| **Item**  **No.** | **Task/Activity Description** | **Inspection/Test** | | | | | **Type** | **Responsibility** | **Checked/Verified by (initial/Date):** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Frequency** | **Acceptance Criteria** | **Reference Documents** | **Inspection/ Test Method** | **Record of conformity** | **TfNSW** | **Fulton Hogan** | **PV** | **Date** |
| **1** | **Preliminaries** | | | | | | | | | | | |
| 2 | Check location of underground and above ground utilities | Per Area | * Before You Dig contacted * Excavation Permit is obtained | WHSMP |  | Verification Checklist | IP | Site Engineer |  |  |  |  |
| 3 | Check the type, size and class of pipes and other drainage structures to be laid  Size: …….  Class:……… | Per Delivery | Supplied items are:   * + - To correct spec, class, size and quantity * Defect free, safely and securely stored * Markings have been made as required * Delivered 7 days after casting and concrete has reached specified 28 day strength | R11.2 |  | Verification Checklist | IP | Site Engineer |  |  |  |  |
| 4 | Supply of precast concrete members subject to traffic and/ or earth pressure loading, and water containing structures with capacity greater than 25,000 Litres | Per Type | Submitted design and manufacturing documentations to the Project Verifier for precast concrete structures which subject to traffic loads and/or earth pressure and water retaining structures with a capacity in excess of 25,000 litres. | R11.2.4.1 |  | Hold  Point | HP | Site Engineer |  | HP |  |  |
| 5 | Incorporation into the works any supplied, manufactured drainage product. | Per Lot | Submit a Certificate of Conformity to the Project Verifier 7 days prior to incorporating into the works | R11.2.6 |  | Hold  Point | HP | Site Engineer |  | HP |  |  |
| 6 | Verify conformance of BH (bedding & haunch) materials  Material Conformance Lot:…. | G:1/ 50m³  PI:/100m³ | Grading limits as per Table 6 in AS 3725 except that ≤12% passing 75µm & PI < 6 | R11 3.1.1  R11/L  Q6 8.1.1 | T201  T109 | NATA Test Report | TP | Site Engineer |  |  |  |  |
| 7 | Verify conformance of SO (side & overlay) materials  Material Conformance Lot:…. | G:1/ 50m³  PI:/100m³ | Max size 53mm, grading within limits in Table 7 of AS 3725 and PI >2 and < 12 | R11 3.1.2  R11/L  Q6 8.1.1 | T201  T109  AS 3725 | NATA Test Report | TP | Site Engineer |  |  |  |  |
| 8 | Verify conformance of material Adjacent to Weepholes | Per Delivery | Broken stone or river gravel of max size 53mm and < 5% passing 9.5mm sieve | R11 3.2  R11/L | T201 | NATA Test Report | TP | Site Engineer |  |  |  |  |
| 9 | Subsurface drainage pipes | Per Delivery | Provide certificate of compliance accompanied by NATA certified test results in accordance with TfNSW 3552 not more than 6 months old | R11.4.4.5  TfNSW 3552 | T1505  T1506 | Certificate of Conformity | IP | Site Engineer |  |  |  |  |
| 10 | Inspect supplied items upon delivery | Per Delivery | Supplied items are to correct spec, class, size and undamaged  Steel Reinforced Pipes as per CL3.3 & 3.4 of AS4058  Fibre Reinforced Pipe as per CL9 & 10 AS4139 | QMP |  | Receiving Inspection Checklist | IP | Site Engineer |  |  |  |  |
| **11** | **Trenching and Excavation** | | | | | | | | | | | |
| 12 | Construction of each drainage system | Per Lot | Set out the stormwater drainage systems as shown on the drawings in sufficient detail to identify:   * the locations, lengths and levels at outlets and inlets of pipes and box culvert structures; * the locations and levels of gully pits, junction boxes, energy dissipaters, and inlet and outlet structures; * the locations and levels of the ends of wing walls and headwalls; and * the locations and levels of open drains.   Notify PV that set out of drainage system has been completed. | R11.4.1.1 |  | Hold  Point | HP | Surveyor |  | HP |  |  |
| If set out is within 5 metres of an environmental sensitive area notify Environmental Manager | G36.4.12 |  | Hold Point | HP | Surveyor |  |  | HP |  |
| 13 | Excavate trench to the underside of bedding to correct width | Per Lot | * Width and depth of **pipe** trench as per AS 3725 and standard drawings, refer to right table * For other structures, the clear width between structure wall & face of excavation is ≥ 300mm or 1/3 height of excavation face, whichever is greater * Trenches > 1.5m deep are either shored or benched * The excavation is ≤ 50mm beyond the specified width and depths of the trench * For pipes under embankments   - “Embankment Condition”: embankment is constructed to a height ≥ 0.7 times the external dia of the pipe above the top of the bed zone, and for a min lateral distance past the boundary of the trench of 2.5 times the external dia of the pipe  - “Trench Condition”: Trenches done after the construct of the embankment to the level of the underside of the Selected Material Zone |  | | | | | | | | |
| R11.4.3  MD.R240-01 |  | Verification Checklist | IP | Site Foreman |  |  |  |  |
| 14 | Foundation Compaction | Q6/L | Foundation to be compacted to 95%. (Standard compaction) | R11.4.9.2  R11.4.9.3  Q6 8.1.1 | T166 | Test Report | TP | Site Engineer |  |  |  |  |
| 15 | Excavation for pipe installation and other drainage structures | Per Lot | Notify the Project Verifier of the anticipated date of completion of excavation and preparation of foundations.  Not later than 24 hours, but not earlier than 5 working days.  GDR to provide Geo-report to state that the foundation is suitable or need further treatment | R11.4.3 |  | Witness Point | WP | Site Engineer |  | WP |  |  |
| 16 | Remove & replace unsuitable materials, if directed by PV | Where required  Q6/L | Replace with materials from cuttings or conforming material to full depth in 150mm layers and compact to 95% Standard Compaction | R11.4.3  Q6 8.1.1 | T166 | Test Report | TP | Site Engineer |  |  |  |  |
| 17 | Replacement of inadequate foundation material. | Where required | Notification to the Project Verifier that inadequate foundation material has been excavated to the extent required. | R11.4.3.3 |  | Witness Point | WP | Site Engineer |  | WP |  |  |
| **18** | **Placement of Pipes** | | | | | | | | | | | |
| 19 | Place Bedding | Q6/L | * Bedding placed to a thickness of 100mm for pipes up to 1200mm dia pipes and 150mm for pipes greater than 120mm * Bedding compacted to 95% | R11  R240-01 |  | Verification Checklist | IP | Site Engineer |  |  |  |  |
| 20 | Install pipes in accordance to manufacturer’s instructions and design documentations | Per Lot | * Correct size and class of pipe installed * Pipes laid from inlet to outlet with socket laid upstream * Pipe support are Type HS3 conforming to AS3725 and MD R240-01 * Pipe ends cleaned and rubber rings correctly installed * Where grade exceed 20%: anchor blocks provided at 3m spacing max., at bends, junctions and where shown on drawings * 100mm dia Subsurface drainage installed at the discharge end of pipes 3m long, laid beside & 100mm above invert level of drainage pipe * All joints have rubber rings fitted and pipes butting against each other. * Connection to pits in accordance with MD R220-43 | R11.4.4  R240-01  R220-43 |  | Verification Checklist | IP | Site Engineer |  |  |  |  |
| 21 | Pit/headwall to pipe connection | Per connection | * Pit to pipe connections are to be flush along the pit wall, with minimal protrusions or depressions. | CMS 7.8 |  | Verification Checklist | IP | Site Engineer |  |  |  |  |
| 22 | Verify that completed pipeline against survey marks | * Per Lot | * Completed pipeline is inline and within ±200mm of location (plan) * Invert level are within 20mm of the design level at any point * To be checked at each pit and headwall | R11.5.1  Table R11.4 |  | Survey Report | SC | Surveyor |  |  |  |  |
| **23** | **Construction of Drainage Structures (Other Than Pipes and Box Culverts)** | | | | | | | | | | | |
| 24 | Construction of drainage structures other than pipes and box culverts. | Per Structure | The notification is to be at least 7 days prior to the date of installation work. | R11.4.7.2 |  | Witness Point | WP | Site Engineer |  | WP |  |  |
| 25 | Place bedding layer underneath pit, or plain concrete blinding to headwalls. Ensure correct survey tools have been used to transfer levels, i.e. dumpy level | Per Structure | The bedding materials consists either of:  For Precast Pits 50mm layer DGB20 or CLSM;  For other than precast a 50mm blinding layer | R11.4.7.2 |  | Verification Checklist | IP | Site Foreman |  |  |  |  |
| 26 | Install precast drainage structures as specified on design documentations | Per Structure | * Installed within 14days after installation of associated pipes, box culverts or open drains * Where drainage structure abuts a structure or concrete pavement, a 10mm wide filler complying with TfNSW 3204 is installed as an isolation joint * Subsoil drainage pipe connected to downstream headwalls/pits * Lifting holes are sealed * Structure is level and plumb | R11.4.7 |  | Verification Checklist | IP | Site Foreman |  |  |  |  |
| 27 | Install Cast In place drainage structures (incl. headwalls and curtain walls) as shown on design documentations  R53-GCW Lot No:\_\_\_\_\_\_\_ | Per Structure | * Constructed as per R53-GCW-ITP * Backfilled after 14 days of placing the concrete or when the 28 day compressive strength is achieved, whichever achieved earlier * Insitu curtain walls at the outer edge of the aprons are only for pipes between 300-1200mm diameter | R11.4.7  R11.4.7.3 |  | R53-GCW Lots | IP | Site Foreman |  |  |  |  |
| 28 | Verify that the finished drainage structures are within tolerance, check pipe gaps over joints are within allowance | Per Structure | * Within ± 200 mm longitudinally * Within ± 20mm laterally * Within ± 20mm of design invert level | R11.5  Table R11.4 |  | Survey Report | SU | Site Engineer |  |  |  |  |
| 29 | Install rung ladders if pits are > 600mm deep | Per Pit | * Top of uppermost rung < 600mm below the top of the pit. * Top of Bottom Rung is within 300 to 500mm above the invert of the pit. * Rung spacing is 300±50mm | R11.4.7.4 |  | Verification Checklist | IP | Site Engineer |  |  |  |  |
| 30 | Patch grout around pipes recesses as required | Per Structure | * Cementitious grout is placed evenly covering the entire recess of the pipe-pit connections if any | DRA-CMS |  | Verification Checklist | IP | Site Foreman |  |  |  |  |
| 31 | Install weepholes in headwalls and wingwalls, if provided | Per Structure | * Material placed to height ≥ 450mm above the bottom of the weephole over a plan area ≥ 600mm along the wall by 300mm out from the wall (Located centrally of the weephole) * Enclosed it with geotextile filter fabric | R11.4.8  R63 |  | Verification Checklist | IP | Site Foreman |  |  |  |  |
| 32 | Place scour protection / dissipator, if required | Per Outlet Structure | * Scour protection and installation of dissipater completed as details specified in design documentations | Design DWGS |  | Verification Checklist | IP | Site Foreman |  |  |  |  |
| **33** | **Backfilling** | | | | | | | | | | | |
| 34 | Place and spread haunch, side zone, overlay and backfill, compact and test to specified densities | Per Lot  Q6/L | * Backfill placed in 150mm layers and compact to 95% std compaction (102% if within SMZ) * Testing frequency refer to Q6/L3.1 (every layer if within SMZ) * If stabilised sand used, the materials been vibrated to obtain complete placement & compaction of material under & around pipe and the placed stabilised materials are firm a day after placement. Working time to be noted. * Stabilised sand not exempt from T166 in accordance with R11 * Working times of stabilised sand should be considered (T147) | R11.4.9.1  TfNSW Q6 Annexure Q/L  Q6 8.1.1 | T166  T120  T147 | Test Report | TP | Site Engineer |  |  |  |  |
| 35 | CCTV Inspection | Per Line | * CCTV inspection of installed drainage completed after backfill of drainage line but before placement of pavements * Video footage and report in accordance with WSA05-2008 | R11.5.2 |  | CCTV Report | IP | Site Engineer |  |  |  |  |
| 36 | Moving heavy construction plant or vehicles over pipe or box culvert structures. | Per Location | Provide a certificate and verification of protective measures. | R11.4.11 |  | Hold Point | HP | Site Engineer |  | HP |  |  |
| 37 | Covering up of work subject to a conformity verification survey. | Per Lot | Survey Report verifying conformity. | G71.5.6.6 | Survey | Hold Point | SU | Surveyor |  | HP |  |  |

**Legend:**

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| **HP** | Hold Point | Work shall not proceed past the HP until released by the Project Verifier | **IP** | Inspection point | Formal Inspection to be done and recorded |
| **HP\*** | FH Hold Point | Work shall not proceed past the HP\* until released by Fulton Hogan | **TP** | Test Point | Product compliance test to be undertaken and recorded/reported |
| **WP** | Witness Point | An inspection which must be witnessed by the Project Verifier | **SU** | Survey conformance point | A qualified surveyor to check product/section/structure and report |
| **AP** | Approval Point | Written or verbal approval given by the Project Verifier | **SC** | Survey Check | |

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| **Notes** |  |