Environment Agency

NEC3 professional services contract (PSC)

Scope

Project / contract Information

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| --- | --- |
| Project name | Pulteney & Twerton Gates Condition Assessment |
| Programme Name |  |
| Project SoP reference |  |
| Contract reference | SW0298 |
| Date | 30 June 2016 |
| Version number | 10 |
| Author | Deborah Steadman/Melvin Wood/Ian Barnard |

Revision history

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| --- | --- | --- |
| Revision date | Summary of changes | Version number |
| 11-3-15 | First issue | 1 |
| 06-5-15 | Second issue | 2 |
| 15-5-15 | Third issue | 3 |
| 21-03-16 | Fourth issue | 4 |
| 31-03-16 | Fifth Issue | 5 |
| 08-04-16 | Sixth issue | 6 |
| 18/04/2016 | Seventh issue | 7 |
| 27/05/2016 | Eight issue | 8 |
| 09/06/2016 | Ninth issue | 9 |
| 30/06/2016 | Tenth issue | 10 |

Details of the services

Details of the services are:

##### Project objectives

The project is seeking to achieve an understanding of the current state, structural condition and remaining life of Pulteney and Twerton Gates of the Bath Flood Alleviation Scheme.

We require a detailed inspection of Twerton radial gate and vertical sluice and Pulteney radial gate from an experienced structural engineer or a radial/vertical gate expert. As part of this assessment we are seeking below water diving inspections at both gates. ***The survey shall include both the structural and mechanical elements of the gates, including ultrasonic thickness testing and concrete testing at both gates. The survey should include upstream and downstream wing walls.***

Copies of the Site Details are provided in attachment “Site Information”.

The project should identify any elements of the structures that are likely to fail, as well as provide an estimate of costs and timescales for repair or replacement for all of those elements.

**Structural Condition Survey specification:**

| **Item** | **Project deliverable** |
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| 1 | An Assessment Report for each gate setting out the existing structural condition and any failure mechanism /defects observed on site. |
| 2 | Structural surveys of the assets are to be undertaken and provided within reports, including concrete test results for Twerton supporting structure. |
| 3 | Reports to indicate residual life of all aspects of the assets. |
| 4 | An estimate of costs to repair and replace all the components that are likely to fail. These are to be detailed within the reports |
| 5 | Two hardcopies and an electronic copy of the reports to be produced along with all relevant drawings and surveys undertaken. |

The *Consultant* shall notify the responsible officer Paul Olejnik (07776 453 725) prior to site access and agree any limitations of access or equipment operation.

One of the gates at Twerton must be kept in automatic operation at all times. The other gate will be closed and locked down for the duration of the survey. You should base your tender on the assumption that one of the gates will remain in the fully closed position throughout the survey, however the Environment Agency responsible officer may permit limited operation of the gate depending on water level/flow conditions on the day of the survey. Without their permission the gate may not be operated.

Specialist access equipment will be required to inspect fully the fixed and moving parts of the gate and supporting structure that are above water. The *Employer* will not arrange for boat availability or provide specialist access equipment.

Divers will be required to inspect as far as possible the fixed and moving parts of the gate and supporting structure that are below water.

The *Employer* cannot artificially raise or lower water levels in the river and it will not be possible to stoplog or dewater the gates for the purposes of this survey.

In the case of high river flows, the operation of all gates will be necessary. Any in-channel inspections should therefore be suspended if a flood alert is issued for the Lower Bristol Avon.

The steel and concrete parts of the structure should be assessed both individually and as a whole. ***Please provide a price for carrying out both thickness testing of metal parts (as deemed necessary) and for concrete sampling of the supporting structures. Please provide a price for 6 core samples at Twerton and 2 at Pulteney, taken from convenient locations above the water level, to be agreed on site. Tests to include compressive strength, reinforcement detail, carbonation and chloride content.***

To consent these works, we will require a method statement including the guidance in the Environment Agency pollution prevention guidance.

This survey may require the prolonged operation of the gearbox and therefore may need the gearbox to be disconnected from its driven output. Disconnection of the gearbox from either input or output connections requires a separate risk assessment and SSOW. The output load could be supported by the non-reversing characteristics of the drive train and disconnection of any part of the drive train could lead to uncontrolled release of the load.

Your own methodology and risk assessment, provided within your tender must determine any additional requirements to the schedule below and any other hazards that are relevant.

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| 1. Carry out a detailed inspection of the condition of access walkways, stairs, ladders, platforms and other structural items associated with access or operation of the gate.
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| 1. Carry out a detailed inspection of the gate lifting mechanism and structure. **There may be a need to remove the lifting equipment to carry out the inspection – a separate risk assessment and SSOW is required to ensure the loads are restrained and supported for this work**
* check any adjustment positions and ensure they are free moving.
* for wire ropes check for evidence of surface corrosion, broken strands, kinking and the lay of the rope onto any winding gear.
* for transmission type chains check for general lubrication on all links that are required to be flexible.
* for racks and screws the wear on the drive nut or drive pinion is important. Inspect and report on the wear.
* for linear actuation such as hydraulic rams, screwed rods or racks the pivot arrangements are critical to ensure no bending moments are applied. Check and inspect pivot arrangements and check that any lubrication arrangements are clear and working.
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| 1. Inspect the guarding and check it is firmly fixed and correctly positioned.
* if access points are provided for maintenance inside the guarding, check they are accessible and if they incorporate disabling interlocks test that these work.
* check the guards are suitable, painted and any warning signs and labels correctly fixed and clearly legible
 |
| 1. Pressure wash the gate if required, to allow for detailed inspection.
* fully inspect the gate and connections and report on the condition of the paint system and / or cathodic protection. Where there are indications of significant reduction of steel thickness through corrosion, take measurements of remaining thickness.
* inspect the moving gate seals and the fixed sealing faces or seals. Report any deterioration of the fixed sealing faces.
* inspect any thrust or location wheels and check they are free moving and correctly adjusted.
* inspect any knapp breaking devices that prevent gate vibration.
* Check that any structural drain holes are not blocked
* check that any buoyancy compartments are intact
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| 1. Visually inspect any winding gear support bearings, check that any oil and grease lubrication points are unblocked and any automatic lubricating arrangements are functioning and charged with lubricant. This will require the lifting of bearing caps to inspect plain bearings.

On radial gates the pivot bearing should be visually inspected without extensive dismantling |
| 1. Inspect the floats and associated mechanism/structure at Pulteney gate, including intake pipe, valves and chambers.
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| 1. Inspect and use any equipment designed for latching or locking the gate into a fixed position. In some cases latching pins are actuated and these should be inspected for correct operation. Any obvious deterioration in the arrangement that could reduce the effectiveness of the latch to hold the weight must be reported.
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| 1. Inspect any mechanical torque limiting devices, slipping clutches may be present and the adjustment of them is critical to their operating limits.
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| 1. Carry out a detailed inspection of operational equipment including gearboxes, actuators, couplings, winding drums, plumber blocks, motors and their mountings and report.
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| 1. Carry out inspection of concrete structures above and below the waterline. Concrete samples are required for the supporting piers at Twerton. Make good the concrete following testing.
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| 1. Access and inspect the displacer chambers, inlet and outlet penstocks. Take measurements of coating and material thickness.
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| 1. Carry out a detailed inspection both above and below the water line (including the gate skin, gusset plate, connections, cill faces, cast in channel sections, rails, roller wheels, running shafts, cill beams, seals, base of clutches). Take measurements of section sizes, corrosion and coating thickness if necessary).
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DRIVE CHAINS AND SPROCKETS WORK SCHEDULE

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| 1. Inspect structure, checking for corrosion and security of attachment bolts.
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| 1. Check chains for damage, elongation of links and any signs of stretching.
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| 1. Check chains guides.
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| 1. Check that chains are adequately lubricated.
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| 1. Check sprockets for damage, missing teeth and corrosion.
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| 1. Check sprockets fixing to driveshaft, keyway and securing bolts for signs of damage and wear.
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| 1. Check that sprockets are adequately lubricated.
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| 1. Check chain securing links, lugs and points for damage, elongation and any signs of stretching.
 |
| 1. If grease nipples are located remote to equipment. Check grease nipples, associated piping and couplings for damage, fractures and leakage. Check for delivery of lubricant at equipment
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| 1. Check that all associated guards are in place and undamaged.
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| 1. Test operate the gate, within the bounds permitted by the Environment Agency responsible officer
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GEARBOX WORK SCHEDULE

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| 1. Operate equipment to check for vibration and noise, within the bounds permitted by the Environment Agency responsible officer. Isolate equipment.
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| 1. Inspect input and output shafts and access seals for leakage and report any defects
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| 1. Operate any manual or alternative drive input system checking any interlocks or remote indicators that should operate when alternative drives combinations are used. Check that any clutches or gear changes are working effectively
 |
| 1. Inspect input and output couplings for wear and unacceptable backlash
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| 1. If oil or coolant temperature gauges are fitted check for accuracy. Where directed remove them and get them re-calibrated against an external reference.
 |
| 1. **Non-sealed open gear systems**
* clean grease from all gears
* inspect gearing teeth for correct meshing, pitting, cracking, erosion, metal deposits and excessive wear
* inspect gear keyways and keys for security and wear
* measure backlash from input shaft to output shaft and record
* prove the greasing points are clear and reapply grease
* check whether canister auto greasing units need replacing
* if required top up auto greasing units
 |
| 1. **Forced lubrication systems**:
* open inspection plates and as far as practicable examine gearing for wear and damage to the gearing
* measure backlash from input shaft to output shaft and record
* check spray head patterns, oil pressures and that oil is discharging as required.
* remove pressure gauges for “dead weight” testing,
* remove drain and inspection plugs and check for debris, drain and flush the gearbox
* check and replace sight glasses as necessary
* replace the oil
* refit drain and inspection plugs with new seals
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| 1. **Splash lubricated systems**
* open inspection plates and as far as practicable examine gearing for wear and damage to the gearing
* measure backlash from input shaft to output shaft and record
* inspect the oil reservoir for signs of moisture ingress.
* remove drain and inspection plugs and check for debris, drain and flush the gearbox
* check and replace sight glasses as necessary
* replace the oil
* refit drain and inspection plugs with new seals
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| 1. **Gear box cooling systems** - check
* filters
* pumps
* gauges
* pressure test coils or plate exchangers (seek advice on correct test pressures)
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| 1. Inspect any guards and ensure they are correctly fitted and secure
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| **Item** | **Description of outcome** |
| --- | --- |
| 1 | The *Employer* will have an understanding of the current structural conditions of the assets to help with prioritisation and programming of any work. |
| 2 | The *Employer* will have an understanding of the residual life of the components within the assets and/or asset as a whole and therefore, we will be able to determine a costed programme of repairs or replacement. |
| 3 | The extent of failure of components/asset will be known to the *Employer*. |
| 4 | The *Employer* will have an estimate of the cost of carrying out any repairs and complete replacement of the gates (like for like). |

| **Item** | **Product and requirement** |
| --- | --- |
| 1 | Pulteney gate |
| 2 | Twerton radial and vertical gates |

The services specifically exclude the following:

| **Item** | **Description of exclusion** |
| --- | --- |
| 1 | Detailed structural calculations other than an outline assessment |
| 2 | Detailed hydraulic calculations other than an outline assessment |
| 3 | Design of any replacement gates |

2. Drawings and site information are provided in ‘Site Information’ zip file available in tender pack. For sight of the O&M manual please contact Dave Skinner on 020302 50158.

3. Specifications of standards to be used

1. EA divesafe form. Please see attachment with tender documents.

4. Constraints on how the Consultant provides the services

1. The *Consultant* must not access the site without prior arrangement with Dave Skinner, or Paul Olejnik, at the Environment Agency.
2. The *Consultant* must review each site with regard to ‘Confined Spaces’ and if determined as a confined space then price accordingly in your tender. The *Consultant* is to arrange suitable safe entry as part of their commission.
3. Sites may be subject to fluvial flow variations and the *Consultant* must take this into consideration when planning their inspections.
4. If boat access is required to any of the sites this will need to be included within the *Consultant’*s offer. The *Consultant* will be required to take into consideration river flows and level when undertaking their planning for the inspections.
5. RAMS will be required to be submitted to the *Employer* prior to any commencement of work.
6. The *Consultant* will need to obtain all necessary consents before starting work on site.
7. The *Employer* will not withhold unreasonable access; however, it will be subject to operational constraints and could change without prior notification.
8. All assumptions made about conditions on site in order to undertake survey must be clearly stated in the tender proposal.
9. Consultants are invited to view the sites, prior to tender submission, by arrangement. Please contact Dave Skinner on 020302 50158 to arrange a site visit.

5. Requirements of the programme

1. The site surveys will be completed before the 2nd September 2016 in low flow conditions.
2. A draft report will be required by 7th October 2016.
3. The final report will be required by 18th November 2016.