



June 12, 2020

Ms. Caren Roche  
Township Of Langley  
20338 - 65th Avenue  
Langley, BC V2Y 3J1

Dear Ms. Roche:

The enclosed report has been prepared to provide pertinent technical information about the property at 27214 Fraser Hwy, Aldergrove, BC. This report meets or exceeds the ASTM standard E2018-15 for Property Condition Assessment. As such, the report is not technically exhaustive and should be considered preliminary.

The entire report must be considered in order to rely on the findings contained within. Sampling information in the report may put it out of context.

The report will not be released to anyone without your permission.

Thank you for giving us the opportunity to be of service. Should you have any questions regarding this report, please do not hesitate to call us.

Sincerely,

Henry Khoo, P.Eng.

## PROPERTY CONDITION ASSESSMENT REPORT

27214 Fraser Hwy, Aldergrove, BC

DATE OF INSPECTION: June 12, 2020

FINAL REPORT SUBMITTED: June 18, 2020



Ms. Caren Roche

Township Of Langley

20338 - 65th Avenue

Langley, BC V2Y 3J1

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June 12, 2020

## Property Condition Assessment Report

Property: 27214 Fraser Hwy, Aldergrove, BC

### 1.0 SUMMARY

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This is a property condition assessment report (PCR) of the property at 27214 Fraser Hwy, Aldergrove, BC.

The subject property consists of three-storey commercial industrial structures covering approximately 15,000 square feet (very rough estimate). There is a pub, liquor store, and restaurant at the ground floor; hotel rooms are located at the second floor, and a penthouse suite on the third floor. There are asphalt paved park lots located at the south and east sides of the building.

It was suggested to JDI that the building was constructed approximately in 1948.

The building was mostly vacant except for the liquor store, which was still in operation at the time of the inspection.

This report has been prepared by James Dobney Inspections on behalf of our client, Ms. Caren Roche of Township Of Langley.

Our client is the current building owner and this report has been prepared to provide general information on the condition of the property.

The site inspection was carried out on June 12, 2020. Our inspection was limited to components that were readily visible and not obstructed by storage, finishes, vegetation, etc.

#### Overall Condition and Level of Maintenance:

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This is a typical older building in which maintenance has been somewhat lacking, for the most part.

The building is in poor to serviceable overall condition. Significant deterioration was noted at the majority of the building systems.

#### Structure:

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The overall condition of the building structure is poor to fair. Maintenance has been less than ideal.

A number of significant deficiencies were noted to the building envelope with potential damages relating to the wood-framed wall, floor and ceiling structures. There is a high potential for hidden damages within the wall, floor and ceiling structures of the building. Anticipates significant cost to repair.

Significant deterioration and structural deficiencies were noted to the exterior rear wood stair structures.

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**Electrical:**

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The overall condition of the electrical system is fair to serviceable. The general maintenance has been less than ideal.

Significant deterioration was noted to the electrical systems with various unprofessional installations and repairs noted. Anticipates significant cost to repair.

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**Heating and Air-Conditioning:**

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The overall condition of the heating and air-conditioning system is poor to fair. The general maintenance has been less than ideal.

Significant deterioration was noted to the heating and air-conditioning systems. Heating pipe rehabilitation and replacing older air-condition system will be required in the short term. Anticipates significant cost to repair.

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**Ventilation:**

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The overall condition of the ventilation system is fair to serviceable. The general maintenance has been less than ideal.

Significant deterioration was noted to the ventilation systems. Updating these systems will be required in the immediate term.

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**Plumbing:**

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The overall condition of the plumbing system is poor to serviceable. Maintenance has been less than ideal.

Significant deterioration was noted to the plumbing system. Replacement of the older waste piping and older copper supply piping should be anticipated in the short term including repairing some of the bathroom fixtures and bathtub enclosures at the same time. Anticipates significant cost to repair.

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**Roofing:**

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The overall condition of the roofing system is fair to serviceable. The general maintenance has been adequate, for the most part.

This modified bitumen membrane at majority of the building appears to be approximately 3 to 4 years old. This type of system has an expected useful lifespan of 10 to 15 years, but it is suspected that the membrane was installed overtop of an older membrane(s). Based on the visual condition of the flat roofs, the performance and expected service life of this current flat roof installations is unpredictable.

A roofing contractor should be engaged to evaluate and provide repairs to a number of deficiencies noted at the roof systems in the immediate term.

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**Exterior**

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The overall condition of the exterior components is fair. Maintenance has been adequate.

**Walls:**

Many deficiencies were noted with the wall cladding systems including leakage and wood rot visible at a number of locations.

We recommend a building envelope review with invasive testing by a building envelope specialist to determine the extent of damage and anticipate significant cost to repair.

**Windows and Doors:**

Many deficiencies were noted with the building windows and doors. The head and sill metal flashing detail are inadequate and missing. These areas should be addressed as part of the building envelope assessment.

**Site Work:**

No major deficiencies were noted with the asphalt paving on the site. Updating sections of the asphalt paving may be required within the next few years.

**Interior:**

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The overall condition of the interior system is fair to serviceable. Maintenance has been less than ideal.

Significant amount of interior improvements will be required, while addressing potential hazardous asbestos materials. As is typical with older buildings, insulation levels are below modern standards. Increasing insulation levels should be considered with any major repairs/renovations. Anticipates significant cost to repairs to the interior and insulation.

**1.1 Five-Year Summary Report Timeframe**

Please find the following table of recommendations made in this report, the priorities and associated cost estimates. A 5-year time frame has been considered. Other minor recommendations can be found in the Recommendation Tables at the end of each building system section.

**Five-Year Summary of Recommended Repairs**  
(2020 Dollars)

Report Reference No.	RECOMMENDATION	Quantity	Units	Time Frame (years)	Present Cost of Replacement	Years out					
						0 2020	1 2021	2 2022	3 2023	4 2024	5 2025
ELECTRICAL											
3.2.38.3.2.4	Electrical distribution equipment and wiring repairs	1	lump sum	0	\$ 120,000	120000					
MECHANICAL											
Heating and Air-Conditioning - Forced Air											
4.2.3	Heating pipe rehabilitation and radiator replacement (not including boiler)	1	lump sum	0	\$ 125,000	125000					
4.2.4	Heating and air conditioning replacement with possible ducting upgrades for west restaurant and east pub	1	lump sum	0	\$ 45,000	45000					
4.2.6	Provide liner for masonry chimney and replace metal chimney	1	lump sum	0	\$ 4,000	4000					
Ventilation											
5.2.2	Further evaluation of ventilation and repair	1	lump sum	0	\$ 30,000	30000					
Plumbing											
6.2.28.6.2.4	Waste and supply water piping rehabilitation	1	lump sum	0	\$ 225,000	225000					
6.2.3	Provide backflow prevention device	1	lump sum	0	\$ 3,500	3500					
6.2.6	Renovation to bathrooms, washrooms, kitchens and laundry room	1	lump sum	0	\$ 300,000	300000					
ARCHITECTURAL											
Roof											
7.2.2	Further evaluate and general roof repairs to the deficiencies at the roofs (Flat and sloped roof areas)	1	lump sum	0	\$ 25,000	25000					
7.2.2	Modified bitumen replacement below the south southeast metal roof and rear entrance	530	sq ft	5	\$ 25,000						25000
7.2.2	Modified bitumen replacement at the second and third levels	7400	sq ft	0	\$ 162,800	162800					
7.2.5	Gutter and downspout replacement	200	linear ft	1	\$ 4,500		4500				
7.2.6	Repair masonry chimney	1	lump sum	0	\$ 8,000	8000					
Interior											
8.2.3	Finish flooring replacement	1	lump sum	0	\$ 75,000	75000					
8.2.4	Further evaluation and removal of asbestos materials - Need to consult with environmental specialist	1	lump sum	0	Unpredictable	Unpredictable					
Insulation											
9.2.1	Insulation improvements	1	lump sum	0	\$ 35,000	35000					
Structure											
10.2.2	Structural repair - Contingency	1	lump sum	0	\$ 150,000	150000					
10.2.3	Rebuild rear exterior stairs	1	lump sum		\$ 40,000	40000					
Exterior Cladding											
11.2.3	Cost for further evaluation by a building envelope specialist to provide remediation methods and cost estimate for scope of work	1	lump sum	0	\$ 5,000	5000					
11.2.3	Potential cost for building envelope rehabilitation including window and doors	1	lump sum	0	\$ 375,000	375000					
Site Work											
11.2.4	Grading improvement at the south, west and contingency for potential repair	1	lump sum	0	\$ 15,000	15000					
11.2.5	We recommend further evaluation of the perimeter drainage system and repair/provide as required	1	lump sum	0	\$ 50,000	50000					
TOTALS						\$ 1,793,300	\$ 4,500	\$ -	\$ -	\$ -	\$ 25,000

Note: \* The time frame for replacement is estimated, as the exact time frame is unpredictable by nature.  
 \*\* This item is discretionary and time frame for providing is an estimate.

## **2.0 INTRODUCTION**

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### **2.1 Inspection Authorization and Scope**

As per the request of Ms. Caren Roche of Township Of Langley and in accordance with our proposal dated June 03, 2020, a visual inspection was performed to identify the existing conditions of the following building components:

- Structure
- Electrical System
- Heating System
- Air-conditioning System
- Ventilation System
- Plumbing System
- Roofing System
- Interior Components
- Insulation
- Exterior Components

No equipment was operated as part of this assessment.

This assessment exceeds the ASTM standard E2018-15 for Property Condition Assessments in that a five-year timeframe was used. However, at the request of our client:

- Fire safety systems were not reviewed.
- A Building Code and Fire Code violation inquiry was not undertaken.

This report provides recommendations, preliminary cost estimates and priorities for:

- remedying major deficiencies,
- updating aging major components, and
- undertaking further detailed investigations.

The recommendations are for remedial actions that are considered to be beyond the normal maintenance of the building. Costs are provided for recommendations expected to exceed \$3,000. The costs are only intended to provide an order of magnitude, and do not include any engineering design or construction management fees. Contractors should be consulted for exact quotations.

This report is a professional opinion, based on the accessible features of the building. We evaluated the current physical condition; we did not perform a design analysis. We visually reviewed the performance, looking for evidence of distress. It should be understood that there are limitations to such an inspection. Throughout any inspection, inferences are often drawn which cannot be confirmed by direct observation. Therefore, it should be understood that we can reduce the number of unforeseen repairs; however, we cannot eliminate them. Consequently, no guarantee or warranty can be offered or implied.



This report is intended for the exclusive use of our client. Use of the information contained within the report by any other party is not intended and, therefore, we accept no responsibility for such use.

This report is considered to be preliminary in nature. Before any major repairs are undertaken, we recommend that a specialist perform a detailed condition survey and develop a plan of action.

The site inspection was carried out on June 12, 2020. Our inspection was limited to components that were readily visible and not obstructed by storage, finishes, vegetation, etc.

The inspection included a visual review of the building exterior, roof, mechanical and electrical rooms, common areas and a sampling of the tenant spaces.

It should be understood that there are limitations to performing an inspection such as this. It is not considered that this number of apartments constitutes a representative sample; consequently, only an overview of the systems is given. Access was not gained to some of the hotel suites.

The following defined terms are used to describe the condition of the components and systems reviewed:

- Satisfactory – Performing its intended function; no major defects noted.
- Serviceable – Performing its intended function, but has visible defects or is aging. It will require minor to moderate repairs.
- Fair – Barely performing its intended function. Has visible defects or is aging and will require moderate to major repairs in the short term.
- Poor – Not properly performing its intended function. At or beyond its useful life. Component requires major repair or replacement.

Only the items specifically addressed in this report were examined. No comment is offered on fire protection equipment or on fire regulation, building code and building bylaw compliance, or environmental concerns.

The weather at the time of the inspection was overcast with light rain, with an approximate outdoor temperature of 15°C.

## 2.2 Building Description

The subject property consists of three-storey commercial industrial structures covering approximately 15,000 square feet (very rough estimate). There is a pub, liquor store and restaurant at the ground floor, hotel rooms are located at the second floor and a penthouse suite on the third floor. There are asphalt paved park lots located at the south and east sides of the building.

It should be understood that all building sizes noted here are rough approximations based on site observations, and are for the purposes of this report only.

It was suggested to JDI that the building was constructed approximately in 1948.

The building was mostly vacant except for the liquor store, which was still in operation at the time of the inspection.

For the purpose of this report, the front of the building is considered to be facing north.

### **2.3 Documents Reviewed**

As part of the Property Condition Assessment, a request was made to review available building plans, maintenance records, warranties and equipment lists.

No documentation was available at the time of this inspection.

### 3.0 ELECTRICAL

#### 3.1 Description

The electrical service to the building is overhead. The location and size of the main transformer for the building could not be verified. This information can be obtained by contacting the electric utility provider.

The building is equipped with a 400-amp, 120/208-volt, three-phase, four-wire service. This capacity was determined by the rating of the main disconnect switch. The service size could be verified by opening the main disconnect switch or contacting the electric utility provider.

The main service is divided into the following areas:

Location	Amperage
Panel A	100-amps
Panel B	100-amps
Panel C	100-amps
Air conditioner	Undetermined
Café lights	100-amps
Music booth	60-amps
Generator	40-amps

There is a single meter for the building.

The distribution panels employ fuses and circuit breakers.

All wiring examined is copper. Wiring types noted include armoured cable and non-metallic sheathed.

The lighting fixtures for the building are of the incandescent, and fluorescent types.

The building is not equipped with a standby generator.

The electricity is reported to be supplied to the building by BC Hydro.

#### 3.2 Observations and Discussion

**3.2.1** It is impossible on an inspection such as this to determine adequacy for commercial demands.

**3.2.2** The overall condition of the electrical system is poor to serviceable. The general maintenance has been less than ideal.

**3.2.3** The distribution equipment requires significant improvement. Deficiencies noted at the distribution equipment are as follows:

- The main disconnect switch equipment at the main electrical room are original to the building. As the equipment gets older, it may have a higher risk of non-performance. The replacements of the disconnect will be necessary within the timeframe considered by this report.
- The unprotected openings at the distribution panels should be covered over.
- The majority of the panel boards are old. As the panel boards get older they may have a higher risk of non-performance. As such the panel boards will likely need to be replaced within the timeframe considered by this report.

**3.2.4** Representative samples of accessible wiring were examined. Repairs are recommended as follows:

- The exposed, non-metallic-sheathed wire should be protected in rigid conduit.
- The loose wiring requires additional fasteners.
- The abandoned wiring should be removed or appropriately terminated.
- Missing cover plates on switches, outlets and junction boxes should be replaced where needed.
- As with many older buildings, the number of electrical outlets in some areas may prove less than ideal. It is suggested that individual outlets be added as needed.
- Ideally, ground-fault circuit-interrupter (GFCI) type outlets would be installed at the bathrooms.
- Some of the lights are inoperative. These lights should be re-lamped, repaired, or replaced, as necessary.
- Wires connected outside of a box were noted. All electrical connections should be made within approved junction boxes, complete with covers.
- Several examples of unprofessional workmanship were noted. There is an increased probability of hidden defects.

**3.2.5** It could not be verified that the building electrical equipment is properly grounded. This should be further evaluated and corrected as needed.

**3.2.6** For safety reasons, electrical repairs should be considered high priority.

**3.3 Recommendations, Costs and Priorities**

Recommendation		Cost	Time Frame
<b>3.3.1</b>	Electrical distribution equipment and wiring repairs	\$90,000 to \$135,000 and up depending on types of upgrades	Immediate to five years

## **4.0 HEATING AND AIR-CONDITIONING**

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### **4.1 Description**

#### **Hot Water Heating System**

The building is heated by a gas-fired hot water system with an input of 495,000 BTUs per hour. The boiler is located boiler room at the south side of the building.

Heat distribution is provided in most areas by radiators and convectors

#### **Forced Air Conditioning**

The west restaurant and east pub areas of the building appear to have had air conditioning in the past. The total available cooling capacity for these areas was not determined at the time of the site visit.

There is a single ceiling-mounted, gas-fired unit heater located at the east pub area.

There is a single gas meter for the building, located at south exterior. The supplier of natural gas to the building was not verified.

### **4.2 Observations and Discussion**

- 4.2.1** The overall condition of the heating and air-conditioning system is fair to serviceable. The general maintenance has been less than ideal.

#### **Hot Water Heating**

- 4.2.2** The boiler is approximately 12 years old. While it is impossible to predict with certainty when any boiler will fail, hot water systems of this type typically last 20 to 25 years. Their heating efficiency decreases with age. The boiler was shut down during our site visit. Further evaluation and repaired as required.
- 4.2.3** It was reported to JDI that a significant pipe leak occurred roughly in December of 2019. The location of the leak was not determined and therefore the boiler and the pipes have since been disconnected from the radiators throughout the building. Based on our visual inspections of the accessible heating pipes at certain areas, it appears that the pipes are of varying vintage and a number of pipe repairs noted over the years. Copper pipes that are approaching or at the end of their expected service life will have high risk of failures and the consequent leaks can be difficult to isolate. Future frequent pipe failures can have prolonged disruptions for future tenants. We recommend further evaluation by a qualified heating contractor for possible remediation methods and to anticipate significant cost to repair.

#### **Forced Air - Air-Conditioning**

- 4.2.4** There are rooftop units located at the west and south lower roofs. The units appear to be quite old and inoperative at the time of the site visit. The economic service lifespan of the equipment is considered to be 20 years. As such, the rooftop equipment will need to be replaced in the short term and the supply ducting may also need to be repaired or reconfigured depending on future tenant improvements. Similar to the recommendations above, a qualified heating contractor should be engaged to provide possible remediation methods.

- 4.2.5** The unit heater at the east pub appears to be less than 20 years old. While it is impossible to predict with certainty when a heat exchanger will fail, the average life for heating systems of this type is 15 to 25 years. The life expectancy for the ceiling-mounted equipment is dependent on location. A heater located close to an overhead door experiences greater thermal stress, which reduces its life expectancy. This equipment should be expected to require replacement within the timeframe considered by this report.
- 4.2.6** The boiler chimney appears to be unlined masonry construction. A liner will most likely be required and is recommended. A qualified serviceperson should be consulted.
- 4.2.7** Most areas reviewed have heat sources with radiator. The supply air registers in the restaurant and pub areas are overhead.
- 4.2.8** No air return ducts were noted in the restaurant and pub areas. It is a simple matter to provide ducts during equipment replacement.
- 4.2.9** The metal exhaust chimney is cracked and corroded in the boiler room and should be replaced as required.

#### **4.3 Recommendations, Costs and Priorities**

	<b>Recommendation</b>	<b>Cost</b>	<b>Time Frame</b>
<b>4.3.1</b>	Heating pipe rehabilitation and radiator replacement (not including boiler)	\$100,000 to \$150,000 and up	Immediate to five years
<b>4.3.2</b>	Heating and air conditioning replacement with possible ducting upgrades for west restaurant and east pub	\$30,000 to \$60,000	Immediate to five years
<b>4.3.3</b>	Provide liner for masonry chimney and replace metal chimney	\$3,000 to \$5,000	Immediate

#### **4.4 Limitations**

- 4.4.1** Heating equipment was shut off while air conditioning equipment were inoperative during the site visit.

## 5.0 VENTILATION

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### 5.1 Description

There are no exhaust fan cabinets on the roof.

The building washrooms and bathrooms are ventilated by either a window, individual fans, or passive wall vent ducts. The kitchen at the penthouse suite is ventilated by operable window.

### 5.2 Observations and Discussion

**5.2.1** The overall condition of the ventilation system is fair. The general maintenance has been less than ideal.

**5.2.2** The washroom and bathroom exhaust fans and vents appear to be exhausting into various interconnected ducting system. With the mixture of different vent situations among the washrooms and bathrooms at the building, it is possible that the moisture and odours is not adequately expelling to the exterior. We recommend engaging with a qualified contractor to further evaluate the venting system in order to determined the ventilation needs of the building.

**5.2.3** The use of operable windows for ventilation in a building of this age is common.

### 5.3 Recommendations, Costs and Priorities

Recommendation		Cost	Time Frame
<b>5.3.1</b>	Further evaluation of ventilation and repair	\$20,000 to \$40,000 and up	Immediate to five years

### 5.4 Limitations

**5.4.1** Exhaust fans were not functional at the time of the site visit.

## **6.0 PLUMBING**

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### **6.1 Description**

There is a copper domestic water supply line to the building. The main shutoff valve is located boiler room. The building does not appear to be equipped with a water meter. The building does not appear to be equipped with a backflow prevention device at the main domestic water service entrance.

The supply plumbing examined is a combination of copper and plastic. The visible drain, waste and vent piping is a combination of ABS plastic, copper, galvanized steel and cast iron.

There are two 50-US gallons, gas-fired domestic water heaters in the boiler room.

Men's and women's washrooms are located on the main floor. Bathrooms are located at the 2<sup>nd</sup> and 3<sup>rd</sup> floors. The penthouse suite has a kitchen while there is a commercial kitchen located at the west main floor restaurant.

There is also a common laundry room located at the 2<sup>nd</sup> floor.

There are walk-in coolers located at the southeast main floor.

There are no visible sump pumps noted in the building.

The supplier of domestic water to the building could not be verified.

### **6.2 Observations and Discussion**

**6.2.1** The overall condition of the plumbing system is poor to serviceable. Maintenance has been less than ideal.

**6.2.2** Evidence of past and recent leakages was noted at a number of ceiling areas. The domestic supply piping within the building appears to be various vintages. Similar to the heating pipes, various repairs were noted in past years. Copper pipes that are approaching or at the end of their expected service life will have high risk of failures and the consequent leaks can be difficult to isolate. Future frequent pipe failures can have prolonged disruptions for future tenants. We recommend further evaluation by a qualified plumbing contractor for possible remediation methods and to anticipate significant cost to repair.

**6.2.3** The building is currently not equipped with a backflow prevention device at the main domestic water service entrance. The purpose of the backflow prevention device is to prevent contamination of the municipal water supply. Recent changes in many municipal and regional bylaws require the provision of such devices in buildings. The provision of a backflow prevention device is recommended.

**6.2.4** Evidence of past leakage was noted in the waste piping below a number of ceiling areas. Similar to the supply water pipes, various repairs were noted in past years. The Waste pipes that are approaching or at the end of their expected service life will have high risk of failures. Future frequent pipe failures can have prolonged disruptions for future tenants. We recommend further evaluation by a qualified plumbing contractor for possible remediation methods and to anticipate significant cost to repair.



**6.2.5** The domestic water heaters are approximately six and 11 years old. While it is impossible to predict with certainty when a domestic water heater will fail, these units typically last 15 years. Therefore, updating a water heater may be necessary within the next few years. This is typically a minor expense.

**6.2.6** Most plumbing fixtures appears to be poor to serviceable condition. The washrooms, bathrooms, kitchens and laundry room at the building are showing moderate to significant deterioration.

Renovating some of the bathrooms, washrooms, kitchens and laundry room will be required within the timeframe considered by this report. This report allows a contingency amount for some bathrooms, washrooms, and kitchen renovation. It is recommended that renovations to the bathrooms, washrooms, and kitchens be co-ordinated with the waste and supply piping rehabilitations.

### **6.3 Recommendations, Costs and Priorities**

<b>Recommendation</b>		<b>Cost</b>	<b>Time Frame</b>
<b>6.3.1</b>	Waste and supply water piping rehabilitation	\$150,000 to \$300,000 and up depending on types of upgrades	Immediate to five years
<b>6.3.2</b>	Provide backflow prevention device	\$3,500	Immediate
<b>6.3.3</b>	Renovation to bathrooms, washrooms, kitchens and laundry room	\$200,000 to \$400,000 and up depending on types of upgrades	Immediate to years

### **6.4 Limitations**

**6.4.1** Water was shutoff to the majority of the washrooms, bathrooms and kitchens during the site visit.

## **7.0 ROOFING**

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### **7.1 Description**

The building is covered by modified-bitumen membranes on three levels. The membranes appear to consist of a single-ply.

The roof drainage is via aluminium gutters and downspouts. The downspouts discharge the water above grade.

There are sloped metal panel roofs located at front and rear of the building.

There is a single metal chimney above the roof. This chimney services the domestic hot water heaters.

There is a single masonry chimney above the roof. This chimney services the boiler.

### **7.2 Observations and Discussion**

**7.2.1** The overall condition of the roofing system is fair to serviceable. Maintenance has been less than ideal.

**7.2.2** The modified bitumen membranes are estimated to be approximately four years old. This type of system has an expected useful lifespan of 10 to 15 years.

It is suspected that the membranes was installed ovetop of the older membranes. Moisture may be trapped within the roof assembly, thus reducing the life expectancy of the roofing membrane.

Based on the visual condition of the membranes, the performance and expected life expectancy of the flat roof is unpredictable. Reroofing the flat roof may be expected in less than 10-years. Existing roofing materials should be removed at that time. A thermographic scan and cut tests could be undertaken to verify if moisture is currently trapped within the roof assembly.

Some of the cap flashing at the plumbing stacks are missing and should be installed as required.

Blistering was noted in the membranes at a number of areas. Blistering occurs when air or moisture gets trapped within or below the roof assembly, and may be a function of installation quality. As blisters increase the risk of damage and leakage, they should be monitored and repaired when needed.

The modified bitumen replacement below the south southeast metal roof and rear entrance has exceeded their expected service life and should be replaced as required.

A roofing contractor should be engaged to evaluate and provide repairs to a number of deficiencies noted at the roof systems in the immediate term.

**7.2.3** Water ponding on the roofs was noted at various areas of the flat roofs, indicating some poor drainage areas. While this is not a desirable condition, it is typically not cost effective to correct until the roof membranes are replaced.

- 7.2.4** The sloped metal roofs are estimated to be at less than 10 years old. This type of system has an expected useful lifespan of 30 to 40 years. Any sloped roof covering lifespan is strongly dependent on the quality of the original material, roof slope and orientation, maintenance level, and weather severity. Replacement of the metal roofs is not expected within the 5-year timeframe considered by this report.
- 7.2.5** The gutters and downspouts are in serviceable condition. Gutters may require replacement within the 5-year timeframe considered by this report.
- 7.2.6** The chimney brickwork is in poor condition. A chimney cap is missing and moisture has penetrated into the masonry causing spalling and mortar deterioration. The chimney should be repaired above the roofline as required including a liner provided as needed.

### 7.3 Recommendations, Costs and Priorities

Recommendation		Cost	Time Frame
<b>7.3.1</b>	Further evaluate and general roof repairs to the deficiencies at the roofs (Flat and sloped roof areas)	\$20,000 to \$30,000	Immediate
<b>7.3.2</b>	Modified bitumen replacement below the south southeast metal roof and rear entrance (rough estimate) (530 square feet)	\$15,000 to \$30,000	Immediate
<b>7.3.3</b>	Modified bitumen replacement at the second and third levels (rough estimate)(7,400 square feet)	\$140,000 to \$180,000	Unpredictable (Five years)
<b>7.3.4</b>	Gutter and downspout replacement (rough estimate)(200 linear feet)	\$3,000 to \$6,000	Immediate to one year
<b>7.3.5</b>	Repair masonry chimney	\$5,000 to \$10,000	Immediate

## 8.0 INTERIOR COMPONENTS

### 8.1 Description

In general, the electrical, mechanical and janitorial areas of a building are not finished. This section addresses the conditions noted in the finished areas of the building. Since the condition of interior components is subjective to some degree, comments here are general except where functional concerns are noted.

The finished area floor coverings consist of carpet, resilient tile and ceramic tile.

The wall finishes consist of drywall and plaster.

The ceiling finishes consist of suspended tile, drywall and plaster.

There is a wood staircase located at the west side of the building.

### 8.2 Observations and Discussion

**8.2.1** The overall condition of the interior system is fair to serviceable. Maintenance has been less than ideal.

**8.2.2** A water stains were noted at wall and ceiling areas. These appear to have been the result of previous plumbing, previous roof or previous exterior leakage. The water damage can be repaired when renovating. Refer also to the Plumbing and Exterior section.

**8.2.3** The finished floor coverings located at each of the floor levels are in fair to serviceable condition. Based on the sampled floor spaces, a contingency amount for updating floor coverings at the building has been allowed for by this report.

**8.2.4** It was indicated to JDI that the building contains asbestos within the building materials. As with any renovation work that is required, we recommend consulting with an environmental specialist to provide protocols for removal of the building materials that contained the asbestos. Anticipates significant cost of removal.

**8.2.5** No major deficiencies were noted with the stairwell.

### 8.3 Recommendations, Costs and Priorities

	Recommendation	Cost	Time Frame
<b>8.3.1</b>	Finish flooring replacement	\$60,000 to \$90,000 and up depending on types of upgrades	Immediate to five years
<b>8.3.2</b>	Further evaluation and removal of asbestos materials – Need to consult with environmental specialist	Unpredictable	Immediate

## 9.0 INSULATION

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### 9.1 Description

It should be understood that a review of the thermal characteristics of the building envelope is beyond the scope of our assessment. Only general information is provided here.

The presence of insulation in the exterior walls could not be verified. It is possible that little or no insulation is present.

The amount of insulation in the flat roof could not be ascertained. It is suspected that little or no insulation is provided here.

### 9.2 Observations and Discussion

- 9.2.1** The current standard for exterior wall insulation is R-12 to R-20. There are several methods of retrofitting insulation into wall assemblies. This is typically done during any building envelope rehabilitation.
- 9.2.2** The amount of insulation noted on the roof is considered typical for a building of this age. The modern standard is R-20. It is typically not cost-effective to upgrade insulation until the roof membrane is replaced.
- 9.2.3** It should be understood that increasing insulation levels in a building is more an upgrade than a necessary repair. Overall building energy usage is, however, an on-going consideration.

### 9.3 Recommendations, Costs and Priorities

Recommendation		Cost	Time Frame
<b>9.3.1</b>	Insulation improvements	\$20,000 to \$40,000 and up	Immediate to five years

## 10.0 STRUCTURE

### 10.1 Description

The building is of slab-on-grade construction.

The poured-concrete foundations support masonry and wood-frame exterior walls.

The floor joists are wood. The joists are supported by the exterior walls and wood beams and columns.

The wood roof deck is supported by wood roof joists. The joists are supported by exterior walls and wood beams and columns.

### 10.2 Observations and Discussion

**10.2.1** The overall condition of the building structure is fair. Maintenance has been less than ideal.

**10.2.2** A number of significant deficiencies were noted to the building envelope and potential damages relating to the wood-framed wall, floor and ceiling structures. There is a high potential for hidden damages within the wall, floor and ceiling structures of the building. Anticipates significant cost to repair.

**10.2.3** A number of deterioration and structural deficiencies were noted to the exterior rear wood stair structures. These should be rebuilt according to current accepted building standards.

### 10.3 Recommendations, Costs and Priorities

Recommendation		Cost	Time Frame
<b>10.3.1</b>	Structural repair - Contingency	\$100,000 to \$200,000 and up depending hidden damage	Immediate
<b>10.3.2</b>	Rebuild rear exterior stairs	\$30,000 to \$50,000	Immediate

### 10.4 Limitations

**10.4.1** The examination of the structural components was visual only; a design review was not undertaken.

**10.4.2** The evaluation of the building's structure was limited because of the interior finishes.

**10.4.3** The evaluation of the building's structure was limited because of the exterior finishes.

## **11.0 EXTERIOR COMPONENTS**

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### **11.1 Description**

The exterior walls are clad with brick veneer and stucco.

The front entrance doors are aluminum-framed, single-glazed units. The personnel doors are steel and wood units.

The building windows are aluminum-framed, double-glazed units. The operable windows are horizontal sliders.

There is a parking lot at the south and east sides of the building. This provides approximately 23 standard parking spaces. The lot is asphalt paved.

There is a unit paver sidewalk at the north and west sides of the building.

The building includes a rotating sign box on the northeast rooftop.

### **11.2 Observations and Discussion**

**11.2.1** The overall condition of the exterior components is fair. Maintenance has been lacking.

#### **Exterior Walls**

**11.2.2** The brickwork along the front side is at or below grade level. This has caused some moisture related damage to the brick and mortar, and water has penetrated the interior. The affected areas require repair.

**11.2.3** The assessment of the building's exposure levels is an important factor in evaluating the performance of the building's components. Buildings that are designed with minimal exposure can expect to perform sufficiently, but may fail in highly exposed locations. Factors that may influence the buildings' exposure level include:

- Presence or lack of overhangs at the roof level and their projection length.
- The building height and configuration.
- The orientation of the building according to the wind-driven rain.
- The surrounding topography, vegetation or other buildings.

The building's configurations consist of flat and sloped roofs with some overhangs being provided to the exterior walls to no protections at other walls. In the majority of cases, the exterior walls appear to be in fair condition.

The majority of the windows are aluminum-framed, double-glazed units. As mentioned above, the building is considered vulnerable due to lack of overhang protections and high exposure level. Also there are a number of stucco cracks, rot damages, negligent sealants usage, wall openings from air conditioning units, and a number of deficiencies at the windows and doors such as lack of head and sill flashings including poor window and door transitions at the exterior walls that may have led to water ingress and possible hidden damage to the exposed exterior walls of varying degree.

We recommend consulting with a building envelope specialist for further evaluation and to provide remedial repairs including cost estimates for scope of work.

## Site Work

- 11.2.4** Grading improvements should be undertaken along the south, west side of the building. The asphalt pavement is installed against the wood framed wall. This will allow moisture related damage to the wood framed wall, and will allow interior water penetration. It is recommended that the asphalt pavement be removed and excavated to a depth of eight inches below the top of the foundation wall, the framed wall repaired as needed.
- 11.2.5** Based on the visual condition and the age of the building, it is possible that there are partial or no functioning perimeter drainage system around the building. Currently the downspouts discharged the rainwater above the grading. We recommend further evaluation of the perimeter drainage system and repair/provide as required.
- 11.2.6** No major deficiencies were noted with the sidewalks.
- 11.2.7** No major deficiencies were noted with the rooftop sign box.
- 11.2.8** The asphalt pavement on the site is in serviceable overall condition.
- Potholes and depressions at the south side should be repaired.

When the pavement was replaced, it appears that the previous asphalt surface was not removed. This is not a recommended practice, as the underlying condition of the previous asphalt can affect the life expectancy of the newer asphalt. However, repairs are not considered cost effective at this time.

## 11.3 Recommendations, Costs and Priorities

Recommendation		Cost	Time Frame
<b>11.3.1</b>	Cost for further evaluation by a building envelope specialist to provide remediation methods and cost estimate for scope of work	\$5,000	Immediate
<b>11.3.2</b>	Potential cost for building envelope rehabilitation including window and doors	\$250,000 to \$500,000 and up depending on types of upgrades	Immediate
<b>11.3.3</b>	Grading improvement at the south, west and contingency for potential repair	\$10,000 to \$20,000	Immediate
<b>11.3.4</b>	We recommend further evaluation of the perimeter drainage system and repair/provide as required	\$40,000 to \$60,000	Immediate to five years
<b>11.3.5</b>	Asphalt pavement repair	Minor	Immediate



## 12.0 CLOSING COMMENTS

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This report provides you with an overview of the condition of the major components in the building. We trust this information is of value. Should you have any questions, please do not hesitate to contact us.

Appendix A contains photographs documenting conditions noted in our report.

Please observe the Maintenance Recommendations for some of the building components, outlined in Appendix B.

A statement of qualifications and a glossary of terms that may have been used in this report are also included for your reference.

Sincerely,

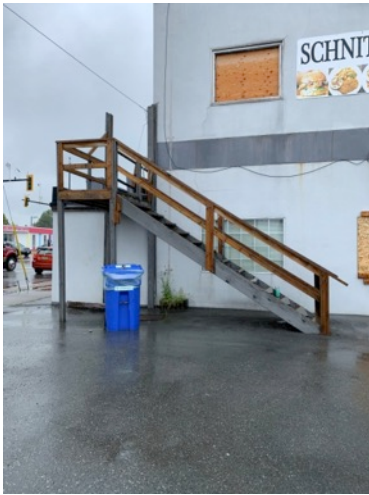
A handwritten signature in black ink, appearing to read 'Henry Khuu', with a stylized flourish at the end.

Henry Khuu, P.Eng.

## **Appendix A**

### **PHOTOGRAPHS**

**27214 Fraser Hwy  
Aldergrove, BC**



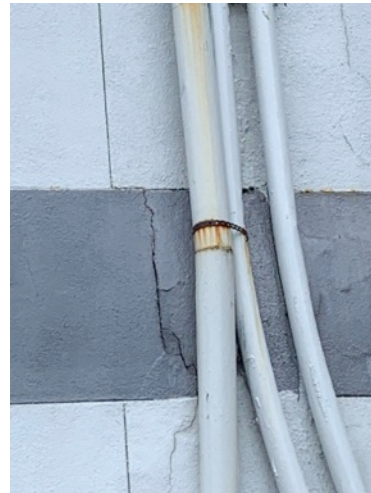
*Photo 1.* View of the exterior wood stairs located at the southwest.



*Photo 2.* West elevation view of the building.



*Photo 3.* View of the sloped metal roof at the front of the building.



*Photo 4.* Close-up view of the stucco cracks and damage noted at the centre of the south exterior wall.



*Photo 5.* View of the kitchen at the penthouse suite of the building.



*Photo 6.* View of the fuse panel located at the penthouse suite.



*Photo 7.* Section of the modified bitumen membrane at the north side of the building.



*Photo 8.* Living room at the penthouse suite.



*Photo 9.* View of the air conditioning units at the lower west side roof.



*Photo 10.* East elevation view of the building.



*Photo 11.* Electrical distribution panel at the west vacant restaurant at the building.



*Photo 12.* View of the main floor common hallway at the west side of the building.





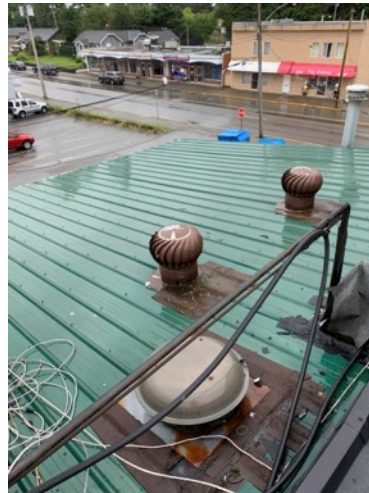
*Photo 13.* View of the parking lot at the south side of the property.



*Photo 14.* View of the upper modified bitumen membrane at the west side.



*Photo 15.* Close-up view of the exterior wall opening above the electrical room. Note the water staining.



*Photo 16.* View of the sloped metal roof at the south side of the building. Noted the patching at the roof venting.



*Photo 17.* Example view of the through-wall air conditioning at the building.



*Photo 18.* View of the modified bitumen membrane above the penthouse suite.





*Photo 19.* Close-up view of the corroded and damage metal exhaust vent located in the boiler room.



*Photo 20.* View of the boiler room.



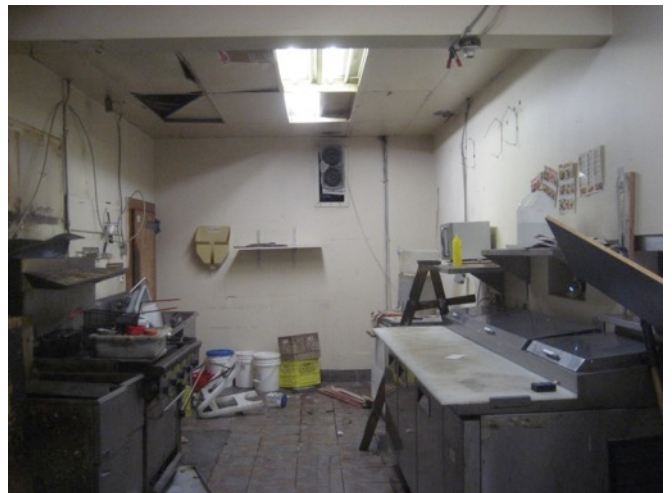
*Photo 21.* View of the walk-in cooler room at the southeast.



*Photo 22.* View of an office room at the southeast.



*Photo 23.* South elevation view of the building.



*Photo 24.* View of the commercial kitchen at the west vacated restaurant.





*Photo 25.* View of the electrical room.



*Photo 26.* View of the gas meter located at the south exterior wall.



*Photo 27.* View of the asphalt paved parking lot the east side of the property.



*Photo 28.* Example view of the windows at the building. Noted at lack of head flashing and corrosion along the window frame.



*Photo 29.* View of the second floor modified bitumen membrane against the southwest window. Note the poor threshold between the window and the flat roof.



*Photo 30.* Front seating area located at the west vacant restaurant.





*Photo 31.* View of the liquor store located at the northeast.



*Photo 32.* Example of a newer bathroom at the second floor hotel suite.



*Photo 33.* Example view of an older bathroom at the second floor hotel suite.



*Photo 34.* View of the men's washroom at the main floor common hallway at the west side.



*Photo 35.* Example view of the older waste piping located at a ceiling opening.



*Photo 36.* View of the room with a recent fire incident at the second floor hotel suite.





*Photo 37.* View of a gas-fired domestic water heater located at the boiler room.



*Photo 38.* View of the pub restaurant located at the northeast of the building.



*Photo 39.* View of the washroom located at the northeast pub.



*Photo 40.* View of the gas-fired heating boiler.



*Photo 41.* View of the modified bitumen membrane above of the southeast cooler.



*Photo 42.* View of the seating area located at the west side vacated restaurant.



*Photo 43.* View of the water stains/leakage noted at the north, west exterior wall of the restaurant.



*Photo 44.* Example view of a hotel suite at the second floor.



*Photo 45.* Close-up view of a unprofessional electrical wiring.



*Photo 46.* View of the washroom at the northwest pub restaurant.



*Photo 47.* View of the wood stair structure located at the south, east.



*Photo 48.* View of the recently elevated asphalt pavement against the south, west exterior wall of the building.





*Photo 49.* Close-up view of the blistering of the roof membrane located at the east side of the second floor flat roof.



*Photo 50.* Close-up view of the rot noted at the underside wall edge on the north side of the building.



*Photo 51.* Example view of the hallway located at the second floor hotel suite.



*Photo 52.* North elevation view of the building.



*Photo 53.* View of the modified bitumen membrane located at the southwest corner of the building. Note the poor practice of overlapping the metal cap flashing.



*Photo 54.* View of the deteriorated masonry chimney at the centre south wall.

## **Appendix B**

### **MAINTENANCE RECOMMENDATIONS**

**27214 Fraser Hwy  
Aldergrove, BC**

This Appendix provides maintenance recommendations related to items mentioned in our report. These recommendations are intended to be general and should not be construed as all-inclusive. Maintenance should be undertaken by qualified personnel only.

Activity		As Necessary	As Directed	Weekly	Monthly	Quarterly	Semi-Annually	Annually
<b>ELECTRICAL</b>								
1	The area in front of electrical panels and disconnects should always be accessible (storage or debris should not be placed in front or on top of the equipment).	x						
2	Each circuit should be labelled to identify the area or equipment it controls.	x						
3	Screw-in type fuses should be tightened semiannually. A supply of correctly sized fuses should be kept on hand.						x	
4	Circuit breakers should be manually tripped and reset semiannually.						x	
5	Extension cords should not be used as permanent wiring.	x						
6	Electrical modifications should be performed by qualified personnel only.	x						
<b>HEATING AND AIR-CONDITIONING</b>								
1	The boiler and associated equipment should be serviced annually by a qualified technician.							x
2	The air-conditioning systems should be inspected and recharged as necessary by a serviceperson, before annual start-up.							x
3	The fans and motors should be lubricated as directed by a qualified serviceperson or the manufacturer.		x					
4	The casings on the rooftop units should be maintained weathertight.	x						
5	The filters should be inspected monthly and cleaned or replaced as necessary during cooling system operation.	x			x			
<b>PLUMBING</b>								
1	The main shutoff valve for the plumbing system (located in the boiler room) should be operated semiannually to ensure that it can be closed in an emergency.						x	
2	The domestic water heaters and associated equipment should be serviced annually by a qualified technician.							x
3	The plumbing fixtures should be inspected monthly for leakage and repairs made promptly.				x			
4	The bathtub caulking and grouting should be checked regularly. Gaps should be filled as soon as they are noted, no matter how small. Annual caulking replacement is suggested.	x						x
<b>ROOFING</b>								
1	The roofs should be inspected semiannually. Particular attention should be paid to the flashings, edges and intersections.						x	
2	Gutters should be maintained free of debris and should slope properly toward downspouts. Inspections should be carried out semiannually.						x	
3	The chimney should be examined annually for damaged masonry. Cracks or gaps noted in the cap should be repaired promptly.							x
4	The metal chimney should be examined annually for corrosion, leaning and loose or missing rain cap.							x
<b>INTERIOR COMPONENTS</b>								
1	Windows should be inspected at least annually for damage resulting from leakage and condensation.							x
2	Wall and ceiling surfaces should be periodically examined for evidence of roof or plumbing leakage.				x			
3	Stairwells should be kept clear of storage and exit doors unobstructed.	x						
<b>EXTERIOR COMPONENTS</b>								
1	Exterior masonry should be inspected annually for deteriorated or missing mortar.							x
2	Stucco should be inspected at least annually for cracks. Minor cracks should be filled promptly.							x
3	Exterior woodwork should be inspected annually for paint failure. Repainting is usually required every 3 to 5 years.							x
4	Exterior trim should be inspected annually for paint failure. Repainting is usually required every 3 to 5 years.							x
5	The caulking and weather stripping should be inspected every fall.							x
6	The asphalt paving should be visually examined annually for cracks or depressions. Repairs should be made promptly.							x

## STATEMENTS OF QUALIFICATIONS

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### **HENRY KHUU, P.Eng. – James Dobney Inspections - Commercial Division**

James Dobney Inspections – Commercial Division is an engineering firm that specializes in Property Condition Assessments, Capital Reserve Studies and Reserve Fund Studies on commercial and residential properties.

- Graduated from the University of Calgary with a Bachelor of Science in Mechanical Engineering
- Designated by the Association of Professional Engineers and Geoscientists of BC (APEGBC) as a Professional Engineer
- Employed by James Dobney Inspections since 2005 performing residential and commercial building inspections. Henry is part of a team that performs Property Condition Assessments, Capital Reserve Studies and Reserve Fund Studies on commercial and residential properties
- Licensed Home inspector with the Business Practices & Consumer Protection Authority of British Columbia – CPBC (#47510)
- Previously an instructor at Douglas College for the Carson Dunlop Home Inspection Training Program. It is consistent with and recognized by the National Occupational Standards document created as part of the National Certification Program for home inspectors in Canada. I have taught the following courses: Structure, Insulation and Interior, Electrical, and Plumbing
- An employee of James Dobney Inspections in 2005. Duties include inspecting over 1,700 residential and commercial buildings of various descriptions and reporting on conditions of major components such as structure, building envelope and mechanical systems
- An employee of Carson Dobney Weldon & Associates Ltd from 2008 to 2015, an engineering firm that specializes in Property Condition Assessments of commercial buildings.
- Memberships:
  - APEGBC – Association of Professional Engineers and Geoscientists of BC
  - BCBEC – British Columbia Building Envelope Council
  - CPBC – Business Practices & Consumer Protection Authority
  - CHOA – Condominium Home Owners Association
- Continuing education courses include:
  - Certified Level 1 Thermographer, itc – Flir Canada
  - Green Roof Design, BCIT
  - Building Code: Part 9 (SFD), BCIT
  - Building Envelope Performance, BCIT

## GLOSSARY

**ABS** — A type of black plastic pipe commonly used for waste water lines.

**Aggregate** — Crushed rock or stone.

**Air chamber** — A vertical, air filled pipe that prevents water hammer by absorbing pressure when water is shut off at a faucet or valve.

**Air-conditioner condenser** — The outside fan unit of the air-conditioning system. The condenser discharges heat to the building exterior.

**Alligatoring** — Coarse checking pattern on the surface of a material. Typically caused by ageing, exposure to sun and/or loss of volatiles.

**Ampacity** — Refers to the how much current a wire can safely carry. For example, a 12-gauge electrical copper wire can safely carry up to 20 amps.

**Asphalt** — A bituminous material employed in roofing and road paving materials because of its waterproofing ability.

**B-Vent** — A double-walled metal flue used for venting gas fired appliances in the U.S. and Canada. In some areas a single-walled vent might be used for gas-fired equipment such as a water heater. A single-walled metal vent or a B-vent would be unsafe if used to vent a woodstove or oil-fired equipment.

**Backfill** — The replacement of excavated earth into a trench or pit.

**Backflow** — A reverse flow of water or other liquids into the water supply pipes, caused by negative pressure in the pipes

**Ballast** — A transformer that steps up the voltage in a florescent lamp.

**Balusters** — Vertical members in a railing used between a top rail and bottom rail or the stair treads. Sometimes referred to as pickets or spindles.

**Base sheet** — Bottom layer of built-up roofing.

**Batt** — A section of fiberglass or rock-wool insulation.

**Bay window** — Any window space projecting outward from the walls of a building, either square or polygonal in plan.

**Beam** — A structural member transversely supporting a load. A structural member carrying building loads (weight) from one support to another. Sometimes called a girder.

**Bearing wall** — A wall that supports any vertical load in addition to its own weight.

**Bird's-mouth cut** — A cutout in a rafter where it crosses the top plate of the wall providing a bearing surface for nailing. Also called a heel cut.

**Bitumen** — Term commonly applied to various mixtures of naturally occurring solid or liquid hydrocarbons, excluding coal. These substances are described as bituminous. Asphalt is a bitumen. *See Asphalt.*

**Blocking** — Small wood pieces to brace framing members or to provide a nailing base for gypsum board or paneling.

**Board and batten** — A method of siding in which the joints between vertically placed boards or plywood are covered by narrow strips of wood.

**Bottom chord** — The lower or bottom horizontal member of a truss.

**Brick tie** — Metal strips or wires that are inserted into the mortar joints of the brick veneer. Ties hold the veneer wall to the backer wall behind it.

**Brick veneer** — A vertical facing of brick used to clad a building. Brick veneer is not a load-bearing component.

**Building paper** — A general term for papers, felts and similar sheet materials used in buildings without reference to their properties or uses. Generally comes in long rolls.

**Built-up roof** — A roofing composed of three to five layers of asphalt felt laminated with coal tar, pitch or asphalt. The top is finished with crushed slag or gravel. Generally used on flat or low-pitched roofs.

**Butt joint** — The junction where the ends of building materials meet. To place materials end-to-end or end-to-edge without overlapping.

**Cant strip** — A triangular shaped piece of lumber used at the junction of a flat deck and a wall to prevent cracking of the roofing which is applied over it.

**Cantilever** — Any part of a structure that projects beyond its main support and is balanced on it.

**Cap flashing** — The flashing covering over a horizontal surface to prevent water from migrating behind the base flashing.

**Cap sheet** — The top layer in modified bitumen roofing.

**Casement window** — A window with hinges on one of the vertical sides and swings open like a door.

**Ceiling joist** — One of a series of parallel framing members used to support ceiling loads and supported in turn by larger beams, girders or bearing walls. Can also be roof joists.

**Cement** — The grey powder that is the "glue" in concrete. Portland cement. Also, any adhesive.

**Certificate of Occupancy** — Certificate is issued by the local municipality and is required before anyone can occupy and live within the building. It is issued only after the local municipality has made all inspections and all monies and fees have been paid.

**CFM (cubic feet per minute)** — A rating that expresses the amount of air a blower or fan can move. The volume of air (measured in cubic feet) that can pass through an opening in one minute.

**Chase** — A framed enclosed space around a flue pipe or a channel in a wall, or through a ceiling for something to lie in or pass through.

**Checking** — Cracks that appear with age in many large timber members. The cracks run parallel to the grain of the wood. At first superficial, but in time may penetrate entirely through the member and compromise its integrity.

**Cleanout** — An opening providing access to a drain line. Closed with a threaded plug.



## GLOSSARY

**Closed-cut valley** — A method of valley treatment in which shingles from one side of the valley extend across the valley, while shingles from the other side are trimmed 2 inches from the valley centerline. The valley flashing is not exposed.

**Collar tie** — Nominal one- or two-inch-thick members connecting opposite roof rafters. They serve to stiffen the roof structure.

**Column** — A vertical structural compression member that supports loads acting in the direction of its longitudinal axis.

**Combustion air and ventilation air** — The ductwork installed to bring fresh, outside air to the furnace or boiler room. Normally two separate supplies of air are brought in: one high for ventilation and one low for combustion.

**Compressor** — A mechanical device that pressurizes gas in order to turn it into a liquid, thereby allowing heat to be removed or added. A compressor is the main component of conventional heat pumps and air-conditioners. In an air-conditioning system, the compressor normally sits outside and has a large fan (to remove heat).

**Concrete board or cement board** — A panel made out of concrete and fiberglass, usually used as a tile backing material.

**Condensate drain line** — The pipe that runs from the air-conditioning cooling coil to the exterior or internal building drain, to drain away condensation.

**Condensation** — The change of water from vapor to liquid when warm, moisture-laden air comes in contact with a cold surface.

**Condensing unit** — The outdoor component of a cooling system. It includes a compressor and condensing coil designed to give off heat.

**Conduit, electrical** — A pipe, usually metal, in which wire is installed. The pipe serves to protect the wire.

**Control joint** — Tooled, straight grooves made on concrete floors or structures to "control" where the concrete should crack (as a result of shrinkage).

**Cooling load** — The amount of cooling required to keep a building at a specified temperature during the summer, usually 25° C, based on a design outside temperature.

**Corbel** — To build out one or more courses of brick or stone from the face of a wall. This may be decorative, or serve to support a structural component.

**Counterflashing** — A metal flashing usually used to cover another flashing and prevent moisture entry.

**Course** — A row of shingles or roll roofing running the length of the roof. Parallel layers of building materials such as bricks, or siding laid up horizontally.

**CPVC** — See *PVC*.

**Crawlspace** — A shallow space below a building, normally enclosed by the foundation walls.

**Cricket** — A saddle-shaped, peaked construction connecting a sloping roof plane with a wall or chimney. Designed to encourage water drainage away from the chimney or wall joint.

**Culvert** — Round, corrugated drain pipe (normally 15 or 18 inches in diameter) installed beneath a driveway and parallel to and near the street.

**Cupping** — A type of warping that causes boards or shingles to curl up at their edges. Typically caused by uneven drying or loss of volatiles.

**Curb** — The short elevation of a supporting element above the deck of a roof. Normally a box (on the roof) on which a skylight or piece of mechanical equipment is attached.

**Curtain wall** — An exterior building wall that is supported entirely by the building structure, rather than being self-supporting or load-bearing.

**Damper** — A metal "door" placed within the ductwork, typically. Used to control flow of air, etc., in the ductwork.

**Damp-proofing** — The black, tar-like material applied to the exterior of a foundation wall. Used to minimize moisture penetration into the wall.

**Deck** — The surface, installed over the supporting framing members, to which the roofing is applied.

**Dedicated circuit** — An electrical circuit that serves only one appliance or a series of electric heaters or smoke detectors.

**Dew point** — Temperature at which a vapor begins to deposit as a liquid. Applies especially to water in the atmosphere.

**Disconnect** — A large electrical ON-OFF switch.

**Diverter valve** — A device that changes the direction of water flow from one faucet to another.

**Dormer** — A box-like projection from the sloping plane of a roof that frames a window.

**Double-hung window** — A window with two vertically sliding sashes, both of which can move up and down.

**Downspout** — A pipe for draining water from roof gutters. Also called a leader.

**Drain tile** — A perforated, corrugated plastic pipe laid at the bottom of the foundation wall and used to drain excess water away from the foundation. It prevents ground water from seeping through the foundation wall. Sometimes called perimeter drain.

**Drip** — A groove in the underside of a sill or drip cap to cause water to drop off on the outer edge instead of drawing back and running down the face of the building.

**Ducts** — Usually round or rectangular metal pipes installed for distributing warm or cold air from the heating and air-conditioning equipment.

**Eaves protection** — Additional layer of roofing material applied at the eaves to help prevent damage from water backup (typically caused by ice damming).

**EIFS** — Exterior Insulation Finish System. An exterior cladding system that employs a relatively thin acrylic stucco coating over insulation panels. (Pronounced "ee-fus")

**Elbow** — A plumbing or electrical fitting that lets you change directions in runs of pipe or conduit.

## GLOSSARY

**Evaporator coil** — The part of a cooling system that absorbs heat from air passing through it. The evaporator coil is found within the ductwork.

**Expansion joint** — A joint that allows for building material expansion and contraction caused by temperature changes.

**Exposed aggregate finish** — A method of finishing concrete which washes the cement/sand mixture off the top layer of the aggregate — usually gravel. Often used with precast concrete exterior wall finishes.

**Exposure** — The portion of the roofing or wall cladding material exposed to the weather after installation.

**Fascia** — a vertical member attached to the ends of the roof structure and often the backing of the gutter.

**Felt** — Fibrous material saturated with asphalt and used as an underlayment or part of a built-up roofing system.

**Finger joint** — A manufacturing process of interlocking two shorter pieces of wood end to end to create a longer piece of dimensional lumber or molding. Often used in jambs and casings and are normally painted (instead of stained).

**Fire stop** — A solid, tight closure of a concealed space, placed to prevent the spread of fire and smoke through such a space. Includes stuffing wire and pipe holes in the fire separations.

**Flashing** — (1) Sheet metal or flexible membrane pieces fitted to the joint of any roof intersection, penetration or projection (chimneys, copings, dormers, valleys, vent pipes, etc.) to prevent water leakage. (2) The building component used to connect portions of a roof, deck, or siding material to another surface such as a chimney, wall, or vent pipe. Often made out of various metals, rubber or tar and is mostly intended to prevent water entry.

**Flatwork** — Common word for concrete floors, driveways, patios and sidewalks.

**Flue** — The space or passage in a chimney through which smoke, gas, or fumes ascend.

**Fluorescent lighting** — A fluorescent lamp is a gas-filled glass tube with a phosphor coating on the inside. Gas inside the tube is ionized by electricity which causes the phosphor coating to glow. Normally with two pins that extend from each end.

**Footing** — A widened, below-ground base of a foundation wall or a poured concrete, below-ground, base used to support foundations or piers.

**Forced air heating** — a common form of heating with natural gas, propane, oil or electricity as a fuel. Air is heated through a heat exchanger and distributed through a set of metal ducts.

**Form** — Temporary structure erected to contain concrete during placing and initial hardening.

**Foundation** — The supporting portion of a structure below the first floor construction, or below grade, including the footings.

**Framing** — The structural wood, steel or concrete elements of the building.

**Framing, balloon** — A system of framing a building in which all vertical structural elements of the bearing walls consist of single pieces extending from the top of the foundation sill plate to the roof plate and to which all floor joists are fastened.

**Frost line** — The depth of frost penetration in soil and/or the depth at which the earth will freeze and swell. This depth varies in different parts of the country.

**Furring** — Strips of wood or metal applied to a wall or other surface to even it and normally to serve as a fastening base for finish material.

**Gable** — A sidewall, typically triangular, that is formed by two sloping roof planes.

**Gable roof** — A type of roof with sloping planes of the same pitch on each side of the ridge. Has a gable at each end.

**Gasket** — A device used to seal joints against leaks.

**GFI or GFCI or Ground Fault Current Interrupter** — An electrical device used to prevent injury in locations where one might be in contact with a grounded surface and an electrical appliance. Most GFIs are located in a receptacle or circuit breaker and can be identified by the presence of a "test" and a "reset" button.

**Glued laminated beam (glulam)** — A structural beam composed of wood laminations. The laminations are pressure-bonded with adhesives.

**Granules** — Crushed rock coated with ceramic material, applied to the exposed surface of asphalt roofing products to add color and reduce ultraviolet degradation. Copper compounds added to these help make them algae resistant.

**Groundwater** — Water from a subsurface water source.

**Grout** — Mortar made of such consistency (by adding water) that it will flow into the joints and cavities of the masonry work and fill them solid.

**Gusset** — A flat metal, wood, plywood or similar type member used to provide a connection at the intersection of wood members. Most commonly used at joints of wood trusses. They are fastened by nails, screws, bolts, or adhesives.

**Gutter** — The trough that channels water from the eaves to the downspouts.

**H-beam** — A steel beam with a cross section resembling the letter H.

**H-clip** — Small metal clips formed like an H that fits at the joints of two plywood (or wafer board) sheets to stiffen the joint. Normally used on the roof sheeting.

**Header** — A beam placed perpendicular to joists and to which joists are attached in framing for around an opening.

**Hearth** — The fireproof area directly in front of a fireplace. The inner or outer floor of a fireplace, usually made of brick, tile, or stone.

**Heat pump** — A device that uses compression and decompression of gas to heat and/or cool a building.

**Heating load** — The amount of heating required to keep a building at a specified temperature during the winter, based on an outside design temperature.

## GLOSSARY

**Hip** — The external angle formed by the meeting of two sloping sides of a roof.

**Honeycombs** — The appearance concrete makes when aggregate in the concrete is visible and where there are void areas in the concrete.

**Hose bib** — An exterior water faucet.

**Hot wire** — The wire that carries electrical energy to a receptacle or other device-in contrast to a neutral, which carries electricity away again. Normally the black wire.

**HVAC** — An abbreviation for Heat, Ventilation, and Air-Conditioning.

**I-beam** — A steel beam with a cross section resembling the letter I.

**Ice damming** — The buildup of ice and water at the eaves of a sloped roof. Melting snow on the roof refreezes at the roof overhang, causing the damming. Buildings with inadequate attic insulation or ventilation or with large roof projections beyond the exterior walls are more prone to ice damming.

**Irrigation** — Lawn sprinkler system.

**Jack post** — A type of structural support made of metal, which can be raised or lowered through a series of pins and a screw to meet the height required. Typically used as a replacement for an old supporting member in a building.

**Joist** — One of a series of parallel beams, usually two inches in thickness, used to support floor and ceiling loads, and supported in turn by larger beams, girders, or bearing walls.

**Joist hanger** — A metal U-shaped item used to support the end of a floor joist and attached with hardened nails to another bearing joist or beam.

**Knob-and-tube wiring** — A common form of electrical wiring used before the Second World War. When in good condition it may still be functional for low amperage use such as smaller light fixtures.

**Lath** — A building material of narrow wood, metal, gypsum, or insulating board that is fastened to the frame of a building to act as a base for plaster, shingles, or tiles.

**Lattice** — An open framework of crisscrossed wood or metal strips that form regular, patterned spaces.

**Leader** — See *Downspout*.

**Ledger** — The wood or metal members attached to a beam, studding, or wall used to support joist or rafter ends.

**Lintel** — A horizontal structural member that supports the load over an opening such as a door or window.

**Load-bearing wall** — A wall supporting its own weight and some other structural elements of the building such as the roof and floor structures.

**Louvre** — A vented opening into a room that has a series of horizontal slats and arranged to permit ventilation but to exclude rain, snow, light, insects, or other living creatures.

**Mansard roof** — A roof with two sloping planes of different pitch on each of its four sides. The lower plane is steeper than the upper, and may be almost vertical.

**Masonry** — Stone, brick, concrete, hollow-tile, concrete block, or other similar building units or materials. Normally bonded together with mortar to form a wall.

**Modified bitumen roof** — A roof covering that is typically composed of a factory-fabricated composite sheet consisting of a copolymer-modified bitumen, often reinforced with polyester and/or fiberglass, and installed in one or more plies. The membrane is commonly surfaced with field-applied coatings, factory-applied granules or metal foil. The roofing system may incorporate rigid insulation.

**Mortise** — A slot cut into a board, plank, or timber, usually edgewise, to receive the tenon (or tongue) of another board, plank, or timber to form a joint.

**Mullion** — A vertical divider in the frame between windows, doors, or other openings.

**Neutral wire** — Usually color-coded white, this wire carries electricity from a load back to the service panel.

**Newel post** — The large starting post to which the end of a stair guard railing or balustrade is fastened.

**Nosing** — The projecting edge of a molding or drip or the front edge of a stair tread.

**On center** — The measurement of spacing for studs, rafters, and joists in a building from the center of one member to the center of the next.

**Open valley** — Method of valley construction in which shingles on both sides of the valley are trimmed along a chalk line snapped on each side of the valley. Shingles do not extend across the valley. Valley flashing is exposed.

**Open web steel joist** — One of a series of parallel beams, used to support floor and roof loads, and supported in turn by larger beams, girders or bearing walls. Consists of horizontal top and bottom chords, with diagonal and/or vertical web members connecting the chords together.

**Oriented Strand Board or OSB** — A manufactured 4-foot-by-8-foot wood panel made out of one- to two-inch wood chips and glue. Often used as a substitute for plywood.

**P-trap** — Curved, U-section of drain pipe that holds a water seal to prevent sewer gasses from entering a building through a fixtures' drain pipe.

**Parapet** — The portion of an exterior wall that extends above the edge of a roof.

**Parging** — A thin layer of cement placed over masonry units.

**Partition** — A wall that subdivides spaces within any story of a building or room.

**Paver** — Materials (commonly masonry) laid down to make a firm, even surface on the exterior.

**Performance bond** — An amount of money (usually 10 percent of the total price of a job) that a contractor must put on deposit with a governmental agency as an insurance policy that guarantees the contractors' proper and timely completion of a project or job.

## GLOSSARY

**Perimeter drain** — Typically 4-inch perforated plastic pipe around the perimeter (either inside or outside) of a foundation wall (before backfill) that collects and diverts ground water away from the foundation.

**Pilot light** — A small, continuous flame (in a boiler, or furnace) that ignites gas or oil burners when needed.

**Pitch** — (1) The degree of roof incline expressed as the ratio of the rise, in feet, to the span, in feet. (2) A thick, oily substance commonly obtained from tar, used to seal out water at joints and seams. Pitch is produced from distilling coal tar, wood tar, or petroleum.

**Pitch pocket** — A container, usually formed of sheet metal, around supporting connections with roof-mounted equipment. Filling the container with pitch, or better yet, plastic roof cement, helps seal out water even when vibration is present. A pitch pocket is *not* the preferred method of flashing a roof penetration.

**Plan view** — Drawing of a structure with the view from overhead, looking down.

**Plate** — Normally a horizontal member within a framed structure, such as: (1) sill plate — a horizontal member anchored to a concrete or masonry wall; (2) Sole plate — bottom horizontal member of a frame wall; or (3) top plate — top horizontal member of a frame wall supporting ceiling joists, rafters, or other members.

**Plenum** — The main supply air or return air duct leading from a heating or cooling unit.

**Plumbing stack** — A plumbing vent pipe that penetrates the roof.

**Ply** — A term to denote the number of layers of roofing felt, veneer in plywood, or layers in built-up materials, in any finished piece of such material.

**Point load** — A point where a bearing/structural weight is concentrated and transferred to another structural member or component.

**Portland cement** — Cement made by heating clay and crushed limestone into a brick and then grinding to a pulverized powder state.

**Post** — a vertical framing member usually designed to carry a beam.

**Post-and-beam** — A basic building method that uses just a few hefty posts and beams to support an entire structure. Contrasts with stud framing.

**Power vent** — A vent that includes a fan to speed up air flow.

**Pressure relief valve** — A safety device mounted on a water heater or boiler. The relief valve is designed to release any high pressure in the vessel and thus prevent tank explosions.

**Pressure-treated wood** — Lumber that has been saturated with a preservative to resist rot.

**Pvc or cpvc** — (Polyvinyl choride) A type of white or light gray plastic pipe sometimes used for water supply lines and waste pipe.

**Quarry tile** — A man-made or machine-made clay tile used to finish a floor or wall. Generally 6 inches by 6 inches by ¼-inch thick .

**R value** — A measure of insulation's resistance to heat flow. The higher the R value the more effective the insulation.

**Rafter** — (1) The framing member that directly supports the roof sheathing. A rafter usually follows the angle of the roof, and may be a part of a roof truss. (2) The supporting framing member immediately beneath the deck, sloping from the ridge to the wall plate.

**Rafter, hip** — A rafter that forms the intersection of an external roof angle.

**Rafter, valley** — A rafter that forms the intersection of an internal roof angle.

**Rake edge** — The overhang of an inclined roof plane beyond the vertical wall below it.

**Rebar** — Reinforcing bar. Ribbed steel bars installed in concrete structures designed to strengthen concrete. Comes in various thicknesses and strength grades. May be epoxy coated to enhance rust resistance.

**Refrigerant** — A substance that remains a gas at low temperatures and pressure and can be used to transfer heat. Freon is an example.

**Register** — A grille placed over a supply air or return air duct.

**Reglaze** — To replace a broken window.

**Reinforcing** — Steel rods or metal fabric placed in concrete slabs, beams, or columns to increase their strength.

**Relief valve** — A device designed to open if it detects excess temperature or pressure. Commonly found on water heating or steam producing systems.

**Resilient flooring** — A durable floor cover that has the ability to resume its original shape.

**Retaining wall** — A structure that holds back a slope or elevation of land and prevents erosion.

**Ridge** — The horizontal line at the junction of the top edges of two sloping roof surfaces.

**Riser** — A vertical member between two stair treads.

**Roll roofing** — Asphalt roofing products manufactured in roll form.

**Romex** — A name brand of nonmetallic sheathed electrical cable that is used for indoor wiring.

**Roof deck** — The surface, installed over the supporting framing members, to which the roofing is applied.

**Roof sheathing** — The wood panels or sheet material fastened to the roof rafters or trusses on which the shingle or other roof covering is laid.

**Roof valley** — The "V" created where two sloping roofs meet.

**Roofing membrane** — The layer or layers of waterproofing products that cover the roof deck.

**Run, stair** — The horizontal distance of a stair tread from the nosing to the riser.

## GLOSSARY

**Saddle** — Two sloping surfaces meeting in a horizontal ridge, used between the back side of a chimney, or other vertical surface, and a sloping roof. Used to divert water around the chimney or vertical surface.

**Sanitary sewer** — A sewer system designed for the collection of waste water from the bathroom, kitchen and laundry drains, and is usually not designed to handle storm water.

**Sash** — The frame that holds the glass in a window, often the movable part of the window.

**Saturated felt** — A felt that is impregnated with tar or asphalt.

**Scratch coat** — The first coat of plaster, which is scratched to form a bond for a second coat.

**Scupper** — (1) An opening for drainage in a wall, curb or parapet. (2) The drain above a downspout or in a flat roof, usually connected to the downspout.

**Sealer** — A finishing material, either clear or pigmented, that is usually applied directly over raw wood or concrete for the purpose of sealing the wood or concrete surface.

**Seasoning** — Drying and removing moisture from green wood in order to improve its usability.

**Service equipment** — Main control gear at the electrical service entrance, such as circuit breakers, switches, and fuses.

**Service lateral** — Underground power supply line.

**Shake** — A wood roofing material, normally cedar or redwood. Produced by splitting a block of the wood along the grain line. Modern shakes are sometimes machine sawn on one side.

**Sheathing** — (1) Sheets or panels used as roof deck material. (2) Panels that lie between the studs and the siding of a structure.

**Short circuit** — A situation that occurs when hot and neutral wires come in contact with each other. Fuses and circuit breakers protect against fire that could result from a short.

**Sill** — (1) The two-by-four or two-by-six wood plate framing member that lays flat against and bolted to the foundation wall (with anchor bolts) and upon which the floor joists are installed. (2) The member forming the lower side of an opening, as a door sill or window sill.

**Skylight** — A more or less horizontal window located on the roof of a building.

**Slab-on-grade** — A type of foundation with a concrete floor which is placed directly on the soil. In warm climates, the edge of the slab is usually thicker and acts as the footing for the walls. In cold climates, the slab is independent of the perimeter foundation walls.

**Sleeper** — Usually, a wood member that serves to support equipment.

**Soffit** — (1) The finished underside of the eaves. (2) A small ceiling-like space, often out of doors, such as the underside of a roof overhang.

**Solid waste pump** — A pump used to 'lift' waste water to a gravity sanitary sewer line. Usually used in basements and other locations which are situated below the level of the city sewer.

**Spalling** — The cracking and breaking away of the surface of a material.

**Span** — The clear distance that a framing member carries a load without support (between structural supports).

**Splash block** — A pad placed under the lower end of a downspout to divert the water from the downspout away from the building. Usually made out of concrete or fiberglass.

**Stair stringer** — Supporting member for stair treads. Can be a notched plank or a steel member.

**Starter strip** — Asphalt roofing applied at the eaves that provides protection by filling in the spaces under the cutouts and joints of the first course of shingles.

**Step flashing** — Flashing application method used where a vertical surface meets a sloping roof plane.

**Storey** — That part of a building between any floor or between the floor and roof.

**Storm collar** — A metal flashing used to seal around a penetration in a roof.

**Storm sewer** — A sewer system designed to collect storm water, separate from the waste water system.

**Storm window** — An extra window usually placed outside of an existing one, as additional protection against cold weather, or damage.

**Stucco** — An outside plaster finish made with Portland cement as its base.

**Stud** — One of a series of slender wood or metal vertical structural members placed as supporting elements in walls and partitions.

**Stud framing** — A building method that distributes structural loads to each of a series of relatively lightweight studs. Contrasts with post-and-beam.

**Sump** — Pit or large plastic bucket/barrel inside a basement, designed to collect ground water (storm water) from a perimeter drain system.

**Sump pump** — A submersible pump in a sump pit that pumps any excess ground water to the storm sewer.

**Suspended ceiling** — A ceiling system supported by hanging it from the overhead structural framing.

**Tempered** — Strengthened. Tempered glass will not shatter nor create shards, but will "pelletize" like an automobile window. Required in tub and shower enclosures, for example.



## GLOSSARY

**Termites** — Insects that superficially resemble ants in size, general appearance, and habit of living in colonies; hence, they are frequently called “white ants.” Subterranean termites establish themselves in buildings not by being carried in with lumber, but by entering from ground nests after the building has been constructed. If unmolested, they eat out the woodwork, leaving a shell of sound wood to conceal their activities, and damage may proceed so far as to cause collapse of parts of a structure before discovery.

**Terra cotta** — A ceramic material molded into masonry units.

**Threshold** — The bottom metal, concrete, or wood plate of an exterior door frame. They may be adjustable to keep a tight fit with the door slab.

**Toenailing** — To drive a nail in at a slant. Method used to secure floor joists to the plate. Not acceptable for securing joists flush to a header or beam.

**Tongue-and-groove** — A joint made by a tongue (a rib on one edge of a board) that fits into a corresponding groove in the edge of another board to make a tight flush joint. Typically, the subfloor plywood is tongue-and-groove.

**Top chord** — The upper or top member of a truss.

**Trap** — A plumbing fitting that holds water to prevent air, gas, and vermin from entering into a building.

**Tread** — The walking surface board in a stairway on which the foot is placed.

**Treated lumber** — A wood product which has been impregnated with chemicals to reduce damage from wood rot or insects. Often used for the portions of a structure which is likely to be in ongoing contact with soil and water. Wood may also be treated with a fire retardant.

**Truss** — An engineered and manufactured roof support member with “zig-zag” framing members. Does the same job as a rafter but is designed to have a longer span than a rafter.

**Tube-and-knob wiring** — See *knob-and-tube wiring*.

**UFFI** — Urea Formaldehyde Foam Insulation, a foam insulation blown into existing walls. (Pronounced “you-fee”)

**Ultraviolet degradation** — A reduction in certain performance limits caused by exposure to ultraviolet light.

**Underlayment** — (1) A one-quarter-inch material placed over the subfloor plywood sheathing and under finish coverings, such as vinyl flooring, to provide a smooth, even surface. (2) A secondary roofing layer that is waterproof or water-resistant, installed on the roof deck and beneath shingles or other roof-finishing layer.

**Uv rays** — Ultraviolet rays from the sun.

**Valley** — The inward angle formed by two intersecting, sloping roof planes. Since it naturally becomes a water channel, additional attention to waterproofing it is desirable.

**Vapour barrier** — A building product installed on exterior walls and ceilings under the drywall and on the warm side of the insulation. It is used to retard the movement of water vapour into walls and prevent condensation within them. Normally, polyethylene plastic sheeting is used.

**Vent** — A pipe or duct allowing the flow of air and gases to the outside. In a plumbing system, the vent is necessary to allow sewer gases to escape to the exterior.

**Vermiculite** — A mineral closely related to mica, with the faculty of expanding on heating to form lightweight material with insulation quality. Used as bulk insulation and also as aggregate in insulating and acoustical plaster and in insulating concrete floors.

**Water closet** — A toilet.

**Weather stripping** — Narrow sections of thin metal or other material installed to prevent the infiltration of air and moisture around windows and doors.

**Weep holes** — Small holes in exterior wall cladding systems that allow moisture to escape and air pressure equalization in the cavity space drained by the weep hole.

**Wythe** — (rhymes with “tithe” or “scythe”) A vertical layer of masonry that is one masonry unit thick.

**Zone** — The section of a building that is served by one heating or cooling loop because it has noticeably distinct heating or cooling needs. Also, the section of property that will be watered from a lawn sprinkler system.

**Zone valve** — A device, usually placed near the heater or cooler, which controls the flow of water or steam to parts of the building; it is controlled by a zone thermostat.