

**FIGURE 309-A: CONCRETE MAINTENANCE HOLE**

**Concrete:**

1. All concrete shall be N32 unless stated otherwise.
2. N32 concrete shall be normal class as per WSA PS357.
3. N40 concrete shall be special class with exposure classification SCC to WSA114- 2002.
4. Concrete aggregate shall be < 20mm.
5. The wall thickness(s) specified in Table 307-A is the minimum.
6. Where required, slump testing shall be undertaken by the Water Agency as per AS1012. Slump shall be 20 to 60mm.
7. Concrete cure heat shall be controlled to prevent early age shrinkage cracks. This shall be done by:
  - 7.1. Limiting the thickness of concrete (at base etc) to < 500 thick,
  - 7.2. Limiting the temperature of the concrete to < 45°c,
  - 7.3. Control the risk of early age cracking for concrete sections > 225 thick by:
    - 7.3.1. Purchasing a low heat mix from the concrete supplier, &
    - 7.3.2. Use water curing to ensure a humid atmosphere and avoid drying of concrete, &
    - 7.3.3. Scheduling thick additions of concrete for early in the morning.
  - 7.4. In addition, control the risk of early age cracking for concrete sections > 300 thick by:
    - 7.4.1. Monitoring the temperature of a placement of each configuration of thick concrete and confirming the temperature rise is acceptable, &
    - 7.4.2. Using chilled water / aggregate where temperature will likely be excessive.

**Concrete Placement:**

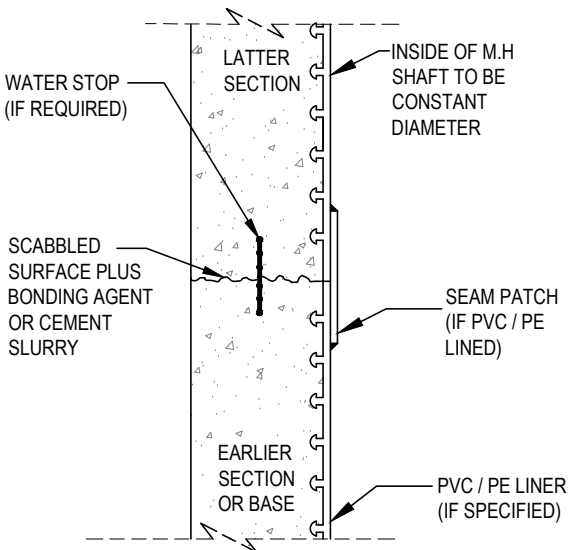
8. Concrete Formwork to AS3610.
  9. All concrete shall be placed within 90 minutes of being mixed.
  10. Once mixed, additional water shall not be added.
  11. Concrete shall not free drop > 1.5m.
  12. Falling concrete shall not contact reinforcement (this is required to prevent segregation).
  13. Exposed concrete shall be kept wet (ie: cover in plastic / wet hessian) for > 4 days.
  14. External formwork not required (unless specified otherwise) but wall & base concrete thickness shall not exceed 500.
  15. Concrete must be free of voids.
- A vibration probe shall be inserted to 100 below the underlying layer surface at intervals < 300 or 1/3 of zone of influence of the probe, whichever is less.  
Less than 500 high of concrete shall be added between vibration events.

**Concrete Post Placement:**

16. Internal finish to class 2 finish (AS3610).
17. Backfill only after 60% of nominal concrete strength achieved (ie: min 24 hours).
18. Formwork may be removed after 12 hours provided structure is not loaded until 60% nominal concrete strength achieved.
19. Concrete shall be rejected if it is: porous, segregated, honeycombed, or contains surface defects / cracks > 0.1mm.
  - 19.1. Repair defects < 1mm with low viscosity epoxy.
  - 19.2. Repair defects > 1mm with epoxy mortar.
20. 28 day drying shrinkage cracks shall not exceed 600 microstrains.

**Steel Reinforcement:**

21. Reinforcement shall be as per AS/NZS 4671:
  - 21.1. Shape D,
  - 21.2. Strength grade 500MPa,
  - 21.3. Ductility class N.
22. Bend, cut, splice and fix reinforcement steel as per AS3600.
23. All reinforcement shall have > 65 clear cover.
24. All reinforcement mesh shall be SL81 unless stated otherwise. Bottom reinforcement layer shall be > 65 from slab bottom. Separate reinforcement layers using 65 high reinforcement spacers / chairs.
25. Shaft reinforcement bar size as per the design schedule.
26. Shaft horizontal hoops (rings) to be placed centrally at 200 separation.
27. Shaft vertical bars to be placed centrally at 300 separation.
28. Hoop, bar and mesh to overlap as follows:
  - 28.1. SL81 mesh- 200 overlap,
  - 28.2. N12 bar- 400 overlap,
  - 28.3. N16 bar- 500 overlap, and
  - 28.4. N20 bar- 650 overlap.
  - 28.5. Overlap and fix reinforcement bars of MH base to vertical bars in shaft.



**FIGURE 309-B: CONCRETE CONSTRUCTION JOINT REINFORCEMENT NOT SHOWN BUT MAY BE REQUIRED**

**NOTES Regarding Concrete Construction Joints:**

- A. Maximum height between construction joints shall be 2400.
- B. Water stops to be placed centrally around perimeter of construction joints when:
  - B.A. The joint is deeper than 6m, or
  - B.B. Where geotechnical information indicates that the construction joint is below the water table, or
  - B.C. Ground conditions during construction indicate that the construction joint is below the water table.
  - B.D. Waterstops shall have an overlap of 400.
- C. Mastic construction joints may only be used between shafts and flat tops (refer Figure 313-D).
- D. Concrete construction joints shall be constructed in the following way:
  - D.A. Lower section shall cure for min 12 hours before next pour commences.
  - D.B. Within 2 hours of the next pour,
    - D.B.A. Scabble the upper surface to expose aggregate, removing >5 deep of material, or
    - D.B.B. Retard the cure in the top of the lower pour (using chemical treatment, eg: pre-co-h) when placed and then high pressure water clean off soft surface within 2 hours of the next pour.
  - D.C. Remove all debris from surface with a stiff brush or compressed air (if scabbled).
  - D.D. Within 2 hours of the next pour, wet the surface (without ponding water)
  - D.E. Apply concrete bonding agent or cement slurry (cement 1: sand 4. <50 thick) to the surface.
  - D.F. Pour next section to a maximum height of 2400 (if practicable).
  - D.G. Install water stop centrally around top of placement while wet in accordance with the manufacturer's requirements (if required).
  - D.H. Wire restrain water stop to reinforcement (if present) to hold in the vertical position.

**NOTES Regarding MH Preferences:**

- A. Precast concrete MHs require water agency approval.
- B. Different MH shaft materials shall not be used, ie: the same material shall be used between base and top of shaft.
- C. Where specified as acceptable in the design, prefabricated MHs (eg: plastic or GRP MHs) may be used provided:
  - C.A. The assembly is listed as acceptable in the products portal.
  - C.B. An entire integrated assembly from base to surface is being used.
  - C.C. The manufacturer's installation arrangements are followed.
- D. Where no suitable products are listed by the water agency, cast in situ concrete MHs shall be constructed.

ALL DIMENSIONS IN mm UNLESS STATED OTHERWISE				DESIGNED: R. JAGGER		DATE: 1 JULY 2015	
				DRAWN: R. JAGGER		DATE: 1 JULY 2015	
CHECKED:		NAME		DATE		APPROVED: NAME	
<input checked="" type="checkbox"/> CWW		D. MOORE		01/09/15		<input checked="" type="checkbox"/> CWW	
<input checked="" type="checkbox"/> SEW		C. PAXMAN		01/09/15		<input checked="" type="checkbox"/> SEW	
<input checked="" type="checkbox"/> YVW		K. DAWSON		01/09/15		<input checked="" type="checkbox"/> YVW	
ISSUED 2015				VERSION 1			

MELBOURNE RETAIL WATER AGENCIES

MRWA SEWERAGE STANDARDS

MAINTENANCE HOLES

GENERAL CONSTRUCTION REQUIREMENTS

NOT TO SCALE

MRWA-S-309

Planning	Design	Construction
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