

# Demolition Standard

(SHEMS-STD-GR-090)

## Contents

1	Introduction .....	3
2	Scope.....	3
2.1	External References .....	3
2.2	Definitions and Acronyms.....	3
3	Unitas Requirements .....	4
3.1	Introduction .....	4
3.1.1	Selection of Contractors .....	4
3.1.2	Competence .....	4
3.1.3	Structural Considerations .....	5
3.1.4	Services – Isolation/Disconnection .....	5
3.1.5	Asbestos .....	5
3.1.6	Soft Stripping .....	6
3.1.7	Temporary Works .....	6
3.1.8	Scaffolding .....	6
3.1.9	Exclusion Zones .....	7
3.2.0	Plant .....	7
3.2.1	Floor by Floor piecemeal demolition.....	7
3.2.2	Structural Refurbishment.....	7
3.2.3	High Reach Demolition.....	8
3.2.4	Deliberate (Controlled) Collapse .....	8
3.2.5	Foundation Removal .....	9
3.2.6	Weather.....	9
3.2.7	Use of Mobile Crushers .....	9
3.3	Environmental Considerations.....	9
3.3.1	Waste .....	10
3.3.2	Nuisance .....	10
3.4	Fire Risk Management .....	10

## 1 Introduction

This standard sets out the minimum requirements for work undertaken by or for Unitas which involves any form of demolition.

## 2 Scope

The scope of the SHEMS covers all persons, workplaces and operations in our Business

Exceptions will be documented through a SHEMS Appendix B process (SHEMS-FOR-GR-999), authorised by the SHE Director Responsible for coordinating SHE.

Unitas SHEMS Manual (SHEMS-STD-GR-003) provides guidance and signposting for the compliance, implementation, monitoring, audit and review of our systems, demonstrating continual improvement and achievement of business objectives.

### 2.1 External References

BS6187 Code of practice for full and partial demolition

BS 5228 1 and 2 2009 Control of Noise and Vibration on Construction Sites

NFDC Guidance for Deconstruction of Tower Blocks floor by floor/piecemeal

<http://demolition-nfdc.com/download/nfdcguidancefordeconstructionoftowerblocks.html>

NFDC High Reach Demolition Rig Guidance Notes

<http://demolition-nfdc.com/download/highreach2012.html>

NFDC Guidance Notes on the Safe Use of Mobile Crushers in the Demolition Sector

<http://demolition-nfdc.com/download/sumc.html>

NFDC Demolition Attachment Guidance Note

<http://demolition-nfdc.com/download/attachment.html>

NFDC Asbestos Guidance Note

<http://demolition-nfdc.com/download/agn.html>

NFDC Demolition Scaffolding Guidance Note

<http://demolition-nfdc.com/download/scaffoldnote.html>

NFDC Disconnection of Services – For Demolition and Refurbishment Work Places

<http://demolition-nfdc.com/download/disser.html>

### 2.2 Definitions and Acronyms

<b>NFDC</b>	National Federation of Demolition Contractors
<b>CSCS</b>	Construction Skills Certification Scheme
<b>CPCS</b>	Construction Plant Certification Scheme
<b>NPORS</b>	National Plant Operators Registration Scheme
<b>CCDO</b>	Certification of Competence of Demolition Operatives
<b>NASC</b>	National Access and Scaffolding Confederation
<b>FOPS</b>	Falling Object Protective Structure
<b>FOGS</b>	Falling Object Guard Screen

### 3 Unitas Requirements

#### 3.1 Introduction

Demolition is the taking down of a structure that has ceased to be of use in its current state. Demolition differs to deconstruction which is the careful dismantling of a structure for the same reason but also to preserve elements for re-use.

Refurbishment is the renovation of older and/ or damaged structures to make it more suitable for the end user. All of these types of work are complex and high-risk activities involving a number of intrinsic hazards that must be considered in order to produce an adequate safe system of work. Essentially, but not exclusively, these hazards are:

- Persons falling from height
- Materials falling from height
- Injury from electricity, gas, water and pressurised supplies
- Structural instability
- Unintended collapse of building/structure's
- Unintended collapse of temporary works
- Contact with plant and machinery
- Incorrect use of plant
- Contact with or the release of harmful substances/noise/vibration
- Fire and explosion
- Unauthorised entry by third parties
- Asbestos
- Dust, Vibration, Noise

##### 3.1.1 Selection of Contractors

Contractors selected to undertake demolition works must be able to demonstrate competence to complete the type of demolition required of the project. Items to be considered include:

- Form and construction of structure
- Previous project experience of contractor
- Previous project experience of operatives
- Available plant capability

Types of demolition include soft stripping, structural refurbishment, partial demolition and full demolition. Methods of partial and full demolition can include use of high reach plant or a floor by floor approach.

Demolition contractors used by Unitas must be members of the National Federation of Demolition Contractors (NFDC) or alternatively to be externally audited to ensure the competence of the company and their compliance with health, safety and environmental law.

It is the responsibility of the chosen demolition contractor to submit the section 80 notice of demolition works to the local council. Record of this notification must be provided to Unitas before demolition work begins.

##### 3.1.2 Competence

All operatives completing any demolition works on a Unitas project must possess the correct Certificate of Competence of Demolition Operatives (CCDO) card. CCDO is an affiliated scheme of CSCS.

There are currently six different card categories:

- Demolition Site operative (Trainee) – Green
- Demolition, Reclamation and Refurbishment Operative – Red

- Demolition Experienced Worker (Topman) – Blue
- Demolition Operative – Blue
- Demolition Supervisor – Gold
- Demolition Manager – Black

Plant operators undertaking demolition operations will need to possess a CPCS card covering the D90 category. The CPCS D90 and D92 categories cover the following demolition adapted 360 excavators with relevant attachments and skid steer loaders:

- Demolish above 30m (D90E)
- Demolish up to 30m (D90D)
- Demolish up to 15m (D90C)
- Demolition Plant (Below 10 Tonne) (D90B)
- Materials processing (D90A)
- Demolition Skid Steer Loader – Extracting (D92A)
- Demolition Skid Steer Loader – Demolishing (D92B)

Before any operator is permitted to operate any plant on a Unitas site they must be issued with a SHEMS-FOR-GR-146 Plant Authorisation Permit.

See Vehicles, Plant and Equipment – PUWER standard (SHEMS-STD-GR-057) for further guidance.

Supervisors and Managers of demolition contractors must hold either the CCDO Demolition Supervisors card or CCDO Demolition Managers Card.

### 3.1.3 Structural Considerations

Before any demolition works are allowed to commence that will alter the structure of the building an appropriate structural survey, covering all areas of the structure to be worked upon, must be completed. This survey must be completed by a competent person employed by or contracted to Unitas. The survey must consider, but not be limited to, all of the items found in the checklist within Appendix A. The permanent works/ project consultant engineer must be provided with the opportunity to comment on the proposed method of demolition, particularly where the building is being only part demolished or is considered a complicated demolition. Advice should be sought from a designer/ structural engineer with temporary works experience for the project on the proposed method of demolition.

### 3.1.4 Services – Isolation/Disconnection

Prior to any form of demolition works commencing, the building which is to be worked on must have all services isolated or disconnected. If this is not deemed possible then physical protection must be provided. This must include, for gas services, a physical cut line in the service at the closest point to where it enters the building and for electrical services the cables should be physically isolated and disconnected from the meter.

Electrical services isolations and disconnections must be made by a competent electrician and certification provided to Unitas.

Gas services must be vented, drained and purged by a competent Gas Safe engineer and certification provided to Unitas.

Any services that are to remain live during demolition works must be clearly tagged every 5 meters using Unitas service markers, physically protected where possible and this made aware to all operatives during the site induction or a similar recorded pre-task briefing.

### 3.1.5 Asbestos

All asbestos surveys, removal and clearance certification must be completed in strict accordance with the Asbestos Management Standard (SHEMS-STD-GR-041) and associated Asbestos Management minimum standards. Soft stripping of an area within a structure must only commence when it has been confirmed by a UKAS accredited analyst or asbestos surveyor that all asbestos identified in the demolition and

refurbishment survey has been removed or the asbestos has been encapsulated and suitably protected if it is to remain.

### 3.1.6 Soft Stripping

Soft stripping is the non-structural deconstruction of a structure. During soft stripping it is important to ensure any hazards concealed within the fabric of the structure have been identified as far as is practical.

These hazards may include:

- Asbestos
- Lead
- Live services
- Pigeon guano
- Needles/Sharps
- Dead animals

All works which may expose operatives to lead must be completed in accordance with the Lead at Work Standard (SHEMS-STD-GR-053).

Pigeon guano can cause health problems if not safely removed from work areas

A specialist hygienist cleaning contractor competent and experienced in this type of work must be sourced to complete the removal of droppings.

The safe and controlled removal of needles, syringes and other sharp objects is extremely important as this type of waste can carry harmful diseases and if not removed and disposed of correctly can lead to serious infections.

It is imperative that any discovery of sharps be reported to Unitas project management immediately to allow the safe removal by a competent, experienced contractor.

### 3.1.7 Temporary Works

All temporary works must be undertaken in strict accordance with the Temporary Works Standard (SHEMS-STD-GR-048). A structural Engineer or Temporary works designer should be consulted for temporary works involved in demolition works.

Façade retention, shoring or other temporary support may be required when partial or phased demo takes place in order to maintain the stability of the remaining parts of the structure and any adjoining structures. It may also be required to preserve architectural interests or listed buildings. Any façade retention/ shoring/ support, inclusive of design, installation, maintenance and protection measures, must be in accordance with the Temporary Works standard after consultation with a structural engineer or temporary works designer.

Prior to installation of any façade retention or shoring, an initial survey should be undertaken by the project consultant structural engineer. Following installation, subsequent surveys should be undertaken by a competent person, under direction from the Temporary Works Co-ordinator, at least every 7 days, or after any incident likely to have affected the structure, to monitor any potential change in the façade and/or the retention system.

### 3.1.8 Scaffolding

Any scaffolding used, especially those used to envelope a structure must be erected in accordance with the current revision of the NASC's TG20. Particular attention must always be made to the tying arrangements for the scaffolding once the building structure begins to be removed. A specific dismantling plan must be produced by the scaffolding contractor to be used in tandem with the demolition method statement.

For sheeted scaffolds the top lift must always be tied unless designed otherwise. It must be ensured that the dismantling plan contains specific method for maintaining these ties.

When adopting a floor by floor demolition method, due planning must allow for guardrails on the inside face of the scaffold. These internal guardrails must be included to ensure compliance with SG4 when dismantling the scaffold after the structure has been demolished.

### 3.1.9 Exclusion Zones

Full demolition, partial demolition and structural refurbishment will generally require the provision of exclusion zones. Exclusion zones will help to reduce the risk of operatives from being struck by falling debris, waste and contact with plant. Also they will help to restrict unauthorised access into restricted areas.

When erecting an exclusion zone the following must be considered:

- The height of the structure
- Deterioration of the structure
- Potential for 'fly' of the material and
- The surrounding environment

### 3.2.0 Plant

Types of plant used whilst undertaking demolition works include:

- 360 degree Excavators
- 360 degree excavators with demolition attachments including grab, pulveriser etc
- Skid Steer loaders
- Remotely controlled demolition robots (As a trade name e.g. Brokks)

Selection, use and maintenance of plant must be in accordance with the Vehicles, Plant & Equipment - PUWER standard (SHEMS-STD-GR-057)

All operators must be competent to operate the selected pieces of plant. Where a CPCS/NPORS category is applicable the operator must demonstrate competence to this standard. See competency section for further information.

Where a CPCS/NPORS category does not apply, e.g. remotely controlled demolition robots (Brokk), then evidence of training direct from the manufacturer or manufacturer approved centres must be demonstrated.

### 3.2.1 Floor by Floor piecemeal demolition

This form of demolition involves the deconstruction of a structure on a floor by floor basis. It is sometimes used until the structure is at a height which can then be reached by traditional demolition plant to safely demolish the lower floors.

Typical constructions can be, but not limited to, pre-cast panels and framed systems (either steel or concrete) with infill panels. Piecemeal demolition will differ from one structure to another. The structural survey will help to determine the safest demolition of key elements taking into account the:

- Requirement for temporary propping
- Sequence of demolition
- Current condition of the structure
- Permissible floor loadings
- Debris loadings
- Changing load capacity of the structure and
- The lifting of large composite panels

As part of the safe system of work for the demolition, the contractor responsible **must, where required**, provide drawings showing the agreed sequence of demolition.

### 3.2.2 Structural Refurbishment

The structural refurbishment of a building can alter the load bearing parts of the structure. This form of demolition can involve the removal of floors and walls, the forming of new openings, the addition of floors and a significant rebuild of a structure.

An assessment should be made during the pre-construction phase of a project as to how invasive the planned work will be. This assessment will enable the demolition plan to be as specific as possible taking into account:

- Type of instability that may be created
- The potential for uncontrolled collapse
- Progressive Collapse
- Shear failure
- Load bearing requirements for remaining elements
- Overloading from demolition debris
- Dynamic and static loading from plant
- Requirement for any temporary support system
- Demolition of post tensioned beams

Competent advice should be sought as early as possible from a structural engineer or temporary works designer, local SHE Manager/ Advisor and those competent in the form of structural refurbishment to be undertaken.

### 3.2.3 High Reach Demolition

High reach demolition involves the use of large machinery to remotely demolish buildings where other methods have been deemed unsafe or less productive. In the main, high reach works refers to works above 15m in working height but can sometimes be much lower.

Machines used for high reach works and all demolition works, must be fitted with a Falling Object Protective Structure (FOPS) and a Falling Object Guard Screen (FOGS) cab to protect the operator. Windows that are cracked or damaged will impair operator visibility and must be replaced immediately.

A high reach machine should use a ratio of 2:1 when working distances. This means that if the working height is 20m then the base of the machine should be at least 10m away from the structure being demolished. This measurement should be taken from the front of the machine cab (NFDC Guidance on high reach demolition). This distance reduces the risk of the machine being struck by falling debris.

When using a high reach machine, pushing against a structure with the attachment should never be attempted.

All machines should be fitted with a boom angle indicator that provides a visible and audible alarm that the boom is in a safe working position. The machine should always be operated in line with the tracks and not with the cab at a 90 degree angle. Machines used must also be fitted with an inclinometer coupled to a warning indicator that will alert the operator if the machine is being used on an unsafe incline.

High reach machines **MUST NOT** be used as cranes. They are not designed to be used as cranes or for any lifting operations.

Other considerations when planning and undertaking high reach demolition works are:

- Hazard of overhead power lines
- Ground conditions, known voids, culverts, type of soils, working platforms
- Weak retaining walls
- Adequate exclusion of the working area
- Loading and unloading of the machine upon arrival/removal from site

### 3.2.4 Deliberate (Controlled) Collapse

Deliberate collapse may sometimes be the only option available to demolish a structure. Where it is envisaged that deliberate collapse of a structure must be used, it must be demonstrated by a risk assessment as the safest option after consultation with the local SHE manager.



### 3.2.5 Foundation Removal

Once a structure has been demolished down to ground level there may be a requirement for the foundations to be removed. A permit to dig must be issued prior to the breaking of any ground to ensure that the contractor is aware of all known services. See the Underground Services standard (SHEMS-STD-GR-059) and the Earthworks and Contaminated Land standard (SHEMS-STD-GR-61) for further guidance.

### 3.2.6 Weather

As demolition of a structure progresses, consequently the structure weakens. Consideration should always be given to the effect weather, notably wind and the build-up of rainwater, can have on a weakened structure. This is relevant when demolishing all structures, taking into account local conditions, and is particularly important when demolition takes place over a prolonged period and the structure is left in a temporary condition overnight or over a weekend.

### 3.2.7 Use of Mobile Crushers

A mobile crusher can be either a wheeled or track mounted machine incorporating jaws or impact type crushers allowing it to crush solid forms of construction waste such as brick, concrete and blocks.

Mobile crushers must be operated in accordance with legal requirements.

Environmental Permitting (England and Wales) Regulations 2010 compliance requires a permit for operation of a mobile crusher. The demolition contractor must provide Unitas with a copy of the permit prior to the crusher arriving on site. In addition to this the contractor must confirm that the local authority in which the site resides has been notified that the crusher will be used.

A separate safe system of work and risk assessment must be produced for the safe operation of a crusher. The operator of the crusher must possess a CPC card, category A42, to operate this piece of plant. **No operative is permitted to be on the working platform of the crusher whilst it is in operation in accordance with current HSE and NFDC guidance.** The crusher operator must complete daily recorded inspections of the crushing plant with records provided to Unitas.

Crushers can be fed from loading shovels, excavators or conveyors.

If a loading shovel is to be used then the access ramp must be complete with edge protection on either side of the ramp with a level top platform so that the machine is not discharging uphill and a stop-block is to be in place on the platform. The maximum gradient of the ramp must be in accordance with the manufacturer's instructions.

The operating area of the crusher and resulting stockpile must be segregated using physical barriers and clear warning signage to prevent operatives coming into contact with plant and to prevent unauthorised access. All moving parts of the machine must be adequately guarded at all times.

**Prior to initial operation of the crusher the operator must demonstrate to a nominated Unitas Manager that the relevant emergency stop buttons are working.**

## 3.3 Environmental Considerations

Demolition activities have a wide range of environmental issues that require consideration.

If the works are due to take place in a planning conservation area or include listed buildings refer to the Archaeology and Heritage standard (SHEMS-STD-GR-060) for details of Conservation Consent under the Town and Country Planning Act or Listed Building Consent from the local Authority. If the structures to be demolished are in the vicinity of listed buildings or ancient monuments, consideration should be given as to how vibration may impact on these.

An ecology/ wildlife survey must be completed prior to demolition works commencing. Requirements detailed within any such survey must be complied with. If the structures to be demolished contain

bats, active bird nests or other protected species refer to the Ecology and Biodiversity standard (SHEMS-STD-GR-062). Further guidance should be sought from the local Environmental Manager/ Advisor and/ or SHE advisor.

### 3.3.1 Waste

All Demolition arising's are to be considered as waste.

To ensure waste management requirements have been considered, refer to the Waste Management standard (SHEMS-STD-GR-065). Difficult wastes should be considered (eg. Asbestos, bird faeces, needles/sharps). This includes:- requirements for crushers to be deployed under the correct environmental permits; exemptions required for on-site crushing and screening of demolition waste and exemptions or documentation required for storage and use of demolition waste on site. Crushing that is completed in accordance with the Waste Resource Action Programme for the production of Recycled Aggregate from inert waste must be completed in strict accordance with the guidance found in the WRAP Protocol Guidance and the checklist in QP Producers Checklist. A Factory Production Control System Template (SHEM-FOR-GR-191) is available which is in accordance with the protocol.

Consideration must also be given to the logistics of removing demolition waste from the building whether this is by skips, drop zones or rubbish chutes. Refer to the appropriate Minimum Standard for Waste chutes (SHEMS-MST-DPS-033) for guidance on the safe use of this method.

### 3.3.2 Nuisance

Nuisance issues include noise, dust and vibration emitted from demolition activities.

Environmental dust, noise and vibration must be considered. The Unitas pre-construction works will determine whether it is necessary to apply for a section 61 notice from the local authority. Refer to the Nuisance Management standard (SHEMS-STD-GR-063) for further guidance.

Dust from demolition works will be produced on a small scale, i.e. during soft stripping but also on a larger scale during demolition of concrete structures, use of mobile crushers and stockpiling crushed materials.

The most effective method for managing dust emissions is via the use of water suppression. The Unitas preferred options are for hoses connected directly to the arm of the plant used and/ or remote water suppression i.e. a dustboss. Remote suppression allows for operatives to be kept away from the demolition area and moving plant.

## 3.4 Fire Risk Management

Demolition works involve their own inherent fire risks. The work itself can involve the use of hot works especially the use of oxy-propane cutting equipment. When using oxy propane equipment both the oxygen and propane bottles must be positioned in a proprietary trolley and secured in place by a suitable chain. Both the oxygen and propane bottles must be fitted with flashback arrestors and non-return valves. Refer to the Unitas fire management procedure for further guidance on storage of flammable gases.

The Fire Safety & Other Emergencies Plan (SHEMS-FOR-GR-080) must also take into consideration how the demolition on a structure can affect the project fire strategy. Items to consider:

- Maintenance of accessible emergency escape routes
- Distances between escape routes
- Removal of fire breaks
- Removal of fire doors
- In refurbishment projects, maintenance of the dry riser.

Further guidance can be sought from the current JCOP for fire prevention on construction sites.

## A.1 Appendix A – Structural Survey Checklist

	Item to be checked	Yes	No	N/A	Comment
1.	Has the form of construction been identified? Steel frame, concrete frame etc?				
2.	Is the age of the structure known?				
3.	Is the current condition of the structure good? Look for vandalism, corrosion, changes to the structure etc				
4.	Will there be loads imposed on the existing floors during demolition? i.e plant, debris etc				
5.	Are the sizes and weights of pre-cast elements known?				
6.	Has information been provided to determine stability of party walls?				
7.	Are core tests required to determine quality of concrete?				
8.	Has the reinforcing arrangement been identified?				
9.	Are concrete posts tensioned?				
10.	Has the safe load capacity of floors and walls been determined?				