| **INSPECTION AND TEST CHECKLIST FOR:**  **Cast In Place Reinforcement Concrete Piles (B59)** |
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| Activity No.# | Description | Requirements / Reference | | Acceptance Criteria | | | | | | | Comments / Attachments / Records | | | | Engineer Signoff | |
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| 1 | **Safety Review** | Project Safety Plan | | * All site personnel inducted (includes environment and cultural) * Required Safe Work Method Statements completed and signed * Subcontractor’s safety plan/procedure approved | | | | | | |  | | | |  | |
| 2 | **Environment** | Project Environment Plan  G36 CL 3.1  G38, G40 | | * Installation of soil erosion and sedimentation controls completed in accordance with ESC Plan and EMP, as well as Specification TfNSW G38 * All work undertaken under this Specification must be approved by the Environmental Site Representative (refer TfNSW G36) and comply with Abergeldie’s CEMS and CEMP | | | | | | |  | | | |  | |
| 3 | **Concrete Mix Design** | B80 Cl 3.9.1 | | Prior to ordering concrete to site, seek approval of the concrete mix design by providing this information to the Client.  **HOLD POINT: Use of each nominated mix**  At least 4 weeks prior to the proposed date for use of the concrete mix, submit to the Principal the following:  (a) (i) all details in Clause 3.9.3; or  (ii) mix ID and concrete mix design of a nominated mix from the Register of TfNSW Concrete Mixes  and  (b) a statement stating that the mix conforms to the B80 Specification and is suitable for its intended use | | | | | | |  | | | |  | |
| 4 | **Delivery of Prefab. Reinforcement Cages** | B80 Cl 6.6.2 | | Show on the shop drawings the design location(s) of lifting and transport support points for prefabricated support cages, and mark these locations indelibly on the cage during fabrication. Show the lifting requirements on a drawing on durable material, attached to the cage prior to lifting. Conform to B80 Cl 6.5 for welding of load bearing welds  **WITNESS POINT: Assembly, lifting and transport of cages**   * At least 2 working days prior to expected date of delivery, submit to the Principal a Certificate of Conformity in respect of load bearing weld sizes and locations, and conformity of finished welds, together with drawings and checklists | | | | | | |  | | | |  | |
| 5 | **Program and Personnel** | B59 Cl 3 | | Provide a weekly program to the Principal showing the scheduled pile construction work each day, for the duration of the week  The Piling Supervisor must supervise and control the piling operations at all times   * During excavation of each pile, the engaged Geotechnical Engineer must be in attendance. *For each pile,* the Geotechnical Engineer will direct the Piling Supervisor as to when ground or rock of the *length,* class *and strength* specified on the Drawings has been reached, the extent of further excavation required to form the socket in conformity to the Drawings, and when the pile hole and socket are considered to be clean *and appropriately roughened and grooved. If any pile level adjustments proposed by the Geotechnical Engineer are greater than 1.0 metre from the indicative levels shown on the Drawings, you must advise the Principal who will review and consider the adjustments. Your Geotechnical Engineer must also provide a report showing advice and verifications in accordance with the requirements of this Clause and Clauses 3.7 and 4.5*. The attending Geotechnical Engineer must be a Chartered Professional Engineer with membership of Engineers Australia practicing in the field of geotechnical engineering (or equivalent) and experienced in the geotechnical assessment of pile excavations. An alternative to membership of Engineers Australia is registry on the National Engineering Register (NER) in the general area of practice of civil engineering, and experienced in the geotechnical assessment of pile hole excavations | | | | | | | * Geotechnical Engineer qualifications | | | |  | |
| 6 | **Concrete Grey Cards** | B80 Cl 7.2.2  B80 Cl 7.2.3 | | The Concrete Supervisor must hold a TfNSW Bridgeworks Concreting Grey Card and have suitable and acceptable TAFE (or equivalent) qualifications for the concrete works taking place, and must be present during all stages of the pour until implementation of the curing regime  In addition to the Concrete Supervisor, at least half of the remaining crew involved in a concreting operation must hold a TfNSW Bridgeworks Concreting Grey Card  **HOLD POINT: First concrete pour in the Works**  At least two weeks prior to the first concrete pour, submit to the Principal the names of the personnel who will be involved in the relevant concreting works, which of these personnel hold a Grey Card, as well as corresponding evidence of this.   * At least four working hours prior to pouring concrete, provide the Principal with a statement stating that at least half of the personnel who will be involved in the pour hold a Grey Card | | | | | | |  | | | |  | |
| 7 | **Proposed Plant and Method** | B59 Cl 3.3 | | **HOLD POINT: Delivery of piling plant and equipment to the Site**   * Submit to the Principal details of the proposed piling equipment and method together with certification, including calculations, by a Chartered Professional Engineer, that proposed piling equipment and working platforms or supports, complies with B59 Cl 3.3.1 and 3.4.1 | | | | | | |  | | | |  | |
| 8 | **Pile Set Out and Additional Boreholes** | B59 Cl 3.7  B59 Cl 4.1.1 | | Set out locations for piles as per the Drawings  When required by the Principal, and as required by site conditions, prior to commencing pile hole excavation, drill additional boreholes and take cores to confirm the adequacy of the pile shaft and base, and the extent of temporary casings if required. *During any coring, your Geotechnical Engineer must be in attendance. Your Geotechnical Engineer is to log cores and make their interpretations of the cores available for the Principal’s review.*  If the Drawings do not show details of support for the sides of excavated pile holes, it is Abergeldie’s responsibility to implement whatever measures are necessary, using a method which is appropriate to the site geology and ground water conditions  **HOLD POINT: Commencement of excavation of pile hole**  Provide the following documents to the Principal:  (a) Certification that pile hole set out (refer Cl 3.6), and additional boreholes (refer Cl 3.7) where required, have been completed  (b) Borehole logs and cores, where required  (c) If not previously submitted, details of the following: (i) Extent of temporary casing ~~or details of drilling fluids where proposed~~ for each pile hole. (ii) Method of placing concrete in the pile hole including size and number of any proposed tremie pipes (refer to Cl 6.5) | | | | | | |  | | | |  | |
| 9 | **Pile Hole Excavation** | B59 Cl 4.4  B59 Cl 4.5  B59 Cl 4.5.3 | | *Do not use drilling fluids to provide support to the side of the excavated pile hole*  Excavate into the founding material to obtain a rock socket of the specified depth in rock, of the class of rock or founding material specified in the Drawings. Record and measure the operating parameters of the drilling rig when excavating the first pile hole, and excavate subsequent pile holes with the same parameters and work methods  Where excavation of the pile hole to a level lower than that shown in the Drawings is ~~directed~~ *recommended* by the Geotechnical Engineer, the Principal will either accept the level reached or direct that excavation be continued to a lower level  Roughen the side of the rock socket and clean the pile hole prior to completion of excavation  **HOLD POINT: Acceptance of pile hole**  Notification, *including associated report(s) by your Geotechnical Engineer,* that the pile hole excavation is complete, and documentation verifying that the plan position, size and alignment of the casing, and the pile hole, ~~and where applicable a record of drilling fluid properties measured during the excavation and after de-sanding~~, will result in a pile that conforms to the specified tolerances and other requirements of the Drawings and this Specification   * Following acceptance of the pile hole, keep the side and base in a clean and stable condition until such time as the concrete is placed | | | | | | |  | | | |  | |
| 10 | **Inspection of Reinforcement Cage** | B59 Cl 5.1 | | Clean the pile hole and reinforcement cage of all loose and adhering material before and after the reinforcement cage is placed  Place the reinforcement for the piles as per B80 and B59 Specifications. Ensure the reinforcement cage is centralised and that minimum concrete cover is not less than the specified value  **WITNESS POINT: Inspection of reinforcement cage prior to placing into pile hole**   * Notify the Principal at least 2 hours prior to proposed time of placement of the reinforcement cage into pile hole. | | | | | | |  | | | |  | |
| 11 | **Cleaning of Pile Hole and Reinf. Cage** | B59 Cl 5.2 | | Place the steel reinforcement and concrete as soon as practicable following final socket cleaning, and within 24 hours of the excavation of the pile hole. Where this is delayed, do not place the steel reinforcement if further cleaning of the pile hole or rock socket is required  **HOLD POINT: Placing steel reinforcement cage in the pile hole**   * Submit to the Principal Certification that the pile hole is clean, and that all loose and adhering materials have been cleaned from the reinforcement cage | | | | | | |  | | | |  | |
| 12 | **Submission of Certificate of Conformity** | B80 Cl 7.5.2 | | **HOLD POINT: Each placement of concrete in the Works**  At least two working days prior to each concrete placement, submit to the Principal a pour specific method statement detailing:  (a) delivery rate;  (b) placement method and rate;  (c) equipment on standby.   * At least 4 working hours prior to commencement of placing concrete (unless otherwise permitted by the Principal), submit to the Principal a Certificate of Conformity, endorsed by the Concrete Supervisor, in respect of formwork, reinforcement, embedments and screeding guide rails or height pins. This certificate must be accompanied by verification checklists and other details showing conformity to this Specification | | | | | | |  | | | |  | |
| 13 | **Test Member** | B80 Cl 5.3 | | Produce test members if directed by the Principal, to demonstrate the suitability of the concrete mix for the Works, and the suitability of the work methods.  Where test members are required, design and construct them in accordance with AS 3610.1 for test panels. The method of construction must effectively simulate the formwork, reinforcement layout and concreting operations to be applied in the works themselves  **WITNESS POINT: Placement of concrete for the test member (if required)**   * Provide at least two working days’ notice, in writing, of the proposed placement of concrete for the test member. Thereafter, give the Principal the opportunity to inspect the constructed test member | | | | | | |  | | | |  | |
| 14 | **Pouring of Concrete** | B59 Cl 6.3 - 6.7  B80 | | The pile hole may only be dewatered where practical and subject to the Principal’s approval  Provide a continuous supply of concrete, such that each pile hole is concrete in one uninterrupted operation. All concrete placed must have the nominated workability of the approved concrete mix, at the time of placement in the pile hole  Unless specified otherwise, place the concrete as per TfNSW Specification B80  Use a tremie pipe and hopper to place the concrete. The tremie pipe must be rigid and watertight throughout. Tape a steel plate to the bottom end of the tremie pipe or similar, prior to placing concrete, and select a suitable tremie size and concrete pump (if needed)  Place the concrete in a continuous process from the base to above the top of the pile, in a manner and consistency such that pockets of air, water or ground materials are not entrapped in the concrete, and the concrete cover completely consists of sound concrete  During concreting, maintain a record of the depth of the tremie pipe outlet against the level of the concrete in the pile hole, and the corresponding volume of concrete placed   * Retain other relevant records, such as concrete pour dockets and records | | | | | | | * Concrete pour dockets and records * Concrete test results | | | |  | |
| 15 | **Installation Tolerances** | B59 Cl 7 | | Tolerances on pile installation must conform to Section 7 of AS 2159, with the exception that the inclination tolerance for vertical piles must not exceed 1%.     * Demonstrate to the Principal that the inclination tolerances have been achieved | | | | | | | * Survey reports | | | |  | |
| 16 | ***Integrity Testing - General*** | *B59 Cl 8.1* | | *Where piles are nominated on the Drawings for integrity testing, and / or as directed by the Principal, engage your Geotechnical Engineer to carry out integrity testing, using the Sonic Logging (SL), Pulse Echo (PE) or Impulse Response (IR) method as shown on the Drawings and in accordance with AS 2159*  *Assess the structural integrity of the piles, plus the relative shape of the pile shaft and an estimate of the physical dimensions of the pile. Use integrity testing equipment capable of testing the full length of each pile, taking into account the specific rate of energy dissipation of the founding material*  *Perform the integrity testing after the concrete in the piles has achieved a characteristic strength of at least 25 MPa, and not less than one week after concreting the piles*  ***WITNESS POINT: Integrity testing of piles***   * *Provide the Principal with at least 2 hours advance notice of the proposed time for integrity testing of each pile to be integrity tested* | | | | | | |  | | | |  | |
| 17 | ***Submit Pile Integrity Reports*** | *B59 Cl 8.1* | | *Submit a pile integrity testing report to the Principal in accordance with AS 2159 Clause D2.3*  ***HOLD POINT: Construction of elements on piles***  *Provide applicable pile integrity testing reports for the Principal for their acceptance* | | | | | | |  | | | |  | |
| 18 | **Integrity Testing – Cross-Hole Sonic Logging** | B59 Cl 8.2 | | Carry out integrity testing on all piles nominated on the Drawings *(refer above)* and asses pile integrity in conformity to AS 2159 and relevant TfNSW bridge technical directions. *On completion of integrity testing, fill any log test holes (if any) in the piles with 50 MPa non-shrink cementitious grout, unless shown otherwise on the Drawings or specified*  Where cross-hole sonic logging is used, carry out testing in accordance with ASTM D6760. Space the logging tubes equally around the perimeter at an equal distance from the pile axis, extent the logging tubes to the bottom of the pile hole to enable testing the whole length of the pile. Submit all details of any Cross-Hole Sonic Logging testing to the Principal for their approval prior to carrying out the testing | | | | | | | * Integrity test results | | | |  | |
| 19 | **Pile Load Testing** | B59 Cl 8.3  B59 Cl 8.4 | | Pile Load Testing – General: Where specified on the Drawings, carry out pile load testing to confirm pile design parameters. The required test load is specified on the Drawings and is dependent on the extent of pile testing as specified on the Drawings. Carry out the tests on the nominated test piles. Unless specified otherwise by the Principal, perform static or high-strain dynamic testing in conformity to AS 2159, and Clause 8.4 of this Specification, as applicable. Other types of pile load testing confirming to AS 2159 may also be used, subject to the Principal’s approval  Pile Load Testing – High-Strain Dynamic Testing: Where high-strain dynamic pile testing is to be carried out, extend the top of the pile during concreting as required for the attachment of transducers or other test devices. Ensure testing is carried out in accordance with B59 Clause 8.4.1 and AS 2159, using an approved organisation, with approved equipment, approved dynamic testing system with subsequent dynamic analysis, all as listed in the “Lists of Transport for NSW (TfNSW) Approved Bridge Components and Systems”. Testing must not result in the allowable concrete stresses being exceeded. Provide the Principal with two copies of a report for each pile tested including:   1. Complete PDA (or approved equivalent) output for all blows, including driving stresses and net driving energy 2. CAPWAP (or approved equivalent) analyses for selected blows 3. Certification that the pile has been dynamically tested in conformity to B59 Specification. If it is not possible for this certification to be provided due to nonconformities in the testing or the pile tested, instead provide an itemised nonconformity report, together with the proposed disposition | | | | | | | * Pile load test results | | | |  | |
| **REVIEW BY PROJECT ENGINEER** | | | | | | | | | | | | | | | | |
| Any non-conformances? | | | YES | | NO | | Nos: | | | Closed Out | | | YES | | | NO |
| Other QA details – NCRs, CARs, Identified Records etc | | |  | | | | | | | | | | | | | |
| All work has been satisfactorily completed | | | | | | YES | | | NO | | | | | | | |
| Name | | | | | | | | Signature | | | | Date | |  | | |