

Shoring Operations

System of Work

Shoring operations should be carried out by appropriately trained personnel. A shoring supervisor should be appointed who will be responsible for implementing a safe system of work.

The PPE and RPE required for shoring operations will depend on the specific activities that personnel are undertaking and the environment in which they are working. All personnel should wear full USAR PPE, namely safety helmet, eye protection, steel toe-capped boots, gloves and long-sleeved overall providing protection from splinters. If cutting timber, respiratory protection (minimum P3 standard) should be donned. The need for hearing protection should be based on a specific risk assessment.

Safe Working at Height

The construction of shores, especially raker shores, will inevitably involve some working at height. The same considerations should be applied to shoring as to other working at height environments, and the following should be given consideration.

- The use of ladders or working platform
- The use of fall arrest/work restraint systems and the use of slings wrapped round shoring members as anchor points (be wary of using bolted anchor points if they could compromise the shore or the structure being shored)
- The advisability of limiting fall distances to the absolute minimum to protect against hitting something during the fall and reducing the shock load on the anchor point.
- The use of improvised ladders in the form of additional horizontal/lateral bracing
- Where necessary, and after suitable risk assessment, it may be the safest course NOT to employ any additional system

Preparations for Shoring Operations

An assessment must be carried out that will take into consideration:

- Information on the location and number of trapped victims.
- The state of the structure, using a six-sided approach, on all four sides, top and bottom, with particular attention paid to the collapse area. This will identify structural elements, hazards such as loose or hanging debris which will have to be dealt with, and parts of the structure which were previously adequately supported but now are not, and where the load can be transferred.
- Factors such as the age of the structure and whether it has been open to the elements for a considerable period, which may have caused rotting of wooden elements, water saturation of plaster, etc.

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Where an assessment has identified that a particular part of a structure requires shoring due to structural damage and potential victim location, the type and placement of shores must be decided.

When deciding what type and size of shore to build, the load to be supported must be estimated. The loads of different materials can be estimated by calculating the volume and multiplying it by the density of the material, or by using a ready-reckoner for weights of different elements.

The appropriate shore can then be selected, and by referring to the capacity of the shore, the number of shores required can be estimated.

The placement of the shores is then assessed according to the elements to be supported, the limitations of the shore, and the condition of the structure.

Selection and Positioning of Shores

The decision on which shore to use will be dictated by the element to be supported, the space available and the condition of the structure and foundation. A leaning wall next to a solid base for example, may require solid sole raker shores.

Some types of structure may require additional items, for example a broken masonry wall may require plywood facing on the shores to collect the load.

Shoring structural supporting elements such as beams and columns will generally be the most effective use of limited shoring materials.

The load path of the shores should be continuous, from the load to be supported all the way to the substrate that will ultimately carry the load. This can be achieved by aligning the shoring systems directly on top of each other on each floor throughout the height of a building all the way to the ground or basement level where the load is distributed into the ground.

Access areas may need to be shored to create safe zones and passageways.

Shoring should not be placed where it will interfere with the removal of victims.

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Sequence of Shoring Operations

Once assessment is complete, a shoring plan must be developed. The principle is to work from the safest area into more dangerous areas.

Temporary metal spot shores will usually be used in the first instance to provide a quick reduction of risk. These can then be followed up by more stable timber shores. If necessary the temporary metal shores can then be repositioned further into the structure.

With multi-storey buildings an assessment will have to be made of whether to start shoring directly under the damaged floor and work downwards, or alternatively start at the bottom of the structure (perhaps even in the basement) and work upwards towards the load to be supported. This will depend on a number of factors such as the structural condition of the building and the location of any casualties. In these situations, engineering advice should be sought.

When supporting walls, shores are usually started at a corner and progressed towards the middle of the wall.

If determined by a risk assessment, it may be necessary to shore an area of hazard before committing personnel to rescue operations in or on the area potentially affected by a secondary collapse.

As rescue operations proceed and debris is removed, shoring may have to be readjusted.

Shoring must be checked for stability and overload at frequent intervals.



Figure 1: [SOP_SHO002]
Raker Shoring in place

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Management of Shoring Operations

A **Shoring Supervisor** should be appointed who is in charge of the operation and determines (with others) which shores to build and where they will be placed. To work efficiently, shoring operations should be conducted by two separate crews: the Cutting Crew and the Shore Assembly Crew. Should the size of the shoring task be limited, one crew may be able to perform all the shoring functions.

The Shore Assembly Crew comprises:

- **Measurer** who does all the measuring and relays the sizes to the cutting crew.
- Two **Shorers** who clear debris, assist the measurer and construct the shores.
- Further **Shorers**, safety personnel and runners can be added to the team.

The Cutting Crew comprises:

- **Layout Marker** who sets up the cutting station, measures and marks the timber ready for cutting.
- **Cutter** who performs all cutting tasks.
- **Tools and Equipment** person who manages tools and equipment, and performs logistic duties.
- Further personnel can be added such as a **Feeder** who moves and feeds measured and marked shoring material and holds it while being cut, and a runner.

Shoring supervisors should note that one cutting crew can supply three or four shore assembly crews.

Organisation of the Workplace

Except in the case of small-scale incidents where the amount of shoring required is very limited, safety and effectiveness can be increased by preparing a working area comprising a 'cut station' and 'shore assembly area'.

The Cutting Crew will be based in and around the cut station and the Shore Assembly Crew between the shore assembly area and the work site.

The shore assembly area should be as close as possible to the work site, provided it is in a position safe from secondary collapse. This will minimise manual handling of completed or partially constructed shores over rubble or debris. Both the shore assembly area and the cut station should be sited on level ground, well lit and well drained. The use of temporary shelters or undamaged buildings should be considered as giving protection from inclement weather.

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The cut station will include a saw bench and measuring area. In extended operations, the cutting crew may consider the construction of bespoke tables for measuring, laying-out and cutting shore elements.

Other elements should be accommodated within the overall layout for shoring operations:

- Power area for electricity supply to power tools and lighting
- Timber store – USAR Module 5 may provide this facility
- Waste materials dump

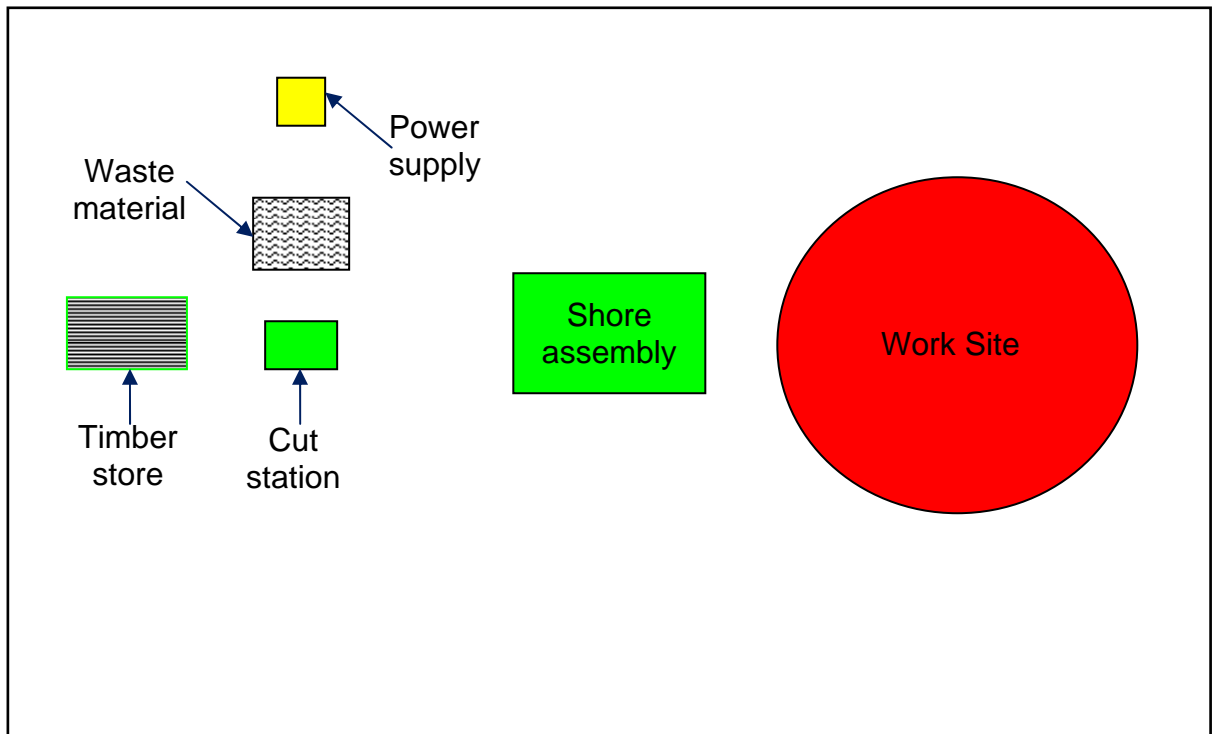


Figure 2: [SOP_ SHO002]
Layout of the Shoring Workplace

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