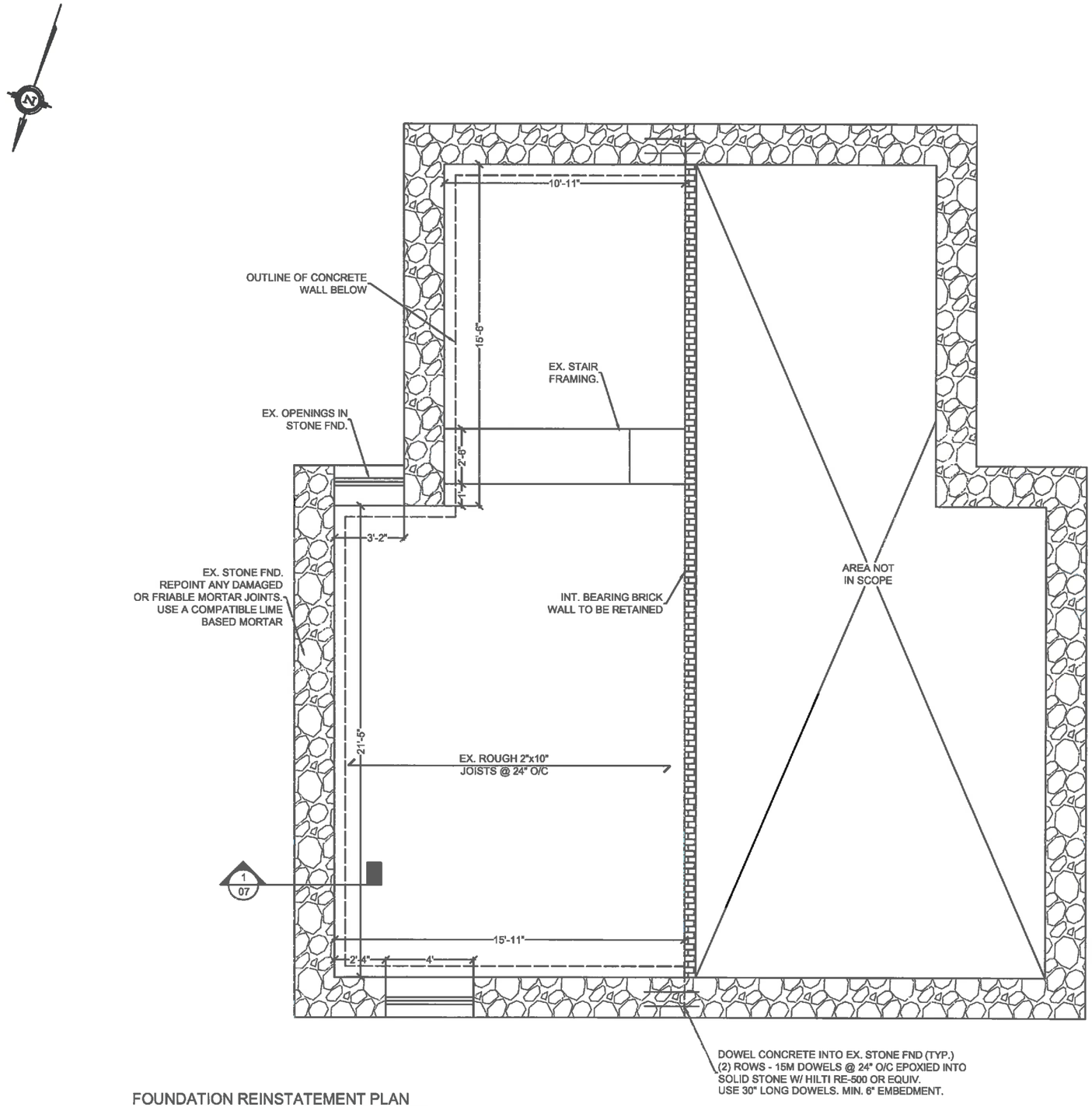
DATE
3 AUGUST 2017

DRAWING NO.
DFA17-174C-05



FOUNDATION REINSTATEMENT PLAN
SCALE: 3/16" = 1'-0"

NEW FOUNDATION INSTRUCTIONS:

1. CLEAN THE SURFACE OF THE EXIST. FOUNDATION WHERE IT WILL BOND WITH NEW CONCRETE.
2. INSTALL 15M DOWELS @ 24" O/C INTO THE U/S OF THE EXIST. FOUNDATION & AT THE VERTICAL FACE ADJACENT TO THE INTERIOR BEARING WALL. DOWELS SHALL BE EPOXIED INTO SOLID STONE USING HILTI RE-500 ADHESIVE.
3. FORM WALLS AROUND TEMP. STEEL BEAMS.
4. POUR MIN. 20MPa @ 28 DAYS LOW-SHRINK CONCRETE MIXTURE BELOW STONE BEING RETAINED. ALLOW FOR A 8" OVERPOUR. VIBRATE MIXTURE ADEQUATELY TO ENSURE CONCRETE IS UNIFORM AND VOIDS ARE FILLED.
5. FOLLOWING REMOVAL OF THE TEMP. STEEL BEAMS, FILL ALL OPENINGS WITH SOLID MASONRY AND PARGE THE EXTERIOR FACE.

ADDITIONAL NOTES:

1. SHORE AND BRACE WHERE NECESSARY TO ENSURE SAFETY AND STABILITY OF THE EXISTING STRUCTURE DURING REPAIRS
2. DRAINAGE AND GRADING BY OTHERS.
3. FOUNDATION WALL SHALL BE WATERPROOFED IN ACCORDANCE TO CL. 9.13. OF 2012 OBC.
4. All WALLS SHALL BEAR ON UNDISTURBED NATIVE SOIL OR COMPACTED GRANULAR FILL.
5. ALL NEW CONCRETE SHALL BE MIN. 20MPa
6. NEW FOOTINGS SHALL BE FOUNDED ON UNDIST. NATIVE SOIL OR COMPACTED GRANULAR W/ THE FOLLOWING MIN. BEARING CAPACITIES:
   ULS = 165 kPa
   SLS = 135 kPa
   BEARING CAPACITY SHALL BE VERIFIED BY GEOTECHNICAL ENGINEER.

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4. OIL CONTAMINATION DELINEATION BY OTHERS;
5. THIS IS NOT A SURVEYED DRAWING.

REVISIONS

No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
FOUNDATION REINSTATEMENT PLAN

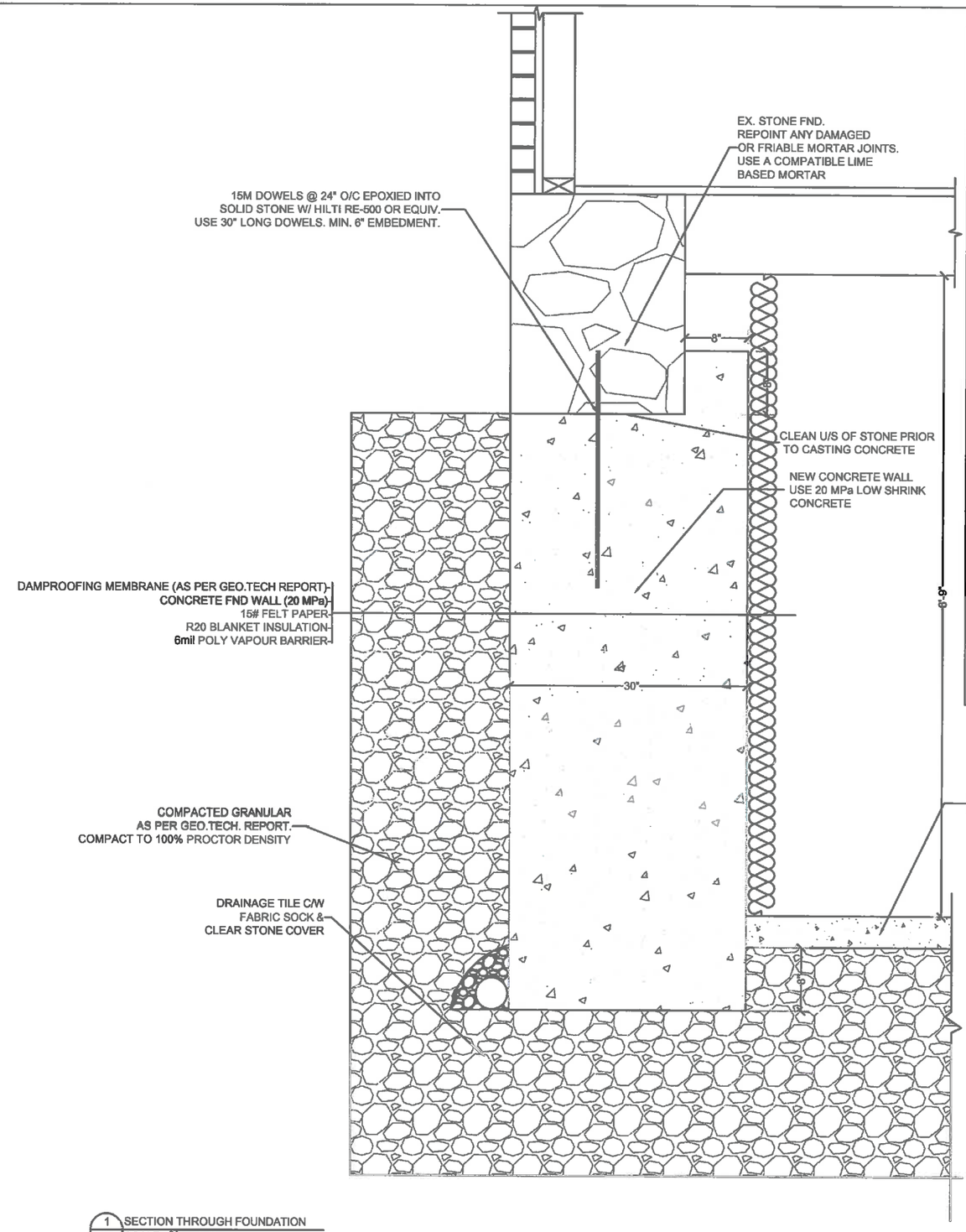
SCALE
5/32" = 1'-0"

DRAWN BY
HM

REVIEWED BY
HM

DATE
3 AUGUST 2017

DRAWING NO.
DFA17-174C-06



1/07 SECTION THROUGH FOUNDATION
SCALE: 3/4" = 1'-0"

NEW FOUNDATION INSTRUCTIONS:

1. CLEAN THE SURFACE OF THE EXIST. FOUNDATION WHERE IT WILL BOND WITH NEW CONCRETE.
2. INSTALL 15M DOWELS @ 24" O/C INTO THE U/S OF THE EXIST. FOUNDATION & AT THE VERTICAL FACE ADJACENT TO THE INTERIOR BEARING WALL. DOWELS SHALL BE EPOXIED INTO SOLID STONE USING HILTI RE-500 ADHESIVE.
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5. ALL NEW CONCRETE SHALL BE MIN. 20MPa
6. NEW FOOTINGS SHALL BE FOUNDED ON UNDIST. NATIVE SOIL OR COMPACTED GRANULAR W/ THE FOLLOWING MIN. BEARING CAPACITIES:
   ULS = 165 kPa
   SLS = 135 kPa
   BEARING CAPACITY SHALL BE VERIFIED BY GEOTECHNICAL ENGINEER.

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REVISIONS

No.	DATE	DESCRIPTION

PROJECT
OIL SPILL
22 HAWTHORNE AVE, OTTAWA

DRAWING
SECTION THROUGH FND.

SCALE
3/4" = 1'-0"

DRAWN BY
HM

REVIEWED BY
HM

DATE
3 AUGUST 2017

DRAWING NO.
DFA17-174C-07