**Inspection and test plan – FRP (structures)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project no.** | CC0375 | **Project name** | Hunter Power Project | | | | | | |
| **Symal ITP no.** | CC0375-ITP-015 | **Revision no.** | 7 | **Revision date** | | 02/05/2023 | **Plant and equipment used** | |  |
| **UGL ITP no.** | 3200-0663-HPP-QA-ITP-015 | | | | | | **SHL ITP no.** | HPP-UGL-QUA-GN-GEN-ITP-0015 | |
| **Symal Lot No.** |  | | | | | | | | |
| **Location (chainages, detailed description or marked up plan)** | | | | |  | | | | |

Attach Dockets, Certificates and QA Documents to ITP

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| Contact Details | | Summary of Requirements | | | Principle Codes / Standards | | Records | |
| **Customer:**  **Construction Manager:**  **Project Engineer:**  **Quality Representative:**  Subcontractors    Surveillance / Inspection Key  **HOLD POINT (H):** Nominated point beyond which work shall not proceed without verified acceptance by nominee.  **WITNESS POINT (W):** Points at which the nominee shall be notified and invited to witness an activity, but further work may proceed without the presence of the nominee.  **REVIEW (R): Verify** by examination of documentary evidence that inspection / tests have been satisfactorily conducted.  **SURVEILLANCE (S): Continuing** evaluation of the status of methods, analysis of records and monitoring of activities on a random basis to ensure quality requirements will be met.  **VISUAL (V): 100**% Visual Inspection of work / item to ensure compliance with code / specification.  **DIMENSIONAL (D): Measurement** of critical dimensions to ensure work / item is within tolerance | | **Process Qualifications**  **Traceability:**  Material:  Alloy Verification  Heat Treatment:  Pressure Testing  Consumable:  NDT:  Welder ID:  WPS:  Electrical:  Instruments  **Heat Treatment:**  **Dimensional Control:**  **Testing (NDT):**  **Acceptance Specification:**  **Pressure Testing:**  **Elect. / Instrumentation:**  Notes: | | | **Client Specifications**  HPP-AEC-CIV-GN-GEN-SPT-0161 QUALITY (CONSTRUCTION)  HPP-AEC-CIV-DD-SWS-SPT-1121 EARTHWORKS  HPP-AEC-CIV-GN-GEN-SPT-0319 MINOR CONCRETE WORKS  HPP-AEC-CIV-ST-GEN-SPT-0002 CONCRETE SUPPLY, CONSTRUCTION AND GROUTING  HPP-MHI-QUA-GN-GEN-ITP-0002 - CG-64290 – Inspection and Test Plan at Site for MHI Scope Section  HPP-MHI-CIV-ST-GPS-PRO-0001 – CG-64293 - Installation Procedure for Anchor Bolts and Template for GT  HPP-MHI-CIV-ST-GPS-PRO-0002 – CG-64292 – Check Sheet for GT & GTG Anchor Bolt Setting  MHI GT Erection Procedure (Site Assembly)  **Engineering Procedures / WI**  HPP-MHI-CIV-ST-GPS-PRO-0001  HPP-MHI-CIV-ST-GPS-PRO-0002 | | **(MDR Insert as marked 3 )**   * Inspect Release Certs. * Deviations/Concessions * Material Certificates * Conformance Certificate * Welding Records * Welder Qual. Register * NDT Reports * Report on Repairs * Heat Treatment Records * Dimensional Records * Non-Conformance Rpts * Pressure Test Records * Drawings & Data Sheets * Misc Verification Records * Electrical Test Sheets | |
| Prepared by: | Yash Bhavsar | | Date : 02/05/2023 | Approved By: Mitchell Hogg | | Date : 02/05/2023 | |  |

|  |  |  |  |  | **Verification of acceptance by** | | | | | | **Remarks / record (eg. test frequency, reports, certificates, checklist etc)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **Symal** | | **UGL** | | **SHL** | |
| **Item no.** | **Activity** | **Ref docs** | **Acceptance criteria** | **Acceptance** | **Key** | **Sign date** | **Key** | **Sign date** | **Key** | **Sign date** |
| **1.0 Preliminaries** | | | | | | | | | | | |
| **1.1** | Documentation | Issued drawings / Site copy drawings | Check that you have the latest site and engineering drawings BEFORE starting each task/set of tasks. | Yes  No  N/A | S |  | S |  | S |  |  |
| **1.2** | Lot Traceability | Spec. 0161 Quality [Cl 7.3] | Prepare a lot map for traceability of the work area. | Yes  No  N/A | S |  | S |  | S |  |  |
| **1.3** | Set out | Drawings | Setout structure to the location and levels on the drawings. This shall be presented for inspection by the superintendent. | Yes  No  N/A | S |  | S |  | S |  |  |
| **1.4** | Underlying Lot Conformance | Underlying Lot ITP | Underlying services and/or assets have been installed prior to commencing works over and/or above.  Refer underlying lot ITP(s) | Yes  No  N/A | S |  | S |  | S |  |  |
| **2.0 Excavation and bedding** | | | | | | | | | | | |
| **2.1** | Excavation |  | Excavate to the depth nominated on the drawings and remove any loose material at the base.  Ensure excavation is carried out to a width which will not impede external formwork. | Yes  No  N/A | S |  | S |  | S |  |  |
| **2.2** | Unsuitable Material | Spec. 1112 Earthworks [Cl 4.6] | Any Unsuitable Material to be removed to the depth as directed by the Superintendent  **HOLD POINT** | Yes  No  N/A | **H** |  | **H** |  | **H** |  |  |
| **2.3** | Compaction - Foundation | Spec. 1112 Earthworks [Cl 4.7, 4.13]  Spec 0161 [CL 7.2] | Foundation (including any unsuitable replacement) to be compacted to a relative compaction of 97% modified to a depth of 200mm below foundation level  Test Frequency = 1 per 500m2 | Yes  No  N/A | S |  | S |  | S |  | Test reports |
| **2.4** | Foundation Inspection | Spec. 1112 Earthworks [4.7] | Foundation to be inspected by the Superintendent prior to placing blinding  **HOLD POINT** | Yes  No  N/A | **H** |  | **H** |  | **H** |  |  |
| **2.5** | Blinding | Spec. 1354 Stormwater Drainage Structures [Cl 3.6] | Blinding (N15) for Reinforced Concrete Bases to be a 100mm thick mass concrete layer or as otherwise shown on the drawings.  Unreinforced bases can be poured directly on the earth | Yes  No  N/A | S |  | S |  | S |  |  |
| **2.6** | Mating Concrete Surface Preparation | Spec. 0002 [CL 3.9] | Construction joints prepared and free of loose material  Dowelled joints prepared and bond breaker applied for expansion joints if applicable | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.0 Installation of cast in-situ structures** | | | | | | | | | | | |
| **3.1** | Formwork | Spec. 0002 Concrete supply, construction, and grouting [Cl 4.0]  Drawings | Formwork installed as per drawings and adequately supported.  Completed formwork to be inspected by the Superintendent prior to concrete placement  Formwork engineers inspection certificate complete and received  **HOLD POINT**  **Before Placing Concrete** | Yes  No  N/A | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| **3.2** | Steel reinforcement | Spec. 0002 Concrete supply, construction, and grouting [Cl 5.0]  Drawings | Reinforcement installed as per drawings, ensuring sufficient lap length and cover is achieved on all bars. Inspection per layer installed.  Concrete pre-pour inspection complete.  **HOLD POINT**  **Before Placing Concrete** | Yes  No  N/A | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| **3.3** | Reinforcement Splice Lengths | Spec. 0002 Concrete supply, construction, and grouting [Cl 5.7] | Where splicing of reinforcement is not shown on drawings min. lap lengths shown below shall be adopted. (SPT-0002 Table 6) | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.4** | Pit & Pipe Connections | Spec. 1354 Stormwater Drainage Structures [Cl 3.3]  Spec. 0002 Concrete supply, construction, and grouting [Cl 2.6]  Drawings | Inlet and outlet pipes to be integrally cast into foundation/pit walls and the joint waterproofed as per design requirements.  Embedded pipes to be adequately restrained against flotation  **HOLD POINT** | Yes  No  N/A | **H** |  | **H** |  | **W** |  | ITP for associated pit/pipe reviewed for conformance |
| **3.5** | Installation of Core Holes, Voids, HD Bolts and Embedments | Spec. 0002 Concrete supply, construction, and grouting [CL 2.6, 7.1, 7.2, 7.3] | Firmly Fixed in position in all directions  Reinforcement displaced where necessary, bars requiring cutting approved by superintendent  Integrity of surface treatments maintained (galvanising, painting etc)  Threads covered | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.6** | Tolerances of Core Holes, HD Bolts and Embedments | Spec. 0002 Concrete supply, construction, and grouting [CL 2.6, 7.1, 7.2, 7.3] | HD bolts positioned using a template. Tolerance for HD bolts as per CL 7.2 (see below table)   |  |  | | --- | --- | | Condition | Tolerance | | Any 2 bolts within a group | ± 3mm Centre to Centre | | Adjacent HD bolt groups | ± 6mm Centre to Centre | | Bolt Projections – From concrete level | + 5mm, -0mm | | Embedded steel finishing flush with surface | ± 3mm from surface | | Bolt reduced level | + 5mm, -0mm | | Verticality of any bolt | 1:300 | | Maximum accumulation of 6 mm per 30,000mm along an established column line of multiple HD bolt groups, but not to exceed a total of 25 mm. | | | 6 mm from the centre of any HD bolt group to the established column line through that group. | |   \*Before pouring concrete of the GT & GEN foundation, MPW TA will check the setting condition of GT & GEN anchor bolt. Witness Point as per MHI ITP.  Tolerances for other embedded fabricated items in line with AS 3990 or AS4100 as applicable.  Pre-pour survey performed and recorded to verify location  **HOLD POINT** | Yes  No  N/A | **H** |  | **H** |  | **W** |  | Pre-pour inspection and Survey Records  Inc MHI Check Sheet for GT & GTG Anchor Bolt Setting CG-64294 |
| **3.7** | Earthing for Concrete Structures | Drawings  Spec. 0002 Concrete supply, construction, and grouting [CL 2.6] | Earthing installed for concrete structures as per provided Drawings  **HOLD POINT** | Yes  No  N/A | **H** |  | **H** |  | **W** |  | UGL Earthing FIC |
| **3.8** | Concrete Mix and properties |  | Concrete compressive strength required (28 days) = \_\_\_\_\_\_\_ MPA  Approved Concrete mix ID = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Slump = \_\_\_\_\_\_\_\_ mm | Yes  No  N/A | S |  | S |  | S |  | Material dockets Concrete pour records |
| **3.9a** | Concrete Supply Temperature - **GT Foundation Only** | Spec. 0002 Concrete supply, construction, and grouting [Cl 8.1.2]  Thermal Analysis Report | Temperature of concrete at the time of placement must be minimum 10°C and **maximum 25°C.**  Ambient air temperature at the time of placement must be between **5oC and 30oC.** |  | S |  | S |  | S |  | Material dockets Concrete pour records |
| **3.9b** | Concrete Supply Temperature – **Other foundations** | Spec. 0002 Concrete supply, construction, and grouting [Cl 8.1.2] | Temperature of concrete at the time of placement must be minimum 10°C and maximum 30°C.  Ambient air temperature at the time of placement must be between 5oC and 32oC.  If ambient temperature is between 32oC and 38oC, seek approval from superintendent to proceed by taking special precautions noted in the specification. |  | S |  | S |  | S |  | Material dockets Concrete pour records |
| **3.10** | Concrete Placement | Spec. 0002 Concrete supply, construction, and grouting [Cl 8.1.4] | Ensure elapsed time between batching and discharge of the mix does not exceed 1.5 hours.  Concrete placed in layers ≤ 300mm thick and adequately vibrated avoiding over-vibration.  Concrete thoroughly compacted – one internal vibrator per 10m3 concrete placed per hour |  | S |  | S |  | S |  | Material dockets Concrete pour records |
| **3.11** | Concrete Slump Testing |  | Slump Test - One per batch of concrete  Slump within tolerances specified in AS 1379  Testing to be executed by a NATA accredited test facility | Yes  No  N/A | S |  | S |  | S |  | Concrete pour record |
| **3.12** | Concrete Compressive Strength Testing | Drawings | Compressive Strength Testing - 2 x 7day and 2 x 28day per 50m3  Testing to be executed by a NATA accredited test facility | Yes  No  N/A | S |  | S |  | S |  | Concrete pour record |
| **3.13** | Surface finish | Spec. 0319  Minor Concrete Works [Cl 4.2]  Drawings | Concrete surfaces shall be true and even, free from honeycombed surface depressions or rejections.  Formed surfaces conform with surface finish requirements of AS3610 for the surface class nominated.  **WITNESS POINT**  **1 day prior** | Yes  No  N/A | **W** |  | **W** |  | **W** |  |  |
| **3.14** | Surface Treatments |  | Any surface treatments to be applied are approved for use and appropriate dose rates have been determined | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.15** | Joints | As per drawings | As per design drawings. Sawn joints to commence as soon as the concrete has hardened sufficiently. | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.16** | Curing | Spec. 0319  Minor Concrete Works [Cl 4.13] | From completion of finishing cure continuously with an approved method for a min period of 7 days or as directed by the Superintendent.   1. Ordinary Portland cement concrete – 7 days 2. High early strength concrete – 3 days 3. Concrete with cement or pozzolan materials – 10 days | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.17** | Stripping of formwork | Spec. 0002 Concrete supply, construction, and grouting [Cl 4.4.5] |  | Yes  No  N/A | S |  | S |  | S |  |  |
| **3.18** | Concrete Repair (If required) | Spec. 0002 Concrete supply, construction, and grouting [Cl 8.7] | Defective concrete shall be repaired or replaced. The materials and techniques of repair shall be examined and approved by the Superintendent prior to the commencement of repairs. | Yes   No  N/A | **H** |  | **H** |  | **H** |  | Grout Placement Checklist  Approved Aconex Corro for Repair Methodology |

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| **4.0 Backfill and Compaction** | | | | | | | | | | | |
| **4.1** | Structure Backfill | Spec. 1112 Earthworks [Cl 4.10] | Backfill to be Select fill for material within 1.5m of pavement and General Fill below 1.5m deep.  Placed in layers of maximum compacted thickness of 150mm  Select backfill material to be a granular material with a maximum particle size of 50mm and a PI between 2 & 12 | Yes  No  N/A | S |  | S |  | S |  | Material Test Report |
| **4.2** | Compaction - Backfill | Spec. 1112 Earthworks [Cl 4.13] | Minimum relative compaction requirements for backfill against structures to be:   * 92% for general fill * 97% for select fill   Test Frequency = 1 per layer | Yes  No  N/A | S |  | S |  | S |  | Test reports |
| **4.3** | Moisture Content | Spec. 1112 Earthworks [Cl 4.13 & 7.1] | Moisture Content for Backfill material to be within 60% to 90% OMC unless otherwise approved by Superintendent | Yes  No  N/A | S |  | S |  | S |  | Test reports |
| **5.0 Conformance check** | | | | | | | | | | | |
| **5.1** | Survey Report | Spec. 0161 Quality [Cl 3.13]  AS3610 | An as-built survey of the structure has been completed to ensure all structures are within the following construction tolerances:   * Absolute position in plan shall be within 10 mm. * Floor to floor plumb shall not exceed 0.002 times the dimension between the floors or 10 mm whichever is the greater. * Deviation from the specified dimension shall not exceed 0.001 times the specified dimension or 5mm, whichever is the greater. | ☐ Yes ☐ No ☐ N/A | **H** |  | **H** |  | **W** |  | Survey report |
| **5.2** | Concrete Test Results | Spec. 0002 [Cl 8.2] | Certificates received, reviewed and conforming to requirements  for each pour. | ☐ Yes ☐ No ☐ N/A | S |  | S |  | S |  | Test reports |
| **5.3** | Acceptance and closure of non-conforming items | Spec. 0161 Quality [Cl 3.8] | NCRs to be opened for non-conforming items and closed prior to closing construction lot. **HOLD POINT** | ☐ Yes ☐ No ☐ N/A | **H** |  | **H** |  | **H** |  |  |

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|  | **Comments**: | |  |
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| **Acceptance of works:** | | | | |  | |
| Symal Infrastructure representative name |  |  | Symal Infrastructure representative signature |  | Date |  |
| UGL representative name |  |  | UGL representative signature |  | Date |  |
| SHL representative name |  |  | SHL representative signature |  | Date |  |

**Inspection Checklist Report**

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| **Project no.** | CC0375 | **Project name** | Hunter Power Project | | **Date** |  |
| **Symal ITP no.** | CC0375-ITP-15 | | | | | |
| **UGL ITP no.** | 3200-0663-HPP-QA-ITP-015 | | **SHL ITP no.** | | HPP-UGL-QUA-GN-GEN-ITP-0015 | |
| **Symal Lot no.** |  | | | | **Symal Sub Lot no.** |  |
| **Location (chainages, detailed description or marked up plan)** | | | |  | | |

|  | **Verify of acceptance by** | | | | | | **Remarks / records** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Symal** | | **UGL** | | **SHL** | |
| **ITP Step No.** | **Activity to be verified** | **Items conforms?** | | | **NCR / Test Report No.** | | **Key** | **Sign Date** | **Key** | **Sign Date** | **Key** | **Sign Date** |  |
| Yes | No | NA |
| **1.0 Preliminaries** | | | | | | | | | | | | | |
| 1.1 | Documentation |  |  |  |  | | S |  | S |  | S |  |  |
| 1.2 | Lot Traceability |  |  |  |  | | S |  | S |  | S |  |  |
| 1.3 | Setout |  |  |  |  | | S |  | S |  | S |  |  |
| 1.4 | Underlying Lot Conformance |  |  |  |  | | S |  | S |  | S |  |  |
| **Excavation and Pipe Laying** | | | | | | | | | | | | | |
| 2.1 | Excavation |  |  |  |  | | S |  | S |  | S |  |  |
| 2.2 | Unsuitable Material  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  | Test reports |
| 2.3 | Compaction - Foundation |  |  |  |  | | S |  | S |  | S |  |  |
| 2.4 | Foundation Inspection  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  |  |
| 2.5 | Blinding |  |  |  |  | | S |  | S |  | S |  |  |
| 2.6 | Mating Concrete Surface Preparation |  |  |  |  | | S |  | S |  | S |  |  |
| **Installation of Cast In-situ Structures** | | | | | | | | | | | | | |
| 3.1 | Formwork  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| 3.2 | Steel reinforcement Stage 1  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| 3.2 | Steel reinforcement Stage 2  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| 3.2 | Steel reinforcement Stage 3  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| 3.2 | Steel reinforcement Stage 4  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **H** |  | Pre-pour inspection |
| 3.3 | Reinforcement Splice Lengths |  |  |  |  | | S |  | S |  | S |  |  |
| 3.4 | Pit & Pipe Connections  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **W** |  |  |
| 3.5 | Installation of Core Holes, Voids, HD Bolts and Embedments |  |  |  |  | | S |  | S |  | S |  |  |
| 3.6 | Tolerances of Core Holes, HD Bolts and Embedments  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **W** |  | MHI Checksheets |
| 3.7 | Earthing for Concrete Structures  **HOLD POINT** |  |  |  |  | | **H** |  | **H** |  | **W** |  | UGL Earthing FIC |
| 3.8 | Concrete Mix and properties |  |  |  |  | | S |  | S |  | S |  | Material dockets Concrete pour record |
| 3.9a | Concrete Supply Temperature |  |  |  |  | | S |  | S |  | S |  | Material dockets Concrete pour record |
| 3.9b | Concrete Supply Temperature |  |  |  |  | | S |  | S |  | S |  | Material dockets Concrete pour record |
| 3.10 | Concrete Placement |  |  |  |  | | S |  | S |  | S |  | Material dockets Concrete pour record |
| 3.11 | Concrete Slump Testing |  |  |  |  | |  |  |  |  |  |  | Concrete pour record |
| 3.12 | Concrete Compressive Strength Testing |  |  |  |  | | S |  | S |  | S |  | Concrete pour record |
| 3.13 | Surface finish  **WITNESS POINT** |  |  |  |  | | **W** |  | **W** |  | **W** |  |  |
| 3.14 | Surface Treatments |  |  |  |  | | S |  | S |  | S |  |  |
| 3.15 | Joints |  |  |  |  | | S |  | S |  | S |  |  |
| 3.16 | Curing |  |  |  |  | | S |  | S |  | S |  |  |
| 3.17 | Stripping of formwork |  |  |  |  | | S |  | S |  | S |  |  |
| 3.18 | Concrete Repair (If required) |  |  |  |  | | **H** |  | **H** |  | **H** |  | Grout Placement Checklist  Approved Aconex Corro for Repair Methodology |
| **Filling and Compaction** | | | | | | | | | | | | | |
| 4.1 | Structure Backfill |  |  |  |  | | S |  | S |  | S |  | Material Test Report |
| 4.2 | Compaction - Backfill |  |  |  |  | | S |  | S |  | S |  | Test reports |
| 4.3 | Moisture Content |  |  |  |  | | S |  | S |  | S |  | Test reports |
| **Conformance Check** | | | | | | | | | | | | | |
| 5.1 | Survey report |  |  |  |  | | **H** |  | **H** |  | **W** |  | Survey reports |
| 5.2 | Concrete Test Results |  |  |  |  | | S |  | S |  | S |  | Test reports |
| 5.3 | Acceptance and closure of non-conforming items |  |  |  |  | | **H** |  | **H** |  | **H** |  |  |

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| I certify that this Lot conforms to the requirements of the design and specifications; that all associated NCRs have been closed out: and all survey, conformance testing and inspections have been undertaken in accordance with the specified requirements. | | | | |
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| **Symal Representative** |  | **Signature** |  | **Date** |
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| **UGL Representative** |  | **Signature** |  | **Date** |
|  | | | | |
|  |  |  |  |  |
| **SHL Representative** |  | **Signature** |  | **Date** |
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| **Comments:** | | | | |
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