Read Jones Christoffersen
Consulting Engineers

Suite 1014
22 Federick Street
Kitchener, ON N2H 6M6
Canada

519 954-6392
Fax 519 744-5489
www.rjc.ca

May 21, 2015

City of Stratford
City Hall, P.O. Box 818
Stratford, ON N5A 6W1

Attn: Mr. Ronald Shaw
Chief Administrative Officer

Dear Mr. Shaw:

RE: Cooper Site Building - 350 Downie Street, Stratford, ON
Roofing Components Visual Review
Including Hazardous Materials Abatement Costs **RJC No.: TOR.103282.0012**

1.0 Introduction

Read Jones Christoffersen Ltd. was authorized by Mr. Ronald Shaw, Chief Administrative Officer for the City of Stratford, to undertake a review for the presence and extent of hazardous materials within the roof decking components of the Cooper Site Building located at 350 Downie Street in Stratford, Ontario as per our proposals dated February 23, 2015 and March 24, 2015 (RJC No. TOR.099521.0001).

In our March 31, 2015 draft report, costs associated with the abatement of hazardous materials within the roof deck components were presented. However, as the roof was inaccessible due to snow accumulation, limited roof deck samples could be taken from the ground for hazardous materials testing. Given the magnitude and range of estimated asbestos abatement costs at that time, it was recommended that a complete asbestos survey be completed after the snow had melted at the site.

The purpose of this review was to determine to what extent hazardous materials (i.e. lead and asbestos) are present within the roof decking components. In addition, the purpose of this review was to further refine estimated costs associated with the abatement of these hazardous materials while considering several options for extent of roof deck removal.

As part of our review, the following work, briefly described below, was carried out:

.1 Review of available drawings and documents describing the structure and the roofing components to re-familiarize ourselves with the construction of the building.

.2 Review of previous "Roofing Components – Visual Review" RJC report dated November 14, 2014 and "Roofing Components – Hazardous Material Review" RJC report dated March 31, 2015 to re-familiarize ourselves with previous conclusions and recommendations provided to the City of Stratford.

.3 One site review by RJC during collection of roof deck material samples.

.4 Engagement of Conestoga-Rovers & Associates (CRA) to perform an asbestos survey of the Cooper site roof deck. The objective of the Limited Asbestos Survey was to identify and quantify asbestos containing material (ACM) as defined and regulated by O.Reg. 278/05 "Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations".

This report is exclusively for the use and benefit of City of Stratford and is not for the use or benefit of, nor may it be relied upon by, any other person or entity. The contents of this report may not be quoted in whole or in part or distributed to any person or entity other than the client.

2.0 Brief Building Description

2.1 Building Description

The main building located at 350 Downie Street is an abandoned industrial building constructed circa 1871 generally of riveted steel construction currently covering a footprint of approximately 160,000 square feet. The building has undergone various iterations of additions and demolition over its history prior to and following abandonment in 1989.

It is our understanding that the building located at 350 Downie Street was originally constructed in 1871 as a locomotive repair shop with expansions in 1889 and 1907, and an addition in 1949. Currently, only the 1907 expansion and 1949 addition exist on site, with the original building and 1889 expansion having been demolished in 2004. The property is bound by a community centre on Downie Street to the east, a municipal parking lot and a university campus building on St. Patrick Street to the north, the Festival Hydro yard on Wellington Street to the west, and the rail lines to the south.

The remaining building is generally arranged with four (4) bays, all of which are open from the ground to the roof structure with the exception of the north-most bay, which includes a mezzanine level (*refer to Figure #1 below*). From north to south, the north-most bay (herein referred to as the "mezzanine bay") is approximately 615-ft long by 40-ft wide and 50-ft high to its peak. The next bay south (herein referred to as the "low bay") is approximately 770-ft long by 65-ft wide at a similar height of 50-ft to its peak. The 3rd bay south (herein referred

to as the "high bay") is approximately 780-ft long by 70-ft wide and 67-ft high to its peak. Finally, the south-most bay (herein referred to as the "addition bay") is approximately 580-ft long by 50-ft wide and 38-ft high to the roof surface.

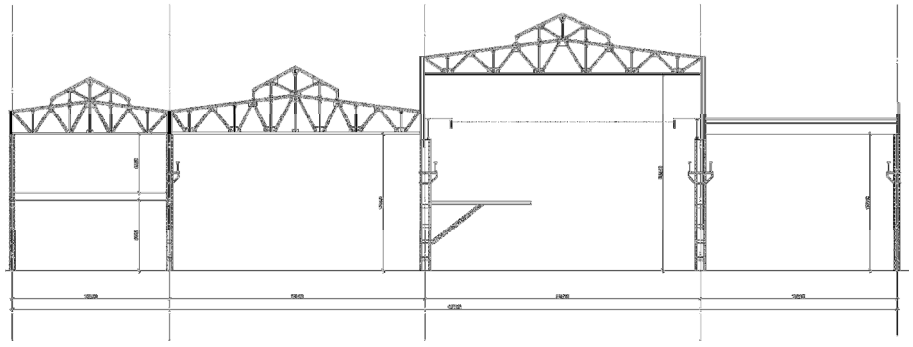


FIGURE #1: TYPICAL BUILDING SECTION

In plan, the main bays are denoted by lettered gridlines As, Cs, Ds, Es, and Fs, spaced in the north-south direction as per the bay width noted above. The transverse gridlines are numbered and identify the column spacing in the east-west direction, generally at 22' centres.

Access to the building is achieved from a municipal surface parking lot at the north side of the building, where the main entrance can be accessed near the centre of the north side of the building.

2.2 Structure Description

The building structure ranges from approximately 38-ft to 67-ft tall with the main portion of the building constructed of riveted built-up steel construction and the addition constructed of rolled structural steel sections. The building, in general, is constructed above grade with several below-grade pits of unknown depths present throughout the footprint of the building.

The steel structure utilizes cross-bracing in the vertical plane along gridlines As, Cs, and Ds and horizontal plane at the roof levels to provide lateral stability. The main building area constructed in 1907 consists of riveted steel with main roof trusses spanning in the north-south direction across each bay (varying from 40' to 70') supported by built-up steel column sections. The columns are spaced approximately 22' apart along the length of the facility. Rolled steel 'C' and 'I' section purlins span between trusses to support the roof deck. Large plate girders are also present within the structure, formerly utilized to support mobile crane loads carrying locomotives.

2.3 Roof Components

Having undergone various phases of expansions, additions, modifications, repairs, and demolition, the building utilizes several forms of roofing systems.

In general, the main building is constructed similarly for each of its three bays, with a higher, sloped roof with a central peak at the central half of each bay (herein referred to as the "apex") elevated by short walls from the low sloped roof on either side. The apex roof areas are generally constructed of sheet metal supported by wood strapping and metal U-channel grid. The walls at the edges of the apexes were generally constructed with wood studs sheathed with plywood, and in some cases cement board, and coated with asphalt felt, similar to the low-slope roof areas below. The assembly of the low-slope roof areas at the outer bands of each bay was typically constructed with mopped multi-ply asphalt roof membrane on solid 2" thick tongue-and-groove wooden roof deck spanning over the steel purlins.

The roof of the 1949 addition is a flat roof (with mild slope towards the exterior south parapet wall) constructed with a multi-ply roofing system with pea gravel and copper flashing. The membrane was applied to the underlying solid 2" thick tongue-and-groove wooden roof deck.

2.4 History & Background

The building was constructed by Grand Trunk Railway (GTR) as a locomotive shop to accommodate their growing steam locomotive market, with the site in Stratford being selected as it was located at the crossroads of the main line from Quebec to Chicago and the east-west line from Buffalo to Goderich on Lake Huron. The original shops were completed in 1871. After acquiring Great Western Railway (Hamilton to Detroit), GTR expanded the Stratford facility in 1889 to accommodate the influx of staff and equipment relocated from Hamilton. Another major expansion was constructed in 1907 to provide more space to the increasing size of the locomotive, and a final addition was constructed in 1949 to accommodate even larger locomotives. During that time, GTR was absorbed by Canadian National Railway (CNR) in 1923. Due to the takeover by diesel engines, CNR no longer required the locomotive repair shops and sought offers for the fully equipped facility in 1953. In 1959, the U.S.-based Cooper-Bessemer Corporation (later named Cooper Energy Services) leased the facility from CNR for its manufacturing purposes. By 1989, due to the turnaround in fortunes for Cooper Energy Services, the building became, and remains, vacant.

Since becoming vacant, the property has seen a few changes in ownership with several proposals and plans put forth for redevelopment of the facility, none of which ever came to fruition. In 2003, a major fire occurred in the west end of the building causing extensive damage. Another smaller fire occurred in 2008, with only minor damages noted. In 2004 and 2010, respective demolition of the 1871 and 1889 portions of the building were completed, leaving the 1907 expansion and 1949 addition as the building currently existing on the site.

3.0 Description and Results of Field Work

The field work associated with RJC's visual review of the roofing components was performed on October 19, 2014. Field observations from the visual review are summarized in our report "Cooper Site Building Roofing Components – Visual Review" dated November 14, 2014.

The following sections summarize the results of the field work completed during CRA's asbestos surveys at the Cooper Site:

3.1 Hazardous Material Testing – Roof Component Samples Obtained February 17

CRA obtained fallen roof deck materials from the ground at the Cooper Site on February 17, 2015. Hazardous material testing was completed following the site visit and results were forwarded to RJC on February 20, 2015. The hazardous materials test results for the February 17 field work can be found in Appendix A.

Conestoga-Rovers & Associates (CRA) collected six (6) roof deck material samples from site for hazardous material testing. Due to snow accumulation on the roof and on the ground at the building site, direct access to the roof could not be provided. Roof deck samples were collected from piles of fallen roofing material located on the ground floor slab. Based on the locations of openings through the roof deck above, the roof decking materials were assumed to have fallen directly from these locations. As a result of the limited site access, roof decking samples were collected from the two middle building bays only (*Refer to Figure #1*). Descriptions of the sample locations are as follows:

Table 3.1 – Locations of Roof Deck Test Samples

Test Sample ID #	Location	Description
551501533-0001	"Low Bay"	Roofing tar and felt
551501533-0002	"Low Bay"	Paint from wood roof deck
551501533-0003	"Low Bay"	Paint from wood roof deck
551501533-0004	"High Bay"	Roofing tar and felt
551501533-0005	"High Bay"	Roof insulation
551501533-0006	"High Bay"	Paint from wood roof deck

The paint on the underside of the roof deck was observed to be in fair condition and contained between 1.1% and 3.2% lead. Roofing tar and felt sample 551501533-0004 from the high roof was confirmed to contain 24.6% chrysotile asbestos. However, asbestos was not detected in samples 0001 and 0005. Please refer to Appendix A for full copies of the hazardous material test results.

3.2 Hazardous Material Testing – Roof Component Samples Obtained April 14

CRA obtained roof deck materials directly from various locations at the roof on April 14, 2015. Hazardous materials testing was completed in a laboratory following the site visit and CRA's summary report was forwarded to RJC on May 8, 2015. A copy of CRA's May 8 report can be found in Appendix B.

Based on the lab results, asbestos is present in most of the roof deck areas, with the exception of the south bay addition. The full test results from CRA's April 14 field work and subsequent lab tests can be found in Section 4.0 of CRA's report in Appendix B.

4.0 Conclusions and Discussion

Refer to RJC's previous report "Cooper Site Building Roofing Components – Visual Review" dated November 14, 2014, for a complete summary of RJC's Conclusions/Discussions regarding the visual review of the roofing components.

Based on the hazardous materials testing, CRA has indicated that the paint at the underside of the roof deck materials contain lead throughout the building. Although not the focus of this report, CRA has also confirmed that the roof structural steel members are coated in lead-based paint. If the roof structural steel members were to be removed, costs for lead management would be driven by the disposal facility. If the roof structural steel members were to be left in place, they could either be repainted and managed in place, or the paint could be removed.

Based on the hazardous materials testing, CRA has indicated that asbestos is present in most of the roof deck areas, with the exception of the south bay addition. In their report, CRA outlined the following conclusions based on the results of the Limited Asbestos Survey:

- Appropriate notification of the presence and hazards of asbestos should be provided to employees and contractors working in areas with asbestos containing material (ACM) that may be disturbed.

- Asbestos is present in roofing materials and window caulking/glazing at the Site. If potential ACM is discovered behind walls, above ceilings, under floors or in other debris during renovations/demolition activities, work should cease until samples are analyzed. Alternatively, suspect materials can be treated as ACM for management and disposal purposes.

- An Asbestos Management Plan (AMP) should be prepared to manage ACM to prevent exposure of occupants, maintenance personnel, or renovation/demolition contractors until all ACM is removed from the Site by a qualified asbestos abatement contractor.

5.0 Possible Courses of Action

The proposed action plans outlined below are based on the findings of our review with respect to the present condition of the roofing components, our observations during the walkthrough of the structure's exterior perimeter, and the confirmation of asbestos within the roof decking materials. Our analysis of this information has allowed us to extrapolate and predict future expenditures that may be needed on this structure based on its present condition.

Given the uncertainty with the future redevelopment plans of the structure, the rehabilitation of the roof deck materials for the building was not considered as an option.

Based on the findings of the evaluation, the following courses of action are available to address the potential safety hazards as they relate to the deterioration observed at the time of our review.

5.1 Option #1 - Removal of Loose Roofing Components and Annual Monitoring

The purpose of this strategy is to address the current potential safety hazards observed at the time of our review associated with the falling roofing components (i.e. roofing membrane and wooden decking). This work involves retaining the services of contractor to remove all the areas of deteriorated roofing components that are in danger of falling and/or being blow off the roof (estimated to be approximately 10,000 to 15,000 sq.ft.). The majority of loose roofing components are in the vicinity of the existing roof deck openings at the west end of the building where fires previously occurred. Direction would be provided by RJC at the Owner's request.

It should be noted that the observed deterioration of the roofing components is likely to continue at an accelerated rate and additional engineering assessments as well as removal of the loose roofing components is recommended on an annual basis until full scale restoration is implemented or demolition is required to mitigate a large scale collapse due to advancing levels of deterioration. Based on the expected accelerated rate of deterioration, it is anticipated that the observed deterioration may progress to a point where complete demolition of the roofing components may be required within a 3 to 5 year period unless measures are taken to rehabilitate the observed deterioration and protect the structure from future moisture degradation.

This option recognizes that the proximity of adjacent properties and buildings cannot be adequately protected against falling roofing debris, which could otherwise be contained by the perimeter fencing.

It should be noted that the removal of the roofing components will further expose the building's structural framing components (i.e. steel frame, perimeter concrete and masonry walls, etc.) to the elements which in turn will accelerate the rate of corrosion related deterioration resulting in potential risks associated with the reduction of the load carrying capacity and potential structural integrity concerns.

5.2 Option #2 – Demolition of the Roof Deck Components West of Gridline 10

This strategy is similar in purpose and consequences to Option #1, however, it involves the complete demolition and removal of all roof deck components for the first nine (9) bays at the west end of the building up to Gridline 10. This would involve the removal of approximately 30,000 sq.ft. of roof deck material. This option would provide a clear delineation line for the removal of roof deck material for potential contractors.

5.3 Option #3 – Complete Demolition of All Roof Deck Components

This strategy is relatively self-explanatory, essentially involving the complete demolition of all roofing components of the building (i.e. approximately 160,000 sq.ft. of a combination of roofing membrane, wooden and metal decking, etc.). The purpose of this strategy is to mitigate from potential costs associated with annual evaluation and need for additional removals of the roofing components as the structure continues to deteriorate. It should be noted that exposing the structural components to the elements will accelerate the rate of corrosion related deterioration of these components resulting in potential risks associated with the reduction of the load carrying capacity and potential structural integrity concerns.

The following scope of work is the minimum recommended work required to demolish the west end wall:

1. Protection of the site for the duration of the demolition work to restrict access only to contractor and consultants as well as maintain site safety.

2. Demolition of the roofing components (i.e. roofing membrane, wooden and metal decking, etc.).

6.0 Opinion of Probable Construction Costs

The following cost estimates represents our opinion of the probable construction costs and are based on the information obtained during our previous visual survey, the hazardous material abatement information provided by CRA, and estimated removal costs provided by a local demolition contractor. The following cost estimates should be treated as "ball park" figures only and cannot be guaranteed accurate.

Based on the construction review experience we have in the repair and rehabilitation of existing structures and buildings, we advise that it is reasonable to assume that the repair quantities - as compared to those deteriorated quantities observed during the condition survey - will be larger. Different items for repair characteristically have exhibited different increases in size during the repair program. Our summary to follow, which outlines the estimated construction costs, has considered this increase from the observed deteriorated quantities:

6.1 Option #1 - Removal of the Loose Roofing Components and Annual Monitoring

The construction cost estimate for the removal and disposal of the loose roofing components, as described in Section 5.1 of this report, assuming all work is performed in one year in 2015 dollars, is approximately $ 190,000.00 plus H.S.T. and breaks down as summarized in the table below. As summarized in Section 5.1, ongoing removal of loose roofing components will likely be required on an annual basis. The costs associated with this ongoing removal are not included in the table below:

Table 6.1 – Option #1 Opinion of Cost Breakdown

Item	Description	Report Value
1	Mobilization, General Accounts, Overheads	$ 35,000.00
2	Lead Paint Abatement †	$ 20,000.00
3	Demolition and Asbestos Abatement of Loose Roofing Components *	$ 120,000.00
4	Engineering Fees **	$ 15,000.00
	Total ("Class D" - Cost Estimate)	**$ 190,000.00**

† Report value based on lead paint abatement estimates given by Conestoga Rovers & Associates. Includes production of a management plan, increased dust suppression, and training for workers. Refer to Appendix A for complete description.

* Demolition and abatement costs based on information provided by Conestoga Rovers & Associates and demolition contractor.

** Engineering Fees include preparation of technical documentation, tendering of the project, site review and contract administration.

6.2 Option #2 – Demolition of the Roof Deck Components West of Gridline 10

The construction cost estimate for the removal and disposal of all roof deck components west of Gridline 10, as described in Section 5.2 of this report, assuming all work is performed in one year in 2015 dollars, is approximately $260,000.00 plus H.S.T. and breaks down as follows:

Table 6.2 – Option #2 Opinion of Cost Breakdown

Item	Description	Report Value
1	Mobilization, General Accounts, Overheads	$ 35,000.00
2	Lead Paint Abatement †	$ 20,000.00
3	Demolition and Asbestos Abatement of Roofing Components West of Gridline 10 *	$ 190,000.00
4	Engineering Fees **	$ 15,000.00
	Total ("Class D" - Cost Estimate)	**$ 260,000.00**

† Report value based on lead paint abatement estimates given by Conestoga Rovers & Associates. Includes production of a management plan, increased dust suppression, and training for workers. Refer to Appendix A for complete description.

* Demolition and abatement costs based on information provided by Conestoga Rovers & Associates and demolition contractor.

** Engineering Fees include preparation of technical documentation, tendering of the project, site review and contract administration.

6.3 Option #3 – Complete Demolition of All Roof Deck Components

The construction cost estimate for complete demolition of all roofing components, as described in Section 5.3 of this report assuming all work is performed in one year in 2015 dollars, is approximately $1,410,000.00 plus H.S.T. and breaks down as follows:

Table 6.3 – Option #3 Opinion of Cost Breakdown

Item	Description	Report Value
1	Site Protection	$ 35,000.00
2	Bonding, Mobilization, General Accounts, Overheads	$ 75,000.00
3	Lead Paint Abatement †	$ 20,000.00
4	Demolition and Asbestos Abatement of All Roofing Components *	$ 1,040,000.00
5	Contingency Allowance	$ 55,000.00
6	Soft Costs **	$ 185,000.00
	Total ("Class D" - Cost Estimate)	**$ 1,410,000.00**

† Report value based on lead paint abatement estimates given by Conestoga Rovers & Associates. Includes production of a management plan, increased dust suppression, and training for workers. Refer to Appendix A for complete description.

* Demolition and abatement costs based on information provided by Conestoga Rovers & Associates and demolition contractor.

** Soft costs include engineering fees, cost of building permit and material testing fees and are estimated to be approximately 15% of the total construction budget.

7.0 Recommendations

Based on the findings of this evaluation, we recommend the following course of action to address the potential safety hazards as they relate to the deterioration of the roofing components observed at the time of our review. As indicated in Section 6.0, the estimated costs associated with demolition and disposal of the roofing components are significant. The high demolition cost estimates for the roof decking material are largely due to estimated abatement costs for asbestos.

With respect to the deterioration of the roofing components observed during our visual review, we are of the opinion that the observed deterioration has progressed to a point where the integrity of the wooden roof decking and roof membrane has been compromised and fallen roofing debris was noted throughout the site.

As a result, in the short term, we recommend implementing Option No. 2 as discussed in Sections 5.2 and 6.2 of this report and retaining the services of contractor to remove all the wooden roof decking and roofing membrane at the west end of the building up to Gridline 10 and implementing annual update reviews of the roof structure. Annual reviews will monitor the structure for future deterioration and identify the need for additional removals and/or site protection or structural shoring based on the increased level of deterioration. It should be noted that implementation of this option should not be delayed due to the safety concerns associated with the falling roofing debris and/or debris blown off the building noted at the time of our review.

Alternatively, if the redevelopment of the site is not planned to be completed within next 3-5 years it may be more cost effective to implement Option No. 3 as discussed in Sections 5.3 and 6.3 of this report. This option becomes the more cost effective approach due to the accelerated rate of deterioration that is expected to occur as long as the roofing components remain unprotected in their current state. It should be noted that implementation of this option will result in exposing the main structural components of the building to the elements and may accelerated the corrosion related deterioration of the superstructure.

8.0 Closing Remarks

Thank you for selecting Read Jones Christoffersen Ltd. for this project. We would be pleased to assist you with the implementation of our recommendations. Should you have any questions or concerns, please do not hesitate to contact this office.

Sincerely,

Read Jones Christoffersen Ltd.

Tim Van Zwol, M.Sc., P.Eng.
Project Engineer
Building Science and Restoration

Reviewed by:

Jeremy Horst, C.E.T., LEED AP
Principal
Building Science and Restoration

Appendix 'A'

Conestoga Rovers & Associates Correspondence Field Test Data - February 20, 2015

Tim Van Zwol

From: Duffield, Craig <cduffield@craworld.com>
Sent: February-20-15 2:05 PM
To: Tim Van Zwol
Cc: Brooks, Greg; Project Email Filing
Subject: RE: City of Stratford - Cooper Site ~COR-057172~
Attachments: 551501533_001.pdf; 551501506_001.pdf; Craig A M Duffield.vcf

Hi Tim:

We collected 6 samples from the Site on Tuesday. Since the area was snow-covered and no access was provided to the roof, CRA collected samples from piles of roofing material on the ground, where the roofing material could be reasonably believed to be from the area directly above. This meant that samples were collected for only the two middle bays (Low Bay and High Bay are the terminology used in the RJC Report). There were piles of debris in other areas, but no way to know where they came from as the roof was intact directly above those areas.

"Low Bay" samples
B-001: Roofing tar and felt
B-002: Paint from wood deck
B-003:Paint from wood deck

"High Bay" samples
B-004:Roofing tar and felt from "High Bay"
B-005:Roof Insulation
B-006:Paint from wood deck

Paint samples contain between 1.1 and 3.2% lead. At these levels, increased costs for demolition/management would be on the order of $10,000-$20,000 to produce a management plan, increase dust suppression, training for workers doing demolition and limited engineering oversight. The paint on the underside of the roof deck was in fair condition, and could be managed as part of the demolition of the roof, without requiring separate removal. The structural members are also covered with paint. If the structural members are to be removed, costs for lead management would be driven by the disposal facility (whether they would accept steel structural members with paint on them that contains lead). If they're to be left in place, they could either be repainted and managed in-place, or the paint could be removed. Cost for removal of paint that can be practically removed from the structural members would likely be around $200,000, subject to getting bids from contractors.

Sample B-004 contains 24.6% chrysotile asbestos, but samples B-001 and B-005 were non-detect for asbestos. Based on these results, additional samples should be collected from the roofs in the spring when they can be accessed with a lift. Samples should be collected of all visually distinct roofing to determine which areas contain asbestos. Based on what we know right now, the roof of the High Bay most likely contains asbestos. Abatement costs for the High Bay roof, subject to competitive bids, would likely be between $1 million and $1.5 million dollars. If all of the roofing material was to contain asbestos, abatement could be on the order of $3 million to $5 million.

As it relates to your options 1 and 2 in the letter, the incremental cost for managing lead would be the same for both - $10,000 to $20,000. The cost for abating/managing asbestos would be lower for Option 1 than for Option 2, and would be based on the amount of material that contains asbestos. The Option 2 cost would be as noted above since it involves the removal all of the roofing materials.

These costs/recommendations are all preliminary, and are subject to confirmation when a complete asbestos survey is conducted for the Site. The asbestos survey should be completed once the snow melts and all areas of the roof can be safely accessed for sample collection.

Feel free to give me a call with any questions,

Craig

Craig A.M. Duffield
Conestoga-Rovers & Associates (CRA)
651 Colby Drive
Waterloo, ON N2V 1C2

Phone: 519.884.0510
Mobile: 519.504.0968
Fax: 519.884.0525
Email: cduffield@CRAworld.com
www.CRAworld.com

From: Tim Van Zwol [mailto:tvanzwol@rjc.ca]
Sent: February-12-15 9:45 AM
To: Duffield, Craig
Subject: City of Stratford - Cooper Site

Hi Craig,

As discussed, we are looking to confirm if the roof decking components (multi-ply asphalt roof membrane on 2" thick tongue-and-groove wooden roof deck) at the Cooper Site contain any lead or asbestos or any other hazardous materials that would require special handing/disposal during demolition.

Attached is a copy of our previous report summarizing the results of our visual review of the roofing components. The review of the structure for the presence of hazardous materials was beyond the scope of the report and was not performed as part of the evaluation. Section 6.0 contains 2 tables – Option #1 for removal of all loose roofing components – and Option #2 for complete demolition of all roofing components.

The City is asking us to revise these Class 'D' estimates to include potential costs associated with the abatement of hazardous materials. We would be looking to CRA for assistance with testing of hazardous materials and estimating demolition/disposal costs for the roofing components.

Tim Van Zwol, BASc, MSc, P.Eng.
Project Engineer

Read Jones Christoffersen Ltd.
Consulting Engineers

Structural Engineering | Building Science | Structural Restoration | Parking Facility Design

22 Frederick Street, Suite 1014
Kitchener, Ontario N2H 6M6 Canada

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	551501506
CustomerID:	55CRAC22
CustomerPO:	20-020011
ProjectID:	

Attn: **Preeti Gururajan**
Conestoga-Rovers & Associates, Ltd.
651 Colby Drive
Waterloo, ON N2V 1C2

Phone: (519) 884-0510
Fax:
Received: 02/18/15 12:12 PM
Collected:

Project: **57172 ROOF SAMPLING STRATFORD ONTARIO**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
B-57172-170215-CD002	*551501506-0001*		2/18/2015	3.2 % wt
B-57172-170215-CD003	*551501506-0002*		2/18/2015	1.3 % wt
B-57172-170215-CD006	*551501506-0003*		2/18/2015	1.1 % wt

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 02/19/2015 09:49:05

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551501533
Customer ID: 55CRAC22
Customer PO: 36670
Project ID:

Attn: Preeti Gururajan
Conestoga-Rovers & Associates, Ltd.
651 Colby Drive
Waterloo, ON N2V 1C2

Phone: (519) 884-0510
Fax:
Collected:
Received: 2/18/2015
Analyzed: 2/19/2015

Proj: 57172 ROOF SAMPLING STRATFORD, ONTARIO

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: B-57172-170215-CD001 A ***Lab Sample ID:*** **551501533-0001**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
TEM Grav. Reduction	2/19/2015	Black	0.0%	100%	None Detected	

Client Sample ID: B-57172-170215-CD001 B ***Lab Sample ID:*** **551501533-0002**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/19/2015	Black	0.0%	100%	None Detected	

Client Sample ID: B-57172-170215-CD001 C ***Lab Sample ID:*** **551501533-0003**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/19/2015	Black	0.0%	100%	None Detected	

Client Sample ID: B-57172-170215-CD004 A ***Lab Sample ID:*** **551501533-0004**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
TEM Grav. Reduction	2/19/2015	Black	0.0%	75.4%	**24.6% Chrysotile**	

Client Sample ID: B-57172-170215-CD004 B ***Lab Sample ID:*** **551501533-0005**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/19/2015				Positive Stop (Not Analyzed)	

Client Sample ID: B-57172-170215-CD004 C ***Lab Sample ID:*** **551501533-0006**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	2/19/2015				Positive Stop (Not Analyzed)	

Client Sample ID: B-57172-170215-CD005 A ***Lab Sample ID:*** **551501533-0007**
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/19/2015	Brown/Black	80%	20%	None Detected	

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 551501533
Customer ID: 55CRAC22
Customer PO: 36670
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: B-57172-170215-CD005 B ***Lab Sample ID:*** **551501533-0008**

Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/19/2015	Brown/Black	80%	20%	None Detected	

Client Sample ID: B-57172-170215-CD005 C ***Lab Sample ID:*** **551501533-0009**

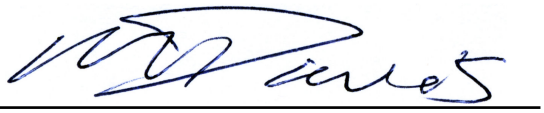
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/19/2015	Brown/Black	80%	20%	None Detected	

Analyst(s):

Arabee Sathiaseelan	PLM (2) PLM Grav. Reduction (2)
Matthew Davis	TEM Grav. Reduction (2)
Natalie D'Amico	PLM (1)

Reviewed and approved by:



Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 02/19/201518:07:37

Appendix 'B'

Conestoga Rovers & Associates Report
Limited Asbestos Survey - May 8, 2015

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

May 8, 2015 Reference No. 11102738-01

Mr. Tim Van Zwol
Read Jones Christofferson Ltd.
22 Frederick Street, Suite 1014
Kitchener, Ontario N2H 6M6

Dear Mr. Van Zwol:

Re: Limited Asbestos Survey – Roof Repairs
Cooper Site, 350 Downie Street, Stratford, Ontario

1.0 Introduction

CRA was retained by Read Jones Christofferson Ltd. (RJC) to conduct a Limited Asbestos Survey (Asbestos Survey) of the roof of the abandoned industrial building located at 350 Downie Street in Stratford, Ontario (Site). The building at the Site is an abandoned industrial building that has been vacant since approximately 1989. The roof at the Site is in poor condition due to lack of maintenance and building fires that occurred in 2002 and 2008.

The objective of the Limited Asbestos Survey was to identify and quantify asbestos containing material (ACM) as defined and regulated by O. Reg. 278/05 "Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations". The Limited Asbestos Survey also was conducted in accordance with Designated Substances in the Workplace: A Guide to the Asbestos Regulation for Construction Projects, Buildings and Repair Operations [Ontario Ministry of Labour (MOL), May 2011 and industry practice. The survey was limited to roof and building components likely to be impacted by planned renovations/selective demolition of certain roof areas as directed by RJC.

2.0 Scope of Work

CRA completed a Limited Asbestos Survey of the roof, windows in the mezzanine and addition bays and spray insulation on structural steel at the east end of the high bay for ACM based on regulatory requirements, guidelines and industry practice. The following tasks were completed:

- Field identification and evaluation of suspect ACM, estimation of quantities, and collection of samples of suspect materials for laboratory analysis

- Preparation of an inventory of ACM and documentation of activities and evaluations in a report

Items in other areas of the Site were not inspected or sampled since these will not be impacted during the planned works. The observations during the Site inspections were documented in CRA standard Asbestos Survey inspection forms.

3.0 Records Review

No previous asbestos survey or other information (e.g., hazardous materials surveys or abatement records) were provided to CRA for review. The Site contact was not aware of any previous surveys or other relevant information or documentation.

4.0 Asbestos Survey

On February 17 and April 14, 2015, Mr. Craig Duffield, Mr. Nick Quehl and Mr. Paul Scanlan of CRA completed a Site inspection and sampling. RJC arranged for CRA to have access to the required Site areas. A technical peer review of this work was completed by Mr. Fred Taylor of CRA.

As part of the Asbestos Survey, a total of 38 individual samples of suspect ACM were collected. The number of bulk samples for each type of material was determined by the requirements provided in Table 1 of O. Reg. 278 (Number of Bulk Samples Required). Where one sample of a homogeneous material contained asbestos at a concentration greater than the regulatory definition (0.5 percent), the remaining samples of that material were not analyzed (Positive Stop) to reduce analytical costs. The materials sampled as part of the Asbestos Survey included roofing tar and felt, roof insulation, window caulking/glazing and spray insulation on structural steel.

The samples were submitted under chain of custody protocol to EMSL Canada, Inc. in Mississauga, Ontario for asbestos analysis. Samples of suspected ACM were submitted for analysis by polarized light microscopy (PLM) Method EPA/600/R 93/116.

The detailed description of materials surveyed, including location, type, approximate quantity, and condition, as well as samples collected and the analytical data are provided in Table 1. The sample locations, and locations of confirmed asbestos in the roofing material are shown on Figure 1. The analytical laboratory reports are provided in Appendix A.

Based on the analytical data, the following materials contain asbestos:

- Approximately 1,300 metres (m) of non-friable caulking/glazing on windows in the mezzanine bay contained 2 percent chrysotile asbestos.
- Approximately 12,000 square metres (sq. m.) of non-friable tar and felt membrane on the roof of the mezzanine bay, low bay and high bay (three northern-most bays) contained between 36 and 42.5 percent chrysotile asbestos.
- Approximately 40 cubic meters of roofing tar and felt in a debris pile in the high bay area contains 24.6 percent chrysotile asbestos. Based on these results, and the similar appearance of debris piles, approximately 52.5 cubic meters of similar material the mezzanine bay and 45 cubic metres in the low bay contain roofing materials is assumed to contain asbestos.
- Approximately 3,500 m of non-friable caulking/glazing on windows in the addition bay contained 0.75 percent crysotile asbestos.

5.0 Conclusions

The following conclusions are based on the results of the Limited Asbestos Survey:

- Appropriate notification of the presence and hazards of asbestos should be provided to employees and contractors working in areas with ACM that may be disturbed.
- Asbestos is present in roofing materials and window caulking/glazing at the Site. If potential ACM is discovered behind walls, above ceilings, under floors or in other debris during renovation/demolition activities, work should cease until samples are analyzed. Alternatively, suspect materials can be treated as ACM for management and disposal purposes.
- An Asbestos Management Plan (AMP) should be prepared to manage ACM to prevent exposure of occupants, maintenance personnel, or renovation/demolition contractors until all ACM is removed from the Site by a qualified asbestos abatement contractor.

6.0 Limitations

The Limited Asbestos Survey was generally a non-intrusive, non-destructive survey. Observations made are limited to suspect materials in the areas inspected and materials included in the Site inspection. This Limited Asbestos Survey does not account for all ACM that may be present in other areas not inspected and within walls, ceiling cavities, pipe coverings or below grade.

This survey was conducted in a manner consistent with that level of care and skill exercised by members of the profession currently practicing under similar conditions, and was based upon the information made available to CRA representatives at the time of this survey. This Limited Asbestos Survey has been prepared for RJC and their client (City of Stratford) and may not be relied upon by others without the written consent of CRA. Any such unauthorized reliance on or use of this report, including any of its information or conclusions, will be at the third party's risk.

Please contact the undersigned if you have any questions.

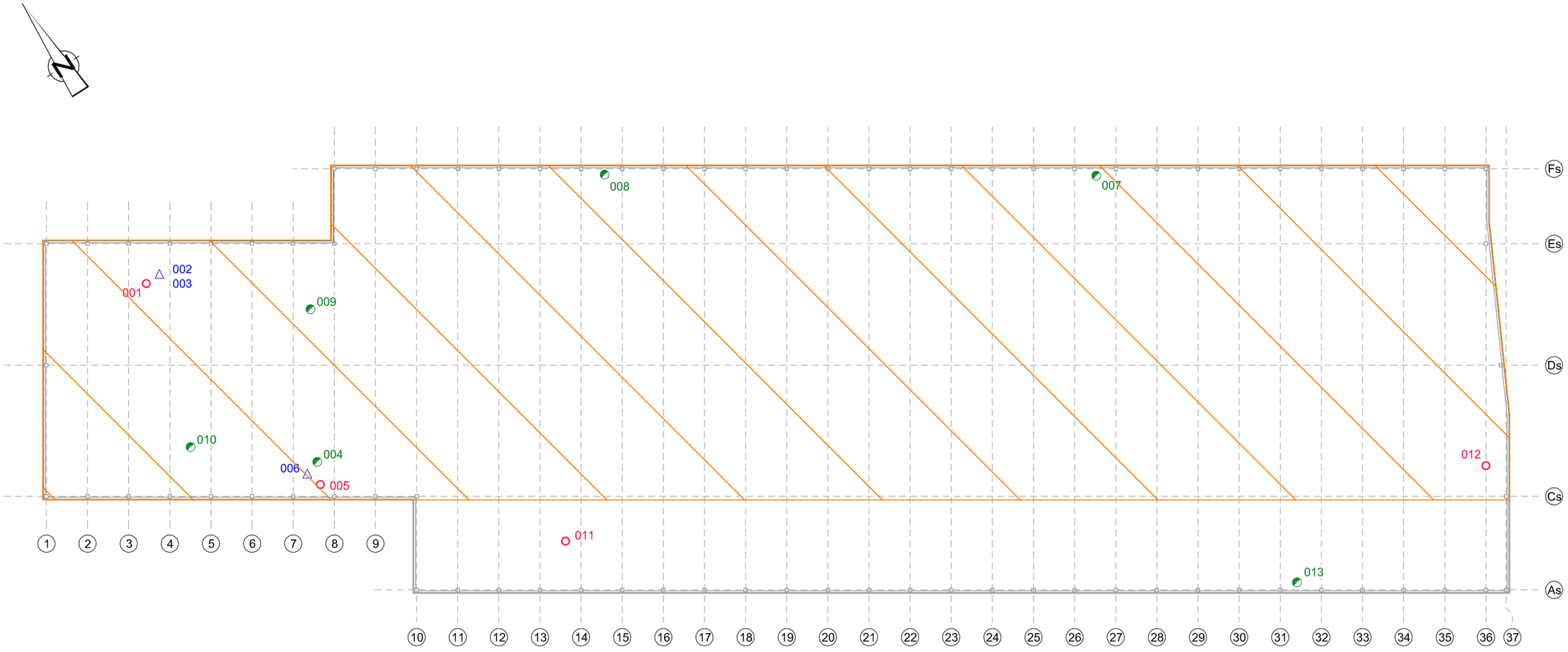
Yours truly,

CONESTOGA ROVERS & ASSOCIATES

Fred K. Taylor, P. Eng.

CAD/ks/1
Encl.

cc: Greg Brooks, CRA
Craig Duffield, CRA



LEGEND

009 ASBESTOS DETECTED AT SAMPLE LOCATION

012 ASBESTOS NOT DETECTED AT SAMPLE LOCATION

006 LEAD SAMPLE

ROOF MATERIAL CONTAINS ASBESTOS

figure 1

SAMPLE LOCATION PLAN
DESIGNATED SUBSTANCE SURVEY
COOPER SITE
350 Downie Street, Stratford, Ontario

TABLE 1

ASBESTOS SURVEY
350 DOWNEY STREET, STRATFORD, ONTARIO

Sample Location	*Surface*	*Material Type*	*Accessibility*	*Building Material*	*Total Amount*	*Units*	*Damaged Material*	*Material Condition*			*ACM*	*Sample ID*		*Comments*
		S T M	*H M L N*			*Each, m, sm, NQ*	*%*	*I D SD*	*NPD PD PSD*	*F NF*	*ND NS CH( ) A*			
17 February 2015 Samples														
Low Bay West End Debris Pile	Ground	M	H	RF		NQ	100%	SD	PSD	NF	ND(0.5%)	B-57172-170215-CD001	A-C	Roof tar and felt in debris pile on the ground
High Bay West End Debris Pile	Ground	M	H	RF		NQ	100%	SD	PSD	NF	CH(24.6%)	B-57172-170215-CD004	A-C	Roof tar and felt in debris pile on the ground
High Bay West End Debris Pile	Ground	M	H	IN		NQ	100%	SD	PSD	F	ND(0.5%)	B-57172-170215-CD005	A-C	Fibrous Insulation in debris pile on the ground
14 April 2015 Samples														
Mezzanine Bay, North wall	Window Frame	M	H	CA	1300	m	5%	I	NPD	NF	CH (2%)	B-11102738-041415-PS-007	A-G	Grey window glazing from mezzanine bay
Mezzanine Bay	Roof	M	L	RTM	2,500	sm	15%	I/D	NPD	NF	CH (36.0%)	B-11102738-041415-PS-008	A-C	Black roof tar & felt from mezzanine bay
Low Bay, Bay 7	Roof	M	L	RTM	4,500	sm	15%	I/D	NPD	NF	CH (42.5%)	B-11102738-041415-PS-009	A-C	Black roof tar & felt from low bay
High Bay, Bay 4	Roof	M	L	RTM	5,000	sm	15%	I/D	NPD	NF	CH (40.1%)	B-11102738-041415-PS-010	A-C	Black roof tar & felt from high bay
Addition Bay, Bay 13	Roof	M	L	RTM	2,700	sm	15%	I/D	NPD	NF	ND (0.5%)	B-11102738-041415-PS-011	A-C	Black roof tar & felt from addition bay
High Bay, East end structural steel	Ceiling	M	L	IN	100	sm	0%	I	NPD	NF	ND (0.5%)	B-11102738-041415-PS-012	A-C	White/beige spray coating
Addition Bay, South Wall	Window Frame	M	H	CA	3500	m	5%	I	NPD	NF	CH (0.75%)	B-11102738-041415-PS-013	A-G	Grey window glazing from addition bay

ACM Type:
S = Surfacing
TSI = Thermal
M = Miscellaneous

Accessibility:
H = High Easily Accessible
M = Medium
L = Low
N = Not Accessible

Building Material:
VT = Vinyl Floor Tile
SF = Sheet Flooring
CT = Ceiling Tile
PL = Plaster
GY = Gypsum/Wallboard
ST = Stucco
MA = Mastic
SH = Shingles
PA = Paper
IN = Insulation
BK = Backing
GL = Glue
TSI = Thermal System Insulation
RRM = Roof Rubber Membrane
RTM = Roof Tar Membrane
DC = Drywall Compound
CA = Caulking
C = Concrete

ACM:
A = Assumed
ND (0.5) = Not Detected at a detection limit of 0.5%
NS = Not Sampled
NQ = Not Quantified
CH ( ) = Chrysotile (Percent by volume)
AM ( ) = Amosite (Percent by volume)
NQ = Not Quantified; m= Metres; sm= Square Metres

Material Condition:
I = Intact
D = Damaged
SD = Significantly Damaged
NPD = No Potential for Damage
PD = Potential for Damage
PSD = Potential for Significant Damage
F = Friable
SF = Semi-Friable
NF = Non-Friable