

DESIGN SPECIFICATION

D8

WATERFRONT DEVELOPMENT

SPECIFICATION D8 – WATERFRONT DEVELOPMENT

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CITATION

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VERSIONS, D8, Waterfront Development

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Infrastructure
1.0	Version 1 – First Draft Version		March 2025	

DESIGN SPECIFICATION D8

WATERFRONT DEVELOPMENT GENERAL

D8.01 SCOPE

1. The work to be executed under this Specification consists of the design of waterway facilities and structures for waterfront developments to meet the requirements of Council, and other relevant authorities.

2. This Specification provides specific requirements related to developments that include water frontages to natural waterways and recreational facilities. The Specifications contained herein are to be considered supplementary to the requirements of Council's other design specifications.

Scope

3. Waterfront developments for the purposes of this specification shall be all developments within the coastal zone as specified in accordance with the Council Cadastral Mapping Series.

**Waterfront
Developments
- Definition**

4. Canal estate developments, as defined by SEPP 50 Canal Development Section 3, shall not be undertaken, and as such are not covered within this Specification. Exceptions to this include development of any kind:

**Canal Estate
Developments**

- (a) that is required to complete a canal estate development in accordance with a development consent that was granted before the date of commencement of SEPP 50 and that has not lapsed, and
- (b) that does not change the size or shape of the canals, or
- (c) development that is needed for the maintenance of an existing canal.

D8.02 OBJECTIVE

1. The objective of this Specification is to provide both guidelines and requirements for Designers of developments that include water frontage. The requirements and guidelines seek to ensure waterfront development that is environmentally and structurally sound and minimises future maintenance and commitments.

D8.03 REFERENCE AND SOURCE DOCUMENTS

(a) Council Specifications

- D1 - Geometric Road Design
- D3 - Structures and Bridge Design
- D5 - Stormwater
- D7 - Erosion
- DCP 36 - Exempt and Complying Development

(b) Australian Standards

- AS 2870.1 - Residential slabs and footings - Construction
- AS 3798 - Guidelines on earthworks for commercial and residential developments.
- AS4678 - Earth-Retaining Structures

(c) NSW State Legislation

Fisheries Management Act 1994
Protection of Environment Administration Act 1991
Coastal Protection Act 1979
Environment Planning and Assessment Act 1979
Environment Planning and Assessment Regulation 2000
SEPP 71 Coastal Protection
SEPP 14 Coastal Wetlands
SEPP 50 Canal Development
Water Management Act 2000 No. 92

(d) State Authorities

- PUBLIC WORKS DEPARTMENT, NSW.
- Floodplain Management Manual. (Jan 2001)
 - Design Guidelines for Wharves and Jetties. Report No. 88062 (1990).
 - Boat Launching Ramp Guidelines. Report No. PWD78024 (1985).
 - Marina Guidelines. Report No. 87054 (1985).

(e) Bibliography

Australian Runoff Quality Manual, June 2003

D8.04 CONSULTATION

1. Consultation with public authorities is necessarily more comprehensive in the case of waterfront developments. Design proposals shall not be considered by Council until all relevant approvals from public authorities have been obtained. Relevant public authorities include, but are not limited to:

***Public
Authority
Approval***

- (a) The Department of Public Works and Services, NSW (PWD)
- (b) NSW Fisheries
- (c) Waterways Authority
- (d) National Parks and Wildlife Services (NPWS)
- (e) The Department of Infrastructure Planning and Natural Resources (DIPNR)

D8.05 GENERAL REQUIREMENTS

- | | | |
|-----|---|-------------------------------|
| 1. | There are general requirements pertinent to waterfront development, which are applied by Council or other public authorities. These requirements include: | <i>Flood Levels</i> |
| (a) | No adverse effect to flood levels and flows in the area. | |
| (b) | No adverse effect to erosion or deposition conditions within the existing environment. | <i>Erosion</i> |
| (c) | Revetment walling is to be located within the property boundary. | <i>Revetment Walls</i> |
| (d) | Compliance with Water Management Act 2000 No. 92 | |
| (e) | Environmentally sensitive designs | |
| (f) | Structural Stability to withstand flood, debris, buoyancy and live loadings | |
| (g) | Maintenance of Waterway Facilities where no buffer zone is required (see Aus-Spec D7 for buffer zone specifications) | <i>Maintenance</i> |

D8.06 LAND RECLAMATION

- | | | |
|----|--|---|
| 1. | A detailed foundation investigation shall be carried out by a qualified engineer in accordance with Aus-Spec DQS to determine the long term bearing capacity of the site. The investigation shall include the bearing capacity of the in-situ and fill components of the foundation. It shall predict the settlement of the finished surface through time (without structural loading). The foundation investigation shall specify any procedures or provisions to ensure that the foundation performance of the site will be suitable for the proposed types of site development in accordance with AS3798. | <i>Fill Bearing Capacity</i> |
| 2. | Before any allotments can be sold to the public, a certificate shall be issued by a qualified practising geotechnical engineer, certifying that the site has achieved the desired standard of performance and each site is to be classified in accordance with AS 2870.1. | <i>Geotechnical Certification for Allotments</i> |
| 3. | The design of structural foundations should be carried out by a qualified engineer in accordance with Aus-Spec DQS to ensure compatibility with the inherent foundation properties of the proposed site. | <i>Foundation Design</i> |

WATERWAYS**D8.07 PLANNING CONCEPTS**

- | | | |
|----|--|--------------------------|
| 1. | Waterway frontages shall be natural in appearance. Buffer zones, as specified in Aus-Spec D7, shall be used to ensure this. Designs for the maintenance of existing canal structures shall also be kept natural in appearance and undertaken in consultation with Council. | <i>Appearance</i> |
|----|--|--------------------------|

- | | |
|---|-------------------------------|
| <p>2. Developments fronting existing waterways shall also ensure depths for navigation and mooring are available in accordance with the following:</p> <ul style="list-style-type: none"> (a) draught of boat (b) underkeel clearance (UKC) (c) allowance for sedimentation. <p>3. Water quality must be such that the following are not adversely affected:</p> <ul style="list-style-type: none"> (a) occasional swimming and wading (b) boating (c) passive recreation (d) visual aesthetic acceptability (e) freedom from excessive plant and algal growth (f) the maintenance of a complete aquatic faunal community. | <p><i>Moorings</i></p> |
|---|-------------------------------|

D8.08 RESERVED

D8.09 WATERWAY DEPTHS

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|--|---------------------------------------|
| <p>1. Depths should be sufficient for safe navigation by craft likely to use the waterway, except in non navigable areas which may be set aside for creation of wetland habitats.</p> <p>2. Waterway depths for existing waterways should be sufficient for safe navigation by craft likely to use the waterway and a minimum of 2m is preferred..</p> | <p><i>Navigable Depths</i></p> |
|--|---------------------------------------|

D8.10 WATERWAY WIDTHS

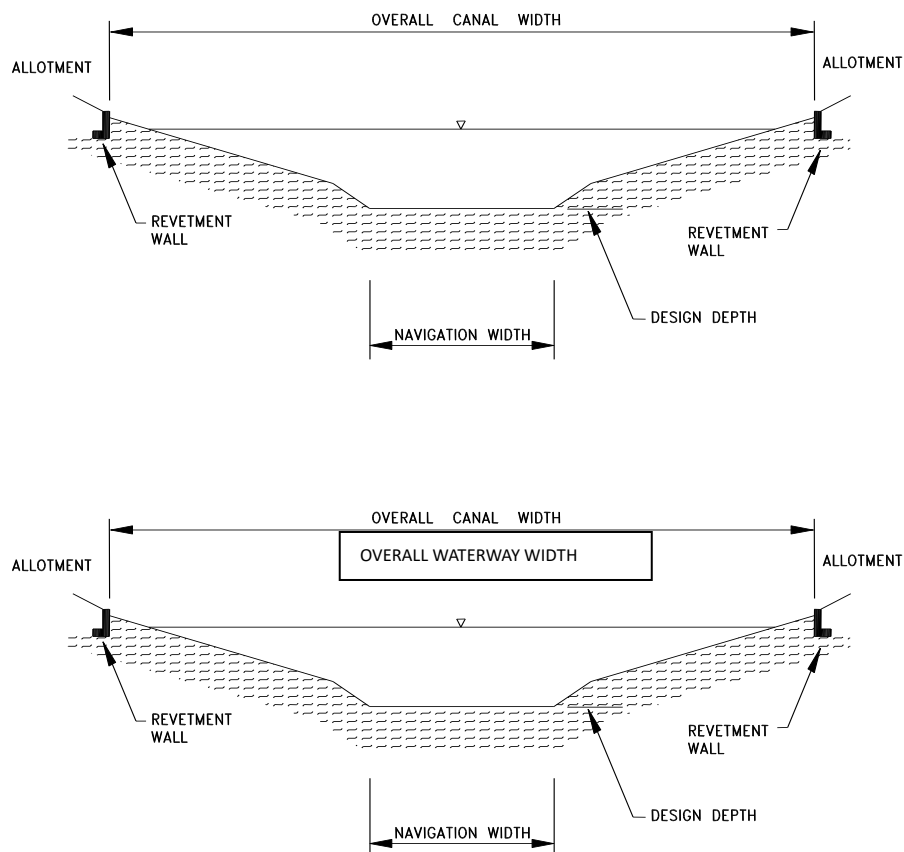
- | | |
|---|---------------------------------------|
| <p>1. Two measurements for width can be distinguished:</p> <ul style="list-style-type: none"> (a) navigation width: width at the navigation depth (natural waterway and existing canals) (b) overall width: <ul style="list-style-type: none"> (i) width between the top of the revetment walls (existing canals); and (ii) width from bank to bank (natural waterway) | <p><i>Width Definition</i></p> |
|---|---------------------------------------|

These two widths are shown in Figure D8-2 for a typical existing channel "Dry Beach" cross-section.

- | | |
|--|---------------------------------------|
| <p>2. The navigation widths for Waterways shall be sufficient for safe navigation by two-way and one-way boat traffic respectively, taking into account the size of craft likely to use the waterway. Minimum navigation widths shall be 5 x B_{max} or 20m whichever is the greater</p> | <p><i>Navigable Widths</i></p> |
|--|---------------------------------------|

Where $B_{\max}$ is the maximum beam of the craft likely to use the waterway.

Where any structures or moored craft encroach into the navigation width, a clear distance of $5 \times B_{\max}$ shall be provided measured between structures or craft moored on opposite sides of the waterway.



FigureD8.1 Typical Existing Channel Beach Cross Section

3. Craft shall not be permitted to navigate into waterways with a navigation width of less than 25 m.
4. The overall width shall be determined by appropriate hydrological studies.

Navigation Width

Minimum Overall Width

5. Determination of the navigation and overall widths shall take into account bank and bed stability considerations.

D8.11 RESERVED

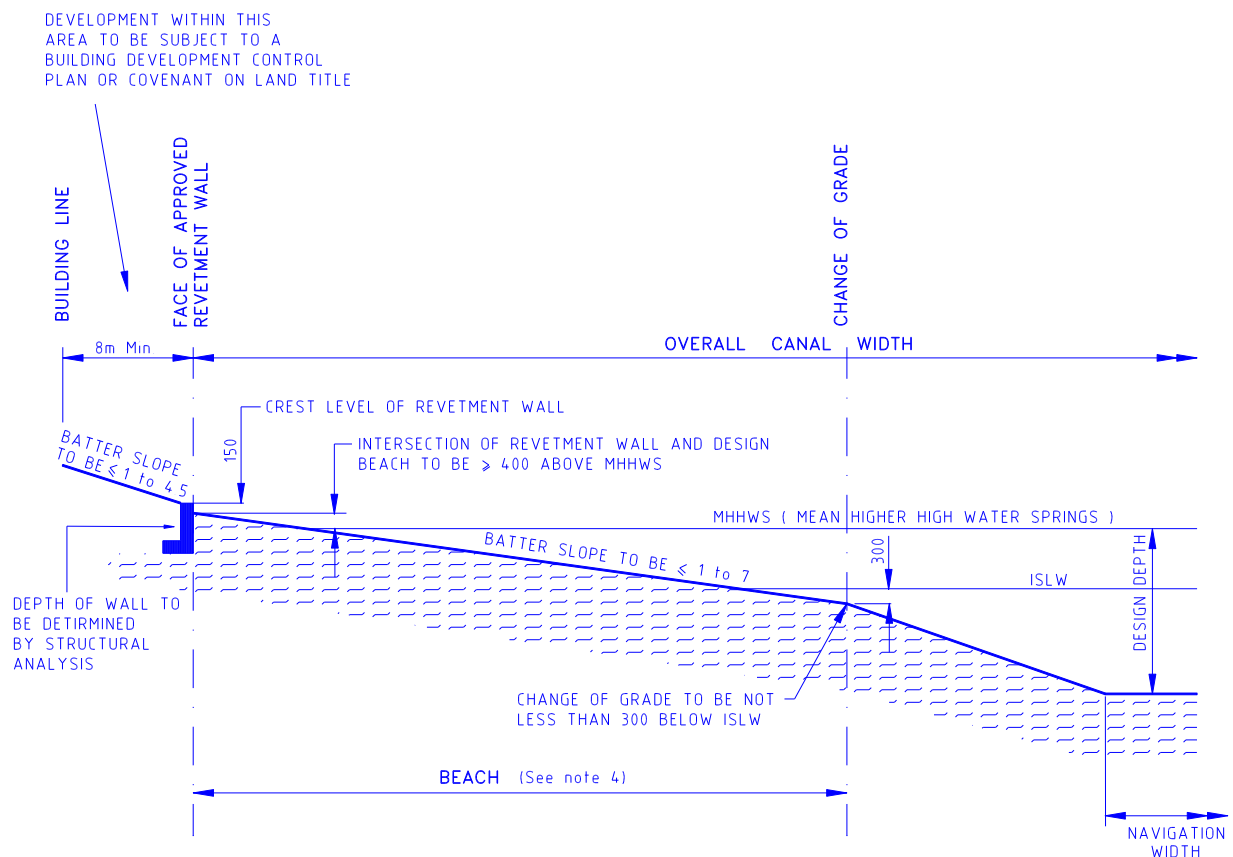
D8.12 WATERWAY FRONTAGE PROFILES

1. The cross-section and edge treatment shall be designed in accordance with sound engineering practice by a qualified civil engineer in accordance with Aus-Spec DQS, taking into account the type of soil conditions, the likely range of water levels including long term variations, and the applied forces, including wind and wave assessments. Engineering studies demonstrating the adequacy of the cross-sections and edge treatment shall be made available to the DIPNR.

***Engineering
Studies***

2. The cross-section design for existing land developments adopting a beach profile should conform in principle with the design cross-sections shown in Figure D8.2 however, alternative designs such as structural retaining walls, rock gabions and mass rock will be considered where necessary for maintenance works and only after consultation with Council.

Alternatives



NOTES:

- 1 Revetment wall to incorporate kerb and gutter detail to prevent runoff over wall onto beach
- 2 Design of revetment wall to allow for a minimum of 300 erosion in front of wall
- 3 Revetment wall shown schematically only
- 4 Beach to comprise a minimum 600 thickness of clean sand approved grain size and to a minimum width of 7.5m
- 5 All underwater batter slopes subject to engineering investigation
- 6 Building line to be specified by Council
- 7 Diagram not to scale

Figure D8.2

No Beach Submerged Cross Section – Existing Canals Only

Source: Public Works Department 1992

D8.13 UNDERWATER BATTERS AT WATERWAYS AND SHORELINES

1. The typical ranges of stable underwater batters shall be determined by a geotechnical report and structural analysis. Table D8-1 has been included for guidance only.

Table D8-1**Effect Of Material Type On Underwater Batter – For Guidance Only**

MATERIAL	STABLE UNDERWATER BATTER		
Stiff Clay		1 : 1.5	
Firm Clay	1 : 2	to	1 : 4.5
Sandy Clay	1 : 4	to	1 : 7
Coarse Sand	1 : 3	to	1 : 6
Fine Sand	1 : 5	to	1 : 10
Mud	1 : 8	to	1 : 50

2. Stormwater outlets into beach type waterways are to be designed after Consultation with Council. They are preferred to be above mean high watermark. If this cannot be achieved, after consultation with Council, a headwall and extended apron shall be provided for access for maintenance operations.

Stormwater Outlets

3. Use of coarse granular materials > 20mm for beach formation, eg. gravels and cobbles, may cause problems in the form of oyster and barnacle growth. A well-graded soil up to 20 mm in diameter shall be used.

Beach Material**D8.14 ENTRANCES TO MARINAS & HARBOURS**

1. For navigable entrances, the width and depth of the entrance shall be sufficient for safe navigation by craft likely to use the waterway.

Navigation

2. Refer to D8.07 point 3 'Waterways' for depth selection factors.

Depth Selection

3. Extensive modelling may be required to account for tidal influences, see Section D8.17 Note 2.

Modelling

HYDRAULICS

D8.15 STORMWATER MANAGEMENT

1. The proposed development shall not adversely affect water quality within the development and host waterbody, or lead to problems associated with siltation and erosion. Design concepts and details for site specific stormwater treatments shall ensure:
 - a) The development allotment shall be graded to ensure as much runoff as possible is directed to the street where it may be collected and then directed into the waterway through properly designed stormwater outlets.
 - b) Wherever practical, stormwater outlets shall be located at points of maximal flushing, or directly within the host waterbody.
 - c) Sediment control shall be in accordance with Aus-Spec D5 and D7.

Water Quality

Flushing

Sediment Control

D8.16 FLOOD CONTROL STRUCTURES

1. Flood control structures include devices such as: weirs, flow deflectors, and rock protection.
2. Flood control structures are to be approved by the DIPNR and Fisheries. Usually detailed designs for flood control structures are commenced only after the overall waterway system and flood structures have been mathematically and physically modelled and approved by the DIPNR and Council. Preliminary plans are usually prepared as part of a "flood study" which involves modelling procedures.
3. Designs must ensure that the proposed works and any raising of the land will not result in any significant increase in flood levels in the area.

Definition

Flood Study

D8.17 TIDAL INFLUENCES

1. The level of study of tidal hydraulics necessary to adequately demonstrate the impact of the proposed development on tidal hydraulics, and the effects of the tidal hydraulics on the development, is dependent on a number of factors. It is important that the proponent seek early consultation with the DIPNR.
2. It is likely that detailed studies, involving mathematical and/or physical modelling, will be necessary where it is proposed that the development have more than one entrance, where an understanding of internal tidal circulations is important, or where the development is located within the entrance reach of the host estuary and would involve significant changes to the frictional and shallow water controls on tidal propagation.

Modelling

3. The Designer shall assess variations in the tidal characteristics of the host estuary at the development site taking into account cyclic and long term changes in: estuary shoaling and scour, entrance stability, hydrologic input, mean sea level, and any engineering works (such as large scale estuary dredging, entrance works, or other canal subdivisions) proposed or approved by the various government authorities. The implications of these changes to the design and functionality of the development shall be established and accommodated.

Tidal Characteristics

4. The Designer shall establish the tidal levels at the proposed development site. These levels may be based on existing information supplied by the DIPNR, where available, or measurements undertaken on behalf of the proponent by a suitably qualified surveyor or civil engineer.

Tidal Levels

5. There is no minimum acceptable tidal range below which a development would not be considered. The degree of tidal flushing will however reduce as tidal range decreases, and this effect must be considered in the water exchange and mixing studies required by the Department and outlined elsewhere in the guidelines.

Tidal Range

6. Flood control structures, such as weirs, significant rock protection and groynes are to be designed and certified by an Engineer in accordance with Aus-Spec DQS. As part of the design certification the designer shall provide to Council evidence of issue of the relevant licenses issued under the Water Management Act 2000, and the Fisheries Management Act and PDE Act. All designs shall be undertaken in accordance with the Australian Standards and Statutory Authority Guidelines relevant to each element of the design.

D8.18 RESERVED

D8.19 EROSION AND SEDIMENTATION INFLUENCES

1. Sandy beaches within waterway developments require maintenance (nourishment) at regular intervals. Where recovery of the eroded sand from the bed of the waterway is unlikely to be feasible, it is necessary to make allowance for ongoing sedimentation on the waterway bed from this source.

Sand Beach Maintenance

2. Shoreline structures which extend across the littoral drift zone, eg. some stormwater outlet designs, should be avoided where relatively high littoral drift rates are anticipated, except where special provision has been made to mitigate beach erosion.

Drift

3. The sediment load carried by stormwater outlets from a given catchment area shall be determined in accordance with Aus-Spec D7.

Sediment Load

STRUCTURES

D8.20 REVETMENT WALLS FOR EXISTING CANAL DEVELOPEMENTS ONLY

1. Revetment walls are to be designed in accordance with Aus-Spec D3.

Design

2. Filling is to be composed of material not injurious to the health of the neighbourhood and shall comply with Council's requirements for filling in subdivisions.

Filling Behind Walls

3. The crest of the revetment wall above the design waterway profile, for the particular type of waterway cross-section adopted, shall conform with the requirements set out in Table D8-2.

Wall Height

4. There is no maximum height for revetment walls as such. However, consistent with the requirements in Table D8-2 the crest level of revetment walls should be kept as low as possible to enable easy access from the allotments onto the waterway, to optimise mixing wind action, and to reduce visual impact.

Maximum Height

5. Determination of the full construction height, structural adequacy and stability of the wall shall take into account erosion allowance and subsoil drainage facilities, and hydraulic processes, in front of the wall. In the absence of detailed hydraulic tests the allowances for erosion shall not be less than the values specified in Table D8-3.

**Erosion
Allowance**

Table D8-2

Factors For Determining Height Of Revetment Walls

SHORELINE CROSS-SECTION	HEIGHT OF REVETMENT WALL ABOVE DESIGN CANAL PROFILE
Dry Beach	Minimum of 150mm
Inter-Tidal Beach	Sufficiently high to accommodate MHHWS* plus wind setup, wave runup, long term changes in mean sea level and local tide levels, without overtopping.
No Beach - Submerged Slope	Sufficiently high to accommodate MHHWS plus wind setup, wave runup, long term changes in mean sea level and local tide levels, without overtopping.
No Beach - Vertical Wall	Sufficiently high to accommodate design water depth, MHHWS, wind setup, wave runup, long term changes in mean sea level and local tide levels, without overtopping.

(* MHHWS = Mean Higher High Water Springs)

Table D8-3

Minimum Erosion Allowances For Revetment Walls

SHORELINE CROSS-SECTION	MINIMUM EROSION ALLOWANCE IN FRONT OF REVETMENT WALL (MM)
Dry Beach	300

Inter-Tidal Beach	450
No Beach - Submerged Slope	300
No Beach - Vertical Wall	300

6. To mitigate against beach erosion, runoff from the slope behind the revetment wall should be interrupted and dissipated by infiltration or broad sheet flow prior to flowing over the revetment wall onto the beach.

Beach Erosion

D8.21 JETTIES, PONTOONS AND BOAT RAMPS

1. Where jetties and pontoons are proposed for waterways which serve as floodways, the effect of these structures on the hydraulic performance of the waterways shall be taken into account in the hydraulic design of the waterways.

***Pontoons
Jetties***

2. Jetties, pontoons and boat ramps shall be designed in accordance with sound engineering practice by a qualified Civil Engineer, in accordance with Aus-Spec DQS, to satisfactorily resist all dead loads and applied live loads. Jetties, pontoons and boat ramps shall be designed to meet the requirements of DCP 36 Part A 'Jetties and Boating Structures'. Particular consideration shall be given to the effect of flood currents and debris loading on structures proposed to be located within waterways which will serve as floodways.

3. Special design requirements due to the height of water levels during flooding shall also be considered, eg. electrical connections and cut-off levels for mooring piles.

***Electrical
Connections***

4. Account shall be taken of jetty pontoon, ramp, etc design in assessing the required width of the waterways.

5. Where a hinged access ramp leads to a pontoon the slope of the hinged access ramp shall not exceed 1 in 6 at the lowest anticipated water level. Where pontoons are to be provided, fixed-jetties can be used to reduce the length of hinged access ramps but shall not extend past the revetment wall by a distance greater than 7m. The level of the jetty deck shall be not greater than 300mm above the top of the revetment wall, and the deck shall not rest on the wall. The overall length from the revetment wall to the outer edge of the mooring structure shall not exceed 17m and shall not extend into the navigation channel.

***Ramp
Geometry***

6. Boat ramps for individual allotments are acceptable only in the Dry Beach and Inter-Tidal Beach cross-sections. They shall be constructed of concrete and be not less than 150mm thick on the canal side of the revetment wall and have a width not less than 3m. Isolation joints are to be provided so that the concrete slabs forming the ramp are not supported by the revetment wall and can move independently of the wall.

Boat Ramps

7. The ramp shall not extend below the position of the change in grade at ISLW-0.3m (Canal Cross-Section/Edge Treatment; Figure D8.2).

End of Ramp

8. A boat ramp can be constructed with its surface either flush with beach surface or the top of the revetment wall at the point of intersection. There are advantages and disadvantages with each approach which should be evaluated during the determination of a standard design. The following issues should be considered:-

Ramp Level

- (a) Boat ramps flush with waterway beach:
 - (i) structural design of the revetment wall will need to allow for recessing
 - (ii) allotment surface drainage control could be disrupted.
- (b) Boat ramps flush with top of revetment wall:
 - (i) ramp will be proud of beach profile which could lead to beach scour through groyne action and local wave reflections
 - (ii) ramp will constitute an impediment to access for maintenance vehicles (if required).

- | | |
|---|--|
| 9. Boat ramps and other structures should be designed to minimise their visual impact. Boat ramps having their surfaces level with the canal beach surface are less visually prominent and are therefore preferable, in terms of visual impact, to ramps which project above the beach surface. | <i>Visual Impact</i> |
| 10. Adequate provision shall be made to ensure that scour does not occur under any part of the ramp, eg. by founding the ramp on stable, non-erodible, material and/or incorporating deeper edge beams. | <i>Scour</i> |
| 11. Reference should also be made to the "Boat Launching Ramp Guidelines" (Public Works Department, 1985) and "Design Guidelines for Wharves and Jetties" (Public Works Department, 1990). | <i>Other References</i> |
| 12. A standard design could be considered for jetties, pontoons and boat ramps (including the means of shore connection) that are proposed as part of the development or that may be constructed by owners at a later date. | <i>Standard Designs</i> |
| 13. Public boat launching facilities and marina facilities shall be developed in accordance with the Public Works Department's "Boat Launching Ramp Guidelines" and "Marina Guidelines" respectively. | <i>Public Facilities</i> |
| 14. Where it is proposed to construct public boat launching facilities within a canal development, consideration shall be given to siting of the launching facilities so as to minimise any adverse noise impacts on adjacent development due to the particular hours of use of the facilities. | <i>Noise</i> |
| 15. At public boat launching ramps, consideration should be given to providing holding beaches and boarding jetties or pontoons to facilitate rigging and efficient boarding of craft. | <i>Holding Beaches at Ramps</i> |
| 16. Disabled access shall be considered in design of these constructions. | |

D8.22 BRIDGES AND STRUCTURES

1. Bridges and structures shall be designed in accordance with the Specification for Structures and Bridge Design (D3).
2. The vertical clearance of any proposed bridge should be checked with the Waterways Authority.

SPECIAL REQUIREMENTS

D8.23 CERTIFICATION

1. The designer shall be required to certify the design and ultimately certify the WAE plans for compliance with design in accordance with Aus-Spec DQS and Aus-Spec D14 WAE Plans.

D8.24 RIPARIAN VEGETATION

1. Developments with frontage to existing waterways shall have a buffer. The buffer shall be determined in accordance with Aus-Spec D5 and D.7

D8.25 RESERVED