
Structural Triage

Scope

This guidance document will assist in the decision making process at incidents involving more than one damaged structure, allowing prioritisation of the structures based on those likely to yield the most live casualties for the least time, effort or risk, until such times that enough assets are on the incident ground to deal with the more hazardous or more technical and protracted rescues.

The Triage Process

The triage process has three main levels:

Initial

This is a basic risk assessment carried out by the first responders. This would identify buildings where they feel confident to carry out initial search and rescue, i.e. snatch rescues, or buildings that are too damaged or unstable to approach.

Detailed

This is the triage process carried out by the USAR reconnaissance team (as detailed below).

Specialist

This is a more thorough triage, taking advice from structural specialists etc, and using building plans or other information gathered in the course of the incident.

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The process of triage of a structural collapse incident will involve two main areas for consideration:

- Work site triage
- Initial structural consideration

Work Site Triage

This is only required for incidents where a large number of buildings are damaged or the incident ground is spread over a large area. (For example, aircraft crashed onto, or a storm passing through major population centres).

Work site triage is based on the following 5 steps:

- Zones** Divide the incident ground into zones assigning a zone to an individual. The number of zones is dictated by the size of the incident ground and the number of buildings involved.
- Structures** Identify totally or partially collapsed structures within each zone.
- Information** Gather information from first responders, witnesses, etc.
- Categorise** Place buildings into triage category (1-8, see below). These categories are based on three triage factors:
- Victim information
 - Void potential
 - Building instability
- Prioritise** Prioritise on the basis of the triage category, taking into account access into the structures, team capability, and other relevant factors.

This information along with information from all other zones should be collated by the incident commander and USAR tactical adviser to plan search and rescue operations.

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Initial Structural Considerations

This is an assessment of individual buildings within a smaller incident area, or even an area of a larger building defined as sectors on the incident plan (e.g. a wing of a hospital or school, or a quadrant in a shopping mall etc).

Once a damaged structure has been identified the following considerations should be adopted:

Building	Determine the original building footprint, height, type of structure, use of the building, etc.
Collapse	Study the collapse pattern. Why and how did it fall?
Failures	Study local failures (damage to columns, beams, connections, etc.)
Voids	Identify possible survivable voids.
Priorities	Determine operational priorities.
Search	Decide entry points and initial search route.
Rescue	Decide entry points and initial rescue route.
Shoring	Decide on initial shoring.
Evacuation	Develop an evacuation plan and assembly point.
Monitoring	Implement a building stability monitoring system.

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Scoring System

The criteria for scoring damaged structures are:

Casualties

Our primary reason for being there is to search for and rescue casualties. Therefore, structures that may yield casualties will be high on the list of priorities. Information on possible casualty numbers and locations should be gathered from:

- **Witnesses** – including other people working in the building at the time, passers by may have witnessed the incident and helped in the initial rescues, and first responding emergency personnel
- **Use of the building** – should give a rough idea of likely occupancy numbers. For example, large commercial premises, retail and leisure complexes, have very different occupancy factors
- **Time of day** – will probably have a direct bearing on the casualty numbers. For example, a school would be less likely to yield any casualties during the night, possibly the caretaker, cleaning and maintenance staff, whereas during the day the occupancy number could be high.

Condition of the structure

It is vital to assess the structural integrity of the building at this time. Any doubts should be reflected in the triage score. Rescue attempts should not begin until structural integrity issues are addressed.

Potential for survivable voids

The structure should be assessed for likely voids, paying particular attention to location, number and size. The size of possible voids is particularly important if children are involved, as they may survive in very small voids. Access and stability of voids should also be considered.

The scoring system is based on pre-determined criteria (damage, casualties, stability and voids). It is based on a number system, with 1 being allocated to those buildings that take first priority for search and rescue operations, down to 8 for those buildings that are a low priority.

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Structural Triage – Pro Forma (USAR 207)

Incident Address/ID		Date and time of inspection		Name		Final triage score
Collapse?	Possible victims	Extreme instability?	Confirmed victims?	Voids Large/small	Stable or unstable?	Category
		No stability issues	Live casualties		Stable	1
				Large voids	Stable	2
			Unknown		Unstable	3
					Stable	4
				Small voids	Unstable	5
Partially or totally collapsed structures	Yes		Live casualties			6
		Extreme instability				7
	No		Unknown			8
Notes:						

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Incident Address/ID <i>Anywhere Anytown Number 1 on plan</i>		Date and time of inspection <i>01/08/06 @ 09.00 hours</i>		Name <i>Jim Taylor Tyne & Wear</i>		Final triage score 1
Collapse?	Possible victims	Extreme instability?	Confirmed victims	Voids Large/small	Stable or unstable?	Category
Partially or totally collapsed structures <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No stability issues <input checked="" type="checkbox"/>	Live casualties <input checked="" type="checkbox"/>	Large voids <input type="checkbox"/>	Stable <input type="checkbox"/>	1
			Unknown <input type="checkbox"/>		Unstable <input type="checkbox"/>	2
				Small voids <input type="checkbox"/>	Stable <input type="checkbox"/>	3
					Unstable <input type="checkbox"/>	4
		Extreme instability <input type="checkbox"/>	Live casualties <input type="checkbox"/>			5
			Unknown <input type="checkbox"/>			6
	No <input type="checkbox"/>					7
						8
Notes:						

This example shows the entries by the person carrying out the assessment in blue. It gives the following information.

- Address and ID on plan
- Date and time of assessment
- Details of person carrying out assessment
- Final triage score in bold blue, in the top right corner for quick reference

It also shows:

- The building is damaged
- Persons are involved
- There are no stability issues
- There are live casualties

The score comes out at 1; therefore we give this building a high priority

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Incident Address/ID <i>Anywhere Anytown Number 2 on plan</i>		Date and time of inspection <i>01/08/06 @ 09.00 hours</i>		Name <i>Jim Taylor Tyne & Wear</i>		Final triage score 6
Collapse?	Possible victims	Extreme instability?	Confirmed victims	Voids Large/small	Stable or unstable?	Category
Partially or totally collapsed structures <input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No stability issues <input type="checkbox"/>	Live casualties <input type="checkbox"/>	Large voids <input type="checkbox"/>	Stable <input type="checkbox"/>	1
			Unknown <input type="checkbox"/>		Unstable <input type="checkbox"/>	2
					Stable <input type="checkbox"/>	3
				Small voids <input type="checkbox"/>	Stable <input type="checkbox"/>	4
					Unstable <input type="checkbox"/>	5
		Extreme instability <input checked="" type="checkbox"/>	Live casualties <input checked="" type="checkbox"/>			6
			Unknown <input type="checkbox"/>			7
	No <input type="checkbox"/>					8
Notes: <i>Once structural considerations have been addressed, reassess, and amend the score.</i>						

This example shows the entries by the person carrying out the assessment in blue. It gives the following information.

- Address and ID on plan
- Date and time of assessment
- Details of person carrying out assessment
- Final triage score in blue bold, in the top right corner for quick reference

It also shows:

- The building is damaged
- Persons are involved
- There are stability issues
- There are live casualties

The score comes out at 6, as shoring may be required before rescue is attempted.

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These examples show a simple scoring method which if used correctly should give the incident commander and USAR advisor an overview of the requirements for search and rescue operations. In particular:

- Buildings most likely to yield quick, less hazardous, and easier casualty extrications.
- Buildings that may require hazard mitigation (shoring etc) before rescue operation can commence, in particular additional assets and personnel required.
- A monitoring system as the incident progresses – the process could be repeated at regular intervals, allowing assets and personnel to be redirected as individual building scores drop as casualties are removed, or conditions change.

Additional Considerations

An unoccupied building with no casualties would normally score 8 and be left. However, the building itself may be unstable, and pose a hazard to adjoining buildings. This would require urgent action. The score should be adjusted to allow hazard mitigation, and as the hazard is addressed the score should be readjusted.

On the pro forma, simply make a note at the bottom, for example:

Notes: *Once structural considerations have been addressed, reassess, and amend the score.*

Conclusion

The triage process has three levels:

- Initial
- Detailed
- Specialist

The detailed triage carried out by USAR teams may be split into two specific operations:

1. Work site triage – large areas or large number of buildings, requiring the incident to be divided into triage zones
2. Initial structural considerations (individual buildings)

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