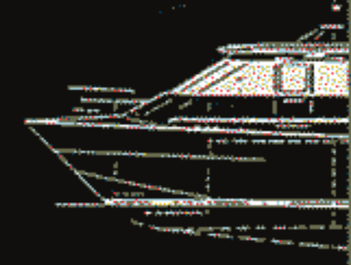
SOUTH AUSTRALIAN BOATING FACILITY ADVISORY COMMITTEE



GUIDELINES FOR PLANNING, DESIGN AND CONSTRUCTION OF BOAT LAUNCHING FACILITIES

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INTRODUCTION

The planning, functional design and layout of boat launching facilities is dependent upon many factors—location, site conditions, access to waterways, size and type of boats, expected usage as well as other engineering and environmental considerations.

These guidelines are intended to assist in the planning, design and construction of trailer boat launching facilities for recreational use, paying attention to safety and economy in regard to operation and maintenance requirements. While not intended to be a comprehensive document, these guidelines set out planning advice, design criteria and recommendations on construction practices for the overall design of a boat launching facility.

Proponents should seek advice from experienced engineering consultants as well as planning and environmental authorities regarding the detailed requirements for a particular proposal and assessment of environmental impacts.

Note: Supplementary Facilities

Supplementary facilities such as landscaping may be considered as appropriate to include in a boating facility development and this document outlines many. However the recreational boating levy fund sourced from an annual levy on recreational boating will be used to improve the boating facilities only—other sources will need to be found to fund such amenities.

ACKNOWLEDGEMENT IS GIVEN TO KINHILL ENGINEERS PTY LTD FOR ASSISTANCE GIVEN TO THE DEPARTMENT FOR TRANSPORT, ENERGY AND INFRASTRUCTURE THESE GUIDELINES.

PLANNING

1.1 The Role of the Launching Facility

The initial planning and eventual detailed design of a launching facility must cater for all potential activities and specific needs of trailer boating. It should be noted that as a launching facility is not a destination in itself but merely part of a route, access roads and the navigation channel or waterway must also be taken into consideration.

Specific points relating to user expectations are set out below.

Location

It must be possible to drive from the boat owner's home (origin) to the launching facility and then motor or sail from that facility to the intended destination. It is pointless to construct a launching facility, no matter how suitable the site, if it is not readily accessible by road or if it does not lead to a boating destination with existing or potential public interest. Suitable sites are rare, and it is easy to overlook this obvious point when a site is first identified.

User Needs

The launching facility must be able to fulfil the two prime user needs i.e. boat launching and boat retrieval at most times. This may be obvious, but again is very often overlooked.

LAUNCHING ACTIVITIES INCLUDE:

- *preparing the boat for launching*
- *manoeuvring the boat onto the launching ramp*
- *launching the boat into an adequate depth of water*
- *holding the boat while the car and trailer are parked*
- *parking and securing the car and trailer*
- *embarking the crew and special passengers*
- *leaving the facility in safety.*

RETRIEVAL ACTIVITIES INCLUDE:

- *disembarking the crew and passengers*
- *holding or mooring the boat while the car and trailer is brought to the ramp*
- *manoeuvring the car and trailer onto the ramp*
- *loading the boat onto the trailer*
- *leaving the ramp and moving to the securing area*
- *preparing the boat for the road including de-rigging, washdown, securing the boat to the trailer etc.*

PLANNING

Supplementary Facilities

(See Note in Introduction)

CONSIDERATION SHOULD ALSO BE GIVEN TO THE PROVISION OF SUPPLEMENTARY FACILITIES SUCH AS:

repair, maintenance and fitting out facilities
dry storage areas and other marina type facilities
fuel supply, accommodation and shopping facilities
rescue facilities
land-based outdoor recreational facilities such as playgrounds and barbecue areas
club-type services and activities.

While the above are not essential, they make the facility more attractive to users and thus should be taken into account in the planning stage.

The launching facility must be able to fulfil the two prime user needs i.e. boat launching and boat retrieval. This may be obvious, but again is very often overlooked.

PLANNING

1.2 Overall Planning of a Launching Facility

Public amenities such as lighting, water supply, telephone, toilets and rubbish disposal receptacles may also be provided. These services and amenities enhance the attractiveness of a particular facility and their provision is increasingly expected.

Components of a Launching Facility

Components of a launching facility can be defined as those connected to the water and those connected with the land.

THE WATER-BASED COMPONENTS ARE:

- *boat launching ramp*
- *area for boat queuing*
- *embarkation facility*
- *access channel*
- *navigation aids*

THE LAND-BASED COMPONENTS OF A LAUNCHING FACILITY ARE:

- ***parking areas:*** *car and trailer parking areas—preferably secured*
- ***manoeuvring areas:*** *rigging area, ramp queue, ramp manoeuvring area, securing area*
- ***access ways:*** *entrance, exit, other access ways*

Supplementary Components:
(See Note in Introduction)

- ***services and amenities:*** *landscaping, toilets, lighting, water supply, rubbish disposal, telephone, regulatory signage etc.*
- ***supplementary facilities:*** *information signage, recreational facilities, fuel supply, accommodation and shopping, facilities etc.*

Depending on the significance of a development these components may require careful consideration so that the launching facility can be developed as a cohesive well planned unit.

PLANNING

Site Investigations

Surveys should be carried out to assess the suitability of a chosen site for the construction of a boat launching facility. Investigations in the following areas should be undertaken:

Boating patterns in the area: *The activities currently generating boat use should be reviewed to predict or estimate future boating movements and anticipated use of a new facility.*
Site proximity to boating destinations: *All channel depth and height restrictions impeding access to boating destinations should be noted.*
Local opinion regarding the development of a launching facility
Land access: *A boat launching facility requires all-weather access and easy access from main roads.*
Land availability: *The land-based component of a launching facility requires a sizeable land area. The boat launching facility should, if possible, be designed to permit expansion to cater for future demand.*
Soil conditions: *A stable foundation material is needed to enable the launching facility to be constructed economically.*
Tide, current and wave observations: *Conditions encouraging siltation, bank erosion and instability due to waves and currents can be detrimental to ramp siting. In general, launching ramps should not be constructed in areas exposed to open sea conditions and on coastal beaches as protection devices such as breakwaters, groynes and the like are costly. They also impact on the environment changing, wave and tidal current behaviour which may degrade the coastline. Where breakwaters are contemplated as part of the facility, wave direction, wave size and sediment transport should be assessed by a consulting engineer.*
Other environmental considerations: *In general, boat launching facilities should not be located where the ramp activities will have an adverse effect on the existing amenity of the area. It is emphasized that the natural vegetation of the foreshore area should be protected and preserved wherever possible.*
Planning Controls *Developers should investigate planning objectives and principles pertaining to the land as part of the site investigations.*

DESIGN

2.1 Design of Water Based Components

2.1.1 Design Levels

Datum:
In tidal areas, all levels and soundings should be reduced to local low water datum (LLWD). Where LLWD is not known, an investigation should be carried out to determine this level. This investigation should be done by a licensed surveyor. In non-tidal areas, all levels and soundings should be reduced to Australian Height Datum (AHD).

Design Low Water:
The water level chosen as the lowest water level for design purposes is the design low water (DLW) level. In most cases LLWD will be chosen as the DLW level but where the use of this datum is unsuitable, the reason for choosing DLW should be given.

Design High Water:
The water level chosen as the highest water level for design purposes is the design high water level (DHW). The level chosen as DHW should be one which is rarely exceeded.

Mean High Water:
Mean high water (MHW) level is the average high water level recorded in tidal areas. Usually recorded as MHW spring tide.

The relationship between LLWD, AHD, DLW, DHW and MHW must be shown on the boat ramp drawings.

2.1.2 Location of the launching components

The location of the launching facility must take account of a number of factors (as previously discussed in Part 1, Planning). The following criteria should be met in respect of the water-based component:

Depth of the access channel to the ramp should be at least 1.0 m below DLW, and should in any situation be not less than 0.75 m below DLW.

Silt deposition and thus the need for maintenance dredging of the channel should be minimal.

Cross currents should be minimal and the bank profile should be such that the ramp can be constructed with minimum cut and fill.

Bank stability must be such that the ramp will not be undercut or silted over.

DESIGN

2.1.3 Boat Queue and Embarkation Facility

The boat queue is the place at which a boat is held, anchored or moored between launching and embarkation, and between disembarkation and retrieval. The embarkation facility is the place at which the crew and passengers embark or disembark. The boat queue and embarkation facility are usually one and the same.

DESIGN OF THE BOAT QUEUE AND EMBARKATION FACILITY SHOULD TAKE INTO ACCOUNT THE FOLLOWING:

There is always a delay between the launching of a boat and its departure from the ramp due to the need to collect the driver of the car and trailer.

Since the driver of the car and trailer is often the boat operator, it is thus not reasonable to assume that the boat will be moved from the ramp, the boat queue or the embarkation facility under its own power.

The boat queue and embarkation facility may be a beach or holding area adjacent to the ramp, and the launching ramp itself a fixed or floating landing or a combination of several of these.

LANDING BEACH

A small landing beach is perhaps the most satisfactory boat queue and embarkation facility except that it is not particularly suitable for disabled passengers or those restricted in mobility. A beach provides a soft landing point for boats, a major safety factor in locations which are exposed to wave action, and the length of the boat queue is limited only by the length of the beach.

At an ideal launching facility a landing beach may exist naturally but it is rare to find a naturally stable beach which slopes at between 1 in 8 and 1 in 10, to match the preferred slope of the ramp, and which extends from DHW to DLW. In many cases, however, it may be possible to construct an artificial beach, using rounded gravel, and such a beach can provide an adequate boat queue and embarkation facility. Developers may need to seek approval under the Development Act.

THE BOAT RAMP

A ramp serves very well as the boat queue and embarkation facility, and a significant number of users tend to use a ramp for this purpose, particularly if there is no immediate demand for the use of the ramp by others. This situation is acceptable but the capacity of the ramp will be lowered if it is necessary to use the launching ramp for these purposes.

JETTIES AND PONTOONS

Fixed jetties or floating pontoons form a useful adjunct to a launching facility and are often considered by users to be the ideal embarkation facility. Such structures are usually capable of serving as the boat queue, depending on expected demand or use, and costs are generally higher than the construction of a beach. Such structures do however enhance a launching facility and warrant consideration.

DESIGN

2.1.4 Launching ramp

THE BOAT LAUNCHING RAMP SHOULD MEET THE FOLLOWING CRITERIA:

Slope
Ideally between 1 in 8 and 1 in 10 (10% to 12.5% gradient) If site conditions or local needs require a grade outside this range, the gradient should be shown on a sign at the head of the ramp. The chosen gradient should be constant over the length of the ramp, as it has been found in practice that a vertical curve or grade change can affect lines of sight to the rear of the trailer making reversing difficult.

Width
A single lane ramp should be a minimum of 4.0 metres wide between kerbs, or at least 4.5 metres for an unkerbed single lane. A multi-lane ramp should be in increments of 3.7 metres.

Head level
The head of the ramp should be a minimum of 0.6 metres above Design High Water.

Toe level
The toe of the ramp should be at a minimum depth of 0.75 m below DLW to ensure that trailers need not be backed further than the toe of the ramp. The bed should be continued at the same gradient as the ramp to a minimum depth of 1.0 m below DLW.

IN ASSESSING THE DIMENSIONS OF THE RAMP, IMPORTANT FEATURES ARE:

The number of ramp lanes required to meet the estimated demand for launchings. As a guide, each lane of a ramp can accommodate 30 to 40 launchings and retrievals per day. This increases to 50 to 60 if separate rigging/de-rigging areas are provided.

It is desirable for both the towing vehicle and boat trailer to be on the ramp itself while the boat is being launched, therefore a length of approximately 10 m of ramp should be exposed at MHW.

The effect of waves, currents and boat wash, if present, should be minimised;
A maximum wave height of 0.2 m is desirable. The ramp should be perpendicular to the predominant waves so that the boat is not moved sideways during launching and retrieval.

It is not advisable to build launching ramps where they are exposed to open sea conditions for reasons of safety, or on coastal beaches where changes in beach levels may render the ramp unusable. However, where locating a ramp in either of these situations is unavoidable, special consideration needs to be given to these conditions.

DESIGN

2.2 Design of Land Based Components

2.2.1 Access, Manoeuvring and Parking Areas

The efficiency of a boat launching facility depends on the layout of the accessways and parking areas. A well designed layout aids considerably in controlling vehicle movements and alleviating traffic constrictions.

Wherever possible the parking and manoeuvring area associated with a launching facility should form a single integrated zone, within which the user can expect to safely carry out all the activities normally associated with the use of a launching facility. The layout of the parking and manoeuvring area should allow for an orderly progression through or past a number of elements which make up the land based components of the launching facility as:

Entrance and Exit:
Ideally there should be a single entrance/exit to the launching facility to reduce the number of intersections with the access road.

Entrance queue:
There must be sufficient length of roadway between the entrance and the rigging area to minimise the possibility that queues will extend into the public access road.

Rigging area:
The entrance should lead to a rigging area which provides between 1.5 and 2 bays per lane of boat ramp for the purposes of rigging and generally preparing the boat for launching. Although there is no need for arriving cars and trailers to pass through the rigging area, in most cases it will be found more convenient to direct this traffic past this area. The route should be direct, resulting in a single queue being formed at the head of the ramp. Clockwise circulation is preferred as it is consistent with driving on the left side of the road and generally makes reversing easier.

Ramp manoeuvring area:
This area is usually positioned at the head of the ramp and should:

- *be free of obstructions including overhead power lines and lane dividing barriers*
- *preferably extend at least 30 m landward beyond the top of the ramp*
- *where possible be orientated to permit straight-line backing down the ramp*
- *have a slope (e.g. 1 in 50) towards the ramp for surface drainage.*

The ramp manoeuvring area may be used as the rigging and securing area however experience shows that such activities reduce the capacity of the facility and thus it is recommended that separate areas be provided.

DESIGN

Securing area:

The exit from the boat ramp should lead directly to the securing area, in order that users are encouraged to vacate the ramp area as soon as the boat is retrieved. This area provides for the de-rigging of a boat and the general readiness for road travel. Boat washdown points and rubbish receptacles should be provided here. The size of the securing area should be similar to that provided for rigging.

Car and trailer parking areas:

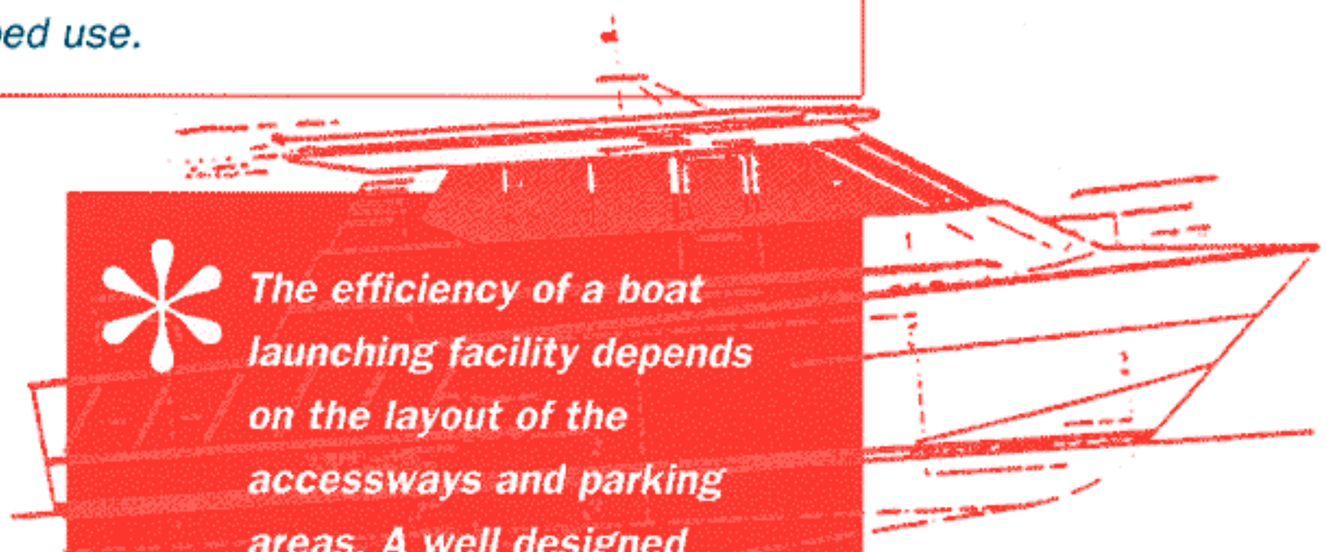
Parking bays should be clearly defined to minimise haphazard parking and arranged at 45 degrees to the direction of travel suitable for nose-in parking. An alternative method, which provides for grassed trailer parking areas to soften the appearance of the car/trailer park, is to arrange the parking bays for reverse parking, i.e. nose out. As an option therefore consideration should be given to the trailer parking areas being surfaced with grass or gravel mulch.

Car and trailer parking should be provided on the basis of at least 30 parking bays per launching lane with only sufficient bays sealed to cater for average daily use. The remaining bays to cater for peak use can be grassed or gravel mulched. Wherever feasible, runoff from paved areas should be encouraged to water adjacent site landscaping and grassed areas, rather than be piped away from the site.

Access roads should be wide enough to provide unimpeded movements of cars and trailers, especially at changes of direction, and be sealed and drained as necessary. It is suggested that accessways be bitumen sealed only where high levels of use are experienced but should be marked and/or signposted to indicate traffic flow directions. Utilise one-way traffic flow wherever possible.

Car parking area:

Separate parking areas for cars without trailers should be provided at the rate of one car park per five car and trailer parks. Failure to provide separate parking may result in cars using the car-and-trailer spaces. The design of the parking area should discourage cars from entering the ramp manoeuvring area. Provision should be made for individuals with physical disabilities. This should comprise a minimum of one parking bay, 3.5 m wide, cut outs or ramps to cross kerbs or other obstructions, and appropriate signposting or pavement marking. As a general rule, designate 2% of car only parking spaces for handicapped use.



The efficiency of a boat launching facility depends on the layout of the accessways and parking areas. A well designed layout aids considerably in controlling vehicle movements and alleviating traffic constrictions.

DESIGN

2.2.2 Traffic Design

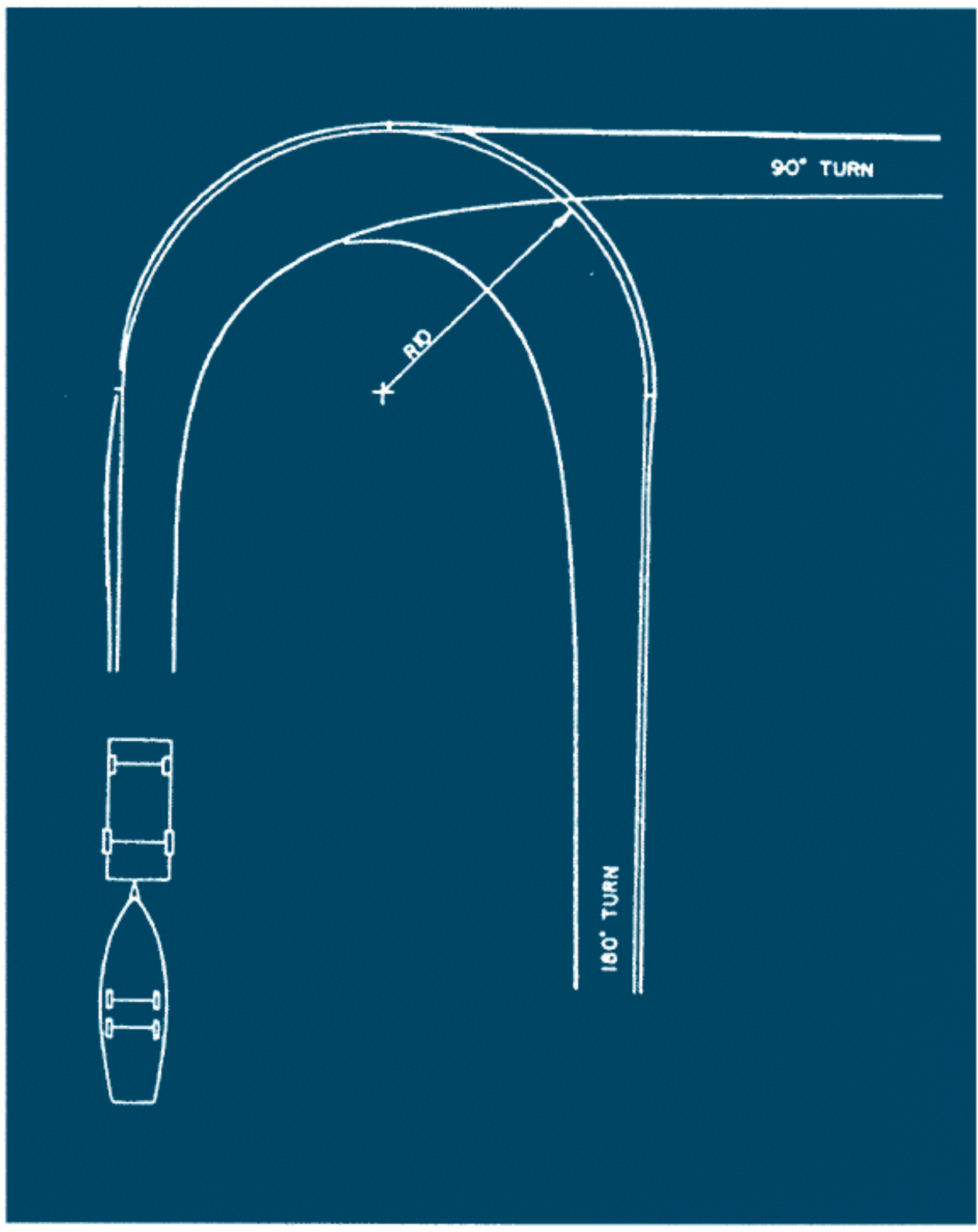
DESIGN VEHICLES

It is not considered necessary to design access ways and parking bays to accommodate the very largest car and trailer combination. Surveys of boat registration information have shown that only about six percent of all trailer boats are more than 6.0 m in length. Furthermore it is not necessary to take account of the overhang of the vessel itself when calculating the dimensions of parking bays. The car and trailer unit proposed for parking bay design is that which would carry a vessel 6.5 m in length, i.e. a vehicle 5.8 m in length coupled to a trailer 7.1 m long giving an overall unit length of 12.9m.

VEHICLE TURNING PATHS

The DTEI has carried out numerous studies of car and trailer movements and has developed templates for use in the selection of turning clearances and turning radii within parking and manoeuvring areas associated with boat launching facilities. The manoeuvring path for a car and trailer unit is shown in Figure 1 and Australian Standard AS 3962 "Design Guide for Marinas" includes this diagram, based on detailed computer studies, as a template for car and trailer turning paths. Reference should be made to this template when designing parking and manoeuvring areas.

Figure 1:
CAR AND TRAILER TURNING PATH



DESIGN

DIMENSIONS OF TRAFFIC LANES AND PARKING BAYS

Guideline dimensions for traffic lanes and parking bays, as follow, are provided for the preliminary design of the layout of roadways and parking areas.

Traffic Lanes

	One-way road	Two-way road
Minimum lane width	*3.5 m*	*3.0 m*
Preferred lane width	*4.0 m*	*3.5 m*

Footpaths and Clearances to Obstructions adjacent to Parking Bays

Minimum footpath width	*2.0 m*
Maximum footpath width	*4.0 m*
Minimum clearance from Parking bay to an obstruction	*0.6 m*

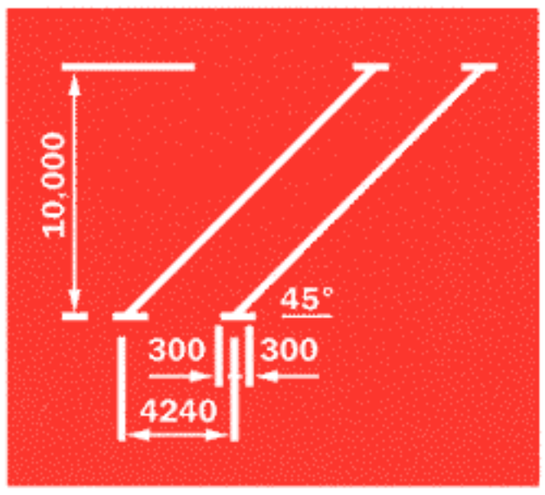
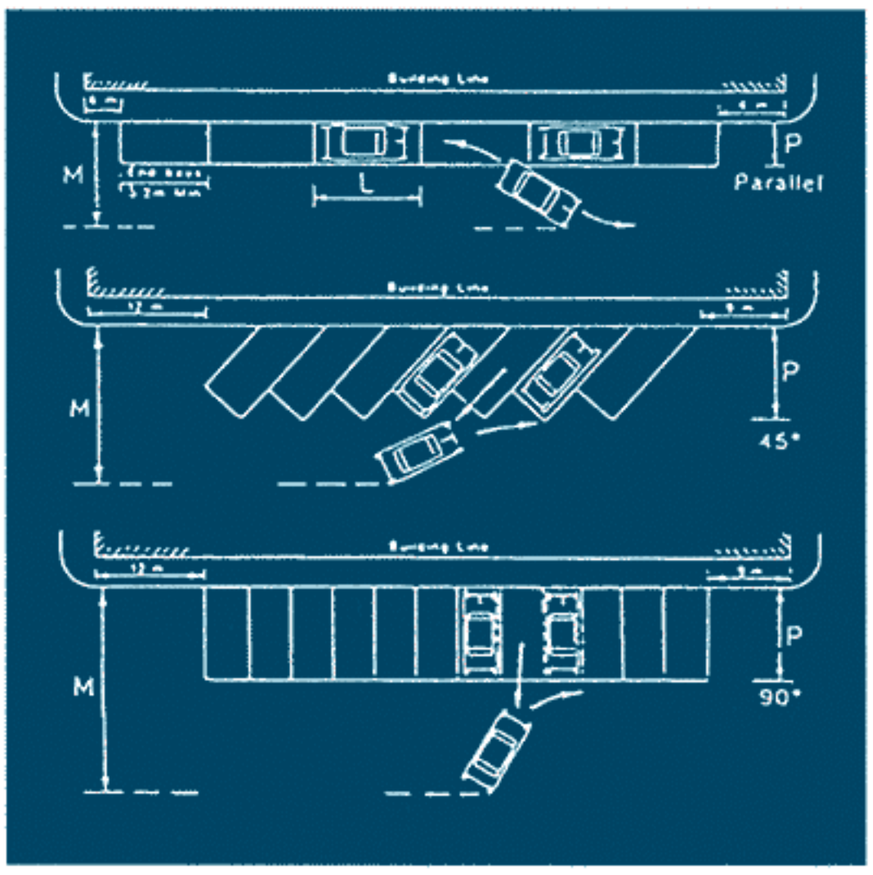


Figure 2: CAR AND TRAILER PARKING BAY

Figure 3: CAR PARKING BAYS



Car and Trailer Parking Bays (Refer Figure 2)

Parking arrangement	Dimension P	Dimension M	Dimension L
45 degrees	*10.0 m*	*15.0 m*	*4.25 m*

Car Only Parking Bays (Refer Figure 3)

Parking arrangement	Dimension P	Dimension M	Dimension L
90 degrees	*5.5 m*	*11.9 m*	*2.75 m*
45 degrees	*5.8 m*	*9.3 m*	*3.9 m*
Parallel to roadway	*2.4 m*	*6.0 m*	*6.7 m*

Traffic Control Devices

Traffic control devices include signs and line marking. In general, designers of boat launching facilities should be guided by Australian Standards AS 1742 and AS 1744.

DESIGN

2.3 Services, Amenities and Supplementary Facilities *(See Note in Introduction)*

In addition to the basic elements of the boat launching facility i.e. the launching ramp, accessways, manoeuvring areas and parking areas, it may be possible to include the provision of the following ancillary features be considered to supplement the general amenity.

LANDSCAPING:

A launching facility often occupies a large area of land and considerable attention to the visual aspects of the facility is justified. It must be remembered that the trailer parking area is usually empty and landscaping must serve to soften the impact of a large, vacant tract of land. The requirements of traffic must also be considered and landscaping must not interfere with lines of site within the parking and manoeuvring area.

It is often possible to soften the impact of the parking area by sealing only a limited portion of the total area available for parking (refer to Section 2.2.1). This possibility should always be examined.

Buffer zones should be maintained or established between parking areas and the shoreline so that cars and trailers are shielded from view from the waterway. If attention is paid to the landscaping and aesthetic aspects of a launching facility, the overall appeal of the facility as a general recreational area will be vastly improved.

INFORMATION SIGNS:

It is often appropriate to erect signs referring to the management of the launching facility. These signs should also show a local waterway map and local boating information. The placement of such signs needs to be considered from the perspective of visual amenity and effectiveness.

RUBBISH COLLECTION FACILITIES:

Refuse bins are essential and should be provided in and about the parking areas in addition to the de-rigging or securing area. It is important that these refuse bins are emptied regularly and kept in good order.

TOILET FACILITIES:

Provision must be made for toilet facilities, including disabled facilities, in a suitable location, and for the necessary services e.g. water supply, sewerage and electricity supply.

LIGHTING:

Lighting at the ramp needs to be considered for night and early morning use but consideration should also be given to the lighting of car and trailer parking areas, for safety reasons, and the provision of navigation aids. In all cases the designer should ensure that the design of lighting is consistent with the requirements of navigation safety.

WATER SUPPLY:

A potable water supply whilst not essential, significantly enhances the amenity of a launching facility and is considered by most users as a necessity. Uses for water at the launching facility include drinking, washing showering (if such facilities are provided) and washing down boats.

PUBLIC TELEPHONE:

A public telephone is desirable for both convenience and safety.

General arrangements for boat launching ramps are shown in the drawings at the end of this document.

CONSTRUCTION

3.1 Ramp Surface

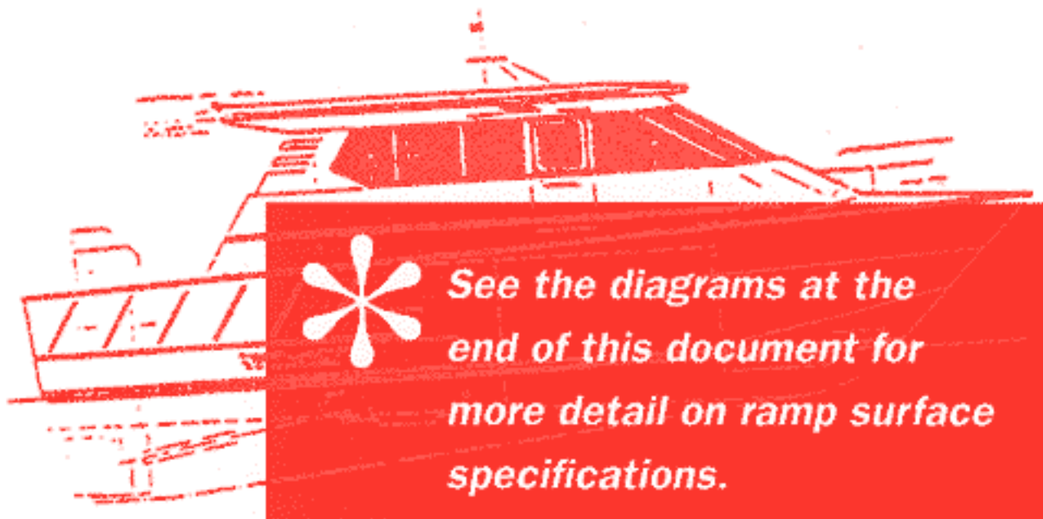
A ramp surface that is simple and economical to construct and which gives an acceptable surface texture is a poured concrete pavement with deep square-shouldered grooves moulded into the surface at an angle of 30 to 45 degrees to the ramp contour to drain excess water and debris and allow "self cleansing". The grooves are required only over the portion of the ramp trafficked by the towing vehicle.

One method of forming these grooves is by means of a frame made up of 25 mm deep and 25 mm wide (slightly tapering) oiled sticks that have been nailed parallel to each other at 100 mm centres onto framing boards. The concrete in the vicinity of the grooves is to be well vibrated and compacted to withstand wear of the top edges of the grooves.

Raked, rough-broomed and other coarse-grained finishes without deep grooves are unsatisfactory as the coarse texture tends to promote marine growths and the surface may be smoothed by tyre wear and wave action, both instances leading to a slippery surface.

An alternative to cast in-situ concrete is precast concrete block mats placed on a prepared sub-base layer.

Many of the existing ramps have precast concrete beams for the below water section of the ramp and avoid the need to pour concrete in water and make a coffer dam.



** See the diagrams at the end of this document for more detail on ramp surface specifications.*

CONSTRUCTION

3.2 Structural Design

The structural design of boat launching ramps is straightforward however, the following points are considered to be particularly relevant.

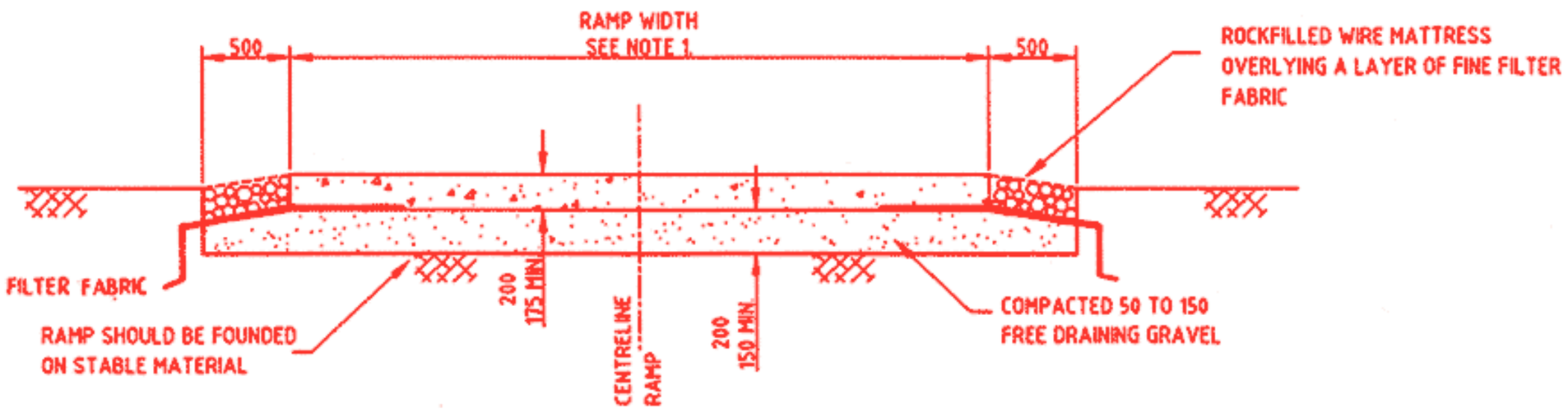
FOUNDATION:

Ramps should be founded on stable material. A sub-base of 50-100 mm sized gravel should then be placed in a layer of 150-200mm minimum thickness. It is essential that the sub-base be well-formed and compacted to ensure the long term structural integrity of the ramp. Use of a filter fabric is recommended over the base material.

Where there is a risk of erosion, rock-filled mesh mattresses overlaying a layer of fine filter fabric around the sides and toe of the ramp should be considered. Advice is recommended from a consulting engineer.

CONCRETE MIX:

Boat launching ramps should be designed for long-term durability when subjected to on-site exposure conditions (i.e. type "D", or type "C" to AS 1315-1973 with not more than 5% tricalcium aluminate content), and should be compatible with the intended method of construction (e.g. pumped applications). In general, use Class 40 (40 MPa) mix for above water and underwater placement.



Typical Cross Section.
See the diagrams at the end of this document for more information.

CONSTRUCTION

CONSTRUCTION METHOD:

The method of construction is a fundamental consideration when designing boat launching ramps. For that portion of the ramp which is above about mid-tide level, the most common method of construction is a reinforced cast-in-situ concrete slab. A slab thickness of 175 mm is generally sufficient for ramps poured on a firm sub-grade as normal wheel loads will be less than 500 kg. However, consideration should be given to loads imposed by occasional maintenance vehicles and thus a slab thickness of 200 mm is preferred.

For the portion of the ramp which is below about mid-tide level, the common methods of construction include:

Pumped placement of concrete on the prepared sub-base in still water conditions. This method is economical for multiple lane ramps but the use of divers is generally essential for this form of construction underwater, careful consideration should be given to the placement of screeding rails to enable accurate underwater forming of the surface – precast concrete beams underwater is an excellent option;

Tremie placement of concrete on the prepared sub-base in still water conditions;

Construction of a cofferdam around the perimeter of the ramp and dewatering, allowing the ramp to be fully constructed in dry conditions. This allows for a high quality finish, but may be more expensive than alternative methods;

Construction of expansion joints as shown in the drawings with recommended longitudinal and transverse directions at not greater than 10 m spacings;

Contraction joints are not required as the grooves in the surface of the ramp control the location of cracks;

A toe at the end of the concrete ramp is recommended to stabilise the ramp and to reduce the possibility of erosion under the extremities of the ramp. Suggested details are shown in the drawings. A similar detail is recommended for the side retaining walls to prevent undermining.

An alternative form of construction is the use of precast concrete slab elements placed by crane on a prepared foundation, with the first slab element being connected to the cast ramp, and adjacent slab elements being connected to each other. A typical element is shown in the drawings. Each slab will require longitudinal steel reinforcement to sustain handling loads, and provision should be made during the casting of the elements for their interconnection. This type of construction is common for the construction of the ramp below mid-tide level and offers cost advantages over the use of tremied concrete or the use of cofferdams and the dewatering of the ramp area.

CONSTRUCTION

3.3 Erosion Control

The ramp must be protected from erosion due to tidal influences, current movements, waves and propeller wash. The areas of the ramp requiring protection, in particular, are the toe of the ramp and the sides in the area of tidal or current influences. Erosion protection from propeller wash is of particular concern as the toe of the ramp may be undermined, leading to collapse of the ramp structure. It is thus recommended that protection be provided beyond the toe of the ramp by the use of rock-filled wire mattresses.

Randomly tipped rock and rough concrete at the sides of ramps should not be used, to reduce the possibility of injury or boat damage and again the use of rock-filled wire mattresses for these areas provides an economical solution.

REFERENCES

4

References

IN THE PREPARATION OF THESE GUIDELINES REFERENCE HAS BEEN MADE TO THE FOLLOWING PUBLICATIONS AND APPROVAL FOR THE USE OF MATERIAL FROM THESE PUBLICATIONS IS ACKNOWLEDGED:

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Australian Standard AS 3962 "Guidelines for Design of Marinas"

Standards Association of Australia:
Australian Standard AS 2890.1 "Parking Facilities: Part 1 Off-street car parking"

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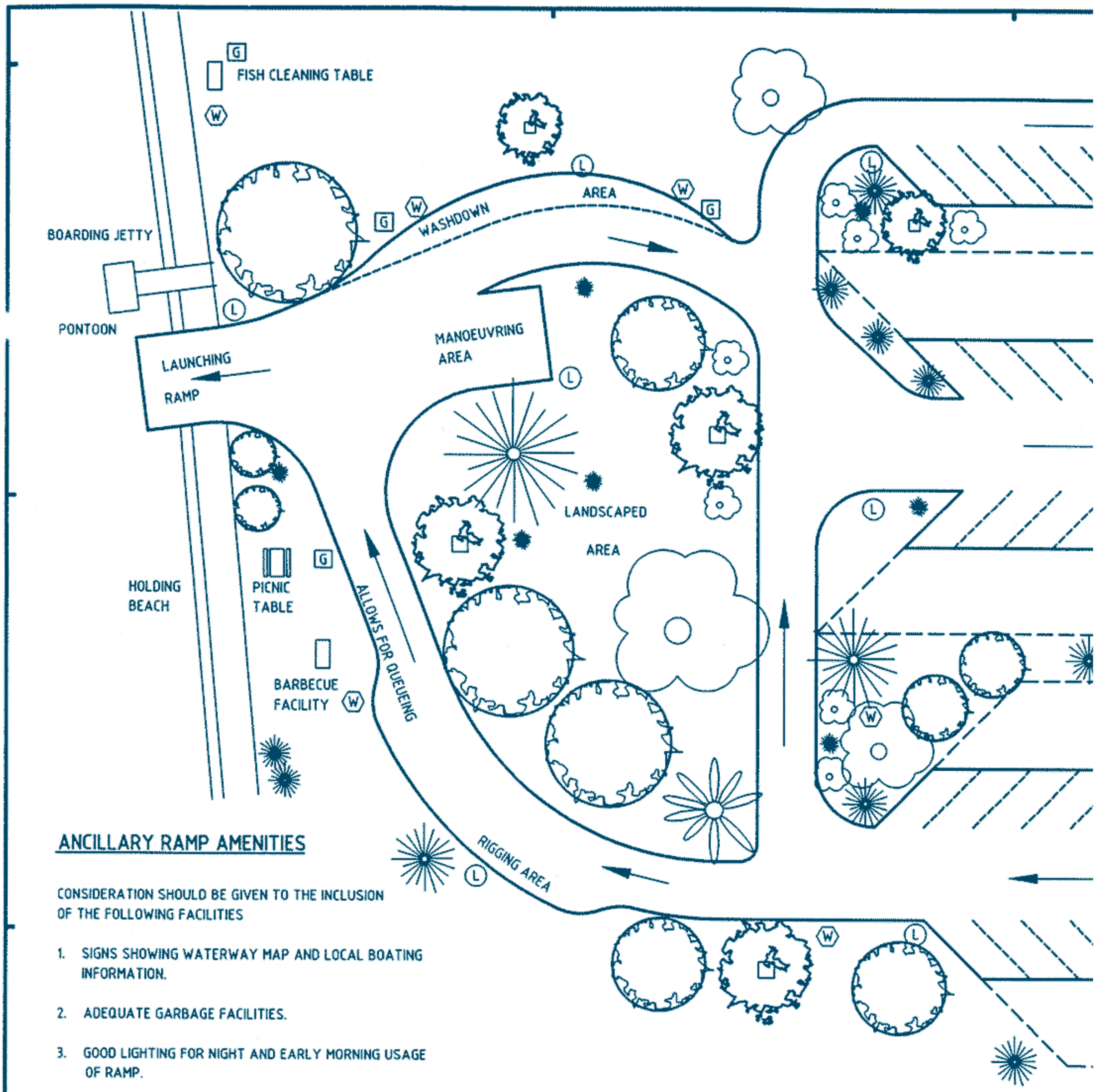
Public Works Department, New South Wales:
"Marina Guidelines"

Department of Harbours and Marine, Queensland:
"Guidelines for the Design of Boat Launching Facilities"

State Boating Council of Victoria:
"Public Recreational Boating Facilities and Safety—Guidelines for Improvement"



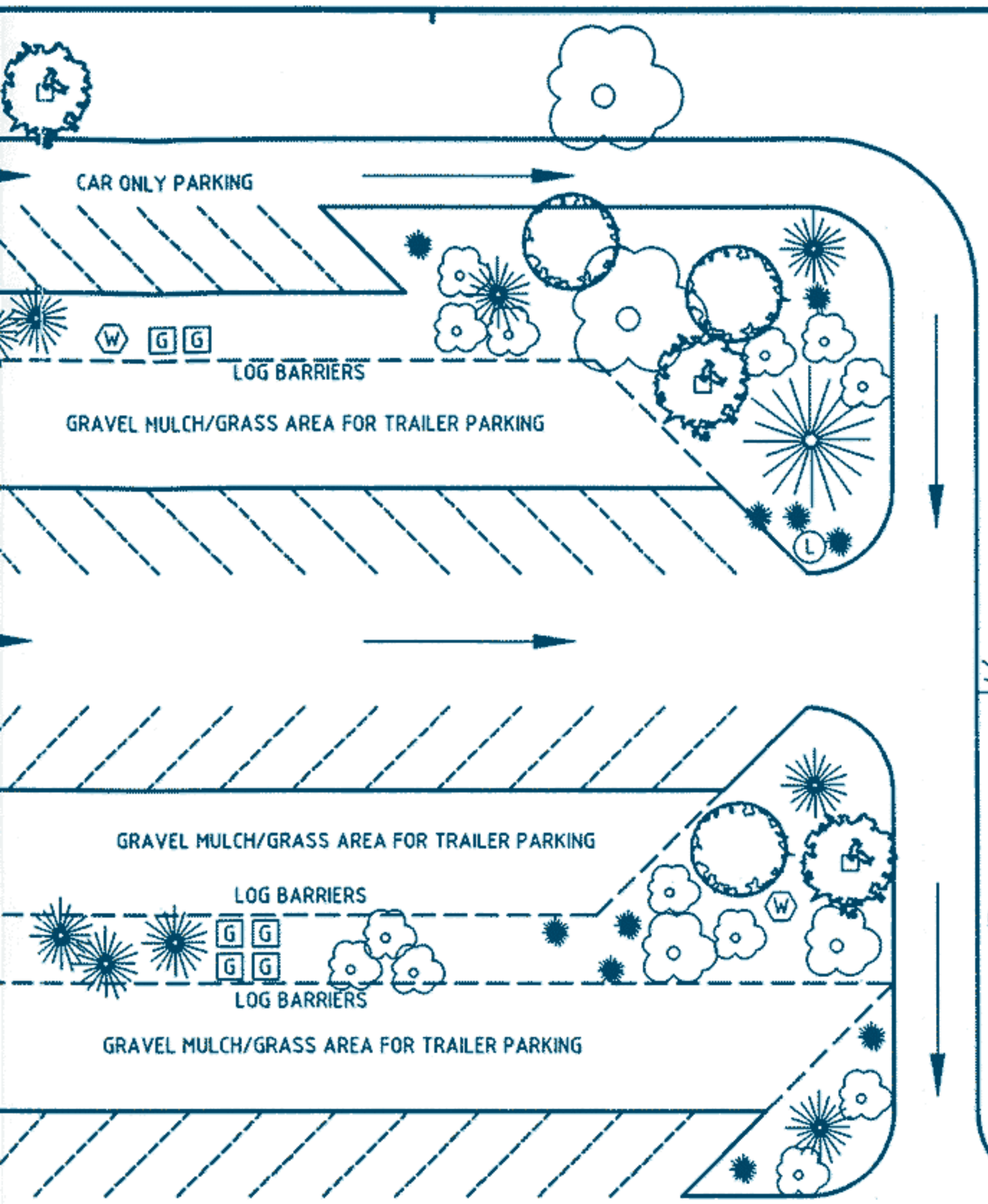
ANCILLARY RAMP AMENITIES

CONSIDERATION SHOULD BE GIVEN TO THE INCLUSION OF THE FOLLOWING FACILITIES

1. SIGNS SHOWING WATERWAY MAP AND LOCAL BOATING INFORMATION.
2. ADEQUATE GARBAGE FACILITIES.
3. GOOD LIGHTING FOR NIGHT AND EARLY MORNING USAGE OF RAMP.
4. FRESH WATER.
5. FISH CLEANING TABLES.
6. BOAT WASH.
7. PUBLIC TELEPHONE.
8. PROVISION OF TREES TO SHADE PARKED VEHICLES AND PICNIC AREAS.
9. TOILETS AND SHOWERS (DEPENDING ON PROXIMITY OF ALTERNATIVE AMENITIES)
10. PICNIC AREAS WITH BARBECUE FACILITIES.

NO.	DESCRIPTION	DATE	RESP	AUTHORISED	APPROVED	DATE
AMENDMENTS						

50 MILLIMETRES ON ORIGINAL DRAWING



NOTES

1. EXAMPLE OF 45° CAR AND TRAILER PARKING IS SHOWN ON THIS DRAWING OTHER PARKING CONFIGURATIONS MAY BE USED DEPENDING ON THE INDIVIDUAL SITE CONDITIONS.
2. ATTENTION SHOULD BE PAID TO THE LANDSCAPING ASPECTS OF THE SITE TO ENHANCE THE OVERALL AESTHETIC APPEAL OF THE FACILITY.
3. G - GARBAGE RECEPTACLES
4. L - LIGHT POLES
5. W - WATERING POINT (FRESH WATER)
6. THE SECTION THROUGH CAR / TRAILER PARKING SHOWS POSSIBLE METHOD OF REDUCING SEALED AREAS.

10 0 10 20 30

DEPARTMENT OF TRANSPORT SOUTH AUSTRALIA

DEBIT ORDER :
FILE NAME :
DIRECTORY :

LONG SECTION
CROSS SECTIONS
DRAINAGE
SERVICES
SURVEY MARKS
MISC. IS SHEET
PAVET. MARKING
SIGNS
LIGHTING
T. CONTROL LAYOUT
T. CONTROL INST.
PEDESTRIAN FAC.
TRAFFIC SIGS.
P.A.C.A.S. ZONE
DUCT LOCATION
TREE REMOVAL
VEG. SURVEY
LANDSCAPE
PAVET TREATMENT

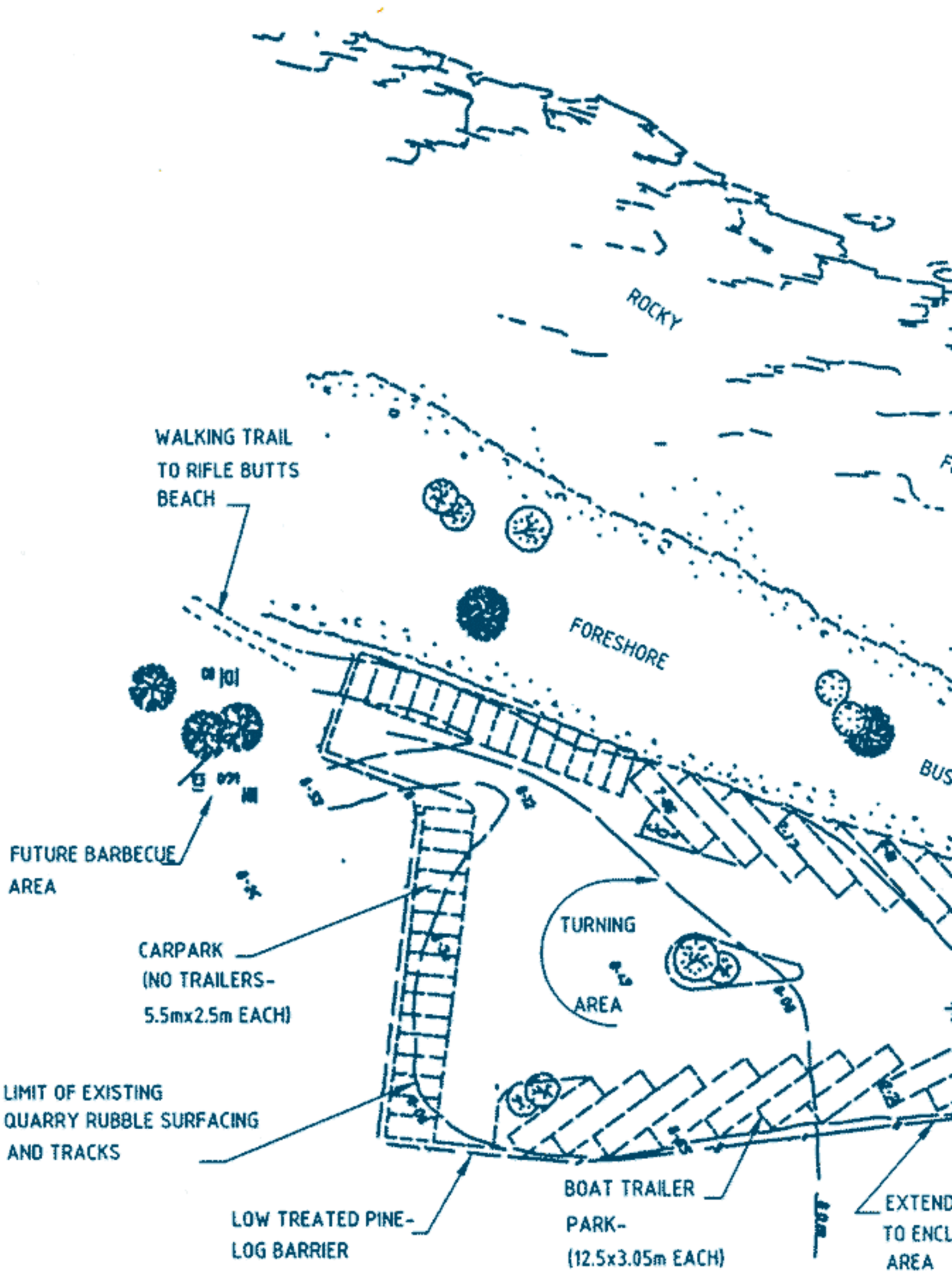
DESIGN	
DRAWN	
CHECKED	
EXAMINED	APPROVED DATE

TYPICAL BOATING FACILITY LAYOUT

SHEET 1

PROJECT START : FRP.	+	KM	PROJECT END : FRP.	+	KM

PROJECT	DOCKET	SURVEY	SHEET	DRG

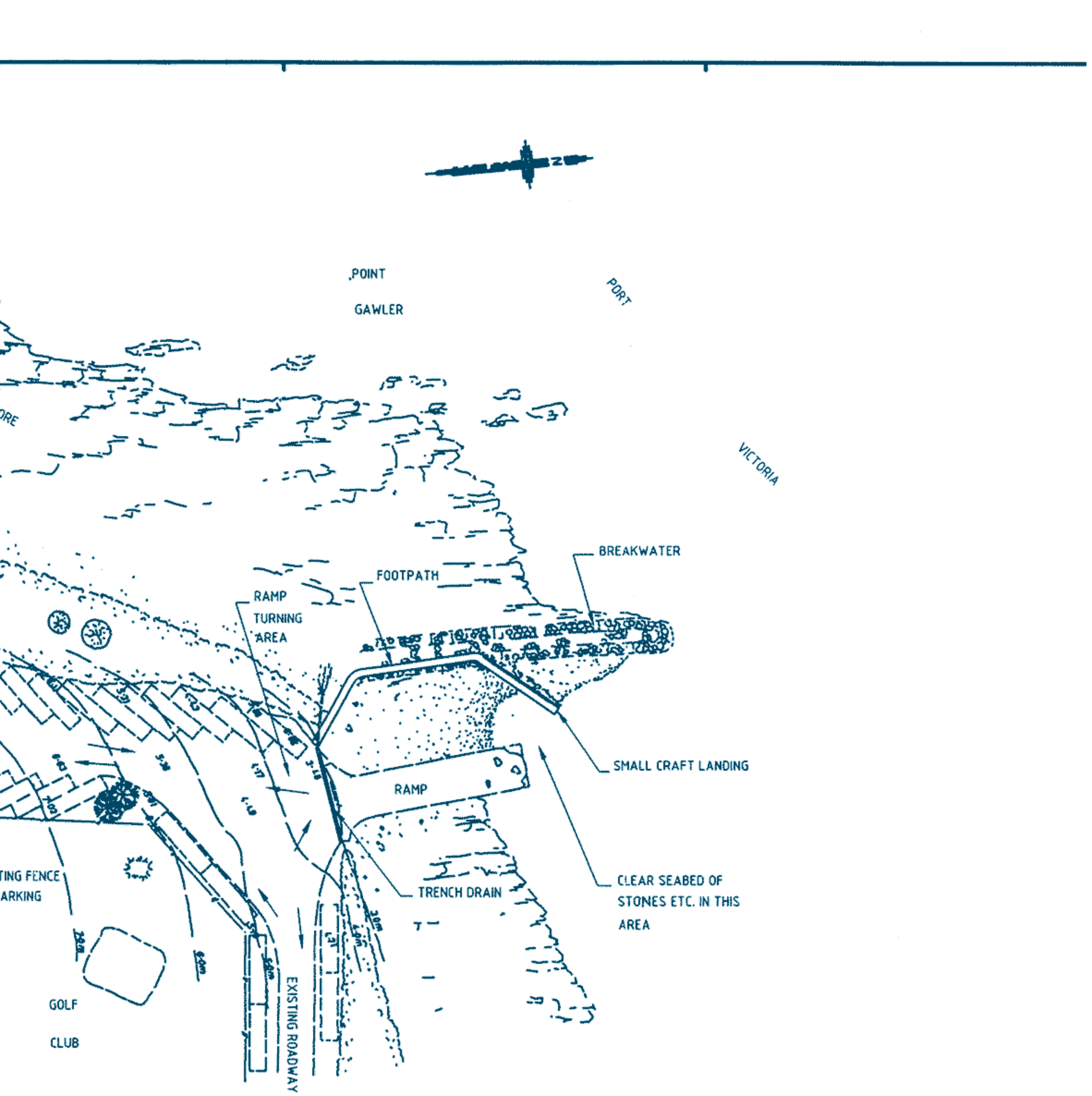


SCALE 10
1:500
(Spot Leve

NO.	DESCRIPTION	DATE	RESP	AUTHORISED	APPROVED	DATE

AMENDMENTS

50 MILLIMETRES ON ORIGINAL DRAWING



PLAN

1 10 20
metres

prox. only)

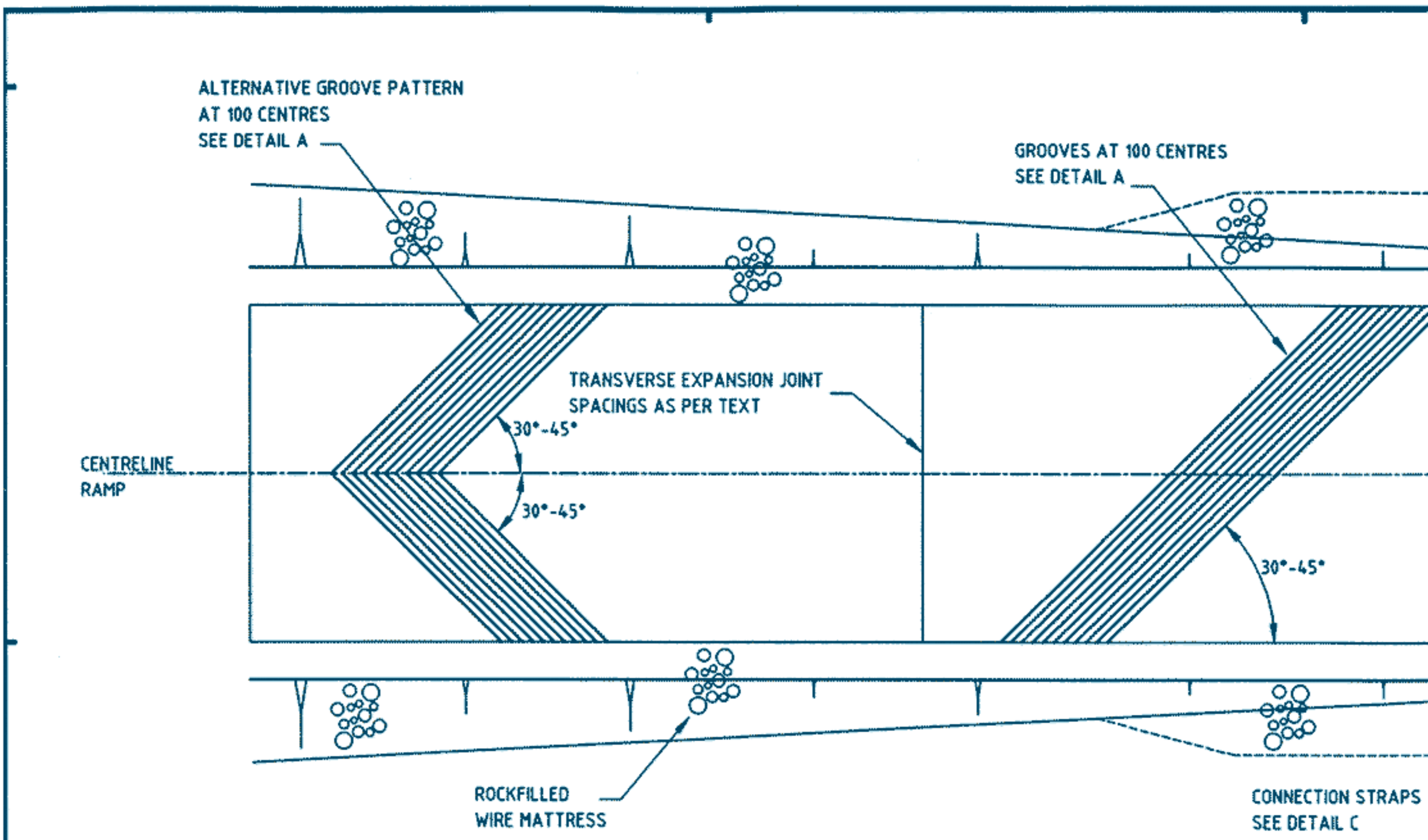
10 0 10 20 30

DEBIT ORDER :
FILE NAME :
DIRECTORY :

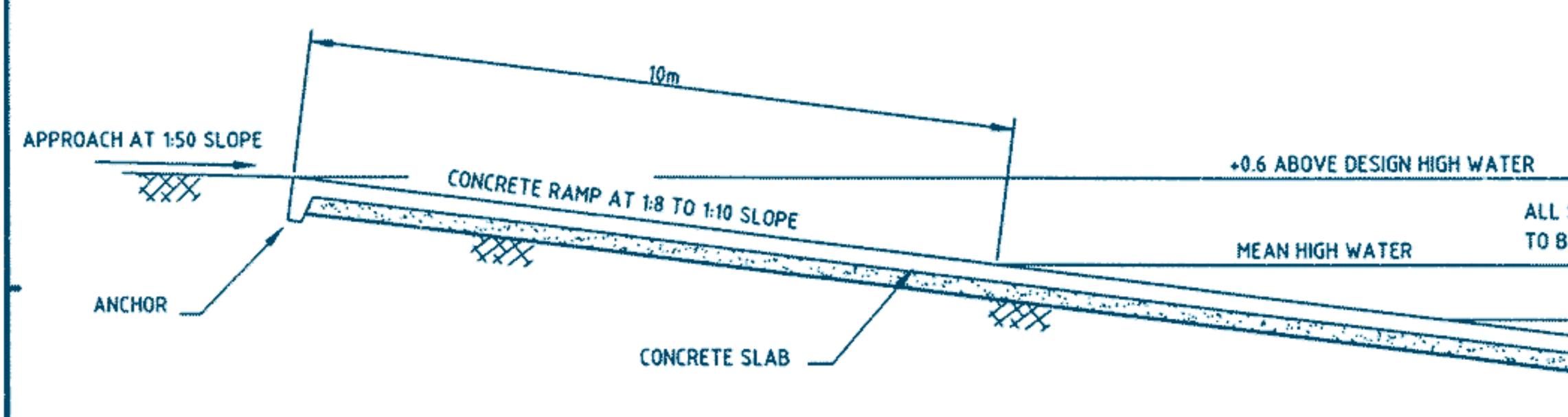
SURFACE LEVELS | LONG. SECTION | CROSS SECTIONS | DRAINAGE | SERVICES | SURVEY MARKS | PEG IS. S/BRS. | PAVET. MARKING | SIGNS | LIGHTING | T. CONTROL LAYOUT | T. CONTROL INST. | PROTECTION, ANC. | TRAFFIC SIGS. | P.A.C./S. SIGNS | DUCT LOCATION | TREE REMOVAL | VEG. SURVEY | LANDSCAPE | PAVET. TREATMENT

DEPARTMENT OF TRANSPORT SOUTH AUSTRALIA

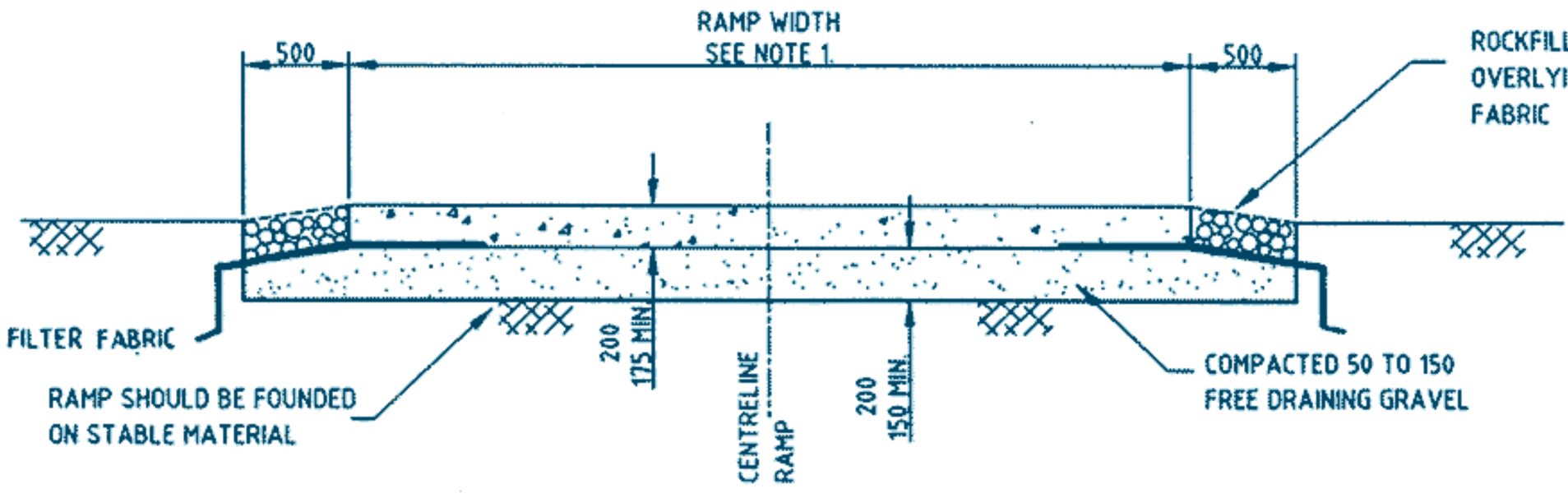
DESIGN		TYPICAL BOATING FACILITY LAYOUT
DRAWN		SHEET 2
CHECKED		
EXAMINED	APPROVED DATE	PROJECT START : PRP. • KH. — PROJECT END : PRP. • KH.
		PROJECT | DOCKET | SURVEY | SHEET | DRG



PLAN



TYPICAL LONGITUDINAL SECTION

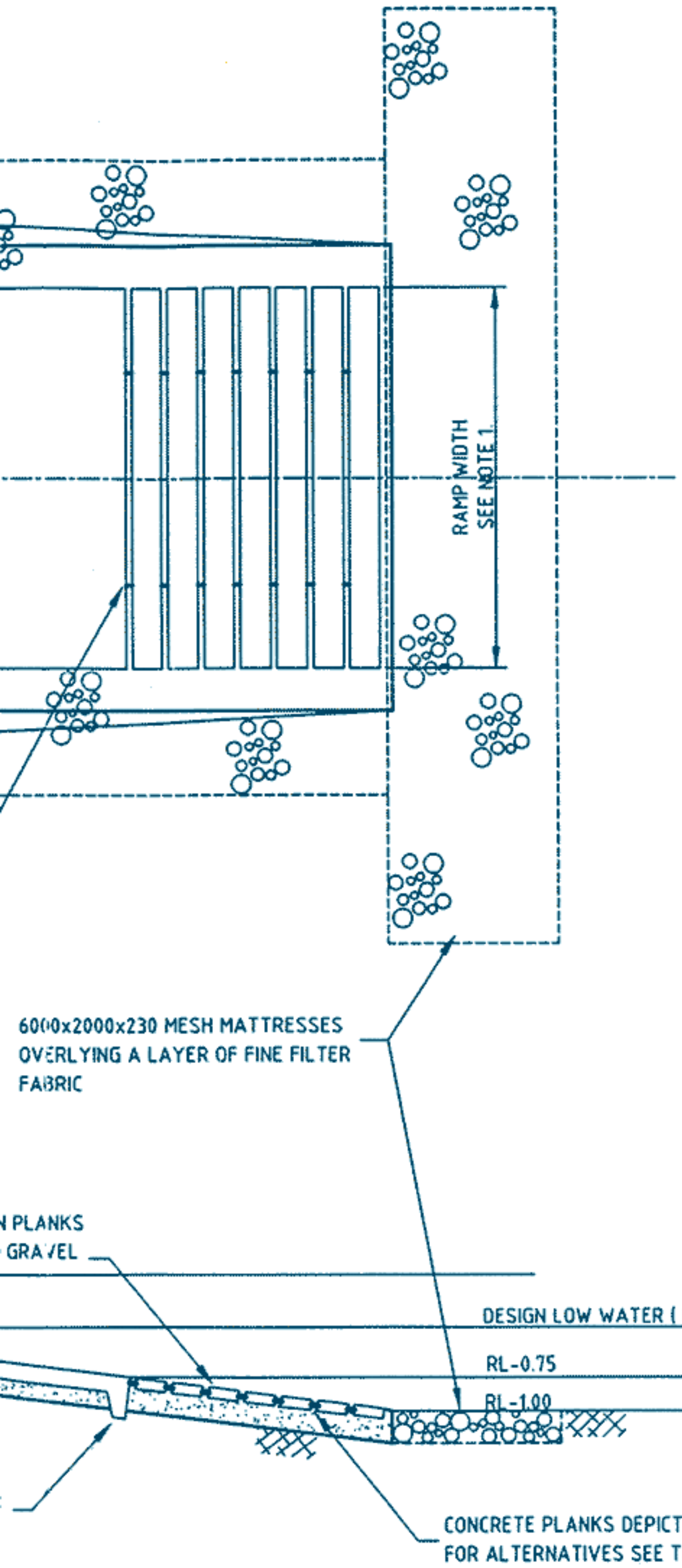


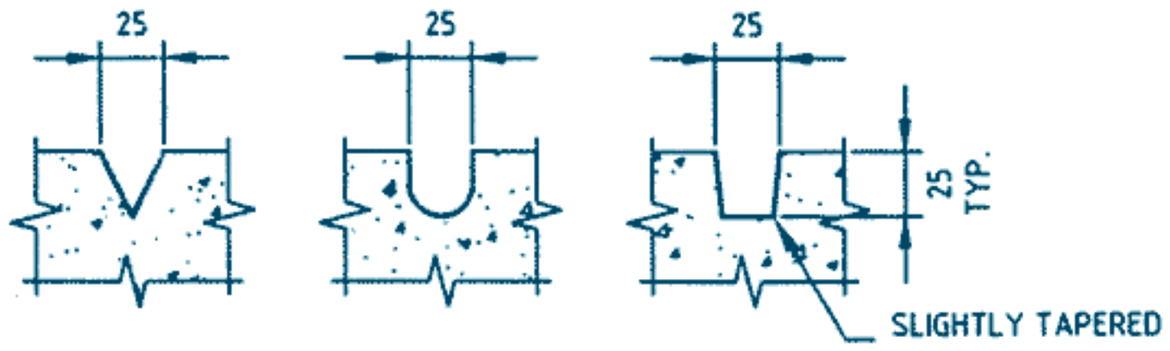
TYPICAL CROSS SECTION

NO.	DESCRIPTION	DATE	RESP	AUTHORISED	APPROVED	DATE

AMENDMENTS

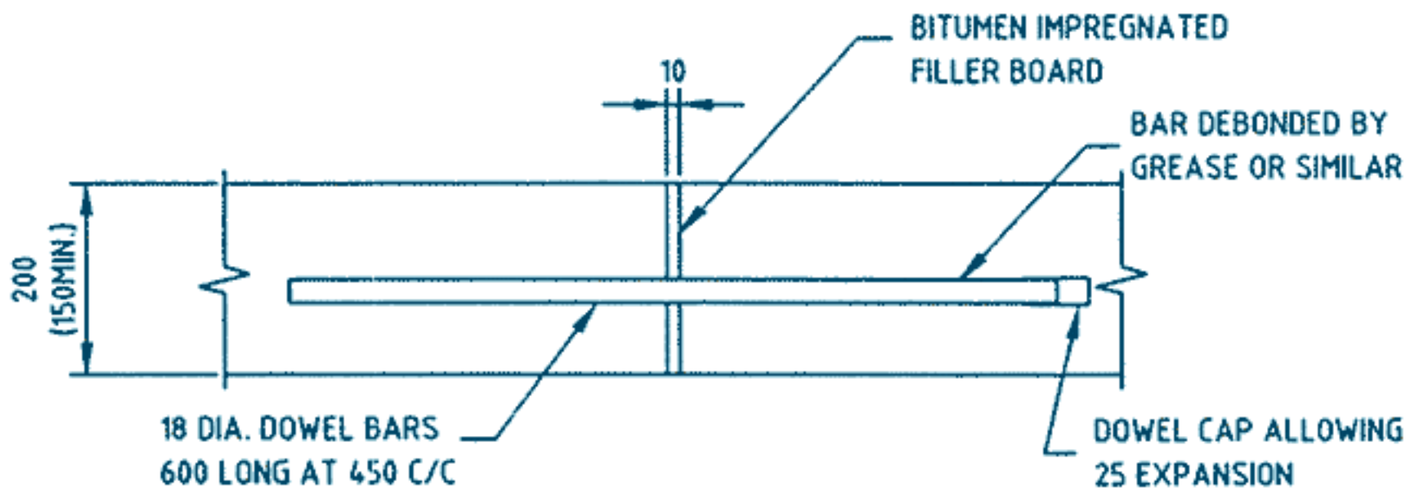
50 MILLIMETRES ON ORIGINAL DRAWING



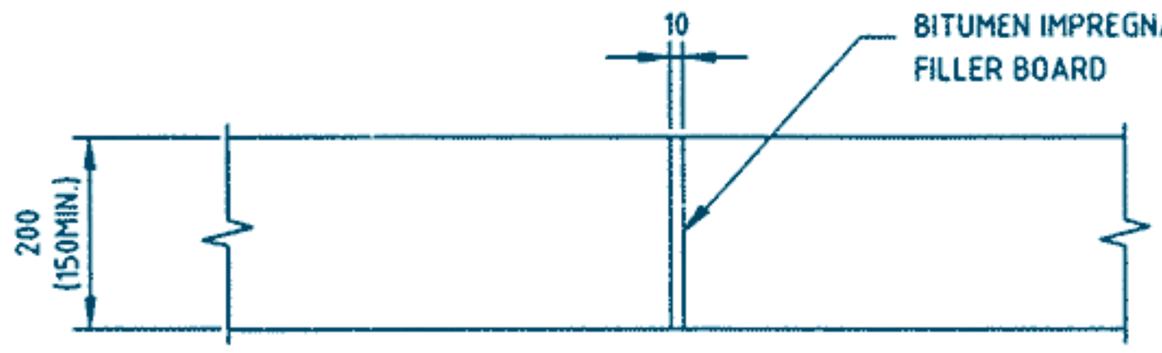


ALTERNATIVE GROOVE SHAPES

DETAIL A

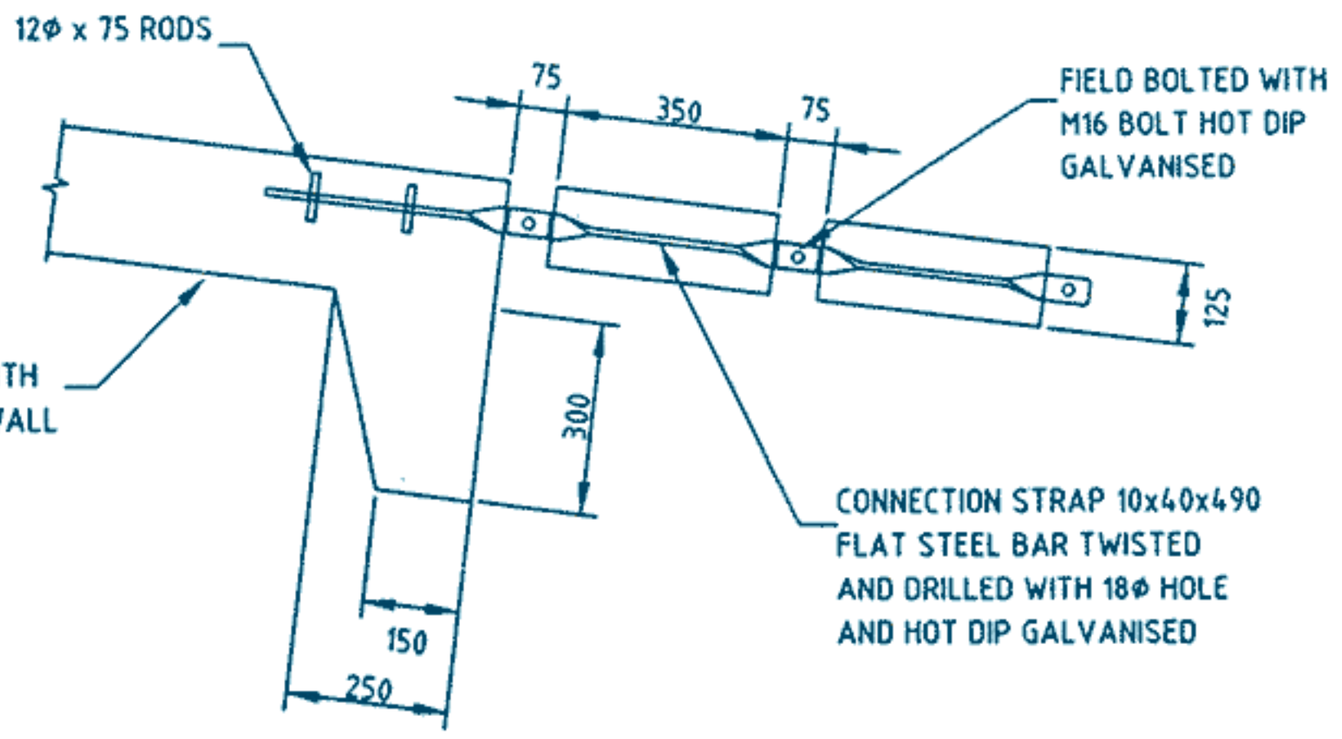


TRANSVERSE EXPANSION JOINT



LONGITUDINAL EXPANSION JOINT

DETAIL B

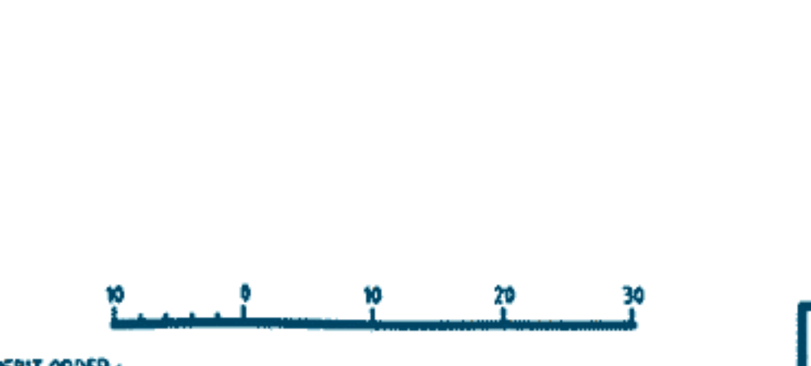


TYPICAL CONNECTION METHOD FOR PRECAST PLANKS

DETAIL C

S

WIDTH: SINGLE LANE - 4.5m PREFERABLE, 4.0m MINIMUM
MULTI LANE - INCREMENTS OF 3.7m



DESIGN
DRAWN
CHECKED
EXAMINED
APPROVED
DATE

DEPARTMENT OF TRANSPORT SOUTH AUSTRALIA

TYPICAL BOATING FACILITY LAYOUT

RAMP DETAILS

PROJECT START - PRP. + KM | PROJECT END - PRP. + KM

PROJECT | DOCKET | SURVEY | SHEET | DRG