

PPS 6**PARTICULAR SPECIFICATION****DEMOLITION AND REMOVAL OF STRUCTURAL CONCRETE**

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PPS 6**DEMOLITION AND REMOVAL OF STRUCTURAL CONCRETE AND BUILDING COMPONENTS****PPS6-1 SCOPE**

This specification covers the requirements for suitable and safe access, demolition, dismantling, spoiling of debris, rehabilitation of debris dumpsite, if applicable, and rehabilitation of the demolition site for work involving the demolition and removal of mass and reinforced concrete. This specification covers the work related to demolition of entire members of a concrete structure and associated building components, as well as the partial demolition and removal of concrete from a member of such a structure and the preparation of the exposed surface.

As the type of work will be entirely dependent on the equipment used and the methods of demolition adopted, the demolition and disposal has only been scheduled according to the in situ volume of material of each component to be demolished.

PPS6-2 INTERPRETATION OF CONCRETE DEMOLITION TECHNOLOGY**PPS6-2.1 Definitions**

For the purpose of this specification the definitions given hereunder shall apply:

PPS6-2.1.1 Temporary works:

The temporary works necessary for access to the work area includes all foundations, scaffolding and support structures, working platforms, cradles, fixtures to existing structural members, etc required for the safe access to and execution of the work, and for the protection of passing persons, animals and vehicles against injury or damage.

PPS6-2.1.2 Mobile access unit:

A mobile access unit consists of a vehicle-mounted access gantry and work platform, including mobile crane type units.

PPS6-2.1.3 Concrete member:

A concrete member shall be defined as a distinct element, or component of mass, reinforced, or pre-stressed concrete.

PPS6-2.1.4 Demolition technique:

A process adopted in breaking and mucking of the concrete, reinforced concrete, stone or brick structure including any cast-in or affixed elements, fittings or fixtures of steel, aluminium, timber, glass, cables and the like by various means as for example: hand tools, mechanical impact breakers, splitters, diamond saws, explosives, expansive chemical agents, thermal heating, laser beams, microwaves, and abrasive water jets.

PPS6-2.1.5 Complete demolition of concrete and building components:

Demolition refers to the breaking up and removal of an entire concrete member or building component, including cast-in or affixed elements into discrete, manageable and disposable fragments with no further repair work undertaken.

PPS6-2.1.6 Partial demolition, or removal of concrete and building components:

Partial demolition, or removal of concrete is defined as cutting back into the surface or end of a concrete member and the breaking off of a defined section of concrete in pieces, to expose a sound and competent material for finishing or as a receiving surface for rebuilding concrete to a different profile.

PPS6-2.1.7 Dismantling:

Cutting or splitting of a structure into sections that can be removed for further breakdown elsewhere.

PPS6-2.1.8 Disposal:

The removal and proper disposal of all demolished concrete and building rubble, including cast-in items fittings, fixtures and equipment to be discarded.

PPS6-3 GENERAL REQUIREMENTS FOR ACCESS AND SAFETY

The Contractor shall provide and will be responsible for safe access structures and work platforms to all areas requiring remedial work. The access and temporary works shall be designed, constructed and maintained in accordance with the current relevant safety regulations, all in compliance with the Occupational Health and safety Act (Act 85 of 1993) and its applicable Regulations, specifically those of 2014, and shall remain in place until removal is authorized by the Engineer. Appropriate allowances shall be made for screening of the work and other protective measures required by the various work activities.

Access and work platforms may be provided from overhead tower cranes, mobile access gantries or vehicles, or from temporary works supported from the ground or fixed to structural members. Such temporary works shall be certified by a professional engineer on behalf of the Contractor to comply with the relevant safety regulations regarding strength and stability for all imposed loads that can be anticipated to arise from the specified work activities.

Notwithstanding approval given by the Engineer for the design and drawings prepared by the Contractor and the acceptance of temporary works including the working platform(s), access structure(s) and crane(s) as constructed, the Contractor shall be solely responsible for the safety and adequacy of the temporary works and shall indemnify and keep indemnified the employer and Engineer against any losses, damage to persons or property, all claims, demands, proceedings, damages, costs, charges and expenses whatsoever, which may arise out of or in consequence of the design, construction, use and maintenance of the temporary works.

The Contractor shall submit to the Engineer the relevant design details and drawings of the working platform(s), access structures (fixed, or partially fixed), tower cranes and mobile cranes for comment and/or record purposes.

Abseiling techniques will not be allowed without prior approval in writing from the Engineer.

The Contractor shall comply with any additional imposed or physical restraints upon the means of access to and from the structure as stated in the project specification and/or the drawings.

The Contractor shall provide safe access and suitable facilities for inspection and testing by the Engineer, including the inspection at the end of the maintenance period. Any specific access facility required for the inspection at the end of the maintenance period shall be as specified in the project specifications.

PPS6-4 MATERIAL TO BE DEALT WITH DURING DEMOLITION**PPS6-4.1 Dam concrete**

Tzaneen Dam was constructed in the late 1970's. Construction and inspection records indicate variable quality concrete was used in the construction of the dam. The coarse aggregate comprised washed river alluvium (boulders and gravel) with maximum sized aggregate in the order of 75mm. The aggregate consists of unweathered to slightly weathered generally well rounded fragments of blue dolerite and white to yellow granite-gneiss. The fine aggregate would appear to consist of a mixture of well-rounded natural sand and more angular crusher sands. A high ratio of coarse aggregate to mortar is evident, with few small sized aggregate particles. The mortar itself exhibits varying quantities of included air voids, from minimal to significant.

Investigations undertaken for the dam raising included two 83mm diameter rotary core holes drilled each side of the spillway from the non-overspill crest. The borehole logs and compressive strength testing are included in Section 11 of Volume 2.

Record drawings showing the configuration of the structure and the location of the investigatory holes are included Volume 5 of this document (the Drawings) for reference.

Dam concrete includes concrete in the non-overspill crest (tongue walls), spillway, spillway training walls and bucket deflector at the toe of the Dam Wall. In the case of Ramadiepa Dam, this additionally include the slabs

at the toe of the spillway. Portions of the Dam Concrete are to be demolished in order to raise the dam height or extend the protection measures at the toe of the dams.

PPS6-4.2 Building structure

The Hoist Room at the top of the intake works comprises of a reinforced concrete framed building of walls, columns, roof slab and beams. The concrete can be described generally as 25MPa/19mm containing reinforcement bars up to 2.5% by volume of concrete. The concrete framed building is partially clad with clay brickwork façade walls, incorporating steel framed windows and a roller shutter door. There are various electrical and data cables in the building. The building houses an overhead travelling crane, crane rails and associated access ladder and fittings which are to be removed, stored, serviced and reinstalled in the new building. The Hoist Room is to be demolished and re-built at a higher elevation on the same footprint.

A stair well is incorporated into the top of the tongue wall to access the floor of the Hoist Room, which has various cast-in steel frames and fittings as well as loose steel components including floor gratings and stop-log gates, are to be demolished.

Building structures include any other buildings or constructions that are not classified as Dam concrete.

PPS6-4.3 Other structures

Other structures to be dismantled, demolished, uplifted and either disposed or stored for future use include components such as hand railings, precast kerbs, precast paving, survey benchmarks, piezometer tubes, data cables, in-situ concrete elements and the like. These components are generally located on the non-overspill crest, or are attached to or cast into the Dam Concrete or building structures that are to be demolished.

Other structures include concrete slabs, precast pipe sections, foundations and associated reinforcements.

PPS6-5 PLANT AND EQUIPMENT

PPS6-5.1 General

The type and capacity of all demolition and disposal equipment shall be adequate and suitable for the proposed means of demolition and subject to approval by the Engineer prior to its use on the structure. In the case of blasting, proof of relative experience in similar, relevant work as well as access to and expertise with appropriate drilling equipment and blasting technology is to be shown.

The suitability of all chosen demolition methods shall be demonstrated on a representative test section identified by the Engineer prior to the execution of any programmed work.

PPS6-5.1.1 Mobile Access Units and Cranes:

Access structures, work platforms and lifting cranes mounted and operated from a mobile vehicular support base shall be of an approved type and capacity for the intended use. Tower cranes mounted onto a fixed base, anchored into the tongue wall or other Dam concrete, shall be of an approved type and capacity for the intended use. Each unit shall at all times be operated within the recommended limits in terms of reach and capacity as stated by the manufacturer or the authority responsible for the operation and maintenance of the access unit, or crane

The Contractor shall, prior to dispatching the mobile access unit, or crane to the site, provide certification from the manufacturer or the operating authority that the unit has been thoroughly inspected and serviced, that the unit is functioning properly and that it complies with the relevant safety regulations.

PPS6-5.1.2 Access, Scaffolds, Platforms, Cradles and Cranes:

Where necessary, the Contractor shall provide suitable and safe temporary access structures, working platforms, debris collection and removal chutes and bins, including protection screens where required, at each location where concrete and associated building materials have to be demolished or removed.

Temporary works entailing scaffolds, platforms cradles and cranes providing access to the work area and transport and lifting facilities shall be assembled and constructed from materials and structural sections complying with the relevant specifications. The temporary works shall be designed, erected, operated,

maintained and dismantled so as to ensure safe working conditions for all site personnel, and where necessary the safety of the general public having access to the site.

The temporary structures, platforms, chutes, etc, must be stable and of sufficient strength and rigidity to safely carry the imposed temporary loads arising from the work activity. Cognisance must be taken of the fact that the demolition work is to be carried out on and above the crest of a dam and that while every effort will be made to maintain a safe working water level within the dam, impoundment level fluctuations cannot realistically be controlled in the event of river flooding. Consideration must accordingly be given to the design of temporary works and particularly access platforms, etc, with a view to minimising their susceptibility to damage in the event of a flood being discharged over the spillway. Consideration must further be given to minimising the exposure of the Contractor's personnel to risk under such circumstances.

Fixed tower cranes, and fixed or partially mobile cranes shall be erected in accordance with the manufacturer's specifications and shall at all times be operated within the recommended limits in terms of reach and capacity as stated by the manufacturer or the authority responsible for the operation and maintenance of the unit.

The Contractor shall, prior to dispatching a crane to the site, provide certification from the manufacturer or the operating authority that the unit has been thoroughly inspected and serviced, that the unit is functioning properly and that it complies with the relevant safety regulations. Once erected on site, the Contractor shall further provide certification of the correct and safe installation and operation of the unit.

PPS6-5.2 Demolition and disposal

All plant, equipment, tools and devices used for the demolition of concrete members, building materials and components or the removal of portions of existing concrete according to the methods adopted and as approved by the Engineer shall be based on proven and accepted technology within the industry. The plant, equipment, tools and accessories shall be inspected and maintained on a regular basis to ensure that they remain in good working order, function efficiently, and that safety is not compromised.

Suitable debris containers and chutes shall be provided to assist in the removal of debris and unusable or rejected materials.

The Contractor shall provide and have available on site at all times equipment capable of accurately measuring the slope and direction of holes and cuts as required.

PPS6-6 DEMOLITION WORK

PPS6-6.1 Provision of access to the demolition areas

The Contractor shall provide adequate and safe access to all demolition areas as required.

All temporary access structures and work platforms and associated works shall be erected, modified, maintained and dismantled under the direction of an experienced and competent supervisor or safety officer.

Prior to using any temporary access structure or facility, and at regular intervals thereafter as approved by the Engineer, or following unforeseen circumstances, the temporary works shall be inspected and certified by a suitably experienced and qualified person on behalf of the Contractor.

The Contractor shall design his access and temporary works to minimise their susceptibility to uncontrollable fluctuations in the impoundment level caused by river flooding. He shall further put in place procedures for evacuating personnel, plant and other removable items that may suffer damage in the event of a flood being discharged over the spillway during the course of the contract.

To ensure the safety of, and to prevent injury or damage to passing persons, vehicles, animals, etc the temporary works shall be enclosed with a suitable screening membrane or boarding where necessary to contain material or work equipment within the limits of the restricted work area.

Where temporary works are to be fixed to, or supported from an existing permanent structure, the location and method of attachment shall be subject to the approval by the Engineer. Such temporary works shall be removed when the work is completed and any cast-in anchor bolts or steel frames shall be cut back below

the top of the concrete and any holes, surface damage or blemishes arising from the fixture shall be repaired to the surface finish of the adjacent surface to the satisfaction of the Engineer.

PPS6-6.2 Inspection of the structure geometry

Detailed scanning survey of the Dam structure has been undertaken and will be made available to the Contractor upon appointment. The Contractor shall inspect and review this survey as it will be used as the baseline from which measurement for payment will be made. The Contractor's review of the survey is to be submitted to the Engineer and any discrepancy resolved prior to commencement of operations. The Contractor shall further inspect and measure the precise dimensions of the structure after approved completion of demolition works, as per PPS6-7.3. These survey records shall be submitted to the Engineer.

PPS6-6.3 Demarcation of sections to be demolished

The Contractor shall demarcate the position, direction, inclination and spacing of demolition lines and the sequence for dismantling the tongue walls, spillway training walls, hoist room and roller bucket structure at the toe of the Dam prior to any demolition.

PPS6-6.4 Underwater survey

An underwater survey of the basin upstream of the dam outlet works, is to be undertaken before and after demolition in order to ensure that the outlet works are unobstructed. Any material which has encroached into the outlet area, as determined by the Engineer, shall be removed by the Contractor at his own cost. After the removal of any obstructing debris, the Engineer may order a further survey, at the cost of the Contractor, to ensure that the outlet works are finally unobstructed.

PPS6-6.5 Method of demolition

PPS6-6.5.1 General

The Contractor's intended method and sequence of demolition of the various components of the structure as detailed on the drawings shall be described in the tender documents as a method statement. Sufficient detail shall be provided for the Engineer to assess the suitability of the methods proposed and to evaluate the related implications for the remainder of the structure. Following pre-construction testing, adjustments to the final method statements may become necessary. All demolition and removal of concrete and building rubble shall be in accordance with the drawings, the final approved method statements and any written instructions issued by the Engineer. After approval of the method statement, the safe execution of the proposed method of demolition remains the Contractor's responsibility.

The Employer reserves the right to obtain the services of an independent demolition specialist to assess the proposed method of demolition and if necessary, supervise the demolition procedure.

The demolition of entire concrete structures or major elements of a structure shall employ techniques that do not damage adjacent structures or structural elements, nor contaminate the surrounding environment except during special periods as may be approved by the Engineer.

The Contractor shall ensure that any nuisance associated with his work activity is minimised by implementing appropriate precautions and measures to the approval of the Engineer. Common nuisances associated with demolition and concrete removal include fumes, noise, dust, flying fragments, heat and vibration. Refer to the Project specification PS-1 and PS-2 in this regard.

Recommended demolition techniques include the use of percussion breakers, chisels or other approved mechanical equipment, the use of thermal or hydraulic cutting techniques or by non-explosive chemical means, to ensure minimal damage (e.g. micro-cracking) to the existing concrete. Proposal for blasting with high explosive shall show by evidence acceptable to the Engineer that damage to the existing concrete will be within allowable tolerances, and noise and flyrock will be contained within safe limits. The provisions of PSD 5.1.1.3 shall be adhered to. Where over-break in excess of the allowable tolerances occurs, the Contractor shall not make any related repairs, but shall simply apply the specified initial preparation to the demolished surface.

PPS6-6.5.2 Removal of concrete from structural elements**PPS6-6.5.2.1 Cutting back concrete to a new finished surface**

The concrete and reinforcement shall be cut back adequately to provide the prescribed concrete cover to the new finished surface as indicated on the drawings. Where concrete is to be demolished without damaging reinforcement that is required for splicing onto new reinforcement for re-construction of new works, this is indicated on the drawings. The technique used shall be suited to its intended purpose and shall not cause damage to the remaining concrete member.

Only techniques that do not damage the inherent structure, bond or strength of the remaining sound concrete and reinforcement required for splicing shall be used. The thermal cutting technique shall not be used closer than 100mm from the final surface as indicated on the drawings. The remaining concrete shall be removed using approved mechanical equipment or hydraulic techniques.

The fixed exposed contact surface shall be bounded by straight line edges cut at least 25mm deep by a diamond cutting saw, angle grinder or other approved equipment.

PPS6-6.5.2.2 Partial depth removal of surface concrete and exposure of reinforcement

Where unsound or contaminated surface concrete is encountered in areas of influence on the new works, it shall be removed. Where corroded reinforcement is exposed, special care shall be taken while breaking the concrete from the reinforcement bars, or embedded anchorages, to prevent loss of bond in the remaining sound concrete. Chipping tools shall be selected such that the surrounding concrete is not damaged. Unnecessarily heavy equipment and/or sharp-edged tools may cause damage to the surrounding concrete, e.g. micro-cracking thereby creating additional areas of potential failure.

Where active corrosion of reinforcement bars is exposed, the concrete shall be removed to a depth of at least 20mm around the bar until a 50mm continuous length of bar free from corrosion is exposed.

Where sections of reinforcement bars have to be replaced, additional concrete may have to be removed to accommodate lap lengths, coupler units, etc and any additional clearance requirements for access with associated equipment. Such removal shall be subject to the Engineer's approval.

Large surface areas requiring the removal of a relatively thin layer of concrete without reinforcement may be effectively treated with a scabbler, scarifier or planer.

The exposed contact surface shall be bounded by straight-line edges cut at least 15mm deep by using a diamond cutting saw, angle grinder or other approved concrete cutting equipment.

PPS6-6.5.2.3 Preparation of exposed contact surfaces

At the contact surface of old concrete onto which new concrete will finally be placed, all loose and shattered concrete, laitance, as well as foreign material such as oil, paint, grease, dust, dirt, etc, shall be removed to expose protruding, but well embedded aggregate and to provide a good bonding surface. Where a smooth surface is produced by sawing, etc, this shall be roughened to facilitate a good bond with new concrete.

The mechanically prepared concrete surface and splicing reinforcement such as may be required shall be cleaned by means of oil-free compressed air or water jetting.

The initial preparation of the exposed surfaces previously in contact with demolished concrete components is regarded as part of the removal of the relevant concrete component. Where the surface was previously exposed and requires preparation as described above, specific provision for the preparation will be made in the payment items.

PPS6-6.6 Special precautions during demolition by blasting

Only certificated blasters with adequate and appropriate experience may be employed on the site. Before any blasting occurs a comprehensive method statement (giving full details of the depth and inclination of the blast holes, type of proposed explosives and method of charging) shall be submitted to the Engineer for approval.

The expected peak particle velocity in the body of the dam shall be limited to 120mm/s at 10m from the nearest hole. This value must be verified by the readings obtained during blasting. The Contractor shall also indicate in the method statement what precautions will be taken to protect the dam wall, outlet works and surrounding area from flyrock and debris.

The Contractor will be required to set up a system to monitor his own blasting independently of monitoring by other parties. Special care shall be taken to ensure the outlet works and dam wall are not damaged in any way.

Any blasting within the work area must be organised in consultation with the Department of Water and Sanitation personnel operating the dam and the Engineer, and the Contractor shall accept all responsibility for any consequential damage occurring as a result of blasting and make-good any such damage at his own expense.

Adequate and appropriate warning shall be given to all affected parties surrounding the dam prior to blasting. These measures shall be approved by the Engineer.

Screening and protective measures shall be established around the work area as necessary to ensure acceptable environmental and safety conditions.

PPS6-6.7 Removal of material

Rubble from the demolition of various elements of the spillway, non-overspill crest, intake works structure and other concrete and building materials from demolitions and removals shall be reduced to pieces of a workable size and transported to the designated re-use area as shown on the drawings. The bulk of the materials will comprise concrete or brickwork to be re-used as fill at the Ramadiepa Dam and as such will be transported straight there, although the Contractor may elect to create his own temporary stockpile at his own cost. Reinforcing included in the various elements, where applicable, shall be separated and disposed of at a commercial scrap dealer in Tzaneen.

The Contractor shall make every effort to minimise the quantity of materials falling upstream of the dam wall, and will specify clearly in his method statement all measures to ensure that this criterion is met. Should recklessness result in excess material landing in the dam, the Contractor will be required to remove the excess at his own cost. The Engineer will have final judgement on this issue.

PPS6-7 REHABILITATION OF THE DEMOLITION SITE

PPS6-7.1 General

The rehabilitation of the site after demolition includes repair of damage to the existing structure and removal of all debris.

PPS6-7.2 Rehabilitation programme

The Contractor shall submit to the Engineer a programme of repairs for approval, subsequent to completion of the demolition. All damage due to impacts, vibration or abrasion must be accounted for and rehabilitated. After demolition of the demolished sections, all loose plumbs are to be removed and the holes filled with Grade 30/19 concrete up to the specified demolition level.

PPS6-7.3 Survey of structure after demolition

The Contractor shall inspect and measure the precise dimensions of the structure after approved completion of demolition works. These measurements shall be presented to the Engineer in the form of a survey, with electronic copies, from which a comparison of the design and as-built dimensions can be made. Any over-break in excess of the allowable tolerances shall be determined through this survey.

PPS6-8 TOLERANCES

The Contractor shall remove concrete to a planar, uniform surface with +25 to -75mm maximum deviation from the level or dimension indicated on the drawings unless otherwise approved by the Engineer. The outer edge of the contact surface shall consist of straight lines with maximum deviation of 25mm from straight, measured with a 1m long straight edge, and shall be within +25 to -25mm of the position indicated on the drawings, or as instructed by the Engineer.

PPS6-9 TESTING

The Contractor shall carry out pre-construction tests with the proposed equipment to determine the suitability of the technique for the envisaged application. The test results shall be reported to the Engineer and will be subject to the Engineer's approval.

PPS6-10 MONITORING OF SITE**PPS6-10.1 General**

The integrity of Tzaneen and Ramadiepa Dams may not be compromised by the partial demolition of the dam structure and other ancillary sections. It is most important that the Contractor observes, monitors and reports to the Engineer all incidents, which occur during the demolition.

PPS6-10.2 Instrumentation for concrete dam under partial demolition.

Two approved, calibrated seismographs shall be used at the wall for every blast, one at the base of the wall, the other not more than 10m away from the nearest blast-hole. The sensors for these instruments shall be firmly attached, by means of proper anchoring, to the dam wall to the satisfaction of the Engineer. The Contractor shall install the necessary instrumentation to monitor accelerations, vibration, etc. prior to any blasting taking place. This equipment shall be maintained in good working order for the duration of the contract.

The blasts will be monitored separately by the Contractor and an independent specialist, if directed by the Engineer. The Contractor shall provide all assistance the specialist may require in undertaking the monitoring and he shall ensure the equipment installed is not damaged in any way. Payment for the specialist shall be effected through Pay Item PSA 8.5.

PPS6-11 MEASUREMENT AND PAYMENT

The payment items listed under this clause shall include full compensation for all aspects associated with the provision of suitable and safe access to all areas and components and all work associated with the demolition and removal of concrete elements, or portions thereof, which are not covered under the payment items of the Standard Specifications or the Project Specifications.

The quantities indicated in the Schedule of Quantities are based on the dimensions shown on the drawings and on inspections carried out as part of the preliminary and detail design phases. It must therefore be accepted that the quantities of work actually done may vary significantly from the scheduled quantities, and that the Contractor shall be deemed to have allowed in his tendered rates for such variations in quantities which can be reasonably expected.

The rates quoted for demolition shall include the Contractor's allowance for over-break beyond the allowable tolerances, for which he will be penalised.

PPS6-11.1 Establishment on site for demolitionUnit : Sum

The sum shall cover the provision, establishment, maintenance, dismantling and removal of all plant and equipment required on site for the demolitions, the supply, erection, maintenance and operation of monitoring equipment as specified in sub-clause PPS6-10.2, the maintenance and monitoring of safe working conditions throughout, the completion of a survey of the structure after demolition (PPS6-7.3) and the rehabilitation of the site to standards acceptable to the Engineer. The sum shall include all costs to establish equipment on site not included in other rates.

PPS6-11.2 Temporary access structures and working platformsUnit: Sum

(specify height above ground level)

The sum shall cover all costs related to the establishment, erection, maintenance, dismantling and removal of all access facilities, except cranes, as required to effectively and safely complete the required demolition and removal of concrete, including suitable debris containers, chutes, etc.

Payment shall be made in two instalments; 75% on completion of erection of access facilities to the approval of the Engineer and 25% following satisfactory dismantling and removal thereof.

Where the tower cranes and other access facilities for other construction access are used for demolition, these will be paid for under the items of PSA 8.8.7 and the Contractor shall submit a zero rate for this item.

PPS6-11.3 Establishment of mobile access units and cranesUnit: Sum

The sum shall cover all costs related to the establishment, erection, certification, dismantling and removal from site of any and all mobile access units, or fixed, or mobile cranes, as required as part of the Contractor's method statement for the safe and successful completion of the demolition and concrete removal.

Payment shall be made in two instalments; 75% on completion of erection of access facilities to the approval of the Engineer and 25% following satisfactory dismantling and removal thereof.

Where the tower cranes and other access facilities for other construction access are used for demolition, these will be paid for under the items of PSA 8.8.7 and the Contractor shall submit a zero rate for this item.

PPS6-11.4 Operation and maintenance of mobile access units / cranesUnit: Day

The daily rate shall cover all time-dependant costs related to the maintenance and operation of any and all mobile access units, or fixed, or mobile cranes, as required as part of the Contractor's method statement for the safe and successful completion of the demolition and concrete removal. The Contractor shall further specify the number of days for which the mobile access units and/or cranes are required as part of his method statement, such that the full operation and maintenance cost can be totalled into a sum for his tender.

Payment shall be made on a monthly basis for the duration that the units are on the site, as specified in the Contractor's tender.

Where the tower cranes and other access facilities for other construction access are used for demolition, these will be paid for under the items of PSA 8.8.7 and the Contractor shall submit a zero duration and rate for this item.

PPS6-11.5 Protective measures and screeningUnit: Sum

The sum shall cover all costs associated with the provision, maintenance and removal of screening and protective measures around the work area as necessary to ensure acceptable environmental and safety conditions for the duration of the contract.

Payment shall be made in two instalments; 75% on completion of erection of the screening and protective facilities to the approval of the Engineer and 25% following satisfactory dismantling and removal thereof.

PPS6-11.6 Access at end of maintenance periodUnit: Sum

The sum shall cover all costs related to providing safe temporary access to the Engineer for a full and comprehensive inspection of the works at the end of the maintenance period.

PPS6-11.7 Demolition of concrete in spillway.....Unit : m³

The demolition of the specified portion of the concrete spillway training walls shall be measured by volume on the lines on the drawings, or as specified by the Engineer. The rate shall include all costs for demolition of the concrete by approved means, the cost of dealing with and removing any reinforcing steel or embedded metal components, the cost of pre-construction demolition testing, the cost of demarcating demolition lines, the cost of all safety precautions necessary, the cost of initial surface preparation (PPS6-6.5), the cost of any over-break and the cost of supplying all materials and equipment required. The rate shall also include disposal of demolished material as specified in sub-clause PPS6-6.7.

PPS6-11.8 Demolition of concrete in non overspill crest (Tongue Wall)..... Unit : m³

The demolition of the specified portions of the non overspill crest Tongue Walls shall be measured by volume on the lines on the drawings, or as specified by the Engineer. The rate shall include all costs for demolition of the concrete by approved means, the cost of dealing with and removing reinforcing steel or embedded metal components, the cost of pre-construction demolition testing, the cost of demarcating demolition lines, the cost of all safety precautions necessary, the cost of initial surface preparation (PPS6-6.5), the cost of any over-break and the cost of supplying all materials and equipment required. The rate shall also include disposal of demolished material as specified in sub-clause PPS6-6.7.

PPS6-11.9 Demolition of concrete in Intake Works Unit : m³

The demolition of the specified portions of the intake works structure on the left flank shall be measured by volume on the lines on the drawings, or as specified by the Engineer. The rate shall include all costs for demolition of the concrete by approved means, the cost of dealing with and removing reinforcing steel or embedded metal components, the cost of pre-construction demolition testing, the cost of demarcating demolition lines, the cost of all safety precautions necessary, the cost of initial surface preparation (PPS6-6.5), the cost of any over-break and the cost of supplying all materials and equipment required. The rate shall also include disposal of demolished material as specified in sub-clause PPS6-6.7.

PPS6-11.10 Demolition of miscellaneous concrete elements (Buildings and other structures) ... Unit : m³

The demolition of the specified concrete and miscellaneous building components and elements shall be measured by volume on the lines on the drawings, or as specified by the Engineer. The rate shall include all costs for demolition of the concrete and masonry by approved means, the cost of dealing with and removing or protecting reinforcing steel or embedded metal component and other building materials the cost of pre-construction demolition testing, the cost of demarcating demolition lines, the cost of all safety precautions necessary, the cost of initial surface preparation (PPS6-6.5), the cost of any over-break and the cost of supplying all materials and equipment required. The rate shall also include disposal of demolished material as specified in sub-clause PPS6-6.7, but excluding material falling downstream of the dam wall.

PPS6-11.11 Preparation of existing concrete surfaces to receive new concrete Unit : m²

The preparation of the specified portions of the concrete monolith shall be measured by square metre on the lines on the drawings, or as specified by the Engineer. The rate shall include all costs for preparing the concrete surface as specified by approved means, the cost of dealing with and removing any minor amounts of surface concrete, the cost of demarcating scabbling lines, the cost of all safety precautions necessary, the cost of initial surface preparation (PPS6-6.5), and the cost of supplying all materials and equipment required. The rate shall also include disposal of demolished material as specified in sub-clause PPS6-6.7, but excluding material falling downstream of the dam wall.

In the case of surfaces to receive retro-fit water bars, the rate shall additionally cover to smoothen out the surface to receive the epoxy and water bar.

PPS6-11.12 Assessment and repair of damage to the structure Unit : Sum

The sum for assessment and repair of all damage to the structure shall include the preparation of an inventory for the Engineer, preparation of damaged concrete surfaces, supply of repair materials and execution of the repair. Necessary repairs not covered by this rate shall be paid for under dayworks.

PPS6-11.13 Underwater topographical survey Unit: Sum

The sum for the underwater topographical survey shall cover all costs to undertake underwater topographical surveys, as specified in subclause PPS6-6.4, before and after demolition work. Sufficient readings shall be taken to show that the outlet works is not obstructed.

PPS6-11.14 Penalty for over-break Unit: m³

Over-break of concrete in excess of the tolerances and the lines indicated on the drawings and/or instructions of the Engineer shall be measured by volume. Measurement shall be made by comparing the final as-built survey of dimensions with the lines of the drawings and/or the written instructions of the Engineer. A penalty of R 2000/m³ shall be applied to all concrete over-break not approved by the Engineer and the total amount shall be deducted from the Contractor's final payment certificate (independently of retention monies).