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## 8 BUILDING DEMOLITION

### 8.1 GENERAL

#### 8.1.1 Scope

- 1 This Section specifies the requirements for demolition work, disposal of materials arising from demolition work, and procedures for dealing with hazardous materials encountered during demolition work.

- 2 Related Parts and Sections are as follows:

This Section

Part 01 ..... General

Part 14 ..... Temporary Works & Equipment

Section 1 General

Section 11 Health & Safety

#### 8.1.2 References

- 1 The following standards are referred to in this Section:

BS 5607 ..... Safe use of explosives in the construction industry

BS 6657 ..... Guide to prevention of inadvertent initiation of electro-explosive devices by radio-frequency radiation.

Environment Protection Law No. 30 (2002)

Institution of Civil Engineers (2010). Demolition protocol.

Qatar National Vision 2030.

Qatar National Development Strategy.

Waste & Resources Action Programme (WRAP) and the Environment Agency (2013). Quality Protocol: aggregates from inert waste.

Waste and Resources Action Programme (WRAP). Designing out Waste: design team guides for buildings and civil engineering.

#### 8.1.3 Definitions

- |   |                      |   |
|---|----------------------|---|
| 1 | Demolition           | Work done to dismantle or take apart and remove an existing building or facility.   |
| 2 | Hazardous Materials  | General term to encompass any and all materials which have been contaminated by substances which are dangerous or potentially dangerous to the public. It is inclusive of materials which if not properly contained could continue to spread and contaminate soil, ground water or become airborne. |
| 3 | Materials Arising    | Any parts or portions of building materials or accessories which are removed or salvaged once the demolition process begins.  |
| 4 | Method Statement     | The defined method or process to be followed for demolition of a specific project.  |
| 5 | Selective Demolition | Typically refers to demolition work done to only parts of buildings or facilities for retrofit for renovation type work.  |

- 6 Unsafe, unstable In reference to this Section, this is interpreted to mean a building or structure or condition which is dangerous to the safety of the public.

#### 8.1.4 Records

- 1 Documentation
- (a) All available plans of the structure to be demolished are to be examined and where the nature of the construction is uncertain a special investigation is to be carried out as agreed with the Engineer.
  - (b) Adjacent buildings or structures will be inspected and their existing interior and exterior condition shall be documented prior to and after demolition in writing or photographs or both.

#### 8.1.5 Materials Arising

- 1 General Requirement
- (a) All materials arising from the demolitions are to become the property of the Contractor unless otherwise specified in the Project Documentation.
  - (b) Materials arising shall be cleared from the site as the work proceeds in an approved manner.
  - (c) Materials arising from the demolitions and alterations are not to be burnt on site.
  - (d) Removal operations for materials arising should be conducted with the least interference to the public and not be commenced until approved in writing by the Engineer. The Engineer has the right to reject off-site disposal plans if disposal would leave an unsightly condition anywhere.

#### 8.1.6 Safety

- 1 Safety Requirements
- (a) The Contractor is to provide safeguards, including warning signs, barricades, and temporary fences as required for the protection of the public and Site personnel during demolition and removal operations. The safeguards are to be maintained until demolition and removal operations are complete.
  - (b) Within populated or trafficked areas and when adjacent to other structures the Contractor is to provide enclosed rubbish chutes from each floor to carry debris into disposal trucks/skips. Overhead bridges of tight board or prefabricated metal construction to be provided at rubbish chutes to protect persons and property from falling debris.
  - (c) The Contractor shall conduct his operations in a manner that minimises the spread of flying particles and dust. Rubbish and debris shall to be sprinkled with water to keep dust to a minimum.
  - (d) In addition, the following safety rules shall be observed in the performance of the work:
    - (i) No wall or part of wall shall be permitted to fall outwardly from structures.
    - (ii) If the building is to be demolished storey by storey, at least one stairway in each structure shall be maintained in usable condition to highest remaining floor.
    - (iii) Stairways are to be kept free of obstructions and debris until that level of structure has been removed.
    - (iv) Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use; all possible users are to be instructed in use of fire extinguishers.

- (v) Hydrants are to be accessible at all time; no debris is to be permitted to accumulate within a radius of 4 metres of fire hydrants.
- (e) The Contractor will at all times comply with the requirements of the Civil Defence Department.
- (f) In the case of structures that are to be partly demolished, the condition of those parts of the structure that are to be retained shall be checked for safety and stability before any demolition work begins. Similarly, the condition of adjoining properties which may be affected by the demolition shall be checked for safety and stability before any demolition work begins.
- (g) Independently supported platforms are to be provided to avoid working from that part of the structure being demolished.
- (h) Isolated walls should not be left un-shored unless they are structurally stable against wind and other forces likely to affect them.

### 8.1.7 Use Of Explosive

#### 1 General Description

- (a) When the use of explosives is necessary for the carrying out of the work, the Contractor is to exercise the utmost care not to endanger life or property. The Contractor shall be responsible for all damage resulting from the use of explosive.
- (b) All explosives are to be stored in a secure manner in compliance with all the requirements of the Police, Civil Defence Department and the manufacturer of the explosive. All such storage places are to be clearly marked, "DANGEROUS - EXPLOSIVES", in English and Arabic and shall be in the care of a competent watchman.
- (c) Explosives will not be stored closer than 300 metres from any road, building, camping area or place of human occupancy.

#### 2 Procedures

- (a) The Contractor is to notify each public utility department having structures in proximity to the Site of his intention to use explosive. Such notice shall be given sufficiently in advance in order to enable the said authorities to take such steps as they may deem necessary to protect their property from damage.
- (b) The written consent of the Engineer is to be obtained for each proposal of the Contractor to use explosives.
- (c) Where blasting is proposed adjacent to a building or other structure, existing or under construction, the Contractor will satisfy the Engineer that safe values of vibrational amplitude and peak particle velocity will not be exceeded.
- (d) The Contractor is to comply with the provisions of BS 6657 in respect of the use of electrical detonators in the vicinity of static and mobile radio transmitters, including normal radio and television broadcasting stations and radar units associated with aircraft movements.
- (e) The handling, transport and use of explosives will be in accordance with the relevant provisions of BS 5607. Explosives are to be used in the quantities and manner recommended by the manufacturers.

### 8.1.8 Special Investigations

#### 1 General Description

- (a) The Contractor is to ascertain from the responsible authority whether any mains or services need to be redirected or cut-off. The Contractor shall conform to any procedures prescribed by the relevant authority and the Engineer.

- (b) Notwithstanding any information supplied by the Engineer, the Contractor is to take all necessary steps to establish the presence of any stressed components, supporting walls and the like in the structures to be demolished.
- (c) Where special circumstances such as unknown soil conditions exist (which could reveal hazardous material) or where the structural components of the building support system are unknown, additional investigations as necessary will be performed. The cost of such investigations shall be borne by the Contractor unless otherwise stated in the Project Documentation.

#### 8.1.9 Method Statements

- 1 Method Statements for all works covered in this Part shall be prepared by the Contractor and submitted to the Engineer for approval.
- 2 Method Statements shall be in accordance with Section 11 of the QCS
- 3 No Demolition work shall commence until all necessary Method Statements have been approved in writing by the Engineer.

### 8.2 PREDEMOLITION AUDIT

- 1 Before obtaining a demolition permit in 8.4 below, the contractor shall carry out a pre-demolition audit of the building or structure to be demolished. The pre-demolition audit will identify materials that can be removed for reuse or recycling, such as furnishings and fittings, false ceilings and floors, partitions, air conditioning units and other mechanical plant.
- 2 The audit should also identify the possible presence of any hazardous materials such as asbestos. Specialist surveys should be carried out to establish whether hazardous materials are present and to identify the correct procedures for removing them prior to demolition.
- 3 The pre-demolition audit should identify the main structural features of the building and enable an estimate of the total amount and nature of demolition waste to be made.
- 4 The contractor should plan the demolition so as to maximise the quantity of high quality, segregated material – clean concrete, blocks, bricks, etc.

### 8.3 WASTE MANAGEMENT PLAN

- 1 Based on the results of the pre-demolition audit, the contractor shall prepare a waste management plan showing how he intends to handle materials before and during demolition so as to minimise contamination of the materials and achieve maximum value from reuse and recycling.
- 2 The plan should indicate arrangements for storage and segregation of waste on site, a programme for demolition showing the various activities and an estimate of the likely quantities of different types of waste and where they will be sent for reuse, recycling or disposal.

### 8.4 DEMOLITION PERMIT

- 1 The contractor shall submit the pre-demolition audit, waste management plan and any specialist surveys that have been carried out to the Ministry of Municipality (MM) when applying for a demolition permit.
- 2 MM will only issue a permit once the waste management plan has been approved.
- 3 Demolition shall proceed in accordance with the programme shown in the waste management plan, subject to any changes required for health and safety reasons or due to discovery of unexpected materials or structural conditions.

### 8.5 WASTE TRANSPORT

- 1 Transportation of classified waste shall be carried out only by companies licenced and approved by MM and deposited in MM's approved waste disposal facility.
- 2 The destinations of the various waste streams shall not change from those set out in the waste management plan without approval from MM.
- 3 The quantities, composition, source and final destination of the waste shall be recorded on a "duty of care controlled waste transfer note".
- 4 Disposal permit shall be obtained from MM for the disposal of hazardous waste.
- 5 Hazardous waste shall be transported by a licensed waste contractor to an approved disposal facility.
- 6 The contractor shall keep records of the quantities of different waste streams and where they were sent for processing, recycling or disposal. The records may be in paper or electronic format.
- 7 The records should be available for inspection at the site office during the demolition works and should be kept at the contractor's main office for a minimum of two years after completion of the demolition work.

## **8.6 BUILDING DEMOLITION**

### **8.6.1 Scope**

- 1 This Part specifies procedures and requirements for demolition and removal of buildings, structures and related service utilities. The scope of demolition or renovation work is specified for three categories of demolition:
  - (a) Standard Demolition - typical type demolition work
  - (b) Special Demolition - demolition of partially collapsed or unsafe structures
  - (c) Selective Demolition - demolition required for alteration or expansion type work

### **8.6.2 General Requirements**

- 1 Unless otherwise indicated in the Project Documentation or directed by the Engineer, the Contractor is to complete the demolition and removal of buildings and structures together with all foundations and retaining walls, piers, partitions and columns, and associated service utilities.
- 2 The demolition is to be carried out in a planned and safe sequence, generally in reverse order of erection, reducing the shell of the building in small lifts.
- 3 The Contractor is responsible for the removal and disposal of all debris resulting from demolition work.
- 4 Upon hand over of the Site to the Contractor, the Contractor is to take over all responsibility of the buildings to be demolished.
- 5 The Contractor is to inspect each building he is to remove and determine for himself the work involved and the equipment and the materials required for the specified demolition work.
- 6 The Contractor shall at his own expense, make good any damage done to other property during demolition Works.

### **8.6.3 Standard Demolition**

- 1 Method Statement

- (a) The Contractor is to prepare a method statement which shall detail all aspects proposed demolition work and associated procedures before commencing any demolition work. The method statement shall be approved by the Engineer before any demolition work commences.
- (b) The Contractor shall establish whether any stressed components are present in the structure. The Contractor shall include a complete statement of his proposed method of demolition of such components in his method statement.
- (c) The Contractor shall establish whether any of the walls of the structure to be demolished are load bearing and shall establish whether cross walls are bonded into the abutting walls. The Contractor shall identify such walls in his method statement.

## 2 Execution

- (a) The Contractor shall completely demolish and remove buildings and structures, including all services related or connected thereto, as noted below:
  - (i) To minimum depth of 900 mm below finished grade in areas new paving is to be placed unless greater depth is required for installation of new utility service lines.
  - (ii) To full depth within an area defined by hypothetical lines located 1.5 m outside building lines of new structures.
  - (iii) To minimum depth of 600 mm below finished grade in all other areas unless greater depth is required for installation of new utility service lines.
- (b) Debris, including brick, concrete, stone, metals and similar materials are to become the property of contractor and be disposed of by him, off the Site. Concrete slabs below grade that do not require removal from the site are to be broken up into pieces not exceeding 60 cm<sup>2</sup>.
- (c) In removing buildings and structures of more than two stories, demolition work shall start at the highest level and progressing down to third floor level. Demolition of first and second stories may proceed simultaneously.
- (d) Where explosives are to be used, comply with Part 1 of this Section and BS 5607.
- (e) The Contractor is to conduct his operations in such a manner as to avoid danger to persons and property. Once demolition work has started on any building, the work on that building is to be continued to completion, promptly and expeditiously.
- (f) Where building basements exist and the area is not to be reused, all debris is to be removed from the basement areas and concrete floors broken. The areas are then to be filled with backfill material simultaneously with the breaking of the foundation walls and floors so that the backfill material will be integrated with the pieces of broken concrete.
- (g) Concrete slabs resting on earth and forming footpaths, driveways, or the first floor of buildings without basements are to be broken up and removed from the Site unless otherwise specified in the Project Documentation.
- (h) The Contractor is responsible for removing any additional small "out" buildings or miscellaneous structures that have not been indicated in the Project Documentation unless otherwise instructed by the Engineer.
- (i) Immediately upon award of the Contract and prior to the demolition of any structures, the Contractor is required to paint or stencil in contrasting colours of an oil or lead-based paint "BUILDING TO BE DEMOLISHED" on all four sides of each residential building and on two opposite sides of other structures in Arabic and English. The signs are to be positioned in a prominent location on the structure so that they can be easily seen and read, and at a sufficient height to prevent defacing.



- (j) Existing underground storage tanks on the Site or within the buildings to be demolished are to be removed and disposed of by the Contractor. The Contractor is to take all necessary precautions during the removal of the fluid within the tanks. Where tanks are removed, the Contractor is to backfill the resulting void with the fine aggregate. This backfill is to be compacted in accordance with Section 3, Earthworks Related to Buildings.
- (k) Structures designated to become the property of the Contractor are to be removed from the Site.
- (l) Operations necessary for the removal of an existing structure or obstruction, which may damage new construction, are to be completed prior to placing the new work unless otherwise specified in the Project Documentation.
- (m) Where trees have been designated to remain, but are a hindrance to demolition work, the Contractor is to, at his own expense, temporarily relocate such trees and provide all maintenance as necessary until such time as replanting is feasible.
- (n) Excavation to locate the disused services and backfill after the removal of the services installation shall be carried out in accordance with applicable Sections in the QCS and Project Specification.

#### 8.6.4 Utility Services

##### 1 Demolition Related Work

- (a) The Contractor is to arrange for the disconnection of all utilities that serve buildings in accordance with the respective requirements and regulations of the relevant authority.
- (b) The Contractor shall liaise directly with the service utility authorities to assertion correct procedures and safe working practices related to disconnection of each particular utility service.
- (c) The Contractor is to disconnect and properly seal, in a manner approved by the relevant authority and the Engineer, all sewer outlets that serve buildings to be demolished. The Contractor will keep the Engineer informed of his plans for the performance of any work in connection with the sealing off of such outlets in order that proper inspection may be provided at the time the work is performed.
- (d) Demolition of utilities shall be in accordance with Part 1 and Clause 2.2 of this Section unless otherwise required by the Project Documentation.
- (e) The Contractor shall demolish and remove external utility service lines as follows:
  - (i) Abandoned portions of utility lines located outside areas of new buildings, or new roads, footpaths and parking areas that are less than 650 mm below proposed finished ground levels.
  - (ii) Abandoned portions of utility lines which occur within areas of new buildings, roads, footpaths and parking areas.
  - (iii) Abandoned utility lines that would interfere with installation of new utility lines.
  - (iv) Other abandoned lines not specified that interface with performance of the work of this contract.
- (f) Unless otherwise stated elsewhere in the Project Documentation, the point of disconnection of utility services shall be at a point agreed with by the utility owner.

#### 8.6.5 Special Demolition

##### 1 Scope



- (a) This Clause specifies the requirements and precautions to be taken where demolition and removal of materials is required within buildings or structures which are partially collapsed or considered unsafe.

2 General Requirements

- (a) Where demolition is to be done within partially collapsed or unsafe buildings, additional site specific investigations will need to be made by qualified engineers or specialists to determine if temporary shoring or other measures must be taken for safety of workers, the Public or other adjacent structures of properties. The Contractor is responsible for arranging for such investigations to be made before any demolition work commences. The Contractor shall incorporate the findings and results of the investigation in his method statement. The cost of any specific investigations, as described in this paragraph, shall be borne by the Contractor unless otherwise stated in the Project Documentation.

**8.6.6 Selective Demolition**

1 Scope

- (a) This Clause specifies the requirements and precautions to be taken where only parts of the interior or exterior of buildings are to be demolished, removed or replaced. This may include renovation or remodelling work, additions or expansions.

2 General Requirements

- (a) Demolition work in alterations are to be undertaken with the maximum consideration for the surrounding structure and are to be limited to the minimum required in order to carry out the work. The manner and order of the work, including the design and provision of any supports and other safety precautions, will be the Contractor's responsibility and shall be fully detailed in the method statement.
- (b) The design of any shoring and supports necessary to maintain the stability of any structure retained after the demolition of adjoining property are to be submitted to the Engineer for approval. The responsibility for the sufficiency of the design is to rest with the Contractor, notwithstanding the approval of the Engineer.

**8.6.7 Temporary Work**

1 General Requirements

- (a) The Contractor is to provide temporary works for protection of existing roads, footpaths, utilities, and structures where and when necessary.
- (b) Support is to be provided for members of framed structures before cutting them.
- (c) Where a structure's stability may be affected by the demolition of a member, temporary bracing, and guys, are to be provided to restrain the remaining members.

**8.7 HAZARDOUS MATERIALS**

**8.7.1 Scope**

- 1 This Part specifies requirements and procedures for the Contractor when encountering potential or known hazardous or toxic waste.

### 8.7.2 Relevant Authorities

#### 1 Procedures and Contacts

- (a) The Contractor shall contact and co-ordinate with respective Government agencies in order to ensure correct implementation of approved methods and procedures to be carried out by the Contractor in connection with the removal or containment of hazardous materials. This is especially to be undertaken for the following:
  - (i) Prior to initiation of any work at the Site where known hazardous materials exist.
  - (ii) Immediately upon question, suspicion, or finding of hazardous materials during demolition; all work should cease under this situation, with exception of immediate precautions taken to provide containment or until further direction or approval is given by the Engineer.

### 8.7.3 Method Statement

#### 1 Hazardous and Toxic Waste

- (a) When the Contractor's operations encounter or expose any abnormal condition which may indicate the presence of a hazardous or toxic waste, such operations are to be discontinued in the vicinity of the abnormal condition and the Engineer is to be notified immediately. The presence of the following may be indicators of hazardous or toxic wastes and are to be treated with extraordinary caution:
  - (i) Tanks or barrels.
  - (ii) Discoloured earth, metal, wood, ground water, etc.
  - (iii) Visible fumes.
  - (iv) Abnormal odours.
  - (v) Excessively hot earth.
  - (vi) Smoke.
  - (vii) Other conditions which appear abnormal.
- (b) Hazardous materials include, but are not limited to the following:
  - (i) Anhydrous ammonia.
  - (ii) Combustible liquids, compressed gasses.
  - (iii) Dip tanks, flammable liquids.
  - (iv) Hydrogen.
  - (v) Liquid petroleum gasses.
  - (vi) Nitrous oxide.
  - (vii) Spray finishing.
- (c) Every effort is to be made by the Contractor to minimise the spread of any hazardous or toxic waste into uncontaminated areas.

### 8.7.4 Special Precautions

#### 1 Public Safety Measures

- (a) The Contractor is to provide all safety measures to protect the public from harmful hazardous materials as required by respective authorities.
- (b) The Contractor's operations will not resume until so directed by the Engineer if any safety measures are found to be inadequate for protection from hazardous material conditions encountered during work.

#### 2 Environmental Safety Measures

- (a) The Contractor is to follow and implement all procedures defined or required by related environmental or public safety authorities. These precautions will be taken at all times during the removal or confinement of hazardous materials, whether known or suspected.
- (b) The Contractor is to have present at the Site, a representative of the related approval authority during removal or confinement work, if it is a requirement the approval authority.
- (c) If previously defined safety measures are found not to exist for the type of hazardous materials in question, it will be the Contractor's responsibility to establish procedures and methodology to be implemented. The procedures and methodology shall be to the approval of the Engineer.
- (d) Removal or containment work is to be performed under the constant direction and supervision of pre-approved personnel experienced with working with hazardous materials.

3 Documentation

- (a) The Contractor is to be responsible for processing and approval of any documentation relating to procedures required by governmental or agencies related to procedures for removal or containment of hazardous materials.

**8.7.5 Disposal**

1 Safe Disposal

- (a) Disposal of hazardous materials will be made in accordance with the requirements and regulations of the relevant authority.

END OF PART