BUILDING PERFORMANCE

Field Guide: Rapid Building Assessments

All event types

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Acknowledgments

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Document history

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In this guide

Introduction and Scope

The objective of a rapid building assessment is to quickly establish the usability of buildings and associated infrastructure where functions may be compromised by a hazard event.

Hazard events include earthquakes, floods, landslides, rock-fall, volcanic eruptions, severe weather, tsunami, fire, or any other natural hazard event that may have life safety consequences.

The scope of this field guide covers the rapid assessment of buildings carried out either:

- during a state of emergency or transition period declared under the *Civil Defence Emergency Act 2002* (CDEM Act); **and/or**
- within an area designated under the *Building Act 2004* (the Building Act) for the emergency management of buildings.

Rapid building assessments conducted under the Building Act are specified under section 133BQ of the Building Act: www.legislation.govt.nz

Rapid building assessments quickly establish the usability of buildings and associated infrastructure where functions may be compromised by a hazard event such as an earthquake or flooding. The focus of rapid building assessments is on **immediate public safety**. They do not provide an engineering assessment service to building owners.

Quantified assessment of building damage is necessary to determine reconstruction programmes and resource requirements for repair, and to assess how long recovery may take. Such detailed assessment is outside the scope of this document.

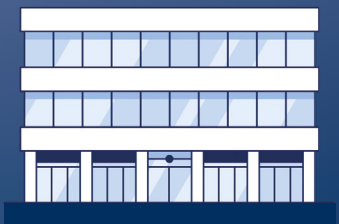
Key terms	Definition
Building Response Manager	person authorised to lead a territorial authority's rapid building assessment operation.
CDEM	Civil Defence Emergency Management.
CIMS	Coordinated Incident Management System. All New Zealand emergency response agencies are mandated to use CIMS as the incident management framework.
Designation	a designated area is an area approved by the relevant decision maker to allow a responsible person to take specific actions under subpart 6B of the Building Act to manage buildings in an emergency.
Emergency	from section 4 of the CDEM Act 2002: a situation that is the result of any happening, whether natural or otherwise that causes or may cause loss of life or injury or illness or distress or in any way endangers the safety of the public or property in New Zealand.
Emergency Coordination Centre (ECC)	facility that operates at the regional CDEM Group level to coordinate and support one or more Emergency Operations Centre (EOC) that are activated in response to an emergency.
Emergency Operations Centre (EOC)	facility that operates at the local territorial authority, unitary authority, or agency level and is used to manage the response to an emergency.
Rapid building assessments	post-event building assessments undertaken either under the CDEM Act 2002 or section 133BQ of the Building Act.

Table 1: Key terms

Key terms	Definition
Rapid Building Assessor (RBA)	person authorised to undertake rapid building assessments.
Rapid Building Assessor Tiers	MBIE trained and registered Rapid Building Assessors according to technical competencies and practical experience: • Tier 1 Technical Leads • Tier 2 Team Leaders • Tier 3 Assessors.
Rapid Impact Assessment (RIA)	assessments undertaken within the first 8 to 48 hours of an emergency, usually by emergency services and/or CDEM Group staff.
State of emergency	a state of national emergency (declared under section 66 of the CDEM Act) or a state of local emergency (declared under section 68 or 69 of the CDEM Act 2002).

Table 1: Key terms

1 Pre-Deployment



Rapid building assessments are a brief initial assessment that are conducted to ensure the safety of building occupants and the public.

1.0 Pre-Deployment

This section provides information on:

- the purpose of rapid building assessments
- rapid building assessment operational structure
- inductions and briefings and assessor authorisation
- Rapid Building Assessor team composition
- working as a member of a team
- Rapid Building Assessor checklist – resources and equipment
- important contacts

Rapid building assessments are intended to quickly establish the usability of buildings and infrastructure potentially compromised by a natural hazard event. They are a brief initial assessment that is conducted to ensure the safety of building occupants and the public. This assessment will identify if the building is safe to remain in.

While the purpose of a rapid building assessment is to assess risk and usability of a building, there are other considerations for you to take into account as a RBA, including:

- minimising displacement of people from their homes where possible
- minimising impact on commercial activity where possible
- conserving heritage fabric where possible.

RBAs are not first responders, and you should ensure sufficient operational precautions have been undertaken by the leadership of a rapid building assessment operation before deployment into the field.

1.1 Rapid Building Assessment Operational Structure

The functional structure for each rapid building assessment operation will be determined by the Building Response Manager for the territorial authority where the operation is taking place.

Aotearoa New Zealand uses the Coordinated Incident Management System (CIMS) structure to manage emergencies. Some standard roles during an RBA operation are as follows:

Building Response Manager: the person who leads a territorial authority's rapid building assessment operation.

Deputy Response Manager: assists the Building Response Manager in the management of the rapid building assessment operation.

Planning & Intelligence: responsible for planning rapid building assessment operational activities, collects and analyses information and produces intelligence for the operation.

Logistics: responsible for the organisation of personnel, equipment and resources to support the operation.

Health & Safety: responsible for advising on measures to minimise risks to personnel involved in a rapid building assessment operation.

Rapid Building Assessment Sector Leads: responsible for leading rapid building assessment teams, usually in a specific geographical or technical sector.

Not all the roles above will be present in every operation, and in larger operations there may be additional roles such as technical advisors and recovery managers and planners.

1.2 Induction, Briefing and Assessor Authorisation

Every RBA should be inducted and briefed before entering the field.

At your allocated assembly point, you should ensure you have been checked in and had your presence and necessary details registered with the appropriate Logistics personnel, and that you have been provided with any personal protective equipment (PPE), accommodation, and other required resources prior to deployment.

If you are not directly employed by the relevant territorial authority, you will need to be authorised by the responsible person before beginning assessments. The entity who is organising your deployment (eg your own territorial authority, employer or MBIE) should ensure pre-populated authorisation forms are sent to the receiving entity who then ensures the correct authorisation is completed and recorded. If unsure, please ask the territorial authority for a copy of the authorisation form during your induction/briefing (a sample form and guidance is provided in the Appendix of this field guide: **page 112**).

You should then ensure that you are provided with an incident-specific health and safety induction that addresses incident specific hazards and controls to manage them.

A pre-deployment briefing should cover the following:

The area of operations assigned to your team and your broader sector unit (if applicable)	This should include a team ID, a map of your allocated area(s), and any lists of addresses for buildings assigned for you to assess.
Operational pacing expectations	Duration of shifts, expected average times to complete assessments.
Contact details	For operational leaders, specialists, and any relevant support services.
Identified incident-specific hazards and controls	Used to minimise risk.
Expected communication channels and standing protocols	Especially if communications are disrupted.
Details of other emergency management personnel	Others likely to be encountered in the field.

Each subsequent day before being deployed with your team, a daily briefing should also be delivered by the Building Response Manager or delegated representative.

The daily briefing will provide updates on the current status of the event and the rapid building assessment operation, as well as any new or altered operational processes to be followed (such as hazards and risk management or approaches to placarding).

Operational debriefs should also take place daily, which should include, where possible, a review and moderation of placard decisions, and discussions of risks and issues encountered in the field.

1.3 Rapid Building Assessor Team Composition

As an RBA, you should be deployed in at least a two-person team for your safety.

Teams can be larger if resources allow or there is a higher level of risk while undertaking assessments (ie working in a dense commercial area affected by an earthquake).

If the rapid building assessment operation is particularly large and has been divided into sectors, your team will likely be grouped together with several other teams as a sector unit under the command of a Sector Lead who you will report directly instead of the Building Response Manager.

In some situations, your team or sector unit may be co-deployed with other specialist personnel that you would be expected to work with to mitigate particular risks or manage special cases. Examples of these include:

- **Urban Search and Rescue (USAR)** personnel to mitigate chance of exposure to building collapse
- **Drone operators** to fly reconnaissance drones to assist with building assessments
- **Welfare specialists** to talk to affected members of the public or the homeowner while assessors focus on building assessments
- **Heritage specialists** to contribute to management of affected heritage buildings.

In all cases where RBA teams or units are co-deployed or end up working together in the field, all personnel are expected to operate together in a collaborative and safe manner. If any issues emerge, these should be notified back through the appropriate command channels to resolve.

1.3.1 Working as a Member of a Team

It is important that the roles within each RBA team are clear from the start. Teams must agree on each team member's responsibilities before being deployed in the field. Consider using a checklist to make sure that the various tasks are covered. Typical tasks include:

- assessing various building aspects
- filling out the assessment form
- posting the placards
- placing barrier tape
- taking photos
- communicating with owners or occupants who are present
- communicating with the emergency operations centre.

For safety, RBAs should always work in a team and stay together, rather than split up.

Contacts:

You should expect to receive a list of contact details at the daily briefing. Remember to take the list with you.

If you have any questions or issues on deployment as an assessor, contact the MBIE Building Emergency Management Team: BEM@mbie.govt.nz

1.4 Rapid Building Assessor Checklist

These resources should be supplied by the relevant territorial authority during your initial briefing:

- [ ] Briefing sheets with all necessary information, such as reporting requirements, contact points, communications arrangements
- [ ] Information handouts for building occupants
- [ ] Assessor identification (if assessor does not have a MBIE-issued ID as a registered RBA)
- [ ] Assessor authorisation
- [ ] Field guide(s)
- [ ] Cell phone (or other means of communication)
- [ ] Camera
- [ ] Assessment forms – digital and/or paper forms
- [ ] Tablet or other electronic device (when using digital assessment forms)
- [ ] Placards, duct tape, indelible marker pens (use thin-tip permanent markers for writing placards)
- [ ] Waterproof bag/cover for assessment forms and/or tablet
- [ ] Security cordoning or barrier tape
- [ ] Tape measure
- [ ] Street maps
- [ ] Aerial photographs and building-specific information
- [ ] Food and water

Personal Protective Equipment (PPE)

- [ ] High visibility vest/jacket
- [ ] Hard hat
- [ ] Protective glasses/goggles
- [ ] Torch and batteries
- [ ] First aid kit
- [ ] Other personal protective clothing such as gloves, dust masks, wet weather gear

To be supplied by assessor

- [ ] Proof of identity (eg MBIE-issued RBA ID card)
- [ ] Steel-capped boots
- [ ] Travel pack with sleeping bag, warm clothes, rain jacket, toothbrush etc.

2 Safety and Welfare

Emergency management operations are generally a marathon rather than a sprint.

2.0 Safety and Welfare

This section provides information on:

- mental health and wellbeing
- field safety
- preliminary hazard assessments in the field
- electrical safety after flooding
- entry into damaged buildings
- dealing with homeowners and occupiers
- dealing with emergencies
- dealing with the media

2.1 Mental Health and Wellbeing

Everyone who goes to work should go home safe and healthy, both physically and mentally.

All organisations have a responsibility under the *Health and Safety at Work Act 2015* to ensure they provide a workplace which looks after the mental health of staff. Rapid building assessment operations are often intense experiences that can include long hours on your feet and challenges unlikely to be encountered in daily life.

All RBAs need to take particular care to monitor their wellbeing and speak up and obtain support when they feel that they are reaching their physical and/or mental limits.

Emergency management operations are generally a marathon rather than a sprint, and personnel pushing themselves or being pushed too hard can endanger themselves, their colleagues, the public and the operation. Look after yourself and your colleagues.

Considerations

- Recognise that the role of an RBA can be a hard and tiring undertaking that can have both immediate and delayed impacts on your mental wellbeing.
- Encourage and support your team-mates. For example, you could develop a buddy system with a colleague and keep an eye on each other.
- Try to recognise when you and your colleagues (especially in your direct team) have reached your limits.
- Watch out for signs of fatigue such as headaches, loss of concentration and focus, increased irritability, and similar symptoms of stress.
- Take opportunities to eat proper meals, keep hydrated, take regular breaks, and try and get a good sleep.
- Make good use of standdown periods after several consecutive days of operation and/or particularly intense experiences to avoid burnout. Operational command should also ensure these standdown periods are delivered for all personnel.
- Seek extra support if things become overwhelming, for example talking to someone you trust. This can help provide perspective and relief from stressful thoughts arising from experiences during a rapid building assessment operation.

Remember that external help may also be available through your workplace Employee Assistance Programme (EAP), Red Cross, Salvation Army, or through a Ministry of Social Development representative.

Don't wait for a situation to deteriorate. Ask for help early. This will help both you and your colleagues and contribute to a successful rapid building assessment operation.

2.2 Field Safety

After a hazard event, many areas around buildings as well as the buildings themselves may be dangerous from potential collapse, falling debris, damaged services, insanitary conditions, landslides and other hazards. Rapid building assessment is inherently a dangerous activity, so assessors need to be able to identify and mitigate risk.

Situational awareness for RBA teams means maintaining sufficient alertness and perspective of the surroundings your team is operating in and having pre-established means of reaching safer areas in the event the risk from a hazard escalates. Good situational awareness is achieved by paying attention to details from briefings, taking the time to assess and maintain awareness of your surroundings while in the field and not rushing your work, and knowing when to remove yourself and your team from a situation or change your approach in response to a potential or actual risk.

General tips

- always work in a team while undertaking rapid building assessments – never go out in the field by yourself
- ensure you check-in and check-out each day in the field, and that your movements are able to be tracked for your safety and the safety of your colleagues and the public
- take care of yourself and your team members: watch out for signs of fatigue such as headaches, loss of concentration, increased irritability and signs of stress.

The personal safety of RBAs is of paramount importance, and all personnel should feel comfortable to stop what they are doing and report any issues or concerns if they feel there is a risk to their safety, the safety of other personnel, or the public that requires more controls to be in place before proceeding.

Field safety tips

In the field, be alert to hazards not just from the building(s) being assessed, but also from neighbouring buildings and from the surrounding environment.

Avoid these situations:

- doing assessments alone
- travelling next to buildings or under canopies – if roads are closed to public traffic, consider travelling down the centre of the road
- areas where a hazardous substance may be present, or a gas leak may be possible. If you smell gas, shut off the gas if you can do so safely and cordon the area
- downed power lines and any buildings in contact with them
- contamination from biohazards such as sewage.

There are many possible hazards and risks not listed here. RBAs must always be alert to the hazards presented by the environment they are faced with.

Follow this safety advice:

- **look up as well as ahead.** Be alert to falling debris from buildings, hills or escarpments
- evacuate the area if fire breaks out
- be careful after earthquakes/aftershocks – if you are outside, move away from buildings or other falling hazards. If you are inside, do not run out of the building until the shaking has stopped.
- ensure that you and other team members receive appropriate food and water, eat regularly, take a rest period, and attend a debrief at the end of the day.

2.2.1 Preliminary Hazard Assessments

As a team, before approaching a building for an assessment, you must take the time to scan the immediate area around the building for any hazards or risks. This includes:

- checking the immediate site is stable
- checking that adjacent buildings or structures are not at risk
- checking that there is no apparent risk from adjoining land, especially land above the site
- there are no other obvious risks that should prevent you from approaching the building (eg chemical or contaminant risk, downed power lines)
- always assume that debris and flood water (and therefore silt) is contaminated with farm run-off, chemicals, or sewage. Take precautions (eg use gloves and dust mask) if silt is present.

You may need to adjust your assessment strategy or approach to reflect the potential risks or hazards on the site at the time of your visit.

Electrical safety after flooding

There can be almost as much electrical risk in the aftermath of a flood as there is during the event itself. Take the time to consider the following hazards or risks:

- make sure the property is safe before you approach or enter. Obvious signs such as electrical arcing, a burning smell, or submerged socket outlets could indicate the property may not be safe.
- if there is standing water near electrical equipment, do not walk through it or touch it. The water may be electrically charged and can be dangerous. If you notice water around electrical outlets or switches, avoid touching them, as water could be conducting electricity.
- check if a building has solar photo-voltaic (PV) systems. Even if the network supply is turned off, solar PV systems will continue producing voltages and the PV cells and associated wiring will be live.
- contact your local electricity lines/network provider or call 111 if you see any exposed underground cabling or any potential danger that could be caused from damage to overhead lines.

Land instability/geotechnical damage

If you are in an area that has been affected by land instability:

- stay away from any areas impacted by a landslide or rockfall – more may occur
- check for slips, slip material contained upslope, tension cracks above the subject site, uneven ground or debris
- check for damage to power, gas, water and sewage lines.

2.2.2 Entry into Damaged Buildings

It is important to note that you **do not need to enter a building** to do a rapid building assessment. An internal inspection may be as simple as a look through the windows to check for internal damage. If you do decide to enter a building, take careful note of any damage you can see, and the risk of further damaging events like aftershocks. Always survey the building exterior first. Pay attention to and consider any USAR markings (see **page 21**).

If you believe it is necessary and safe to enter a building:

- designate a safety person to remain outside to raise the alarm if necessary
- maintain at least one clear exit at all times
- treat all services as live, and assume any water encountered is contaminated by sewage
- wear a safety mask – any pre-2000 building may contain asbestos
- use a torch to illuminate the way and watch out for trip hazards.

Urban Search and Rescue (USAR) markings

Collapsed or partly collapsed buildings may already have been marked by Urban Search and Rescue (USAR) teams. The marking would usually be located on the exterior of the collapsed structure near the point of entry that offers the best visibility. Consider these markings when deciding whether it is safe to enter a building.

If the marking contains 'No Go' or 'NG', **do not enter** under any circumstances.

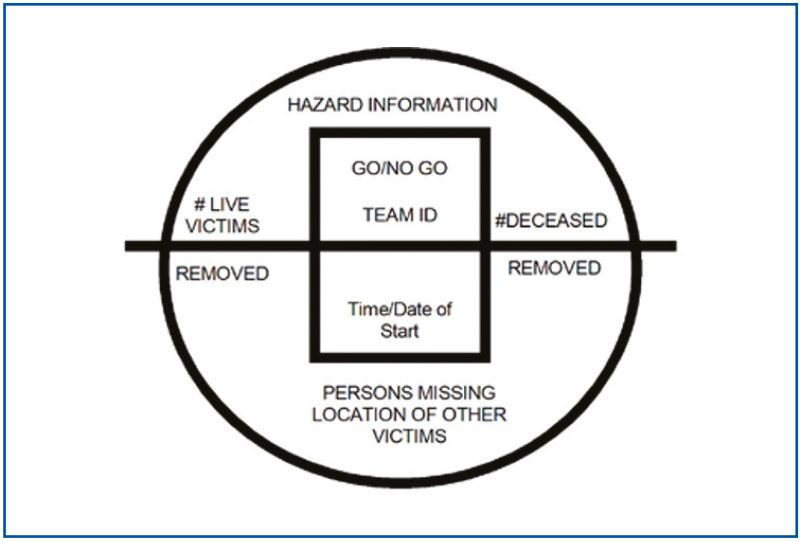


Figure 1: An example of a USAR marking

2.3 Dealing with people

Working in a post-disaster environment will inevitably create some tense situations, especially with the occupants and owners of damaged buildings.

Many people you will encounter will be in a state of distress and uncertainty. They may have lost family members or friends. Losing access to their home or business will add significant pressure.

Remember to stay rational in your decisions, while showing empathy when communicating with affected people. An effective way to split roles in your team is for one of you to focus on the technical assessment while the other deals with the people involved (eg a welfare team member).

The territorial authority should provide consumer-friendly public information sheets that will answer common questions about placarding and what to do next and give important emergency support contacts. Information sheets should be left on site (in the letter box for example) or handed to the owner or occupant if present.

Note: all placards have a QR code that directs homeowners and occupiers to MBIE's building emergency management website pages at www.building.govt.nz, which provides information on the rapid building assessment system.

QR code

As a potential first point-of-contact, you may need to refer building occupants to a range of services. You should be provided with communication material such as handouts that provide information on services, including:

- food and water supply
- social wellbeing and medical services
- welfare centres and contacts for alternative accommodation
- sanitary facilities and requirements
- contact details for a call centre to answer further queries.

Make sure that you follow the allocated assessment schedule and do not give way to public pressure to reprioritise the order of buildings to be assessed or to change the result of a rapid building assessment without a defensible reason.

Note: Where it is necessary to post a red 'UNSAFE' placard, make sure to explain the reasons for this (eg collapse hazard) to those affected.

2.3.1 De-escalation Techniques

Some building owners or occupants may be suspicious, angry and/or reluctant to cooperate. Here are some tips to de-escalate a potentially hostile situation:

- acknowledge the concerns and anxieties of the owner/occupier
- speak slowly and keep the information simple to ensure the individual can understand and respond
- clearly explain the purpose of the placarding, the implications for the owner/occupier and the process for changing the status of placards
- check your understanding, repeat what you've heard back and check it is accurate. Ask them to repeat if necessary
- explain and discuss options and next steps. Use facts and evidence not opinion.

Do not put yourself or team members in harm's way. If a situation escalates, withdraw and contact your team leader or your Building Response Manager.

2.3.2 Dealing with Emergencies

If there are immediate serious dangers to health and life of the public and no appropriate help is available (Urban Search and Rescue, NZ Fire Service, Police, etc.), you may manage the danger situation and also provide first aid if required. Always put your own safety first.

For basic first aid procedures, see the **First Aid** section of this guide.

2.3.4 Dealing with the Media

RBAs should not give any information to the media. If media do approach you, refer them to your Building Response Manager, Public Information Management (PIM) Lead or the territorial authority's call centre.

3 Placarding System

Rapid building assessments should result in a white, yellow, or red placard being issued, which will correspond to the observed damage.

3.0 Placarding System

This section provides information on:

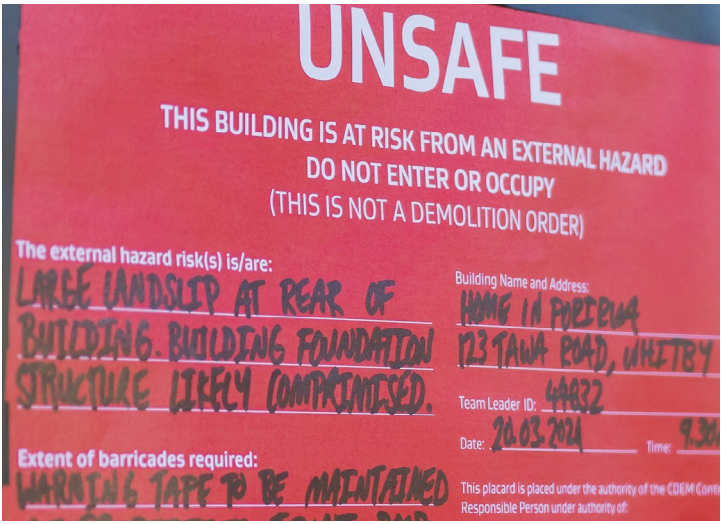
- placard types – white, yellow and red
- how to post placards
- placarding principles
- criteria for issuing placards after an assessment
- assigning the right placard – some examples
- changing a placard
- reassessing a placard
- cordons, barricading and barrier tape

3.1 The Placards

Rapid building assessments should result in a white, yellow, or red placard being issued, which will correspond to the observed damage.

Observed Damage	**Assessment Outcome** (Recorded on the assessment form)	**Placard Issued**
Light or no damage (low risk)	**W=CAN BE USED** No immediate further evaluation required	**CAN BE USED** (WHITE)
Moderate damage (medium risk)	**Y1=RESTRICTED USE TO PART(S)** No entry to part until risk reduced by repair or demolition	**RESTRICTED ACCESS** (YELLOW)
	Y2=USE RESTRICTED TO SHORT TERM ENTRY Entry with or without supervision to obtain personal effects	**RESTRICTED ACCESS** (YELLOW)
Heavy damage (high risk)	**R1=ENTRY PROHIBITED** Significant damage	**ENTRY PROHIBITED** (RED)
	R2=ENTRY PROHIBITED At risk from external factors such as adjacent buildings or ground failure	**ENTRY PROHIBITED** (RED)

Table 2: Placard types



Posting placards

Placards should be filled out using a thin-tip permanent marker pen (biros will fade) and be securely fixed at a clearly visible location near the entrance of the building. If there is more than one entrance to the building, placards should be fixed at each entrance. Take a photo of the posted placard(s) as a record.

With buildings that have multiple units/offices and different entrances, it is important to ensure that you placard all obvious entry points. It is recommended that where a placard cannot be easily seen on the main approach to the building, such as a long driveway, a second placard should be affixed to the letterbox or entry gate.

Ensure that every placard is filled out with specific information about the identified hazards and restrictions on use or occupation.

Important: A clear photo of the posted placard must be recorded as part of the assessment process.

Placarding principles

The Building Response Manager or leader of the assessment operation should provide assessors with some guidelines to follow regarding the decision-making process for placarding to ensure that placarding decisions are consistent and are appropriate. This will depend on the type of hazard event, the scale of the event and the risk of future events.

Examples where a general approach or guidelines for placarding could be provided to assessors could include:

- assessing fallen roof tiles after severe wind (eg tornado event)
- assessing water levels in relation to height of electrical sockets and exposure times
- assessing floodwater depth and moisture checks on wall framing around water and wastewater systems.

Unnecessarily conservative placard decisions will mean that building occupants will have to seek shelter elsewhere. On the other hand, people should not be exposed to unnecessary risk. Daily debriefs should revisit placarding decisions taken by assessment teams during that day and guiding principles/business rules adjusted as required. If in serious doubt about a placard decision, seek additional input from your team or team leader.

Silt after a flooding event

Silt can cause structural and ground damage to a building. The foundations of a structure can be affected by silt in a number of ways:

- silt can block subfloor vents that help to keep the subfloor dry
- silt can trap moisture in framing such as piles, bearers or joists. This can lead to rot or damage
- silt and water loading can dislodge walls and floors
- silt build-up can prevent water draining away from the building leading to ponding against building elements, which in turn can cause damage
- building systems such as plumbing, water, drainage, heating and cooling may be affected either due to blockage, overloading or damage to component parts which can have long-term effects on the building.

If silt build up is present during an assessment, you must note this on a placard, including instructions that sub-floor silt must be cleared. While a building with silt build up could potentially be used (eg a white placard), if the silt is not cleared away, mould can grow and cause a significant risk to the occupant's health. In these situations, a reassessment and a placard upgrade (ie to a yellow or red placard) may be required.

CAN BE USED

NO RESTRICTIONS ON ACCESS

A VISUAL RAPID BUILDING ASSESSMENT

This building has undergone a rapid building assessment during or following an emergency and no significant hazards have been found. This does not mean the building is completely safe or has suffered no damage.

The following items have not been inspected:

- **Utilities (electrical, gas, water, sanitary facilities, etc)**
- **Secondary elements (ceilings, windows, fittings, etc):**

Next steps:

- **The owner should organise a detailed building inspection**
- **Report any unsafe conditions to local authorities**

CAUTION: FUTURE EVENTS MAY CAUSE MORE DAMAGE THAT MAY CHANGE THIS ASSESSMENT.

Building Name and Address:

Scope of Rapid Building Assessment:

☐ Inspected Exterior Only

☐ Inspected Exterior and Interior

Team Leader ID: _____

Date: _____ Time: _____

This placard is placed under the authority of the CDEM Controller or other Responsible Person under authority of:

☐ Section 133BT of the Building Act 2004 or

☐ Civil Defence Emergency Management Act 2002 (tick applicable box)

Further information:

- **building.govt.nz/placards**
- For enquiries about this event: _____

DO NOT REMOVE, ALTER OR COVER THIS NOTICE

White CAN BE USED placard

3.1.1 Placarding Criteria – White (CAN BE USED)

A 'CAN BE USED' placard indicates that no damage has been observed that increases the risk to public safety for use or occupancy of the building.

This placard means: occupancy and use is permitted with no restrictions. In general, this means:

- vertical load capacity not significantly reduced
- lateral load capacity not significantly reduced
- no falling hazards present
- no evidence of ground instability
- main exits and egress ways within the building are useable
- no sewage contamination observed
- no other unsafe conditions observed
- flood waters have not reached underside of flooring.

Observed damage that does not increase the risk to public safety might include:

- cracks in plaster on exterior walls that do not create falling hazards
- non-structural elements that have fallen completely so that there is no further falling hazard (such as a chimney)
- loss of services that do not cause a safety risk, for example plumbing or potable water supply.

Even if a building has received a 'CAN BE USED' placard it also means that:

- electrical and mechanical equipment, water and energy supplies and sanitary facilities may not have been inspected
- subsequent aftershocks, landslides or other events may warrant a reassessment and a change in placard.

A white placard should disregard any temporary repairs. For example, if someone has carried out temporary securing works to enable reoccupation, this would not be enough to lead to a white placard. The reason for this is that the placard may stay in place even if someone removed the temporary repairs. So, the assessor should assign a yellow 'RESTRICTED ACCESS' placard to buildings with temporary securing works, stating that continued use of the building may be permitted, provided that the temporary securing works remain in place.

'CAN BE USED' does NOT necessarily mean SAFE.

If the majority of the buildings being assessed in your assigned area are being issued white placards, call your Building Response Manager or leader. You may need to be reassigned to a different area that may be a higher priority in terms of potential damage to buildings.

Yellow Y1 RESTRICTED ACCESS placard

3.1.2 Placarding Criteria – Yellow (Restricted access)

A yellow placard can be the most difficult to assign, because it covers the area where assessments are more subjective. This placard indicates that the building requires some restriction on its usage.

Two types of restriction are possible:

Y1 Restricted access – to part(s) of the building only

Use this placard to restrict access to part(s) of the building only if:

- entry needs to be prohibited into certain rooms or portions of a building (eg falling hazard) that does not threaten the rest of the building
- use of the water supply needs to be prohibited if subjected to contamination.

Restrictions on use must be clearly identified on both the assessment form and the placard. Unsafe areas must be clearly marked off with barricades, barrier tape and signs. Further actions to reduce danger in and around the building may also be identified in the assessment form and placard.

Yellow Y2 RESTRICTED ACCESS placard

Y2 Restricted access – short term entry only

Use this placard to prohibit entry, except on short term essential business to part or all of the building for emergency purposes. These may include:

- removal of essential business or legal records
- removal of valuables or property
- short term entry for assessment or repair.

In some buildings, the observed damage may pose significant risks for people without appropriate expertise. In those buildings, short-term access may only be permitted under supervision by a person authorised by the territorial authority. This may be a CPEng registered engineer, or any other person deemed suitable by the territorial authority.

Restrictions on use must be clearly identified on both the assessment form and the placard. Unsafe areas must be clearly marked off with barricades, barrier tape and signs. Further actions to reduce danger in and around the building may also be identified in the assessment form and placard.

Other restrictions can be noted on the placard. Examples of 'other' types of restricted entry could be:

- restricted to day-time hours only because there is no working emergency escape lighting
- restricted occupancy (number of people allowed in the building at one time).

Restrictions on use:

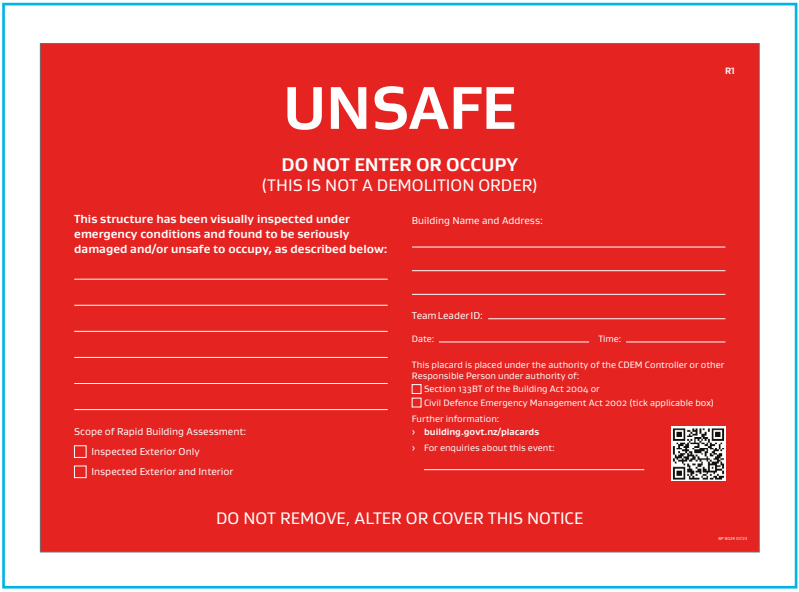
☐ **Removal of essential documents/valuables only**

☐ **Removal of property**

☐ **Other** _____

These types of restrictions must be clearly specified on the placard. These placard decisions should be reported and peer-reviewed to ensure risk to health or life has been appropriately identified and managed by the placard's restrictions.

If only parts of the building could be assessed, and the condition of unassessed parts is unknown, these details must also be clearly stated on the assessment form and placard. In most cases, unassessed areas should be restricted from access and marked and cordoned off accordingly.



Red R1 UNSAFE placard

3.1.3 Placarding Criteria – Red (Unsafe – do not enter or occupy)

A red 'UNSAFE' placard indicates that the building or parts of the building are damaged to a degree that it may pose a danger for entry and occupation. Two types of red placard are possible:

R1 Unsafe – significant damage to building

Use this placard to prohibit entry to a building that has been severely damaged. A building with a red placard means that entry could result in risk to health or life.

Typical structural factors that may make a building unsafe include:

- building or storey significantly leaning
- total or partial collapse of walls or roofs
- severe damage to structural columns or beams with large cracks or exposed reinforcing
- severe spalling or buckling of walls, significant inter-storey movement apparent
- significant damage to the foundations.

Red R2 UNSAFE placard

R2 Unsafe – at risk from external hazard

Use this placard to prohibit entry to a building at risk from an external hazard or hazards.

Typical external hazards that may make a building unsafe include:

- neighbouring building in danger of collapse
- risk of rockfall or landslides
- potential for flooding due to damaged dams or levees
- other risks caused by the building's environment such as trees or sink holes
- gas leaks, severed or exposed power lines
- significant crack(s) in the ground next to or under the building.

Note: A red placard does not necessarily indicate that demolition is required.

3.1.4 No Placard Required Option

Where multiple buildings or specific areas within your assessment zone are not affected or damaged, it may not be necessary to assess each one and issue a white placard (for example, where there is no evidence of damage in an entire street that had been allocated for assessment). To save time and provide a record for reporting purposes, a 'No Placard Required' status can be used if the digital assessment tool used allows for this option.

A 'No Placard Required' option is generally used where rapid impact assessments have not been carried out. Using this option can reduce the likelihood of unnecessary duplication of assessments and also provide information for ongoing enquiries. The Building Response Manager will provide guidance or business rules on when this option should be used.

A 'No Placard Required' decision can be made in areas where it is clear that there is no significant damage to buildings (eg all white placards in an assigned street or area) AND the digital assessment tool has an option to record a 'No Placard Required' status.

3.1.5 Multiple Placards on a Building

In almost all cases, one building should usually only receive one placard. However, there may be instances where you would need to issue different placards on one building. For example, for a building with multiple units where a potential collapse of a neighbouring building may impact some parts of a building, red placards may be issued for those units that are at risk from the potential collapse, while other parts of the building that are not exposed to the same amount of risk may receive different placards (eg white or yellow). In the absence of separate addresses, a clear building description must be recorded for each placard issued.

3.1.6 Assigning the Right Placard – Some Examples

Assigning a placard can be a difficult decision. Although you are aiming to minimise risk to occupants and the public, you also need to avoid imposing unwarranted hardship on owners and occupants of damaged buildings when deciding on the placarding of buildings.

The table below provides some examples of possible placard decisions:

Placard type	Situation
White 	Cracking of lightweight partition walls
	Loss of water supply
	Fallen roof tiles but no other falling hazard present (for more widespread roof damage, a yellow placard may be more suitable)
	Complete fallen chimney – no other falling hazards present
Y1 Yellow 	Chimney collapse in roof space of living room only
	Structure subject to further degradation but global collapse unlikely
	Back part of building damaged or at risk from a landslip
	Bottom storey (eg garage) may be flooded but upper storey(s) are safe for occupants to use
Y2 Yellow 	Damage suspected but unable to observe primary structural elements
	Contamination of water supply bore by flood waters
	Signs of movement at foundation level/signs building moving off foundations (could also be a red placard)

Placard type	Situation
R1 Red 	Significant lean in building or storey
	Significant foundation damage
	Significant falling hazards – damaged chimneys of parapets in danger of collapse
	Total or partial collapse of walls or roofs
	Severe damage to structural elements resulting in low residual capacity (eg structural beams or columns with large cracks)
R2 Red 	Risk of landslide, rockfall or neighbouring building collapse
	Gas leaking, severed and exposed power lines
	Contamination of building by sewerage inundation

Table 3: Examples of possible placard decisions

3.1.7 Changing Placards

Sometimes a placard may need to be changed. Examples where a placard may need changing include:

- to correct an oversight, mistake in judgment, after a second opinion, or after a review of placard decisions
- after a Level 2 assessment
- after an engineering assessment
- after a geotechnical assessment
- after a secondary event (eg a significant aftershock, more rain/flooding).

In these scenarios, the initial placard should be removed and replaced with a new placard and new inspection date to show that the building has been reassessed, even if the assessment result remains unchanged.

The table below outlines some scenarios where a placard may need to be changed to a more restrictive placard (ie from yellow to red) or to a less restrictive placard:

Changing to a more restrictive placard	Changing to a less restrictive placard
Previously unobserved damage has been found, or the territorial authority believes that an engineering report or second opinion is warranted.	An engineer may re-evaluate a building after temporary repair or securing work and recommend a change in placard status in writing to the territorial authority.
Additional events have increased the risk. For example: • aftershocks have significantly worsened the condition of the building • further degradations of ground stability have been observed.	A hazard or risk initially identified during assessment has now lessened or no longer exists (eg water levels have receded, or electrical/gas issues rectified, or an alternative water supply has been made available), so a placard may be changed by an assessor to reflect the remaining hazard/risk. This scenario would likely require a reassessment.
As part of **ongoing quality assurance reviews** of placarding decisions, the Building Response Manager may recommend changing some placards where there was an inconsistency in decisions, or the original risk/hazard is worse than initially thought.	As part of ongoing quality assurance reviews of placarding decisions, the Building Response Manager may recommend changing some placards where there was an inconsistency in decisions, or the original risk/hazard has lessened.

Table 4: Changing placard examples

Placard after a geotechnical assessment

There may be cases where both a rapid building assessment and a geotechnical assessment are completed on the same property. The rule of thumb is that the last placard to be assigned is the one that remains. For example, a rapid building assessment can be completed on a building and a white placard initially issued, as no significant structural hazards were observed. Two days later, a geotechnical assessment is carried out on the land surrounding the property. The geotechnical engineer assessed that the back part of the building was at risk of a landslip to the rear of the property and allocated a yellow 'RESTRICTED ACCESS' placard as a result. This yellow placard takes precedence, and the initial white placard would be removed and recorded in the 'existing placard' field of the geotechnical assessment form.

Only an RBA properly authorised to undertake an assessment under the CDEM Act or the Building Act (as relevant) can change a placard.

3.1.8 Removing Placards

A placard cannot be removed once issued without authorisation. It can only be changed to a different colour as described in the above section or removed once a reassessment has been conducted following repair or remediation work. Some territorial authorities may choose to specify an expiry date for the white placards they issue, which means they can be removed by the building owner after they expire.

Reassessing Placards

A reassessment of a building subject to a placard will examine the building post-repair against the risks noted in the original placard decision and any other relevant information. Reassessments must be organised through the relevant territorial authority, who will require evidence that the identified repair works have been completed on the building. The territorial authority will review the evidence and decide if the placard should either be downgraded or removed entirely.

Where conducting a reassessment, remember: a placard colour is a reflection of the risk caused by the event.

3.1.9 (Re)assessing a Building that already has a Placard

If you are assigned a building to assess and find that it already has a placard, or you have been assigned to reassess a placarded building, you should:

- read the placard – what was the original hazard(s) identified, and are those hazards still present?
- if the circumstances remain unchanged, assign a new placard of the same colour, with new assessment date and details
- if the circumstances have changed (eg risk has now reduced), assign a different placard with new date and details, and remove the original placard.

Rapid building assessment forms have a field to record existing placard details. Ensure you record this information on your assessment form to ensure there is an accurate record of all placard decisions for that building even if your own assessment concludes with the same placard as the existing one.

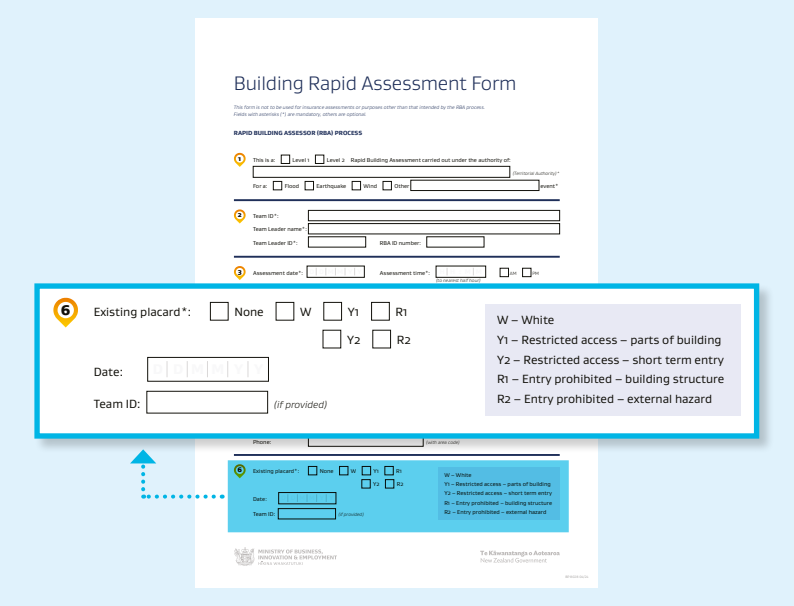


Figure 2: Section 6 of rapid building assessment form – recording details of an existing placard

3.2 Cordons, Barricading and Barrier tape

Part of the rapid building assessment operation is the application of appropriate measure such as cordons, barricades, hoardings or fences where required to protect buildings or keep people at a safe distance.

The table below explains the difference between cordons, barricades and barrier tape and who the decision-maker is for each:

	Cordoning	Barricading	Barrier Tape
Definition	Ordinarily a large area where access is prohibited whether for short/ fixed period or on a more permanent basis.	A 'fence-like' structure to protect people from collapse of a building or structure.	Temporary warning or lower risk (eg chimney or flooded room)
Decision-maker	Responsible person – usually the territorial authority (designated area), Controller or Recovery Manager	Usually person authorised for this power – eg Building Response Manager	Usually person authorised for this power – eg Rapid Building Assessor
Role of RBA (Tier 2 Team Leader)	May be involved in making recommendations to the BRM that supports the cordoning decisions of the Controller.	Makes recommendations about where barricades should be set.	May set out tape or instruct where barrier tape should be set out by others.

Table 5: Cordon types and who is responsible

If you believe that cordons or barricades are required in your assessment area, escalate up to the required decision-maker immediately.

Barrier tape

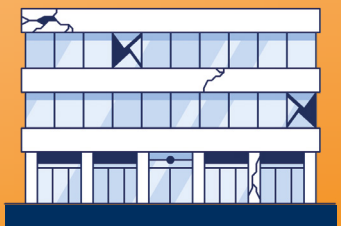
If a building is assessed as yellow or red, you may need to install barrier tape to restrict access into a building or restricted area or services. This may include areas that have been identified as fall zones.

Where possible, place barrier tape in a way that minimises the restrictions on passing traffic and pedestrians. Remember that glass can shatter, and heavy items like bricks will spill outwards on hitting the ground.

You will need to consider the construction materials of the building and the likely failure mode:

- concrete panels typically fall 1.0 x height
- brick walls typically spill 1.5 x height
- potential for full building collapse (consider full building height)
- limited to top storey collapse (consider height of top storey).

4 Rapid Building Assessment Forms



An assessment form must be completed for each building that has been assessed.

4.0 Rapid Building Assessment Forms

An assessment form must be completed for each building that has been assessed.

There are two different types of assessment form:

- rapid building assessment form – all events
- geotechnical assessment form – geotechnical assessments only (see the Geotechnical Field Guide for these assessments).

The rapid building assessment form covers all natural hazard event types and can be used for Level 1 and Level 2 assessments.

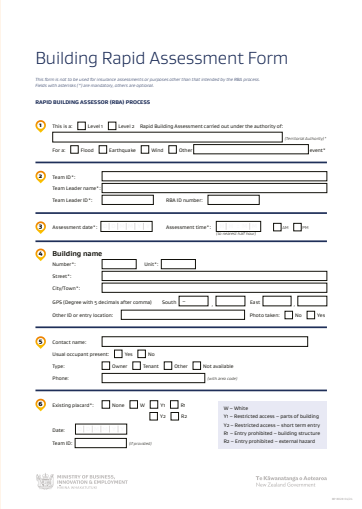
Assessment forms may be digital (eg tablet or phone-based application such as Survey 123) or a pre-printed paper form. The Building Response Manager and the territorial authority within which you are working will determine what the available and preferred option(s) for conducting assessments will be. Follow the instructions at your briefing.

4.1 Digital Rapid Building Assessment Forms

At the time of publication of this guide, the most common digital assessment form software used by territorial authorities is ESRI's Survey123 tool.

However, as territorial authorities can add additional data fields to the core assessment form, there may be variations in the formatting of the digital form. It is therefore important during your induction to ensure that you can load and complete the local version of the digital form before you enter the field.

If using digital assessment forms, make sure that you are familiar and equipped with hardcopy forms in case you run into problems with the digital form or equipment.


Building Rapid Assessment Form

RAPID BUILDING ASSESSOR (RBA) PROCESS

Building name

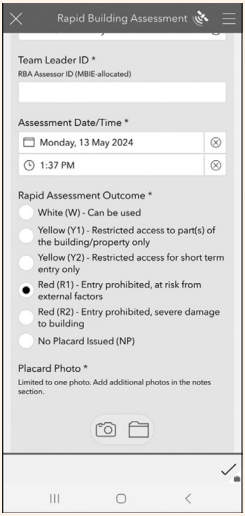


Figure 3: Paper-based assessment form

Figure 4: Digital assessment form (Survey 123)

Filling in assessment forms

It is important that all specified data fields are completed on an assessment form and, in the case of paper forms, make sure writing is clear. **Fields marked with an asterisk (*) are mandatory**.

The information on the placards and on assessment forms must be consistent. Best practice is to repeat the statements on the placards as closely as possible on the assessment form and the register.

Complete forms and documents neatly and accurately. BLOCK CAPITALS are recommended for legibility. Check that the building identification, such as the building address, is correct.

When you return to attend a debriefing and sign-out at the end of the day, make sure any and all completed hardcopy forms are given to a designated Receiving Officer from the territorial authority.

4.2 Building Identification

As part of your pre-deployment briefing, you and your team should receive maps, aerial photographs, official street addresses and detail about any heritage buildings in your assigned area.

However, depending on the emergency event and/or area, you may not receive all this information.

Commercial buildings may not have street numbers, or may have different numbers from their official address, particularly if a building occupies a corner site or has access from more than one street. Record the official address on the sheet and record a short name or any observed variance as '**Other ID or other location**'. If the building has a name, this is helpful for identification.

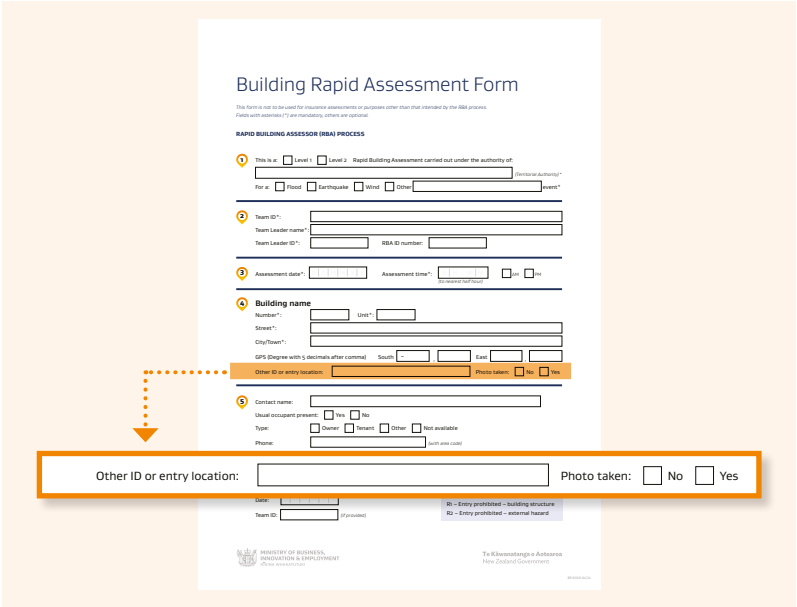


Figure 5: Section 4 of rapid building assessment form – Building name

Use the '**Other ID or entry location**' field to physically describe the position of a building where there is more than one building on a property. For commercial and industrial buildings, it is helpful to record the name of the business that occupies the premises – for example, the prominent tenancy (usually ground floor).

GPS coordinates are particularly useful in this situation. Wherever possible record the GPS coordinates of the building. A useful reference place to record the coordinates is at the building entrance. The preferred GPS format is in decimal degrees to **five decimal places** with South negative and East positive to adhere to the World Geodetic System (WGS) 1984 used by most GIS systems by default (eg -41.11385, 174.84676).

Photographs: If practical, take a photograph of the building near the entrance where the GPS coordinates were taken, and with the placard posted. This is useful for identification purposes and for future monitoring. If you are taking additional photos, we recommend you always do one of the following things, so that you can later match photos to buildings:

- show the assessment form or placard with the building identification in the foreground of each photo, or
- take a photo of the building identification first before taking photos of the building, for example, street view with street number or assessment form, and
- when taking photos, name the files in a way that allows later matching with the building (building name, address, council register ID, etc).

Other important information

- Ensure you enter any identified external hazards in **Section 8: External hazards** of the assessment form. Add a brief description if '**Other**' risks are observed. If the posed risk is due to a neighbouring building, identify that building in your assessment form.
- Ensure you fill out **Section 10: Building damage and usability assessment** table and all recommended further actions (eg a geotechnical or structural engineering assessment, Level 2 assessment or welfare visit required). Also include any immediate actions that have been undertaken during the assessment (eg disconnecting power or gas).

5 Rapid Building Assessment Basic Approach

Assessors will observe the nature of damage and assess its impact on the ability of the building (or part) to withstand reasonably foreseeable future events.

5.0 Rapid Building Assessment Basic Approach

This section provides information on:

- basic approach and process for rapid building assessments
- rapid building assessment types
- Level 1 assessment observations and criteria
- Level 2 assessment observations and criteria

Assessors will observe the nature of any damage and assess its impact on the ability of the building (or part) to withstand reasonably foreseeable future events, such as earthquakes or aftershocks.

The Building Response Manager should provide assessors with some guidelines to follow regarding the decision-making process for placarding (depending on the type of hazard event, the number of assessments likely required and the risk of future events/deterioration of the environment).

Rapid assessments are primarily looking for any:

- threat of overall or partial collapse due to loss of strength, stability, or stiffness of the structural system
- threat of non-structural elements of a building, that are not part of the structural frame
- becoming falling hazards; for example, loose bricks from a chimney, tiles from a roof
- threat posed by damage to adjacent land
- threat posed by damage to adjacent structures
- other threat to public safety caused by the event, such as biocontamination through leaked sewage or electrical issues.

The outcome of the rapid building assessment is a completed assessment form and an appropriate placard. The basic assessment process is outlined opposite:

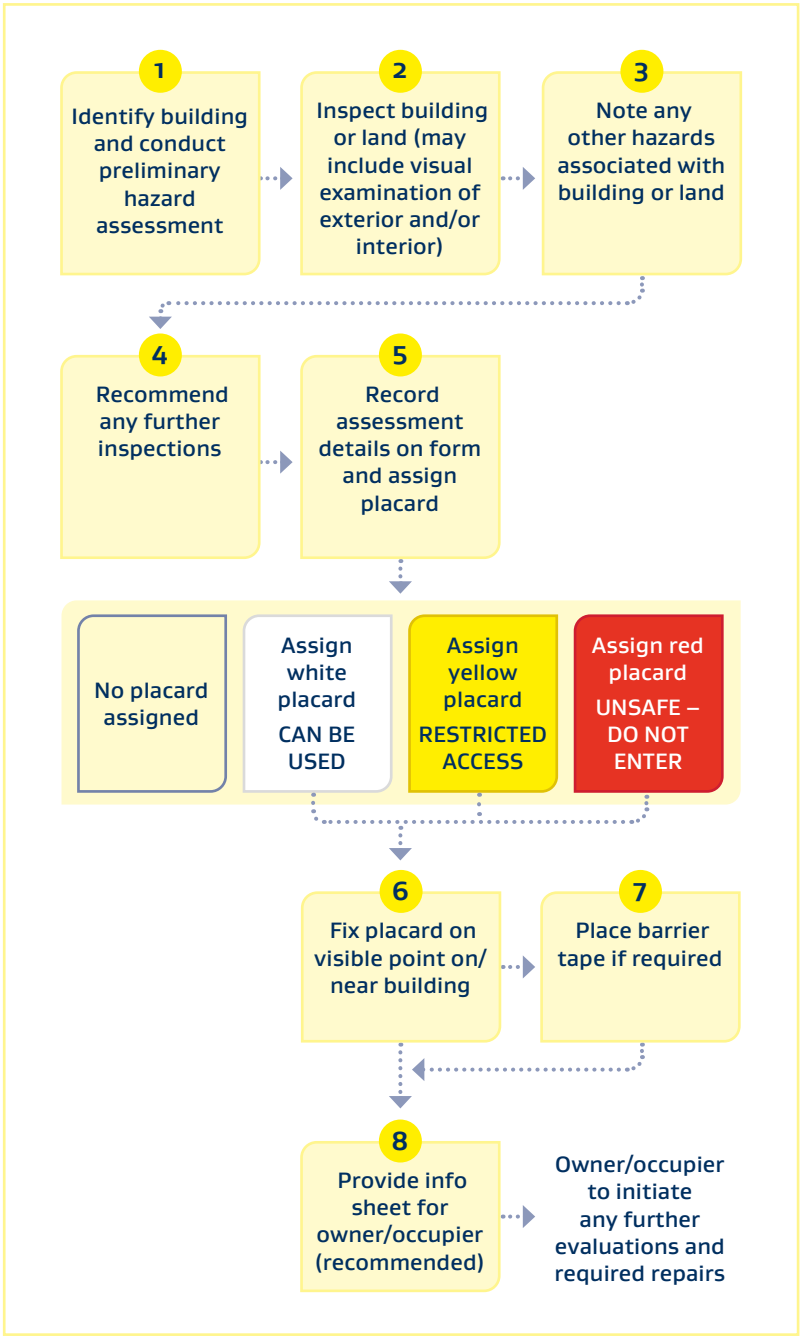


Figure 6: Basic rapid building assessment process

Assessing usability is based on the damage observed in the context of the event that has occurred. It is accepted that larger events could cause failure. Reasonably foreseeable events that affect the serviceability and structural performance of buildings include:

- normal service loading
- wind or snow loading
- earthquakes of a similar magnitude or less than the original event.

The focus is on applying judgment to assess future risk from damage, based on a minimum of specific knowledge about a building.

The assessment teams may also make recommendations for work to be done under urgency where there is a need to demolish or secure the structure to keep the public safe or to protect adjacent property.

5.1 Rapid Building Assessment Types

There are different types of assessments that can be completed depending on the building type.

These are summarised in the table below:

Level 1 rapid building assessment	
Description	A brief visual inspection of damage to individual buildings. An external inspection of building only
Assessor type	Registered assessors where possible. Building consent officers, architects, structural and civil engineers
Building type	Simple residential houses (eg NZS 3604 type)
	Complex residential (eg a two-storey block with two flats), non-residential buildings
Time estimate	10–20 mins

It is not a requirement that a Level 1 assessment is done before undertaking a Level 2 assessment. However, always first inspect the building's exterior and external environment before deciding if a building can and should be entered.

Level 2 rapid building assessment	
Description	A more detailed inspection that involves both external and internal inspection of building (if safe to enter)
Assessor type	Registered assessors where possible. Teams should comprise at least one structural engineer, with input from geotechnical engineers where necessary
Building type	Buildings with typical commercial construction details (eg unreinforced masonry walls, tilt-up panels)
	Multi-storey buildings and containing 3 or more residential units
	Essential facilities (eg schools, hospitals, police & fire stations)
	Any buildings where a Level 1 assessment identifies the need for further inspection
Time estimate	From 30 mins to 2 hours+

Geotechnical rapid building assessment	
Description	An inspection by geotechnical professionals to assess the life safety risk posed by land instability hazards and their effects on building usability
Assessor type	Registered assessors where possible. A geotechnical professional (eg geotechnical engineer) must be part of the team
Building type	Any individual properties or wider areas (multiple properties) identified as being potentially affected by land instability
Time estimate	15–20 mins for an individual property. (inspection of hazards affecting multiple properties will take longer)

5.2 Level 1 Rapid Building Assessments

Level 1 assessments should be conducted on simple residential, complex residential (eg a two-storey building) and non-residential buildings.

A Level 2 assessment should be conducted on buildings with typical commercial construction (eg unreinforced masonry walls, tilt-up panels) and multi-storey buildings with 3 or more residential units.

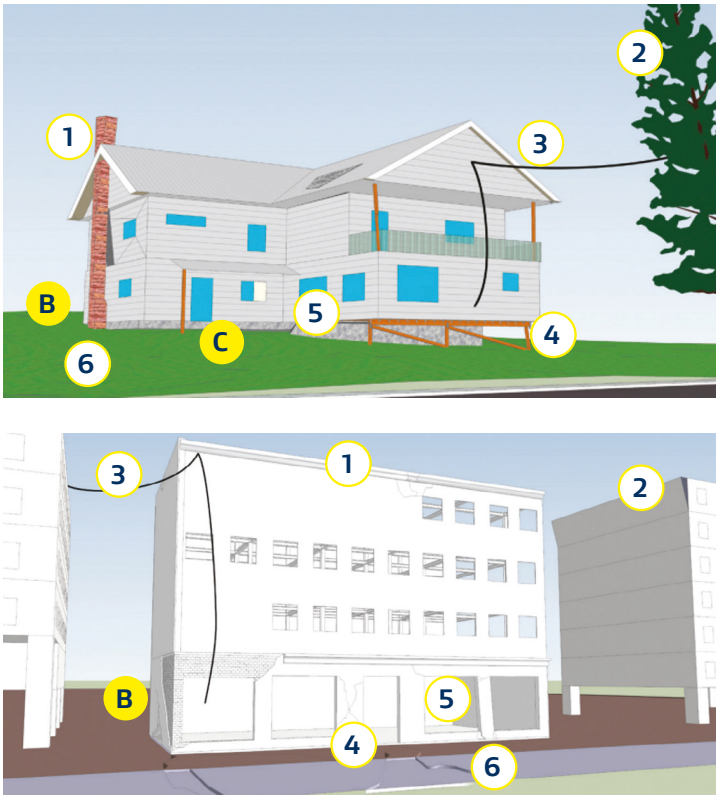
A Level 1 rapid building assessment typically follows the steps in the order shown below:

A Observe the building exterior of the building from the street access:

1. look out for falling hazards from above
2. inspect whether neighbouring buildings or natural features such as hills, dams or trees pose a hazard
3. identify non-structural hazards such as chemical spills, ripped power lines or gas leaks
4. inspect street level damage to the building structure.
5. where possible, look into the building through windows to identify interior damage.
6. inspect the ground around the building for slopes or fissures.

B Walk around the building as far as possible and inspect each elevation.

C Enter the building for a closer inspection, if required and if entry is safe.



Figures 7 & 8: Inspection steps for a Level 1 Rapid Building Assessment

5.2.1 Key Level 1 Assessment Observations for Simple Residential Buildings

Structural damage

The key criteria (or observed conditions) to look for are:

- collapse, partial collapse, off foundation
- building or storey leaning
- structural damage to vertical system – look for damage to posts, joists, beams and columns
- structural damage to lateral system:
  - look for racking of sheet or strip cladding and disconnections at the top and bottom of studs and posts, and at the base of walls
  - buckling of steel braces or tearing of steelwork paint systems
  - racking of timber linings
- in addition, for multistorey buildings:
  - observe whether significant inter-storey movement has occurred
  - concrete spalling and hinging at the top and bottom of columns, and at the base of walls
- falling hazards – for example, chimneys, overhanging canopies, broken windows, pergolas and balconies
- ground slope movement or cracking – look for ground displacement under or next to the building, or foundation damage
- other hazards present – gas, electricity, sanitary sewer, stormwater or hazardous materials/processes.

If significant interior damage is suspected or visible from the outside, or if not enough of the structural components can be seen from the outside, inspect the interior of the building. Only enter the building if access and exit routes are safe.

Flooding & severe weather damage

The key criteria (or observed conditions) to look for are:

- ground slope movement or cracking – look for ground displacement under or next to the building, or foundation damage
- slope instability
- damage to the wastewater system – assess whether sewage has leaked. All septic tanks that were covered with flood waters will need pumping out. **Note:** where floodwaters contain high sediment load, gully traps will also need clearing as sediment can settle out in the gully traps.
- damage to water supply – inspect whether any water tanks or bore holes are contaminated
- damage to stormwater system
- wall linings exposed to water or silt – all wall linings should be removed to 300mm above the highest flood height so debris and silt can be cleaned from cavities (eg removing silt from the cavity between brick cladding and building paper), and framing exposed to the air for drying before relining.
- unsafe electrical systems – flood-impacted electrical circuits need to be isolated. If flood waters have inundated electrical systems of whiteware, the whiteware is considered to be electrically dangerous and should be discarded.
- other non-structural damage:
  - ceilings, partitions, light fixtures, HVAC systems
    (Refer to the section: **Non-structural hazards on Page 95**)
- other hazards such as:
  - reticulated or bottled gas
  - unsafe electricity lines
  - hazardous materials or processes
  - damage to fire protection and detection equipment
  - damage to stairs, jammed doors, or other obstructions to pathways.
- flooding and severe weather events may also cause structural damage from water, silt, landslides, or other debris.

Flooding and severe weather events may also cause structural damage from water, silt, landslides, or other debris. Possible damage includes:

- significant settlement or cracking of foundations or collapse/partial collapse of foundation
- basement fractures or uneven settlement
- building or storey leaning
- structural damage to vertical system
  - look for damage to posts, joists, beams and columns
- structural damage to lateral system
  - look for racking of sheet or strip cladding and disconnections at the top and bottom of studs and posts, and at the base of walls
  - buckling of steel braces
  - racking of timber linings. Observe whether significant inter-storey movement has occurred
- falling hazards – for example:
  - chimneys, overhanging canopies, broken windows, pergolas and balconies.

A Level 2 Assessment should be recommended if significant interior damage is suspected or visible from the outside, or if not enough of the structural components can be seen from the outside. For example, multi-storey buildings typically need a more detailed internal assessment by structural engineers.

5.3 Level 2 Rapid Building Assessments

Level 2 Assessments should be conducted on buildings with typical commercial construction (eg unreinforced masonry walls, tilt-up panels) multi-storey buildings with 3 or more residential units and essential facilities.

A Level 2 Assessment generally involves entry into the building. Before entering the building, you must first assess the exterior of the building for damage and hazards. Refer to the section: **Level 1 assessment process on Page 59**.

In addition, you also need to ensure that pathways in and out of the building are clear and safe to enter. Refer to the section: **Entry into damaged buildings on Page 20**.

The steps to assess the interior of a building will often be case specific but should always include these steps:

A. Observe the building exterior from street access

B. Walk around the building as far as possible and inspect each elevation

C. Carry out interior observations if safe to do so:
   1. inspect a sample of rooms; for example, lower/middle/upper storeys, centre and corners of the building
   2. if feasible, lift the ceiling tiles to inspect a sample of structural members that are not normally exposed
   3. look in stairwells, mechanical rooms, and other exposed areas as required to view the structural system
   4. go into basement spaces to inspect the more exposed structural members.

Inspection teams should allow 30 minutes to 2 hours per building for a Level 2 Assessment, depending on building size and complexity.

5.3.1 Key Level 2 Assessment Observations

In addition to the observations made during a Level 1 Assessment, the Level 2 Assessment will typically look for the following damage:

Structural damage

- basement fractures or uneven settlement
- significant settlement or cracking of foundations
- structural damage to vertical system – look for damage to beams and columns
- structural damage to lateral system – observe whether significant inter-storey movement has occurred, and look for:
  - concrete spalling and hinging at the top and bottom of columns, and at the base of walls
  - buckling of steel braces or tearing of steelwork paint systems
  - racking of timber linings
- damage to diaphragms – look for significant cracking of floor slabs and any indication of floor or roof framing that has begun to pull away from its supports
- precast connections – look for:
  - fractured bolts
  - panel cracking or spalling at connections or panels out of alignment
  - separation from interior linings
- non-structural damage to ceilings, partitions, light fixtures, roof-top tanks, HVAC systems. Refer to the section: **Non-structural hazards on Page 95**
- other hazards such as:
  - defunct elevators
  - exposure of hazardous materials such as chemical spills and leaks
  - damage to fire protection and detection equipment
  - damage to stairs, jammed doors, or other obstructions to pathways
- falling hazards such as:
  - chimneys, parapets and overhanging canopies
  - rooftop plant
  - broken windows.

Flooding & severe weather damage

All of the above structural observations, including:

- structural damage to gravity system – look for damage to foundation, floor or roof systems, beams and columns
- structural damage to lateral system – look for:
  - hinging at the top and bottom of columns, and at the base of walls
  - buckling of steel braces or tearing of steelwork paint systems
  - racking of timber linings
  - observe whether significant inter-storey movement has occurred
- other hazards such as:
  - reticulated or bottled gas
  - unsafe electricity.

6 Assessing Specific Building Types – Structural Damage

Our current building stock consists of a range of buildings with varying earthquake performance. Each building must be assessed individually.

6.0 Assessing Specific Building Types – Structural Damage

This section covers assessment observations and examples for:

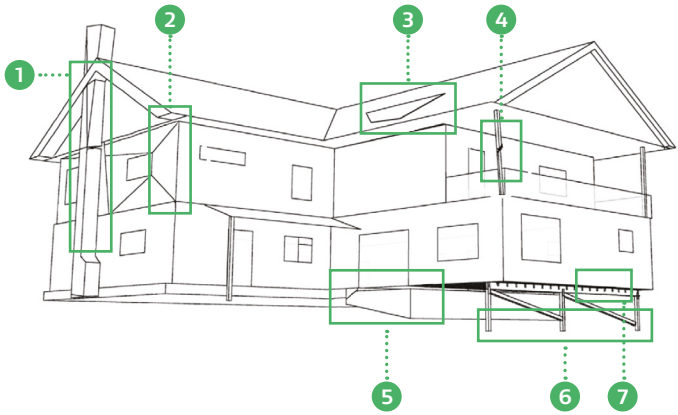
- timber framed structures
- reinforced concrete or masonry wall construction
- reinforced concrete frame construction
- precast concrete tilt-up structures
- suspended concrete floors
- steel frame structures
- unreinforced masonry structures

Our current building stock consists of a range of buildings with varying earthquake performance. Although the following sections outline typical failure points in different construction types, each building must be assessed individually.

6.1 Timber Framed Structures

In these types of buildings, look for:

- chimney separation, collapse or cracking
- house sliding off its foundations
- racking of walls, specifically bracing walls
- failure of subfloor bracing
- failure of pole supports or retaining structures on hillside sections
- damage to inter tenancy walls or fire cell walls in multi tenancy buildings.



1. Chimney
2. Raking Walls
3. Other Damage
4. Decks and Pergolas
5. Slab Floors
6. Floor Bracing
7. Foundation Anchorage

Figure 9: Typical damage areas in timber frame structures

Example 1: Figure 10 below shows a section view of a building with a concrete perimeter wall foundation and a subfloor wall around the crawl space. The ground or first floor framing is supported by the subfloor wall and by posts and bearers inside the crawl space.

Above the ground floor, both the exterior and interior walls are covered with sheathing and fitted with diagonal steel bracing straps to provide strength. However, the subfloor is typically braced by diagonal timber struts between the bearers and piles, cantilevered foundation piles or perimeter reinforced masonry walls.

The view on the right in **Figure 10** and in **Figure 11** shows the previous house after a moderate or large earthquake force. The earthquake actions overcame the strength of the subfloor bracing, so the whole house fell sideways and down.

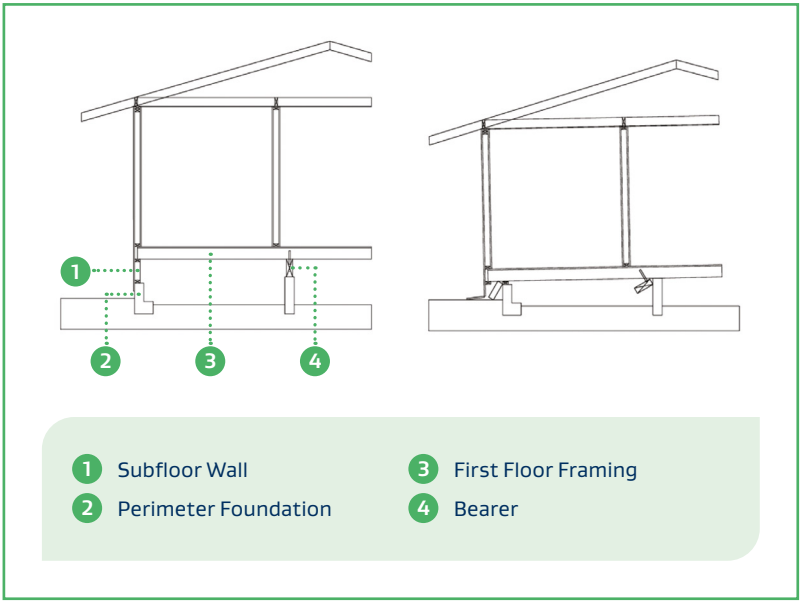


Figure 10: Housing subfloor structure; the view on the right shows the house slipped off the foundations

Figure 11: House fallen off its foundations

6.2 Engineered Timber Structures

These types of buildings often have frame type systems (moment and/or braced) with similar potential issues to those in the following sections on steel and concrete frames.

However, the particular nature of timber and engineered timber can lead to some specific issues. These may include:

- damage adjacent to connections
- damage at junctions with different types of materials or non-structural items
- damage due to corrosion, decay or deterioration, which may have a significant effect on material properties and therefore contribute to a step wise change in expected performance both in the short term and medium term.

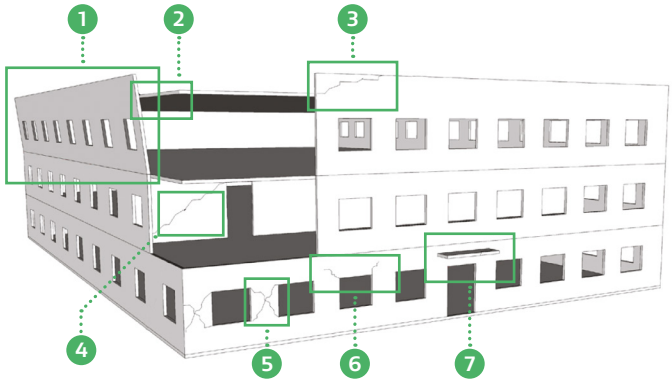
6.3 Reinforced Concrete or Masonry Wall Construction

In this type of building, look for:

- diagonal shear cracking in piers
- diagonal cracking of walls with spalling of boundary elements
- single horizontal cracks in walls (indicative of non-ductile behaviour)
- floor or roof separation
- damage to openings and lintels
- damage adjacent to egress routes
- combinations of unreinforced masonry partitions with reinforced concrete frames.

Example 2: Figure 12 on page 73 shows the most probable areas of damage to this type of building with structural walls in an earthquake. The visible exterior walls on concrete-wall-type buildings are much of the structure of the building.

Expect damage in certain places because of the wall configuration, especially in older buildings. One such place is at a **soft storey**, usually the bottom storey, where there is less continuous wall area than the upper floors. It is often a weak point where more earthquake deformation can occur (see **Figure 13 on page 73**).



1. Storey out of Plumb
2. Roof or Floor Separation
3. Parapet Damage
4. Cracking of Unreinforced Masonry Partitions
5. Shear Wall Failure of Pier
6. Concrete Cracking at Openings
7. Falling Hazards

Figure 12: Typical damage areas in reinforced concrete or masonry structures

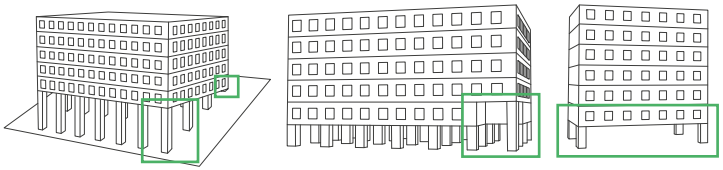


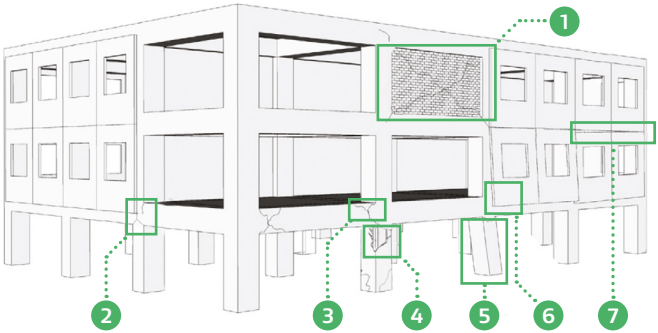
Figure 13: Soft storeys

6.4 Reinforced Concrete Frame Construction

Reinforced concrete-frame buildings have horizontal beams and vertical columns in rectangular bays.

In this type of building look for:

- columns out of plumb or storey leaning
- diagonal shear failure of columns
- buckling of column reinforcement
- diagonal cracking of beam-column joints
- cracking and spalling of end regions of beams and columns
- tearing of floor diaphragms adjacent to hinging beams
- racking of cladding
- cracked infill walls
- damage to egress routes including stairs. See **Figures 14 and 15:**



1. Cracked Infill Walls
2. Panel Zone Cracking
3. Beam Concrete Spalling Exposure of Reinforcement
4. Column Concrete Spalling Exposure of Reinforcement
5. Columns out of Plumb
6. Damaged Cladding Connections
7. Raking of Cladding

Figure 14: Typical damage areas in reinforced concrete-frame structures

Undesirable behaviour in weak column-strong beams may lead to the collapse of concrete frames. Reinforcing steel may fracture in hinge zones of concrete columns (see **Figure 16**). Wall-cladding panels may detach from structures, particularly at roof level, causing an overhead falling hazard.

Figure 15: Column hinging top and bottom (left); Top of column hinging failure above suspended ceiling (centre); Columns out of plumb (right)

Figure 16: Weak column-strong beam frame collapse (left); Column flexural hinging with concrete crushing and reinforcing steel fracture (centre); Falling hazard from partially detached wall cladding panel (right)

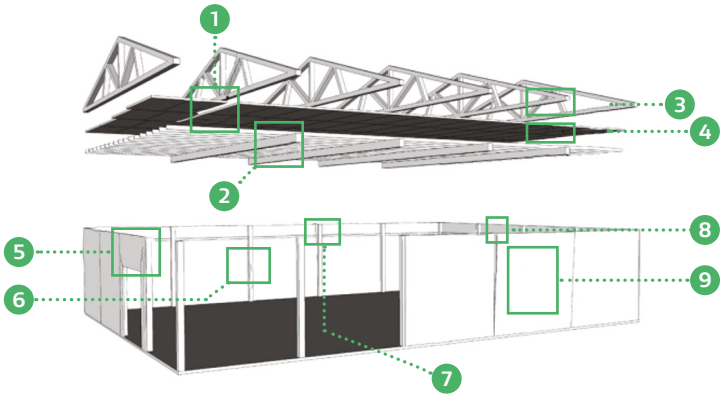
6.5 Precast Concrete Tilt-up Structures

Concrete 'tilt-slab' buildings have a slab-on-grade concrete floor on which reinforced concrete walls are cast (or poured offsite) and then tilted up and connected to a steel or timber-frame roof structure.

Cast-in-place concrete pilaster columns are often placed between wall panels to support the larger roof members.

In this type of building look for (see **Figure 17**):

- fracture or pullout of bolts connecting wall panels to roof structure
- spalling of exterior panel face at cast-in bolt connections
- horizontal cracks at mid-height of wall panels
- outward leaning panels
- wall separation from roof diaphragm
- separation of framing in diaphragm
- diaphragm chord failure in tension.



1. Spreading of Plywood Sheets
2. Separation of Framing in Diaphragm
3. Diaphragm Chord Failure in Tension
4. Roof Framing Separation from Vertical Support
5. Corner Cracking at Openings
6. Damage to Concrete Closure Strips
7. Wall Separation from Diaphragm
8. Failure at Tie between Panels
9. Outward Leaning Panel

Figure 17: Typical damage areas in reinforced tilt-up slab structures

6.6 Suspended Concrete Floors

Suspended concrete floors not only support gravity loads, but also act as horizontal diaphragms connecting lateral load-resisting elements such as shear walls and bracing frames.

Cast in-situ concrete floors are typical of older structures. While these floors are typically relatively robust, frameless flat slabs have considerable vulnerability to punching shear failure. On in-situ concrete floors look out for:

- punching shear failure at columns
- tearing between floor slab and concrete frames.

Precast concrete floors are typical of buildings constructed from the 1980's onwards. Relatively minor damage to these floors can pose a significant hazard due to the lack of redundancy in the load paths. Floor, ceiling and/or wall coverings will need to be removed to allow access to view key areas. Areas to look out for include:

- any precast unit running parallel and directly adjacent to a frame, or a wall element
- horizontal cracks across the width of the flange on prestressed double-tee units
- tearing at the end seating of prestressed double-tee units
- horizontal cracks running along webs of prestressed hollow core units
- horizontal cracks running across the width of prestressed hollow core units (typically within 300–600mm of the end support)
- diagonal flexure-shear cracks in the webs of prestressed hollow core units
- horizontal cracks through prestressed ribs (particularly at ends of units)
- tearing between floor slab and concrete frames.

Composite concrete floors cast on steel decking are more typical of buildings constructed from the 1990's onwards. These floor systems are typically supported on steel beams and are relatively robust. Look out for tearing between floor slab and frames.

- Portions of buildings may be deliberately separated structurally at movement joints that can open up during an earthquake (see **Figure 18 left photo**).
- Earthquake design actions transfer through the floor slabs and can lead to their damage, particularly at sharp changes in their shape (see **Figure 18 centre photo**).
- At the ends of shear walls, damage may occur in the floor slab or beams connecting them to adjacent walls (see **Figure 18 right photo**).

Figure 18: Structural movement joint in suspended slab (left); Floor diaphragm damage (centre); Punching shear failure in suspended slab at end of shear wall (right)

6.7 Steel Frame Structures

For these types of buildings, it is likely you will need to remove some wall, ceiling and/or floor coverings to allow access to view the key structural elements.

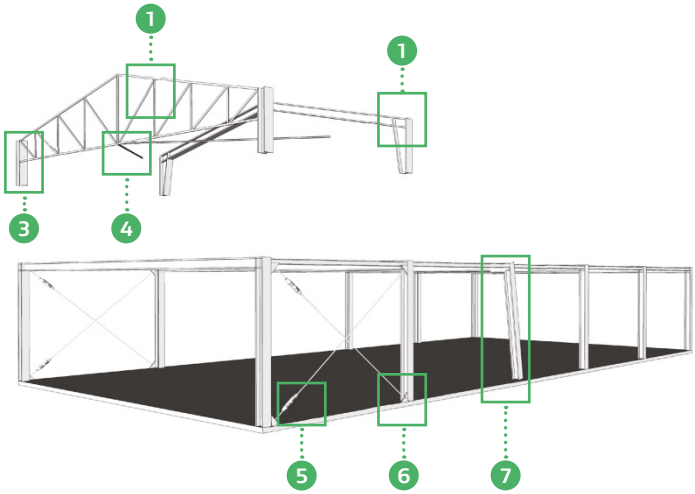
Steel structures typically consist of moment-resisting frames, or braced frames to resist lateral loads. In **steel moment-resisting frame structures** look for:

- columns out of plumb or storey leaning
- buckling of columns
- buckling of column flanges
- buckling or yielding of beam-column joints
- yielding of end regions of beams (typically observed by flaking of paint)
- tearing of floor diaphragms adjacent to hinging beams
- racking of cladding
- cracked infill walls.

In **steel-braced frame structures** look for:

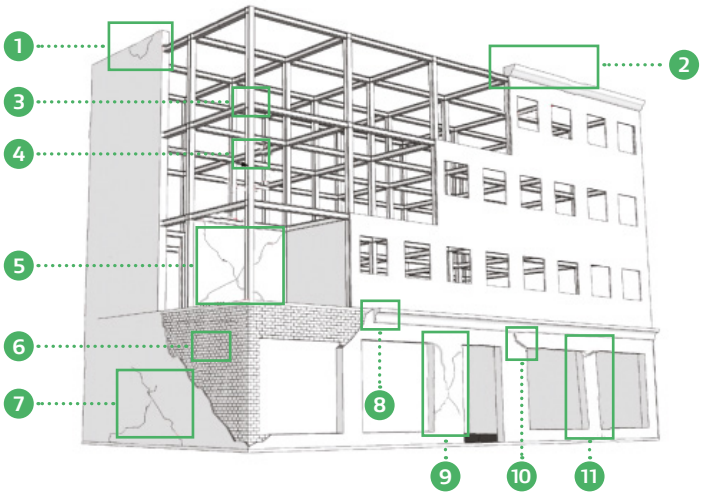
- fracture or buckling of braces
- fracture of bolts or welds at brace connections
- yielding or tearing of active links (beams) between braces in Eccentrically Braced Frames (EBFs)
- buckling of columns.

Figure 19 and **Figure 20** below and on **page 83** show typical damage areas in lightweight and standard steel frame structures.



1. Broken or Buckled Truss Members
2. Distress at Moment Connections particularly where Bolts used in Tension
3. Separation or Distress
4. Broken Horizontal Bracing or Connections
5. Broken or Buckled Brace. Broken Connection
6. Slip at Base
7. Building Leaning

Figure 19: Typical damage areas in light-weight steel structures



1. Localised Wall Collapse
2. Parapet and Cornice Damage
3. Beam-Column Joint Distress
4. Column Distress
5. Damage to Masonry Partitions, particularly at Stairwells and Elevator Shafts
6. Fallen or Loose Bricks
7. Shear Cracks
8. Falling Hazards associated with Badly Cracked Masonry or Concrete
9. Failed Pier
10. Corner Cracks at Openings
11. Storey out of Plumb

Figure 20: Typical damage areas in steel structures

Also consider (see **Figure 21**):

- welds between steel roof members and concrete supports are often field-welded and can be susceptible to fracture if they are too small or the quality of welding is not adequate (see **Figure 21, left photo**)
- as columns in steel frames flex, their base plates can deform and lift from their pads, stretching the holding down bolts (see **Figure 21, centre photo**)
- connection cleats of bracing members can flex and fracture (see **Figure 21, right photo**).

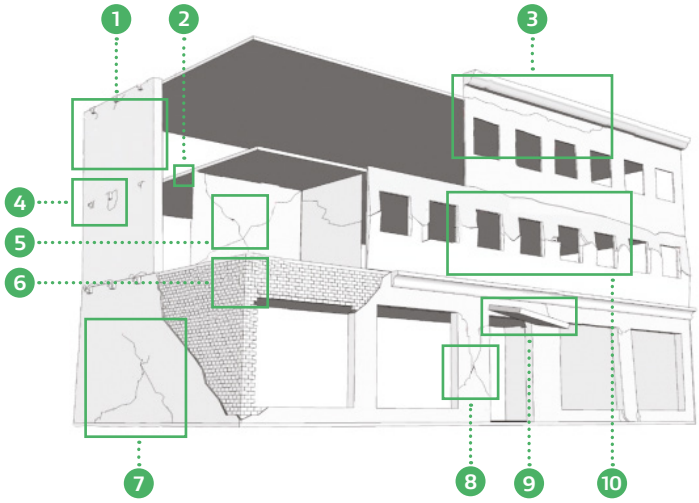
Figure 21: Weld failure of rafter attachment to concrete support (left); Base plate deformation (centre); Steel bracing cleat fracture (right)

6.8 Unreinforced Masonry (URM) Structures

Unreinforced masonry structures typically comprise brick or stone masonry bearing walls, supporting timber floors and often with parapets and potentially cantilevered canopies.

Failure is typically the result of out-of-plane failures of the masonry walls, although many URM structures also have a soft storey at ground floor level. In unreinforced masonry structures look for (see **Figure 22**):

- horizontal cracks along base of parapets
- face-load failure of masonry walls between floor levels
- walls or storey leaning
- separation of floor or roof diaphragms from masonry walls
- pullout of anchor bolts securing masonry walls to timber floors or roof
- diagonal shear failure of masonry piers
- collapsed chimneys, damage to parapets or canopy supports.



1. Storey out of Plumb
2. Separation of Floor or Roof Diaphragms from Masonry Walls
3. Horizontal Cracks along Parapets
4. Pullout of Anchor Bolts
5. Damage to Masonry Partitions
6. Fallen or Loose Bricks
7. Shear Cracks
8. Diagonal Shear Failure of Masonry Piers
9. Falling Hazards associated with Badly Cracked Masonry, Concrete or Chimneys
10. Faceload Failure of Masonry Walls between Floor Levels

Figure 22: Typical damage areas in unreinforced masonry structure

7 Assessing Specific Building Types – Flooding & Severe Weather Damage

Flooding and severe weather events can damage the water supply, wastewater and stormwater systems in commercial buildings.

7.0 Assessing Specific Building Types – Flooding & Severe Weather Damage

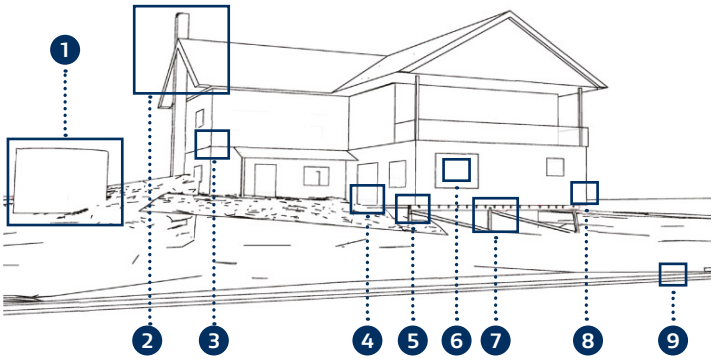
This section covers assessment observations and examples for:

- residential buildings
- commercial buildings
- unreinforced masonry structures

7.1 Residential buildings

The areas to look for on this type of building are:

- damage to lining and build-up of silt
- water supply (town water, boreholes, tanks)
- wastewater and sewage system
- house sliding off foundations or foundation settlement
- racking of walls
- failure of subfloor bracing
- impact damage to external walls from floating debris
- roof damage from high winds
- impact on electrical supply and internal circuits.



1. Water Supply
2. Chimney
3. Raking Walls
4. Slab Floors
5. Wastewater and Sewage Systems
6. Wall Linings
7. Floor Bracing
8. Foundation Anchorage
9. Storm Water System

Figure 23: Typical flooding damage in residential buildings

7.2 Commercial buildings

As in residential buildings, flooding and severe weather events can damage the water supply, wastewater and stormwater systems in commercial buildings.

Damaged furnishings such as wall linings and floor coverings need to be replaced to ensure that they don't collect mould or pose a long-term health risk from sewage contamination.

Flooding events tend to affect the structure of large commercial buildings via associated landslides and fissures in the ground. Most at risk, therefore, are buildings with soft lower storeys and buildings built on slopes.

The areas to look for on this type of building are:

- columns out of plumb or storeys leaning
- beam-column joints for diagonal cracking
- end regions of beams for cracking and spalling
- cladding for evidence of racking
- infill walls for evidence of cracking.

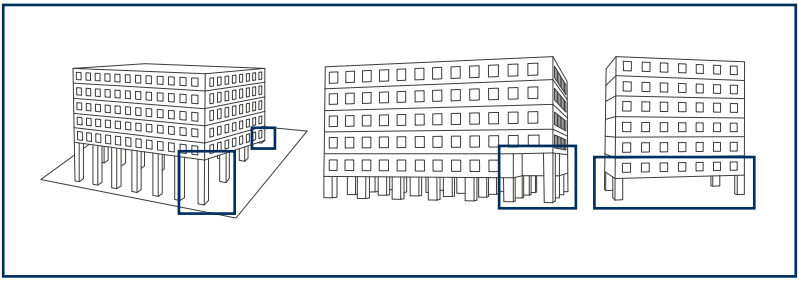
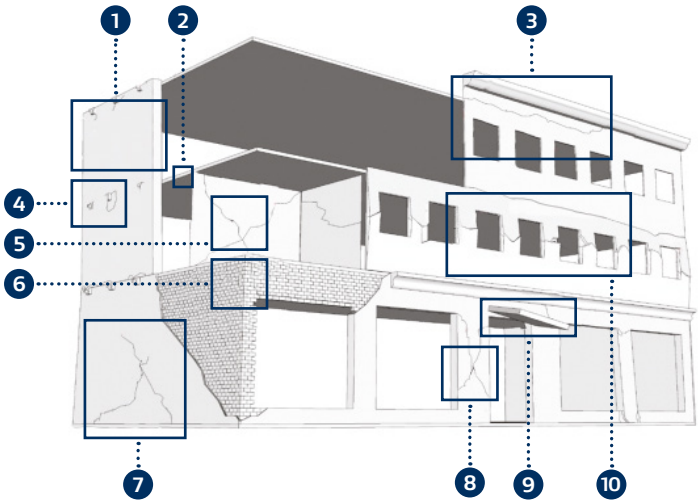


Figure 24: Soft storeys

7.3 Unreinforced masonry (URM) structures

Unreinforced masonry structures typically comprise brick or stone masonry bearing walls, supporting timber floors.

Failure is typically the result of out-of-plane failures of the masonry walls, although many URM structures also have a soft storey at ground floor level.



1. Storey out of Plumb
2. Separation of Floor or Roof Diaphragms from Masonry Walls
3. Horizontal Cracks along Parapets
4. Pullout of Anchor Bolts
5. Damage to Masonry Partitions
6. Fallen or Loose Bricks
7. Shear Cracks
8. Diagonal Shear Failure of Masonry Piers
9. Falling Hazards associated with Badly Cracked Masonry, Concrete or Chimneys
10. Faceload Failure of Masonry Walls between Floor Levels

Figure 25: Typical damage areas in unreinforced masonry structure

Areas to look out for in unreinforced masonry structures are:

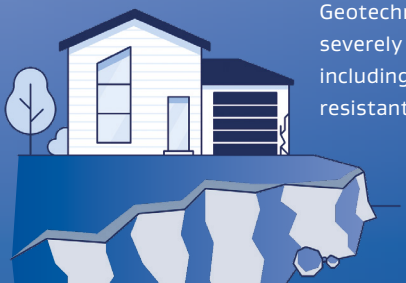
- faceload failure of masonry walls between floor levels
- walls or storey leaning
- separation of floor or roof diaphragms from masonry walls
- pullout of anchor bolts securing masonry walls to timber floors or roof
- diagonal shear failure of masonry piers
- collapsed chimneys.

Larger commercial buildings tend to have more complex services which can suffer from water damage. Typical areas of concern are:

- air-conditioning systems
- lifts and escalators
- central fire warning and protection systems
- electrical systems.

These may require assessment by specialists. Also refer to the section: **Non-structural hazards on Page 95**.

8 Assessing Geotechnical Hazards



Geotechnical conditions can severely damage structures including those otherwise resistant to ground shaking.

8.0 Assessing Geotechnical Hazards

Geotechnical conditions such as large settlements, lateral spreading of soil, landslides, and liquefaction can severely damage structures including those otherwise resistant to ground shaking.

Some typical hazards are shown in **Figure 26** below.

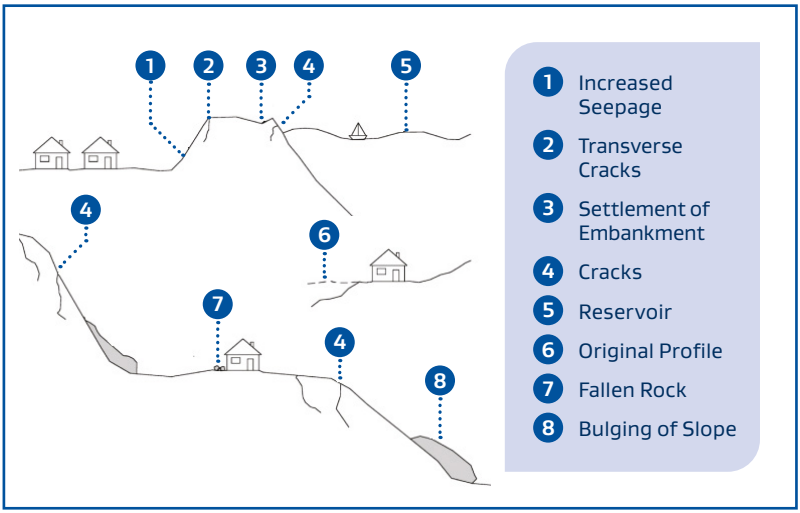


Figure 26: Inspection points for some geotechnical hazards; Top: Potential slope failure, Middle right: Loss of foundation support, Bottom: Unsafe area

Be aware that geotechnical hazards can extend over an area of several buildings or more properties. Typical indications of damage are:

- fissures
- bulged ground
- vertical ground movement
- rockfall or debris.

In hillside areas, examine the area for landslide displacement or debris encroaching onto the site. In some cases, geotechnical evaluation can only be undertaken by qualified geotechnical specialists.

9 Assessing Non-structural Hazards

Non-structural hazards do not generally affect the whole building.

9.0 Assessing Non-structural Hazards

Non-structural hazards do not generally affect the whole building.

They would usually require a yellow '**RESTRICTED ACCESS**' placard with designated unusable zones within the building. These areas should generally be barricaded to prevent entry.

However, where the safety risk is severe and widespread, a red '**UNSAFE**' placarding of the whole building may be warranted.

The following table lists a number of typical non-structural hazards that a RBA should inspect:

Parapets, ornamentation and appendages
Observation – structural damage
Partially dislodged masonry parapets
Masonry parapets with cracking (no evidence of reinforcement)
Concrete parapets with major spalling or severe lean
Ornamentation/cornice/signs/mansards with support distress or partial dislodgement
Fallen or damaged veneer or roof tiles
Damaged or leaning unreinforced chimney

Table 5: Typical non-structural hazards

Canopies
Observation – structural damage
Partial collapse or lean of canopy
Failure or incipient failure of support for canopy, awning or marquee
Flooding & severe weather
Partial collapse or lean of canopy
Failure or incipient failure of support for canopy, awning or marquee
Cladding
Observation – structural damage
Falling hazards from damaged glazing
Broken or damaged cladding
Walls with some fallen panels
Flooding & severe weather
Falling hazards from damaged glazing
Broken or damaged cladding
Walls with some fallen panels
Ceilings and light fixtures
Observation – structural damage
Collapse, partial collapse, or incipient collapse of ceiling
Pendant fluorescent light fixtures with damaged stems
Area with some fallen light fixtures or possible falling hazard
Flooding & severe weather
Collapse, partial collapse, or incipient collapse of ceiling
Pendant fluorescent light fixtures with damaged stems
Area with some fallen light fixtures or possible falling hazard

Interior walls, partitions, and glazing
Observation – structural damage
Collapsed, partially collapsed, or severely cracked partitions
Cracked masonry or tile partitions (no evidence of reinforcement)
Demountable partitions separated from supports
Possible falling glass hazard
Flooding & severe weather
Damaged or contaminated partitions
Demountable partitions separated from supports
Possible falling glass hazard
Mechanical and electrical equipment
Observation – structural damage
Overturning or sliding of gas- or fuel-oil-fired equipment
Gas or fuel line break or leak
Broken exhaust pipe
Overhead piping and ducts with failed supports
Other mechanical and electrical equipment falling hazard present
Flooding & severe weather
Equipment fuelled by gas or fuel-oil water damaged, overturned or moved
Gas or fuel line break or leak
Broken exhaust pipe
Overhead piping and ducts with failed supports

Table 5: Typical non-structural hazards

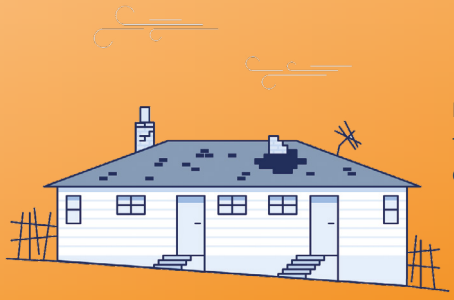
Other mechanical and electrical equipment falling hazard present
Observation – structural damage
Elevator with protective switch tripped
Counterweights out of guides
Damaged guiding member
Damaged guide rails or brackets
Equipment anchorage failure
Flooding & severe weather
Elevator with protective switch tripped
Counterweights out of guides
Damaged guiding member
Damaged guide rails or brackets
Equipment anchorage failure
Cables out of sheaves
Door damage

Table 5: Typical non-structural hazards

Other
Observation – structural damage
Spill of known or suspected dangerous materials
Leakage of unknown substance from tank, pressure vessel, or piping
Reticulated services
Onsite waste disposal systems such as septic tanks
Friable asbestos release
Fire protection or detection equipment inoperable
Solid fuel burners (consider fire hazards)
Fallen electric lines
Unsafe condition at stairways, exit ways, or inoperable exit door (placard all the building unusable if all exits are blocked or otherwise unusable)
Raised access floor with potential for collapse
Flooding & severe weather
Silt build-up
Spill of known or suspected dangerous materials
Leakage of unknown substance from tank, pressure vessel, or piping
Reticulated services
Onsite waste disposal systems such as septic tanks
Friable asbestos release
Fire protection or detection equipment inoperable
Solid fuel burners (consider fire hazards)
Fallen or water damaged electric lines
Unsafe condition at stairways, exit ways, or inoperable exit door (placard all the building unusable if all exits are blocked or otherwise unusable)
Raised access floor with potential for collapse

Table 5: Typical non-structural hazards

10 Essential Facilities



Essential facilities are those facilities most needed by a community after a disaster.

10.0 Essential Facilities

Essential facilities are those facilities most needed by a community after a disaster.

Examples include:

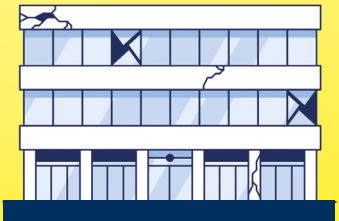
- hospitals
- health care facilities
- police and fire stations
- jails and detention centres
- communication centres
- emergency operation centres
- buildings designated for welfare centres
- key network facilities of lifeline utilities (lifeline utilities are entities that provide essential infrastructure services to the community such as water, wastewater, transport, energy and telecommunications).

All essential facilities should be given a **Level 2 Assessment** as a priority. It is the owner's responsibility to also have structural engineers complete more a detailed evaluation of the building as soon as possible.

All critical, fixed equipment should be checked by appropriate specialist/ maintenance personnel because essential facilities must be operational (rather than only usable). Fire protection and elevator systems should be examined by appropriate specialists.

In most cases, the owners and operators of essential facilities will already have specific arrangements in place with engineers that are familiar with their buildings/structures. These arrangements are referred to as **Priority Response Agreements**.

11 Demobilisation



What to do when your team returns to the base of operations.

11.0 Demobilisation

When your team returns to the base of operations, you will need to:

- sign-out when you have returned from the field
- report to your Sector Coordinator (or other designated person)
- submit your assessment forms (if paper based), along with any photos to the person responsible
- report any health and safety issues, or risks or hazards identified in the field to the appropriate person (eg your Team Leader or the Building Response Manager)
- discuss any technical or process problems with the appropriate person (eg Team Leader, Sector Coordinator or Building Response Manager). This may include the need for additional barricades and consideration of specified buildings for demolition
- ensure you receive clear instructions about your next involvement (that is, next assignment or stand-down)
- attend a debrief (if being held).

11.1 Debriefing

Operational debriefs should take place daily.

They should include, where possible, a review and moderation of placard decisions, and a discussion of risks and issues encountered in the field.

Debriefs also help the management team make any changes needed to future plans and activities to share findings, identified risks and concerns, and discuss placard decisions. A debrief is also a good time to report any health, safety and welfare concerns you have about yourself or others.

12 Simple first aid procedures for the field

You may come across seriously injured people during an assessment. Call 111 first.

12.0 Simple first aid procedures for the field

You may come across seriously injured people during an assessment. Call 111 first.

If no other help is around, you may need to give emergency first aid. You must ensure your own safety before you attend to an injured person. RBAs always work in teams. While one team member attends to the injured person, the other(s) should look for help.

12.1 Bleeding

Deep cuts

Deep cuts in the veins produce dark blood that seeps out slowly and steadily. It can be stopped by pressing gently on the wound with a sterile or clean cloth, then applying a clean or sterile bandage. These wounds may need sewing or glueing, so medical treatment will be necessary after first aid.

Arterial bleeding

Bleeding from an artery can cause death in a few minutes, so urgent first aid is essential. This type of bleeding pulsates and squirts blood as the pulse beats. The blood is often a light red colour. Arterial bleeding must always be treated by a doctor. To manage bleeding from an artery:

- apply hard pressure on the wound, and keep this up until the patient receives medical treatment
- press with a sterile cloth or just use your hand, if nothing else is available
- put a bandage on the wound if possible – if the blood soaks through the bandage, press harder until bleeding stops
- do not remove the soaked bandages, but place another on top if necessary
- do not attempt to clean the wound.

Make the person lie down, preferably with their head lower than the rest of their body. This will help oxygen get to the brain.

If possible, position the wounded area higher than the rest of their body – to reduce the pressure, and therefore the bleeding.

12.2 Shock

Shock occurs when too little blood circulates to the brain. This means that the brain is not getting enough oxygen, which leads to a feeling of faintness, disorientation and dizziness.

Shock may occur after accidents that cause loss of fluids or blood, or after serious burns.

What to do if someone is in shock

1. Lie the person on their back with their feet raised – to help the blood get to the brain
2. Keep the person warm, comfortable and covered by a blanket if possible
3. Do not give them anything to drink, because they could choke or may need surgery
4. If the person vomits or bleeds from the mouth, place them on their side to prevent choking
5. A person in shock must always be treated by a doctor.

12.3 Breathing difficulties

If someone stops breathing, talk to them or touch them on the shoulder to see if they respond.

In adults, the problem is usually the heart rather than the lungs, so cardiac compressions come first and rescue breaths second.

Do not waste time checking for a pulse if the patient does not respond.

12.4 Cardiopulmonary resuscitation (CPR)

Cardiac compressions

1. Place the heel of your hand in the middle of the chest above the breasts, that is the middle of the lower half of the breastbone (not over the ribs or stomach)
2. Place the heel of your other hand on top of the first. Keep your fingers off the chest by locking them together. Apply pressure through the heels of your hands
3. Keep your elbows straight, and bring your body weight over your hands to make it easier to press down
4. Press down firmly and quickly with a downwards movement of 4 to 5cm, then relax and repeat the compression
5. Do this about 100 times a minute (CPR is fast and hard work – you can help your timing and counting by saying out loud 'one and two and three and four. . .' and so on)
6. Do this 30 times.

Breathing

7. Now open the airway by positioning the head with the chin pointing upward
8. Pinch the nostrils shut with two fingers to prevent air leaking out
9. Take a normal breath, and seal your own mouth over the person's mouth, making sure there's a good seal
10. Breathe slowly into the person's mouth – it takes about two seconds to inflate the chest
11. Do this twice
12. Check to see if the chest rises as you breathe into the patient's mouth
13. If it does, enough air is going in
14. If there's resistance, try to hold the head back further and lift the chin again.

Repeat

15. Continue with 30 chest compression, then two rescue breaths – and only stop if the victim starts to breath
16. If you can continue, do not stop for any other reason, until someone else can take over from you. If possible, switch with another person every couple of minutes, without interrupting compressions. If there are two rescuers: one can do breaths and the other compressions.

Appendices

Appendix 1: Sample authorisation form and guidance for deployed Rapid Building Assessors

The purpose of this form is to record the authorisation of a Rapid Building Assessment Assessor to undertake Rapid Building Assessments in relation to an emergency under the Civil Defence Emergency Management Act 2002 and/or the Building Act 2004.

It also provides Assessors (and Authorising Persons) with key information and guidance on functions, resources, and procedures necessary for Rapid Building Assessments during a State of Emergency, Transition Period and/or a designation of an area following an emergency.

1. Authorising Person	**Insert name of the Authorising Person and their role:** See **page 3** for guidance on who the Authorising Person should be.
2. Employer	**Insert the name of the employer engaged (if applicable):**
3. Assessor	**Insert name of person engaged (on behalf of the firm above, if applicable):** **Assessor ID number:** If currently on register of trained Rapid Building Assessors maintained by the Ministry of Business, Innovation and Employment (MBIE)
4. Date of authorisation	**Insert date of authorisation:**

5. End date	**Insert the end date or set out the maximum period (eg maximum of 3 days):** unless extended or terminated sooner by the Authorising Person.	
6. Scope and nature of services	Rapid Building Assessments under the Civil Defence Emergency Management Act 2002 and/or the Building Act 2004 in the interests of public safety per the MBIE guidelines, including issuing placards following assessment. Assessments are to be undertaken in **(insert area):** in relation to **(insert event/emergency being responded to):**	
7. Special conditions	**Insert any special or additional conditions (eg the assessor will not perform geotechnical assessments):**	
8. Signatures	**Authorised person:**	**Date:**
	Assessor (on behalf of firm noted above, if applicable):	**Date:**

Guidance for Assessors

Purpose of rapid building assessments

The purpose of rapid building assessments is to determine the usability of structures in the context of public safety during a State of Emergency, Transition Period and/or designation of an area following an emergency.

This guidance applies to Assessors carrying out rapid building assessments under the Civil Defence Emergency Management Act 2002 and/or the Building Act 2004 only.

Who is the Authorising Person?

The Authorising Person is named in the above form and is the person with authority to undertake Rapid Building Assessments or to authorise others to do so. The appropriate Authorising Person will differ depending on the circumstances of the emergency.

If an area **has been designated under the Building Act 2004**, the Authorising Person for the purposes of this form is the "responsible person" as described in sections 133BJ and 133BK of the Building Act 2004.

Authorising person	
State of emergency at time of designation	A Controller (or a person acting under that person's authority)
Transition period at time of designation	A Recovery Manager (or a person acting under that person's authority)
No state of emergency or transition period at time of designation	The Territorial Authority or, in certain circumstances, the Minister for Building & Construction

If rapid building assessments are carried out under the **Civil Defence Emergency Management Act 2002** (ie because the area has not been designated under the Building Act 2004):

Authorising person	
State of emergency	A Controller (or a person acting under that person's authority)
Transition period	A Recovery Manager (or a person acting under that person's authority)

Note: if circumstances change, the Authorising Person may change, and this form may need to be updated.

Where the Authorising Person is a Territorial Authority, the person exercising powers on behalf of the Territorial Authority should hold the appropriate delegations. Delegations should be set up in advance to ensure efficiency.

Authorising Person roles and responsibilities

The Authorising Person will:

1. provide the Assessor with the means of identification to authorise them to do this work or the Assessor will use the MBIE-issued identification as an authorised Rapid Building Assessor;
2. ensure the Assessor is provided with or has appropriate safety equipment;
3. ensure the Assessor undertakes a health and safety induction prior to undertaking any assessments, including a briefing on the emergency procedures in place;
4. ensure the Assessor will be supported by at least one other person in the field;
5. ensure the Assessor is provided with the standard assessment forms and placards as required.

What are the powers of the Assessor?

Assessors acting under the authority of the Authorising Person may inspect the exterior and interior of a building or land in a designated area and prepare a post-event assessment of any risks posed by or to the building. They may then place a placard on the building identifying its usability and if necessary, record that access is restricted.

A trained Assessor (Tier 1 or Tier 2) should lead each assessment team. The register of trained Rapid Building Assessors maintained by MBIE records that an assessor has completed Rapid Building Assessment training provided by MBIE and sets out the Tier the Assessor has achieved.

Assessor roles and responsibilities

The Assessor will:

1. follow the instructions of the Authorising Person;
2. not operate outside their field of expertise unless under the supervision of another suitably qualified building assessor;
3. take reasonable care for his or her own health and safety;
4. take reasonable care that his or her acts or omissions do not adversely affect the health and safety of other persons;
5. not assume any obligation on behalf of the Authorising Person;
6. not release confidential information received in the execution of these duties to any other party or for any other purpose save for the Rapid Building Assessment for this event; and
7. not talk to the media or make any public statement unless authorised to do so during or after the rapid building assessment.

Unless otherwise agreed, or otherwise provided in a contract for services or a contract of service, the Assessor provides the rapid building assessment services are in a voluntary capacity for the duration and under the conditions specified in the above form and there will be no remuneration for this work. Expenses incurred for travel and accommodation will be met by the territorial authority for the area the work is carried out in. In a national state of emergency these costs may be met by MBIE.

The Assessor shall perform services for assessment of the usability of structures in accordance with rapid building assessment guidelines as produced by MBIE. No other services shall be supplied without express instructions from the Authorising Person or other person with appropriate authority. In providing the services, the Assessor shall exercise skill, care, and diligence expected of a competent professional. The Assessor should advise the Authorising Person of any training or knowledge the Assessor has of building usability assessment systems.

The Assessor completing the rapid building assessment is aware of the safety issues associated with entering or approaching buildings or other structures following an emergency.

Assessor liability

When acting under the Building Act 2004, the Assessor is protected under section 390 of the Act from civil liability in respect of the Assessor's services under the Act, provided they act in good faith.

When acting under the Civil Defence Emergency Management Act 2002, the Assessor is protected under section 110 of the Act from liability for any loss or damage in respect of his or her services carried out under the direction of the Authorising Person, other than conduct that is grossly negligent or in bad faith.

General

Should work proceed beyond the duration indicated or for purposes other than emergency response, a commercial contract should be signed.

Either party may suspend all or part of the services by notice to the other party. It is understood that these services are undertaken under emergency conditions and circumstances as to the Assessor's availability, the nature of the situation, or the requirements of the Authorising Person, may change.

Appendix 2: References

Applied Technology Council, 2005, "ATC 20-1, Field manual: postearthquake safety evaluation of buildings, Second Edition", R.P. Gallagher Associates, Inc., Oakland, California

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Department of Building and Housing, June 2012, "Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch"

Engineering Advisory Group, Revision 7, 2012, "Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2: Evaluation Procedure"

Department of Building and Housing, 2010, "Building Safety Evaluation During a State of Emergency – Guidelines for territorial authorities", prepared by the New Zealand Society for Earthquake Engineering, Draft updated version 14 July 2010

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New Zealand Society for Earthquake Engineering, September 2011, "Report to the Royal Commission of Inquiry into Building Failure Caused by the Canterbury Earthquakes, Building Safety Evaluation Following the Canterbury Earthquakes"

New Zealand Society for Earthquake Engineering, 2012?, "Building Safety Evaluation During a State of Emergency, Key Structural Principles: Types of Construction and Their Failure Modes" (draft)(Figure numbers in this Guide: Fig. 15, 16, 18 and 21)

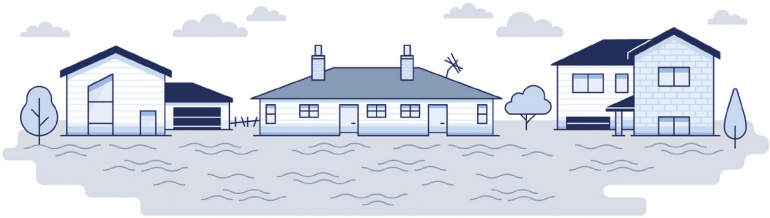
Appendix 3: Useful links

This Field Guide may be downloaded at: www.building.govt.nz/managing-buildings/managing-buildings-in-an-emergency/rapid-building-assessment-system/rapid-building-assessment-resources

For geotechnical rapid building assessments, see the Geotechnical Field Guide: Rapid post disaster: Building usability assessment www.building.govt.nz/assets/Uploads/managing-buildings/post-emergency-building-assessment/building-usability-assessment-geotechnical.pdf

Rapid building assessment forms and placards can be found here: www.building.govt.nz/managing-buildings/managing-buildings-in-an-emergency/rapid-building-assessment-system/rapid-building-assessment-resources#jumpto-rapid-building-assessment-placards

General guidance on building emergency management can be found here: www.building.govt.nz/managing-buildings/managing-buildings-in-an-emergency



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