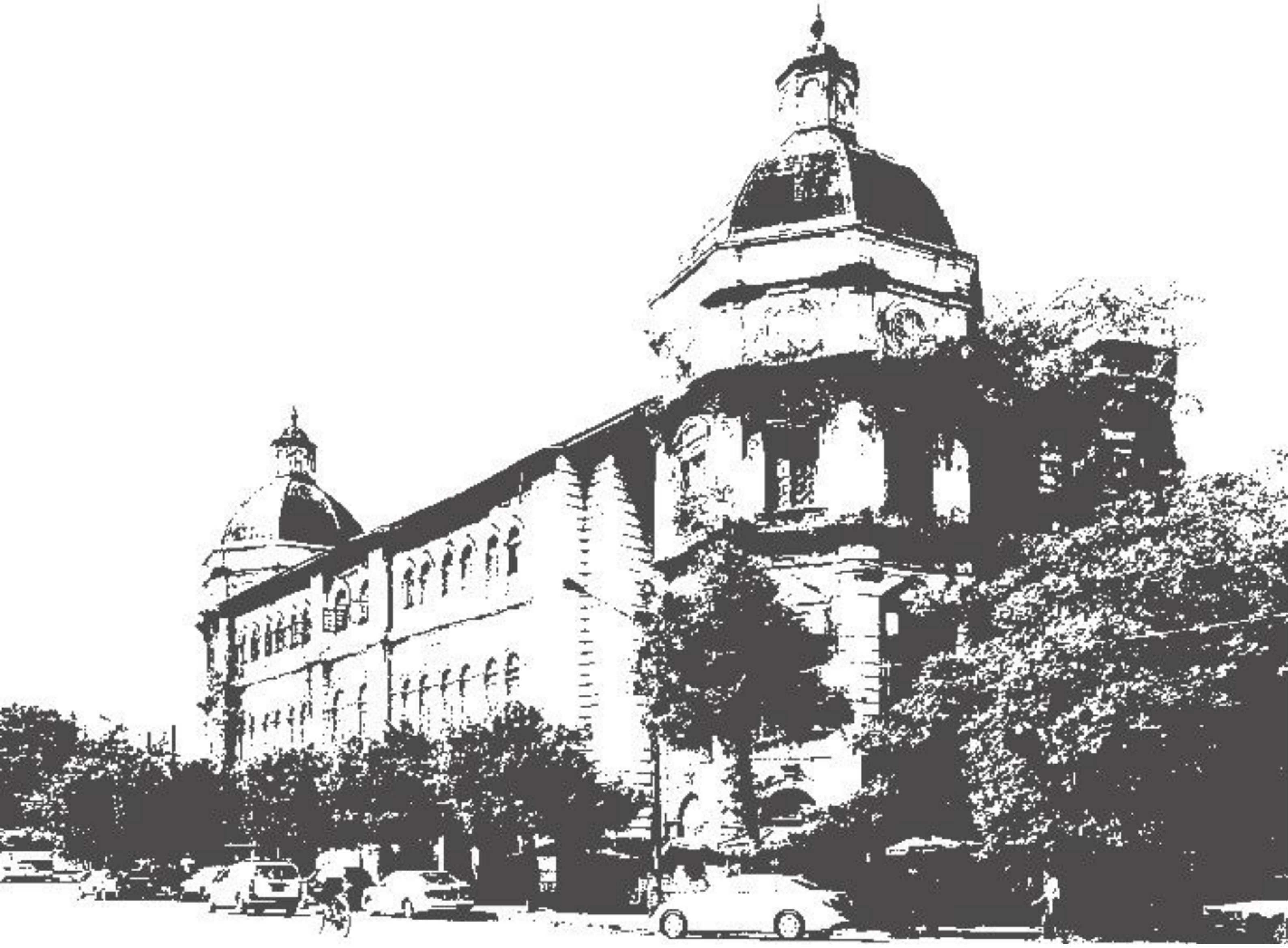
# FIELD GUIDE:
# RAPID POST DISASTER
# BUILDING USABILITY ASSESSMENT



Prepared By

2019

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# Executive Summary

The objective of the rapid building assessment field assessment is to quickly establish the usability of buildings and associated infrastructure where functions may be compromised by the event of the earthquake, which could affect losses of life and damage to residential or business consequences.

The scope of these guidelines covers the rapid assessment of buildings to be carried out during a State of Emergency or in the event of an earthquake.

This field guide provides procedures and guidelines for safety evaluation of damaged buildings. These procedures and guidelines are written for volunteer structural engineers, as well as building inspectors and structural engineers from city municipality department and building officials.

In this document, it describes the basic concept of the guidelines for Level (I) Rapid Evaluation Post Earthquake Damage Assessment and Level (II) Rapid Evaluation for Evaluation (for common and complex buildings). This field guide is easy-to-use field reference document.

This Field Guide has been produced as collaboration between Federation of Myanmar Engineering Society and Myanmar Earthquake Committee Funded by UN-Habitat. The field guide is intended to be taken into damaged areas and used by trained structural engineers.

# 1 Seismic Hazards of Myanmar

Myanmar is prone to different ranges of natural disasters, including earthquakes. Several earthquakes of different magnitudes happened in the past around the country, such as the Magnitude 8.0, May 23, 1912 Maymyo earthquake, March 23, 1839 Ava (M~7.5) Earthquake, May 5, 1930 (M-7.3) Bago Earthquake and July 16, 1956 (M-7.0) Sagaing Earthquake. The most recent damaging Chauk Earthquake happened in 2016 caused three people dead, and several pagodas were damaged and collapsed in the Bagan area.

The seismicity of Myanmar can be divided into three regions based on its geographic and earthquake behaviours.

**Sagaing Fault Region**: The most significant earthquake fault system spanning from north to south in the middle of the country. It is a right-lateral strike-slip fault with a relative movement of 25 mm per year. In this region, up to 8, Richter scale earthquakes are possible. Most of the earthquakes stroke in this region were shallow focused and very destructive.

**Subduction Region**: This is the subduction zone where the Indian plate meets Asian landmass. It is a thrust fault with a relative movement of 47 mm per year. More than 8 Richter scale earthquakes are possible in this region. Most of the earthquakes stroke in this region were medium depth focused and relatively less destructive.

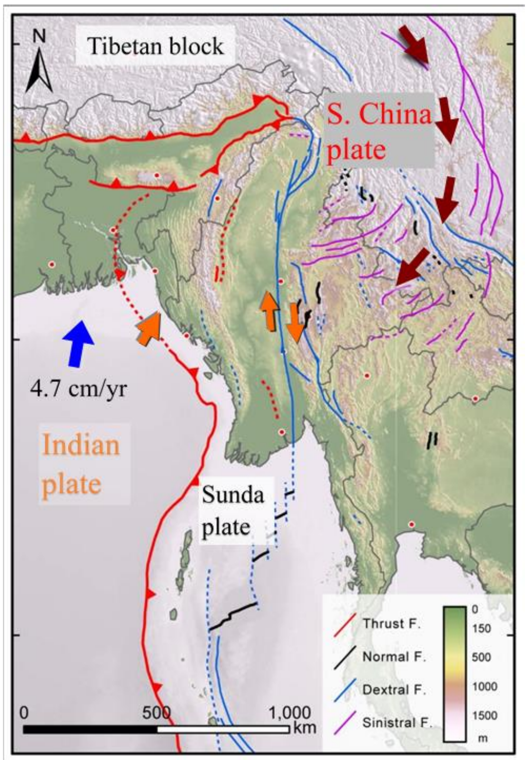



Figure **1:** Major Seismic Regions in Myanmar

**Shear Zone Region:** This is the shear zone region that lies between the Sagaing Fault and the South China plate. It is sinistral faults, and up to 7 Richter scale earthquakes are possible. Earthquakes in this region are shallow focused and destructive.

Moreover, many major cities like Nay Pyi Taw, Yangon, Mandalay, Sagaing, etc. are lies in the direction of Sagaing faults. Therefore, these cities have higher risks in the case of an earthquake.

## 1.1 Building Vulnerability in Myanmar

It has been found out that buildings in Myanmar are seismically vulnerable that result from Thabeikyin and Tarlay Earthquake, which were happened in 2012 and 2011. About 100 buildings were damaged, and 30 people who were living in unsafe buildings were dead due to Thabeikyin Earthquake. Tarlay earthquake left 73 people to death and destroyed about 250 buildings.

Figure 2: Housing Damages Due to Thabeikyin Earthquake

Figure 3: Housing Damages due to Tarlay Earthquake

Therefore, it has been shown that buildings in Thabeikyin and Tarlay townships are seismically vulnerable that these buildings were not built with required seismic demands. Moreover, the following table shows damages and casualties due to a strong earthquake in recent years.

Table 1: shows the damages and causalities due to strong earthquake in recent years

| Date | Place | Magnitude and Recorded Damaged |
|---|---|---|
| 17-Dec-1927 | Yangon | Buildings in Yangon were affected, and Dedaye as well. |
| 8-Aug-1929 | Swa, Taungoo | Railways damaged. Bridges collapsed. Train wagons were fallen. |
| 5-May-1930 | Khayan | M=7.3ı 500 people from Bago and 50 people from Yangon dead |
| 3-Dec-1930 | Nyaunglebin | M=7.3ı (Phyuu Earthquake) Railways damaged, 30 people dead |
| 27-Jan-1931 | Indawgyi | M=7.6ı (Myitkyinar Earthquake) Ground fissures and building damages occurred. |
| 12-Sep-1946 | Tagaung | M=7.5 |
| 16-July-1956 | Sagaing | M=7.0ı Many pagodas damaged. About 40 to 50 people dead. |
| 8-July-1975 | Bagan | M=6.8ı (Bagan Earthquake) ı Many pagodas were devastated. One people dead |
| 5-Jan-1991 | Tagaung | M=6.8ı Pagodas were collapsed. Large ground fissures occurred. |

| Date | Place | Magnitude and Recorded Damaged |
|---|---|---|
| 22-Sep -2013 | Taungdwingyi | M=6.8ı Houses and pagodas were collapsed and seven people dead. |
| 12-March-2011 | Tarchileik | M=6.8ı Houses and pagodas of Tarlay were collapsed, and 71 people dead. |
| 11-Nov-2012 | Thabeikkyin | M=6.8ı Thabeikkyin, Singu, Shwebo. Houses and pagodas damaged. 26 people dead. |
| 24-Aug-2016 | Chauk | Magnitude 6.8, Caves, statues, pagodas, and temples of Bagan were damaged and collapsed. |

## 1.2 Seismic Safety Regulation in Myanmar

Seismic design provision only started to apply after CQHP (Committee for Quality Control of High-rise Building Construction Projects) had established in 2002. Therefore, buildings before the year 2002 have been taken as pre-code buildings. The following figure and table show legal mechanisms and responsible organisations for the regulation of buildings.

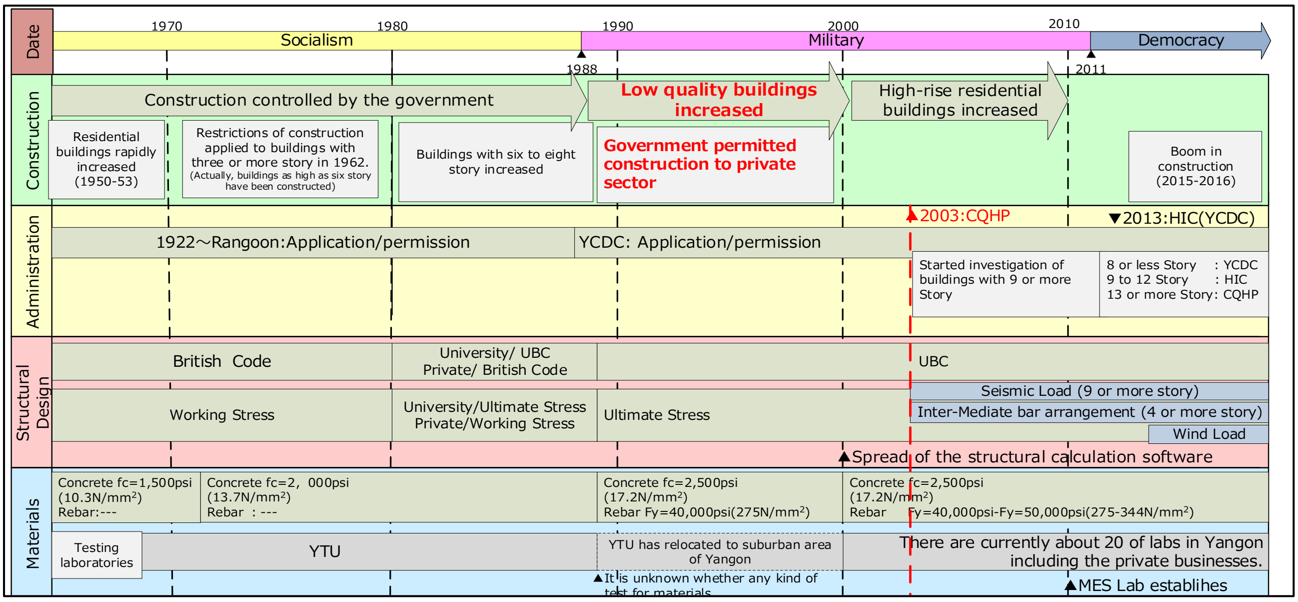



Table 2:Legal Arrangement summary matrix

| Legal Mechanism | Responsible Organizations |
|---|---|
| 1965-1980 – Construction controlled by the government | Ministry of Construction |
| 1990-2002 – Government permitted construction to the private sector | Yangon City Development Committee, Mandalay City Development Committee, Regional municipalities |

| | |
|---|---|
| 2002-2010 – Establishment of Committee for Quality Control of High-rise Building Construction Projects (CQHP) | - Less than nine stories – Yangon City Development Committee, Mandalay City Development Committee, Regional municipalities<br>- Nine or more stories – CQHP |
| 2012 – Establishment of MNBC Provisional Version | - 12 or less story – Yangon City Development Committee, Mandalay City Development Committee, Naypyitaw City Development Committee, Regional Municipalities<br>- 13 or more stories – Committee of Quality for High rise projects |
| 2018 – Myanmar National Building Code | -12 or less story – Yangon City Development Committee, Mandalay City Development Committee, Naypyitaw City Development Committee, Regional Municipalities<br>-13 or more stories – Committee of Quality for High rise projects |

Nowadays, Seismic resistant design for buildings more than eight stories were initially adopted by CQHP in 2002. Later in 2009, Yangon City Development Committee (YCDC) adopted seismic detailing requirements for all new engineered buildings in Yangon, including low-rise ones.

## 1.3 Seismic risk of Existing buildings

In general, it could be clearly imagined that the buildings built before 2002 and buildings without proper seismic detailing could be expected to damage in the case of a strong earthquake severely. In recent years, Myanmar Earthquake Committee had developed Rapid Visual Screening of Buildings for potential seismic hazards in 2015 and Retrofitting guidelines of Myanmar in 2018 with the financially supported of UN-Habitat to investigate the seismic performance of existing buildings in Yangon, Myanmar. The following charts and figures show a summary of results in studied areas collaboration with UN-Habitat, Plan International, and Myanmar and the American Red Cross Society.

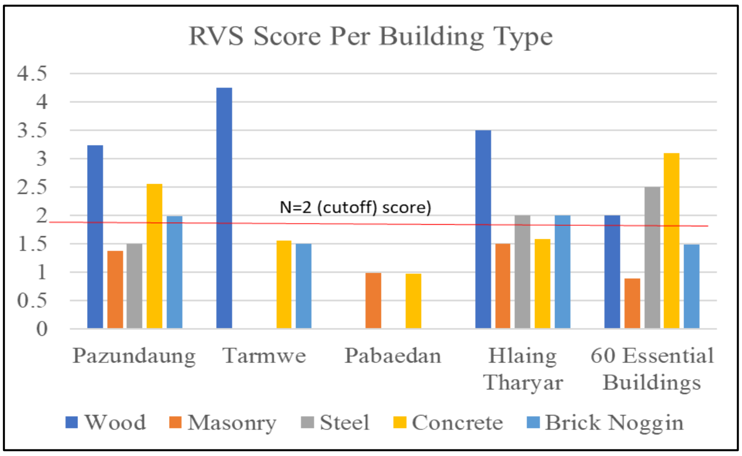



Figure 4: Seismic Performance of Existing buildings

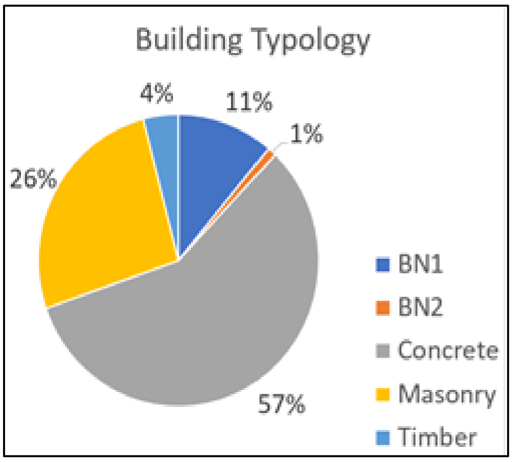



Figure 5: Building Typology distribution in studied areas

According to observation, it could be clearly observed that the seismic performance of existing buildings which doesn't meet seismic requirements are lower than Recommended Safety level. At that time, construction technology is adequately low. Therefore, the buildings without considering earthquake risks could be expected to high in the case of strong earthquakes.

The main vision of the Yangon Region, Earthquake Preparedness and Response Plan report that is published in 2019 clearly is to minimise damage to property, reduce injury and lives lost, and normalise the lives of those affected in a timely manner in the case of damaging earthquake in the region. It is clearly understood that the many buildings not only in Yangon but also in Myanmar are seismically hazardous, and the damage could be expected to be higher in the case of a strong Earthquake. It is undeniable that there is an urgent need to develop/adapt and standardise tools for Post-Earthquake Rapid Damage Guidelines to evaluate the safety of existing buildings after being struck by the earthquake.

Taking into consideration the above factors, this study of strengthening capacity on Post Earthquake Immediate Emergency response assessment is conducted by UN-Habitat, Myanmar Engineering Society, and Myanmar Earthquake Committee. This project's main objectives are (1) To develop standard tools, methodology, framework (2) To develop guidance notes for post-earthquake rapid damage assessment.

# 2 Importance and Usability of Post EQ Rapid Damage Assessment

Earthquake risk is a public safety issue that requires appropriate mitigation measures and means to protect citizens, property, infrastructure, and built cultural heritage. It is essential to implement a system to evaluate and investigate the damage and losses immediately after the event of a destructive earthquake. The following are the importance of guidelines of post-earthquake rapid damage assessment in Myanmar in short- and long-term measures.

## 2.1 Importance of Guidelines of Post Earthquake Rapid Damage Assessment in Myanmar

Building usability assessment which intended to be used immediately after the strong earthquake could support to the affected areas in many ways which shall distinguish mainly into following short term and long term aims as follows.

### 2.1.1 Short Term Aims for Post-earthquake Damage Assessment Tools

- Safe Occupation of buildings for
    - Continued use, especially emergency facilities
    - Minimisation of displacement of People
    - Minimisation of Impact on Economics
- Saving Property from Unnecessary demolition
- Minimising economic impacts for the owners and Community
- Safe use of Streets adjacent to damaged buildings
- Damage distribution Map

### 2.1.2 Long Term Aims for Post-Earthquake Damage Assessment Tools

- Cost of damage estimates
- Determining the required aid and resources
- Obtaining estimated damage data

## 2.2 Approaches for Developing Tools and Guidelines

Before developing the post-earthquake damage assessment in Myanmar, the following references are taking into consideration. After reviewing the documents adopted in International practices, Guidelines of Rapid Post Earthquake Damage Assessment is formulated based on to meet with local contexts.

- ATC-20 Field Manual: Post Earthquake Safety Evaluation of Building (2nd Edition) published in 2005
- New Zealand Field Guide Rapid Post Disaster (Earthquake) ($2^{nd}$ Edition) published in 2011 - are studied as references.

**ATC-20 Field Manual** - ATC-20 has been published first in 1989 and updated in 2005 (second edition) to include new examples and updated evaluation forms and etc. Their Principal Safety Concerns are Collapse, Partial Collapse, Structural Instability, Falling Hazards, and Other Hazards, and it assumes that significant aftershocks will occur. The main objective of this guideline focuses on hazards to life & limbs

**New Zealand Field Guide** - New Zealand Field Guide Rapid Post Disaster was produced in 2011 to assist building control officials, engineers, architects, property managers, and other building professionals to carry out Rapid Building Assessments during a State of Emergency or transition period. At the discretion of a territorial authority (TA), the Field Guide may be used outside the State of Emergency. The main objective is to quickly establish the usability of buildings and associated infrastructure where functions may be compromised by a hazard event. Hazard events include earthquake, flood, landslide, rock-fall, volcanic eruption, storm surge, tsunami, explosion, or other events with life safety, residential, or business consequences.

## 2.3 Experiences of Pre and Post Earthquake assessment conducted by Federation of Myanmar Engineering Societies

Federation of Myanmar Engineering Societies collaborated with Myanmar Earthquake Committee conducted Pre earthquake assessment in major cities of Myanmar such as Yangon, Taungoo, Bago, and Sagaing Cities since 2010. Moreover, post-earthquake investigation to infrastructures and existing buildings was conducted at Thabeikyin Earthquake, Tarlay Earthqukae, Taikyi Earthquake and Chauk Earthquake.

Figure 6: Post Earthquake Assessment after Chauk Earthquake

Figure 7: Post Earthquake Assessment of Temple buildings in Bagan after Chauk Earthquake

Figure 8: Post Earthquake Assessment after Tabeikyi Earthquake

Figure 9: Post Earthquake Assesment after Taikyi Earthquake

Based on the experience and lessons learned from these assessments, Stakeholders from Myanmar Earthquake Committee, Federation of Myanmar Engineering Societies and UN-Habitat were planned to formulate a field guide which covers the rapid assessment of buildings to be carried out during a State of Emergency or in the event of an earthquake after being struck by Chauk Earthquake.

## 2.4 Experts Groups

Professional Engineers and experts from Myanmar Earthquake Committee, Federation of Myanmar Engineering Societies and Special Project Committee are invited and prepared the Post Earthquake Rapid Damage Assessment field guide in collaboration with UN-Habitat professional engineers. The following are the lists of experts from Fed.MES, MEC and SPC.

1. U Nyun Maung San (Chairman, Special Project Committee)
2. U Saw Htwe Zaw (Vice-Chairman, Myanmar Earthquake Committee)
3. Daw Mya Mya Win (CEC member, MES)
4. Dr. Myo Thant (Vice-Chairman, Myanmar Earthquake Committee)
5. U Saw Pyae Aung (Technical Engineer, Myanmar Earthquake Committee)
6. U Wai Yar Aung (Technical Engineer, Myanmar Earthquake Committee)
7. U Min Khant (Technical Engineer, Myanmar Earthquake Committee)
8. Daw Hla Myat Shu (Technical Engineer, Myanmar Earthquake Committee)
9. U Htoo Nyi Nyi Lin (Technical Engineer, Myanmar Earthquake Committee)
10. Daw Nang Mgwe Syang (Project Analyst, Myanmar Earthquake Committee)
11. Daw Thet Htar Swe (Associate Project Analyst, Myanmar Earthquake Committee)

# 3 Methods and Frameworks

This guidebook intends to assess the buildings immediately after the earthquake as soon as possible. This guidebook intends for practising engineers as some of the terminologies would be difficult for people without specific engineering knowledges.

The main approach of the guidebook is to evaluate whether the buildings might be used after the earthquake or not. Post-Earthquake Rapid Damage Assessment is a quick way of assessing building usability after the earthquake based on visual inspection.

Level (I) form rapid damage assessment aims for short term countermeasures and usability assessment of buildings. In level (I) form, it focuses upon the categorisation of the lateral load resisting system, overall damage, and judgment of building usability.

The form is suitable for typical residential construction types. Buildings with standard commercial construction details (unreinforced masonry walls, tilt-up panels, multi-story buildings, and others) will usually require a Level 2 Assessment. Level 1 Assessments may be undertaken by teams comprising building control officers, structural and civil engineers, architects, experienced building contractors and other suitable experienced building professionals.

Level (II) optional rapid damage assessment form evaluates damage severity and extents of building structural risks, non-structural hazards, and geological hazards. After defining mentioned, these parameters scoring system has been used to indicate whether the buildings are safe, partly unsafe, or totally unsafe.

Level 2 Rapid Assessments and Level 2 complex form should be conducted on following building occupancy categories:

- All essential facilities (hospitals, schools, police and fire stations)
- All public infrastructures of 3 or more storeys
- Any other buildings where the Level 1 Rapid Assessment identifies the Restricted Access (Orange Placard) and Unsafe (Red Placard) which needed further inspection.

Level 2 Assessment teams should comprise at least one structural engineer, with input from geotechnical engineers where necessary. However, for the case of essential facilities and public buildings, Level 2 complex form is compulsory and it shall overrule the result or placard of level 1 rapid assessment form.

Always first inspect the building's exterior before entering it. **Note: Level 1 Assessment shall be done before undertaking the Level 2 Assessment.** The outcome of these rapid assessments is a completed form and an appropriate placard.

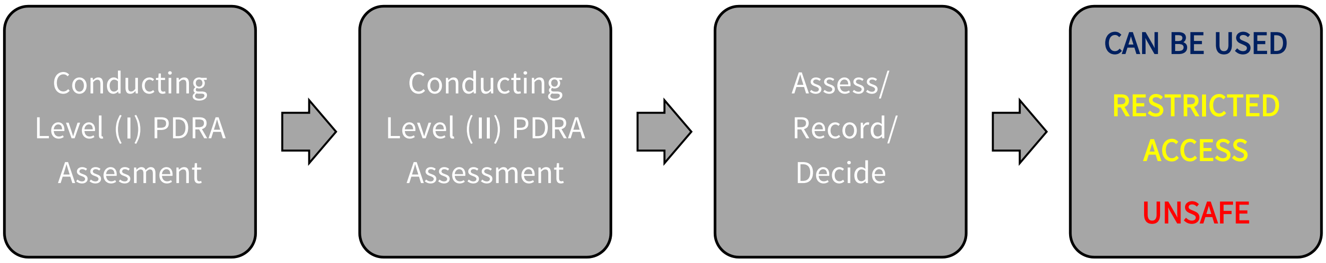



Figure 10: Flowchart of Post EQ Damage Assessment

Rapid assessments are mainly looking for any:

1. Potential of damages to structural members due to loss of strength, stability, or stiffness of the structural system

2. Potential of damages to non-structural elements such as loose bricks from unreinforced walls, tiles from a roof, overhanging signboards

3. Hazards due to falling off adjacent structures and geo-related hazards

If the building has light damage or almost **no damage**, which **does not observe any damage in structural and non-structural components** the building could be assigned as **"CAN BE USED"** (BLUE PLACARD).

If the assessed building has observed **moderate damage** in **structural and/or non-structural components**, it is recommended to the owner left, the building immediately as possible, and placard the buildings as **"RESTRICTED ASSESS"** (ORANGE PLACARD).

If the assessed building has observed **severe damage** in **structural and/or non-structural components**, it is recommended to the owner to leave the building immediately as possible and placard the buildings as **"UNSAFE"** (RED PLACARD).

The detailed concept and procedure explained in Chapter (7) to Chapter (8).

# 4 RESOURCES REQUIRED IN THE FIELD

The local authorities shall supply the following items to the Building Assessors during the building usability assessment after the earthquake.

- **Inventories for field assessment**
    - Assessment forms and placards
    - A4 foldable clipboards inside a plastic bag to protect forms protected from the environment
    - Pens and pencils
    - Indelible marker pens – use thin-tip permanent markers for writing notices,
    - Stapler and staples to attached sketches to assessment forms
    - Thumbtacks or plastic sleeves for placards
    - Duct tape
    - Scissors
    - Security cordoning or barrier tape Street maps
    - Food

# 5 DAMAGE ASSESSMENT PROCESS AND FORMS

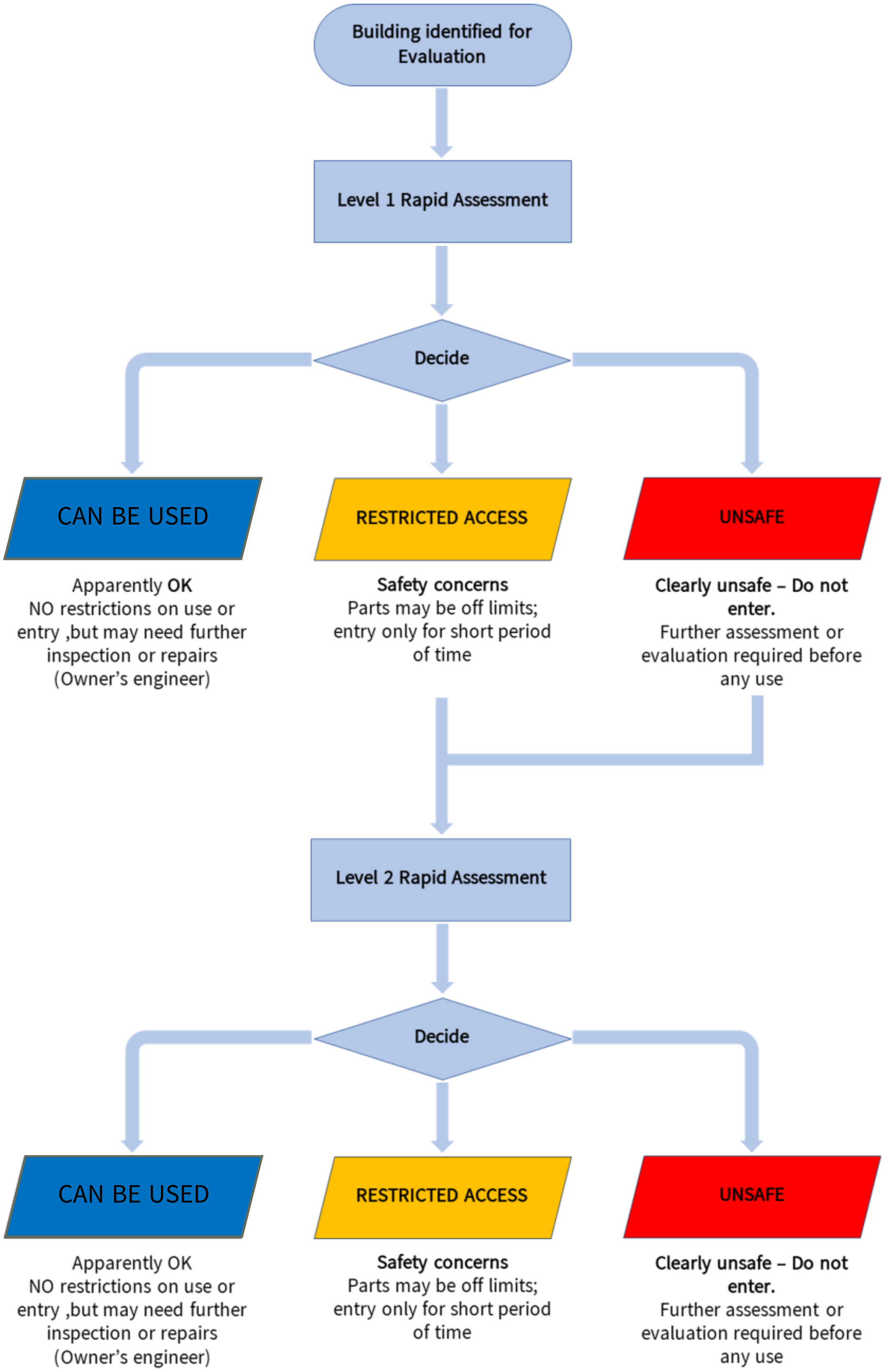



Figure 11: Rapid Assessment placards

## 5.1 Level-1 assessment form

The format and description of the information of the form require to follow the instruction (refer to Section 9). Level-I rapid post-earthquake assessment form shows in below:

### LEVEL-1 RAPID EVALUATION SAFETY ASSESSMENT FORM

UN-HABITAT

**Assessment**

Accessor ID ☐☐☐☐☐☐☐☐☐☐☐

Inspection date and time ☐☐-☐☐-☐☐ ☐☐:☐☐ (D D M M Y Y H H M M)

Team ID ☐☐☐☐☐☐☐☐☐☐☐

Area inspected ☐ Exterior ☐ Interior ☐ Both

**Building Description**

Building Name: ..........................................................................................

Address: ..........................................................................................

GPS Lat: ☐☐° ☐☐' ☐☐" Long: ☐☐° ☐☐' ☐☐"

Dimension X ☐☐☐' Dimension Y ☐☐☐'

Stories above ground ☐☐ Stories below ground ☐☐

| Type of Construction | | Occupancy | | |
|---|---|---|---|---|
| ☐ Bamboo/Wood | ☐ Steel | ☐ Residential | ☐ Industrial | ☐ Hospital |
| ☐ Brick Nogging | ☐ Concrete | ☐ School | ☐ Public/ Assembly | ☐ Emergency |
| ☐ Masonry | ☐ Other..................... | ☐ Office/ Commercial | ☐ Religion/Historic | ☐ Other .................. |

**Evaluation**

| External Risks | No | Yes |
|---|---|---|
| Pounding | ☐ | ☐ |
| Geotechnical hazards | ☐ | ☐ |
| **Overall Conditions** | | |
| Collapse | ☐ | ☐ |
| Partial collapse | ☐ | ☐ |
| Building off foundation | ☐ | ☐ |

| Building Conditions | None | Minor | Moderate | Severe |
|---|---|---|---|---|
| Building or story leaning | ☐ | ☐ | ☐ | ☐ |
| Damage to vertical system | ☐ | ☐ | ☐ | ☐ |
| Damage to horizontal system | ☐ | ☐ | ☐ | ☐ |
| Non-structural hazard | ☐ | ☐ | ☐ | ☐ |
| Other falling hazard | ☐ | ☐ | ☐ | ☐ |
| Other(specify) ...................................... | ☐ | ☐ | ☐ | ☐ |
| **Estimated Building Damage** | ☐ | ☐ | ☐ | ☐ |

**Posting placard**

○ CAN BE USED (Blue) ○ RESTRICTED ACCESS (Orange) ○ UNSAFE (Red)

**Further Actions**

Barricade needed Area: ..........................................................................................

Reason: ..........................................................................................

Detail evaluation recommended ☐ Structural ☐ Geotechnical ☐ Other.................................

Comments: ..........................................................................................

..........................................................................................

..........................................................................................

..........................................................................................

..........................................................................................

..........................................................................................

Sketch (Optional)/Photo no.

## 5.2 Level-2 Assessment Form

After assessing a Level 1 form, the Level 2 Assessment form may be filled out. There are two type of level 2 assessment forms for common building and complex building.

*Level-2 Rapid Evaluation Safety Assessment Form for Common Building*

LEVEL-2 RAPID EVALUATION SAFETY ASSESSMENT FORM (COMMON BUILDING)

UN-HABITAT

No need to fill again if Level 1 form is completed

**Assessment**

Accessor ID [ ] Inspection date and time [ ][ ]-[ ][ ]-[ ][ ] [ ][ ]:[ ][ ] (D D M M Y Y H H M M)

Team ID [ ] Area inspected [ ] Exterior [ ] Interior [ ] Both

**Building Description**

Building Name: ........................................

Address: ........................................

GPS Lat: [ ][ ]° [ ][ ]' [ ][ ]" Long: [ ][ ]° [ ][ ]' [ ][ ]" Dimension X [ ][ ][ ]' Dimension Y [ ][ ][ ]' Stories above ground [ ][ ] Stories below ground [ ][ ]

**Type of Construction**

- [ ] Bamboo/Wood
- [ ] Brick Nogging
- [ ] Masonry
- [ ] Steel
- [ ] Concrete
- [ ] Other....................

**Occupancy**

- [ ] Residential
- [ ] School
- [ ] Office/ Commercial
- [ ] Industrial
- [ ] Public/ Assembly
- [ ] Religion/Historic
- [ ] Hospital
- [ ] Emergency
- [ ] Other..................

**Evaluation**

Severity Score

| | |
|---|---|
| 0 | None |
| 1 | Minor |
| 2 | Severe |

Extent Score

| | | |
|---|---|---|
| 0 | None | |
| 1 | Few | < 30% |
| 2 | Many | > 30% |

| A Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | | | |
| Frame joints | | | |
| Structural walls | | | |
| Beams | | | |
| Floors | | | |
| Roof | | | |
| Pounding | | | |
| Others | | | |
| Total Str: Score | | | |

| B Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | | | |
| Ceilings, light fixtures | | | |
| Infill walls, partitions | | | |
| Elevators, stairs | | | |
| Exits | | | |
| Electric, gas, hazardous | | | |
| Others | | | |
| Total Non-Str: Score | | | |

| C External Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | | |
| Liquefaction | | | |
| Landslides | | | |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total External Score | | | |

**Posting**

| | | | |
|---|---|---|---|
| **Level 1 Posting** | Blue(0-20) | Orange(21-40) | Red(Above41) |
| **Level 2 Update** | Blue(0-20) | Orange(21-40) | Red(Above41) |

| | | Score |
|---|---|---|
| Total Str: Score | A | |
| Total Non-Str: Score | B | |
| Total External Score | C | |
| Total final score | | |

**Further Actions**

Barricade needed Area: ........................................

Reason: ........................................

Detail evaluation recommended [ ] Structural [ ] Geotechnical [ ] Other ....................

Comments: ........................................

........................................

........................................

........................................

Sketch (Optional)/Photo no.

*Level-2 Rapid Evaluation Safety Assessment Form for Complex Building*

LEVEL-2 RAPID EVALUATION SAFETY ASSESSMENT FORM (COMPLEX BUILDING)

UN@HABITAT

No need to fill again if Level 1 form is completed

**Assessment**

Accessor ID ☐☐☐☐☐☐☐☐☐☐☐ Inspection date and time ☐☐ - ☐☐ - ☐☐ ☐☐ : ☐☐ (D D, M M, Y Y, H H, M M)

Team ID ☐☐☐☐☐☐☐☐☐☐☐ Area inspected ☐ Exterior ☐ Interior ☐ Both

**Building Description**

Building Name: ..........

Address: ..........

GPS Lat: ☐☐ ° ☐☐ ' ☐☐ " Dimension X ☐☐☐ ' Stories above ground ☐☐

Long: ☐☐ ° ☐☐ ' ☐☐ " Dimension Y ☐☐☐ ' Stories below ground ☐☐

**Type of Construction**

☐ Bamboo/Wood ☐ Steel
☐ Brick Nogging ☐ Concrete
☐ Masonry ☐ Other..........

**Occupancy**

☐ Residential ☐ Industrial ☐ Hospital
☐ School ☐ Public/ Assembly ☐ Emergency
☐ Office/ Commercial ☐ Religion/Historic ☐ Other..........

**Evaluation**

Severity Score
0 None
1 Minor
2 Severe

Extent Score
0 None
1 Few < 30%
2 Many > 30%

B Blue
O Orange
R Red

A

| Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | | | |
| Frame joints | | | |
| Structural walls | | | |
| Beams | | | |
| Floors | | | |
| Roof | | | |
| Pounding | | | |
| Others | | | |
| Total Str: Score | | | |

6 14 — B ☐ O ☐ R ☐

B

| Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | | | |
| Ceilings, light fixtures | | | |
| Infill walls, partitions | | | |
| Elevators, stairs | | | |
| Exits | | | |
| Electric, gas, hazardous | | | |
| Others | | | |
| Total Non-Str: Score | | | |

6 14 — B ☐ O ☐ R ☐

C

| External Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | | |
| Liquefaction | | | |
| Landslides | | | |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total External Score | | | |

2 5 — B ☐ O ☐ R ☐

**Posting**

| | | | |
|---|---|---|---|
| **Level 1 Posting** | ○ Blue | ○ Orange | ○ Red |
| **Level 2 Update** | ○ Blue | ○ Orange | ○ Red |

**Further Actions**

Barricade needed Area: ..........

Reason: ..........

Detail evaluation recommended ☐ Structural ☐ Geotechnical ☐ Other ..........

Comments: ..........

..........

..........

Sketch (Optional)/Photo no.

# 6 REFERENCE GUIDES FOR DATA COLLECTION

## 6.1 Assessment

| | |
|---|---|
| Accessor ID | Name of the person who did the survey and fill in the form. |
| Team ID | Name of the team who did the survey and fill in the form. |
| Inspection date and time | Enter the date and time of the assessment. The time only needs to be accurate to the nearest half-hour. |
| Area inspected | Enter the survey area Inspected either Exterior Only or Exterior and Interior. |

## 6.2 Building Description

| | |
|---|---|
| Building Name | Mention the name of the building so that it can be easily known. In some cases, the building has its own name describing the occupancy type. |
| Address | Specify where the building is located, including the street name and block name. It is suggested to include the full range of address numbers for the building. |
| Contact Phone: | Get the information of the surveyed building for recalling the memory of uncertain things in the form later. |
| Latitude (Lat) | Fill the geographic coordinate that specifies the north-south position of the building. |
| Longitude (Long) | Fill the geographic coordinate that specifies the east-west position of the building. |
| Footprint area (sqft) | The floor area can be estimated by multiplying width and length of the ground floor. It may be useful at a later time for estimating the value of the building or for estimating occupancy load. |
| Stories above ground | Mention the number of floors above the natural ground level. The number of stories is a good measure for the height of the building. |
| Stories below ground | Mention the number of floors below the natural ground level. Information on the number of stories below grade can be used later if the authority or stakeholder considers the flooding issue in their development plan. |

## 6.3 Type of Construction

| | |
|---|---|
| Bamboo/Wood building | Light frame construction made up of specific dimensional bamboo or wood components, similar to a skeleton. |
| Brick Nogging building | The brickwork used to fill in space between vertical uprights in the wood-frame building. |
| Masonry building | In masonry buildings, walls are the most important load-bearing structural components both in vertical and lateral directions. |
| Steel building | A metal structure fabricated with steel for the internal support and for exterior cladding which is riveted, bolted or welded together. |
| Concrete building | All kind of concrete buildings that are a combination of cement concrete with reinforcements (steel bar). Predominant typologies of the concrete building are concrete moment-resisting frame building, concrete shear-wall buildings. |

*NOTE: "**Other**" means some hybrid buildings which are a combination of two or more kinds of construction types.*

Figure 12: Bamboo building

Figure 13: Wood building

Figure 14: Brick Nogging building

*Source: Internet*

Figure 15: Masonry building


Figure 16: Steel building

Figure 17: Concrete building


Figure 18: Other building (Hybrid)

## 6.4 Occupancy

| | |
|---|---|
| **Residential** | A building where dwellers may rent or own their residences. Some examples of residential building are houses, townhouses, motels, hotels, apartments and condominiums, and residences for the aged or disabled. |
| **School** | This occupancy includes all public and private educational facilities from nursery school to university level. |
| **Office/Commercial** | Office buildings house clerical, management functions, and professional services occupancies. Commercial occupancy classes refer to retail and wholesale business, financial institutions, restaurants, and parking structures. |
| **Industrial** | Industrial class is defined as factories, assembly plants, and heavy manufacturing facilities that produce goods or related services within an economy. |
| **Public/Assembly** | Places of public assembly are those where large groups of people might be gathered in one room at the same time. |

| | |
|---|---|
| **Religion/Historic** | This will vary from community to community. It is included because historic buildings may be subjected to specific ordinances and codes. |
| **Hospital** | Health care facilities encompass a wide range of types, from small and relatively large medical clinics and research hospitals. |
| **Emergency Services** | The emergency services class is identified as any facility that would likely be needed in a major catastrophe. |

*NOTE: Fill **"Other"** with the building is used for what purpose if there are not mention above in types of occupancy.*


Figure 19: Residential

Figure 20: School


Figure 21: Office/Commercial


Figure 22: Industrial


Figure 23: Public/Assembly


Figure 24: Religion/Historic


Source: Internet

Figure 25: Hospital


Source: Internet

Figure 26: Emergency Services

Source: Internet

Figure 27: Other occupancy (Government)


Source: Internet

Figure 28: Other occupancy (Warehouse)

## 6.5 Structural Hazards

Structural hazards can be expected to observe in the following structural member.

| | |
|---|---|
| **Columns** | A column, a structural element is a compression member that transmits, through compression, the weight of the structure above to other structural elements below. |
| **Frame Joints** | The joint has to provide continuity of structural action between the member meeting at the joint and ensure separation between the adjacent members to allow one member to move independently of the other. |
| **Structural walls** | A structural wall is one that holds the structure together with such as shear wall and bearing walls. Shear wall is a structural member used to resist lateral forces, i.e. parallel to the plane of the wall. A bearing wall is a wall that is an active structural element of a building, i.e. it bears the weight of the elements above the wall. |
| **Beams** | A beam is a horizontal member spanning an opening and carrying a load that may be a brick or stone wall above the opening. |

| | |
|---|---|
| **Floors** | A floor is a horizontal surface that lies on the beam of the building and acts as the diaphragm for the storey of the building. |
| **Roof** | A roof is the top covering of the building, including all materials and constructions necessary to support it on the walls of the building. It provides protection against rain, snow, sunlight, extremes of temperature, and wind. |

Structural hazards can also be expected due to pounding.

| | |
|---|---|
| **Pounding** | Building pounding occurs when two adjacent buildings collide. Earthquakes can cause pounding when adjacent buildings have little or no gap providing separation. |

*NOTE: Put the name of other structural elements that primarily resists loads.*

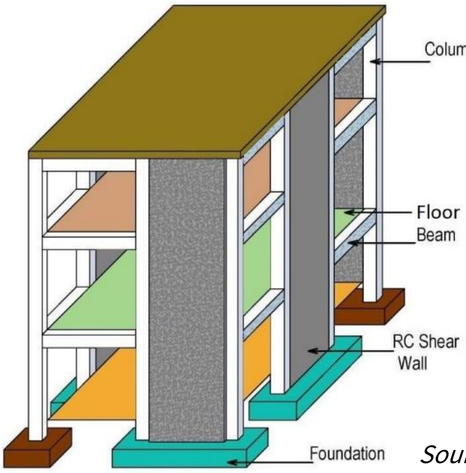

Figure 29: Columns


Figure 30: Frame Joints


Figure 31: Shear Wall


Figure 32: Bearing Wall

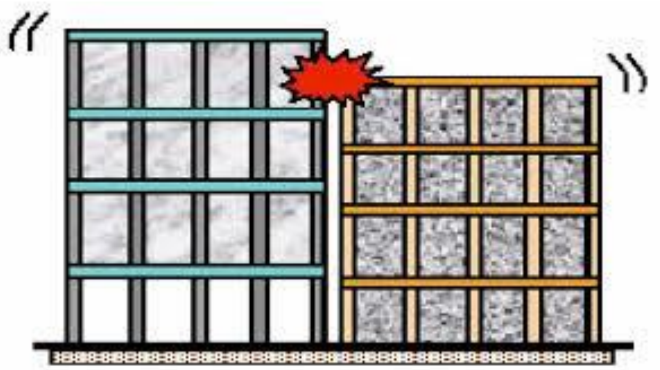

Figure 33: Beams




*Source: Internet*

Figure 34: Floors


Figure 35: Roof



*Source: Internet*

Figure 36: Pounding

## 6.6 Non-Structural Hazards

| | |
|---|---|
| **Tower, parapet, chimney** | They are an extension of the buildings at the top of the roof and are common in older masonry and wood frame dwellings without suitable braced. If they are inadequately tied to the structure, they will fall and become a hazard. |
| **Cladding, glazing** | Large, heavy architectural elements that add detail and decorative interest to the facade will fall off the building unless they have properly anchored in post-earthquake. The concern is greater with larger elements that pose a significant falling hazard risk. |
| **Ceilings, light fixtures** | Ceiling that is losing connection and other overhead facilities which hang on the wall or ceiling such as fans and light fixtures are the most common items to fall, causing damage or injury. |

| | |
|---|---|
| **Infill walls, partitions** | The supporting wall which made of brick, glass or other such material, closes perimeter of a building or separate interior room. |
| **Elevators, stairs** | The infrastructures that transport people or goods between floors (levels, decks) of a building, vessel, and other structure that can safely reach the ground level from the building. |
| **Exits** | The termination of an escape route from a building giving direct access to a street, passageway, walkway or open space, and sited to ensure the rapid dispersal of persons from the vicinity of a building so that they are no longer in danger. |
| **Electric, gas, hazardous** | This includes parts from the power and telephone grids such as electrical poles, wire, electronic equipment, transformers; parts from water and sewage distribution systems; chemicals, dyes and other raw materials from industries and workshops; waste from relief operations and supplies, pesticides and fertilisers, etc. |

*NOTE: Other non-structures may fall off the building in post-earthquake if improperly anchored such as canopies and architectural elements that add detail and decorative interest to the facade. Only The box should be checked if a significant falling hazard risk exists.*


Figure 37: Tower, parapet, chimney


Figure 38: Cladding, glazing


Figure 39: Ceilings, light fixtures


Figure 40: Infill walls, partitions


Figure 41: Elevators, stairs, exits

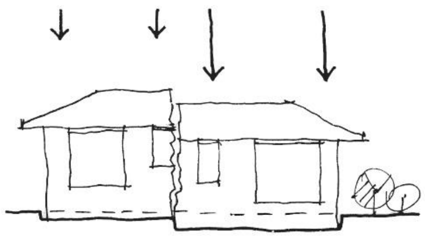

Figure 42: Electric, gas, hazardous

## 6.7 External Hazards

| | |
|---|---|
| Settlement | Settlement is the downward movement of the ground caused by a load consolidating the soil below it or causing displacement of the soil. Typically, settlement occurs within the foundation soils that surround and support the structure. |
| Liquefaction | This occurs in loose deposits of fine sand that have a high-water table. If such a soil configuration is subjected to a sudden disturbance or shock, as in an earthquake, the soil tends to lose stability under the shear stresses. The soil is temporarily transformed into a fluid mass with greatly reduced shear strength, with a condition resembling general soil shear failure. |

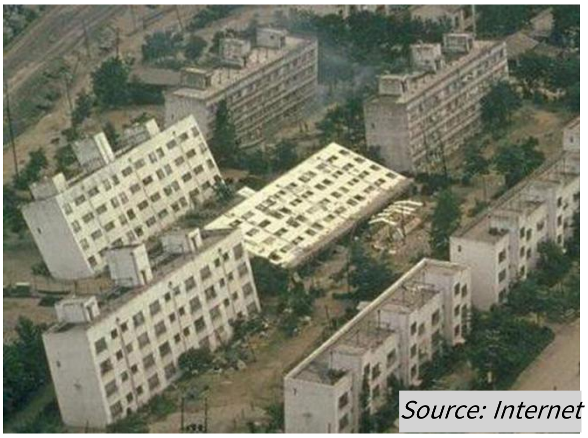
| | |
|---|---|
| Landslides | The movement of a mass of rock, debris, or earth down a slope. Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity. |
| Ground Fractures | A fracture is any separation in a geologic formation, such as a joint or a fault that divides the rock into two or more pieces. A fracture will sometimes form a deep fissure or crevice in the rock. |
| Rock Falls | Downward movements of individual rocks that detach or are ejected from steep slopes or cliffs. The falling mass may break on impact, may begin rolling on steeper slopes, and may continue until the terrain flattens. |
| Debris flow | Debris flows are the mobilisation of a mass of material downslope caused by saturation of the material, usually from inundation of a large volume of water. They often descend rapidly and can scour a channel in the slope during descent. The material in a debris flow can consist of soil, rock boulders, timber and other debris. |

*NOTE: Other hazards that can disrupt the existing building safety from the outside of the building should be considered as External Hazard as well.*



*Source: Internet*

Figure 43: Settlement



*Source: Internet*

Figure 44: Liquefaction

*Source: Internet*

Figure 45: Landslides

*Source: Internet*

Figure 46: Ground Fractures

**Bamboo/Wood**


Figure 47: Inclination of building (Moderate)


Figure 48: Building off foundation (Severe)

**Brick nogging**


Figure 49: Failure of interior and exterior walls (Moderate)


Figure 50: Partial collapse (Severe)

**Masonry**


Figure 51: Wall crack in building (Moderate)


Figure 52: Partial Collapse (Severe)

## Steel


Figure 53: Loose connection (Moderate)


Figure 54: Damage in the vertical members (Severe)

## Reinforced Concrete


Figure 55: Reinforcing bars are exposed due to spalling of the covering concrete (Moderate)

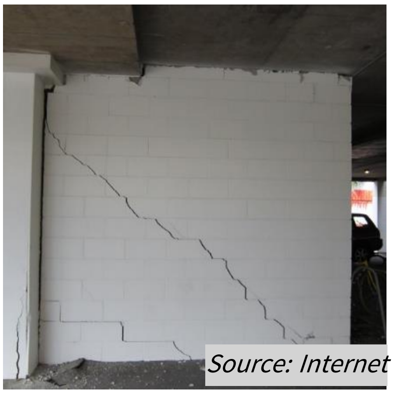



Figure 56: Large diagonal in partition or infill walls (Moderate)


Figure 57: exposure and buckling of reinforcement(severe)


Figure 58: Subsidence of upper floors, and fracture of reinforcing bars(severe)

# 7 INSTRUCTIONS ON HOW TO COMPLETE THE ASSESSMENT FORMS

## 7.1 Level-1 Rapid Evaluation Safety Assessment Form

These instructions refer to the sections of the form with corresponding numbers. Complete the forms in BLOCK CAPITALS to improve the quality of data entry, minimise revisits and facilitate scanning, which may be an option in a large event.

### Assessment

| Assessment | | | | | |
|---|---|---|---|---|---|
| Accessor ID | | Inspection date and time | __ __ - __ __ - __ __   __ __ : __ __<br>D D   M M   Y Y   H H   M M | | |
| Team ID | | Area inspected | ☐ Exterior | ☐ Interior | ☐ Both |

1. Enter your Assessor ID and Team ID under which jurisdiction you are undertaking the assessment. If more than one person is completing the form, use the name and the ID of the team leader.
2. Enter the date and time of the assessment with two digits format. The time only needs to be accurate to the nearest half-hour.
3. Enter the survey Area Inspected such as Exterior, Interior and Both.

### Building description

| Building Description | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Building Name: | ........................................ | | | | | |
| | Address: | ........................................ | | | | | |
| GPS | Lat: | ° | ' | " | Dimension X | ' | Stories above ground |
| | Long: | ° | ' | " | Dimension Y | ' | Stories below ground |

1. Identify the building. The street number and name are required facts. If available, enter the contact details of the building owner, occupant or building manager. This section is not mandatory.
2. 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.

**Type of construction and occupancy**

| Type of Construction | | Occupancy | | |
|---|---|---|---|---|
| ☐ Bamboo/Wood | ☐ Steel | ☐ Residential | ☐ Industrial | ☐ Hospital |
| ☐ Brick Nogging | ☐ Concrete | ☐ School | ☐ Public/ Assembly | ☐ Emergency |
| ☐ Masonry | ☐ Other......................... | ☐ Office/ Commercial | ☐ Religion/Historic | ☐ Other...................... |

1. Select the type of construction and occupancy. If the building type and occupancy are other than described, select other and write the type of construction and occupancy.

## 7.2 Evaluation (Interpretation and Calculation of Level-I Assessment)

| Evaluation | | | | | | | |
|---|---|---|---|---|---|---|---|
| **External Risks** | No | Yes | **Building Conditions** | None | Minor | Moderate | Severe |
| Pounding | ☐ | ☐ | Building or story leaning | ☐ | ☐ | ☐ | ☐ |
| Geotechnical hazards | ☐ | ☐ | Damage to vertical system | ☐ | ☐ | ☐ | ☐ |
| **Overall Conditions** | | | Damage to horizontal system | ☐ | ☐ | ☐ | ☐ |
| Collapse | ☐ | ☐ | Non-structural hazard | ☐ | ☐ | ☐ | ☐ |
| Partial collapse | ☐ | ☐ | Other falling hazard | ☐ | ☐ | ☐ | ☐ |
| Building off foundation | ☐ | ☐ | Other(specify) .............................................. | ☐ | ☐ | ☐ | ☐ |
| **Estimated Building Damage** | | | | ☐ | ☐ | ☐ | ☐ |

*External Risks and Overall Conditions*

1. Enter any external risks.
2. Enter building conditions according to damage conditions.

*Buildings Conditions*

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

- building or storey leaning
- structural damage to vertical system (damage to beams and columns)
- structural damage to lateral system observes whether the significant inter-storey movement has occurred (concrete spalling and hinging at the top and bottom of columns and at the base of walls, buckling of steel braces)
- non-structural hazards refer to section 9.6

Fill other hazards if there are not mention above in types of occupancy.

*Estimated building damage*

1. The overall assessment for use should be combined the (highest observed) severity of element damage with an estimate of its extent (numbers or elements having suffered the particular level of damage) as recorded in the form by selecting a cell.

## Posting

| Posting placard | | |
|---|---|---|
| ◯ CAN BE USED (Blue) | ◯ RESTRICTED ACCESS (Orange) | ◯ UNSAFE (Red) |

1. Enter your placarding decision. In general, you will apply a blue "CAN BE USED" placard only if you have identified no or light risks and damage.
2. In most cases, an "unknown" damage assessment should prompt an orange "RESTRICTED USE" or a red "UNSAFE" placard unless it is reasonable to assume that the unknown building elements do not result in any hazards to occupancy (e.g. electricity where no loose wires are observed). Also, refer to Section 5.2 "Placarding Criteria" on page 22 for guidance on placarding decisions.

## Further actions

| Further Actions | | | | |
|---|---|---|---|---|
| Barricade needed | Area: ........................ | | | |
| | Reason: ........................ | | | |
| Detail evaluation recommended | ☐ Structural | ☐ Geotechnical | ☐ Other ........................ | |
| Comments: ........................ | | | | |
| ........................ | | | | |
| ........................ | | | | |
| ........................ | | | | |
| ........................ | | | | |
| ........................ | | | | |

1. Recommend any further actions to be undertaken under local building authorities or by the building owner. If relevant, identify what particular expertise is required for further assessments and evaluations. Specify the areas where cordons or barricades are required and give some reasons for the use of barricades.
2. Any other recommendations for detail evaluation such as structural, geotechnical and/or another.
3. Provide any comments deemed necessary either to explain the posting or the assessment of damage or to explain information given in the form. Moreover, use the comments section for additional comments that were not yet covered in any other sections.

**Sketch and Photos**

| Sketch (Optional)/Photo no. | |
|---|---|

1. Draw a sketch of the building or describe the photo no. of the buildings to review later. The sketch is optional.

## 7.3 Level-2 Rapid Evaluation Safety Assessment Form

These instructions refer to the sections of the form with corresponding numbers. Complete the forms in BLOCK CAPITALS to improve the quality of data entry, minimise revisits and facilitate scanning, which may be an option in a large event.

### Assessment

| Assessment | | | |
|---|---|---|---|
| Accessor ID | ☐☐☐☐☐☐☐☐☐☐☐ | Inspection date and time | ☐☐ - ☐☐ - ☐☐ ☐☐ : ☐☐ (D D M M Y Y H H M M) |
| Team ID | ☐☐☐☐☐☐☐☐☐☐☐ | Area inspected | ☐ Exterior ☐ Interior ☐ Both |

4. Enter your Assessor ID and Team ID under which jurisdiction you are undertaking the assessment. If more than one person is completing the form, use the name and the ID of the team leader.
5. Enter the date and time of the assessment with two digits format. The time only needs to be accurate to the nearest half-hour.
6. Enter the survey Area Inspected such as Exterior, Interior and Both.

### Building description

| Building Description | | | | | |
|---|---|---|---|---|---|
| Building Name: | ........................................ | | | | |
| Address: | ........................................ | | | | |
| GPS Lat: | ☐☐ ° ☐☐ ' ☐☐ " | Dimension X | ☐☐☐ ' | Stories above ground | ☐☐ |
| Long: | ☐☐ ° ☐☐ ' ☐☐ " | Dimension Y | ☐☐☐ ' | Stories below ground | ☐☐ |

3. Identify the building. The street number and name are required facts. If available, enter the contact details of the building owner, occupant or building manager. This section is not mandatory.
4. 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.

### Type of construction and occupancy

| Type of Construction | | Occupancy | | |
|---|---|---|---|---|
| ☐ Bamboo/Wood | ☐ Steel | ☐ Residential | ☐ Industrial | ☐ Hospital |
| ☐ Brick Nogging | ☐ Concrete | ☐ School | ☐ Public/ Assembly | ☐ Emergency |
| ☐ Masonry | ☐ Other........................ | ☐ Office/ Commercial | ☐ Religion/Historic | ☐ Other...................... |

1. Select the type of construction and occupancy. If the building type and occupancy are other than described, select other and write the type of construction and occupancy.

## 7.4 Evaluation (Interpretation and Calculation of Level-II Assessment)

There are three categories in the evaluation of Level-2 post-earthquake building usability assessment, namely structural hazards, non-structural hazards and External Hazards. Moreover, according to the function of buildings, it is divided into two criteria, namely common buildings and complex buildings.

Buildings that were damaged in Northridge earthquake, Kobe earthquake, Thabeikyin and Tarlay earthquake are considered as case studies to justify the optimum scoring system for Structural Hazards, Non-Structural Hazards and other external hazards. We made the damaged scenario analysis to the hundred damaged buildings that was taken from above earthquakes. According to the damage scenario analysis, three set of basis criteria are come out which is based upon building usage and geological hazards as follows.

| Level (II) Form | CAN BE USED (Blue) | RESTRICTED ASSESS (Orange) | UNSAFE (Red) |
|---|---|---|---|
| Common PDRDA Form | 0-20 | 21-40 | More than 41 |
| Complex PDRDA Form | 0-6 | 7-14 | More than 14 |

In Level (II) Rapid Evaluation safety assessment form, give scoring on parametric weighted factor according to their building importance and structural importance to the randomly sampled buildings with the objective of qualitative system not to mistakenly assigned structurally affected buildings to CAN BE USED (Blue Placard).

As stated in section (3) Methods and Framework, level (II) complex form is intended for essential and emergency building which these buildings needed to assess not only structural hazards but also non-structural hazards and external hazards to make sure that these building could be functioned immediately after the earthquake.

Same methodology was performed as accordance with Level (II) rapid evaluation assessment to get optimum criteria. However, unlike level (II) rapid evaluation, the final scores are set to indicate Restricted Assess (Orange Placard) by using the lower bound value of mean results of all selected buildings. This means that the building will not be used if there only item among structural hazards, non-structural hazard and other external hazard is observed to be severe.

According to the criteria, buildings assessed by Level (II) complex form goes to RESTRICTED ASSESS (Orange Placard) even there are slight damages in non-structural and other external hazards.

*Level-2 Rapid Evaluation form for Common Buildings*

Common buildings refer to residential, public/assembly, office/commercial buildings, religion/historic buildings which do not usually have complex utility services and minor non-structural threats such as dropping off the lightweight ceiling, lighting fixtures and falling off cupboards etc. Therefore, Level-2 Rapid Evaluation form for common building checklist sheet is recommended to use as a tool while assessing these buildings.

*Structural Hazards for Level-2 Rapid Evaluation form for Common Building*

| Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | | | |
| Frame joints | | | |
| Structural walls | | | |
| Beams | | | |
| Floors | | | |
| Roof | | | |
| Pounding | | | |
| Others | | | |
| Total Str: Score | | | |

| Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | 1 | 2 | 2 |
| Frame joints | 2 | 2 | 4 |
| Structural walls | | | |
| Beams | 1 | 2 | 2 |
| Floors | 2 | 2 | 4 |
| Roof | 1 | 1 | 1 |
| Pounding | 2 | 1 | 2 |
| Others | | | |
| Total Str: Score | | | 15 |

The score of structural hazards can be calculated by the following steps:

1. Structural hazards section emphasises on elements or members which resist load in gravity and lateral system. The score of structural hazards can be calculated by multiplication of **(highest observed) severity of element damage** with an **estimate of its extent (numbers or elements having suffered the particular level of damage)** as recorded in the form. Recommend to use **"0"** in severity and extent if there is no damage in particular structural members.
2. Total score is the sum of structural hazards scores.
3. Mathematical equation to calculate the Structural Score is shown with the below equation.

$$\text{Str: Score} = \sum Severity \times Extent$$

*Non-structural Hazards Level-2 Rapid Evaluation form for Common Building*

| Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | | | |
| Ceilings, light fixtures | | | |
| Infill walls, partitions | | | |
| Elevators, stairs | | | |
| Exits | | | |
| Electric, gas, hazardous | | | |
| Others | | | |
| Total Non-Str: Score | | | |

| Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | 2 | 2 | 4 |
| Ceilings, light fixtures | 1 | 2 | 2 |
| Infill walls, partitions | 2 | 1 | 2 |
| Elevators, stairs | 1 | 1 | 1 |
| Exits | 2 | 1 | 2 |
| Electric, gas, hazardous | | | |
| Others | 1 | 1 | 1 |
| Total Non-Str: Score | | | 12 |

The score of non-structural hazards can be calculated by the following steps:

1. Non-structural hazards section emphasises on elements or members which do not resist load in gravity and lateral system but can injure and severely damage to occupants in the case of an earthquake. The score of non-structural hazards can be calculated by multiplication of **(highest observed) severity of element damage** with an **estimate of its extent (numbers or elements having suffered the particular level of damage)** as recorded in the form. Recommend to use **"0"** in severity and extent if there is no damage in particular non- structural members.
2. Total score is the sum of non-structural hazards scores.
3. Mathematical equation to calculate the Structural Score is shown with the below equation:

$$\text{NonStr: Score} = \sum Severity \times Extent$$

*External Hazards Level-2 Rapid Evaluation form for Common Building*

| External Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | | |
| Liquefaction | | | |
| Landslides | | | |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total External Score | | | |

→

| External Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | 2 | 2 |
| Liquefaction | | | |
| Landslides | | 2 | 2 |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total External Score | | | 4 |

The score of external hazards can be calculated by the following steps:

1. Geotechnical hazards section emphasises on geological features of land instability. The score of Geotechnical hazards can be obtained by if there are any geotechnical hazards described in the form. Recommend to use **"0"** in if there is no dominant land instability and use **"2" if observed dominant land instability or geotechnical hazards.**
2. Total score is the sum of external hazards scores.
3. To calculate the External Score (External Score);

$$\text{External Score} = \sum Geotechnical\ Hazards$$

*Overall Building Score*

| | Score |
|---|---|
| Total Str: Score | |
| Total Non-Str: Score | |
| Total External Score | |
| Total final score | |

→

| | Score |
|---|---|
| Total Str: Score | 15 |
| Total Non-Str: Score | 12 |
| Total External Score | 4 |
| Total final score | 31 |

1. Final score for each type can be calculated by multiplying with Factor described in the table.
2. Total score is the sum of the Final Scores.
3. Categorisation of the total score can be divided into three criteria as follows.

   00 – 20 = Blue

   21 – 40 = Orange

   Above 41 = Red

According to example calculation, the exampled building fall within Orange (Restricted Access).

### *Level-2 Rapid Evaluation form for Complex Buildings*

Complex buildings refer to hospitals, schools, Emergency buildings, and heavy industrial buildings which needed to operate as shelter and emergency services because these buildings usually have complex utility services and non-structural threats which could lead to structural failures and explosion.

**Evaluation**

| Severity Score | |
|---|---|
| 0 | None |
| 1 | Minor |
| 2 | Severe |

| Extent Score | | |
|---|---|---|
| 0 | None | |
| 1 | Few | < 30% |
| 2 | Many | > 30% |

| | |
|---|---|
| B | Blue |
| O | Orange |
| R | Red |

| A Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | 1 | 2 | 2 |
| Frame joints | 1 | 2 | 2 |
| Structural walls | | | |
| Beams | 1 | 2 | 2 |
| Floors | 2 | 2 | 4 |
| Roof | 1 | 1 | 1 |
| Pounding | 2 | 1 | 2 |
| Others | | | |
| Total Str: Score | | | 13 |

6 14

B ☐ O ☑ R ☐

| B Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | 2 | 2 | 4 |
| Ceilings, light fixtures | 1 | 2 | 2 |
| Infill walls, partitions | 2 | 1 | 2 |
| Elevators, stairs | 1 | 1 | 1 |
| Exits | 2 | 1 | 2 |
| Electric, gas, hazardous | | | |
| Others | 1 | 1 | 1 |
| Total Non-Str: Score | | | 12 |

6 14

B ☐ O ☑ R ☐

| C Geotechnical Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | 2 | 2 |
| Liquefaction | | | |
| Landslides | | 2 | 2 |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total Geotechnical Score | | | 4 |

2 5

B ☐ O ☑ R ☐

| Posting | Blue | Orange | Red |
|---|---|---|---|
| **Level 1 Posting** | ○ | ○ | ☑ |
| **Level 2 Update** | ○ | ☑ | ○ |

The only difference between Leve-2 Rapid Evaluation for common buildings and complex buildings is different approach in regarding placard. In common building form the building more emphasized upon investigation of geotechnical hazards and structural members that resist loads in gravity and lateral system whereas damages in non-structural hazards are slightly less prioritize. However, in complex buildings form, the investigation focuses on the same level of priority. In complex buildings forms, for example, even though only one particular is in red condition among other parameters, the building's posting goes to Red (UNSAFE) directly due to its importance of the buildings. Therefore, Level-2 Rapid Evaluation form for complex building checklist sheet is recommended to use as a tool while assessing these buildings.

*Structural Hazards for Level-2 Rapid Evaluation form for Complex Building*

| A Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | | | |
| Frame joints | | | |
| Structural walls | | | |
| Beams | | | |
| Floors | | | |
| Roof | | | |
| Pounding | | | |
| Others | | | |
| Total Str: Score | | | |

6 14

B O R

| A Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | 1 | 2 | 2 |
| Frame joints | 1 | 2 | 2 |
| Structural walls | | | |
| Beams | 1 | 2 | 2 |
| Floors | 2 | 2 | 4 |
| Roof | 1 | 1 | 1 |
| Pounding | 2 | 1 | 2 |
| Others | | | |
| Total Str: Score | | | 13 |

6 14

B O ☑ R

The score of structural hazards can be calculated by the following steps:

1. Structural hazards section emphasises on elements or members which resist load in gravity and lateral system. The score of structural hazards can be calculated by multiplication of **(highest observed) severity of element damage** with an **estimate of its extent (numbers or elements having suffered the particular level of damage)** as recorded in the form. Recommend to use **"0"** in severity and extent if there is no damage in particular structural members.
2. Total score is the sum of structural hazards scores.
3. Mathematical equation to calculate the Structural Score is shown with the below equation.

$$\text{Str: Score} = \sum Severity \times Extent$$

4. Categorisation of Str: Score can be divided into three criteria as follows.

   00 – 06 = Blue

   07 – 14 = Orange

   Above 15 = Red

According to example calculation, the building fall into Orange (Restricted Access)

*Nonstructural Hazards Level-2 Rapid Evaluation form for Common Building*

| B Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | | | |
| Ceilings, light fixtures | | | |
| Infill walls, partitions | | | |
| Elevators, stairs | | | |
| Exits | | | |
| Electric, gas, hazardous | | | |
| Others | | | |
| Total Non-Str: Score | | | |

6 14

B O R

| B Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | 2 | 2 | 4 |
| Ceilings, light fixtures | 1 | 2 | 2 |
| Infill walls, partitions | 2 | 1 | 2 |
| Elevators, stairs | 1 | 1 | 1 |
| Exits | 2 | 1 | 2 |
| Electric, gas, hazardous | | | |
| Others | 1 | 1 | 1 |
| Total Non-Str: Score | | | 12 |

6 14

B O ☑ R

The score of non-structural hazards can be calculated by the following steps:

1. Non-structural hazards section emphasises on elements or members which do not resist load in gravity and lateral system but can injure and severely damage to occupants in the case of an earthquake. The score of non-structural hazards can be calculated by multiplication of **(highest observed) severity of element damage** with an **estimate of its extent (numbers or elements having suffered the particular level of damage)** as recorded in the form. Recommend to use **"0"** in severity and extent if there is no damage in particular non- structural members.
2. Total score is the sum of non-structural hazards scores.
3. Mathematical equation to calculate the Structural Score is shown with the below equation:

$$\text{NonStr: Score} = \sum Severity \times Extent$$

4. Categorisation of Non-Str: Score can be divided into three criteria as follows.

   00 – 06 = Blue

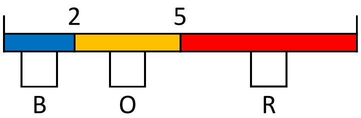
   07 – 14 = Orange

   Above 15 = Red

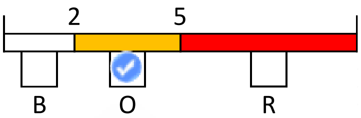
According to example calculation, the building falls into Blue (CAN BE USED).

*External Hazards Level-2 Rapid Evaluation form for Common Building*

| C Geotechnical Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | | |
| Liquefaction | | | |
| Landslides | | | |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total Geotechnical Score | | | |




| C Geotechnical Hazards | NO 0 | YES 2 | Score |
|---|---|---|---|
| Settlement | | 2 | 2 |
| Liquefaction | | | |
| Landslides | | 2 | 2 |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total Geotechnical Score | | | 4 |




The score of external hazards can be calculated by the following steps:

4. Geotechnical hazards section emphasises on geological features of land instability. The score of Geotechnical hazards can be obtained by if there are any geotechnical hazards described in the form. Recommend to use **“0”** in if there is no dominant land instability and use **“2” if observed dominant land instability or geotechnical hazards.**
5. Total score is the sum of external hazards scores.
6. To calculate the External Score (External Score);

$$\text{External Score} = \sum \textit{Geotechnical Hazards}$$

1. Categorisation of External Hazard: Score can be divided into three criteria as follows.

   00 – 02 = Blue

   03 – 05 = Orange

   Above 6 = Red

*According to the example calculation, buildings fall into Red (UNSAFE).*

*Overall Building Score*

**Evaluation**

| Severity Score | |
|---|---|
| 0 | None |
| 1 | Minor |
| 2 | Severe |

| Extent Score | | |
|---|---|---|
| 0 | None | |
| 1 | Few | < 30% |
| 2 | Many | > 30% |

| | |
|---|---|
| B | Blue |
| O | Orange |
| R | Red |

| A Structural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Columns | 1 | 2 | 2 |
| Frame joints | 1 | 2 | 2 |
| Structural walls | | | |
| Beams | 1 | 2 | 2 |
| Floors | 2 | 2 | 4 |
| Roof | 1 | 1 | 1 |
| Pounding | 2 | 1 | 2 |
| Others | | | |
| Total Str: Score | | | 13 |

Scale: 6 – 14; B ☐ O ☑ R ☐

| B Nonstructural Hazards | Severity | Extent | Score |
|---|---|---|---|
| Tower, parapet,chimney | | | |
| Cladding, glazing | 2 | 2 | 4 |
| Ceilings, light fixtures | 1 | 2 | 2 |
| Infill walls, partitions | 2 | 1 | 2 |
| Elevators, stairs | 1 | 1 | 1 |
| Exits | 2 | 1 | 2 |
| Electric, gas, hazardous | | | |
| Others | 1 | 1 | 1 |
| Total Non-Str: Score | | | 12 |

Scale: 6 – 14; B ☐ O ☑ R ☐

| C Geotechnical Hazards | NO (0) | YES (2) | Score |
|---|---|---|---|
| Settlement | | 2 | 2 |
| Liquefaction | | | |
| Landslides | | 2 | 2 |
| Ground fractures | | | |
| Rock Falls | | | |
| Debris flow | | | |
| Others | | | |
| Total Geotechnical Score | | | 4 |

Scale: 2 – 5; B ☐ O ☑ R ☐

| Posting | | | |
|---|---|---|---|
| Level 1 Posting | ○ Blue | ○ Orange | ☑ Red |
| Level 2 Update | ○ Blue | ☑ Orange | ○ Red |

1. According to the exampled calculation, the building falls into Orange (RESTRICTED ACCESS) in Structural Hazards, Blue (CAN BE USED) in Non-Structural Hazards and Blue (Can Be Used) in Geotechnical Hazards. Final results fall into Orange (RESTRICTED ACCESS).

## Posting

*Level-2 Rapid Evaluation form for Common Buildings*

| Posting | | | |
|---|---|---|---|
| **Level 1 Posting** | ○ Blue | ○ Orange | ○ Red |
| **Level 2 Update** | ○ Blue(0-20) | ○ Orange(21-40) | ○ Red(Above41) |

↓

| Posting | | | |
|---|---|---|---|
| **Level 1 Posting** | ○ Blue | ○ Orange | ☑ Red |
| **Level 2 Update** | ○ Blue(0-20) | ☑ Orange(21-40) | ○ Red(Above41) |

1. Previous posting is from the Level-1 Rapid Evaluation Safety Assessment.
2. Update posting the result from Level-2 Rapid Evaluation Safety Assessment.

## Further Actions

**Further Actions**

Barricade needed    Area: ..............................

Reason: ..............................

Detail evaluation recommended    ☐ Structural    ☐ Geotechnical    ☐ Other ..............

Comments: ..............................

..............................

..............................

1. Barricades apply to a specific building whereas cordons restrict access to a street or block of buildings.
2. Recommend any further actions to be undertaken under local building authorities or by the building owner. If relevant, identify what particular expertise is required for further assessments and evaluations. Specify whether cordons or barricades have already been installed or are required.
3. Use the Comments section for additional comments that were not yet covered in any other sections

## Sketch and Photos

Sketch (Optional)/Photo no.

1. Draw a sketch of the building or describe the photo no. of the buildings to review later. The sketch is optional.

## ASSESSING SPECIFIC BUILDING TYPES

The following sections outline typical failure points in different construction types; each building must be assessed individually.

### *Typical Damage Severity for Bamboo/Wood Buildings*

| DAMAGE SEVERITY | DESCRIPTION |
|---|---|
| 0 = None | - No sign of any distress |
| 1 = Minor | - Local light damage in some parts of the building<br>- Few cracks in the foundation |
| 2 = Severe | - Partial or total collapse<br>- Large foundation cracks<br>- Any damage indicating considerable danger for the collapse |

**None**

Figure 59: No sign of any distress (Bamboo building)


Figure 60: No sign of any distress (Timber building)

**Minor**

Figure 61: Local damage in some parts of the building

**Severe**


Figure 62: Partial collapse


Figure 63: Total collapse

### *Typical Damage Severity for Brick Nogging Buildings*

| DAMAGE SEVERITY | DESCRIPTION |
|---|---|
| **0 = None** | - No sign of any distress |
| **1 = Minor** | - Minor cracks in structural elements<br>- Slight separation of walls from timber post<br>- Light residual leaning of walls on wall surfaces<br>- Stairs and other non-structural materials have some damages |
| **2 = Severe** | - Partial or total collapse<br>- Severe damage in structural members<br>- Failure of interior and/or exterior walls<br>- Stair supports have severe damage<br>- Substantial ground movement, dislocation of the whole building<br>- Any damage indicating considerable danger for the collapse |

**None**


Figure 64: No sign of any distress

Figure 65: No sign of any distress

**Minor**

Figure 66: Slight separation of walls from timber post

Figure 67: Minor cracks in structural elements

**Severe**

*Source: Internet*

Figure 68: Partial collapse

*Source: Internet*

Figure 69: Total collapse

*Source: Internet*

Figure 70: Failure of interior and/or exterior walls

*Source: Internet*

Figure 71: Substantial ground movement, dislocation of the whole building

*Typical Damage Severity for Masonry Buildings*

| DAMAGE SEVERITY | DESCRIPTION |
|---|---|
| **0 = None** | - No sign of any distress |
| **1 = Minor** | - Few cracks in bearing walls<br>- Fall of fairly large pieces of some part of building<br>- Cracks at the base of parapets |
| **2 = Severe** | - Partial or total collapse<br>- Brick Masonry walls may have visible separation from floor<br>- Substantial ground movement and leaning of the whole building<br>- Any damage indicating considerable danger for the collapse |

**None**


Figure 72: No sign of any distress


Figure 73: No sign of any distress

**Minor**


Figure 74: Fall of fairly large pieces of some part of building


Figure 75: Cracks in bearing wall

**Severe**


Figure 76: Partial collapse


Figure 77: Total collapse


Figure 78: Substantial ground movement and leaning of the whole building

### *Typical Damage Severity for Steel Buildings*

| DAMAGE SEVERITY | DESCRIPTION |
|---|---|
| **0 = None** | - No sign of any distress |
| **1 = Minor** | - Minor damage in structural members and connections<br>- Slight dislocation of structural elements<br>- Minor ground movement but no signs of foundation failure |
| **2 = Severe** | - Partial or total collapse<br>- Buckling of the steel members<br>- Many failed structural members, joints and connections<br>- Any damage indicating considerable danger for the collapse |

### None


Figure 79: No sign of any distress

### Minor


Figure 80: Minor damage in structural members and connections

### Severe


Figure 81: Partial collapse

*Typical Damage Severity for Concrete Buildings*

| DAMAGE SEVERITY | DESCRIPTION |
|---|---|
| **0 = None** | - No sign of any distress |
| **1 = Minor** | - Storey leaning<br>- Minor cracks in some structural elements and walls<br>- Minor ground movement but no signs of foundation failure |
| **2 = Severe** | - Partial or total collapse<br>- Severe deformation of several structural elements<br>- Visible settlement of the building<br>- Any damage indicating considerable danger for the collapse |

**None**

Figure 82: No sign of any distress

Figure 83: No sign of any distress

**Minor**


Figure 84: Columns out of plumb or storey leaning


Figure 85: Small cracks in few infill walls or partition walls

**Severe**


Figure 86: Partial collapse


Figure 87: Total collapse


Figure 88: Severe deformation of vertical columns

# 8 Placarding System

## 8.1 The placards

Rapid Assessments will result in either a blue, orange or red placard corresponding to the observed damage.

| Observed damage | Rapid Assessment Outcome | Placard |
|---|---|---|
| Light damage (Low risk) | **CAN BE USED**<br>• No immediate further evaluation required | **CAN BE USED (Blue)** |
| Moderate damage (Medium risk) | **RESTRICTED ACCESS TO PART(S) OF THE BUILDING ONLY**<br>• No entry to parts of building with significant damage<br>• ONLY with or without supervision<br>• Entry restricted to removal of contents and securing work | **RESTRICTED ACCESS (ORANGE)** |
| Heavy damage (High risk) | **ENTRY PROHIBITED**<br>• At-risk from external factors such as adjacent buildings or ground failure<br>• Significant damage | **UNSAFE(RED)** |

**CAN BE USED**

No Restrictions on Access

This structure has been inspected as indicated below:

- Light or no damage
- No obvious structural problems were found
- But the building might be damaged and still unsafe
- Aftershocks may cause more damaged that may change this assessment

The following items have generally not been inspected:

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

Report any unsafe condition to local authorities; reinspection may be required

Building Name & Address:____________________________
____________________________
____________________________

This building has been subject to a rapid assessment:

☐ Exterior Only
☐ Exterior & Interior

Assessor ID:____________________________
____________________________

Date:______________ Time:____________________

Inspector comments ____________________________
____________________________
____________________________
____________________________

**DO NOT REMOVE THIS NOTICE**

# RESTRICTED ACCESS

☐ To Parts of the Buildings Only
☐ Short Term Entry Only

This structure has been inspected as indicated below:

- The building has been damaged and its structural safety is questionable
- Enter only at own risk
- Future events may cause damage

Description of hazard observed:____________________
_______________________________________________

Restricted areas are:____________________________
_______________________________________________

Restrictions on use:

☐ Removal of essential documents/valuables only
☐ Removal of property
☐ Other:____________________________________

Building Name & Address:_______________________
_______________________________________________
_______________________________________________

This building has been subject to a rapid assessment:

☐ Exterior Only
☐ Exterior & Interior

Assessor ID:_________________________________
_______________________________________________

Date:______________ Time:____________________

Inspector comments ____________________________
_______________________________________________
_______________________________________________
_______________________________________________

**DO NOT REMOVE THIS NOTICE**

# UNSAFE

(THIS IS NOT A DEMOLITION ORDER)

There has been a quick visual inspection of this building:

- This building is at risk from an external hazard
- This building has been seriously damaged

Description of hazard observed: ___________________
_______________________________________________
_______________________________________________

Extent of barricade required: ______________________
_______________________________________________
_______________________________________________

Assess is not permitted without written authorization

Building Name & Address:_______________________
_______________________________________________
_______________________________________________

This building has been subject to a rapid assessment:

☐ Exterior Only
☐ Exterior & Interior

Assessor ID:_________________________________
_______________________________________________

Date:______________ Time:____________________

Inspector comments ____________________________
_______________________________________________
_______________________________________________
_______________________________________________

**DO NOT REMOVE THIS NOTICE**

Figure 89: Rapid Assessment placards

| အပျက်အစီးများ | လျင်မြန်စွာအကဲဖြတ်ပေးရမည့်အခြေအနေများ | သတိပေးချက်ကဒ် |
|---|---|---|
| ထိခိုက်ပျက်စီးမှု နည်းသည် | **အသုံးပြုနိုင်သည်**<br>• အသေးစိတ် ထပ်မံစစ်ဆေးရန် မလိုအပ်ပါ။ | **အသုံးပြုနိုင်သည် (အဖြူရောင်ကဒ်)** |
| ထိခိုက်ပျက်စီးမှု အသင့်အတင့် ရှိသည် | **အကန့်အသတ်ဖြင့် အဆောက်အအုံ၏ နေရာအချို့ကိုသာ ဝင်ရောက်သွားလာ အသုံးပြုခွင့်**<br>• ပြင်းထန်စွာ ပျက်စီးနေသော အဆောက်အအုံနေရာများသို့ ဝင်ရောက်ခွင့်မပြု<br>• ပစ္စည်းများ ဖယ်ရှားရန်နှင့် လုံခြုံမှုနှင့်သက်ဆိုင်သော လုပ်ငန်းများအတွက် ဝင်ရောက်နိုင်/အသုံးပြုနိုင်ပါသည်။ | **အကန့်အသတ်ဖြင့် အသုံးပြုနိုင်သည် (လိမ္မော်ရောင်ကဒ်)** |
| ပြင်းထန်သော ပျက်စီးမှု ရှိသည် | **လုံးဝ ဝင်ရောက် ဖြတ်သန်း အသုံးပြုခွင့် မပြု**<br>• မြေကြီးပြိုကျပျက်စီးခြင်း (သို့) ထိစပ်နေသော အဆောက်အအုံများမှ ထိခိုက်မှုရှိခြင်းစသော ပြင်ပအန္တရာယ်များ<br>• ပြင်းထန်သော ပျက်စီးမှုရှိသော နေရာများ | **နေထိုင်ရန် မသင့်တော်ပါ (အနီရောင်ကဒ်)** |


# အသုံးပြုနိုင်သည်
(သွားလာခွင့်အားကန့်သတ်ထားမှုမရှိပါ)

အဆောက်အအုံအားအောက်ဖော်ပြပါညွှန်းချက်များအတိုင်းစစ်ဆေးထားပါသည်
➢ ထိခိုက်ပျက်စီးမှုနည်းသည်
➢ သိသာထင်ရှားသောအဓိကအစိတ်အပိုင်းများပျက်စီးမှုမရှိ
➢ သို့သော်အဆောက်အအုံတွင်ပျက်စီးမှုနှင့်မလုံခြုံမှုရှိနိုင်သည်။
➢ နောက်ဆက်တွဲငလျင်သည်ယခုအကဲဖြတ်ထားမှုအား ပြောင်းလဲစေသောသက်ရောက်မှုရှိနိုင်သည်။
လိုအပ်လျှင်စစ်ဆေးပေးရမည့်အပိုင်း
➢ အသုံးပြုမှုများ (လျှပ်စစ်၊ရေပိုက်လိုင်းစနစ်များ)
➢ မျက်နှာကျက်၊ပြတင်းပေါက်များ စသဖြင့်
လုံခြုံမှုမရှိသောအခြေအနေများအားတာဝန်ရှိသူများသို့တင်ပြရမည်ထပ်မံစစ်ဆေးမှုလိုအပ်နိုင်သည်။

အဆောက်အအုံအမည် ______________________________
လိပ်စာ ______________________________
______________________________
အဆောက်အအုံအား လမစ နည်းအတိုင်းစစ်ဆေးထားပါသည်။
☐ အပြင်ဘက်
☐ အတွင်းနှင့်အပြင်
အကဲဖြတ်သူမှတ်ပုံတင် ______________________________
______________________________
နေ့ရက် ______________ အချိန် ______________
စစ်ဆေးသူသုံးသပ်ချက် ______________________________
______________________________
______________________________
______________________________

**သတိပေးချက်အား မဖယ်ရှားရ**

# အကန့်အသတ်ဖြင့်အသုံးပြုနိုင်သည်

☐ အဆောက်အအုံ၏နေရာအချို့ကိုသာဝင်ရောက်သွားလာနိုင်သည်
☐ ယာယီအသုံးပြုရန်သာဖြစ်သည်

အဆောက်အအုံအားဖော်ပြပါညွှန်းချက်အတိုင်းစစ်ဆေးထားပါသည်။

- ➢ အဆောက်အအုံ၏ကြံ့ခိုင်မှုသည်လုံခြုံစိတ်ချရမှုမရှိပါ
- ➢ ထိခိုက်မှုတစ်စုံတစ်ရာဖြစ်ပါက မိမိတာဝန်သာဖြစ်သည်
- ➢ နောက်ဆက်တွဲဖြစ်ရပ်များကြောင့်အပြောင်းအလဲရှိနိုင်သည်။

တွေ့ ရှိရသောပျက်စီးမှုများ ____________________________

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ကန့်သတ်ထားသောနေရာများ _______________________

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အကန့်အသက်ဖြင့်သွားလာခွင့်

- ➢ အရေးကြီးသောစာရွက်စာတန်းများနှင့်အဖိုးတန်ပစ္စည်းများသွားရောက်ဖယ်ရှားခြင်း
- ➢ ပစ္စည်းဥစ္စာများသွားရောက်ဖယ်ရှားခြင်း
- ➢ အခြား________________________________________

အဆောက်အအုံအမည် ______________________________

လိပ်စာ ______________________________________

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အဆောက်အအုံအား လမစ နည်းအတိုင်းစစ်ဆေးထားပါသည်။

☐ အပြင်ဘက်
☐ အတွင်းနှင့်အပြင်

အကဲဖြတ်သူမှတ်ပုံတင်_____________________________

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နေ့ရက်______________အချိန် ____________________

စစ်ဆေးသူသုံးသပ်ချက်_____________________________

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**သတိပေးချက်အား မဖယ်ရှားရ**

# နေထိုင်ရန်မသင့်တော်ပါ

(ဖြိုချရန်လိုအပ်သောအဆောက်အအုံအဖြစ်သတ်မှတ်ထားခြင်းမဟုတ်ပါ)

အဆောက်အအုံအားအောက်ဖော်ပြပါညွှန်းချက်များအတိုင်းစစ်ဆေးထားပါသည်။

- ➢ အဆောက်အအုံသည် ပြင်ပမှ အန္တရာယ်များကြောင့် ထိခိုက်ပျက်စီးနေသော အခြေအနေဖြစ်သည်။
- ➢ အဆောက်အအုံသည် ပြင်းပြင်းထန်ထန် ထိခိုက်ထားပါသည်။

တွေ့ရှိရသောပျက်စီးမှုများမှာ___________________________

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______________________________________________

ဘာရီကိတ်အသုံးပြုရမည့်ပမာဏ______________________

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ဖြတ်သန်းသွားလာမှုအားအခွင့်မရှိဘဲ ဖြတ်သန်းခွင့်မပြု

အဆောက်အအုံအမည် ______________________________

လိပ်စာ ______________________________________

______________________________________________

အဆောက်အအုံအား လမစ နည်းအတိုင်းစစ်ဆေးထားပါသည်။

☐ အပြင်ဘက်
☐ အတွင်းနှင့်အပြင်

အကဲဖြတ်သူမှတ်ပုံတင်_____________________________

______________________________________________

နေ့ရက်______________အချိန် ____________________

စစ်ဆေးသူသုံးသပ်ချက်_____________________________

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**သတိပေးချက်အား မဖယ်ရှားရ**

## 8.2 Posting of placards

Placards should be filled out by using permanent marker pen, and must be fixed at a clearly visible site near the entrance of the building. Use only one placard classification per building. Different occupancies in the same building cannot have different placards.

A “RESTRICTED ACCESS” placard may indicate different restrictions for different parts or services of the building. If an area or service is considered unsafe and should not be entered, barricades or caution tape should be placed to designate the unsafe areas or services.

## 8.3 Changing placards

Sometimes a placard may have to be changed. Only a Building Assessor authorised by the Controller can change a placard.

Some reasons for changing a placard

- To correct an oversight, mistake in judgement, or after Level 2 Rapid Assessment.
- Aftershocks have significantly worsened the condition of the building. (Note that updated placard should be placed with new inspection date, even if the assessment result remains unchanged)
- After professional engineering report has completed.

After the State of Emergency is lifted, placards can only be replaced by issuing a notice from the local authority.

## 8.4 Removing placards

A placard cannot be removed during the State of Emergency. It can be changed to a different colour, as described in the previous section. The placard can be removed once the building is demolished.

When the State of Emergency is lifted, orange and red placards may fulfil the purpose of warning notices. They can be removed only by a person authorised by the local authority.

# 9 REFERENCES


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