NON-DESTRUCTIVE TESTING – CORROSION INVESTIGATION

Xradar Project # XBC-VAN-9793

Project Site: 12184, 224 Street, Maple Ridge, BC
Client: Evoke Buildings Engineering Ltd.
Examination Date: 04-30-2024 – 05-01-2024
Report Date: 05-15-2024
Report Prepared By: M. Neale

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DATE OF SURVEY: 04-30-2024 – 05-01-2024

PROJECT: 12184, 224 Street, Maple Ridge, BC

SUMMARY: The purpose of the Xradar survey was to determine:

-The state of corrosion of the structural members of nominated sections of suspended slab and reinforced walls within the building parkade.
- The presence, cover, spacing and diameter of the structural members within nominated example areas within the aforementioned survey areas.

OVERVIEW: Sections of the parkade ceiling slab are exposed above and notably contain no waterproofing membrane. The concrete was showing visual signs of water ingress and corrosion of reinforcement. Xradar was brought in to assess the extent of possible corrosion.

EQUIPMENT USED:

Corrosion Survey
GPR Units: GSSI SIR4000 with GSSI 1.6GHz Antenna with 3 Wheel Cart/survey stick.
GSSI 2.0 GHz Antenna (for structural scans).
Proceq GP8800 (for structural scans).

Image collection:
Leica BLK 360

Calibration of the equipment was conducted on site according to the manufacturers' recommendations.

Survey Methods and Investigation

Ground Penetrating Radar (GPR): GPR uses electromagnetic pulses to image the subsurface. If the pulse encounters variations of the electrical properties within the concrete - such as rebar or a void - a significant amount of the transmitted signal will be reflected and registered by the receiver antenna.

The GPR methodology for corrosion utilizes computer assisted visual assessment to identify reinforcement 'reflections' in the radargrams that show anomalous drops in amplitude and form, which are indicative of potential corrosion. Depending on the extent of the observed amplitudes, possible corrosion is categorized as either moderate or severe corrosion.

Survey Locations

A total area of 2044 square meters was surveyed. This was divided into five (8) individual grids, consisting of six (6) suspended slab survey areas and two (2) wall areas across three (3) different areas.
Structural scanning locations consisted of a total of nine (9) approximately 1m x 1m locations. One (1) on each wall location, three (3) within Area 1 and two (2) within Areas 2 and 3 each.

A Summary of the individual grid names and details are displayed below.

SURVEY TYPE	SURVEY AREA NAME	STRUCTURE	APPROXIMATE AREA SURVEYED (M^2)	COLLECTION DIRECTION/ASPECT /LOCATION	NOTES
CORROSION SURVEY	AREA 1- A	SUSPENDED SLAB	595	SOUTH-NORTH	
	AREA 1- B	SUSPENDED SLAB	178	WEST-EAST	SECTIONS OF THIS OVERLAPPED AREA 1-A.
	AREA 1- C	SUSPENDED SLAB	63	EAST-WEST	LOWERED SECTION
	AREA 2- A	SUSPENDED SLAB	296	EAST-WEST	SECTIONS OF THIS OVERLAPPED AREA 2-B
	AREA 2- B	SUSPENDED SLAB	643	SOUTH-NORTH	
	AREA 3- A	SUSPENDED SLAB	156	SOUTH-NORTH	
	AREA 1 - WALL	REINFORCED WALL	30	TOP-BOTTOM	
	AREA 2- WALL	REINFORCED WALL	83	BOTTOM-TOP	
STRUCTURAL SCAN	SCAN 1	SUSPENDED SLAB	1	NORTH SIDE OF AREA 1 INSIDE AREA 1-B	
	SCAN 2	SUSPENDED SLAB	1	SOUTH SIDE OF AREA 1 IN ISDE AREA 1-A	
	SCAN 3	SUSPENDED SLAB	1	SOUTH WEST SIDE OF AREA 1 – INSIDE AREA 1-C	
	SCAN 4	SUSPENDED SLAB	1	NORTH SIDE OF AREA 2	
	SCAN 5	SUSPENDED SLAB	1	SOUTH SIDE OF AREA 2	
	SCAN 6	SUSPENDED SLAB	1	NORTH SIDE OF AREA 3	

	SCAN 7	SUSPENDED SLAB	1	SOUTH SIDE OF AREA 3	
	SCAN 8	REINFORCED WALL	1	CENTRE OF WALL – SOUTH FACE	
	SCAN 9	REINFORCED WALL	1	CENTRE OF WALL – EAST FACE	

***Figure 1** – Survey area details.*

The survey area boundaries of the slab survey areas can be seen on SHEETS 2, 6 and 10. The wall location areas can be seen on SHEETS 13-14. The location of the structural scans can be seen on SHEETS 3,7,11,13 and 14.

The concrete surfaces on top were mostly dry at the time of survey and were abraded and rough in places where water had degraded them.

Survey Procedures

GPR Calibration

Depth calibration: It is always necessary to calibrate the antenna in accordance to the velocity of the material being scanned. Recorded depth of targets (rebar, slab bottom) are a direct result of the velocity of a material. Typically, this is achieved by measuring to a "known truth" such as exposed rebar, or slab bottom through a hole and calibrating the velocity accordingly.

In this instance, the slab edge was measured for thickness, the velocity of the radar was then adjusted until the perceived depth of the slab was correct. This produced an average dielectric constant of 8.2. This process was done on each survey area separately.

Distance calibration: Xradar's equipment utilizes a survey wheel to track the distance traveled by the antenna and regulates the scan rate. Distance measurements are regularly calibrated and saved within the control system.

Data Collection

For the GPR corrosion survey, survey area boundaries and collection direction were selected to optimize amount of data collected whiles minimizing obstructions.
GPR profiles were collected at 0.25m intervals along the baselines of each survey area. The antenna itself has a coverage of approximately 0.2m. The collection direction for each survey area can be seen in the table *Figure 1.*

The Xradar GPR datasets were processed and compiled in GRAD software and analyzed visually to pick areas that show features indicative of potential corrosion. The subsequent datasets were outputted as a 'heatmap

style' referenced image and subsequently digitized. The categorization of interpreted results is shown on the included SHEETS 4, 8, 12, 13 and 14.

Additionally, seven (7) slab scan locations and two (2) wall scan locations were scanned two-dimensionally to map out the reinforcement within the concrete in order to provide typical examples. Reinforcement cover, spacing and diameter (where applicable) was recorded.

For spatial referencing of the structural results, a full 3D photogrammetric scan was carried out. This provided a scaled point cloud and mesh model of the survey site. This, along with photographs and physical measurements, allowed for positioning and visual representation of the results and their locations.

Prior to capturing with the laser camera, visual signs of corrosion on both the underside and topside were identified and marked, these were then drawn over on the point cloud, to have a spatial representation of the visual signs of corrosion. These were separated into areas of exposed corroded rebar and obvious cracks, some including efflorescence.

Results

Please refer to the included drawings (SHEETS 1-15) as well as the limitations section in conjunction with the following written results.

Corrosion has been characterized into two (2) types: moderate corrosion; and severe corrosion. The table below explains data characteristics of each classification.

CLASSIFICATION	DATA CHARACTERISTICS
NO CORROSION	Rebar reflection is strong uniform and clear with hyperbola shape. Reflection of back wall is consistent and strong.
MODERATE CORROSION	Rebar reflection is relatively weak but hyperbola shape is still clearly visible. Possible "sag" of back wall reflection implying decreased radar velocity due to possible corrosion.
SEVERE CORROSION	Strong attenuation at top rebar level; hyperbola shape from rebar is distorted or almost disappeared. Reflection of back wall is distorted or almost disappeared.

Fig.1 *-Table of GPR corrosion classifications. Colour scheme applies to results.*

Both moderate and severe corrosion were found across the survey areas. Area 1 contained lots of small localized sections on both the upper and lower reinforcement mat. A much more condensed area of

moderate corrosion exists in the central southern area of Area 1, on the bottom rebar mat. Additionally visual signs of corrosion were abundant on the underside of the slab in this southern area. Cracking was present on the topside and underside of the slab most notably in the north west corner of area 1. Some cracking was also present on the underside of the south-central zone of area 1.
Area 2 was similar containing multiple isolated areas of moderate corrosion and some severe, and a condensed area in the south-central part of Area 2. There were multiple areas of visual corrosion notably the north east and south west of the area. Cracking was abundant on the underside of area 2 with some sporadic cracks on the topside of the slab. Areas of exposed bars existed on the underside of some of the beams in area 2 also. It is worth nothing the underside of beams were not scanned using GPR. Depth penetration from the top of the slab did not reach to the bottom of the beams.
Area 3 contained some small sporadic areas of moderate corrosion, no severe corrosion. Additionally, some cracking was observed on the topside and underside, with one area of exposed rebar on the underside.
It is worth mentioning the presence of manmade trenches for draining water, on Areas 2 ad 3. These are clearly retaining water.

Both wall 1 and wall 2 contained some isolated suspected moderate corrosion. Wall 2 did contain two small areas of exposed rebar. The wall was very rough in places missing some chunks of concrete so data collection was limited to areas the antenna could roll over.

Conclusions and Recommendations

The following limitations section should be closely considered when drawing conclusions from the results.

Both moderate and severe corrosion were identified across the survey areas. This predominantly existed in isolated pockets. With some notable areas being more widespread. The eastern area of concentrated moderate corrosion on area 2 correlates with the location of previously pooling water. Saturation of the concrete surface can cause a change in the dielectric of the surface concrete and therefore make the reinforcement appear more corroded. This could be possible in this area. However, the opposite could be true and the pooling water is in fact a cause of the corrosion in this area. Delamination, spalling and exposed rebar was present on the bottom of the slab in places. In the areas where visual corrosion exists but GPR corrosion does not it is suspected corrosion of the exposed bars is limited to those bars running in that direction. When corroded rebar is isolated to specific bars as opposed to more spread it is best identified when running perpendicular to the bar with antenna. Grid collection direction varied so therefore there is a chance for some bars to be missed.

It is recommended a structural engineer is approached to determine structural condition and provide and assessment of the rebar condition.

Limitations

Scan Boundaries:

- Only the areas within the structural scan boundaries (Yellow) and survey area boundaries (orange) have been scanned. No targets outside the scan boundaries have been marked.

Clearances:

- GPR has varying obstruction limitations dependent on set up and direction of scan. In this project, on the base slab no data could be collected within 0.3m of an obstruction when scanning laterally to it, 0.85m away from it when in front of the scanner and 0.7m when behind. The grid outlines in SHEET 1 reflect this.

Depth Penetration:

- Depth penetration of Xradar GPR signal varies due to site conditions, and is dependent on various factors, such as concrete age, surface conditions, and embedded content (reinforcement/conduits). Calibration of the GPR signal enables for a higher degree of accuracy; however, GPR and Xradar are subject to the physical limitations of radar. Depth measurements are subject to +/- 10% of measured depth through a *consistent* medium. The maximum GPR signal penetration was approximately 30cm from the surface.

Corrosion limitations

- Interpretation of corrosion using GPR involves assessing the amplitude of the rebar reflection. However, corrosion of concrete slabs causes and increase in the dielectric properties of the concrete. This in turn changes the velocity the radar passes through the medium. This change in velocity is best observed when the full thickness of the slab can be penetrated. In this case, due to slab bands in the parkade and other slabs in the walls, the back of the structure could not be seen in sections of the survey areas. Therefore, interpretation of corrosion was limited to rebar amplitude only in these areas.
- Areas that have been saturated for a while (puddles) can cause a change in the image of the reflection, imitating that of corrosion. Therefore, data in areas of long-standing puddles could be misidentified as corrosion.
- When corrosion is isolated to individual bars and not wide spread, it is often only identifiable when passing perpendicular over the specific rebar. Individual corroded bars running in the direction of collection may be missed.
- Visual inspection did not include any hammer sounding or other methods. It included flagging areas of exposed rebar and substantial cracks only.
- Not all areas on the underside were accessible for visual inspection.

Digital Report:

- Xradar utilizes a 3D laser scanner to capture and record the concrete survey results as well as the structural features surrounding the survey area that can be utilized to superimpose the results onto structural drawings. The point cloud data collected from the 3D laser scanner can have up to 6mm of error that will affect the accuracy of the overlaid results. Likewise, the existing structural features on site may have a degree of error to that of the structural drawings.

Report prepared by:

Michael Neale

Report reviewed by:

R. Allen

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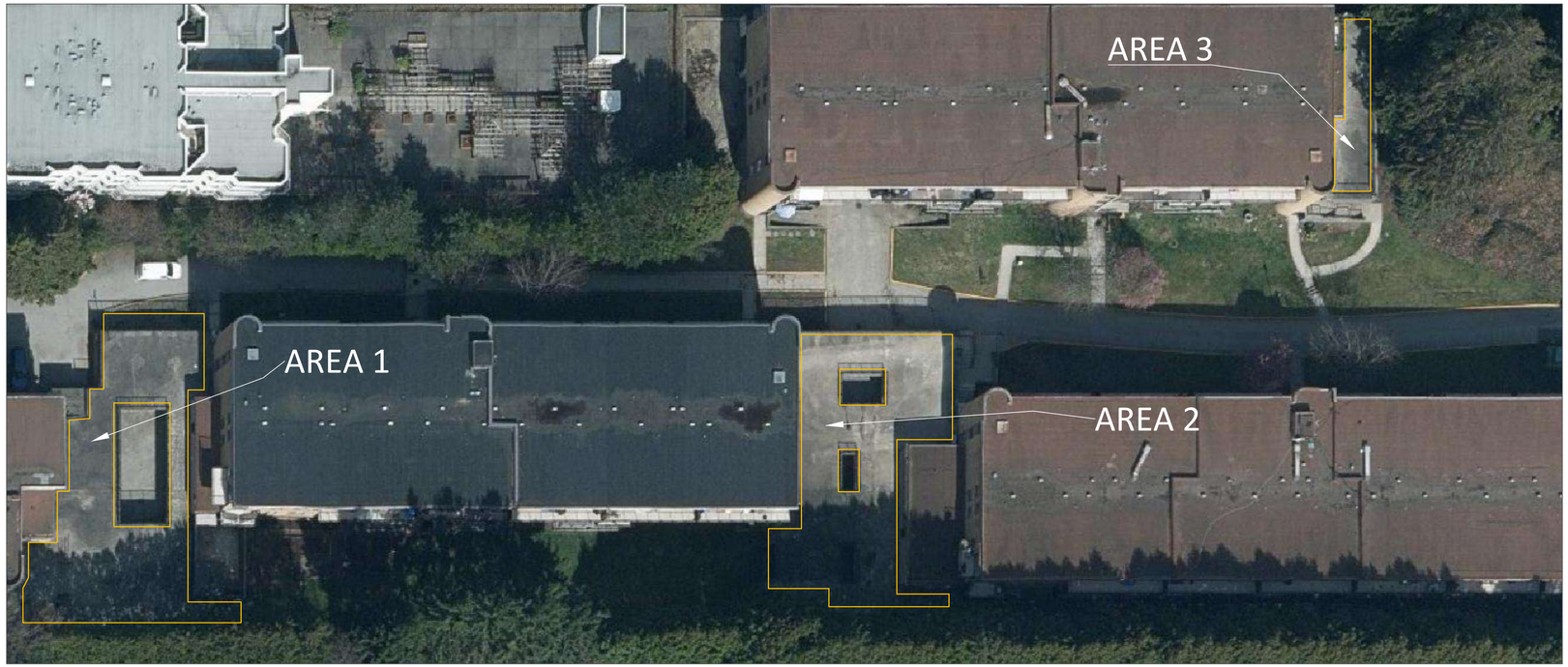
SHEET 1 - OVERVIEW OF THE SURVEYED AREAS

AERIAL LOCATOR
SCALE: 1:4000

AREAS LOCATOR
SCALE: 1:300



A DETAILED SURVEY METHODOLOGY AND LIMITATIONS CAN BE FOUND IN THE ACCOMPANYING WRITTEN PART OF THIS REPORT.

THE PURPOSE OF THE XRADAR SURVEY WAS TO DETERMINE THE STATE OF CORROSION OF THE STRUCTURAL MEMBERS WITHIN THE THREE (3) NOMINATED SECTIONS OF SUSPENDED SLAB AND TWO (2) NOMINATED AREAS OF WALLS WITHIN THE BUILDING PARKADE. ADDITIONALLY THE SURVEY SET OUT TO PROVIDE INFORMATION ON REBAR PRESENCE, SPACING, COVER AND DIAMETER OF SELECT EXAMPLES WITHIN THESE SURVEY AREAS.

GENERAL NOTES

- THIS REPORT IS A DIGITAL REPRESENTATION OF THE DATA COLLECTED BY XRADAR BC INC. THE CONCRETE SCANNING WAS PERFORMED USING XRADAR^{TM} ENHANCED GPR.
- THE PLANS PRODUCED IN THIS REPORT ARE FOR THE PURPOSE OF INDICATING THE APPROXIMATE POSITIONS OF THE SURVEY GRIDS AND ANOMALIES IN THE DATA.
- ALL DIMENSIONS AND MEASUREMENTS ARE DISPLAYED IN METERS.

METHODS

THIS SHEET PRESENTS THE SURVEY RESULTS OF 1 INSPECTION METHOD;
- GROUND PENETRATING RADAR (GPR)

OVERALL EIGHT (8) LOCATIONS WERE INSPECTED USING THIS METHOD WITHIN THREE (3) DIFFERENT AREAS. THE SURVEY LOCATIONS ARE SEPARATED BETWEEN WALLS AND SLABS AND REFERENCED IN THE SHEETS AND IN THE CORRESPONDING WRITTEN SECTION AS AREA 1A, 1B AND 1C, AREA 2A AND 2B AND AREA 3 FOR THE SLABS AND WALLS 1 AND 2 .

RESULTS

CORROSION

CORROSION IS CLASSIFIED INTO TWO (2) TYPES;
-MODERATE CORROSION
-SEVERE CORROSION

XRADAR BC INC USED AVAILABLE MEANS IN AN ATTEMPT TO DETERMINE THE PRESENCE AND LOCATION OF REINFORCEMENT WITHIN THE SLAB, HOWEVER, RADAR METHODS ARE INTERPRETIVE AND SUBJECT TO LIMITATIONS, DAYLIGHTING IS RECOMMENDED TO VERIFY REBAR LOCATION AND DEPTHS. XRADAR BC INC. IS NOT RESPONSIBLE FOR ANY LOSS OR DAMAGE ARISING OUT OF THE USE OF, OR RELIANCE ON, THE SUBSURFACE DATA COLLECTED OR THE REPORT PRESENTED. THIS DRAWING HAS BEEN PREPARED FOR THE USE OF XRADAR BC INC CLIENT, AND MAY NOT BE USED, REPRODUCED OR RELIED UPON BY THIRD PARTIES.

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4415 JUNEAU ST,

BURNABY, BC

PROJECT

CORROSION INVESTIGATION

12184 - 224 STREET,

MAPLE RIDGE, BC

LEGEND

	SURVEYED AREA
	LOCATION OVERVIEW

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
00	2024-05-01	M. NEALE & C. BROWN	M.NEALE		R. ALLEN	J.SALAZAR	

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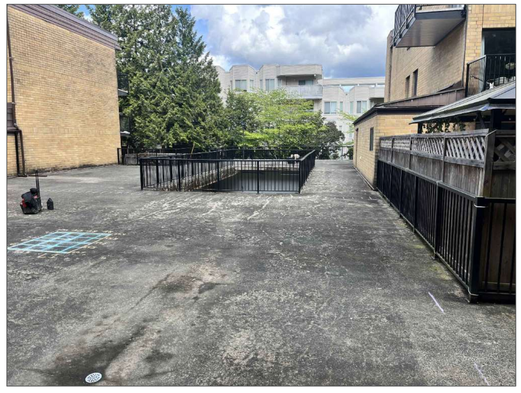
XBC-VAN-9793.	DXBC-VAN-9793-U01
PAGE TITLE	
OVERVIEW OF SURVEY AREAS	
PAGE SIZE	SHEET
ANSI D	1 OF 14

SHEET 2 - OVERVIEW OF AREA 1

AERIAL LOCATOR
SCALE: 1:800

AREA IMAGE
SCALE: N/A



AREA IMAGE
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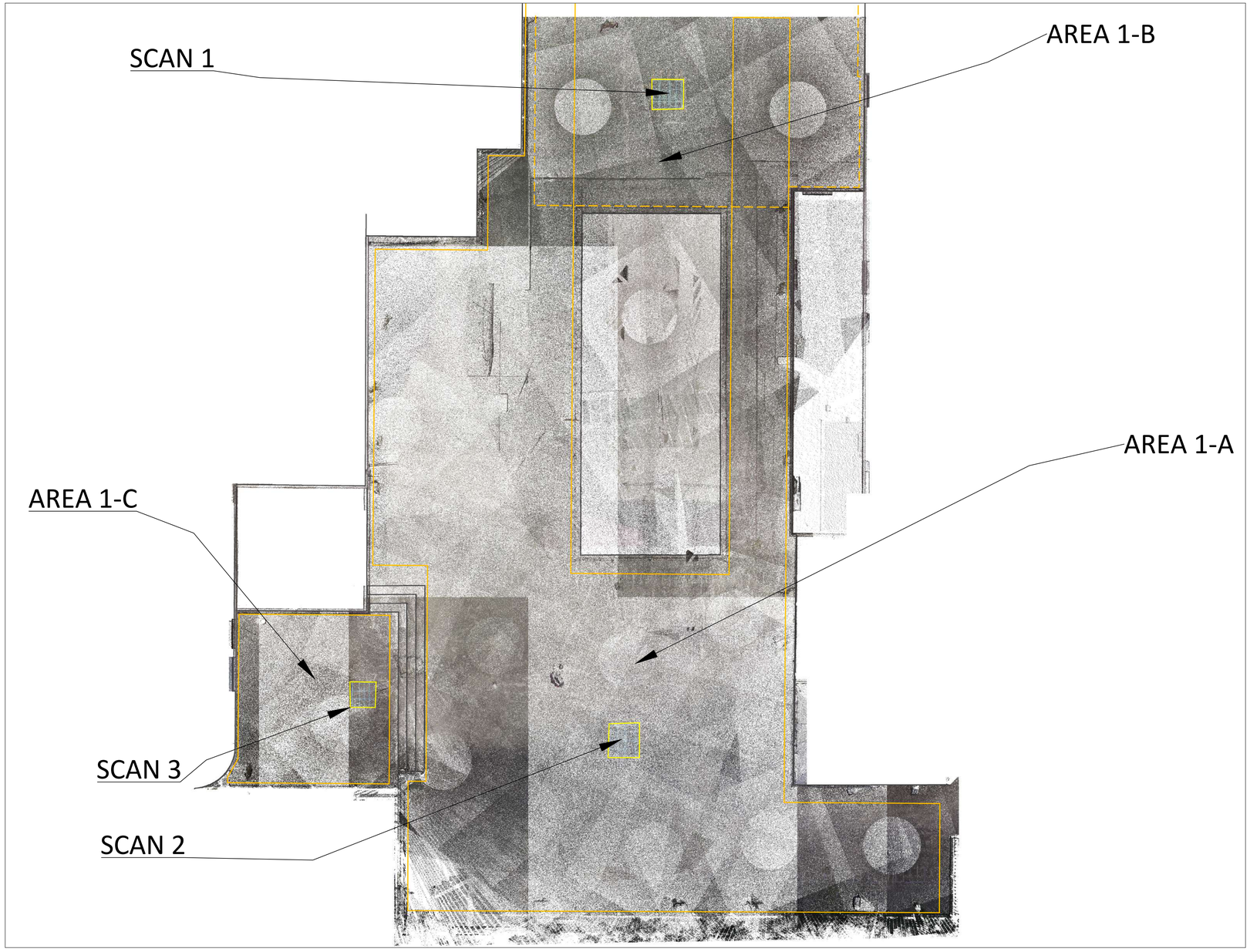
AREA 1 - SURVEY GRID BOUNDARIES
SCALE: 1:80



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12184 - 224 STREET,
MAPLE RIDGE, BC

LEGEND	
	SURVEYED AREA
	STRUCTURAL SCAN LOCATION
	STRUCTURE LINES (FROM POINT CLOUD)

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00	2024-05-01	M. NEALE & C. BROWN	M.NEALE		R. ALLEN	J.SALAZAR	

PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 1- SURVEY BOUNDARIES
PAGE SIZE: ANSI D
SHEET: 2 OF 14

SHEET 3 - AREA 1- STRUCTURAL RESULTS

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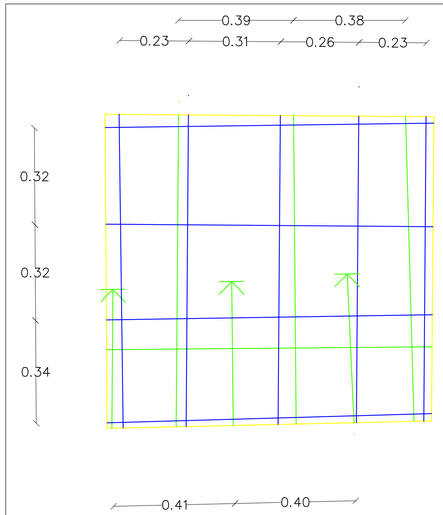
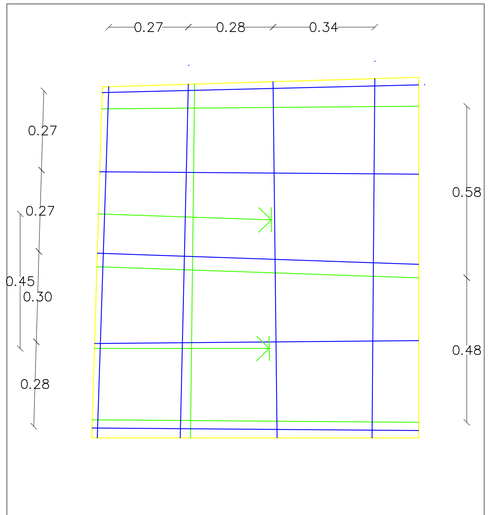
AREA 1 - STRUCTURAL SCAN LOCATIONS
SCALE: 1:50

STRUCTURAL SCAN 1
SCALE: 1:10



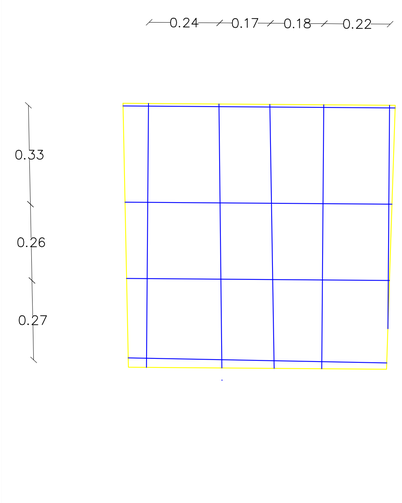
REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	50-65	15
	EAST-WEST REBAR	75	15
BOTTOM REBAR	NORTH- SOUTH REBAR	155-175	20
	EAST-WEST REBAR	154-181	20
SLAB			200
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

STRUCTURAL SCAN 2
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	103	15
	EAST-WEST REBAR	46-68	15
BOTTOM REBAR	NORTH- SOUTH REBAR	175-201	20
	EAST-WEST REBAR	188-197	20
SLAB			210
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

STRUCTURAL SCAN 3
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	N/A	N/A
	EAST-WEST REBAR	N/A	N/A
BOTTOM REBAR	NORTH- SOUTH REBAR	112-125	20
	EAST-WEST REBAR	95-131	20
SLAB			200
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

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CORROSION INVESTIGATION

12184 - 224 STREET,

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LEGEND - STRUCTURAL

	COMPLETE SCAN BOUNDARY
	TOP REBAR
	BOTTOM REBAR
	REBAR ENDS
	SLAB BANDS/SLAB THICKENINGS
	STRUCTURE LINES (FROM POINT CLOUD)

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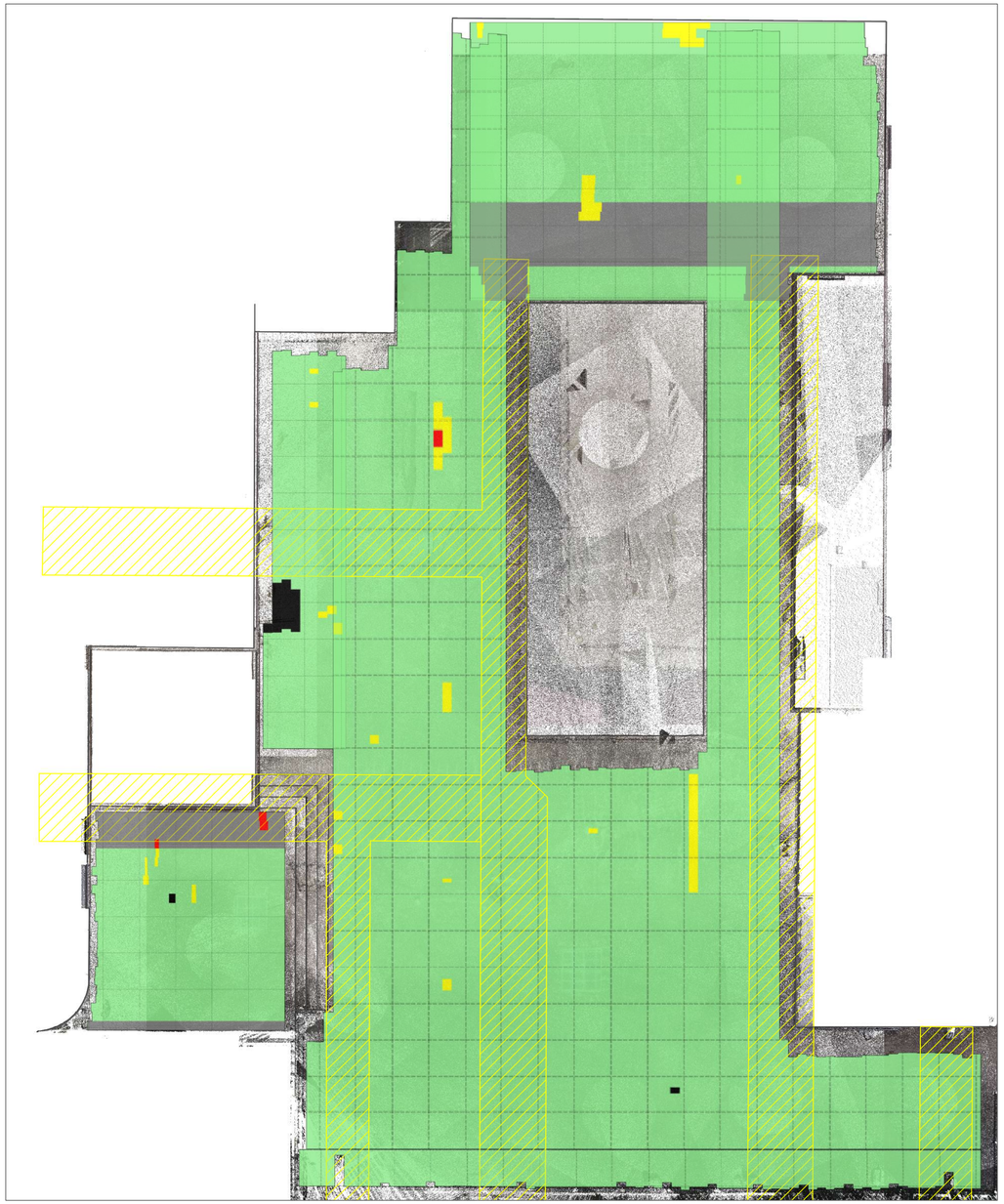
PAGE TITLE	
AREA 1- STRUCTURAL SCAN RESULTS	
PAGE SIZE	SHEET
ANSI D	3 OF 14

SHEET 4 - AREA 1- GPR CORROSION RESULTS

AREA 1 - GPR CORROSION RESULTS- TOP REBAR MAT
SCALE: 1:80



AREA 1 - GPR CORROSION RESULTS- BOTTOM REBAR MAT
SCALE: 1:80

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LEGEND

	SLAB BAND (FROM POINT CLOUD)
	SLAB BAND (FROM GPR DATA- WHERE NO POINT CLOUD IS AVAILABLE)
	STRUCTURE LINES (FROM POINT CLOUD)

INTERPRETATION OF GPR CORROSION MAP

COLOUR CODE	SEVERITY OF CORROSION
	SEVERE CORROSION
	MODERATE CORROSION
	NO CORROSION DETECTED
	POOR DATA/ NO DATA

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PAGE TITLE: AREA 1- GPR CORROSION RESULTS
PAGE SIZE: ANSI D
SHEET: 4 OF 14

SHEET 5 - AREA 1- VISUAL CORROSION RESULTS

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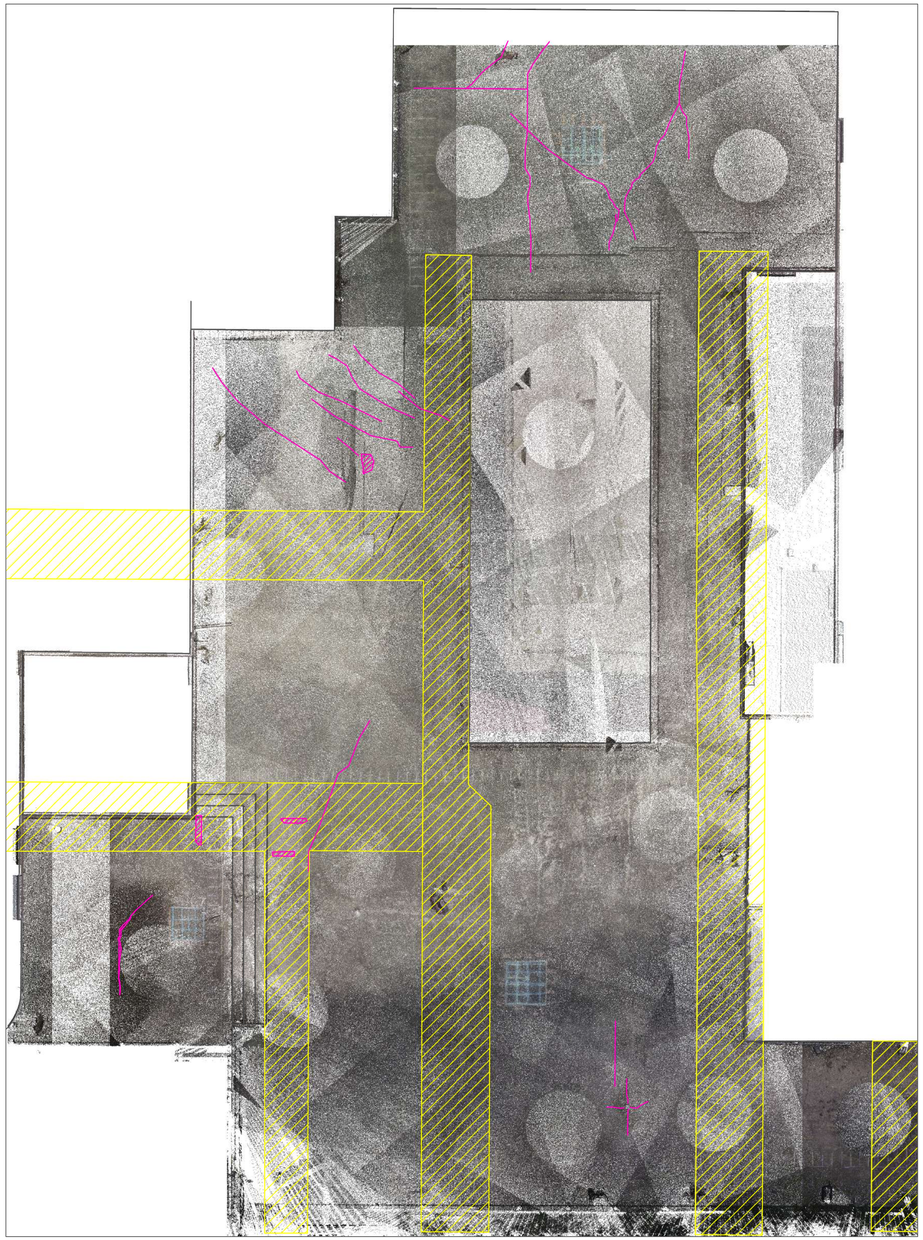
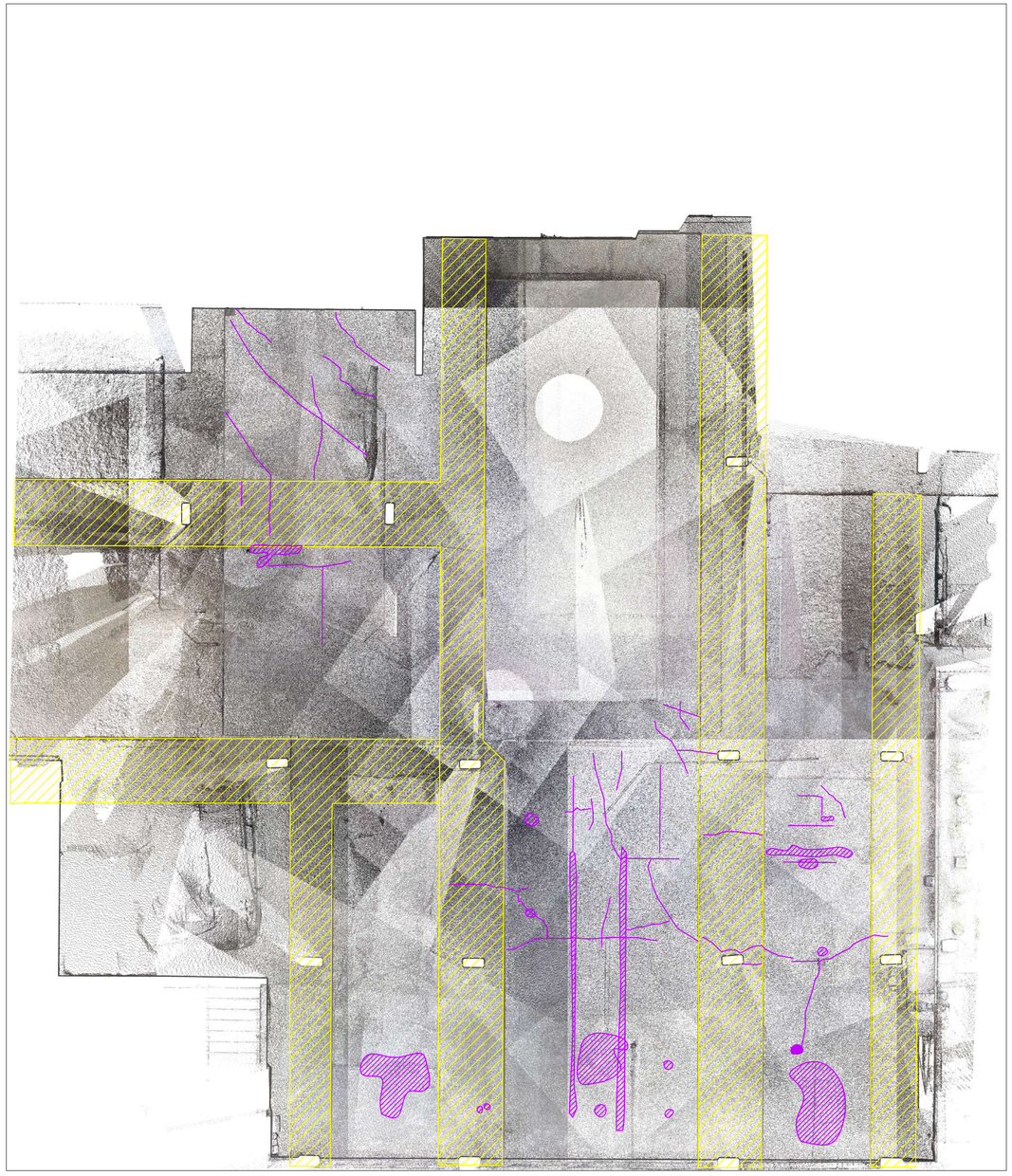
AREA 1 - VISUAL CORROSION - TOPSIDE
SCALE: 1:80



AREA 1 - VISUAL CORROSION - UNDERSIDE
SCALE: 1:80



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EVOKE

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MAPLE RIDGE, BC

LEGEND

	SLAB BAND (FROM POINT CLOUD)
	STRUCTURE LINES (FROM POINT CLOUD)
	VISUAL CORROSION - TOPSIDE (EXPOSED CORRODED REBAR)
	CRACK - TOPSIDE
	VISUAL CORROSION - UNDERSIDE (EXPOSED CORRODED REBAR)
	CRACK - UNDERSIDE (SIGNS OF WATER INGRESS & EFFLORESSENCE)
	HAMMER DRILLED TRENCH IN CONCRETE

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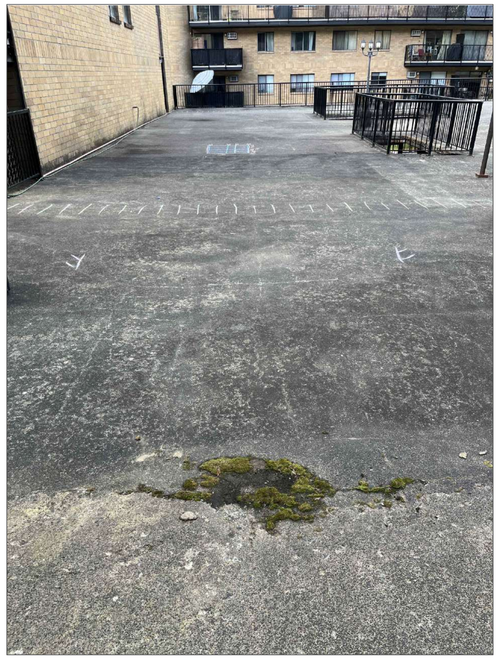
00	2024-05-01	M. NEALE & C. BROWN	M.NEALE		R. ALLEN	J.SALAZAR	

PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 1- VISUAL CORROSION RESULTS
PAGE SIZE: ANSI D
SHEET: 5 OF 14

SHEET 6 - OVERVIEW OF AREA 2

AERIAL LOCATOR
SCALE: 1:800

AREA IMAGE
SCALE: N/A



AREA 2 - SURVEY GRID BOUNDARIES
SCALE: 1:80

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CLIENT
EVOKE BUILDINGS ENGINEERING LTD.
4415 JUNEAU ST,
BURNABY, BC

PROJECT
CORROSION INVESTIGATION
12184 - 224 STREET,
MAPLE RIDGE, BC

LEGEND	
SURVEYED AREA	
STRUCTURAL SCAN LOCATION	
STRUCTURE LINES (FROM POINT CLOUD)	

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
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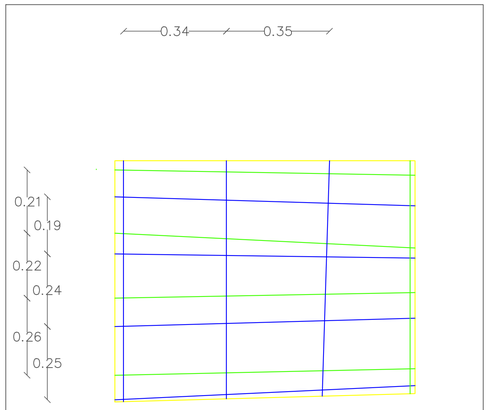
PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 2- SURVEY BOUNDARIES
PAGE SIZE: ANSI D
SHEET: 6 OF 14

SHEET 7 - AREA 2- STRUCTURAL RESULTS

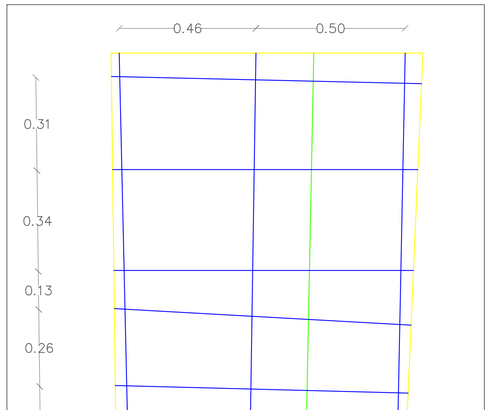
AREA 2 - STRUCTURAL SCAN LOCATIONS
SCALE: 1:50

STRUCTURAL SCAN 4
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	68	15
	EAST-WEST REBAR	31-42	15
BOTTOM REBAR	NORTH- SOUTH REBAR	160-178	20
	EAST-WEST REBAR	185-192	20
SLAB			200
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

STRUCTURAL SCAN 5
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	55	15
	EAST-WEST REBAR	N/A	N/A
BOTTOM REBAR	NORTH- SOUTH REBAR	191-137	20
	EAST-WEST REBAR	153-159	20
SLAB			200
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

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PROJECT

CORROSION INVESTIGATION

12184 - 224 STREET,

MAPLE RIDGE, BC

LEGEND - STRUCTURAL

	COMPLETE SCAN BOUNDARY
	TOP REBAR
	BOTTOM REBAR
	REBAR ENDS
	SLAB BANDS/SLAB THICKENINGS
	STRUCTURE LINES (FROM POINT CLOUD)

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
00	2024-05-01	M. NEALE & C. BROWN	M.NEALE		R. ALLEN	J.SALAZAR	

PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 2- STRUCTURAL SCAN RESULTS
PAGE SIZE: ANSI D
SHEET: 7 OF 14

SHEET 8 - AREA 2- GPR CORROSION RESULTS

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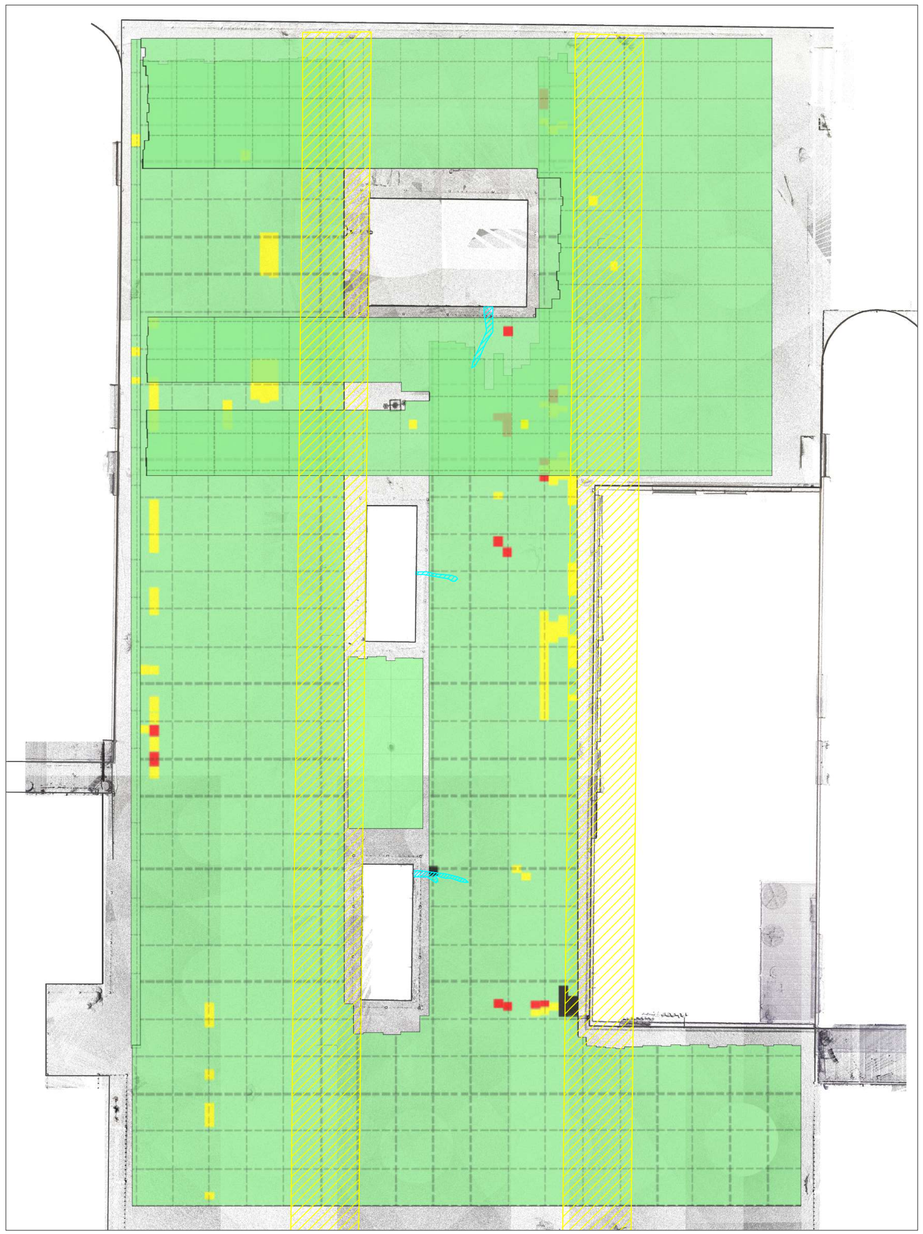
AREA 2 - GPR CORROSION RESULTS- TOP REBAR MAT
SCALE: 1:80



AREA 2 - GPR CORROSION RESULTS- BOTTOM REBAR MAT
SCALE: 1:80

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PROJECT

CORROSION INVESTIGATION

12184 - 224 STREET,

MAPLE RIDGE, BC

LEGEND	
SLAB BAND (FROM POINT CLOUD)	
STRUCTURE LINES (FROM POINT CLOUD)	

INTERPRETATION OF GPR CORROSION MAP	
COLOUR CODE	SEVERITY OF CORROSION
	SEVERE CORROSION
	MODERATE CORROSION
	NO CORROSION DETECTED
	POOR DATA/ NO DATA

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
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PROJECT NUMBER	XBC-VAN-9793.
DRAWING NUMBER	DXBC-VAN-9793-U01
PAGE TITLE	AREA 2- GPR CORROSION RESULTS
PAGE SIZE	ANSI D
SHEET	8 OF 14

SHEET 9 - AREA 2 - VISUAL RESULTS

AREA 2 - VISUAL CORROSION - TOPSIDE
SCALE: 1:80

AREA 2 - VISUAL CORROSION - UNDERSIDE
SCALE: 1:80

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PROJECT

CORROSION INVESTIGATION

12184 - 224 STREET,

MAPLE RIDGE, BC

LEGEND

	SLAB BAND (FROM POINT CLOUD)
	STRUCTURE LINES (FROM POINT CLOUD)
	VISUAL CORROSION - TOPSIDE (EXPOSED CORRODED REBAR)
	CRACK - TOPSIDE
	VISUAL CORROSION - UNDERSIDE (EXPOSED CORRODED REBAR)
	CRACK - UNDERSIDE (SIGNS OF WATER INGRESS & EFFLORESSENCE)
	HAMMER DRILLED TRENCH IN CONCRETE

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
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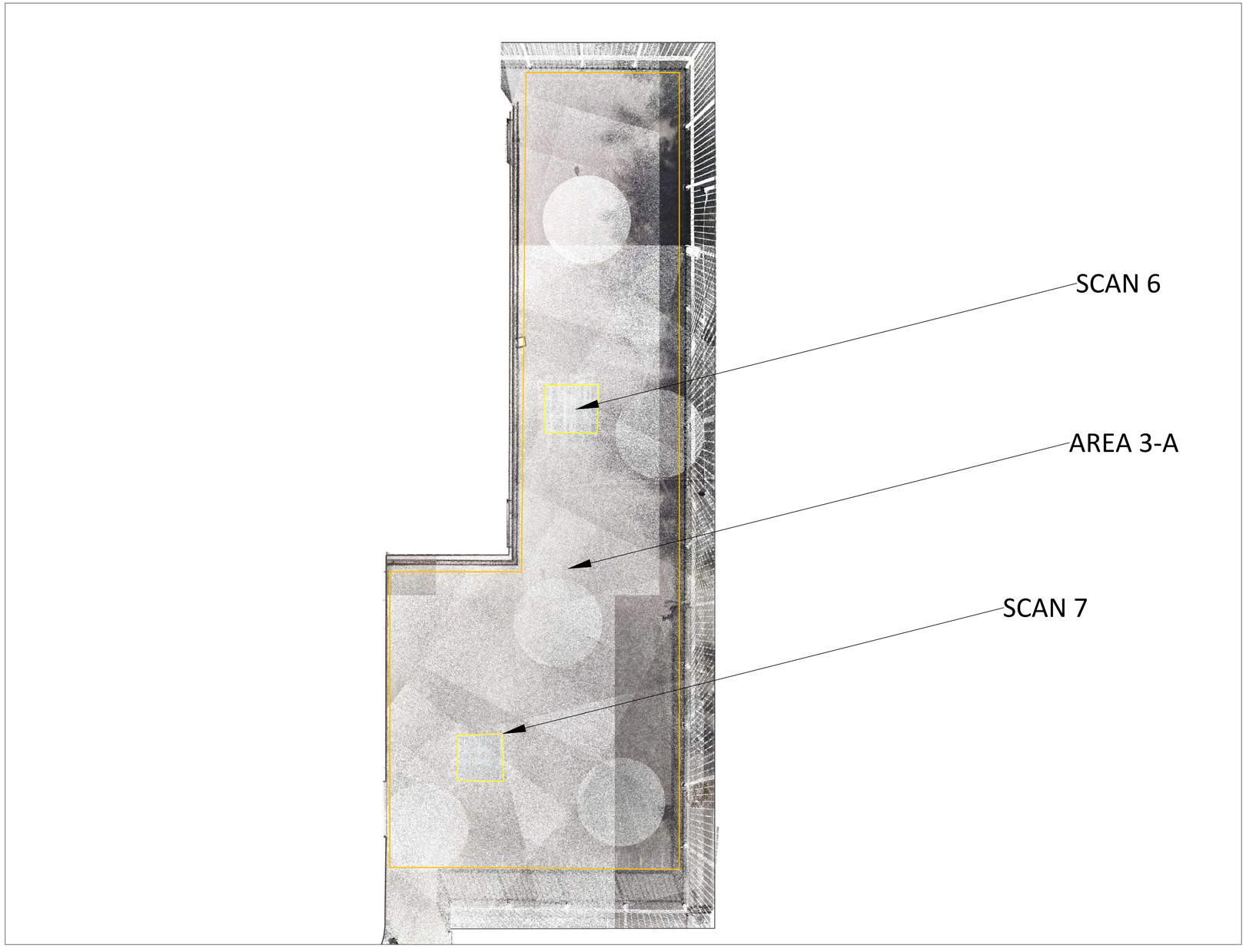
PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 2- VISUAL CORROSION RESULTS
PAGE SIZE: ANSI D
SHEET: 9 OF 14

SHEET 10 - OVERVIEW OF AREA 3

AERIAL LOCATOR
SCALE: 1:800

AREA IMAGE
SCALE: N/A

AREA 3 - SURVEY GRID BOUNDARY
SCALE: 1:50



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PROJECT
CORROSION INVESTIGATION
12184 - 224 STREET,
MAPLE RIDGE, BC

LEGEND	
SURVEYED AREA	
STRUCTURAL SCAN LOCATION	
STRUCTURE LINES (FROM POINT CLOUD)	

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
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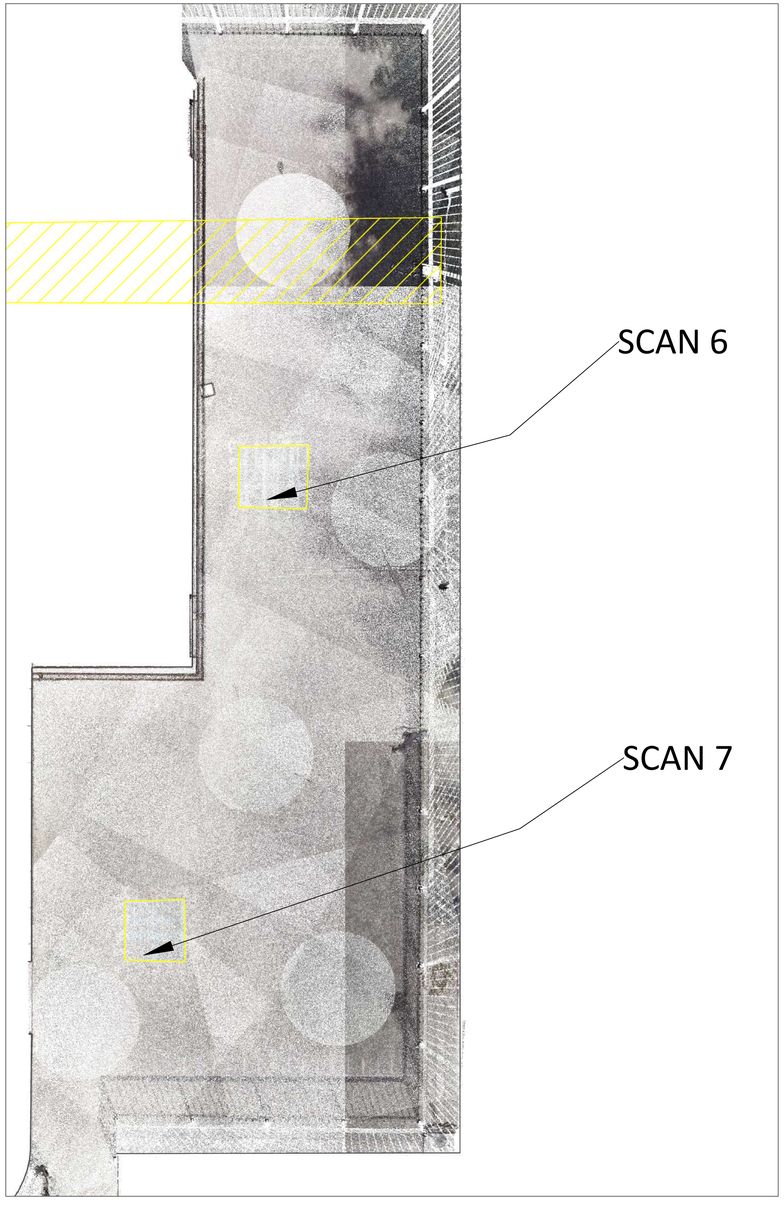
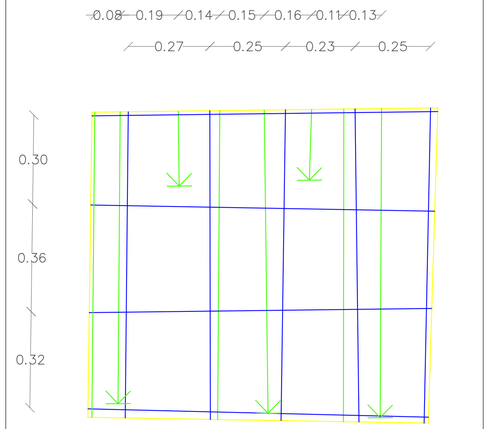
PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 3- SURVEY BOUNDARIES
PAGE SIZE: ANSI D
SHEET: 10 OF 14

SHEET 11 - AREA 3- STRUCTURAL RESULTS

AREA 3 - STRUCURAL SCAN LOCATIONS
SCALE: 1:50

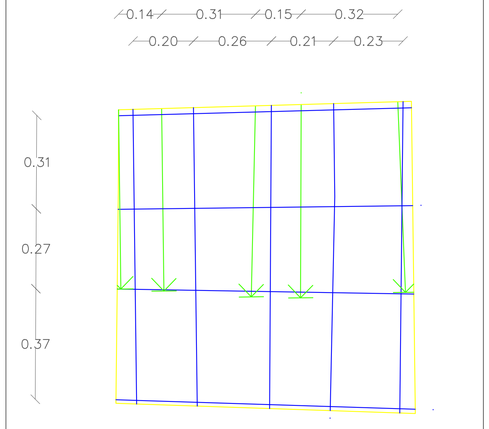


STRUCTURAL SCAN 6
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	56-73	15
	EAST-WEST REBAR	N/A	N/A
BOTTOM REBAR	NORTH- SOUTH REBAR	110-122	20
	EAST-WEST REBAR	98-131	20
SLAB			200
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

STRUCTURAL SCAN 7
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	NORTH- SOUTH REBAR	77-83	15
	EAST-WEST REBAR	N/A	N/A
BOTTOM REBAR	NORTH- SOUTH REBAR	107-116	20
	EAST-WEST REBAR	93-120	20
SLAB			200
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

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BURNABY, BC

PROJECT
CORROSION INVESTIGATION
12184 - 224 STREET,
MAPLE RIDGE, BC

LEGEND - STRUCTURAL

	COMPLETE SCAN BOUNDARY
	TOP REBAR
	BOTTOM REBAR
	REBAR ENDS
	SLAB BANDS/SLAB THICKENINGS
	STRUCTURE LINES (FROM POINT CLOUD)

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
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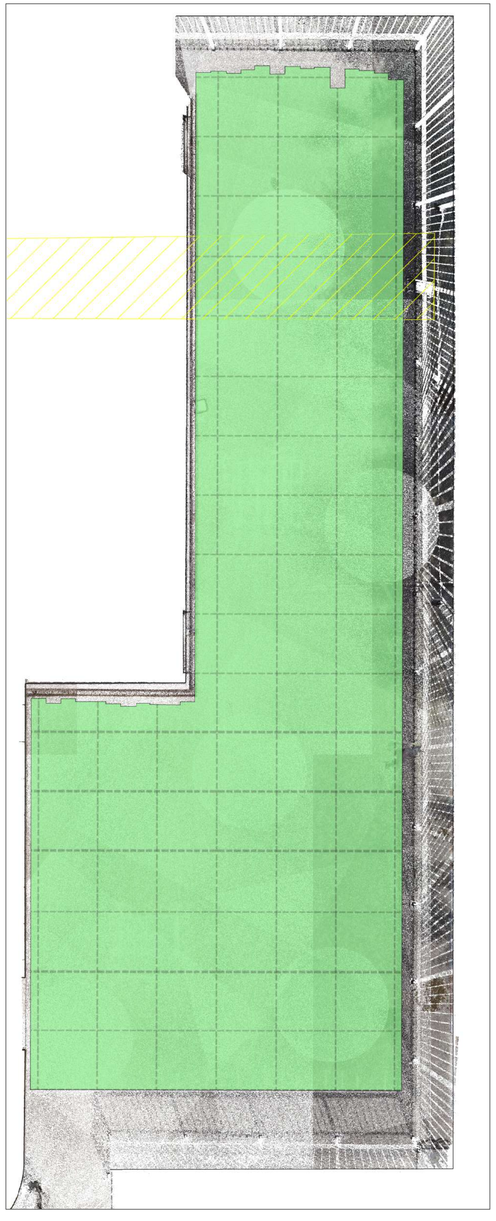
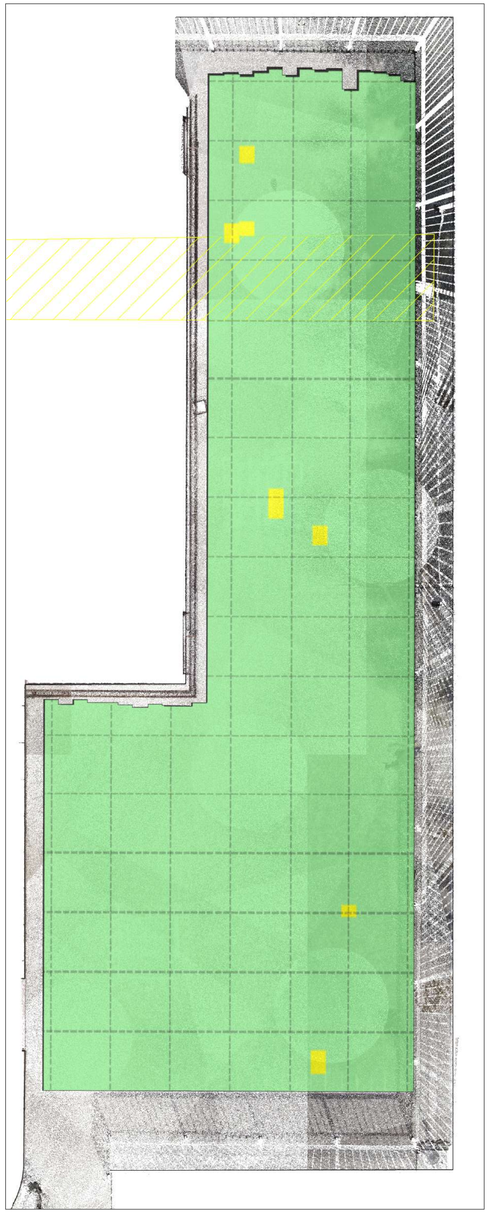
PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 3- STRUCTURAL SCAN RESULTS
PAGE SIZE: ANSI D
SHEET: 11 OF 14

SHEET 12 - AREA 3- GPR CORROSION AND VISUAL RESULTS

AREA 3 - GPR CORROSION RESULTS- TOP REBAR MAT
SCALE: 1:50

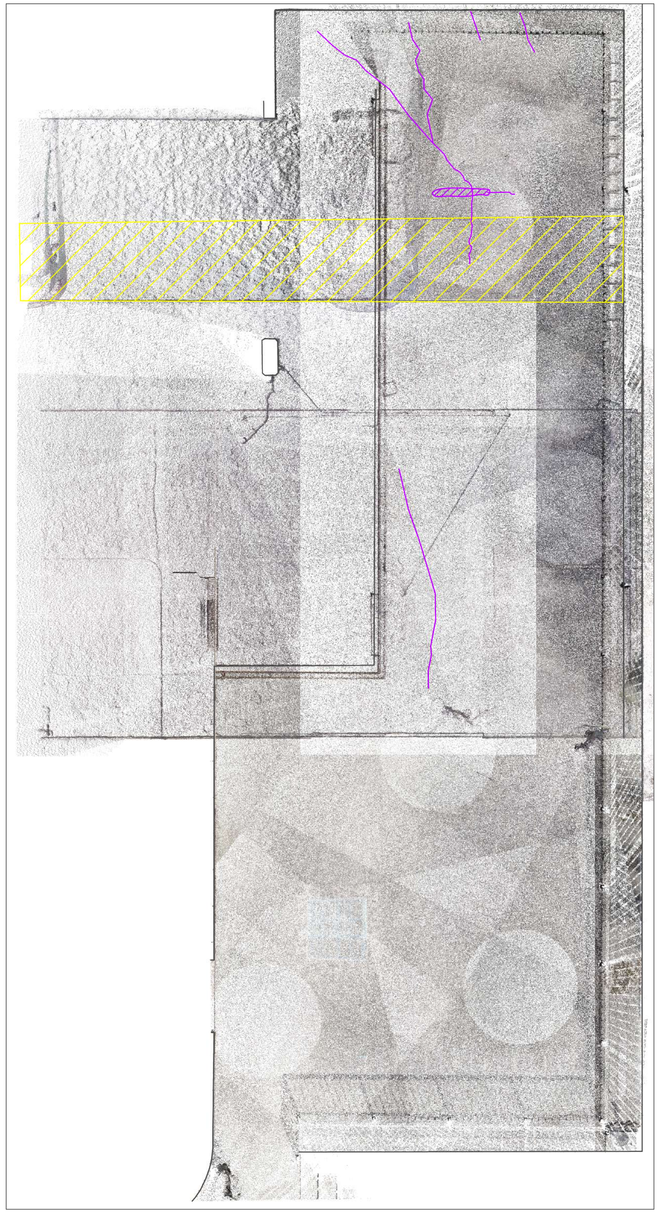


AREA 3 - GPR CORROSION RESULTS- BOTTOM REBAR MAT
SCALE: 1:50



AREA 3 - VISUAL CORROSION & DETERIORATION -TOP OF SLAB
SCALE: 1:50

AREA 3 - VISUAL CORROSION & DETERIORATION - UNDERSIDE OF SLAB
SCALE: 1:50



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BURNABY, BC

PROJECT

CORROSION INVESTIGATION

12184 - 224 STREET,

MAPLE RIDGE, BC

LEGEND	
	SLAB BAND (FROM POINT CLOUD)
	STRUCTURE LINES (FROM POINT CLOUD)
	VISUAL CORROSION - TOPSIDE (EXPOSED CORRODED REBAR)
	CRACK - TOPSIDE
	VISUAL CORROSION - UNDERSIDE (EXPOSED CORRODED REBAR)
	CRACK - UNDERSIDE (SIGNS OF WATER INGRESS & EFFLORESSENCE)
	HAMMER DRILLED TRENCH IN CONCRETE

INTERPRETATION OF GPR CORROSION MAP	
COLOUR CODE	SEVERITY OF CORROSION
	SEVERE CORROSION
	MODERATE CORROSION
	NO CORROSION DETECTED
	POOR DATA/ NO DATA

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
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PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 3- GPR CORROSION & VISUAL RESULTS
PAGE SIZE: ANSI D
SHEET: 12 OF 14

SHEET 13 - AREA 1- WALL- OVERVIEW & RESULTS - CORROSION AND STRUCTURAL

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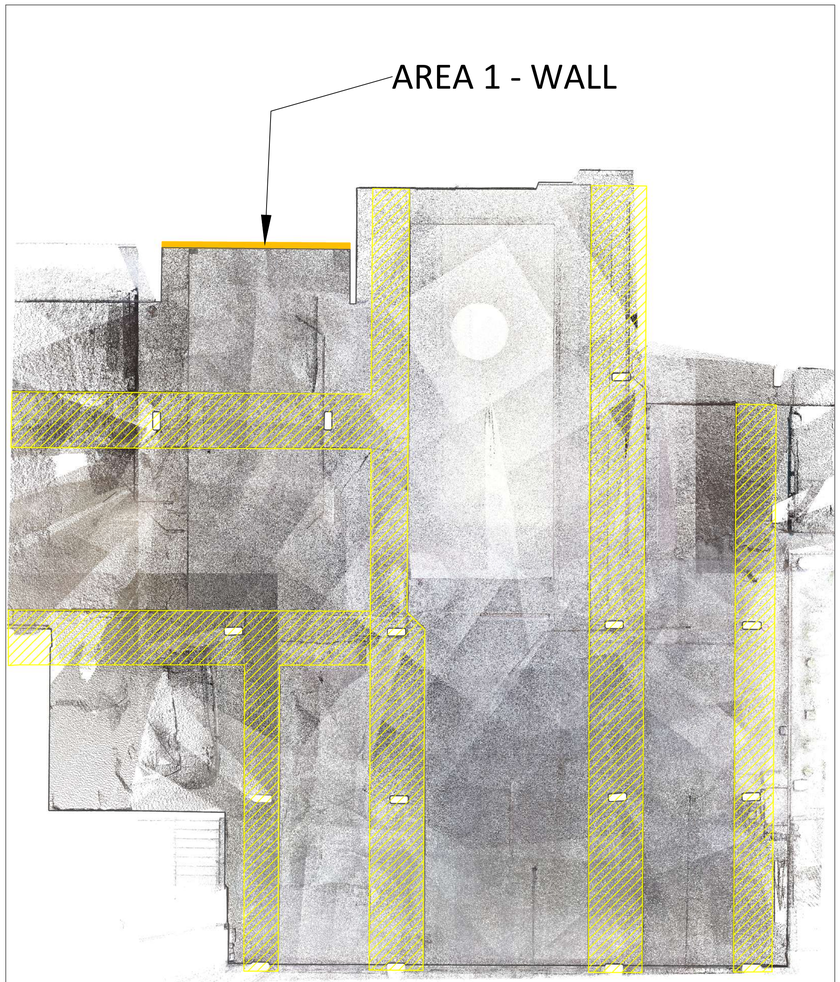
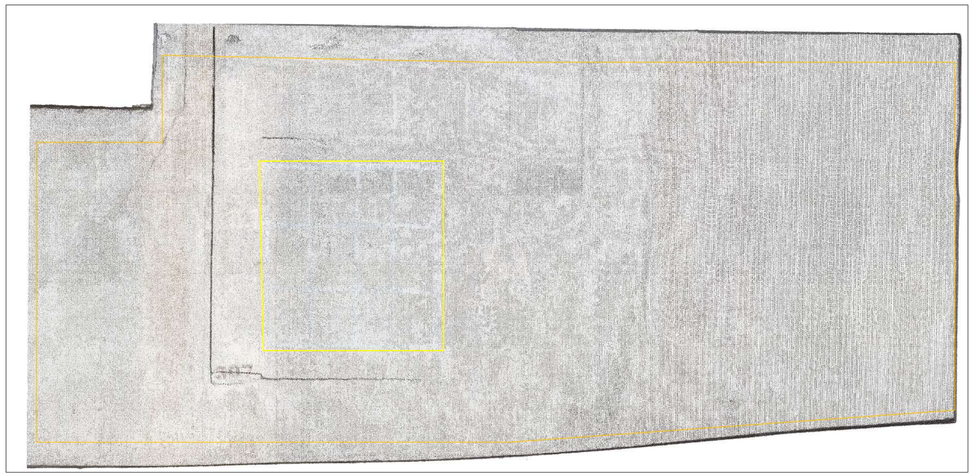
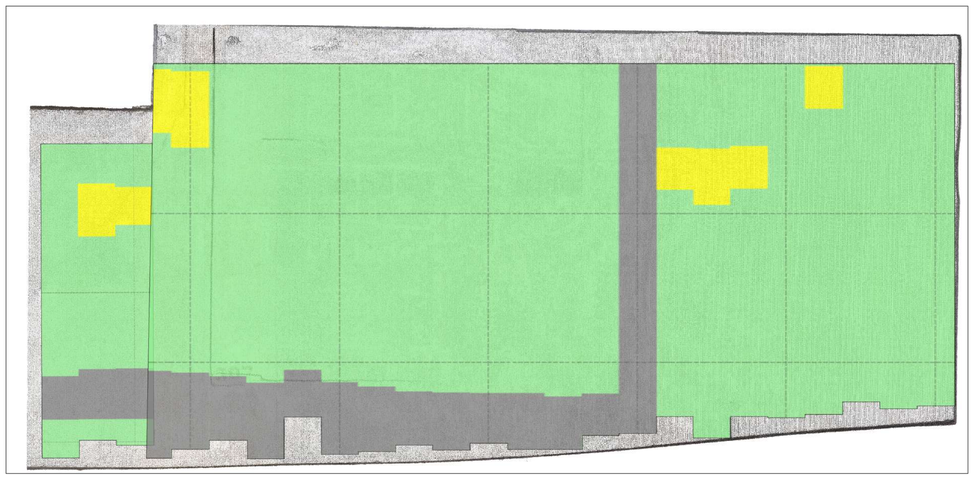
AREA 1 - WALL LOCATION
SCALE: 1:100



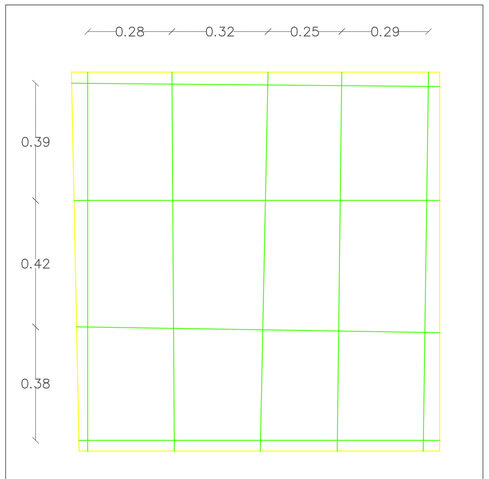
AREA 1 WALL - SOUTH FACE
SCALE: 1:20



AREA 1 WALL - SOUTH FACE - CORROSION RESULTS
SCALE: 1:20



WALL SCAN 1
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	VERTICAL	92-103	20
	HORIZONTAL	111-135	20
BOTTOM REBAR	N/A	N/A	N/A
	N/A	N/A	N/A
SLAB			
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

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PROJECT
CORROSION INVESTIGATION
12184 - 224 STREET,
MAPLE RIDGE, BC

LEGEND		LEGEND - STRUCTURAL	
	SURVEYED WALL		COMPLETE STRUCTURAL SCAN BOUNDARY
	SLAB BANDS/SLAB THICKENINGS		TOP REBAR
	SLAB BAND (FROM GPR DATA- WHERE NO POINT CLOUD IS AVAILABLE)		BOTTOM REBAR
	VISUAL CORROSION - TOPSIDE (EXPOSED CORRODED REBAR)		REBAR ENDS
	CRACK - TOPSIDE		

INTERPRETATION OF GPR CORROSION MAP	
COLOUR CODE	SEVERITY OF CORROSION
	SEVERE CORROSION
	MODERATE CORROSION
	NO CORROSION DETECTED
	POOR DATA/ NO DATA

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
00	2024-05-01	M. NEALE & C. BROWN	M.NEALE		R. ALLEN	J.SALAZAR	

PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 1- WALL OVERVIEW & RESULTS
PAGE SIZE: ANSI D
SHEET: 13 OF 14

SHEET 14 - AREA 2- WALL- OVERVIEW & RESULTS - CORROSION, VISUAL AND STRUCTURAL

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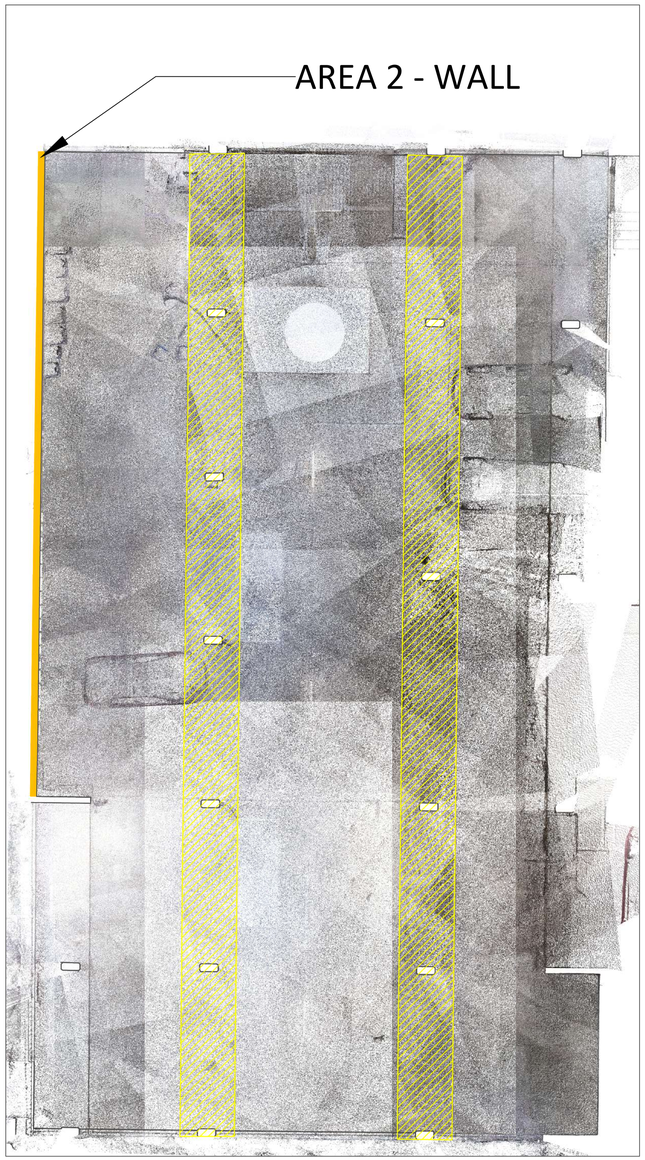
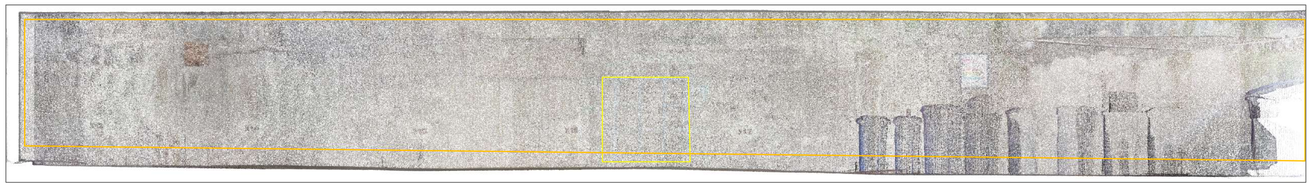
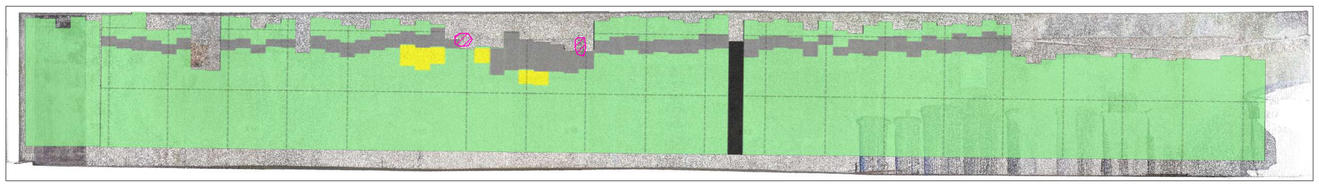
AREA 2 - WALL LOCATION
SCALE: 1:100



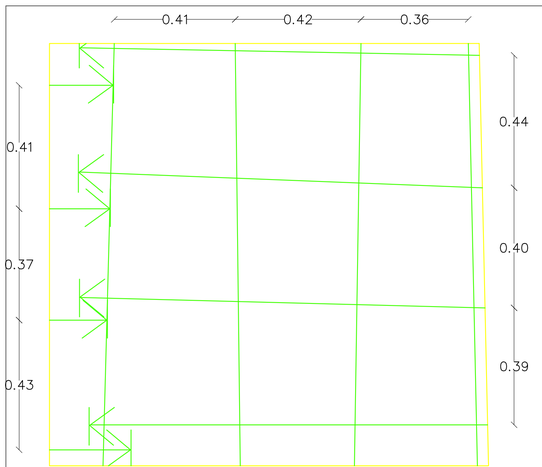
AREA 2 WALL - EAST FACE SURVEY BOUNDARIES
SCALE: 1:50



AREA 2 WALL - EAST FACE - GPR CORROSION AND VISUAL
SCALE: 1:50



WALL SCAN 2
SCALE: 1:10



REINFORCEMENT DETAILS (MM)			
REINFORCEMENT MAT	ORIENTATION	COVER	DIAMETER/ THICKNESS
TOP REBAR	VERTICAL	91-149	20
	HORIZONTAL	105-140	20
BOTTOM REBAR	N/A	N/A	N/A
	N/A	N/A	N/A
SLAB			
	REBAR DIAMETER ESTIMATES ARE +/- 1 BAR SIZE		

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PROJECT
CORROSION INVESTIGATION
12184 - 224 STREET,
MAPLE RIDGE, BC

LEGEND		LEGEND - STRUCTURAL	
	SURVEYED WALL		COMPLETE STRUCTURAL SCAN BOUNDARY
	SLAB BANDS/SLAB THICKENINGS		TOP REBAR
	SLAB BAND (FROM GPR DATA- WHERE NO POINT CLOUD IS AVAILABLE)		BOTTOM REBAR
	VISUAL CORROSION - TOPSIDE (EXPOSED CORRODED REBAR)		REBAR ENDS
	CRACK - TOPSIDE		

INTERPRETATION OF GPR CORROSION MAP	
COLOUR CODE	SEVERITY OF CORROSION
	SEVERE CORROSION
	MODERATE CORROSION
	NO CORROSION DETECTED
	POOR DATA/ NO DATA

REV	DATE	ON SITE WORK BY	DRAWN BY	SIGNATURE	REVIEWED BY	ASTTBC ACCREDITATION	SIGNATURE
00	2024-05-01	M. NEALE & C. BROWN	M.NEALE		R. ALLEN	J.SALAZAR	

PROJECT NUMBER: XBC-VAN-9793.
DRAWING NUMBER: DXBC-VAN-9793-U01
PAGE TITLE: AREA 2- WALL OVERVIEW & RESULTS
PAGE SIZE: ANSI D
SHEET: 14 OF 14