



PRACTICE ADVISORY

STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

Version 1.1, Revised March 4, 2021

This practice advisory has been issued to inform members and licensees of Engineers and Geoscientists British Columbia of the standard of practice for registered professionals engaged in respect of the City of Vancouver's recently added provisions in the Fire By-law 12472 requiring structural inspections of exterior means of egress for buildings over 3 storeys in height.

BACKGROUND

Cases involving persons seriously injured because of falls from exterior means of egress, including fire escapes, that were in disrepair prompted the City of Vancouver to implement a new provision in the Fire By-law.

The Fire By-law 12472, Division B, Sentence 2.7.1.9. (2), effective June 25, 2020, includes the following inspection requirements for all buildings in the City of Vancouver that are more than 3 storeys in building height:

"All structures providing exterior means of egress, including their guards, handrails, and connection to the building, shall be inspected for structural integrity by a registered professional at intervals not greater than 5 years." (City of Vancouver 2019a)

Exterior passageways, exterior stairs, and other types of exterior means of egress that are intended for building occupants to use during emergencies are commonplace on buildings of all types and sizes. One type of exterior means of egress is a "fire escape," which, in the Vancouver Building By-law (VBBL), is considered to be any set of exterior stairs, ladders, landings, and platforms that do not conform to codified dimensions for treads, run, rise, or width (VBBL, Division B, Article 3.4.6.8.) (City of Vancouver 2019b). Such fire escape structures are commonly accessed from the inside of the building through doors or windows, and may be constructed of metal, concrete, or wood. Since 1980, the Vancouver Building By-law has prohibited fire escapes to be erected on new buildings; however, fire escapes are still permitted in existing buildings that have specific occupancies with specific requirements.

REQUIREMENT

Following is an excerpt of the new provision in the Fire By-law 12472, effective June 25, 2020:

“2.7.1.9. Inspections and Maintenance of Structures Providing Exterior Means of Egress

- 1) This Article applies to all buildings more than 3 storeys in height with any structures providing exterior means of egress where the difference in floor or ground level is more than 2 m, except buildings of residential occupancy only with no more than two principal dwelling units.
- 2) All structures providing exterior means of egress, including their guards, handrails, and connection to the building, shall be inspected for structural integrity by a registered professional at intervals not greater than 5 years.
- 3) All structures providing exterior means of egress, including their guards, handrails, and connection to the building, shall be maintained so as to be structurally sound at all times.
- 4) All structures providing exterior means of egress shall have a securely affixed tag showing the date of the inspection, maintenance, or repair, and the name, seal and signature of the registered professional.
- 5) The tag referred to in Sentence (4) shall be clearly visible from the adjacent ground level.
- 6) The tag referred to in Sentence (4) shall be displayed at all times.” (City of Vancouver 2019a)

Exterior means of egress included in this provision are those with a difference in elevation of more than 2 metres between the means of egress walking surface and the adjacent surface, which could be another floor, walkway, landing, ground, or other surface. This provision does not apply to single-family houses, single-family houses with secondary suites, duplexes, or duplexes with secondary suites.

PROFESSIONAL EXPERIENCE REQUIREMENTS

In accordance with the applicable Fire By-law clause, a registered professional is required to be responsible for undertaking a structural assessment of exterior means of egress. Professional engineers undertaking such assessments should have knowledge and experience in:

- structural engineering as it applies to the egress structure(s) being assessed;
- failure mechanisms of structures and structural elements, particularly but not limited to structural connections between the base building and the egress structure;
- non-destructive inspection techniques appropriate to such assessments;
- properties, life expectancy, and durability of structural materials used in egress structures; and
- past and present methods and materials in building construction.

ASSESSMENT PROCESS

The process for structural assessments of external means of egress involves first completing an on-site inspection, followed by formulation of an engineering opinion as to the condition of the egress structure by a professional engineer (also referred to as the “assessment engineer”), and, finally, assignment of a coloured tag as required by the Fire By-law. The following figure illustrates the overall workflow for the structural assessment and repair (if required) of an exterior means of egress structure.

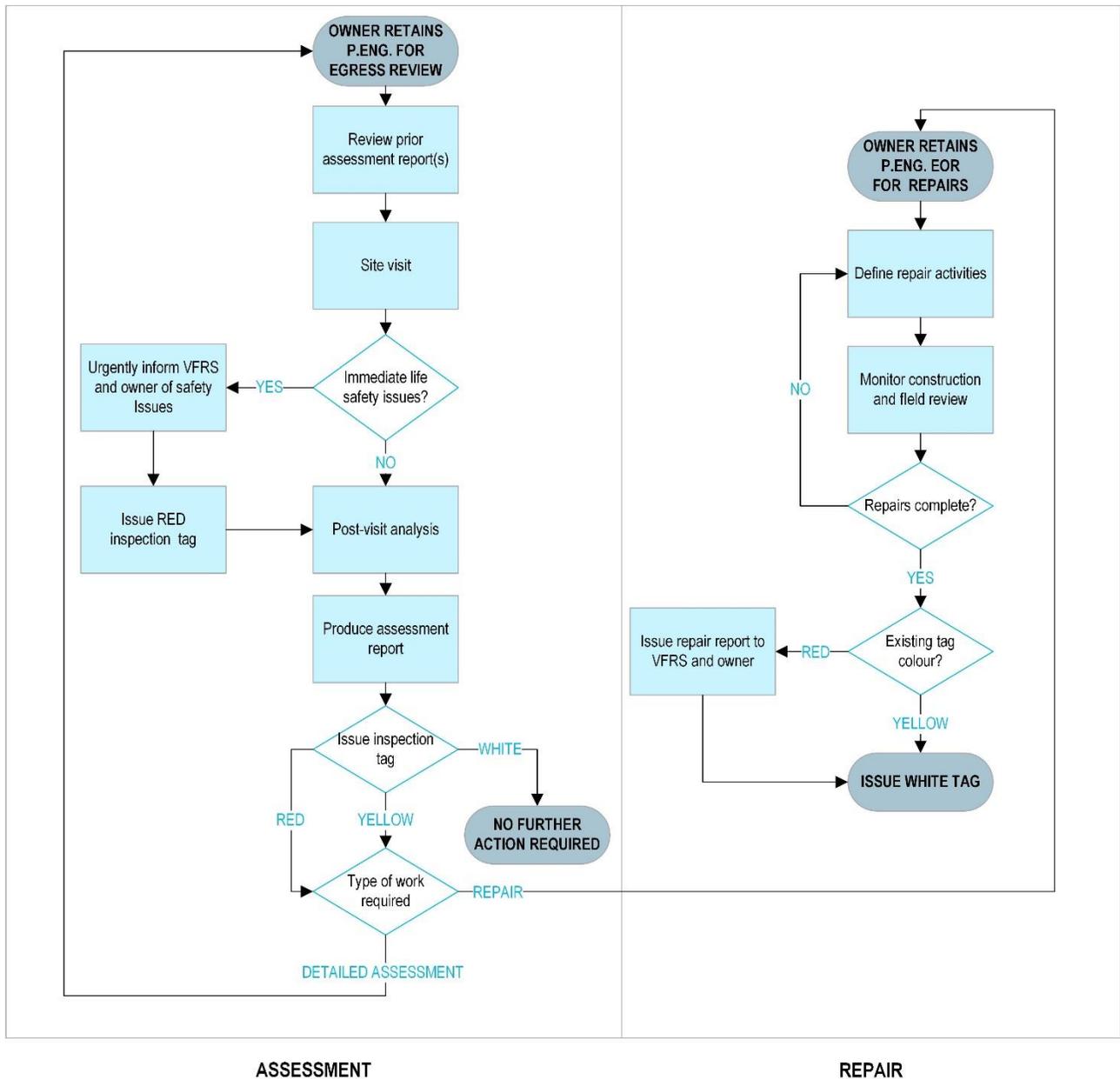


Figure 1: Flowchart Illustrating the Process for a Structural Assessment of Exterior Means of Egress

NOTES: EOR = engineer of record; VFRS = Vancouver Fire Rescue Services

When an assessment engineer is engaged to perform a structural assessment of an exterior means of egress, the following items must be considered in the review:

1. Prior assessment reports
 - The assessment engineer should request from the owner any previous assessment reports that relate to the egress structure(s) under review, and descriptions of any work performed on the egress structure(s) between the date of the last report and the present.
2. General observation items
 - The owner should test any operable items related to the egress structure, such as ladders or counterbalances, in the presence of the assessment engineer. If there are operability concerns or obvious performance issues, these deficiencies should be noted in the assessment engineer's report and reflected in the selection of tag colour.
 - The assessment engineer should identify if there are obvious issues regarding the route of egress, including obstructions or access issues.
3. Material degradation and overall quality of the egress structure, including guards, handrails, and connections
 - The assessment engineer should review the egress structure to identify:
 - rot, cracks, settlement, rust or corrosion development, or any other signs of damage or distress;
 - protective paint deterioration;
 - deformation of joints;
 - missing pieces;
 - loose or missing connections between pieces;
 - apparent anchorage quality with respect to connections between the egress structure and the existing building wall or structure providing anchorage;
 - integrity of the hand rails, guard rails, and their respective attachments; and
 - overall integrity of the existing building wall or structure providing anchorage.

The checklist provided in [Attachment 1: On-Site Checklist for Structural Assessments of Exterior Means of Egress](#) is intended to be a useful tool to remind on-site assessors of typical items to be checked and inspected. The checklist is not a substitute for a properly completed assessment report, because it is not meant to be relied upon by clients. The completed checklist need not be delivered as part of the assessment report. Detailed and/or actionable results of the assessment must be conveyed via the signed and sealed assessment report.

During the review, if the assessment engineer observes general issues related to life safety and building egress—such as locked doors, obstructed egress routes, or inoperable equipment—the assessment engineer must inform the City of Vancouver of the existence of these potential life-safety issues using the contact numbers below. Such issues should also be immediately identified to the owner, but it is not expected that they be included in the structural assessment report.

CITY OF VANCOUVER CONTACTS FOR FIRE-RELATED ISSUES

- To report a fire EMERGENCY
 - Call 9-1-1.
- To report a fire issue that is URGENT but non-emergency, such as a blocked or locked fire exit, or fire alarm not working, or sprinkler system not working:
 - During business hours, call the Fire Prevention Office at 604-873-7593.
 - Outside of business hours, call 9-1-1 and ask for Fire Dispatch.
- To report a fire issue that is NOT URGENT and non-emergency:
 - Call 3-1-1.
 - Contact the City of Vancouver online via VanConnect: <https://vancouver.ca/your-government/tell-us-online.aspx>

REPORTING

As part of the initial structural assessment, the assessment engineer prepares, signs, and seals an assessment report to the owner, including, if applicable, follow-up actions for immediate attention.

The following items should be addressed in the report:

1. Site visit
 - Include relevant details, such as date, personnel involved, weather and lighting conditions, and encountered access issues
2. Condition assessment
 - Describe visual observations
 - Include results of non-destructive testing, if applicable
 - Include photographs of documented deficiencies
3. Analysis
 - Determine and describe whether or not the means of egress structure is an imminent hazard. If a means of egress structure component is determined to be structurally unsafe, the assessment engineer must immediately notify the City of Vancouver and the owner.
4. Recommendations
 - When applicable, the assessment engineer may recommend follow-up structural work such as the following:
 - Identification of components requiring repair, reinforcement, or replacement
 - Further testing (load testing) by a certified testing company
 - Verification of building wall connections by load test
 - Other invasive exploration (such as exposing hidden connection)
 - Review of the integrity of existing building wall
5. Provide coloured tag(s) to be placed on each of the means of egress in conspicuous locations above the ground (see Tagging Requirements below).

TAGGING REQUIREMENTS

After completing the assessment report and checklist, the assessment engineer must determine which of the following inspection tags is appropriate to affix to each of the exterior means of egress:

- Red tag = danger – do not use
- Yellow tag = use caution – repairs or further assessment required
- White tag = in good repair – substantially complies

The assessment engineer must obtain the inspection tag as found on the City of Vancouver website and is responsible for filling out, signing, and sealing the tag, and providing it to the owner of the building.

The assessment engineer should also offer as part of his/her services a sufficient number of durable (laminated) copies of the tags to meet the owner's display requirements. The owner is responsible for securely affixing tags to the exterior means of egress so they are visible at all times from the adjacent ground level. It should be noted that VFRS may look for tags during routine inspections of the property. Failure to appropriately display tags may result in a Notice of Violation of the Fire By-law being issued to the owner.

If a means of egress is tagged with a red tag, the assessment engineer should notify the owner that all building occupants must be advised of the unsafe condition of the means of egress, and the owner must provide an alternate method of fire safety. In consultation with VFRS, an alternate method of fire safety may be provided by the owner, such as a fire watch, among other measures. Notification to all building occupants of the unsafe condition may also mean cordoning off, and posting a copy of the red tag at all points of access to, the unsafe means of egress.

FOLLOW-UP STRUCTURAL WORK

With respect to follow-up work required to address deficiencies identified during a structural assessment, the resolution of the deficiencies and the follow-up assessment is outside of the scope of the initial structural assessment activities provided by the assessment engineer.

The assessment engineer must submit the assessment report to the owner, and must include in it mention of the identified items that require immediate attention. The owner may then elect to address deficiencies and/or conduct a follow-up assessment using an engineer (who may be called the "repair engineer") different from the assessment engineer who performed the initial structural assessment.

The repair engineer may provide the following services with respect to deficiency remediation or follow-up assessment:

- Consulting services to define the specific work tasks for follow-up work, including construction activities, based on the recommendations made in the assessment report
- For repairs, structural engineering services and acting as the engineer of record for the repairs
 - As the engineer of record, the repair engineer must meet the structural engineering obligations for design and field review for structural repairs of part 3 buildings
 - The owner may be required to obtain a permit for the repairs
- For detailed follow-up assessments, assessment services per the recommendations made in the initial assessment report

For repairs related to unsafe conditions (such as those requiring red tags), the repair engineer who completed the design and field review for the repairs must provide the owner with a report indicating that all deficiencies have been repaired, and must submit a copy as soon as possible to the City of Vancouver.

Once follow-up work has been completed, the repair engineer who was responsible for the work must issue an updated tag for the affected egress structure(s).

REFERENCES

City of Vancouver. 2019a. Fire By-law 12472. Vancouver (BC): City of Vancouver. [accessed: 2020 Feb 20]. <https://vancouver.ca/your-government/fire-bylaw.aspx>.

City of Vancouver. 2019b. Vancouver Building By-law 12511. Vancouver (BC): City of Vancouver. [accessed: 2020 Feb 20]. <https://vancouver.ca/your-government/vancouver-building-bylaw.aspx>.

LIST OF ATTACHMENTS

Attachment 1: On-Site Checklist for Structural Assessments of Exterior Means of Egress

VERSION HISTORY

VERSION NUMBER	PUBLISHED DATE	DESCRIPTION OF CHANGES
1.0	May 4, 2020	Initial version.
1.1	March 4, 2021	Minor changes to the description of tag colour interpretations

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ATTACHMENT 1

ON-SITE CHECKLIST FOR STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

ON-SITE CHECKLIST FOR STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

This checklist is intended to provide a list of typical items to be considered during the site visit portion of an exterior mean of egress assessment. This checklist is not intended to be a complete list of matters or issues requiring review nor is it intended to be a substitute for engineering expertise, knowledge, skill, or judgment when on site reviewing a specific (and likely unique) structure.

Professional engineers completing on-site reviews should always exercise their professional knowledge, skill, and judgment in taking all steps necessary in the circumstances to adequately complete the assessment of the exterior means of egress and issue the appropriate tag for the reviewed structure.

Note: Upon completion, this checklist is not to be relied upon as a complete record of the assessment and need not be delivered as part of the assessment report. Detailed and/or actionable results of the assessment must be conveyed via the signed and sealed assessment report.

ON-SITE CHECKLIST FOR STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

OCCUPANCY INFORMATION

Occupancy Name (optional): _____

Occupancy Address: _____

Building Point of Contact

Name: _____ Phone: _____

Address: _____

Email (optional): _____

Assessor

Name: _____ Phone: _____

Address: _____

Email: _____

ASSESSMENT INFORMATION

Date of Assessment: _____

Exterior Egress Location on Site / Identifier: _____

Exterior Egress # _____ of _____

ON-SITE CHECKLIST FOR STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

GENERAL OBSERVATIONS	CHECKED?	ACCEPTABLE?	COMMENTS
1. The assessor requested and received prior assessment reports related to exterior egress in the building.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2. The exterior egress is clear and unobstructed; e.g., no items such as AC units, window guards, plants, or satellite dishes are on the exterior egress.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3. No electrical lines or other unusual hazards are located on or within the exterior egress.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4. A sign is displayed and permanently posted on the exterior egress at the lowest edge of the lowest landing and is easily read at grade.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
PRIMARY SUPPORT STRUCTURE	CHECKED?	ACCEPTABLE?	COMMENTS
5. The exterior egress is painted and being maintained and protected from rust or rot.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6. Bolts and rivets are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7. Welds are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8. Nails and screws (wood) are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9. Stair stringers are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10. Treads, platforms, and landings are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11. Hand rails and guard rails are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

ON-SITE CHECKLIST FOR STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

PRIMARY SUPPORT STRUCTURE (CONT'D)	CHECKED?	ACCEPTABLE?	COMMENTS
12. Ladders are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13. Other structural members (as applicable) are in acceptable condition.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

ANCHORING DEVICES	CHECKED?	ACCEPTABLE?	COMMENTS
14. All anchoring devices to the building or at the exterior egress base are intact and show no visible rusting, corrosion, cracking, or other deterioration.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15. The support legs at grade are on concrete piers or are sufficiently connected at their base.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

COUNTERBALANCE AND LADDERS ON FIRE ESCAPES	CHECKED?	ACCEPTABLE?	COMMENTS
16. The counterbalance and ladder/stairs are balanced and operational.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17. The counterbalance and ladder/stairs were dropped and stayed down, at grade, when activated and/or released, requiring no special knowledge and allowing for unrestricted access to a public way.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18. All counterbalance and ladders/stairs were tested to ensure smooth operation of all releases and mechanisms.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19. The ladder extends to a point where the lowest rung is not more than 305 mm above the ground.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

SIGNATURE (OPTIONAL)

Signature of Assessor: _____ **Date:** _____

Signature of Building Point of Contact: _____ **Date:** _____