



NRA

THAMES ENVIRONMENT DESIGN HANDBOOK

FOREWORD

The Thames Environment Design Handbook is primarily concerned with the non-tidal Thames from Teddington Lock upstream to Lechlade. The 124 miles of navigable river passes through rural and urban landscapes of great variety and interest and each year attracts in excess of a million visitors. These visitors, from abroad as well as within the UK, have increasing expectations of how the river infrastructure is managed, especially at the most accessible and impressive built environments associated with the locks and weirs. These structures have fulfilled a navigational or regulatory role over centuries, and can be considered, collectively, as a unique contribution to Britain's heritage. They also contribute significantly to the visual character of the river and to the enjoyment of the many visitors.

The need for a design manual to address management and design issues at the strategic and site specific levels became evident in recent years. A visual appraisal of the river revealed a diminishing consistency in the quality of refurbishment works and the techniques or materials being used. Materials have sometimes been selected from the vast range on the market and used without sufficient thought to their impact on the landscape and character of the site; consequently, the inherent character of some sites has been eroded rather than reinforced. Also, the need for infrastructural works has increased, so accelerating the rate of this erosion. These effects have resulted from the need to increase the capacity of the river navigation, for example to accommodate more boats and operate more efficiently, or to cope with other recreational pressures and potential conflicts between various user groups.

This handbook is intended to assist in resolving the aesthetic and functional problems which have accumulated over the years. It is the result of a high level policy decision that was taken in 1988 to ensure that this erosion of the character of these River Thames sites be halted and that action could be taken to reinstate it where it had been lost. Significantly, and to provide an environmentally aware perspective, the handbook has been prepared within the Landscape Group of the NRA (Thames Region). Through close liaison with Navigation, Engineering and Operations staff a wide range of experience has been harnessed to promote practical recommendations.

Part One of the handbook aims to provide a strategic context on the conservation and enhancement of the river corridor by setting out general landscape assessment and site planning considerations - a framework for the detailed technical guidelines on structures, landscape features and fixtures. The technical sections in Part Two illustrate either a set of consistent 'standards' or 'options' covering issues such as design, materials and scale. For example, timber is regarded as an appropriate material to be used throughout many structures associated with the river. Important considerations on the selective use of tropical hardwoods and most suitable alternatives have been addressed in the light of proposals for a regional policy on the future use of imported tropical hardwoods. The choice of options presented throughout the handbook allow some flexibility in relative construction costs, but more importantly they all acknowledge the need for restricted maintenance commitments and compliance with approved safety standards within an exacting river environment.

The handbook guidelines will often need to be interpreted within the context of site specific constraints. These instances will require further input from the NRA's Landscape Architects for individual projects. However, the wealth of information and experience made available to both established and new staff working with the river infrastructure, will help to ensure that the character of the Thames environment is reinforced and the river heritage secured for future generations.

L.D.Jones

REGIONAL GENERAL MANAGER
NRA THAMES REGION
JUNE 1992.





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THAMES ENVIRONMENT DESIGN HANDBOOK

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PART ONE

STRATEGIC APPRAISALS

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LANDSCAPE PROTECTION

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RIVER THAMES
LANDSCAPE ASSESSMENT

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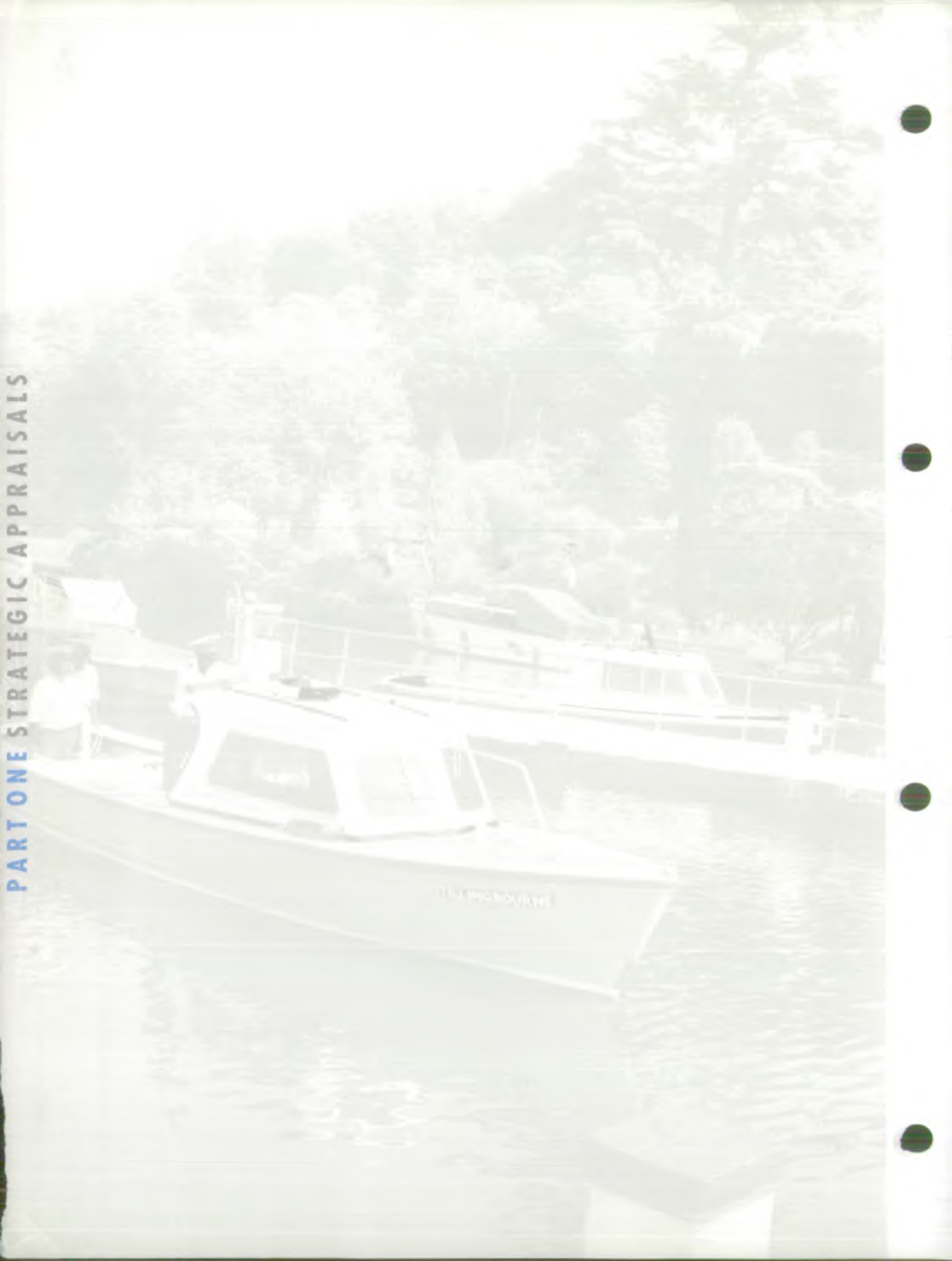
SITE PLANNING

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THAMES LOCKS





LANDSCAPE PROTECTION LEGISLATION

National Legislation

The details provided in this section are outline references to the main legislation relevant to the management of the River Thames landscape heritage.

The section sets out a legislative context for the handbook and demonstrates that there is a substantial volume of statutory law and planning controls aimed at protecting the man-made as well as the natural environments throughout the river scene.

The Water Resources Act 1991

The Water Resources Act is included within a set of five Acts which together consolidate the law relating to the water industry and water resource management.

The Water Resource Act has specifically charged the NRA as part of the Authorities functions, with the duty to: "promote the conservation and enhancement of the natural beauty and amenity of inland and coastal waters" S.2(2).

The Act also imposes general duties on the NRA which relate to the environment and recreation, for example:

"to have regard to the desirability of protecting and conserving buildings, sites and other objects of archaeological, architectural or historic interest" S.16(7).

The D.O.E. has prepared a Code of Practice on these duties to establish a framework for planning and managing the use of water and associated land. The code highlights the need for integrated land use and management plans for sites of particular significance.

The code also sets out general and specific considerations on conservation and enhancement which include such matters as Landscape Design, Nature Conservation, the Man-made Environment and Navigation.

Statutory Instrument No 1217

The Land Drainage Improvement Works (Assessment of Environmental Effects) Regulations 1988.

In response to EEC Directive EEC 85/337 these regulations were made to place an obligation on drainage bodies to assess the environmental impacts of drainage improvement proposals. Procedural steps are laid down in the S.I. together with a schedule of provisions and considerations to be made in an environmental statement for proposed works.

"Environmental Assessment Guidelines" (NRA 1990) contains an inclusion list of works which fall within the definition of a drainage improvement.

Bank protection for flood or tidal defence, weirs and weir alterations, and new locks are included on that list.

Town & Country Planning Acts

These Acts embody legislation relating to Development Control and protection of particular features in the urban fabric. Strategic policies are formulated by County Councils in the form of "Structure Plans" which provide the context for "Local Plans" prepared by District Councils (or Unitary Development Plans prepared by London Boroughs). These documents constitute the development plan which provides a statutory framework for local planning policy.

The Planning and Compensation Act 1991 has enhanced the status of development plans by stating that with regard to planning applications "determination shall be made in accordance with the plan unless material considerations dictate otherwise" S.26.

The future emphasis on plan-led development proposals should enable the NRA to monitor and influence the content of approved development plans which relate to the river catchment to avoid land use designations which are likely to be detrimental to the river environment.

The T.C.P. Act contains important specific controls on the treatment of features which contribute to the amenity of the built environment:

- Conservation Areas (S.277). Designed to protect the "townscape" of villages and towns designated 'as areas of special architectural or historic interest, the character or appearance of which is desirable to preserve or enhance'. Strict planning conditions are imposed on development proposals in these areas which often include extensive lengths of river frontage and certain lock sites on the River Thames.

- Tree Preservation Orders (S.60). Local Authorities are empowered to make T.P.O.'s on individual trees, groups of trees or woodlands in the interests of amenity to prohibit cutting down, topping, lopping, uprooting, wilful damage or destruction.

Work may be undertaken on a protected tree which is dying or dead or has become dangerous, or in compliance with any statutory duty. T.P.O.'s are notified to the owners of land occupied by the tree(s).

Other National Legislation

- The National Trust Act 1907.
- The National Heritage Act 1983.
- Ancient Monuments and Archaeological Areas Act 1979.
- Historic Buildings and Ancient Monuments Acts 1953.



LANDSCAPE PROTECTION DESIGNATIONS

Designated Areas

There are several important area designations made to protect the landscape heritage. The River Thames contributes significantly to the ecological and landscape quality of these areas, therefore a continuing liaison with the appropriate designating agencies should be maintained.

Existing designations of particular relevance are shown on the Landscape Assessment plan (Section 2.2) which illustrates the distribution of these valued environments throughout the course of the river.

Sites of Special Scientific Interest (SSSI's)

The Wildlife and Countryside Act 1981 charged the Nature Conservancy Council (now English Nature) with the duty to identify places in the countryside which are of special interest because of the animals, birds, insects or plants found in them or because of the interesting rocks or features of the land itself. These sites are designated as Sites of Special Scientific interest and enjoy special protection.

The Code of Guidance for SSSI's (HMSO 1982) explains the application of notification procedures and schedules of potentially damaging operations (PDO's) normally drawn up for individual sites as part of these procedures.

Areas of Outstanding Natural Beauty (AONB's)

AONB's are designated by the Countryside Commission as areas protected by restrictions on development and which together with National Parks, contain the most important landscape heritage in England and Wales.

The River Thames impinges on three AONB's:

- Chilterns
- North Wessex Downs
- Cotswolds

The Countryside Commission Policy Statement (1991) states that the primary purpose is "the conservation and enhancement of natural beauty" and that "the conservation of archaeological, architectural and vernacular features is important".

The statement also promotes landscape assessment as a management tool to identify and enhance landscape character, while avoiding developments or practices likely to be detrimental to it.

Areas of Great Landscape Value

These areas are designated within Local or Structure Plans to provide a degree of protection to landscapes of distinct character which would otherwise have no presumption against inappropriate development.

Much of the River Thames valley landscape outside of the AONB's is covered by this designation.

Environmentally Sensitive Areas (ESA's)

ESA's operate under the Agriculture Act 1986 and are designated by M.A.F.F. as advised by the D.O.E., English Nature and the Countryside Commission.

They encourage landowners to conserve special habitats, landscapes and features within areas of national environmental importance through incentives to undertake beneficial land management practices

The Upper Thames Tributaries ESA (upstream of Oxford) due to be designated during 1993, includes the river valley landscapes of the Cherwell, Evenlode and Windrush which are situated on the limestone geology north of the River Thames.

This section is a summary of the strategic landscape assessment relating to the non-tidal Thames between Lechlade and Teddington. The study is intended to provide a framework for a landscape management strategy, throughout the river and a context for detailed assessments of the specific lock and weir environments, subject to future development proposals.

A comprehensive methodology has been developed by the NRA for river landscape assessment at the strategic level. The method enables the user to identify on a comparable basis the character and relative quality of river landscapes within a region.

The strategic assessments are made at two levels of detail: firstly at the 'macro scale' to establish the extent and character of the wider landscape visible from the river, secondly at the 'micro scale' concentrating on the characteristics of the river channel. The objective of the strategic assessment is to establish appropriate management priorities for sections of the river landscape and develop a database to assist with integrated river corridor assessments and catchment planning.

A further 'detailed assessment' is required for site specific uses including planning, design or assessment of capital schemes, preparation of enhancement schemes and maintenance programmes.

The Visual Envelope

The visual envelope is used in the strategic assessment to define the 'corridor' of landscape visible from the immediate vicinity of the river. It does

not necessarily correspond to the physical extent of the river valley. The viewpoints selected are key factors in the visual framework for landscape assessment; the nature and availability of access to the river will also influence the viewer's appreciation of the landscape. The visual envelope changes with movement from one viewpoint to another. Where there are clearly defined boundaries formed by topography or large buildings these provide enclosure and a backdrop to foreground features. Open, level landscapes have low horizons which emphasise tall or bulky foreground features such as tree belts or hedgerows which often veil or curtail the visual envelope. These characteristics can be developed in detailed assessments of 'visual intrusion' associated with existing or proposed developments within the visual envelope.

Landscape Types

The visual envelope contains combinations of features which can be classified into landscape types of distinct character. The River Thames does not have a dramatically varied landscape, as it is generally characterised by broad lowland valley scenery. Land use, therefore, is the main determinant of landscape character although variations in topography combined with the distribution of woodlands, trees and hedgerows make an important contribution to the scale of the landscape.

The landscape types identified throughout the River Thames are as follows:



Enclosed Pasture

A collection of small fields and paddocks of irregular shapes enclosed by mature hedgerows and trees which create an intimate landscape with a 'timeless atmosphere'. These pastures are associated with long established farms, park estates or the margins of rural settlements.



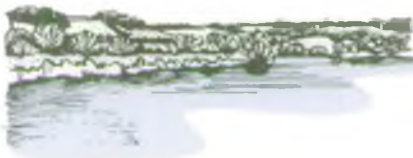
Open Pasture

Extensive pasture or meadow areas with open aspects and an exposed windswept quality. The large regular shaped fields with hedgerow boundaries tend to be associated with dairy farms set back from the river. The elongated remnants of unimproved meadow characteristically border the river creating an open setting for the meandering course of the river stream, with long views to pylons or wooded hill tops.



Open Arable

Contiguous extensive fields of cultivated land carrying cereal crops or horticultural uses, divided by long lengths of boundary fencing or trimmed hedgerow with occasional mature trees. Tend to be situated on the broad valley floor or on river terraces disguising the more subtle variations in topography. Long open views to the horizon highlight significant features such as pylons, large buildings or wooded slopes and hill tops.



Scarp and Vale

Associated with the Thames river valley where it cuts through the chalk encarpments of the Chiltern Hills and North Wessex Downs. A mix of pasture and arable fields, woodland and hedgerows thrown into relief by the distinct topography of rounded hillslopes to create a grand sense of enclosure to the river scene. The visual impact of existing or proposed river infrastructure is heightened by the localising influence of the topography. Any developments elevated within the valley may also create significant visual impacts.



Open Urban

Recreational spaces which are integrated with built up areas and associated with more formal uses such as sports pitches, parks and gardens or pleasure grounds. Tend to be either isolated pockets of land or linear sites following the river with an urban backdrop.



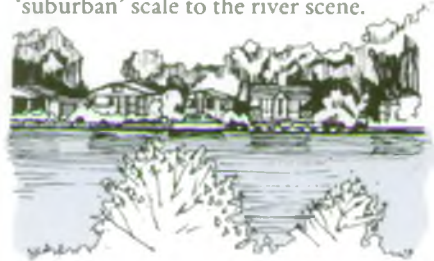
Built up Frontages

Characterised by commercial or residential development, promenades, wharves and moorings which address the river in an integrated way. Usually confined to limited sections of the urban river corridor and associated with historic focal points such as bridge crossings and civic or church buildings. Public access and activity provide a lively atmosphere to these landscapes.



Garden Frontages

Substantial lengths of river bank occupied by a series of residential gardens. These landscapes are associated with either established prestigious houses with boat houses and moorings or the more recent and intensively developed plotland housing characterised by a 'jigsaw' of unco-ordinated building materials and bank rivetments. The combination of houses and garden vegetation creates an enclosed 'suburban' scale to the river scene.



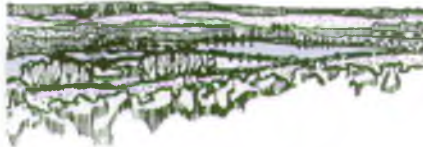


Urban Backlands

Typical of industrial, residential or commercial estates which ignore the river scene and are isolated from the river frontage by physical barriers or tracts of unmanaged land. The potential often exists to integrate these sites more positively with the river landscape.

Historic Landscapes

Landscapes which retain certain unique characteristics which are dependent upon historic associations. These range from management of fields, meadows and woodlands for game cover to parklands and formal gardens valued as landscape setting. Historic associations and even specific historical events can combine with other landscape types to enhance the 'cultural value' of those landscapes.



Disturbed Landscapes

These landscapes have either been radically rearranged to accommodate reservoirs or major roads or are in a state of flux due to temporary land uses such as mineral extraction. They are typically located on the valley floor close to the river and contain features such as industrial plant, stockpiles and perimeter mounding. Wet gravel pits and reservoirs create wide, open aspects punctuated by ribbons of colonising vegetation or remnants of the pre-existing land use.



	POSITIVE FEATURES	NEGATIVE FEATURES	CONSERVATION	ENHANCEMENT	RESTORATION
LECHLADE TO OXFORD	<ul style="list-style-type: none"> ● NARROW MEANDERING CHANNEL WITH NATURAL EDGES. ● "OPEN PASTURE" SUBSTANTIAL AREAS ADJACENT TO RIVER. ● TREEBELTS - POPLAR PLANTATIONS AND POLLARDED WILLOWS CLOSE TO RIVER. ● EXTENSIVE VIEWS SOUTH TO WOODED RIDGES. ● SETTLEMENTS SET BACK ON RIVER TERRACES. ● LOCK AND WEIR SITES ISOLATED WITHIN FLOOD MEADOWS. ● BUSY RECREATION SITES/FACILITIES CLUSTERED AT KEY BRIDGEPOINTS (EG HA'PENNY BRIDGE, TADPOLE BRIDGE). 	<ul style="list-style-type: none"> ● FEATURELESS "ARABLE" BACKCLOTH TO RIVER SCENE. ● PYLON ROUTES TRAVERSING VALLEY ARE VISUALLY INTRUSIVE. ● INTRUSIVE ROAD NOISE FROM OXFORD BYPASS ● LINEAR MOORINGS (EG BABLOCK HYTHE). 	<p>NEED TO CONSERVE SUBSTANTIAL OPEN PASTURES WHICH CONTAIN THE MEANDERING COURSE OF THE RIVER WITHIN OPEN SEMI NATURAL LANDSCAPES.</p> <p>ENCOURAGE CREATION OF ECOLOGICAL BUFFER ZONES BETWEEN RIVER HABITATS AND ADJACENT ARABLE LAND USE.</p>	<p>IMPROVEMENTS TO THE AMENITY OF KEY PUBLIC ACCESS SITES SITUATED AT BRIDGEPOINTS.</p> <p>RATIONALISING OF LINEAR MOORINGS IN OPEN LANDSCAPES.</p> <p>JUDICIOUS PLANTING TO DIVERSIFY WOODLAND CONTENT AND SCREEN INTRUSIVE FEATURES. POSSIBLE USE OF "SET ASIDE" FARMLAND FOR WOODLAND PLANTING</p>	<p>ENCOURAGE USE OF TRADITIONAL VEGETATION MANAGEMENT (EG POLLARDING AND HAYMEADOWS)</p> <p>RESTORE RIVER INFRASTRUCTURE USING TYPICAL CONSTRUCTION MATERIALS IN THE AREA (EG TIMBER AND STONE).</p>
OXFORD TO SANDFORD	<ul style="list-style-type: none"> ● "OPEN PASTURE" FLOOD MEADOW AT PORT MEADOW. ● "ENCLOSED PASTURE" BETWEEN BINSEY & IFFLEY. ● "BUILT UP FRONTAGES" OF ARCHITECTURAL INTEREST BETWEEN OSNEY AND FOLLY BRIDGES. ● ESTABLISHED WALKS INTEGRATE LOCK, BRIDGE AND HISTORIC SITES OF INTEREST. ● JUNCTION WITH OXFORD CANAL AT JERICHO. ● EXTENSIVE VIEWS TO WYTHAM WOODS AND OXFORD CITY. 	<ul style="list-style-type: none"> ● POCKETS OF "DISTURBED LANDSCAPE" AND "BACKLANDS" ON URBAN FRINGE AREAS. ● VISUAL AND NOISE INTRUSION FROM THE OXFORD BYPASS. 	<p>RETAIN THE CONTRASTING SCALES OF OPEN AND ENCLOSED LANDSCAPES BETWEEN OXFORD CITY AND THE BYPASS ROAD.</p> <p>CONSERVE THE DIVERSE ARCHITECTURAL HERITAGE OF BRIDGES AND BUILDINGS THROUGHOUT THE ZONE.</p>	<p>SITE SPECIFIC IMPROVEMENTS TO URBAN FRINGE AREAS. ENHANCE ACCESS AND AMENITY IN ORDER TO PROTECT VULNERABLE HABITATS.</p> <p>SCREEN PLANTING TO REDUCE INTRUSION FROM ROAD, RAIL AND PYLON ROUTES.</p> <p>TREE PLANTING IN FIELD CORNERS.</p>	<p>RESTORATION OF HERITAGE FEATURES AT KEY SITES (EG IFFLEY LOCK AND FOLLY BRIDGE).</p> <p>REDUCE IMPACT OF POTENTIALLY INTRUSIVE DEVELOPMENT.</p>
SANDFORD TO GORING	<ul style="list-style-type: none"> ● "OPEN PASTURE" NARROW TRACTS ADJACENT TO RIVER. ● "BUILT-UP FRONTAGES" AT HISTORIC SETTLEMENTS (EG ABINGDON AND WALLINGFORD). ● "GARDEN FRONTAGES" PRESTIGIOUS HOUSING AT BURCOT, BENSON, MOULSFORD. ● LONG VIEWS TO CHILTERN AND SINODUN HILLTOPS. 	<ul style="list-style-type: none"> ● FEATURELESS "OPEN ARABLE" EXTENSIVE LANDSCAPES ENCRDACHING TO RIVERS EDGE. ● FEW TREEBELTS CONFINED TO RIVER CORRIDOR AND HEDGEROWS RESTRICTED TO LARGE FIELD BOUNDARIES ● OPEN VIEWS CONTAIN VISUALLY INTRUSIVE FEATURES (IE PYLONS, DIDCOT POWER STATION). ● ACCESS RESTRICTED TO RIVERSIDE SETTLEMENTS AND MAJOR BRIDGE POINTS. 	<p>CONSERVE TRACTS OF PASTURE AND EXISTING MATURE TREEBELTS WHICH SIGNIFICANTLY REDUCE THE LARGE SCALE "SEA" OF OPEN ARABLE LANDSCAPE AS PERCEIVED FROM THE RIVER IN THIS BROAD VALLEY ZONE OF THE OXFORD CLAY VALE.</p> <p>CREATE ECOLOGICAL BUFFER ZONE BETWEEN RIVER AND ADJACENT ARABLE FIELDS.</p>	<p>PROMOTE JUDICIOUS WOODLAND PLANTING TO SCREEN INTRUSIVE FEATURES AND FRAME VIEWS.</p> <p>SELECTIVE IMPROVEMENTS TO ACCESS PROVISION THROUGHOUT THE RELATIVELY 'CONCEALED' SECTIONS OF RIVER WITHIN THE ZONE AWAY FROM SETTLEMENTS.</p>	<p>RESTORE LAND TO PASTURE AND ENCOURAGE HEDGEROW PLANTING CLOSE TO RIVER (EG FIELD CORNERS).</p> <p>DIVERSIFY TREE, SHRUB AND FLORA CONTENT WHERE SPECIES HAVE BEEN DISCOURAGED BY AGRICULTURAL PRACTISES.</p>
GORING TO MAIDENHEAD	<ul style="list-style-type: none"> ● "SCARP AND VALE" PHYSICALLY WELL DEFINED RIVER CORRIDOR ENCLOSED BY WOODED SCARP SLOPES TO CHILTERNS. ● "BUILT-UP FRONTAGES" HISTORIC SETTLEMENTS AT READING, HENLEY AND MARLOW CHARACTERISED BY LOCAL MATERIALS. ● "GARDEN FRONTAGES" PRESTIGIOUS HOUSING AT REGULAR STAGES (EG MARLOW, COOKHAM). ● "HISTORIC" ESTATE PARKLAND AND NATIONAL TRUST PROPERTY SITUATED THROUGHOUT THE ZONE. ● WELL ESTABLISHED ACCESS LINKING KEY SITES AT LOCKS AND SETTLEMENTS. ● LONG VIEWS TO WOODED HILLTOPS. 	<ul style="list-style-type: none"> ● NARROW TRACTS OF "OPEN PASTURE" CONFINED TO RIVERSIDE AND SURROUNDED BY "OPEN ARABLE" RISING UP VALLEY SIDES. ● DISTURBED LANDSCAPES AT READING AND MARLOW - WET GRAVEL PITS WITH POTENTIAL TO IMPROVE LANDSCAPE AND ECOLOGICAL QUALITY. ● HEAVY RECREATIONAL USE AND NEED TO RATIONALISE FORMAL CAR PARK AND LINEAR BOAT MOORING FACILITIES THROUGHOUT THE ZONE. 	<p>RETAIN THE EXISTING BALANCE BETWEEN PASTURE AND ARABLE LANDSCAPES.</p> <p>CONSERVE SENSE OF ENCLOSURE CREATED BY WOODLAND VEGETATION ON SCARP SLOPES ADJACENT TO RIVER (EG COOKHAM LOCK).</p> <p>PROMOTE USE OF TRADITIONAL MATERIAL ASSOCIATED WITH THIS ZONE (IE BRICK, STONE, FLINTS).</p>	<p>THIS ZONE HAS AN ATTRACTIVE LANDSCAPE CHARACTER AT THE BROAD AND LOCAL SCALE.</p> <p>SITE SPECIFIC LANDSCAPE AMENITY ENHANCEMENTS TO RECREATIONAL ACCESS, LOCK AND MOORING FACILITIES SHOULD CONCENTRATE ON REDUCING ANY VISUAL INTRUSION INTO THE EXISTING SCENE.</p>	<p>PROMOTE RESTORATION OF RIVERSIDE PASTURE NOW REDUCED TO NARROW TRACTS OF LAND IN THE VALLEY FLOOR.</p>
MAIDENHEAD TO WALTON	<ul style="list-style-type: none"> ● "OPEN PASTURE" ISOLATED SUBSTANTIAL AREAS BORDERING RIVER (EG CHERTSEY MEADS & RUNNYMEDE). ● "ENCLOSED PASTURE" POCKETS ADJACENT TO THE RIVER AT ANKERWYCKE FARM AND DESBOROUGH ISLAND. ● OPEN VIEWS SOUTH TO DISTANT HILLS. ● MATURE VEGETATION ON ISLANDS AND THROUGHOUT RIPARIAN LANDSCAPES. 	<ul style="list-style-type: none"> ● "OPEN ARABLE" - EXTENSIVE AREAS OF DENUDED LANDSCAPE IN THE DATCHET AREA. ● "DISTURBED LANDSCAPES" THROUGHOUT - WET GRAVEL PITS, RESERVOIRS AND SEWAGE TREATMENT. ● "BACKLAND" AND RESIDENTIAL RIBBON DEVELOPMENT THROUGHOUT THE ZONE. ● MAJOR TRAFFIC ROUTES TRAVERSE THE ZONE (M4, M25, M3) CREATING VISUAL/NOISE INTRUSION. ● PYLON ROUTES VISUALLY INTRUSIVE. ● RECREATION AND ACCESS PROVISION IS GENERALLY OF A LOW AMENITY STANDARD. ● PLOTLAND DEVELOPMENT AT PENTON HOOK AND THAMES MEAD. 	<p>MAINTAIN THOSE IMPORTANT PASTORAL LANDSCAPES WITH HISTORIC ASSOCIATIONS WHICH ARE UNDER INCREASING RECREATIONAL PRESSURES (IE RUNNYMEDE, LALEHAM, CHERTSEY MEADS).</p>	<p>MAXIMISE OPPORTUNITIES TO DIVERSIFY THE RIVER ENVIRONMENT THROUGH APPROPRIATE RECREATIONAL DEVELOPMENTS ON RESTORED LAND.</p> <p>TAKE MEASURES TO REDUCE VISUAL AND NOISE INTRUSION BY MAJOR ROAD AND RAIL ROUTES.</p> <p>INTRODUCE AND REGENERATE WOODLAND AND SCRUB HABITATS ON MARGINAL LAND.</p>	<p>SUBSTANTIAL RESTORATION PROPOSALS REQUIRED TO REINSTATE SEMI-NATURAL RIVER ENVIRONMENTS TO BE INTEGRATED WITH THE CREATION OF NEW LANDSCAPES ON DISTURBED LAND.</p>
WALTON TO TEDDINGTON	<ul style="list-style-type: none"> ● BROAD, OPEN RIVER CHANNEL PROVIDES EXTENSIVE VIEWS OF RIVER FRONTAGES. ● "BUILT UP FRONTAGES" - PRESTIGIOUS HOUSING WITH DISTINCTIVE BOAT HOUSES. ● "HISTORIC" PARKLAND AT HAMPTON COURT OCCUPIES SIGNIFICANT SECTION OF RIVER. ● MATURE VEGETATION THROUGHOUT THE RIVER CORRIDOR AND ON ISLANDS (AITS). ● HIGH PROFILE LOCK AND WEIR SITES PROVIDE "SET PIECE" VIEWS FROM ACCESS POINTS. 	<ul style="list-style-type: none"> ● SUBSTANTIAL LENGTHS OF HARD EDGE TO RIVER BANKS. ● "BACKLANDS" ENCRDACH ON RIVER SCENE AT INTERVALS. ● "GARDEN FRONTAGES" - PLOTLAND DEVELOPMENT AND BOATHOUSE MOORINGS (EG TAGG ISLAND). ● "DISTURBED LANDSCAPES" - OPEN GRAVEL PITS AND ENCLOSING BANKS TO RESERVOIRS. ● RESTRICTED VISUAL ENVELOPE, CONCENTRATES VIEWS ON THOSE PARTS OF THE RIVERSIDE FABRIC WHICH ARE IN POOR REPAIR. 	<p>PRESERVE EXISTING VALUABLE AREAS OF OPEN SPACE AND VEGETATED SITES.</p> <p>PROMOTE EXISTING WOODED ISLANDS (AITS) AS HAVEN FOR RIVER WILDLIFE.</p>	<p>IMPROVE THE FABRIC OF THE MANY RIVER ACCESS POINTS. PROMOTE OPPORTUNITIES TO PRESENT AND INTERPRET THE DIVERSE RANGE OF FEATURES AND ACTIVITIES OF SPECIAL INTEREST WITHIN THIS ZONE.</p>	<p>IMPROVE THE QUALITY OF PUBLIC OPEN SPACE AND INTEGRATE WITH THE TOW PATH ENVIRONMENT TO DEVELOP A 'BUFFER ZONE' BETWEEN BACKLANDS DEVELOPMENT AND RIVER THROUGHOUT THE ZONE.</p>

**Landscape Character Zones
(see map)**

The River Thames landscape from Lechlade to Teddington can be divided into six successive sections each containing a distinctive combination of landscape types to form a "landscape character zone". Within each zone there are pressures for varied degrees of access and development. Where these pressures are likely to compromise positive landscape characteristics then appropriate management priorities need to be identified in advance. Conversely, where existing negative features are identified then they may generate opportunities to make landscape enhancements to the river scene.

Landscape Management Priorities

At the strategic level it is feasible to identify only the main strategies relevant to each landscape character zone.

A management plan for a specific site would identify a more detailed set of objectives.

The three management priorities are:-

- Conservation

Emphasis on conservation of existing character and on appropriate management of particular features which contribute to this character.

- Restoration

Emphasis on restoring landscape character where this is being eroded.

- Enhancement

Emphasis on enhancement of landscapes which have lost their former character. There may be opportunities to create new landscapes as a result of enhancement.

Landscape Management Priorities - generally applicable to the River Thames:

Conservation

- Conserve all remaining unimproved pastures or meadows together with associated trees, hedgerows and ground flora - particularly with regard to designated sites such as SSSI's.
- Conserve operational structures of heritage interest throughout the river (locks, weirs, bridges etc) - particularly with regard to sites within or close to designated Conservation Areas.

Restoration

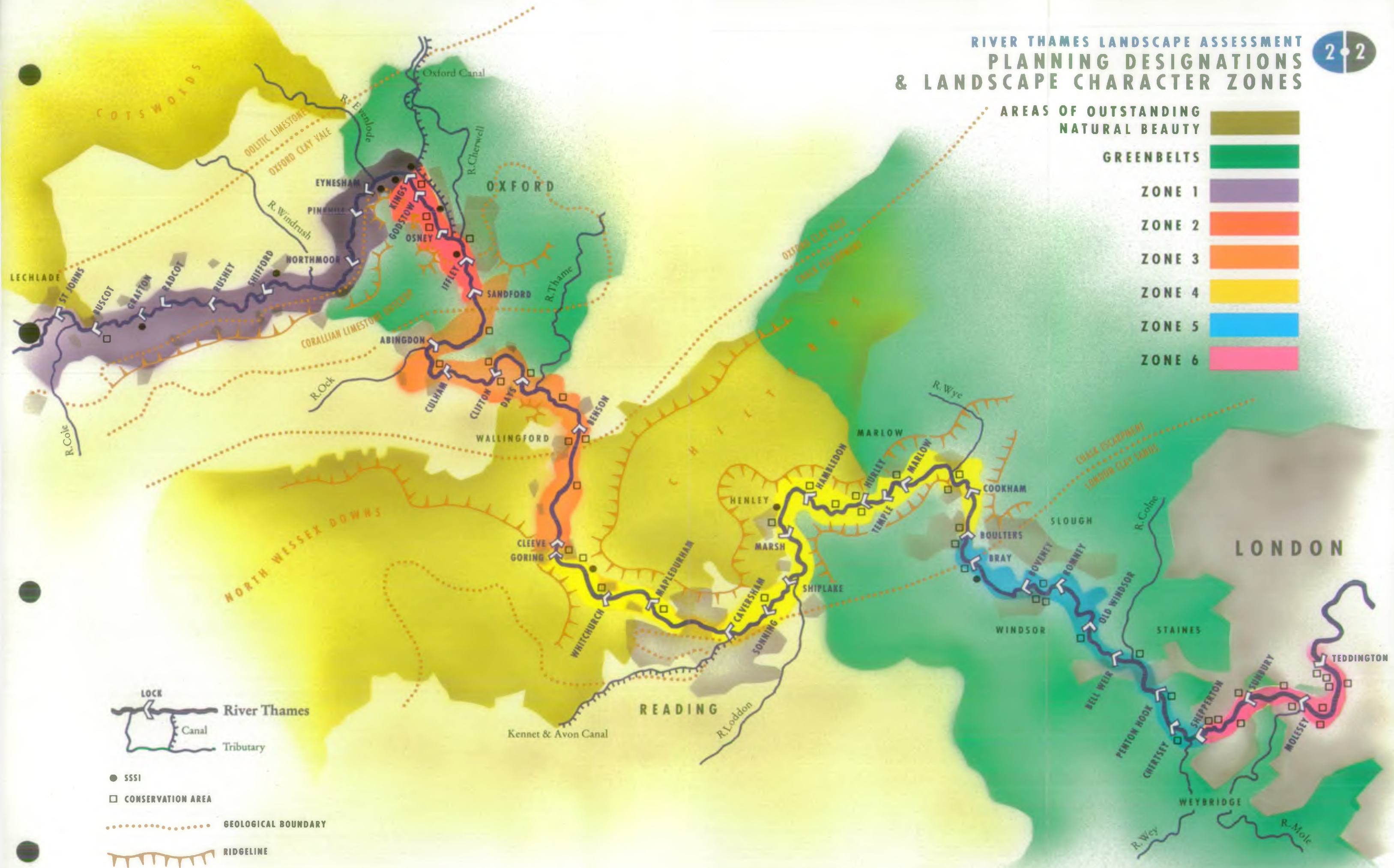
- Restore tree belts, hedgerows, pasture and meadows wherever appropriate through liaison with riparian land owners. Promote restoration of an environmental 'buffer zone' against agricultural land use encroaching on the river.
- Restore river structures and other buildings within the river scene using appropriate traditional materials wherever possible.

Enhancement

- Recreate landscape character on a substantial scale where it has been eroded and where possible incorporate remaining environments of quality to reinforce the sense of place and identity within the landscape.
- Landscape improvements at recreation sites to screen intrusive elements and to improve views of interesting features.
- Improve the quality of the river edge by rationalising boat moorings in rural areas and promoting sympathetic bank edge treatments.

RIVER THAMES LANDSCAPE ASSESSMENT PLANNING DESIGNATIONS & LANDSCAPE CHARACTER ZONES

22





SITE PLANNING LOCK & WEIR SITES SHEET 1

Site Planning

The role of site planning is to provide a strategic overview of the spatial organisation of lock and weir landscapes - based upon an appreciation of operational requirements and also those environmental qualities which are valued by lock users and the general public.

The process should, ideally, lead to the preparation of masterplan and management strategies which provide a framework for well considered conservation or development proposals generated by capital or maintenance works.

The objectives of site planning should be to:

- Identify the key landscape and structural features of conservation and heritage value to ensure that they are conserved as part of future management proposals which protect site character. (Section 3.2 and 3.3)
- Identify the main land use and circulation requirements, in order to reduce potential conflicts between land and water based activity, or recreation and operational access. (Section 3.4)
- Establish the best possible physical and visual integration of new development within the existing fabric of the site. (Section 3.5)

These aims can be achieved through a co-ordinated approach to site planning which combines experience and expertise in landscape design, recreation, conservation, navigation and engineering issues throughout the various stages of a project:

- Survey of site conditions to identify opportunities and constraints.
- Liaison with interested parties and site users to develop the brief, and ensure that relevant needs are anticipated and catered for.
- Preparation of site masterplan accompanied by management proposals for a defined period giving details of anticipated future operational improvements or landscape enhancements.
- Preparation of detailed site planning and design options for specific development (within the context of the masterplan) leading to selection of the optimum design solution.

Other relevant sections

- Landscape assessment
- Lay-bys and moorings
- Ancillary facilities
- Buildings

Site Layouts - An Overview

In general terms the Thames lock and weir sites can be classified into three types of site layout, determined by the physical relationship between lock and weir. Each of these layouts have some distinct site characteristics.

Integrated Sites

These sites form a 'set piece' on the grand scale where lock and weir are almost contiguous forming an intensely developed scene with an open aspect bounded by a backdrop of trees or built up area. Consequently, the coordination of colour and materials, together with screening/planting become very important issues.

Site management is simplified by the 'compact' nature of the layout which favours security and surveillance by the lock keeper. Where there are good vantage points for public viewing these sites become very popular with non-boating visitors, who need to be segregated from the operational areas.



INTEGRATED SITES

Adjacent Sites

The lock and weir are connected by an island and yet are sufficiently set apart to occupy their own smaller scale enclosures, usually within mature vegetation.

Characteristic eye-catching views are gained of these sites from up or downstream locations. Mature trees and vegetation on the island helps to absorb river infrastructure and new facilities into the lock scene.

Public access over the lock and island can be controlled where the path is well defined although the weir is less easily surveyed from the lock. Island sites of modest size can be managed to accommodate 'low key' leisure activities together with conservation proposals and habitat creation which are likely to be confined to the less accessible margins of the island.



ADJACENT SITES

Separated Sites

The lock and weir sites are isolated from each other by an extensive island supporting agricultural, woodland or amenity landuse. Land ownership may be quite complex and impose constraints on site management and access.

The weirstream and lock cut create long, narrow corridors with mature vegetation which screens the lock and weir from wider viewpoints. Infrastructural works need to be sensitively designed as they tend to become a visual focus within the smaller scale of enclosure.

Similarly, bank protection works assume a higher profile in the enclosed lock cut corridor and it is important to establish solutions which encourage marginal vegetation as an alternative to sheet piling or bagwalling which are visually intrusive.



FEATURES	
HERITAGE	
EXISTING SITE FEATURES AND RESOURCES WHICH ESTABLISH SITE CHARACTER AND REQUIRE AN APPROPRIATE MANAGEMENT STRATEGY (E.G. CONSERVATION, RESTORATION OR ENHANCEMENT).	LOCK AND LOCK CUT WEIR AND WEIRSTREAM LOCK HOUSE BRIDGES TOWPATH LOCK GARDEN LOCK ISLAND MATURE TREES SPECIALISED VEGETATION
RECREATION & LANDSCAPE AMENITY	
DEVELOPMENT AND LAND USES RELATED TO HERITAGE RESOURCES DESIGNED TO REINFORCE SITE CHARACTER AND TO PROMOTE OR INTERPRET THE SITE FOR THE BENEFIT OF ALL USERS.	STRUCTURE PLANTING ACTIVITY AREAS SPECIAL FACILITIES SIGNS/INFORMATION SCULPTURE/ARTEFACTS.
INFRASTRUCTURE	
DEVELOPMENT ASSOCIATED WITH IMPROVEMENTS TO SITE FACILITIES.	ACCESS ROADS CAR PARKS LIGHTING MOORINGS LAY-BYS SANITARY FACILITIES REFUSE DISPOSAL WATER POINTS

The following notes provide an overview of key features which combine to create unique environments at lock sites. The descriptions also include a summary of important user requirements and planning consideration which are covered more fully in the relevant sections of the handbook.

The Lock and Lock Cut

The vicinity of the lock chamber is a vigorously functional area dedicated to the efficient and safe passage of boat traffic. The lockside is a focus for boating activity and acts as a draw to non-boating public wherever access allows. Locksides can be planned to define public and private domains and reduce conflicts between boating and other recreational activity. (Sections 7.0, 8.0 and 10.0)

The lock cut is the channel which bypasses the river weir to provide safe navigation to the lock and returns to the river below the weir. The cut should create a sheltered approach to the lock, reinforced by bankside trees. The channel width is usually restricted and therefore edges are vulnerable to boat wash erosion. Bank protection measures should be planned to accommodate treatments which enhance the natural habitat and aesthetic appeal of the waters edge. (Section 16.0)

The Weir and Weirstream

The weir is a visually exciting and dynamic feature in the river scene; cascading overfalls and turbulent water contrast with the controlled lock environments. Main weirs are visually imposing structures their alignment either coursing at angles across the width of the weirstream or bisecting the river in one length.

Successive modifications to increase weir capacity have resulted in the fragmentation of structures into a string of weir components. Overfalls and radial or tilting gates are juxtaposed with large abutment piers whilst traditional paddle and rymer weirs are generally confined to the margins. Important planning considerations concern the scale and composition of new components in reinstated weirs, and the presentation of those structures which are of historic and educational interest. (Section 15.0)

The weirstream is characterised by mature bankside trees and marginal aquatic vegetation. Immediately below the weir banks are subject to substantial erosion by currents generated in the weirpool. Environmentally sensitive bank treatments are required to stabilise the natural edge in this zone, which is also a popular site for angling. (Section 16.0)

Lock Buildings

The lock keepers house is usually the most significant building in the vicinity of the lock. The distinctive architectural designs encountered on the river evoke a sense of location and history.

Lock houses also impose constraints on the planning and design of subordinate structures in the lock scene.

The design of new buildings sited within view of the lockside should reflect some of the architectural characteristics associated with the lock house. For example, the facing materials, roof pitch or hipped gables. (Section 13.0)

Bridges

The legacy of existing bridges on the river makes a great contribution to lock and weir site character by virtue of scale, materials and individual detailing.

Accommodation bridges and towpath bridges which span the river lock cut, or even the lock chamber have a number of impacts on site planning considerations (Section 14.0):

- Provision of adequate headroom for boat traffic, which has implications for the scale and visual impact of the structure.
- Access arrangements for vehicular and pedestrian approach ramps and steps.
- Siting to ensure clear visibility where piers obstruct the navigation.

The Towpath

The towpath route has a history and integrity of its own throughout the course of the river and constitutes the main part of the Thames Path (National Trail). At the local level the towpath is a pedestrian 'gateway' to the lock scene. Where possible interpretation facilities, seating and viewing areas should be integrated with the towpath and lockside setting to present the site to maximum effect. (Sections 3.4 and 9.0)

The Lock Garden and Lock Island

The plantings associated with the lock house garden create shelter and enclosure to the lockside and should present an image to the public of caring ownership. The garden adds colour and horticultural interest and reinforces the perception of the lockside as a semi private area - a useful psychological restraint at sites vulnerable to abuse, especially in urban areas.

Occasionally, the lock house and garden are situated on the island which separates the lock from the weir. In most cases the island is large enough to support an 'oasis' of relatively undisturbed vegetation containing trees, shrubs and flora which can be managed to provide a refuge for wildlife.

Larger islands have an extensive length of valuable river bank where there is increasing pressure to develop permanent moorings. Careful site planning should achieve a balanced use of the river edge. (Section 11.3)

Mature Trees

Thames lock sites together contain a valuable collection of mature trees where native and naturalised species occur in groups or as individual specimens. Species most often found include Horse Chestnut (*Aesculus hippocastanum*), London Plane (*Platanus x acerifolia*) and Ash (*Fraxinus excelsior*).

These are large trees with extensive canopy and root systems, which have impacts on site planning:

- Tree canopies which are managed appropriately, benefit the microclimate and aspect of the site by creating shelter in winter and shade in summer.
- Root systems should be kept intact and new works planned to avoid excavation, laying of sealed surfaces or alteration of water table levels within the root zone. (Section 8.1)

Specialised Vegetation and Plants

The creation of stimulating environments at lock sites should provide opportunities to conserve or establish a range of management practices where natural and cultivated vegetation may be of domestic or educational and conservation value.

For example:

- Coppice woodland/wildflower meadow
- Aquatic plant beds
- Tree/shrub nursery
- Orchard/fruit trees
- Organically cultivated produce

Structure Planting

Planting for shelter and screening purposes should be made an integral part of the landscape management plan for the site to ensure future establishment.

The planting should be substantial enough to respond to site character and the wider landscape setting (by creating backdrops and framing views) rather than simply attempt to obscure or disguise individual eyesores. Structure planting should also help to enclose and separate incompatible activity areas within the site.

Recreation

The issues which demand careful planning to assist site management for recreation concern safety, security and compatible uses.

- The distribution of active and passive recreation sites should be balanced to reduce conflicts between incompatible activities.
- Boundaries between public and private domains should be well defined to increase security, allow easy surveillance, and discourage vandalism.
- Provide information on accessible areas of the site and ensure that access caters for safety of all visitors including those with differing physical capabilities or special needs. (Section 17.1).

Access and Circulation

The hierarchy of access routes at lock sites is a key influence on the safe and efficient operation of lock sites (Section 3.4):

- Direct links are made between operational facilities (e.g. between lock and weir, or lay-by and ancillary facilities).
- Vehicular and pedestrian routes can be segregated to avoid potentially hazardous situations or to improve security.
- Informal footpaths can be planned to avoid sensitive areas of conservation value.

Lay-bys and Moorings

Lock lay-bys are significant operational structures which allow boats to moor temporarily while waiting to enter the lock. Safety and operational facts favour the 'onshore lay-by' built into the bank.

The site planning issues concern:

- Siting of lay-by structures to avoid bankside vegetation of conservation value which should remain intact.
- Use of alternative designs such as the freestanding 'offshore lay-by'.
- The length and freeboard of the structure which influences visual impact in the river scene.

Permanent moorings are normally located against the weirstream banks of the lock island and require a constructed mooring edge. These facilities need to be planned sensitively with carefully selected bankside treatments to ensure that a proportion of island edge is left undeveloped. (Section 11.3)

Ancillary Facilities

These comprise facilities provided almost exclusively for the boating public, which normally require service routes carrying water and electricity to be planned and installed. The routing of these services needs to allow for direct access to lay-bys and for facilities to be grouped together to reduce visual impact. (Section 12.0)

Many of the usual works undertaken on the main River Thames are not included in the ambit of Statutory Instrument 1217 and therefore not subject to the environmental assessment procedures which help to ensure that new developments are well planned and designed. (See Section 1.1) Where an environmental assessment is not required, a comprehensive survey of existing conditions will nonetheless be necessary - whatever the nature or scale of the proposed works.

Works which are most frequently associated with the lock and weir sites include:

- Navigation laybys and moorings
- Modification or refurbishment of existing locks.
- Sanitary stations/ancillary facilities
- Bank protection (other than for drainage or flood defence reasons).
- Works to lock houses
- Bridges
- Flow gauging stations

The results of the survey should be used to form a framework of constraints on the works, and to identify opportunities to enhance the site.

Hydrological

The nature of seasonal variance in river flows and levels upstream and downstream of lock/weir sites should be established.

- Standard water levels at the lock head (SHWL), lock tail (STWL) and the average flood water level (FWL) will indicate what freeboard is required and whether riser posts are necessary for lay-by structures.
- The survey of the river channel bed profile will show channel width and normal water depths to indicate whether dredging is necessary to retain adequate width of navigable channel.
- Assessment of river hazard areas generated by weir stream and lock operations.
- Lock island head (weirstream pull off lock cut).
- Head of Lock (drawdown when lock is filled).
- Tail of lock (turbulence when lock is emptied depending upon size/depth of lock chamber).
- Lock island Tail (push of weirstream cross currents).
- River bends (generate strong 'throw' currents cross stream).

Each lock site will have its individual hazard/problem areas; these include cross currents, back eddies and debris or silt deposition areas. Navigation staff will identify the main hazard areas (which may influence the location and design of lay-by structures).

AREA DOWNSTREAM OF LOCK AND WEIR
SUBJECT TO GREATEST FLUCTUATIONS
BETWEEN SUMMER AND FLOOD LEVELS

TURBULENCE AS
LOCK EMPTIES

UNDER LAY-BY CURRENTS
AND BACK EDDIES

THROW CURRENTS ON
RIVER BEND

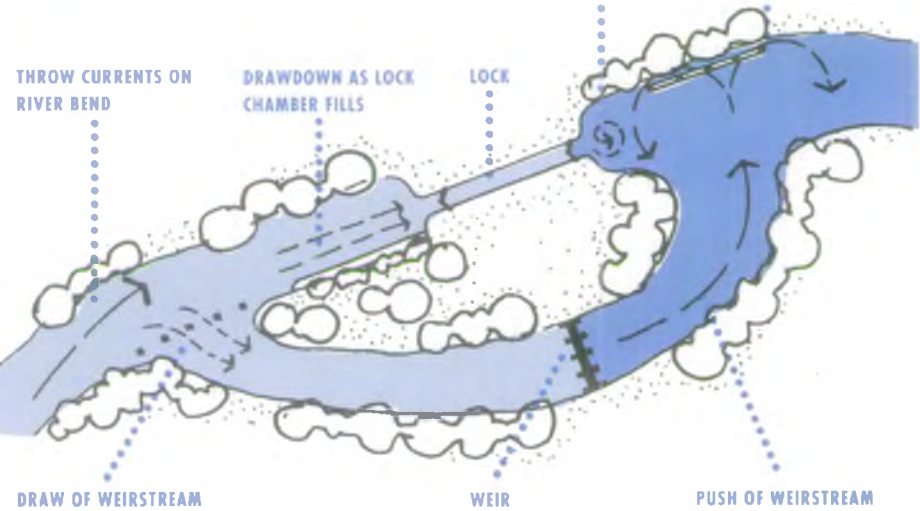
DRAWDOWN AS LOCK
CHAMBER FILLS

LOCK

DRAW OF WEIRSTREAM

WEIR

PUSH OF WEIRSTREAM



Ecology and Landscape

The ecology and landscape content of a site accounts for its conservation and amenity value, which can impose significant constraints on new works.

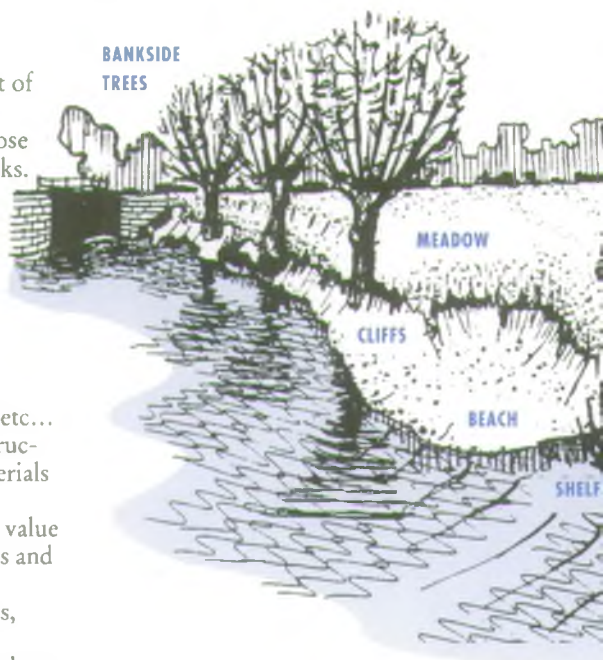
For each proposed site a proper assessment should be made by conservation/landscape staff, of several important habitats which may be present:

- Adjacent land - proximity of unimproved grassland, woodland, marsh, hedgerow trees and shrubs etc... Disturbance through access, construction, spoil disposal, storage of materials may be unacceptable.
- Bankside habitats - conservation value to wildlife of bankside trees, shrubs and ground flora; also morphological features such as cliffs, beaches, bays, terraces etc...
- Marginal habitats - immediately above or below water level.

A detailed assessment of types of plant species and the habitats they provide may be necessary.

For example, some species are considerably rarer or provide a much better bird nesting medium than others.

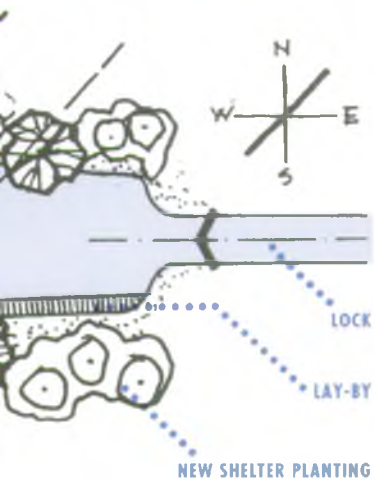
- Aquatic habitats - submerged shelves, pools, riffles and stands of aquatic vegetation such as water lilies etc...
- Trees - all trees situated in the vicinity of the proposed development should be individually assessed as part of a proper tree survey undertaken by a qualified arboriculturalist. The survey will provide details on the value of each tree, and appropriate management prescriptions where necessary.





All of these habitats should be assessed in terms of their local, regional and national importance; the assessment should automatically take into account any statutory sites such as SSSIs.

Disturbance to important sites should be avoided but equally, opportunities to create appropriate habitats should be sought whenever they are absent or scarce.



Climatic

Much of the River Thames flows through broad valley landscapes exposed to varying conditions; however, most sites will have characteristic weather patterns.

- Note exposure to prevailing wind directions (SW-NE). 'cross winds' and 'following winds' can make manoeuvring of craft difficult along the river corridor (may require substantial shelter belt planting).
- North facing sites in shady hollows or cuttings can create uncomfortable frost and fog pockets; damp conditions can make surfaces slippery and accelerate timber rot.
- Retention of existing vegetation and/or carefully planned planting can improve the local microclimate considerably.

Physical

- Exact position and condition of legal boundaries to the site.
- Condition of the river bank, evidence of scour and continuing erosion; establish the original alignment of the bank. These points indicate measures required to counter river currents.
- River bank gradients and changes in level, which will dictate access requirements and need for steps/ramps.
- Physical obstructions to the view from the lock and implications for safety/security surveillance by lock-keeper.
- Ground conditions to the proposed site and nature of access for vehicles and pedestrians; availability of adequate manoeuvring space, etc...
- Existing artefacts and features of historical interest which should be retained or can be replaced nearby - bollards, guard rails, signs, lamp standards etc...



RURAL OPEN



URBAN ENCLOSED



Visual

The main factors which influence the landscape character of the area need to be assessed in order to integrate the structure with the environment.

- Note the surrounding land use - whether urban or rural, open/enclosed to establish how visually prominent the structure will be.
- Note the major viewpoints to and from the structure (to be retained or screened).
- Note the principal traditional building materials in the area e.g. use of local stone, brick, timber, ironwork and finishes.
- Assess the need and potential for amenity enhancement planting works. For example, structure planting to the perimeter of the site to create shelter or to blend new works into adjacent vegetation.

SITE PLANNING ACCESS & CIRCULATION SHEET 1

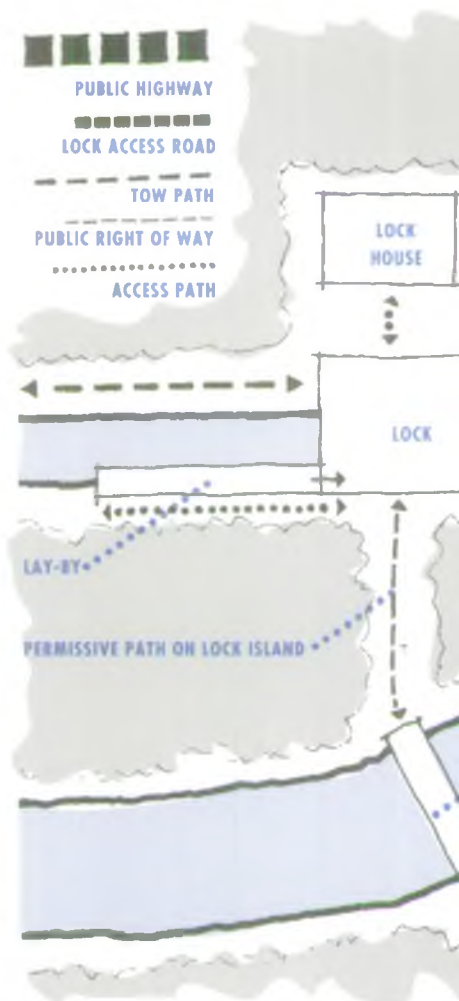
Lock side access and circulation are key site planning considerations which form the backbone of a site masterplan.

An early assessment of existing circulation arrangements should identify the main constraints and opportunities for improvements.

The following principles apply to all locations:

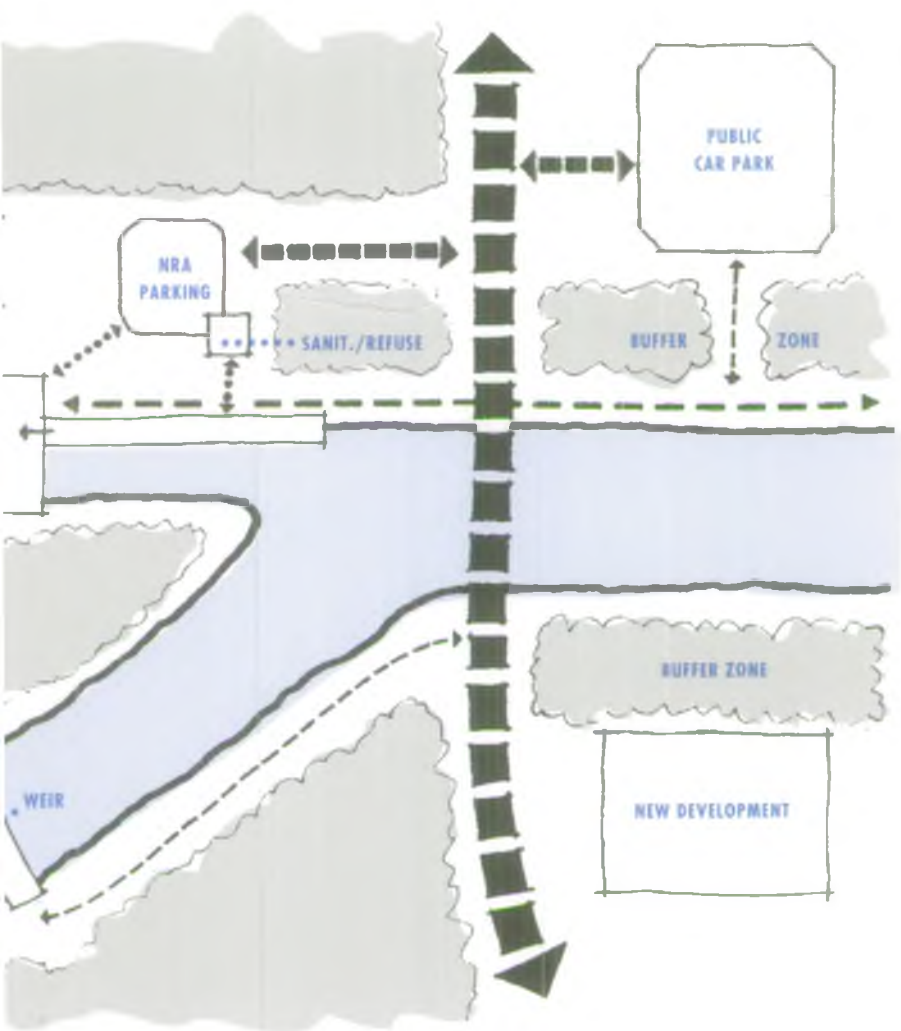
- A hierarchy of access routes should be defined to reduce conflicts between vehicular pedestrian or boating traffic. Recreational and operational areas need to be segregated and access routes should make the necessary connections as part of a planned scheme.
- Access routes should not be imposed on the site but planned into it, by considering the scale and character of the landscape setting. The quality of pedestrian environments in particular influence the visitors perceptions of the site, as much as related signage, fixtures and planting enhance the visitors experience in using the site.

The plan illustrates the hierarchical relationship between access routes common to many of the lock and weir sites on the Thames, and which are discussed in detail throughout this section.



ACCESS & CIRCULATION AT LOCK & WEIR SITES

ACCESS & CIRCULATION



Access Roads

Lock access roads are often quite long, linking the isolated lock site to the public highway. Routes are usually established by agreement with local landowners and the road surface upgraded to mutual benefit.

In rural areas the road traverses open countryside following field edges often on land liable to flooding. In urban areas public highways are in closer proximity to the river and the access road may follow the tow path to the lockside.

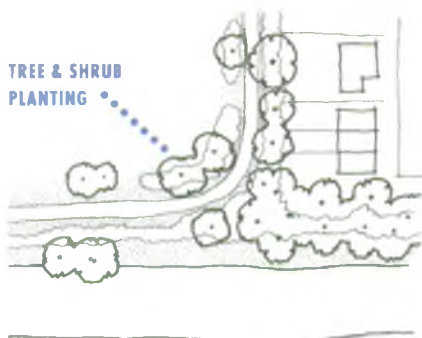
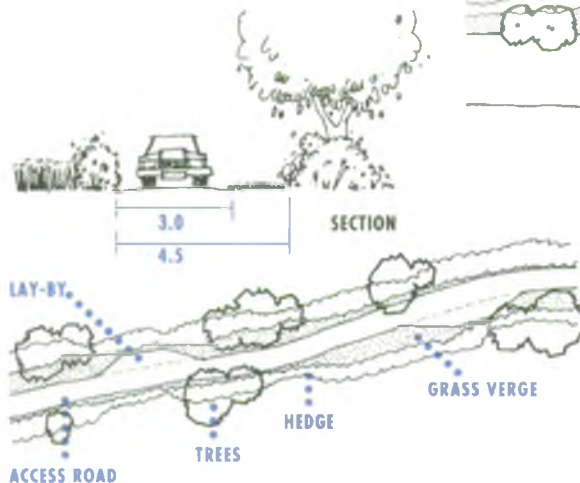
Width and Alignment

● The road should be 3.0 metres wide to accommodate service vehicles. Formal passing places which increase the road width to 4.5 metres should be sited at appropriate intervals on regularly used access roads.

● The access road should be direct, following field and other boundaries as closely as possible.

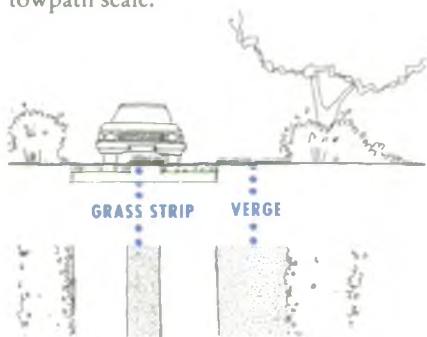
● Land acquisition for road alignment should also include for incorporation of planting areas and stock proof fencing work.

● Tree and shrub planting can help to blend the road into the wider landscape and provide a visual 'buffer' between road and river or nearby housing (e.g. river banks and field corners).



Road Surfaces (see also Section 8.0).

- Surfacing should reflect the anticipated nature of traffic (motor cars, agricultural plant etc...) and be sympathetic to the landscape setting.
- Roads isolated within agricultural areas can be surfaced functionally for low maintenance; asphalt or concrete are satisfactory treatments.
- Where the road follows the towpath a robust but informal treatment is more appropriate to complement the river scene (e.g. tarspray and chippings).
- For heavier traffic asphalt or concrete tracks with central grass strip and verge creates an attractive route retaining the towpath scale.



PLAN

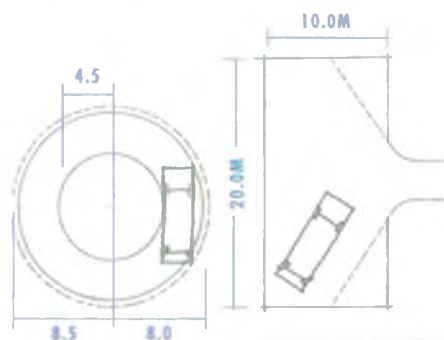
For lighter traffic a crushed stone or gravel surface will be adequate and requires only occasional redressing. This treatment tends to slow traffic and retain a sense of priority for pedestrians using the towpath.

Parking

Parking areas at lock sites provide primarily for service vehicles; therefore they are only occasionally subject to heavy loads. It is seldom possible to conceal them fully from public view so the parking area should be integrated properly with the lock environment.

Siting

- The area should be located on the 'access approach' side of the lock site.
- Turning space for service vehicles will be required together with ready access to refuse and sanitary facilities on site.



MINIMUM TURNING
CIRCLE FOR A REFUSE
COLLECTION VEHICLE

DIMENSIONS REQUIRED
FOR A REFUSE VEHICLE
EXECUTING A THREE
POINT TURN

- Parking areas can be successfully integrated with existing trees and vegetated provided there is adequate clearance to avoid compaction around tree roots.
- The 'land take' should allow for tree and shrub planting works, where it is necessary to screen the parking area from the lockside or neighbouring land uses.

Layout

- There is seldom need for areas to be formally arranged with marked spaces. Informal layouts are more easily adapted to available space and site contours.



- Parking is visually less intrusive if arranged in compact areas set back from the river. If linear parking is unavoidable the length should be broken down into 2/3 space bays by blocks of planting.

TOWPATH OR
SEPARATE FOOTPATH

PARKING BAYS ON A LINEAR ROUTE BROKEN UP BY
INTERMITTANT PLANTING AND SET BACK FROM RIVER EDGE



Surfaces (see also Section 8.0).

- In areas subject to frequent flooding or heavy usage, sealed surfaces are justified - spray and chip, concrete or block/brick paving should be considered.
- Specific areas of hardstanding which take heavy loads and need to be well drained or swept clean can be in situ concrete or brick/block paving units (skip compounds, loading areas).
- Overspill parking areas can be treated with reinforced grass surfacing or unbound gravel as an informal extension to the sealed surface areas.
- Generally, where the land is free draining, then the preferred treatment is unbound gravel or crushed stone - informal, flexible around trees and resilient to traffic wear it requires only occasional redressing.

Edging/Kerbs

- Edges should be kept informal in small parking areas. Where an edge restraint is used for compaction purposes it can be laid flush or removed to allow the surface to run into a grass verge to provide reinforcement.
- Where 'upstanding' kerb edges are necessary to retain topsoiled planting beds then timber round or square section timbers are much preferred to precast concrete kerbs (designed for highways).
- For more formal areas the brick paving units have special canted restraints which provide a neat and shallow retaining edge.

Towpath environment

The River Thames Path which follows much of the original towing path is designated as a National Trail and forms a continuous public right of way from the Source to the Thames Barrier.

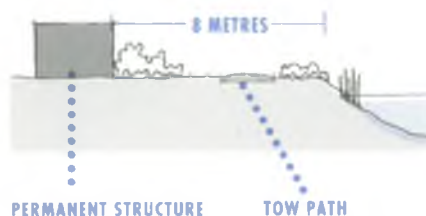
The local highway authorities are ultimately responsible for maintenance of the path surfaces.

The NRA owns short sections of the path beside lock cuts and maintains a proportion of gates and footbridges (attractive structures, inherited from previous authorities).

The Thames Path Design Guide (1991) published by the Countryside Commission is to be promoted, and augmented where necessary, by the Thames Path Officer to ensure that the varied infrastructure of the path is planned and designed to a high standard.

Landscape Buffer Zones

The towpath, being at the interface between land and water, plays a key role in conserving the character of the river landscape, in the face of pressures to develop adjacent land. Byelaws under the Water Resources Act provide for a maintenance strip of 8 metres to be preserved against either bank of the river - which should be kept clear of any permanent structure or fixture. Through normal consultation procedures, any development proposals for land adjacent to the river corridor can be encouraged not only to conform to a building line set well back from the river edge, but also to contribute positively to the content of the river landscape through appropriate management of the 'buffer zone' between buildings and water - whether for recreation or conservation purposes.



Footpath networks.

At many lock sites public rights of way connect with the towpath or traverse the lock and weir to create a network of paths with individual purposes and character:

- Permissive paths are used by the public by permission of the NRA often to gain access across the lock island, and this places an obligation on the authority to maintain the path - at the very least to a standard which cannot be construed as negligent in the event of personal injury. In many instances these paths form links within a circular walk promoted by the local authority to link local sites of interest; therefore adequate safety measures should be provided where the public are allowed to wait around, and cross lock gates, weirs and bridges. (Section 17.1)

Permissive paths should be planned to avoid hazardous locations or sensitive areas where wildlife may be disturbed. Features of particular interest can be viewed from a safe distance without the need for direct access.

- Access paths are more informal and private in character and provide direct, all-weather access to facilities within the site. The scale and surface treatments to these paths are usually dictated by their specific uses; however where confusion may arise, the segregation of public and private circulation can be reinforced by the juxtaposition of contrasting paving surfaces and discreet use of appropriate rails and signage - without the need to introduce intrusive barriers in an attempt to rationalise awkward situations.

LANDSCAPE BUFFER ZONE
PROVIDES LINKING COVER
FOR WILDLIFE

BUILDING LINE

WATER BODY

TOWING PATH





Visitor Perceptions

Statutory obligations do not provide the whole impetus for site management decisions. The general public, their needs and expectations also influence how individual sites are developed.

The lock site visitor survey commissioned by the NRA in 1991 shows that a very substantial non-boating public make repeated visits to sites by foot. A wide variety of ages and group sizes engage in activities ranging from leisure walks to fishing and canoeing - in addition to boaters passing through.

The public have subtle perceptions of the sites they visit as being "natural and unspoilt" or "quiet, peaceful and relaxing" - as well as the spectator interest in lock and boating activity. Visitors are wary that certain developments can potentially over-exploit or detract from these basic qualities.

Where appropriate, provision of facilities such as refreshments, toilets, information or interpretation with circular walks are favoured improvements. The public demonstrate an increasing awareness of how lock sites are managed and where possible their expectations should be reflected in the site planning proposals.

Masterplans

Whereas historically, lock sites have been developed in a piecemeal fashion, responding to needs as they arise, the masterplan is a valuable aid to forward looking and coordinated site management, drawing together the practical recommendations derived from the site planning process together with specific proposals which reflect public expectations of how the site should be improved.

The plan is not inflexible with regard to details, but sets out the main constraints on new development associated with capital or maintenance works.

The masterplan also responds to the landscape character of the site by setting limits on intensity of use - depending for example, on the size and shape of the site, and the urban or rural context.

The following examples are intended to indicate the broad range of issues which should be addressed by masterplans for sites with different landscape characteristics. (See over)

Large Segmented Site

Lockside space forms one of several enclosed spaces of individual character connected by a network of access routes.

Key to masterplan

MATURE TREES AND WOODLAND
TO BE RETAINED



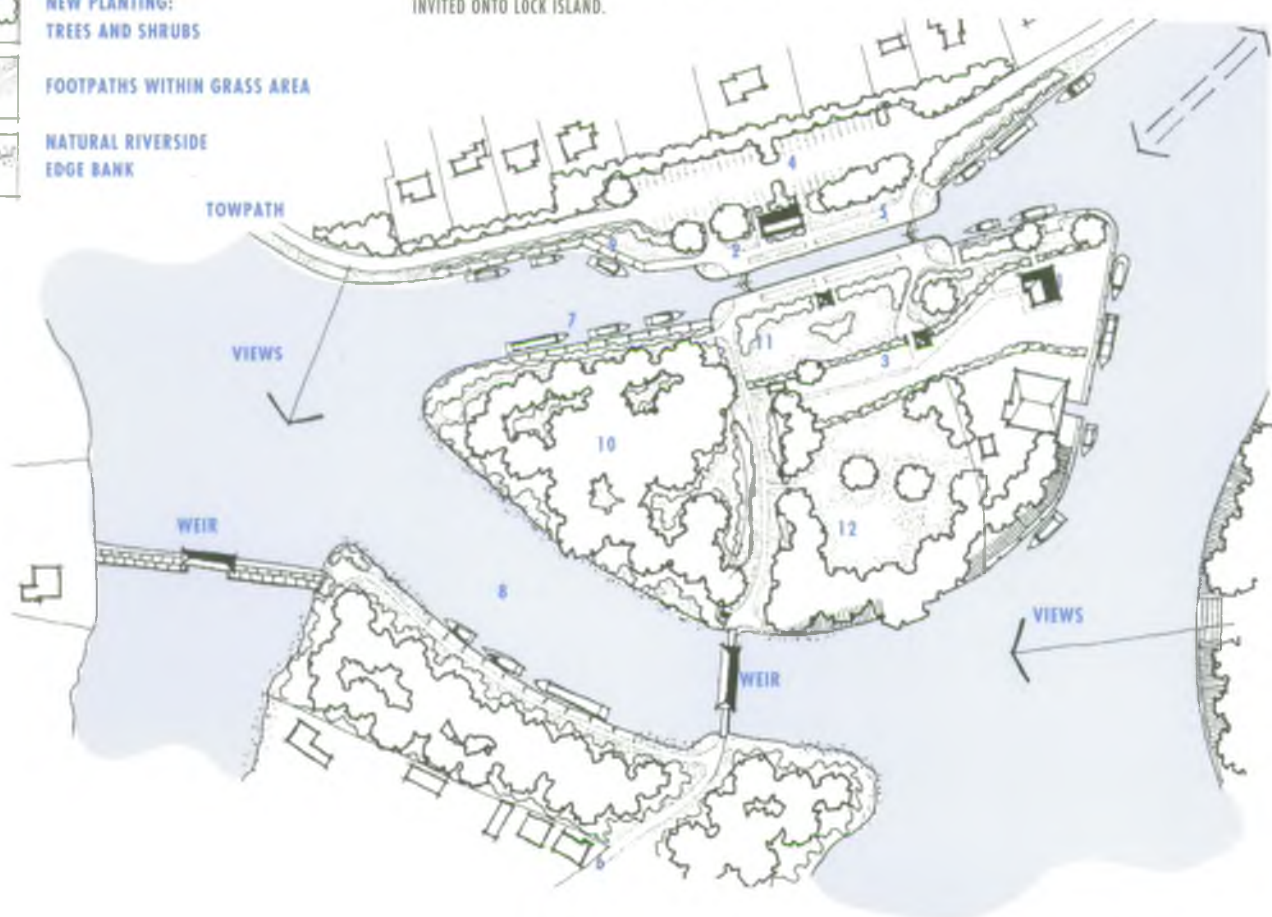
NEW PLANTING:
TREES AND SHRUBS



FOOTPATHS WITHIN GRASS AREA



NATURAL RIVERSIDE
EDGE BANK

**Buildings**

1. LOCK HOUSE IS SET AWAY FROM LOCKSIDE WITHIN THE PRIVATE GARDEN BUT STILL REQUIRES VISUAL CONTACT WITH LOCKSIDE.
2. TOILET BLOCK DOMINATES LOCKSIDE AND THEREFORE NEEDS HIGH QUALITY DESIGN AND DETAILING WITH APPROPRIATE SCALE AND MATERIALS.
3. REFRESHMENTS BUILDING GROUPED WITH RELIEF LOCK KEEPERS FACILITY AND SET BACK BEHIND LOCK HOUSE BUILDING LINE. AMPLE CIRCULATION SPACE REQUIRED FOR PUBLIC INVITED ONTO LOCK ISLAND.

Access

4. PUBLIC CAR PARK ENCLOSED BY STRUCTURE PLANTING TO SCREEN FROM RESIDENCES AND REDUCE SCALE OF AREA. TURNING AREA FOR SERVICE VEHICLES, SEGREGATED FROM PEDESTRIAN AREAS.
5. ACCESS TO LOCKSIDE AND TOWPATH. TOWPATH BESIDE LOCKSIDE OCCUPIES SUNNY SOUTH FACING SPACE - IDEAL FOR WELL POSITIONED SEATS SET BACK FROM OPERATIONAL AREAS.

6. PERMISSIVE FOOTPATH FORMS 'SPINE ACCESS' TO ISLAND RESIDENCES. FENCING CAN BE SET BACK TO OPEN UP THE ROUTE AND CREATE VIEWS OF WEIR STRUCTURE. INFORMAL SPUR PATHS PROVIDE ACCESS TO MOORING EDGES.

Mooring Edges

7. LAY-BY RESTRICTED IN LENGTH AND SET AGAINST A BACKDROP OF MATURE TREES OR NEW SHRUB PLANTING TO REDUCE SCALE AND VISUAL IMPACT.
8. WEIRSTREAM MOORINGS RESTRICTED TO SELECTED EDGES AND REMAINING BANKSIDES LEFT UNDEVELOPED WITH EXISTING VEGETATION KEPT INTACT.
9. REFUSE AND WATER POINTS SITUATED IN UNOBTUSIVE POSITIONS AGAINST A BACKDROP OF VEGETATION OR INTEGRATED WITH THE TOILET BLOCK.

Conservation and Recreation

10. EXISTING MATURE WOODLAND MANAGED TO DIVERSIFY HABITATS FOR FLORA AND FAUNA.
11. NEW STRUCTURE PLANTING TO INCLUDE NATIVE TREES AND SHRUBS TO CREATE ALL YEAR INTEREST AND SHELTER FROM NE/SW WINDS. VARIED MOWING REGIMES OVER EXTENSIVE LAWN AREAS TO CREATE WILDFLOWER MARGINS WHERE APPROPRIATE.
12. LOCK ISLAND ACTIVITY AREA MANAGED FOR SEASONAL CAMPING USE AND PROMOTION OF SPECIAL EVENTS WITHIN AN EXCITING RIVERSIDE SETTING.

Small Linear Site

Lock and lock house are focal features to the site with access routes radiating outwards potentially forming a string of installations which require particularly careful planning.

Key to masterplan

**MATURE TREES AND WOODLAND
TO BE RETAINED**



**NEW PLANTING:
TREES AND SHRUBS**



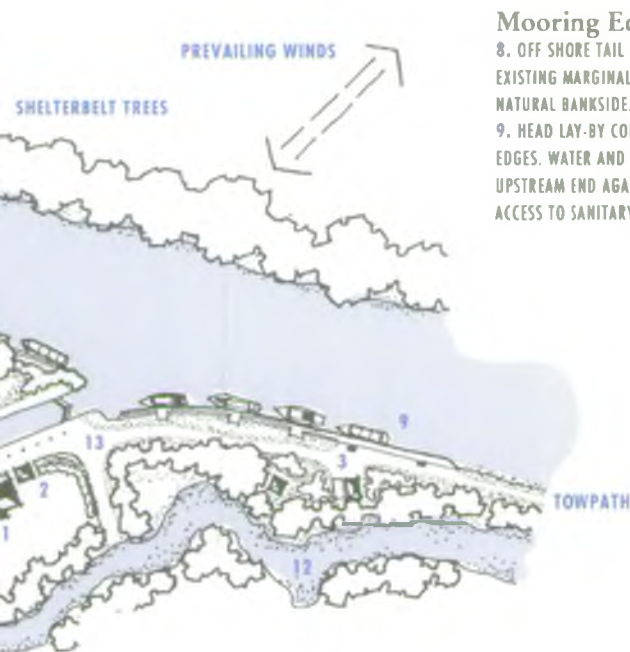
FOOTPATHS WITHIN GRASS AREA



**NATURAL RIVERSIDE
EDGE BANK**

**Buildings**

1. THE LOCK HOUSE DOMINATES THE LOCK SCENE; THE FACADE OPENS TO THE LOCKSIDE AREA. LOW LEVEL PLANTING PROVIDES AN EFFECTIVE BUFFER AGAINST TOWPATH TRAFFIC.
2. LOCK OFFICE IS LOCATED TO ONE SIDE OF HOUSE TO ALLOW FULL SURVEILLANCE OF CHAMBER.
3. SANITARY BUILDING AND RELIEF LOCK KEEPERS FACILITY ARE LOCATED AWAY FROM LOCK AREA AND SET BACK FROM TOWPATH SIGHTLINES INTO EXISTING TREE LINE, WITH ADDITIONAL SCREEN PLANTING.



Mooring Edges

8. OFF SHORE TAIL LAY-BY INSTALLED TO RETAIN EXISTING MARGINAL AQUATIC VEGETATION AGAINST NATURAL BANKSIDE.

9. HEAD LAY-BY COMBINES 'ON' AND 'OFFSHORE' MOORING EDGES. WATER AND PUMP OUT POINTS LOCATED AT UPSTREAM END AGAINST ONSHORE LANDING WITH DIRECT ACCESS TO SANITARY AND REFUSE FACILITIES.

Access

4. LOCK ACCESS ROAD FOLLOWS EXISTING MATURE HEDGELINE AT EDGE OF FIELD WITH NEW HEDGE ON OTHER SIDE.

5. PRIVATE CAR PARK FORMS REGULAR SHAPE SET OUT AMONGST MATURE TREES AND SCREENED BY PLANTING FROM TOWPATH. SERVICE ACCESS ALLOWED THROUGH LOCKSIDE TO TURNING AREA FOR REFUSE VEHICLES.

6. CIRCULAR WALK FACILITATED BY A 'PERMISSIVE' PATH' ACROSS LOCK AND WEIR TO OPPOSITE BANKS. REQUIRES SAFE AND ATTRACTIVE PUBLIC WAITING AREAS ON EITHER SIDE OF LOCK TO REDUCE PRESSURE AT PEAK SUMMER PERIOD.

7. TOWPATH ROUTE THROUGH OPEN MEADOWS KEPT INFORMAL WITH VIEWS TO MAIN WEIR STRUCTURE RETAINED AND ENHANCED.

Conservation and Recreation

10. MATURE TREES ON THE ISLAND RETAINED AT ALL COSTS TO PROVIDE SHELTER AND FRAME VIEWS.

11. SOUTH FACING EDGE OF LOCK ISLAND CREATES SUNNY GARDEN SPACE OPENING ON TO LOCKSIDE TO COMPLEMENT HARD TOWPATH SURFACING OPPOSITE.

12. BACKWATER STREAM WITH MATURE TREES MANAGED AS A QUIET REFUGE FOR WILDLIFE. POSSIBLE INCLUSION IN A 'STUDY AREA' FOR EDUCATIONAL PURPOSES TO COMPRISE LOCKSIDE, WEIR AND OPEN RIVER.

13. TOURIST INFORMATION POINTS SITED AGAINST THE TOWPATH ROUTE TO BE MADE ACCESSIBLE TO ALL LOCK VISITORS AND AVOID INTERFERENCE WITH OPERATIONAL ACCESS ARRANGEMENTS.

The river landscape presents a backdrop of colours and textures, changing throughout the year, which are often subtle but never dull. A complimentary 'foil' to the lock and weir scene busy with colourful boats and people. Within this dynamic context it is appropriate to adopt a strategic approach to the use of colours, materials and finishes which is both practical and sensitive.

The main objectives of the strategy are:

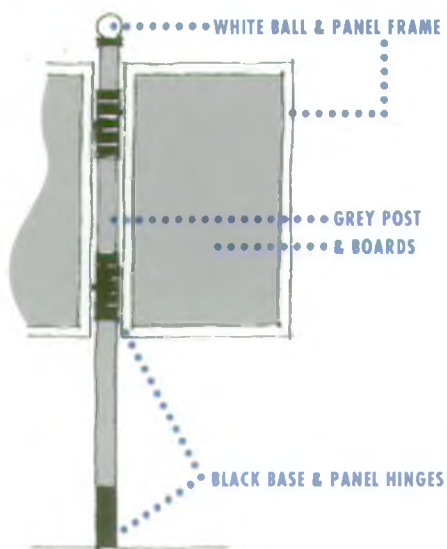
- To promote use of natural finishes to timbers which weather elegantly and therefore help to reduce future maintenance commitments. (Plates 5 & 6)
- To use specified colours consistently throughout the river to improve navigational safety and introduce an element of reassuring corporate identity at lock sites. (Plates 1-3)
- To take advantage of specific opportunities to enhance the appearance of selected structures using colour schemes which relate to their individual settings.

Subject Group Checklist

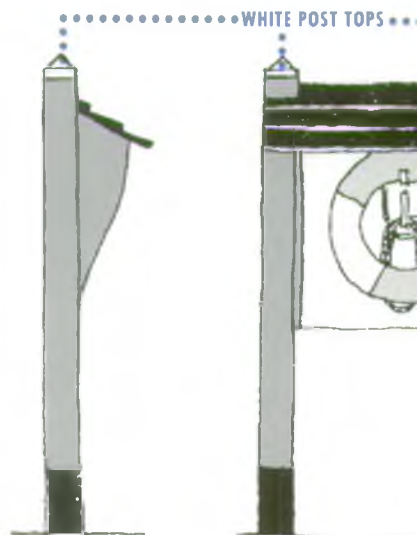
GROUP 1 TIMBER STRUCTURES	TS = TRANSLUCENT STAIN WF = WEATHERED FINISH	<ul style="list-style-type: none"> ● LOCK OFFICE - TS WALNUT/WHITE WINDOW SURROUNDS ● LOCKSIDE RAILS - WF ● FENCING - WF ● BRIDGES AND GATES - WF ● LAY-BYS - WF/WHITE FLASHES TO POST TOPS ● RISER POSTS/STRAKES - WF ● TIMBER DOLLIES/BOLLARDS - WF ● BALANCE BEAMS - WF/WHITE BUTT ENDS WHERE APPROPRIATE
GROUP 2 STEEL FIXTURES	GALVANISED FINISH	<ul style="list-style-type: none"> ● LOCK GATE SAFETY RAILS ● EGRESS LADDER/GRAB RAILS ● WEIR WALKWAY RAILS (SEE GROUP 3) ● OPEN GRID DECKING
GROUP 3 TIMBER/STEEL FIXTURES	GREY WITH OPTIONAL BLACK/WHITE HIGHLIGHTS	<ul style="list-style-type: none"> ● GATE FRAME/BALANCE BEAMS ● GATE CONTROL PEDESTALS ● SEATS (METAL) ● NOTICE BOARDS (POST AND PANEL) ● LIFEBOUY HOUSINGS (SEE GROUP 4) ● WEIR SUPERSTRUCTURES ● BRIDGES (STEEL) ● WEIR WALKWAY RAILS (OPTIONAL) ● PADDLE & RYMER WEIRS
GROUP 4 TIMBER/STEEL STRUCTURES	GREEN WITH OPTIONAL BLACK/WHITE HIGHLIGHTS	<ul style="list-style-type: none"> ● WATER POINT G.R.P. KIOSK ● LIFEBOUY HOUSINGS (OPTIONAL WHERE APPROPRIATE)
GROUP 5 STEEL FIXTURES	BLACK	<ul style="list-style-type: none"> ● STEEL BOLLARDS ● GATE PADDLE BOXES ● GATE SLUICE GEAR ● METAL FENCING
GROUP 6 SELECTED STRUCTURES	INDIVIDUALLY SPECIFIED COLOUR SCHEMES	<ul style="list-style-type: none"> ● WEIR SUPERSTRUCTURES ● BRIDGES (STEEL) ● LOCK HOUSES ● BOAT HOUSES

Selection Table

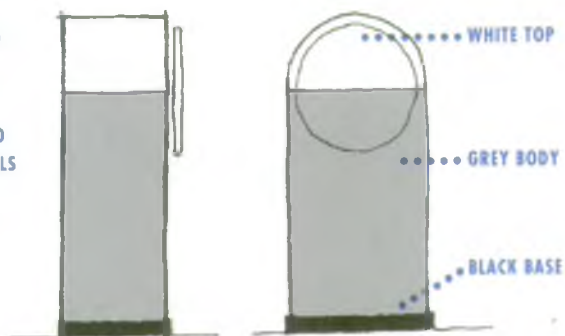
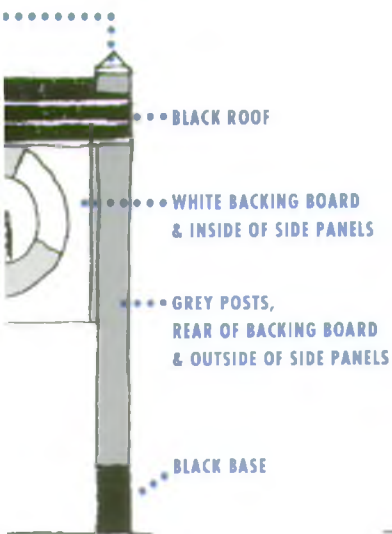
BLENDING TREATMENTS	FINISHES	NOTES/B.S.	SUBJECT GROUP
<ul style="list-style-type: none"> ● FINISHES WHICH BLEND THE SUBJECT INTO THE IMMEDIATE ENVIRONMENT AND REDUCE SCALE (CAN BE COMBINED WITH HIGHLIGHT TREATMENTS WHERE APPROPRIATE). 	<ul style="list-style-type: none"> ● TRANSLUCENT TIMBER STAINS (WALNUT, DARK OAK, LIGHT OAK) ● GALVANISED STEEL ● GREY PAINT (GLOSS) ● GREEN PAINT (GLOSS) 	PERIODICAL RESTAINING OR WEATHERED FINISH. B.S. 729 (1986) B.S. 5252 (CODE 18 B 21) B.S. 5252 (CODE 14 C 39)	GROUP 1 GROUP 2 GROUP 3 GROUP 4
HIGHLIGHT TREATMENTS			
<ul style="list-style-type: none"> ● SERVICEABLE FINISHES FOR OPERATIONAL EQUIPMENT ATTRACTING DIRT/GREASE OR VULNERABLE TO DAMP STAINS. 	<ul style="list-style-type: none"> ● BLACK PAINT (GLOSS) 	B.S. 5252 (CODE 00 E 53)	GROUP 5
<ul style="list-style-type: none"> ● EYECATCHING COLOUR FLASHES APPLIED TO HIGHLIGHT HAZARDOUS FEATURES OR MOVING PARTS. (TO BE APPLIED TO SUBJECTS IN GROUPS 1-6). 	<ul style="list-style-type: none"> ● WHITE PAINT (GLOSS) 	B.S. 5252 (CODE 00 E 55)	GROUP 1-6
COLOUR SCHEMES			
<ul style="list-style-type: none"> ● TO ARTICULATE AND ENLIVEN SELECTED STRUCTURES BY PICKING OUT TARGET FEATURES AND RHYTHMIC PATTERNS AS APPROPRIATE. 	<ul style="list-style-type: none"> ● FINISHES AND COLOURS ARE SELECTED TO COMPLIMENT THE LANDSCAPE SETTING AND ADJACENT STRUCTURES. TREATMENTS NEED TO REFLECT THE SCALE AND COMPLEXITY OF THE SUBJECT. TO BE SPECIFIED BY A LANDSCAPE ARCHITECT. 		GROUP 6



METAL POSTB & PANEL NOTICE BOARDS



TYPICAL TIMBER LIFEBOUY HOUSING



LOCK CONTROL PEDESTAL

For practical and aesthetic reasons, these guidelines promote the use of timber for many structures and fixtures associated with the river scene. The exacting river environment demands careful choice of timber type, detailing and use of appropriate treatments or finishes to ensure that future maintenance commitments are kept to a reasonable minimum level.

Tropical hardwoods

Substantial amounts of these imported timbers have been used over the years for construction and repairs in river work; and in particular, the following species have been employed due to their durability and regular grain:

- Greenheart from Guyana, S. America
- Ekki (or Azobe) from West Africa
- Opepe from West Africa
- Balau from Malaya

Within the timber trades there is a growing awareness of the ecological and socio-economic impacts within countries which harvest hardwood timbers commercially for export. There is also recognition that an independent system of certification is urgently required to ensure that imported timbers are from sustainable plantations.

Until such certification procedures are in place (and also thereafter) the designer should take responsibility for making the following considerations prior to specifying any tropical hardwoods:

- Take into account the current NRA policy on the use of imported tropical hardwoods.
- Alternative use of home grown temperate hardwoods or softwood timbers (treated with preservative to enhance durability).
- Re-use sections of existing hardwood timbers which are in good repair.
- Use of steel members for construction purposes in combination with temperate hardwood or softwood cladding.

Temperate timbers Species selection table

- * = CORROSIVE TO EXPOSED METAL FIXINGS
- ◆ = SUITABLE FOR USE IN WATER UNTREATED
- ◇ = SUITABLE FOR USE IN WATER WHEN TREATED WITH C.C.A. PRESERVATIVE

Temperate hardwoods & softwoods

Temperate timbers have the advantages of ready availability (though not always at larger sizes), economical costs and workability; they are suitable for a wide range of applications when appropriately treated with preservative and careful consideration is given to structure detailing. For heavy construction purposes and aquatic situations certain temperate timbers are also appropriate when treated; structural uses should be in accordance with B.S. 5268.

Both hardwoods and softwoods benefit from impregnation with preservative, particularly when placed in contact with the ground or water and they eventually weather down to an attractive silver-grey appearance. (Plate 5)

The equilibrium moisture content of timbers procured should be similar to that anticipated in service - bearing in mind the higher ambient humidity of river environments during warmer months. Above 20% moisture content the timber is vulnerable to biodeterioration and shrinkage.

Sound detailing should counter adverse effects, for example:

- Minimise direct exposure of end grain to weathering elements.
- Provide adequate ventilation around timbers to aid drying out; also allow for some movement in joints due to expansion and contraction.
- Ensure that post tops and joints are

TIMBER TYPE	DENSITY KG/M ²	DURABILITY (YEARS, UNTREATED)	RESISTANCE TO PRESSURE IMPREGNATION	APPLICATION
HARDWOODS				
JARRAH ◆	820	25+	EXTREMELY RESISTANT	HEAVY CONSTRUCTION, PILES, WALING, POSTS AND RAILS
KARRI ◆	900	15-25	EXTREMELY RESISTANT	HEAVY CONSTRUCTION, PILES, WALING, POSTS AND RAILS
OAK ◆* (EUROPEAN/ AMERICAN WHITE)	720/ 770	15-25	EXTREMELY RESISTANT	CONSTRUCTION, POSTS AND HANDRAILS, DECKING, SEATS/FURNITURE
CHESTNUT *	560	UP TO 5	PERMEABLE	PALES, RAILS & POSTS
SOFTWOODS				
CEDAR * (WESTERN RED)	580	15-25	RESISTANT	VERTICAL CLADDING/ROOF SHINGLES
LARCH (EUROPEAN)	550	10-15	RESISTANT	FENCING POSTS AND RAILS, CONSTRUCTION, DECKING PLANKS
DOUGLAS FIR ◆*	530	10-15	RESISTANT/VERY RESISTANT	CONSTRUCTION, PILES, RUBBING STRIPS (WALING), DECKING.
REDWOOD (PINE, FIR)	510	15-25	MODERATELY RESISTANT	CLADDING, CONSTRUCTION
WHITEWOOD	470	5-10	RESISTANT	CLADDING, CONSTRUCTION
HEMLOCK (WESTERN)	500	5-10	RESISTANT	FENCE RAILS, CONSTRUCTION
SPRUCE (SITKA)	450	5-10	RESISTANT	FENCE RAILS, PALES AND BOARDING



COLOUR & FINISHES TIMBERWORK SHEET 2

Preservative treatment

Temperate timbers used in the river environment should be treated by vacuum pressure impregnation with preservative to significantly enhance durability against soft rot, fungal decay and insect larvae.

The most appropriate preservative is the Copper Chrome Arsenic 'C.C.A. waterborne' system which fixes resins and salts within the timber so that they do not leak out and become harmful to animals and plants. The treatment should be specified by reference to the type of timber and performance required, to ensure that adequate strength and impregnation of preservative is achieved.

Other important considerations are:

- The pre-treatment moisture content of seasoned timbers should be 18% maximum and the timbers **should not be installed on site until 48 hours after treatment when the preservatives have become fixed.**
- The timbers should be in their final form, including joints and weathered ends prior to treatment with preservative.
- Metal fixings used with treated timber should be galvanised or of stainless steel to prevent corrosion of fixings.
- The pigments in 'C.C.A. waterborne' preservative leave the timber with a grey-green colouration which eventually weathers down. Proprietary systems are available which incorporate decorative pigmentations within the preservative - mostly a range of attractive brown colourations, which may obviate the need for any decorative stains to be applied after treatment.

Decorative and protective stains

These finishes may be used to supplement the impregnated preservatives to provide a water repellent protective surface (which also allows moisture to escape from the timber) and retards the weathering effects of sun and rain - particularly with vulnerable new timbers. Stains can be reapplied at intervals or allowed to fade as the timber weathers, depending on the site circumstances.

The appropriate woodstains have a **translucent finish which allows the grain of the wood to show through**. Prior to application to impregnated timbers, residue surface salts should be removed with a stiff brush to avoid possible discolouration.

Two types of translucent stain may be considered:

- Water based stains are normally compatible with C.C.A. preservatives and when dry are harmless to animals and plants even when periodically submerged in water. These stains are particularly suitable for sawn timber as the increased absorption of stain considerably lengthens the maintenance interval.
- Organic solvent based stains of low to medium build are more suitable as a decorative finish to timbers which are not likely to be submerged in water. (These stains contain toxic agents which are fixed only when dry after application). The stains are suitable for sawn or planed timber, particularly a hardwood such as Oak which has an attractive grain.

In both cases the manufacturers instructions should be consulted prior to application

Cast Iron

Old bollards, posts and rails or mechanical gear often deserve to be refurbished. Normally the accumulated rust and corrosion residue can be removed easily by brushing or blast cleaning on or off site.

Treatments should consist of the following:

- Thorough cleaning to remove all rust, dirt and grease.
- 2 coats Metal Primer*
- 2 coats High Gloss Finish or
- 1 coat of silicone-rich Hammer Finish paint (brush or spray application)

*Primers containing red lead should not be used as they are toxic to children and animals.

Steel

In the river environment mild steel posts, rails and sheets need to be fully protected from corrosive elements. This requires the use of a high performance paint coating system, galvanising, or both.

Galvanising.

Raw steelwork should be thoroughly cleaned free of mill scale, oil and grease. Hot dip galvanise should be to B.S. 729 (1986). The minimum average coating weight for any individual test area to be 610 g/m² (except for threaded work, 305 g/m²). Freshly galvanised work should be quenched in a passivating solution to produce a surface suitable for painting.

Painting raw steel.

All steel to be blast cleaned to 2nd Quality B.S. 4232 (1967) and surfaces dusted off, followed by:

- 1 coat Zinc Phosphate Primer.
- 1 coat undercoat.
- 2 coats Chlorinated Rubber Finish paint (dry film thickness of 150-275 microns).

Painting newly galvanised steel.

Dirt or grease to be removed from the surface with a detergent solution followed by:

- Apply wash of passivating solution (galvanised surface to turn black to indicate satisfactory treatment).
- 1 coat Zinc Phosphate Primer.
- 2 coats Chlorinated Rubber Finish paint.

Note: Weathered galvanised steel can be primed direct once the surfaces have been thoroughly cleaned of dirt and grease.

Aluminium

Two types of aluminium are available - cast and extruded. Difficulties may be had in extruding non-standard sections (eg for decking and rails) without expense. Standard sections are easier to obtain. Weld joints also need to be neatly executed to achieve a satisfactory appearance.

Extruded aluminium normally has a polished finish which will eventually weather to a satisfactory dull whitish-grey. In some situations exposed surfaces are prone to permanent staining from lime-rich bird droppings.

Painting polished aluminium.

The surface should be cleaned of dirt and grease followed by:

- Application of etching primer (should not be exposed to water prior to being overcoated).
- 1 coat of Zinc Chromate Primer.
- 1 coat of undercoat.
- 2 coats of High Gloss Finish or other approved paint.

Note: In all instances where proprietary products are specified the manufacturers recommendations should be sought for specific uses.

Old and new structures which have sizeable areas of exposed concrete surface may eventually require structural repairs and associated cosmetic treatments which provide long-term stability and protection.

Processes which commonly cause rapid deterioration of concrete structures on the river are:

- Stress-related fissures and cracks in defective concrete which are vulnerable to frost and weathering.
- Corrosion of steel reinforcements due to carbonation - leading to concrete deterioration and unsightly rust stains on the surface.

Preventative measures should always be taken for new structures, but where necessary repair systems normally consist of a grout filler and cosmetic/protective finishing coat.

The table sets out the main physical and visual characteristics of these materials. Colours generally suitable for synthetic concrete coatings relate to the warmer grey of gneiss or pebble (such as B.S. 5252 Code 06 A 03). Other appropriate colours may be specified by a Landscape Architect for individual projects. (See also Section 6.5)

Repair and Protection Treatments: Summary of Characteristics

TREATMENTS	COMMENTS
REPAIR MATERIALS	
STABILISING PRIMER	A SOLUTION WHICH PENETRATES CONCRETE BINDING TOGETHER POWDERY SURFACES.
CRACK FILLER/GROUTS	EPOXY RESINS AND PASTES TROWELLED INTO PLACE WHICH LEAVE A 'SCAR' AND REQUIRE FURTHER COSMETIC TREATMENTS.
REPAIR MORTARS	(A) SUITABLE FOR REPAIRS WITHOUT USE OF FORMWORK AND FOR USE ON INVERTED SURFACES. (B) HEAVY DUTY REINFORCED MORTARS TO ALLOW APPLICATIONS OF 100MM THICK WITHOUT SLUMP OR SAG. BOTH TYPES REQUIRE FURTHER COSMETIC TREATMENTS.
COSMETIC & PROTECTIVE FINISHES	
OPAQUE SYNTHETIC COATINGS	(A) HIGH BUILD, ELASTIC, TEXTURED COATINGS WHICH SEAL THE SURFACE. VULNERABLE TO CAPILLARY MOISTURE WHICH CAN CAUSE BLISTERING. (B) LOW BUILD COATINGS WHICH ARE POROUS AND TAKE ON THE TEXTURE OF THE CONCRETE SURFACE. EASILY BRUSHED OFF AND REPAINTED.
TRANSLUCENT AND CLEAR GLAZINGS	BOTH TYPES HAVE WATERPROOFING, ANTI-CARBONATION AND SELF CLEANSING PROPERTIES. A SOLUTION APPLIED BY BRUSH OR SPRAY TO FORM A PROTECTIVE MEMBRANE ALLOWS SUBSTRATE MOISTURE TO ESCAPE. CAN HAVE A 'MISTY' FINISH IF ALLOWED TO GET DAMP BEFORE PROPERLY CURED.

Note:

Consult manufacturers on use of proprietary treatments, particularly when applied to non-virgin material; otherwise guarantees may be void.

COLOUR PLATES 1-7 COLOUR & FINISHES



PLATE 1

Manually operated lock gates - balance beams painted grey (or weathered timber finish) with white butt ends. Paddle boxes and collar straps painted black.



PLATE 4

GRP water point housing in dark green set against planting.



PLATE 5

Timber parapet fencing left as a weathered finish.



PLATE 2
Typical timber lifebuoy housing.



PLATE 3
Steel footbridge - grey with cross braces highlighted in white.



PLATE 6
Galvanised steel guard rails against timber piles with white flashes.



PLATE 7
Typical lock office with walnut stained cladding and white painted window frames.

Heritage

Features of heritage interest are defined as those components which express some aspect of the historical development of the lock and may help to interpret the conditions of use during the past.

Some of the less obvious features make key contributions to lock character but are often the most vulnerable to either deterioration or removal during refurbishment schemes (e.g. brick or stone chamber walls, timber bollards and strakes). (Plate 11)



LOCK COTTAGE AND
BEAM GATE AT SHIFFORD

Thames river locks today vary considerably in both structure, size and character throughout the river - the legacy of over two centuries of lock building and modification.

The early pound locks, were almost wholly timber structures which often employed turf banksides instead of constructed vertical chamber walls.

During the nineteenth century, locks were rebuilt with stone or brick facings tied into rubble walls. Normally the chambers would be fitted with fixtures such as timber strakes and fenders which enabled the barge traffic to navigate through without damaging either the vessel or the lock structures.

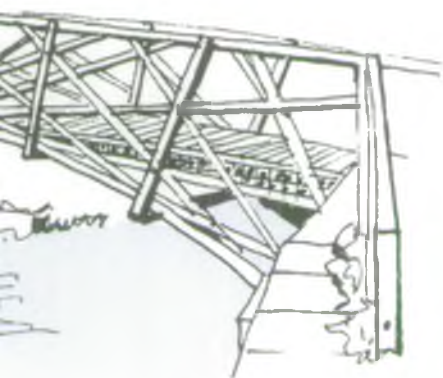


"MATHEMATICAL" TIMBER BRIDGE AT IFFLEY

Some of these features still exist today at most locks. For example substantial grassy banks run alongside the chambers; stone copings and timber bollards (dollies) survive on top of lock head and tail bullnoses. (Plate 12)

Where locks have undergone more recent modernisation, the tendency has been for the legacy of traditional fixtures and materials to be removed on the assumption that they are obsolete.

This process together with the introduction of inappropriate materials has often had a detrimental effect on the character of the lock scene.



Aesthetics

Lock aesthetics are concerned with the treatment of those features which are potentially pleasing to the eye, and help to articulate the scene.

- Surfaces: chamber walls and copings which have texture, colour and reflective qualities in sunlight and against water.
- Linear components: edgebeams, rails and steps influenced by light and shade which define the shape of the lock.



- Point components: bollards, posts and chains contribute pattern and perspective to the lock scene.



- Colour: the rich spectrum of colour in the river scene is generated by contrasts between hard materials and vegetation subjected to weathering and seasonal variation in atmospheric conditions.



THAMES LOCKS CHARACTER APPRAISAL SHEET 2

THAMES LOCKS CHARACTER SECTIONS

UPPER THAMES

MIDDLE THAMES

LOWER THAMES

SIGNIFICANT HERITAGE FEATURES IN LOCK AREA

- | | | |
|-------------------------|---------------------|------------------------|
| STONE LOCK COTTAGE | STONE CHAMBER WALLS | TIMBER BRIDGE |
| BRICK LOCK HOUSE | BRICK CHAMBER WALLS | METAL BRIDGE |
| RENDERED LOCK HOUSE | TIMBER RISER POSTS | STONE BRIDGE |
| BRICK/RENDER LOCK HOUSE | TRADITIONAL CHAMBER | FULL PADDLE/RYMER WEIR |
| | TIMBER BEAM GATES | PART PADDLE/RYMER WEIR |
| | | WEIR SHELTER |
| | | BOAT ROLLER RAMP |

REGIONAL VARIATIONS IN TRADITIONAL CONSTRUCTION MATERIALS

- COTSWOLD STYLE COTTAGES WITH WALLS OF LIMESTONE LAID RANDOM OR TO COURSES. STONE ROOF TILES. RED BRICK DETAILING ON HOUSES. ROBUST TIMBER GATES AND FENCES.
- RED BRICK BUILDINGS WITH SOME BLUE BRICK OR STONE DETAILING TO TOWN HOUSES. CLAY ROOF TILES AND A FEW THATCHED COTTAGES. HALF TIMBERED BUILDINGS IN RURAL AREAS.
- RED, BLUE, GREY BRICKS USED TO CREATE DIAPER PATTERNS. WALLS OF BRICK AND KNAPPED FLINTS FROM CHILTERN HILLS. CLAY WALL TILES IN COTTAGES. GRANITE STONE SETT AND COBBLESTONE SURFACES.
- RED-ORANGE AND YELLOW LONDON STOCK BRICKS IN OLDER BUILDINGS. ISOLATED EXAMPLES OF ELABORATE FRONTAGES TO TOWN HOUSES. SOME HALF TIMBERED BUILDINGS AND WEATHERBOARD CLADDING. GRANITE SETT SURFACES AND EDGES.



Lock Character Appraisal

The appraisal is based on the following criteria:

- Regional variations in traditional construction materials found in the river locality and the extent to which lock sites reflect those variations (see also Landscape Assessment, Section 2.0).
- Repeated characteristics between locks. When a number of consecutive locks have significant features in common, these features develop a 'character bond' between locks. (Conversely, an absence of any serial character tends to emphasise the individuality of each lock).
- Significant heritage features associated with each lock site. Rare or unique combinations of heritage features that deserve special conservation status and make a substantial contribution to lock character.

The appraisal is summarised on the plan above which illustrates how the river is divided into three sections consisting of lock sites with similar characteristics (ie. Upper, Middle and Lower Thames).

Upper Thames

St. Johns Lock to Iffley Lock

A strong character bond between locks, reinforced by the repeated use of local limestones for lock cottage construction and the retention of timber beam gates at most locks. (Plate 1)

Local traditions in the use of a limited range of materials together with robust design are typical of most details.

This section contains a unique 'set' of locks (St Johns Lock to Kings Lock) which collectively constitute a significant piece of river heritage to be kept intact through appropriate conservation measures.

Middle Thames

Sandford Lock to Bell Weir Lock

Most locks in this extensive sections have strong individual character complemented by attractive urban or rural settings.

With the exception of the red brick or rendered lock houses the sites tend to ignore the sophisticated range of building materials and detailing associated with the Middle Thames region.

A selective and refined use of appropriate materials for enhancement works should introduce a discreet character to lock sites so that they relate more closely to the high quality of built environments in this section.

Lower Thames

Penton Hook Lock to Teddington Lock

In this short section, the locks have a character influenced more by their urban setting and grand scale than by individual features.

While the lock houses reflect the prestigious design of local town houses, the lock sides are rather understated, and have been modified with inappropriate materials which echo adjacent suburban developments.

Fragments of traditional brick and stone remain to provide a cue for the restoration of a robust character to heighten the sense of historic commercial river activity with the Lower Thames.



THAMES LOCKS OVERVIEW OF ENHANCEMENT WORKS

CHAMBER REFURBISHMENT

SELECTIVE USE OF GUNITE RENDER TO REPAIR WALLS.
RETENTION OF TIMBER FIXTURES (SECTION 6)

LOCKSIDE REINSTATEMENTS

WALKWAY, WALLS, STEPS AND BANKS.
INSTALLATION OF LOCK QUADRANT PLATFORMS
WHERE APPROPRIATE (SECTION 7)

FENCING & BARRIERS

CHOICE OF APPROPRIATE DETAILS (SECTION 10)

FIXTURES

STANDARD GUARD RAILS, SAFETY EQUIPMENT AND FURNITURE.
MATERIALS AND FINISHES (SECTIONS 4 & 9)

RESTORATION

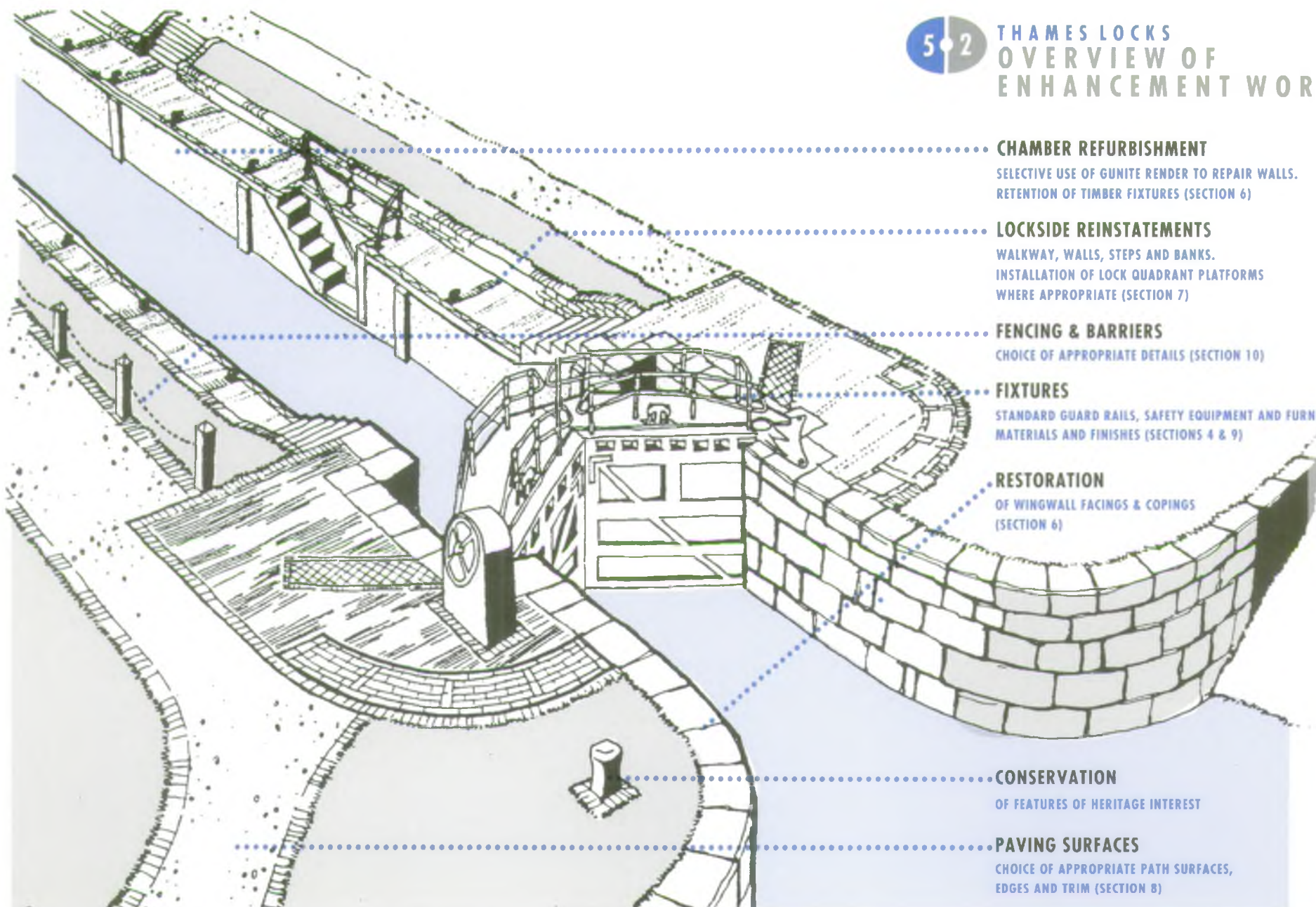
OF WINGWALL FACINGS & COPINGS
(SECTION 6)

CONSERVATION

OF FEATURES OF HERITAGE INTEREST

PAVING SURFACES

CHOICE OF APPROPRIATE PATH SURFACES,
EDGES AND TRIM (SECTION 8)



Using the character appraisal, it is possible to identify appropriate strategic objectives for site improvements to locks within each section:

Upper Thames

Conservation of valuable heritage features and use of a limited range of materials to retain the refreshingly uncomplicated treatments at these sites (e.g. concrete, limestones, timber).

Middle Thames

Create opportunities for enhancement works to realise the full potential of individual sites. Selective use of traditional materials and more elaborate detailing to reflect local vernacular (e.g. brindle bricks, stone setts, timber and ironwork details).

Lower Thames

Restoration of a robust identity appropriate to the grand scale of these sites. Use of materials associated with the London area (e.g. London engineering and stock bricks, stone setts, timber and ironwork details).

A detailed schedule of materials for lockside reinstatement and surfacing works together with conservation priorities for lock chamber refurbishment is shown in this table. The schedule provides a framework of appropriate materials and finishes which will help to establish the strategic objectives for each section of river. These objectives will be achieved through works which will inevitably be undertaken piecemeal over a period of years.

LOCKSIDE SURFACES (SECTION 8)

LOCKSIDE REINSTATEMENTS (SECTION 7)

LOCK CHAMBER/WINGWALLS (SECTION 6)

UPPER THAMES (ST JOHNS LOCK TO IFFLEY LOCK)

LOCKS

SITUATED IN OPEN LAWN SPACES ADJACENT TO STONE BUILT COTTAGES. AUSTERE USE OF MATERIALS RELATING TO COTSWOLD LOCALITY SURFACES

- BOUND MACADAM WITH GRAVEL DRESSING
- CONCRETE - EXPOSED AGGREGATE/BRUSHED
- SEALED GRAVEL OR CRUSHED STONE

EDGES & TRIM

- CONCRETE IN SITU ● STONE SETTS ● LOOSE GRAVEL

QUADRANTS

- CONCRETE PAVING WITH BRUSHED FINISH AND TIMBER/STEEL PUSH TREADS

RETAINING WALLS

- CONCRETE IN SITU WITH EXPOSED AGGREGATE FINISH TO RETAIN LAWNS OR GRASS EMBANKMENTS

WALKWAY & STEPS

- CONCRETE WITH BRUSHED FINISH

- CONSERVE BEAM LOCK GATES

- CONSERVE TRADITIONAL LOCK CHAMBERS (ST JOHNS, BUSCOT, ABINGDON)

- RETAIN/REPLACE TIMBER RUBBING STRAKES, FENDERS AND RISER POSTS

- RETAIN/REPLACE GRANITE COPINGS

- REPAIR STONE FACINGS TO WALLS

- RETAIN TIMBER DOLLIES IN GOOD REPAIR

MIDDLE THAMES (SANDFORD LOCK TO BELL WEIR LOCK)

LOCKS

SET IN ENCLOSED RURAL OR BUILT UP SITES ADJACENT TO RED BRICK OR RENDERED LOCK HOUSES WIDE RANGE OF MATERIALS USED

SURFACES

- BOUND MACADAM WITH GRAVEL DRESSING
- CONCRETE-EXPOSED AGGREGATE
- BRICK PAVING ● SEALED GRAVEL

EDGES & TRIM

- BRICK/COBBLESTONES ● STONE SETTS
- LOOSE GRAVEL OR PEA SHINGLE(6MM)

QUADRANTS

- CONCRETE PAVING WITH BRUSHED FINISH AND BRINDLE BRICK PAVING IN BUILT UP AREAS

RETAINING WALLS

- CONCRETE IN SITU WITH EXPOSED AGGREGATE FINISH AND BLUE BRICK COPINGS
- BRINDLE BRICK WITH BULLNOSE BRICK COPINGS

WALKWAY & STEPS

- CONCRETE WITH BRUSHED FINISH AND BRICK TRIM AT BOLLARD POSITIONS

- SELECTIVE USE OF GUNITE WITHIN CHAMBERS

- REINSTATE BRICK FACINGS AND COPINGS TO WINGWALLS AND CHAMBERS

- RETAIN/REPLACE TIMBER RUBBING STRAKES, FENDERS AND EDGE BEAMS

- REINSTATE CONCRETE COPING BLOCKS WHERE STONE IS UNAVAILABLE

- RETAIN TIMBER DOLLIES IN GOOD REPAIR

LOWER THAMES (PENTON HOOK LOCK TO TEDDINGTON LOCK)

LOCKS

GRAND SETTINGS ADJACENT TO LARGER LOCK (TOWN) HOUSES. LIMIT RANGE OF MATERIALS TO CONTRAST WITH SUBURBAN VARIETY

SURFACES

- BOUND MACADAM WITH GRAVEL DRESSING
- BRICK/BLOCK PAVING ● SEALED GRAVEL

EDGES & TRIM

- BRICK ● CONCRETE BLOCK ● STONE SETTS ● LOOSE GRAVEL

QUADRANTS

- BRICK PAVING AND TRIM

RETAINING WALLS

- BRICK WITH BULLNOSE COPINGS

WALKWAY & STEPS

- CONCRETE WITH BRUSHED FINISH AND BRICK TRIM AT BOLLARD POSITIONS

- SELECTIVE USE OF GUNITE WITHIN CHAMBERS

- REINSTATE STONE OR BRICK FACINGS TO WINGWALLS AND CHAMBERS

- RETAIN/REPLACE TIMBER RUBBING STRAKES, FENDERS AND EDGE BEAMS

- REINSTATE GRANITE OR CONCRETE COPINGS

- RETAIN TIMBER DOLLIES IN GOOD REPAIR

COLOUR PLATES 8-15
THAMES HERITAGE



PLATE 8
Offshore timber lay-by in Buscot Reach.



PLATE 9
Paddle rack for paddle and rymer weir in the Upper Thames.



PLATE 12
Timber dolly beside moorings.



PLATE 13
Timber horsebridge at Marsh Lock.



PLATE 10
A Stone built lock cottage at Rushey.



PLATE 11
Stone lock chamber wall with granite copings at Iffley Lock.



PLATE 14
Boat roller ramps at Molesey.



PLATE 15
Weir structures at Molesey.



NRA

THAMES ENVIRONMENT DESIGN HANDBOOK

PART TWO

TECHNICAL RECOMMENDATIONS

6 • 0

CHAMBER REFURBISHMENTS

12 • 0

ANCILLARY FACILITIES

7 • 0

LOCKSIDE REINSTATEMENTS

13 • 0

BUILDINGS

8 • 0

PAVED SURFACES

14 • 0

BRIDGES

9 • 0

FIXTURES

15 • 0

WEIRS

10 • 0

FENCES & RAILS

16 • 0

BANK PROTECTION

11 • 0

LAY-BYS & MOORINGS

17 • 0

RECREATION

PART TWO TECHNICAL RECOMMENDATIONS
PART TWO TECHNICAL RECOMMENDATIONS



The lock character appraisals provide a strategic framework for specific refurbishment works. For each project the framework will be complemented by:

- A survey of existing conditions/materials.
- A schedule of features likely to be affected by the proposals.

Refurbishment proposals should combine both operational and conservation objectives into a 'refurbishment strategy' which promotes a sensitive solution and where necessary, using labour intensive techniques and selective use of more expensive materials.

The three main strategies may be combined to form an 'overall strategy' for an individual lock refurbishment.

Total reinstatement to match existing

Where the existing facing on the chamber wall consists of concrete, the strategy is straight forward, however reinstatement of imperial sized bricks and limestone facings involve high labour and materials costs, therefore a selective reinstatement or reuse of these materials is advisable. Lock wingwalls and bullnoses are areas particularly worthy of reinstatement in the original materials as they are such visually prominent parts of the chamber. (Section 6.2 and 6.3)

Partial reinstatement to match existing

Specific areas of deteriorated brick or stone facings may be reinstated with matching materials whilst the remainder can be cleaned and repointed. 'Matching materials' should be comparable in dimensions, durability (hardness) and colour to originals; samples will be required for comparison.

Ideally, the boundary edge between new work and existing facings should be as discreet as possible and where possible coincide with existing edges (e.g. rubbing strakes).

Total replacement with a new treatment

A chamber which has deteriorated throughout will require voids to be filled and grouted. The existing wall may be pared back to accept the thickness of a new facing material so that the critical width of the lock is retained.

It is unusual for a chamber to be totally refaced in brick or stone. More often chamber walls are refaced in concrete (e.g. gunite). The smooth floated finish over a large panel areas offers little visual interest. Fixtures which can be retained or reinstated such as timber strakes and beams help to relieve an otherwise bland treatment. (Section 6.5)

Chamber fixtures

These components are selected primarily for operational and safety purposes. Decisions on whether to retain or replace existing fixtures tend to overlook the contribution they make to the lock aesthetics and character (e.g. vertical timber rubbing strakes/posts, timber bollards and slung chains). Fixtures which fulfill such a dual role should co-exist with more recent innovations in lock operation and safety, despite possible longer term maintenance commitments to replacements. (Section 6.8)

Materials

The lock chamber is an extremely exacting environment for all materials. Continual saturation, weathering and frequent boat impacts demand robust qualities from materials which have to function well and look good over a long period of time.

Most materials used on the river in the past have been 'tried and tested' and their life expectancy is anticipated accurately to plan for future maintenance.

A problem exists today in this respect where:

- New or improved materials are being experimented with in the lock environment (e.g. gunite applications).
- Restricted availability of some traditional materials (such as imperial sized bricks and granite copings).
- The contacts with dependable sources of materials such as hardwood timbers have diminished and the procurement of quality materials less assured.

These problems can be overcome in the short term by careful research on the source of materials and applying strict specifications to materials supplied, comparing samples where appropriate.

In the long term the maintenance cycle for materials can be assessed more accurately and contracts made with dependable suppliers.

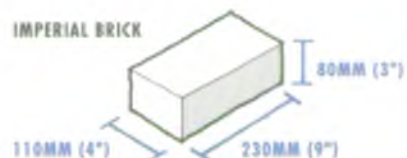
Certain materials can be stockpiled or reclaimed for later reuse (bricks, stones and timbers). See Section 4.0 for details on use of timbers and finishing treatments.

Use and appearance

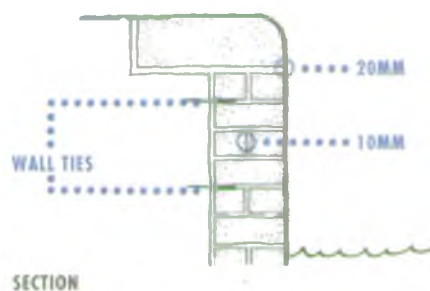
Smooth, hard bricks are durable and drain water quickly off walls; they do not attract rapid algae growth and are easily washed. Brickwork weathers well and retains attractive colouring over its lifetime. Damaged areas are easily replaced and fixtures can be accommodated without trouble.

Specification Notes

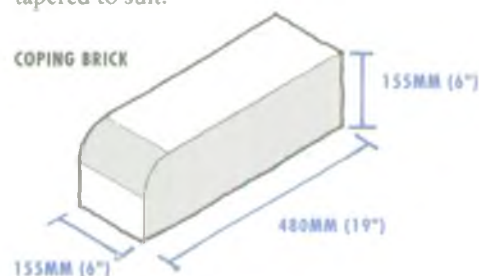
Original bricks: smooth blue engineering bricks made to the larger imperial size with slight variations in individual brick dimensions, (approximately 230 x 110 x 80mm).

IMPERIAL BRICK

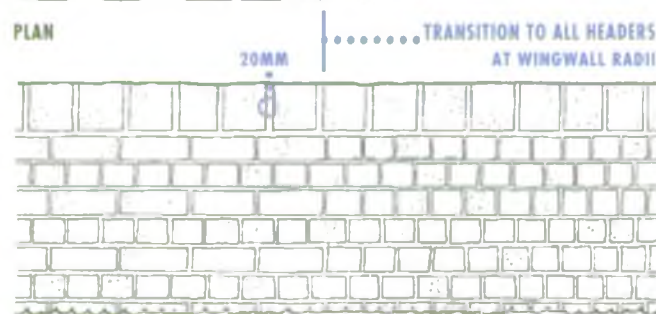
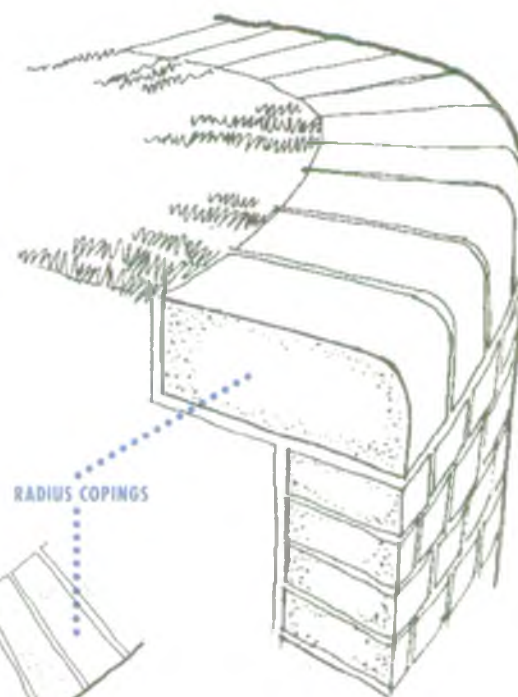
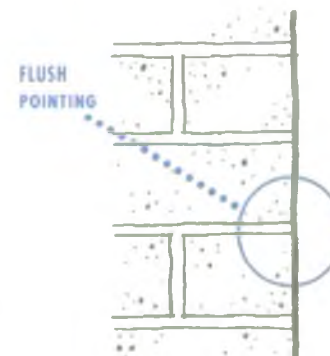
New bricks: class A or B smooth blue brindle engineering bricks with water absorption less than 7%. Sizes available 215 x 102.5 x 65mm.

**SECTION**

Copings: large blue single bullnose coping blocks to engineering standard. 480 x 155 x 155mm radius copings used for wing walls, tapered to suit.

COPING BRICK

Available only by special order with selected brick companies, therefore copings which can be reclaimed from other sites are valuable stock.

**PLAN****BULLNOSE WALL****RADIUS COPINGS****DETAIL**

6.3 CHAMBER REFURBISHMENT STONE FACING

Use and appearance

Dressed limestone blocks are used to face the lock chamber walls and lock wing walls. They are usually laid in courses and tied back into the chamber walls. Limestone weathers extremely well into an attractive appearance as both colour and texture relate well to the local character of the Upper Thames. (Plate 11)

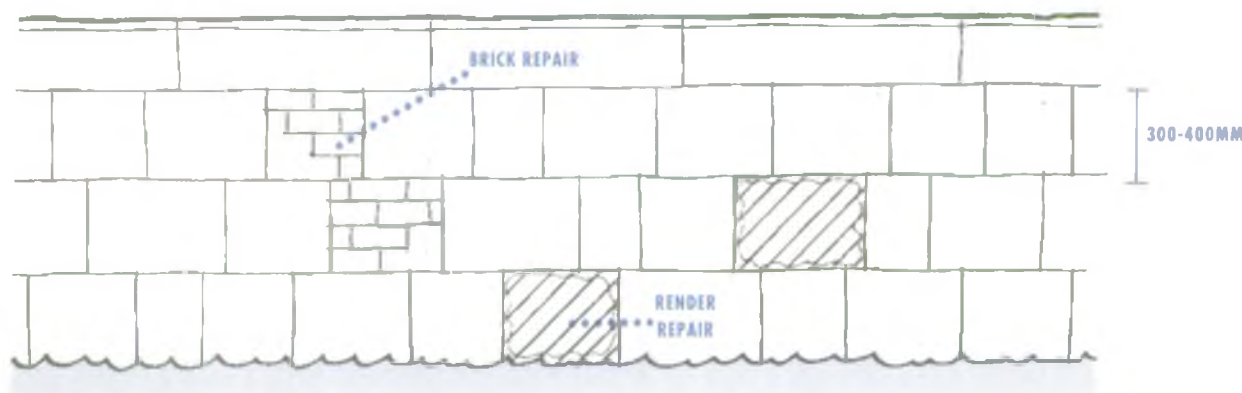
Some stones can be subject to corrosion and staining particularly during refurbishment works. It is worthwhile consulting an experienced stone mason on the specific project to anticipate possible problems on site.

Limestone facings exposed to rain wash are relatively self cleansing but where sections have been reinstated it may be advisable to wash the whole section of wall with a suitable fine spray water system.

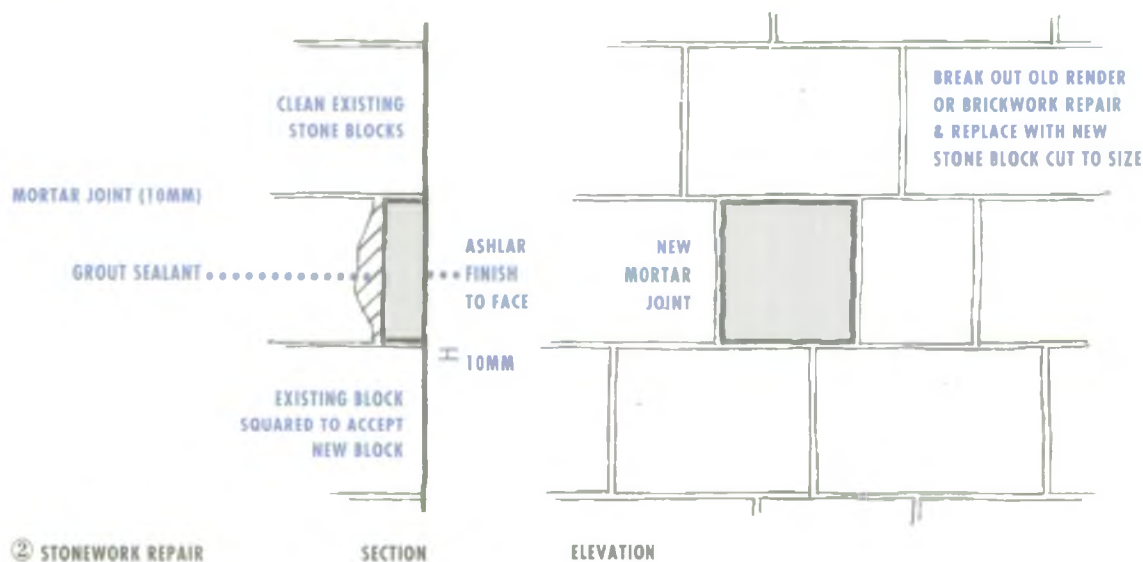
Specification Notes

Suitable limestones are available from a limited number of quarries. Much of the original stone used was known as the Headington Hard (now unavailable). Bath or Clipsam (Witney) Oolitic stones may be suitable substitutes although a core sample will be necessary to test for strength, density and colour match with existing samples in the lock chamber.

Dressed stone facings are available as 3" depth blocks with a smooth ashlar finish. Stones can be cut to specific sizes required.



① TYPICAL WALL REQUIRING REPAIRS



② STONEMWORK REPAIR

CHAMBER REFURBISHMENT BULLNOSE - CONCRETE BLOCK FACING

Use and appearance

Most manufacturers offer a choice of aggregates and cements providing the opportunity to influence the appearance of the blocks (for example use of sulphate resistant cement with PFA to achieve a darker grey colouring). The effect of weathering on concrete blocks is an important consideration. Neutral colours such as greys/buffs weather better due to the content of natural aggregates. Artificial pigments tend to bleach away rapidly.

Surface textures for concrete blocks can also be chosen carefully to match or contrast with existing structures. 'Cast' or 'sawn' blocks given a smooth finish can create a formal 'ashlar' appearance when bonded with narrow joints. 'Split' or 'riven' blocks with varied profiles given a rock-like appearance which is less appropriate for lock structures.②

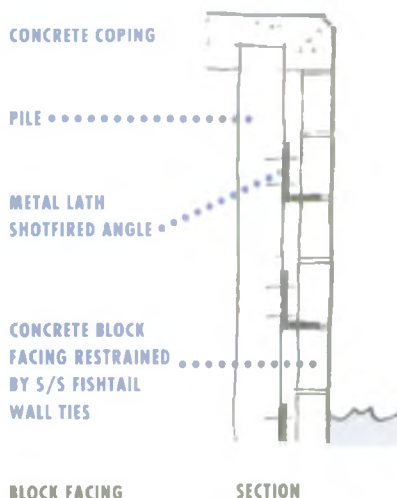
Specification Notes

Concrete blocks are proprietary materials available in a diverse range of unit sizes and colours, therefore, careful consideration of all characteristics is essential.

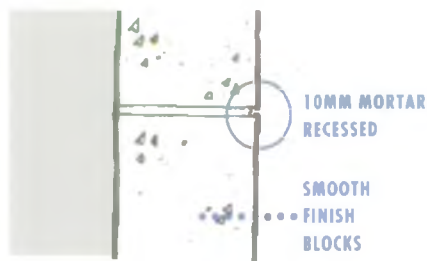
Dense aggregate blocks are required (1500 x 2100 kg/m³) to the required crushing strength.

Smooth textured blocks are liable to develop superficial micro cracks whilst the open textures blocks are less likely to suffer from frost damage.

Unit sizes vary, however dimensions in the order of 440 x 215 - 350mm to appropriate specified thicknesses are suitable for river situations.

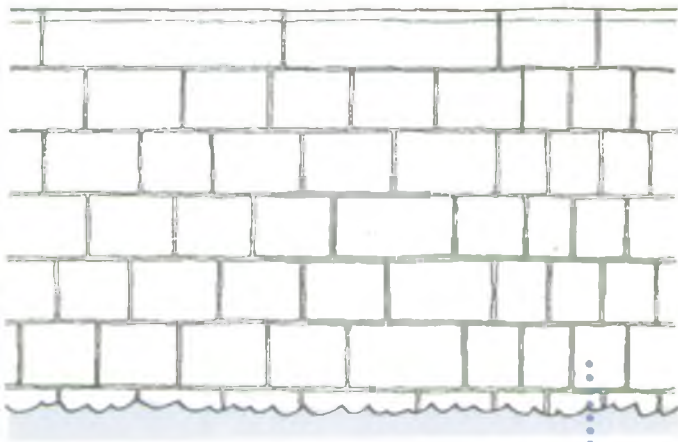


The manufacturers recommendations should always be considered in relation to a specific project.



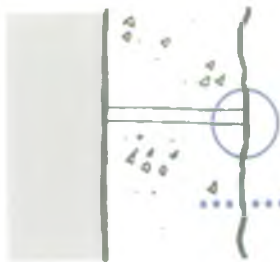
② POINTING DETAILS

CHAMBER REFURBISHMENT
BULLNOSE - CONCRETE BLOCK FACING



① ELEVATION

SMALL BLOCKS TO RADII



15MM MORTAR
FLUSH

ROUGH FINISH
BLOCKS

Use and appearance

Concrete gunite render is a very practical material with which to face a lock chamber wall.

Once the structural wall has been sealed to prevent water seepage from behind, the render will create a tough 'skin' and present a consistent appearance, masking the usual 'jigsaw' of materials beneath.

Unlike brick and stone facing, gunite is not 'naturally' attractive. When fired on to the surface the render has a rough texture and so is usually given a smooth finish with a wooden float to make it less susceptible to picking up dirt suspended in the water.

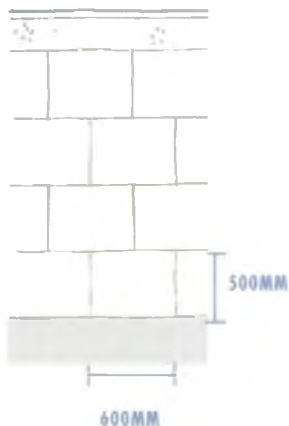
A sheet of smooth gunite render presents a bland, monolithic appearance. Where the thickness of render allows, it is possible to scribe into the gunite to give the visual effect of blockwork. ① Careful attention to detail proportions and absolute regularity in the scribing operation is essential for the effect to be convincing.

A proprietary concrete render sealant with a clear finish may be applied to the gunite surface to prevent rapid build up of dirt or algae. (Section 4.4)

Other details may be employed to provide visual relief to the rendered wall. Where in character, brickwork surrounds to grab chain recesses can be incorporated into the wall to highlight their location. ②



① SCRIBED GUNITE FACING 'BLOCKWORK EFFECT'



② CHAIN RECESS
WITH BRICK SURROUND

Key points to be considered if the guniting option is chosen for chamber wall reinstatement:

- Guniting application is confined wherever possible to within the chamber, and lock wing walls and bullnoses are reinstated using the original materials.
- Where practical, as many of the original timber fixtures within the chamber are retained or reinstated.
- Where appropriate additional detailing in brick or stone is used to provide visual relief and interest.

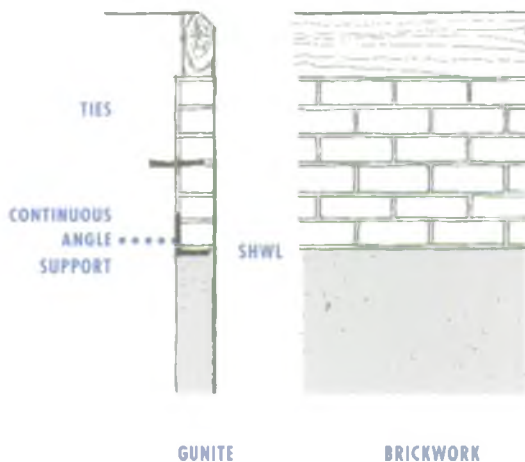
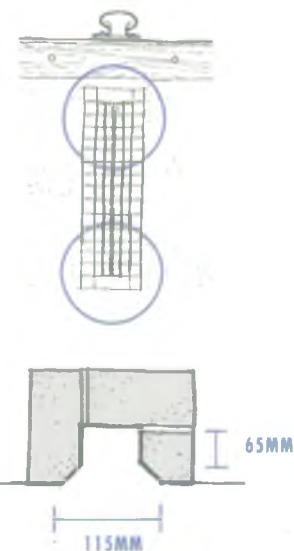
Specification Notes

Guniting is a concrete (sand/cement) render of very dense consistency which dries extremely hard with strong adhesive qualities.

Opportunity to vary the critical specification is severely limited by practical constraints, as any additives or pigments may compromise the mix of cement/water.

Guniting is usually applied to lock chamber walls in large panel areas which have undergone substantial preparation to receive the render.

Where the wall has to be pared back to accept the new thickness of render, the specification should state clearly the existing features to be retained or reinstated. These include timber edge beams and rubbing strakes which provide useful edges for the guniting application to work to.



③ BRICK FACING ABOVE GUNIT

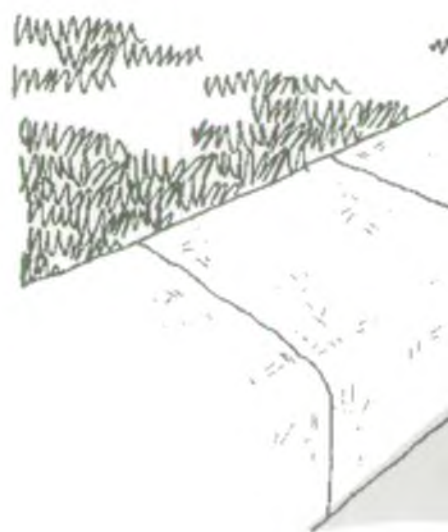
Use and appearance

Granite stones have a permanently attractive appearance. The Cornish stones are a light grey colour; those from other regions have a green or pink hue and may not be a good match. (Plate 11)

The 'stipple' surface texture effect results from chiselling and creates a good non-slip surface. Granite is extremely hard but also brittle so it can tend to chip off when subject to heavy impacts. Once cut to size the granite coping block is usually bedded on a strong epoxy cement bed over a concrete beam. If the beam is exposed it tends to spall and gradually recede under the coping block which becomes vulnerable to uplift by boats trapped under the ledge. Sound specification and detailing should help to overcome this problem and prevent rapid undercutting. ① & ②

Specification Notes

The original granite stones used for coping blocks came from Cornwall. Large stones suitable for reinstatement works are not readily available so that salvaged copings kept for reuse can be invaluable. These stones can be redressed as square blocks or radii blocks for wing wall copings. Usually coping blocks are keyed into each other with keyblocks or even bracketed together with steel staples to prevent displacement.





UNDERCUTTING
PERISHED
CONCRETE OR STONE

① DISPLACED COPING



• EPOXY CEMENT (25MM)
• GUNITE WALL

CONCRETE BASE (150MM)



• EPOXY CEMENT (25MM)
• STONE FACED WALL

CONCRETE BASE (150MM)

② REINSTATED COPINGS

CHAMBER REFURBISHMENT
GRANITE COPING



Use and appearance

Concrete coping has been used extensively on Thames locks in place of granite coping blocks; where this is the case the capping is a substantial size comparable to stone copings. ① The coping to chamber walls needs to be of larger proportions to be convincing. For large copings the surface finish is especially important.

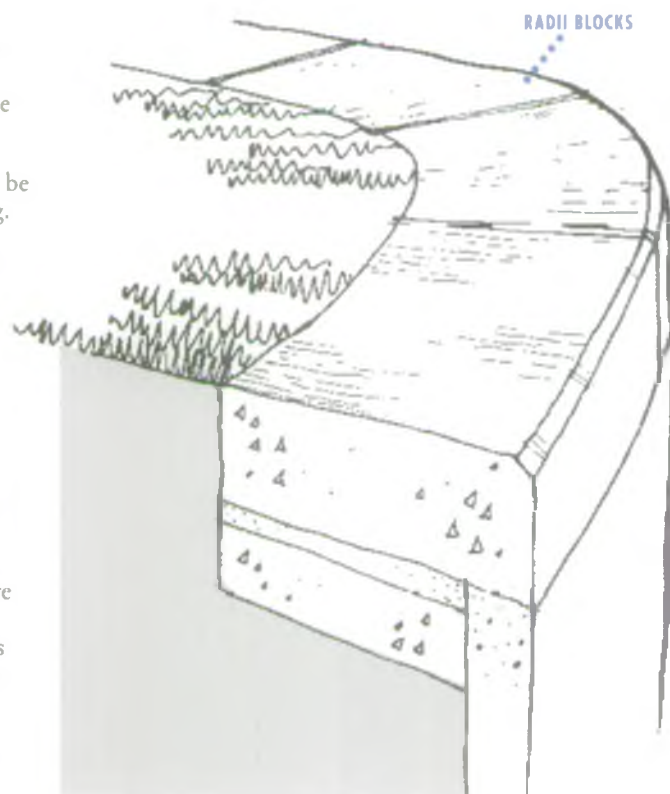
Two finishes are appropriate:

- Exposed aggregate finishes where the mix contains a dark grey stone aggregate lightly exposed to create a textured surface.
- Brushed finish. The surface is wire brushed prior to the concrete setting hard to create a textured finish which drains surface water efficiently.

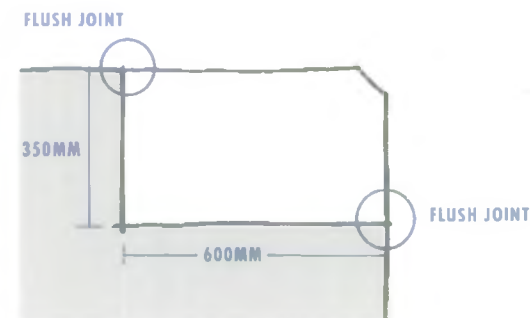
Long lengths of concrete coping require expansion joints at approximately every 4 metres. The scale of continuous coping can be effectively broken down into visual block units by creating 'false joints' at appropriate centres between 1200 and 1400mm in length with the edges of the false joints chamfered to prevent chipping. ②

Specification Notes

Reinforced in situ concrete coping strips are structurally tied into new piles edges or integrated into the reinstated chamber wall. The concrete is of C40 strength with expansion joints placed at 4 metre intervals. Where used to cap bullnose walls the curvature of the radii is easily formed with shuttering.

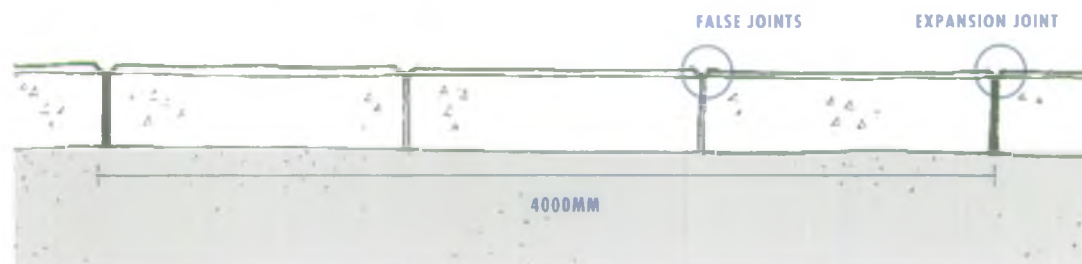


The width of coping varies between 400mm and 600mm whilst the depth is approximately 300mm.



① SECTIONAL DIMENSIONS

Usually the corner of the coping is chamfered and the surface falls gently towards the chamfered edge.



② CHAMBER WALL OR WINGWALL

Use and appearance

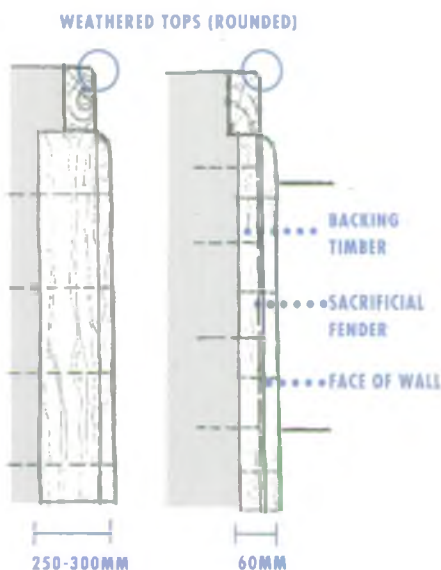
The qualities of hardwood timbers are ideal for lock fixtures. They are naturally dense and durable. Also, they are resilient to heavy impacts, and do not readily absorb moisture. Once in place the timbers will weather down gradually to an attractive grey appearance.

Originally the timber post and beam fixtures in lock chambers acted as fenders to protect the walls and were also used as 'pricking posts' to enable small boats and skiffs to be held against the lock walls (with boat hooks used to spike the timber).

Today the timber fixtures act as fenders and restraints which both add to the visual character of the locks and also vary in individual design.

The fixtures include:

- Vertical timber rubbing strakes bolted into the chamber wall at 3-4 metre centres, standing 60mm proud of the wall, to fend the large boats off the chamber wall. ①
- Horizontal timber edgebeams. Continuous rectangular section beam running along the top edge of the chamber which provides a kind edge to boat hulls on impact. A similar beam runs against the edge of the steps in lock stairwells. ② & ③



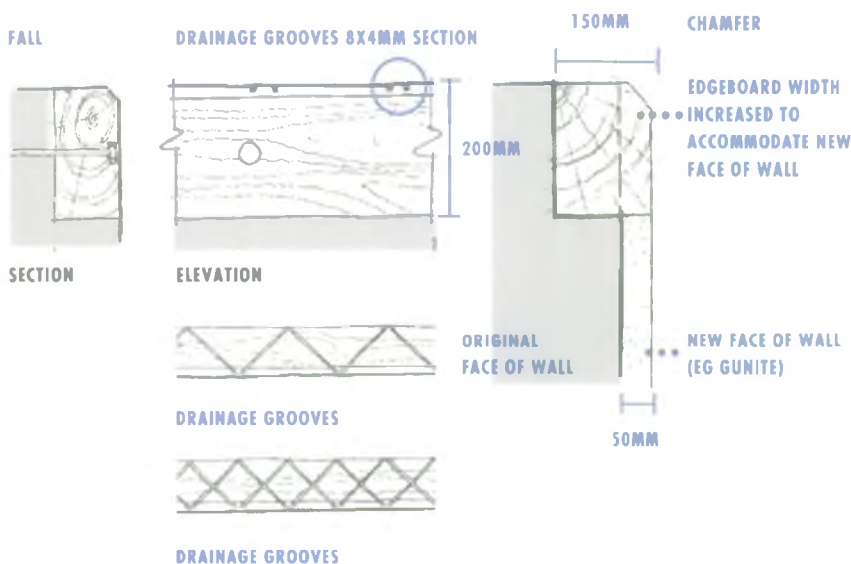
① ONE PIECE STRAKE AND TWO PIECE STRAKE

- Vertical timber riser posts. An extension of the rubbing strakes above the lock walkaway to a height of approx 1200mm. Prevent boats over-riding the walkway in flood conditions. ④
- Lock bullnose and wing wall fenders. Vertical posts bolted into the walls strategically located to fend off boats at potential points of impact. Particularly important at narrow locks and restricted lock approaches. ⑤

Specification Notes

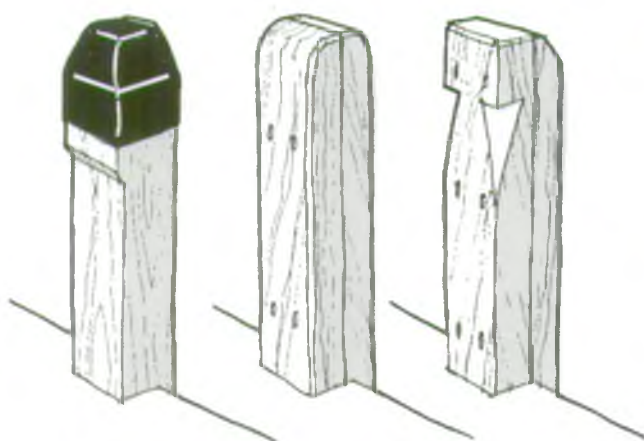
The extremely exacting conditions within the lock environment demand the selective use of imported hardwoods for reinstatement of timber fixtures. The quality of hardwood timber is directly related to cost. To procure the highest quality materials it is necessary to specify 100% heartwood. Inferior timber will be offered at a lower price and will not perform so well in use.

Note: When specifying tropical hardwoods reference should be made to the current NRA policy on use of imported tropical hardwood timbers. (See Section 4.0)

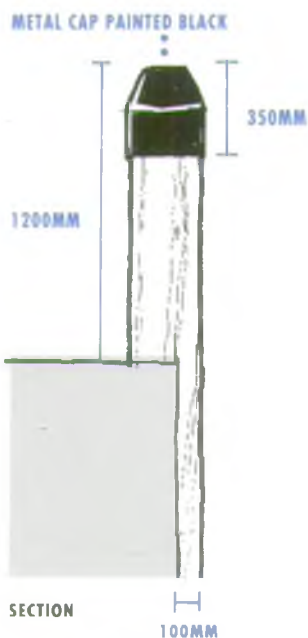


② TIMBER EDGEBEAM DETAIL

③ TIMBER EDGEBOARD TO EXTENDED CHAMBERWALL

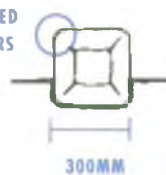


④ TIMBER RISING POSTS



SECTION

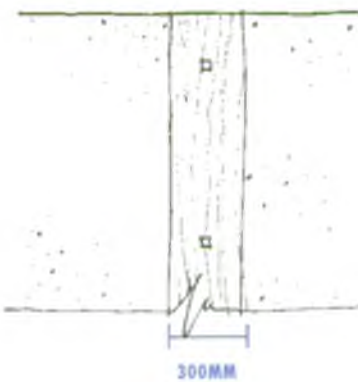
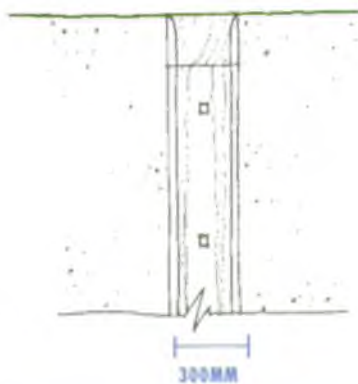
100MM

ROUNDED
CORNERS

300MM

TIMBER OR
GRANITE CAPPING

200MM



⑤ BULLNOSE FENDERS

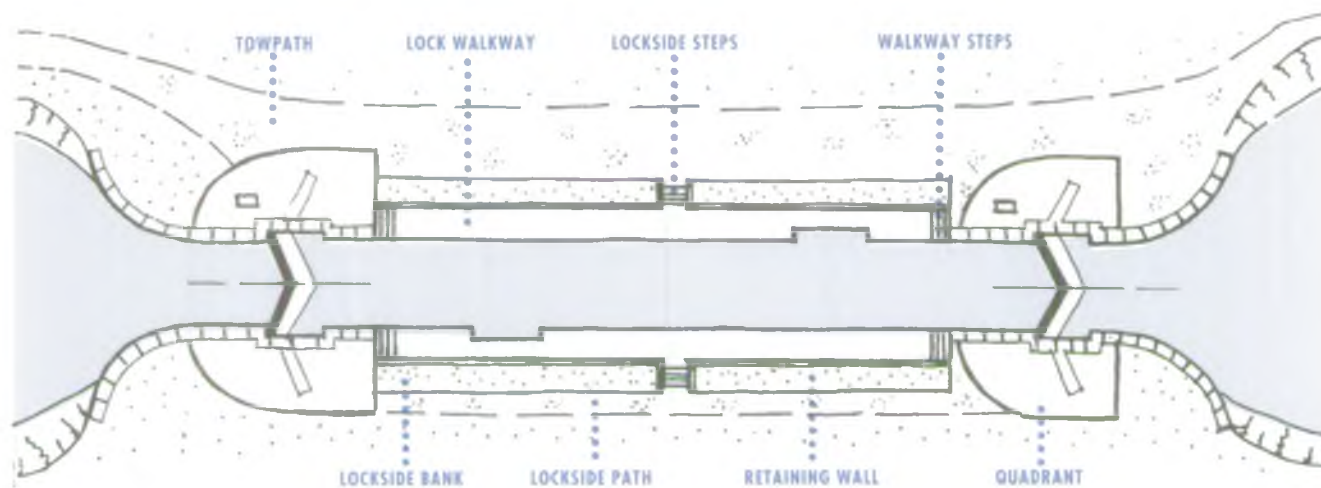
7.1 LOCKSIDE REINSTATEMENTS DESIGN CONSIDERATIONS

In this section, the 'lockside' refers to the immediate vicinity of the lock chamber - an area with strict operational requirements. The lockside area receives intense use from the boating public and reinstatement works are being undertaken to improve the access arrangements at many locks. These works create opportunities to enhance the visual character of lockside components.

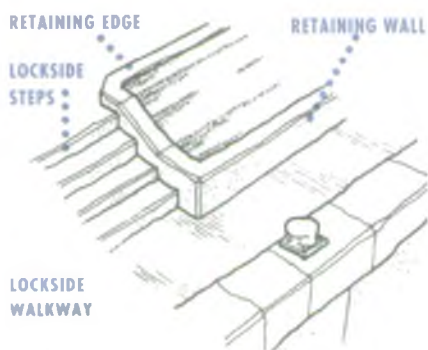
The guidelines in this section provide the basic options for design and detailing of lockside components within the framework set by the lock enhancement strategy (Section 5.2). By selecting the appropriate details the characters of lockside within the defined sections of river should be reinforced consistently throughout the Thames.

The details are not only concerned with visual factors; a primary consideration is to provide safe, well defined access where substantial changes in level between towpath and lock walkway create potential hazards if circulation space is restricted.

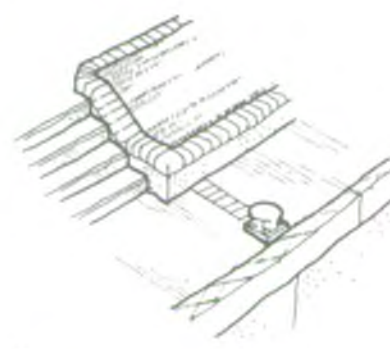
The requirement for reduced maintenance commitments is also considered with regard to choice of durable materials and sound detailing to facilitate ongoing maintenance tasks, and to ensure that repairs do not have to be made in the short term. Opportunities should be taken to reinstate the quadrant surfaces to manual or automatically operated gates. They make a positive contribution to lockside character and help to interpret the historic context of the lock.



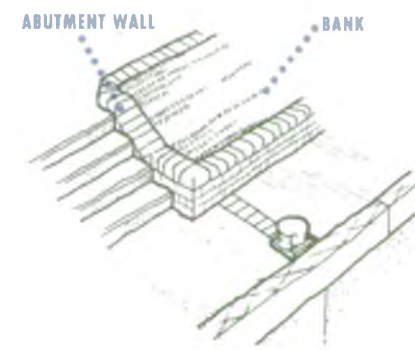
① PLAN OF LOCKSIDE COMPONENTS



② UPPER THAMES LOCKSIDE



③ UPPER & MIDDLE THAMES LOCKSIDE



④ MIDDLE & LOWER THAMES LOCKSIDE

Other relevant sections to be consulted include:

- Colour and finishes
- Thames Locks enhancement strategy
- Chamber refurbishments
- Paving surfaces
- Fixtures

The 'low level' walkway is heavily used by boaters getting on and off boats. Reinstatement works often involve widening the walkway to achieve the required standards (i.e. a minimum of one metre wide, even around the stairwells).

Concrete is the most appropriate surfacing for the walkway due to the following attributes:

- It can be laid in situ with reinforcement mesh to protect against differential settlement.
- Colour, tone and textural finishes can be used to achieve an appropriate visual appearance to match in with existing concrete or granite blocks.
- The neutral appearance of concrete can be used to complement brickwork trim or hardwood edges.
- Concrete surfaces drain well, have good non-slip qualities, and withstand wear and attack from salt used during winter.

Upper Thames

Existing concrete or granite block coping should be retained and the extra required width to the walkway constructed as an insitu concrete slab with a brushed finish applied across the width of the walkway to create a consistent texture. ① ② (Plate 17)

Middle and Lower Thames

Where the walkway has a brick retaining wall behind, with a timber edgebeam against the chamber, the walkway should be constructed in concrete given a brushed finish. A 'soldier course' of brick laid flat should be used to define bollard positions and expansion joints placed midway between those positions. Bricks should match those used in the wall construction.③

EXPANSION JOINT



CONCRETE COPING

① UPPER THAMES

BRUSHED FINISH IN DIRECTION OF FALL



TIMBER EDGEBOARD

② UPPER & MIDDLE THAMES

BRICK SOLDIER COURSE AT BOLLARD POSITIONS

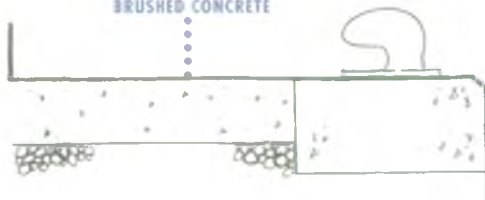


EXPANSION JOINT

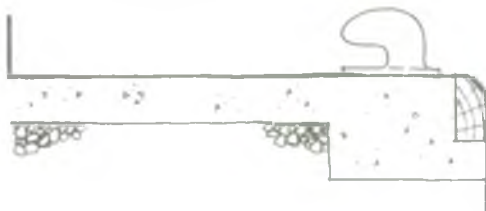
③ MIDDLE & LOWER THAMES

1000MM MINIMUM

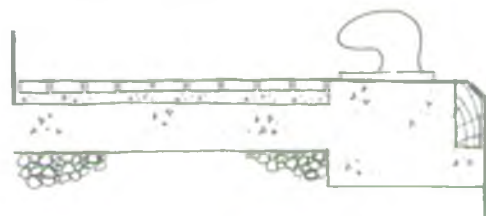
BRUSHED CONCRETE



CROSSFALL 1:60



35MM BRICK SLIPS

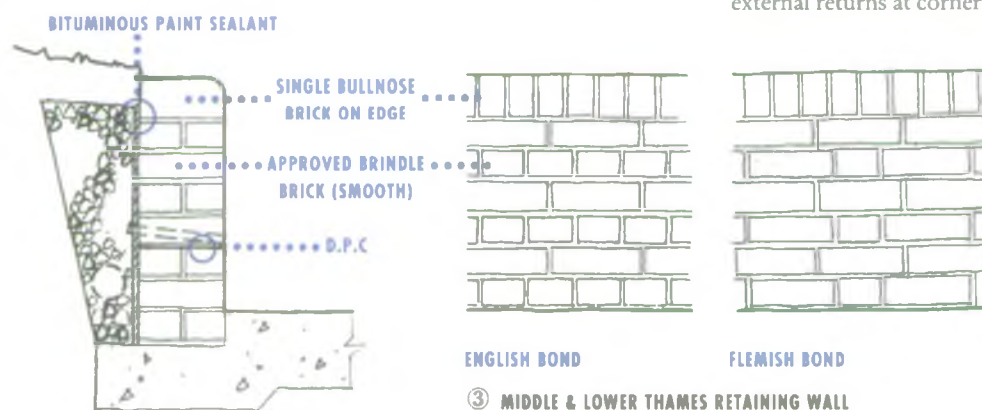
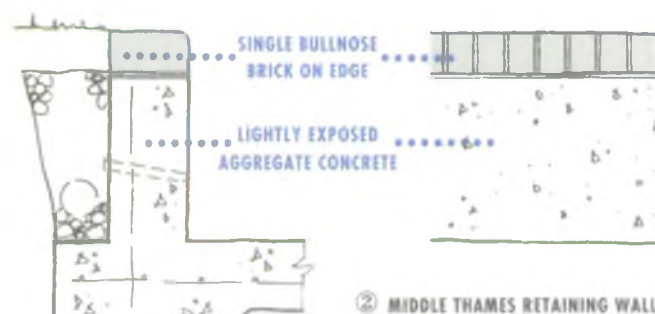
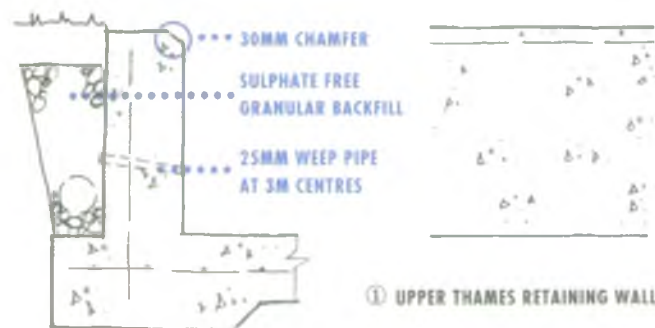


LOCKSIDE REINSTATEMENTS
LOCK WALKWAYS



Low level walkways require a wall or kerb to retain the embankment behind. When a walkway is widened, either the retaining structure has to be made higher or the embankment regraded more steeply. Usually a higher wall is the more practical solution and careful detailing is required to lend character to the wall as it then becomes a visually prominent feature.

Walls must have sufficient footings to eliminate the possibility of differential settlement relative to the lock chamber wall, and should be strong enough to withstand the pressures imposed on them by having piers at regular intervals and weep holes to remove water pressure.



Upper and Middle Thames

Concrete walls cast in situ with steel reinforcement. The appearance of the concrete should be improved by use of natural grey stone aggregate with 'sulphate resistant cement'. A lightly exposed aggregate finish provides texture and helps to quickly establish a weathered appearance. Where brick copings are used they should be single bullnose blue engineering bricks. ① ②

Middle and Lower Thames

- Red/Blue brindle brick with blue copings.
- Blue/buff brindle with blue copings (Lower Thames). (Plates 20 & 21)
- Brickwork should be engineering class bricks (water absorption less than 7%) laid to English or Flemish garden wall bond, bedded in a 1:3 cement/sand mortar with 10mm joints pointed flush. Coping bricks should be Staffordshire Blues on edge, with a single bullnose to the face of the wall. ③

Where appropriate, special shapes should be used to achieve a neat, robust detail. (i.e. stopends to single bullnose copings, external returns at corners).

Safety

Restricted walkway space and substantial changes in level result in a variety of step arrangements which can be potentially hazardous and unnecessarily intrusive.

Lockside steps have a distinct character with characteristically high rises and restricted treads to achieve height in limited space. Well defined edges and consistent detailing become very important considerations. ①



① STEP DIMENSIONS:

The steeper flight of steps tends to slow the pedestrians descent. A wide and gentle flight encourages a hasty descent and so can be a potential hazard in busy lockside spaces. ②

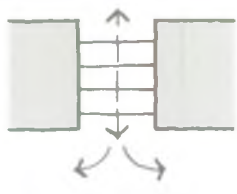
Very wide flights or continuously stepped locksides are not only visually intrusive but also encourage pedestrians to negotiate the flight diagonally creating an obvious trip hazard (especially if there are less than three steps). ③

Flight widths of between 1200-1500mm will encourage movement directly up and down the steps. Flights at either end of the lock walkway should be consistent with the width of the walkway.

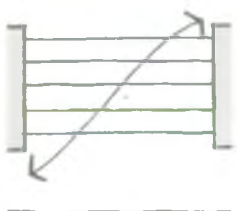
Location and construction

Steps should be strategically located to cater for the lock keeper's access during emergencies. Most locks require steps at either end of each walkway (walkway steps) with a flight placed centrally on both sides of the lock (lockside steps).

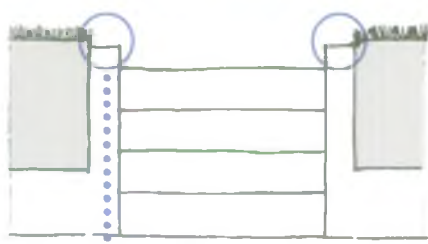
The flight should ideally be bedded into the embankment so that the top of the abutment walls lie flush with the adjacent slope, creating a sound detail which reduces visual intrusion and assists mowing of grass slopes. ④ ⑤



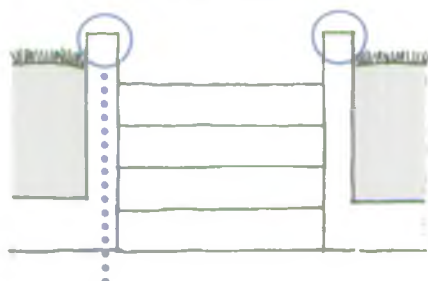
② STEEPER NARROW FLIGHT CONTROLLED MOVEMENT



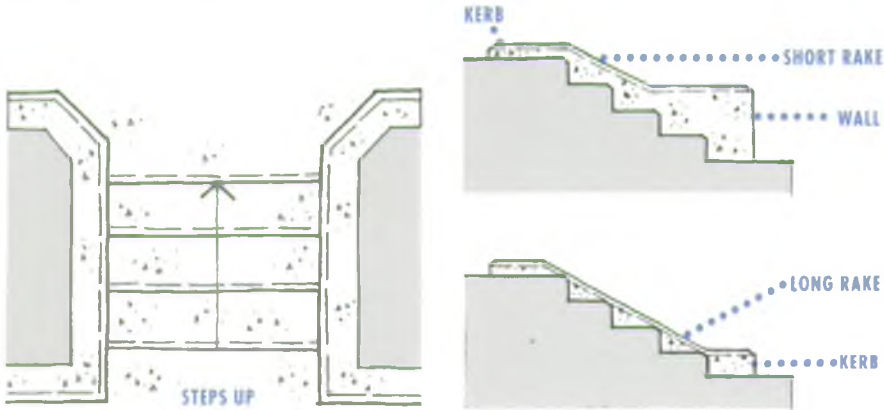
③ GENTLE WIDE FLIGHT HASTY MOVEMENT



④ GOOD DETAILS TO ABUTMENTS

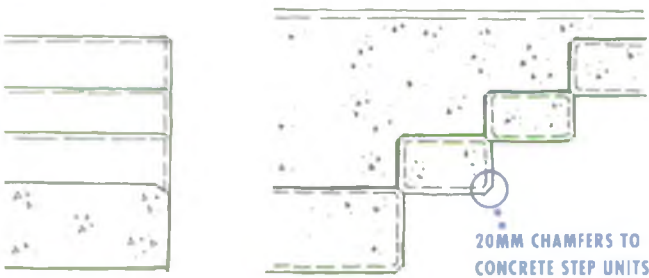


⑤ POOR DETAILS



⑥ UPPER THAMES LOCKSIDE STEPS: PLAN

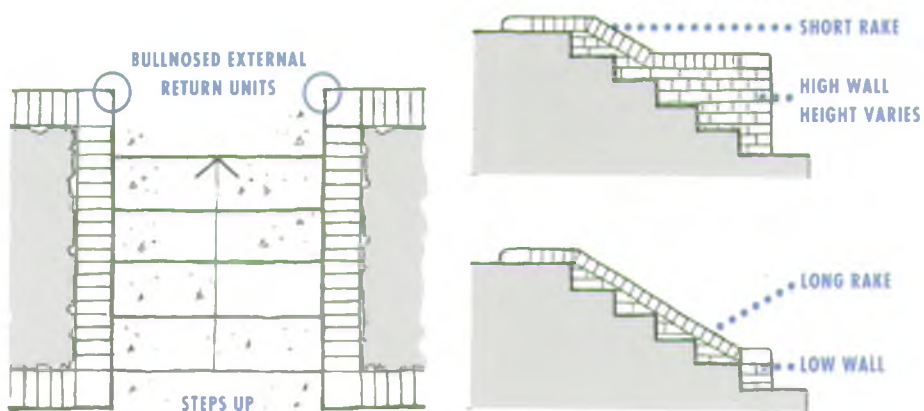
ABUTMENT WALLS: SECTIONS



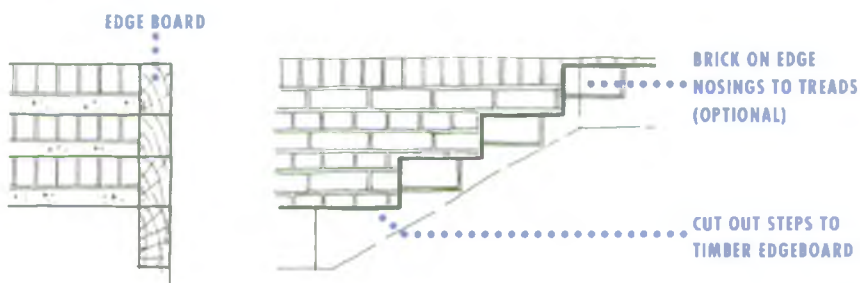
⑦ UPPER & MIDDLE THAMES WALKWAY STEPS: ELEVATION & SECTION

Abutment walls should be constructed in the same materials used for the walkway retaining wall or kerb. The steps are an extension to the walkway surface materials and should be built to shed water rapidly to provide good footgrip in wet conditions.

In situ concrete constructions should have a 'brushed' finish. Where engineering bricks are laid as nosings to each tread, they should match those used in the retaining wall and be without chamfered or bullnose edges. ⑨



⑧ MIDDLE & LOWER THAMES LOCKSIDE STEPS: PLAN ABUTMENT WALLS: SECTIONS



⑨ MIDDLE & LOWER THAMES WALKWAY STEPS: ELEVATION & SECTION

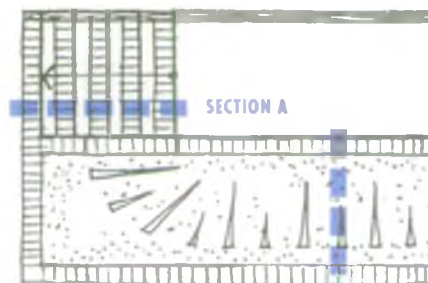
The grass slopes and planting beds on either side of the lock provide an important visual foil to adjacent constructed areas. The retaining wall should be detailed at either end of the walkway to contain the bank in a neat and manageable way.

Turf Banks

Banks in excess of 1000mm width are more suited to grass turves laid over an accurately profiled slope. Both planting and turf laying works will require a specification to include details on backfill material, topsoil quality and depths, and plant species prepared by the landscape architect. ① ②

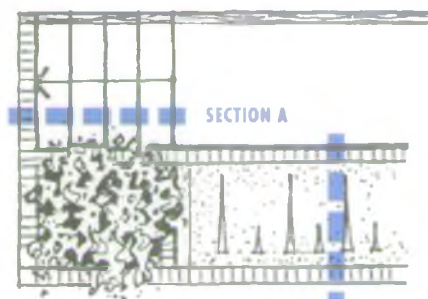
Planting Beds

Banks less than 1000mm width are more suited to groundcover planting which discourages pedestrians encroachment on to steep banks and also helps to soften the hard construction details such as lockside steps and walls. ③



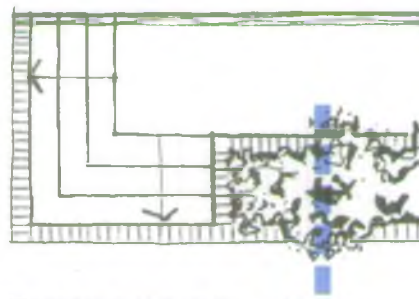
① TURF BANK

SECTION B



② TURF BANK & PLANTING BED

SECTION B



③ LOCKSIDE PLANTING BED

SECTION

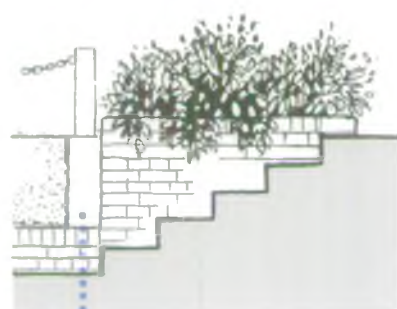


SECTION A

RETAINING EDGE



SECTION B

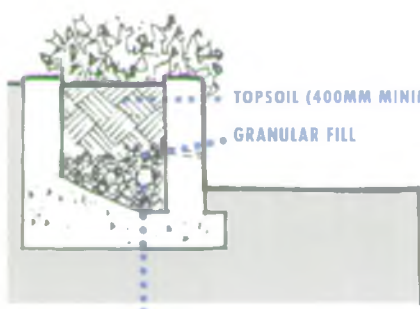


BRICK MOWING EDGE

SECTION A



SECTION B



SECTION

DRAINAGE PIPE

Edges

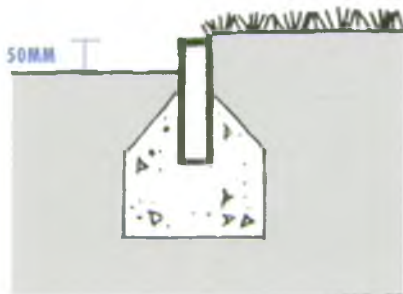
Retaining edges at the top of lockside banks have a number of practical functions:

- Edges act as a restraint to adjacent surfaces. It may be practical to have a flush edge to enable surface water to drain into planting beds or grass banks.
- Upstanding edges block surface water so that a fall is required to drain potential water collection areas.
- Edges retain the soil in planting beds, and prevent grass from growing into adjacent surfaces.
- Where the upper surfaces of the solid turf is laid slightly proud of the edging, the grass can be trimmed or cut easily to produce a neat finish.

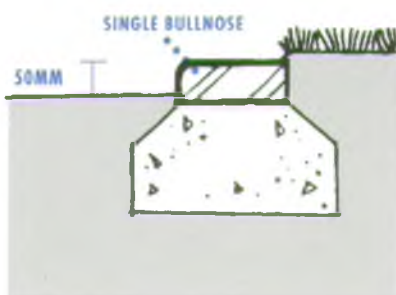
Materials selected for retaining edges should match those used in the construction of adjacent retaining or abutment walls. They should also relate well to adjacent paving treatments. (Section 8.0)



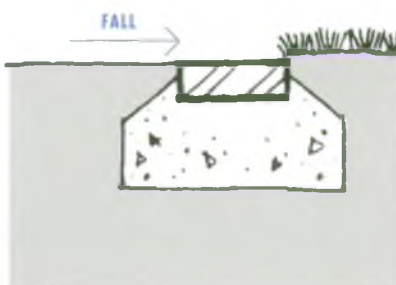
① IN SITU CONCRETE



② CONCRETE PIN STRIP



③ UPSTANDING BRICK



④ BRICK LAID FLUSH

The quadrant is the surface area contained within the arc of the lock gate balance beams. Where beam locks still exist in the Upper Thames the quadrants are important features designed to assist manual operation of the gates. Hydraulically operated gates no longer have balance beams although parts of earlier quadrant surfaces often remain in place.

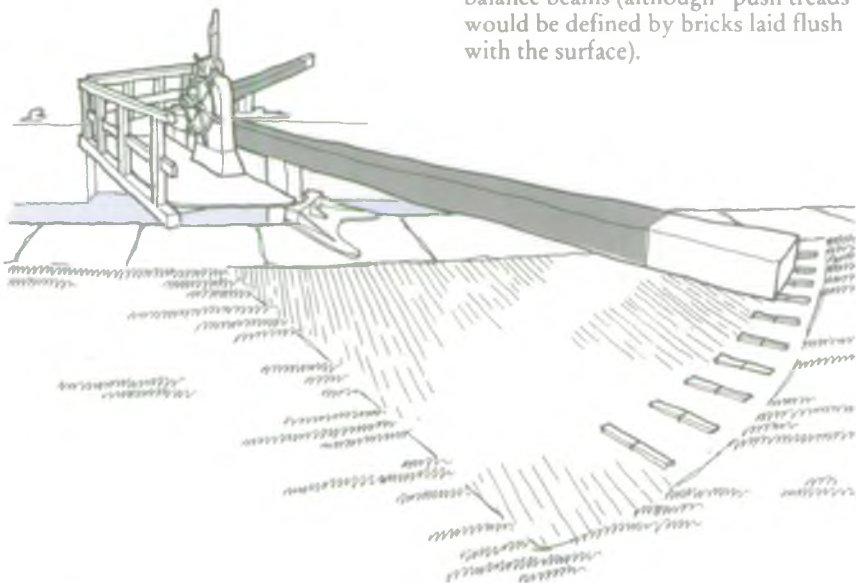
Special surface treatments to quadrant areas serve a number of purposes:

- For beam locks a set of push treads are built into the surface following the radius of the beam to assist leverage in opening and closing the gates.

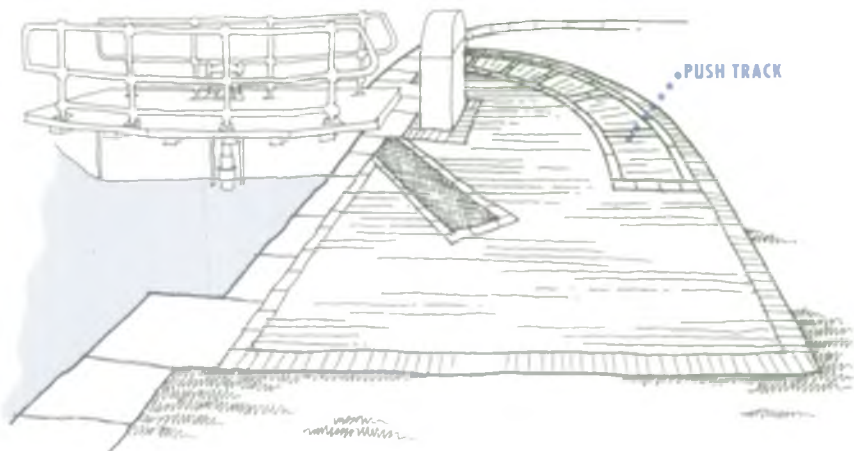
- The surface treatments are designed to cope with frequent and robust use of the area which otherwise would become eroded and ineffective in poor conditions.

- The quadrant area should be defined as an operational area for both manual and hydraulic locks so that when in use the public are encouraged to stay outside the defined area.

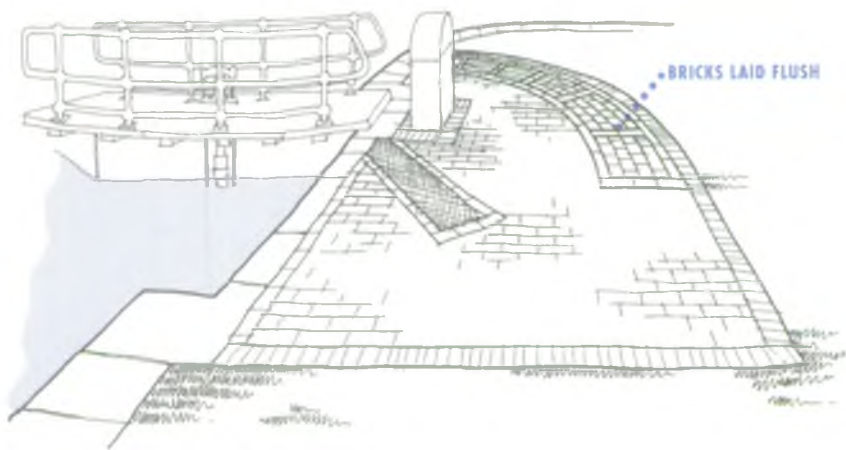
- Quadrants are an opportunity to integrate various features - gates, pedestal, ram pits, grass margins and steps - using appropriate materials. In certain cases the historical context to modern gates can be interpreted by incorporating the arc of the original balance beams (although "push treads" would be defined by bricks laid flush with the surface).



① UPPER THAMES BEAM GATE QUADRANT
SEE DETAILS ④ ⑤ ⑥ ⑦



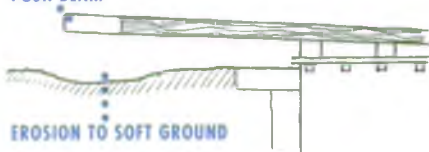
② MIDDLE THAMES CONCRETE/BRICK QUADRANT
SEE DETAILS ⑧ ⑩



③ MIDDLE/LOWER THAMES BRICK QUADRANT
SEE DETAILS ⑨ ⑪

Upper Thames (beam lock quadrants)

PUSH BEAM



The quadrant should be set out to correspond accurately to the beam arc of movement. The surface treatment consists of an in situ concrete slab laid to a fall of 1.40 with a “brushed” finish.

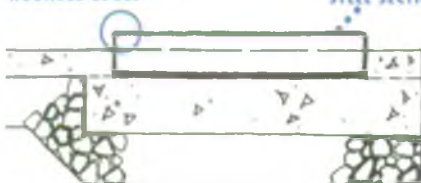
The push treads consist of either blue engineering bricks on edge or steel sections bolted into the concrete at 300-400mm centres.

BLUE BRICK ON EDGE SET INTO CONCRETE



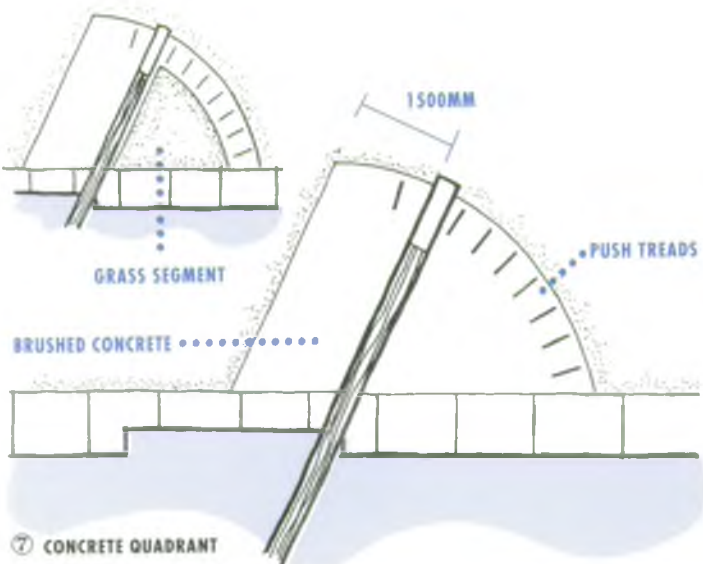
⑤ BRICK TREAD DETAIL

ROUNDED EDGES



⑥ STEEL TREAD DETAIL

Where the quadrant is set within open lawn areas the concrete surface area can be reduced by retaining a grass segment inside the arc of the push treads. (Plate 1)



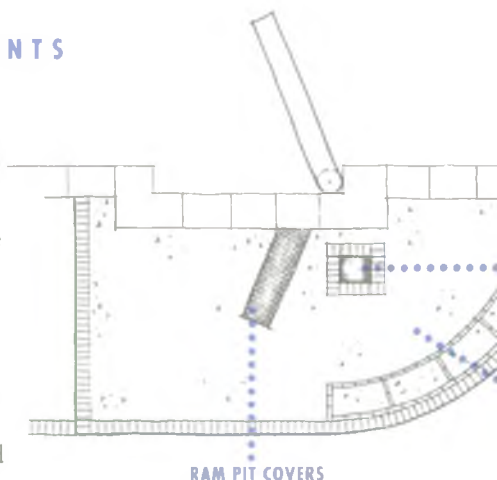
- 30MM UPSTAND
- 70MM SCREED
- 50MM SLAB
- VARIES

- 30MM UPSTAND
- 50MM CONCRETE SCREED
- 100MM CONCRETE SLAB
- VARIES

Middle Thames

The quadrant is set out within existing spatial constraints to tie in with steps and grass margins. The 'push tracks' are set at the original arc if known, or the centre line of the tracks set to a radius of between 3000-3500mm from the gate heel post.

Surface treatment consists of a concrete slab laid to a 1.40 fall with a medium exposed aggregate finish. Brick trim and edges should be blue engineering class bricks bedded with 10mm joints in 1.3 cement/sand mortar.



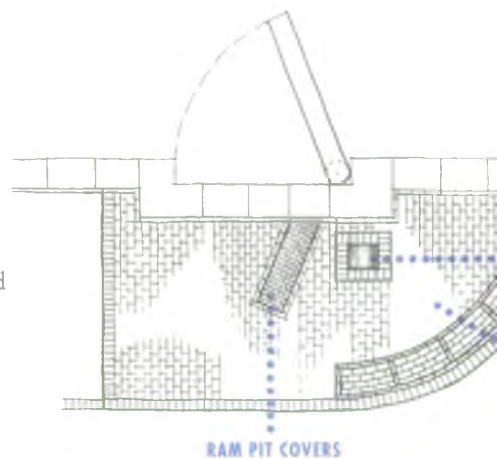
8 CONCRETE AND BRICK QUADRANT

Middle and Lower Thames

The quadrant is set out as for the Middle Thames concrete detail.

The surface treatment consists of red/blue or blue/buff brindle engineering bricks laid in stretcher bond bedded in mortar over a concrete slab and given a 1.40 fall. Edging to the quadrant and the trim to 'pedestal' and 'tracks' should be in blue or red engineering bricks laid flat.

The brick surfaced quadrant is particularly appropriate where the chamber walls or wingwalls are constructed in brick or where brickwork is prevalent within the lock scene.

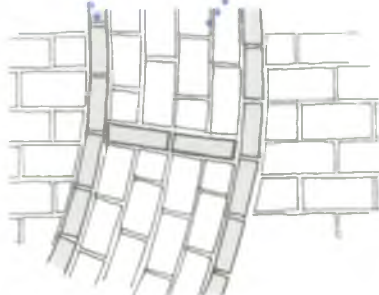


9 BRICK QUADRANT

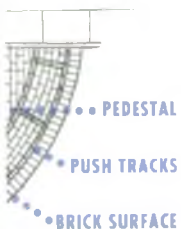


BRICK ON EDGE

BRICK LAID FLAT



10 BRICK PUSH TRACK DETAILS



PEDESTAL SURROUND DETAILS: PLAN & SECTION

At most lock sites large areas are devoted to 'hard' surfaces for both pedestrian and light vehicular traffic. Treatments selected can make a substantial contribution to the appearance of the site and help to reduce maintenance commitments. **All treatments chosen should accord with the lock enhancement strategy in Section 5.2.**

A useful distinction can be made between 'sealed' and 'unsealed' surfaces:

Sealed surfaces

Require a fall to shed water efficiently and prevent puddling. Where surface water cannot be shed directly into the lock or planted area, drainage infrastructure may be required, at extra expense.

With regard to visual appearance sealed pavings fall into two categories:

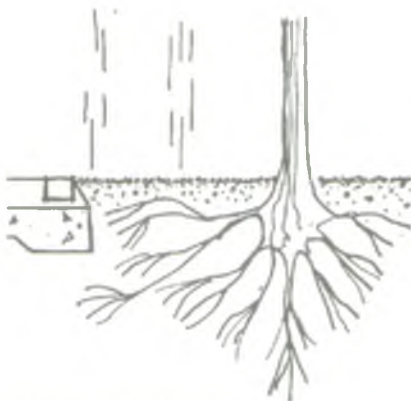
- Bound macadam and in situ concrete treatments allow the use of various colours and size of natural stone aggregates to create interesting textures and neutral colourings which when used discreetly, present a unified 'backdrop' to the lock scene.

- Unit pavings such as clay bricks, concrete blocks or stone setts can be used to combine appropriate colours with bond patterns. These materials need to be handled carefully in more formal situations in order to reflect local character. Unit pavings tend to be used either as trim or edges to complement adjacent areas of bound macadam and concrete treatments or as continuous surfaces over more extensive areas.

Unsealed surfaces

Allow rainwater to percolate through the aggregate and soak away gradually into the ground. This is a practical treatment for areas surrounding mature trees or planted beds as it allows water and air to penetrate to the root zone, and it responds flexibly to any upheave due to root growth.

Unbound compacted stone surfaces create an informal and visually pleasing appearance although proper specification is critical to achieve a robust finish (which requires only occasional reinstatement of worn areas).



LOOSE GRAVEL SURROUND

Surface treatments detailed in this section are considered primarily with respect to visual effects and techniques which can be used to enhance the treatment. Full technical specifications are not provided.

Edgings

Locksides tend to generate a lot of edges due to the complex pedestrian circulation arrangements. Some edgings should be 'picked out' to emphasise certain routes or hazard areas; other should be played down. (Section 7.5)



FLUSH EDGE



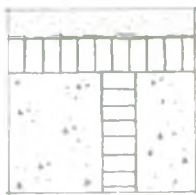
UPSTANDING EDGE

Edgings act as a restraint to the paving construction and provide definition to the surface boundary. Edgings which are 'flush' with the surface will be less visually intrusive than upstanding 'kerbs' which create hard visual edges, impede surface water run off and can be a trip hazard.

The unit size of edgings will determine how corners and changes in direction can be handled. Small units such as bricks and sets allow a range of angles and radii to be used to facilitate easier pedestrian circulation and visually attractive alternatives to square corners.



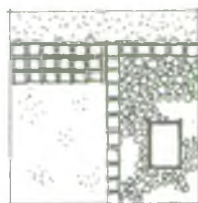
BRICK ON EDGE
ANGLED CORNER



BRICK TRIM
AND EDGING

Trim

'Trim' refers to those materials used to divide large areas of a single paving material in order to reduce its scale and enliven its appearance. Trim can also be used to define boundary lines or potentially hazardous features such as bollard positions or changes in level at steps and ramps. Expansion joints to in situ concrete surfaces can also be integrated effectively with trim. Features which may occasionally need to be modified or reinstated such as posts, bollards and tree pits may benefit from a trim surround which can easily be replaced after the work.



STONE SETT AND
COBBLESTONE TRIM

Other relevant sections

- Colour and finishes
- Thames locks
- Lockside reinstatements



STONE SETT
RADIAL EDGING

Certain pedestrian surfaces in the river environment require specific non-slip treatments which provide better foot grip than the regular paving surfaces which may become slippery in damp or icy conditions. For example, timber decked walkways, lock gate stages, chamber steps and bridge deck ramps are typical waterside situations which are potentially hazardous to either boating public or casual visitors.

The foot grip provided by regular paving surfaces should not be overlooked for use in less critical and well drained locations. Textured concrete, concrete blocks or clay bricks with a rough finish and rough sawn timber are hard wearing, have a better appearance and require less maintenance than specific non-slip applications.

The following table provides recommendations on the selective application of various non-slip treatments:

* THE SPECIFICATION OF ALL THESE SURFACES CAN INCLUDE VARIATIONS OF AGGREGATE SIZE TO CREATE COARSE OR FINE TEXTURES. IT IS THEREFORE IMPORTANT TO WEIGH UP THE AMOUNT OF EXTRA GRIP REQUIRED FOR SAFETY REASONS AGAINST THE HARSHNESS OF THE SURFACES. WHERE PEOPLE ARE LIKELY TO JUMP ONTO THE SURFACE (E.G. LOCK LAY-BYS) IT IS ADVISABLE TO USE A FINER AGGREGATE WHICH IS LESS 'GRIPPY'. A COARSE AGGREGATE MAY CAUSE PEOPLE TO OVERBALANCE AND GRAZE THEMSELVES ON THE SURFACE TREATMENT. A CROSS-FALL WILL BE NECESSARY TO KEEP SURFACES WELL DRAINED.

TREATMENT	CHARACTERISTICS	RECOMMENDED USES
STUCK DOWN AGGREGATE SURFACES		
EPOXY WITH GRIT * VISCIOUS EPOXY RESIN SPREAD DIRECTLY ONTO SURFACES TO BE TREATED AND SPREAD WITH A LAYER OF AGGREGATE IN SITU. THE COLOUR AND SIZE OF AGGREGATE MAY BE VARIED TO COMPLEMENT ADJACENT SURFACES.	DUE TO THIS MATERIALS FLUID NATURE IT IS NECESSARY TO PLAN IN ADVANCE A METHOD OF CONTAINING THE VISCIOUS RESIN TO ENSURE A NEAT EDGE TO AREAS RECEIVING THE TREATMENT. ALSO A NEED TO BRUSH OFF ANY LOOSE GRIT ON NEW APPLICATIONS TO PREVENT DAMAGE TO BOAT DECKS BY GRIT PICKED UP ON FEET. RESIN IS SOLVENT BASED AND SHOULD BE DECANTED OFFSITE TO AVOID SPILLAGE INTO RIVER. THIS TREATMENT ADHERES WELL TO ANY SOLID SURFACE AND IS VERY DURABLE (REPLACE EVERY 3-4 YEARS).	CONCRETE STEPS CONCRETE BRIDGE DECKS
PREFORMED SHEET SURFACES * REINFORCED ROLLS SPREAD WITH EPOXY RESIN AND GRIT MIX TO BE CUT TO SHAPE AND STUCK DOWN ONTO THE RECEIVING SURFACE. PROPRIETARY MATERIALS MAY ALLOW SOME VARIATION IN COLOURS.	VERY EASY TO APPLY, BEING PRE-GLUED WITH A PEEL OFF MEMBRANE AND EASILY CUT TO SHAPE. NO POLLUTION RISKS. WHEN USED ON TIMBER IT IS IMPORTANT TO MAKE SURE THAT THE MOISTURE CONTENT OF THE WOOD HAS BECOME STABLE AFTER FIXING INTO PLACE, OTHERWISE THE ADHESION MAY BE LESS THAN PERMANENT (REPLACEMENTS 1-2 YEARS).	TIMBER DECKED LAY-BYS TIMBER DECKED BRIDGES (RAMPED SECTIONS)
PRE-FORMED PLY BOARDS WITH EPOXY AND GRIT * PLYWOOD BOARDS ARE PRE-COATED WITH EPOXY RESIN AND GRIT SECURED TO THE RECEIVING STRUCTURE. PROPRIETARY MATERIALS MAY ALLOW SOME VARIATION IN COLOURS.	THE MOST DURABLE PREPARATION (REPLACEMENTS EVERY 5 YEARS PLUS), WITH THE NON-SLIP SURFACING BEING HIGH QUALITY FACTORY LAID. IF PLYWOOD BOARDS, BOLTED OR NAILED DOWN, ARE EASILY BUILT INTO STRUCTURES AND THEN REMOVED FOR REPAIRS WHEN REQUIRED.	SLOPING BRIDGE DECKS LOCK GATE WALKWAYS PRE-CUT DECKING PLANKS
TIMBER NON-SLIP SURFACE TREATMENTS		
MACHINE GROOVED AND ROUGH SAWN TIMBER. CONSISTENT WIDE GROOVES 6MM X 6MM SQUARE ALONG THE LENGTH OF DECKING PLANKS.	DRAIN SURFACE WATER OFF PLANKS; PROVIDES ADEQUATE GRIP IN NORMAL CONDITIONS WHEN WELL VENTILATED; PRESERVES THE LOOK AND FEEL OF THE TIMBERS UNDERFOOT.	LEVEL DECKING TO LAY-BYS OR BRIDGES AND BOARDWALKS
CONSISTENT NARROW GROOVES APPROX. 2MM X 2MM ALONG THE LENGTH OF DECKING PLANKS.	IMPROVED GRIP FOR BOATING FOOTWEAR IN NORMAL OR DAMP CONDITIONS WHERE TIMBER FINISH DESIRED. DAMP LEAF LITTER MAY BE A SLIP HAZARD. MAY WEAR SMOOTH UNDER HEAVY USE.	AS ABOVE
STEEL PANELS		
OPEN STEEL GRATINGS.	FREE DRAINING IN WET CONDITIONS BUT NOT SATISFACTORY WHEN ICY. REQUIRES HANDRAIL CLOSE TO HAND. TRANSPARENT EFFECT THROUGH GRATING WHEN VIEWED FROM ABOVE CAN BE DISCONCERTING.	WALKWAY FOR OFFSHORE LAY-BY OR OPERATIONAL STRUCTURES
PERFORATED STEEL PLATES.	DRAIN FREELY BUT CAN BE GIVEN UPSTANDING TEXTURE TO PROVIDE GRIP. NEEDS TO BE KEPT FREE OF DIRT AND OILY SUBSTANCES.	WALKWAYS TO OPERATIONAL STRUCTURES E.G. WEIR STRUCTURES.

Exposed Aggregate Finish

● Use and appearance

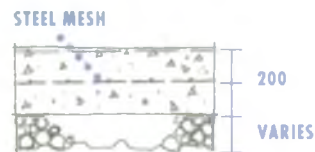
Concrete is an extremely versatile and durable material suitable for both vehicular and pedestrian paving in rural and urban situations. Care should be taken in choice of aggregate and technique to ensure that an appropriate textural effect is achieved together with good anti-skid properties. (Plate 16) A concrete needs to be laid as individual slabs separated by expansion joints which can be used advantageously to accommodate brick or stone trim to reduce the scale of large expanses of concrete surface.

● Specification Notes

The effectiveness of this treatment depends upon three factors, the cement mix, aggregate and method of exposure. The aggregate should be of well graded stones ranging from 20-30mm, preferably of angular shape (and local origin to reduce costs). Granites and hard limestones are ideal and can be mixed with local gravels to introduce local colours, although rounded pebbles are not recommended as they tend to get polished smooth with use.

The cement mix which incorporates a quantity of natural coloured sand (without pigments) will enhance the appearance of the graded aggregate. Sulphate resistant cement tends to have a darker tone preferable to 'white cement'.

The method of exposing the aggregate should be applied consistently over the whole surface to match a previously approved sample.

MEDIUM CUT RETARDANT**PEDESTRIAN****LIGHT VEHICULAR****VEHICULAR****EXPOSED AGGREGATE TEXTURE**

The least expensive method involves use of a 'medium cut' retardant to enable a proportion of cement and fines at the surface to be successively brushed and washed away to achieve the desired texture. Grit-blasting and mechanical brushing techniques used on hardened surfaces allow more precise control but are more expensive techniques. The final appearance of the exposed aggregate may be spoiled by mechanical abrasion.

Textured Finishes

● Use and appearance

This treatment is particularly suitable for small scale work such as pedestrian walkways, ramps and restricted areas of hardstanding. The concrete can be laid in situ and be given a surface texture by hand, where space for mechanical plant may be confined. These textures when applied have good non-slip qualities and allow the surface to drain easily with the fall.

● Specification Notes

The finished appearance depends upon the colour of the concrete as well as the texturing.

Use of grey stone aggregates such as limestones and grit stones together with a dark sand or pulverised fuel ash (PFA) can help to darken the tone of the new concrete. A sulphate resistant cement (SR) is preferred as it tends to dry grey, unlike the 'white cements'.

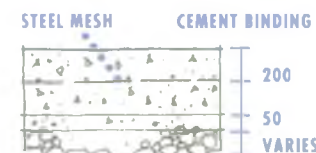
Textures which are cost effective are easily applied and two treatments are particularly appropriate.

● Brushed finish. When the concrete is still green a texture is applied with a stiff bristled broom drawn across the surface in the direction of the crossfall.

The brushed texture should be applied as consistently as possible throughout the surface. (Plate 17)

● Tamped finish. A lightweight board with a square, chamfered or round edge is used to tamp the concrete surface at parallel and evenly spaced intervals.

The grooves should not be too deep and should run either parallel to the crossfall or, on ramps, they should form a 'V' pattern running from the centre out and so draining water to the sides.

BRUSHED FINISH**PEDESTRIAN****VEHICULAR****BRUSHED
TEXTURE****TAMPED
TEXTURE**

PAVED SURFACES BOUND MACADAM

Bitumen Macadam (and Tar Spray & Chippings)

● Use and appearance

Suitable for busy pedestrian routes through the lockside and lightly trafficked vehicular driveways or parking areas.

A top dressing of small stone aggregate bound into the wearing course enhances the surface texture and colour to create a more informal effect. (Plate 18)

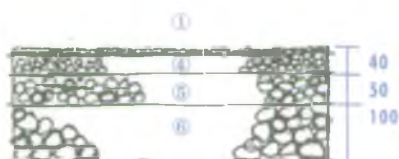
● Specification Notes

The aggregates should be of local origin preferably medium textured graded limestones, bound with bitumen to form the wearing course.

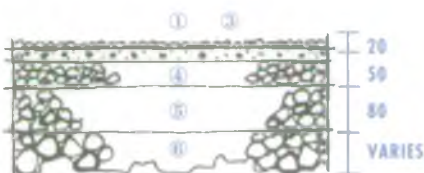
The surface dressing should consist of uncoated limestone or granite fine aggregates, spread and rolled into the wearing course and bound with a 'cut back' bitumen. Some of the dressing aggregate will remain loose on the surface, and this is acceptable where vehicles are not travelling at high speeds. Sub base and base course construction should be designed according to expected use and a fall of 1.60 to the finished surface as required.



PEDESTRIAN



LIGHT VEHICULAR



HEAVY VEHICULAR

- ① GRAVEL DRESSING 6-9MM ROLLED INTO CUT BACK BITUMEN COAT
- ② 6-9MM AGGREGATE BITMAC WEARING COURSE
- ③ BITUMEN WEARING COURSE
- ④ 20MM (MAX) AGGREGATE BITMAC BASE COURSE
- ⑤ 25MM (MAX) AGGREGATE BITMAC BASE COURSE
- ⑥ COMPACTED GRANULAR FILL ROAD BASE

Sealed Gravel

● Use and appearance

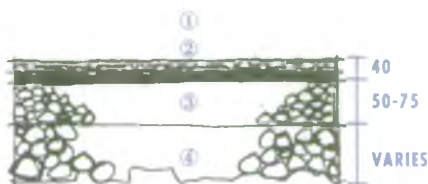
Suitable for pedestrian areas and footpaths in the vicinity of the lock where an informal appearance is required together with the durability and non-skid qualities not achieved with unsealed gravel surfaces.

The treatment is particularly suitable for small or awkward areas where materials can be consolidated with a vibrating plate machine.

● Specification Notes

The sharp chippings should be of local origin, preferably limestones, gritstones or granite of 20 mm single size spread over a layer of cold bitumen emulsion and rolled to form a 30-40mm wearing course. A base course of well consolidated graded limestone aggregate will be required and designed according to existing ground conditions to form a crossfall of 1 in 60.

Care should be taken in removing all weed or moss growth from the sub grade to ensure that future decomposition does not effect the stability of the surface.



- ① 20MM GRAVEL CHIPPINGS
- ② COLD BITUMEN EMULSION
- ③ 25MM AGGREGATE BASE COURSE
- ④ COMPACTED GRANULAR FILL SUB BASE

Brick

● Use and appearance

Where there are brick structures existing on site or within the immediate vicinity, areas of brick paving can be introduced to the look scene. The colour and pattern in brickwork lends a formal and decorative character to pedestrian routes associated with urban areas. The treatment is also suited to small areas of hardstanding, seating areas and 'aprons' to small buildings or information points.

● Specification Notes

Clay engineering class paving bricks with a water absorbency of less than 7% are most suitable for pedestrian areas.

Clay pavers have a micro texture providing non-slip qualities and should meet BS 3921 classification of frost resistance. The most suitable colours for paving work are the 'multibrindle' type which blend red/blue or yellow/brown colourings within individual bricks to create warm attractive surfaces.

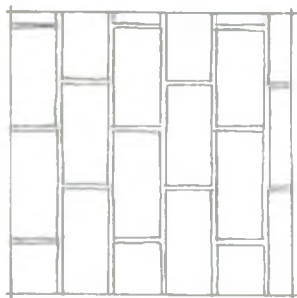
(Plates 20 & 21)

Brick paving should be designed in terms of multiple units to appreciate the full effect of multibrindle patterns and to ensure that the paving bond, joints, edges and necessary cutting of pavers is fully considered. Normal sized bricks (215 x 102.5 x 65mm) are suitable for 'rigid pavings' bedded on a concrete foundation in running bond. Rectangular pavers (215 x 100 x 50mm) are suited to flexible pavings dry laid on a sand bed, where more decorative bonds are used.

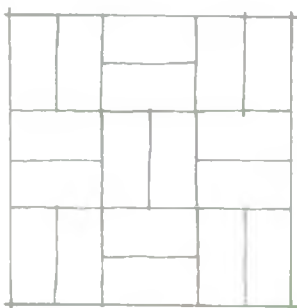
Bonds for rigid pavings bedded in mortar are 'running bond' or 'basket weave bond' both with 10mm mortar joints.

Bonds for flexible paving are the 'square herringbone bond' and 'running bond' with pavers butt jointed.

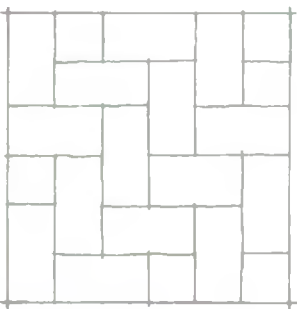
Edge restraints should consist of brick on edge or laid flat, bedded and haunched in mortar. The formation specified for paved areas should allow a fall of 1 in 40 for surface drainage into planted areas or a brick channel to soakaway.



RUNNING BOND



BASKET WEAVE BOND



HERRINGBONE BOND



RIGID PAVING



FLEXIBLE PAVING



DRAINAGE CHANNEL

- ① COARSE SAND
- ② MORTAR
- ③ CONCRETE BASE

Concrete Blocks

- Use and appearance

The concrete block system is an appropriate treatment for strictly functional surfaces which need to be durable and presentable, i.e. small parking areas, hardstandings and lay-by surfaces set away from the lockside.

Concrete blocks do not have the natural aesthetic qualities of natural clay pavers but the 'neutral' pigments do weather to a satisfactory appearance. High chroma pigments (pinks and greens) should be avoided. Concrete blocks do not mix well with brick treatments, although they do complement in situ concrete pavings. Where service runs are installed under block pavings the surface can be reinstated although great care is required to achieve an evidently undisturbed appearance.

Elaborate interlocking block systems are not necessary or appropriate within the lock site.

- Specification Notes

Concrete blocks should be of rectangular shape with a length width ratio of 2:1 (e.g. 210 x 105 x 65mm). This shape allows the blocks to be laid to either 'running bond' or 'square herringbone bond'. The blocks are consolidated between square block or special canted edge restraints where a kerb is required. The chamfered upper arrises allow sand to be brushed into the butt joints and also enhances the texture of the surface.

Appropriate colours are restricted to Charcoal Grey, the Charcoal/Red Brindle (or a percentage mixture) which recede in the lock scene, or the Cream/ Buff pigments which are brighter and help to lighten dark spaces. (Plate 19)

The formation should allow for a surface fall of 1 in 40

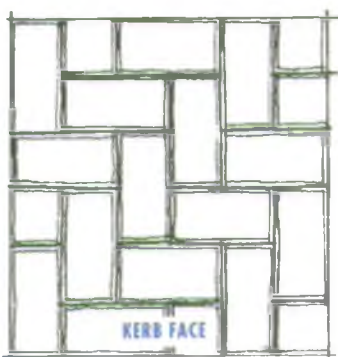


CANTED KERB

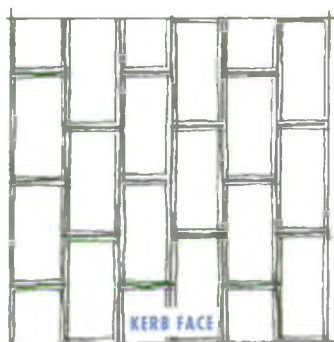


BLOCK KERB

- ① COARSE SAND
- ② MORTAR
- ③ CONCRETE FOUNDATION
- ④ GRANULAR FILL



SQUARE HERRINGBONE BOND



RUNNING BOND

Stone Setts

● Use and appearance

Granite sett paving is an appropriate substitute for brick where used as a 'decorative treatment'. The setts can be used to enliven extensive areas of bound macadam or concrete surfaces and aid the visual transition between areas of contrasting materials. Formal parking areas which may be enhanced by stone sett edging and trim. (Plate 22)

● Specification Notes

Granite setts are often an irregular square shape (approximately 100x100x100mm). Colours vary from grey to pinks and greens although old setts are often polished dark by previous use.

A single line of setts will provide a satisfactory edging and can also form an attractive radius at corners. Three or five courses of setts laid in 'running bond' or 'breaking bond' create more visual impact and may be used to form a shallow surface catchwater channel where necessary.

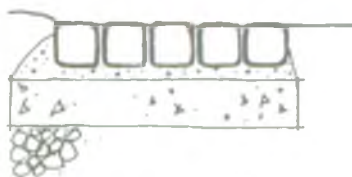
Setts should be laid on a firm concrete foundation and properly haunched and pointed in mortar. Precast concrete setts with a 'split stone' texture, are available from certain concrete manufacturers and may be used to similar effect.



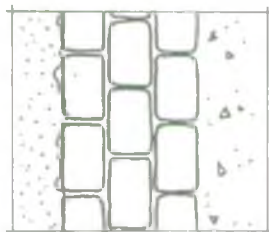
SETT EDGE



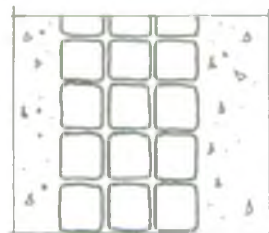
SETT CHANNEL



SETT TRIM



RUNNING BOND



BREAKING BOND

Cobblestones

● Use and appearance

The decorative appearance of cobblestone paving in the townscapes of the Middle to Lower Thames, is distinctive and quite appropriate for use in the riverside scene. The egg shaped rocks have been rounded smooth by the abrasive action of rivers and streams improving their finish and colouring. Cobblestones should be used discriminately; the small unit size and decorative potential makes the stones particularly suitable for awkward areas of trim around fixtures or plants. The irregular surface also acts as an informal pedestrian deterrent to encroachment on vulnerable or unsafe areas.

● Specification Notes

The stones should be procured from an approved source (e.g. firms quarrying sedimentary rocks or flint stones in chalk, for other purposes).

Shapes vary, but round and oval stones of sizes ranging between 50-100mm diameter mix easily.

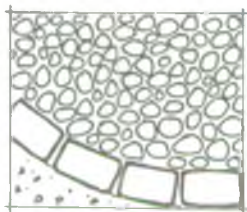
Stones should not be laid in a single line as edging. They are most effective laid en bloc with stones distributed carefully to create a consistent, 'random effect' pattern against a regular edging of brick or stone setts.

Where cobblestones are placed in mortar over a concrete slab or hardcore, they should be bedded to over half their depth with the best face upwards to ensure that they are not easily dislodged.

STONE SETT EDGING



COBBLESTONE PAVING



COBBLESTONE TRIM

Rolled Gravel and Shingle

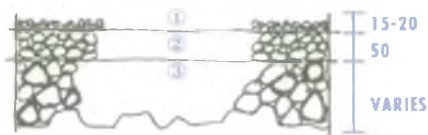
● Use and appearance

This treatment can be very attractive and functional in lightly trafficked 'non-operational' areas such as parking spaces amongst trees or marginal lockside areas where grass will not establish effectively. The surface material is very durable when laid over a well consolidated base and, depending upon which gravel is used as a top dressing, can compliment other treatments very well. The surface is particularly useful where trees are growing because air and water is allowed to penetrate to the roots.

● Specification Notes

A range of aggregates are suitable for various purposes. Graded gravel chippings bond well and therefore are appropriate for parking areas. Single sized (6mm) stone chippings and river aggregates such as pea shingle do not bond quite so well but do create a more decorative surface treatment which will tolerate light pedestrian use.

To avoid erosion and rutting of the surface it is essential that the base material is well consolidated, and that the surface dressing contains enough fines to act as a binder when rolled.

**ROLLED GRAVEL**

- ① 6-9MM GRAVEL CHIPPINGS
- ② 38MM (MAX) STONE AGGREGATE
- ③ COMPACTED GRANULAR FILL

Compacted Crushed Stones

● Use and appearance

Crushed stone surfaces are only suitable for informal pathways or lengths of towpath which receive heavy use around the lock site or lock island. The alignment of the path can be easily varied to avoid obstacles such as mature trees, and the path edges made very informal by allowing grass to 'bleed' into the surface or allowing plants to grow over the edges.

● Specification Notes

The crushed stone aggregate should be grey limestone (25mm - dust) with plenty of fines. Crushed limestone scalpings quarried in Somerset have proved to be a suitable material for this work in recent years.

The material should be spread and rolled while wet in 25mm layers to form a well consolidated base and wearing course. A final layer of 6mm - dust fines should help to form a hard, sealed surface resilient to pedestrian and cycle traffic. (Plate 23)

The formation and sub base should be designed to accommodate ground conditions and provide a surface crossfall of 1 in 60.



COMPACTED CRUSHED STONES

- ① 25MM-DUST STONE AGGREGATE
- ② 40-25MM STONE AGGREGATE
- ③ 75-40MM STONE AGGREGATE

COLOUR PLATES 16-23
HARD LANDSCAPE MATERIALS

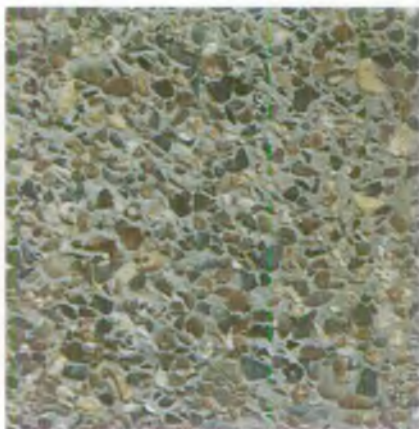


PLATE 16
Concrete - exposed aggregate finish
using washed river gravel aggregate.

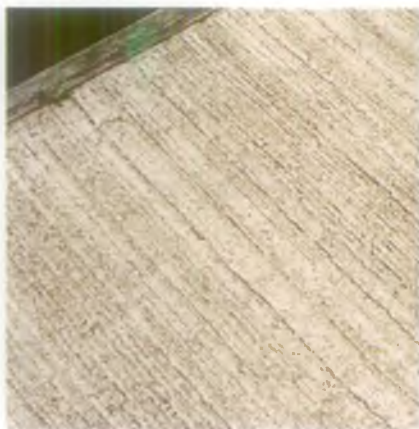


PLATE 17
Concrete - brushed finish
applied with a stiff wire brush.



PLATE 20
Engineering quality red brindle facing
bricks with cement/sand mortar.



PLATE 21
London stock facing bricks
with lime mortar.

COLOUR PLATES 16-23 HARD LANDSCAPE MATERIALS



PLATE 18
 Bound macadam - with granite chippings
 rolled into cut back bitumen.



PLATE 19
 Concrete block paviors - charcoal grey.
 Two years after laying.



PLATE 22
 Stone setts with blue brindle
 engineering bricks - mellowed with age.



PLATE 23
 Crushed stone footpath
 without retaining timber edge.



FIXTURES

STANDARD & NON-STANDARD FIXTURE

This section is in two parts:

- Standard navigational fixtures relating to operational and safety components at the lockside.
- Non-standard fixtures relating to housings for safety equipment, information, and lockside furniture, presented as 'features' which enhance the character of lock sites.

Standard Navigational Fixtures

The visitor navigating through successive locks will be assisted by having key operational fixtures presented on a standard format. Consequently, where the design and location of those fixtures are consistent, they will be readily adopted by river users.

In general old navigational fixtures should be replaced by new, more efficient versions, although wherever possible it is important to conserve examples of old fixtures which are historical references and add to the character of the site. These opportunities are best exploited whenever operational functions can accommodate them.

The following fixtures are considered to be fitted as standard designs throughout the navigation:

- Mooring devices
bollards/rings/timber dollies
- Egress ladders
- Grab rails
- Stairwell rails
- Lay-by rails
- Lock gate rails

Non-standard Fixtures

Through subtle variation of design, these fixtures offer an opportunity to enhance the local character of Thames locks. There are considered to be three main sections of lock site character along the River Thames (see Section 5.1), the Upper, Middle and Lower Thames Locks.

Non-standard fixtures have been arranged in groups responding to these sections, with the addition of splitting the Middle Thames section into two sub-categories:

- Urban settings
- Rural settings

Design and Materials

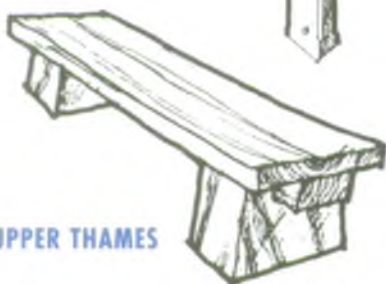
- Upper Thames & Middle Thames rural: simple/rather bulky in appearance and predominantly constructed of timber.
- Lower Thames & Middle Thames urban: tending to be more elaborate and often constructed in steel.

The chart overleaf illustrates the varying character of fixtures from Upper to Lower Thames by showing groups of key fixtures from each character section alongside each other.

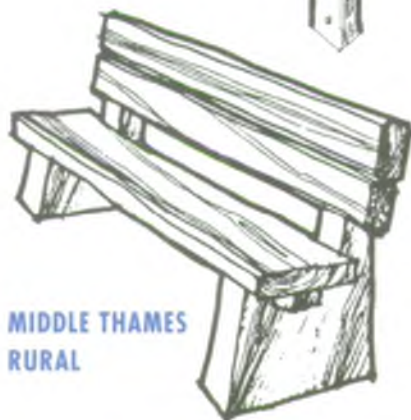
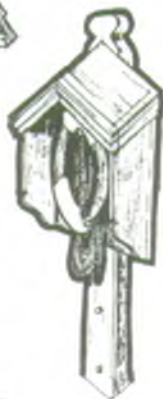
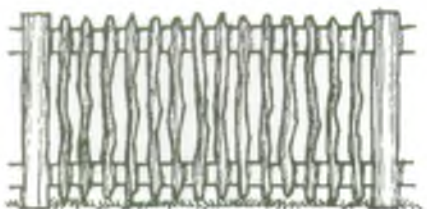
The remainder of this section sets out details on the individual fixtures.

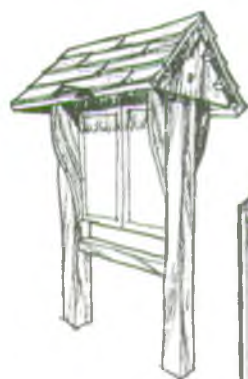
Other relevant sections

- Colour and finishes
- Chamber refurbishment
- Lockside reinstatements
- Lay-bys and moorings
- Fencing and rails



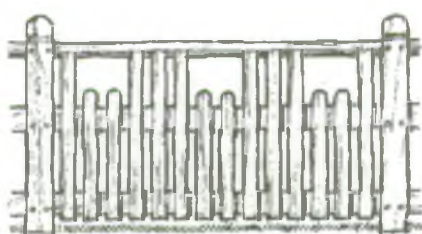
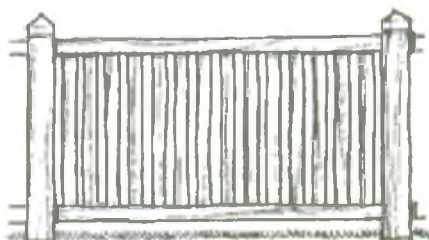
UPPER THAMES

MIDDLE THAMES
RURAL



MIDDLE THAMES
URBAN

LOWER THAMES

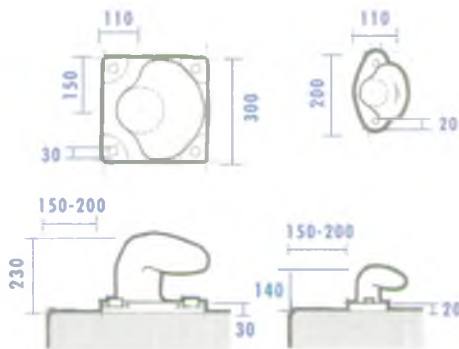


Bollards

Bollards are for temporary mooring within locks or at lock lay-bys.

The modern palm bollard is designed with the inexperienced river user in mind. A rope is easily looped round it and is in no danger of snagging or slipping off unintentionally.

They are available in two sizes, a larger one for locks and in combination with a smaller one for lock lay-bys.



BOLLARD DETAILS/DIMENSIONS

Rings

Rings are used in more permanent mooring situations, where boats are to be left unattended. They can be fixed into walls or into the ground.



MOORING RING

Old cast iron bollards, timber dollies and mooring posts (vertical extensions of rubbing strakes), of many varied styles exist along the Thames and as the new bollards succeed them they are gaining an historical interest.

Therefore in certain situations, where possible, it is important to retain and reinstate old mooring devices.

Where retained they should be away from the immediate lockside, on the lock bullnoses for example, so as to preserve a symmetry important to the visual integrity of the lock chamber.

Bollard Arrangements

(see also Section 11.1)

Both on lay-bys and locksites, bollards should be spaced at 4.0m centres and always equally on any one length.

Lay-bys have a combination of bollard sizes, the majority being small with a large bollard every third one.

In a lock it is visually advantageous to match up the bollard positions with the rubbing strakes or grab chain recesses.



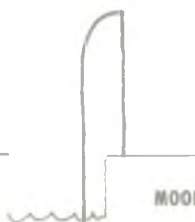
RING SET INTO RECESS AT CANOE LANDING



OLD CAST IRON BOLLARDS



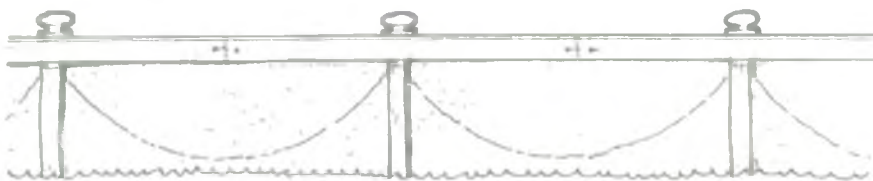
TIMBER DOLLIES



MOORING POST (SEE SECTION 6.8)



LAY-BY & BOLLARDS



LOCK WALL & BOLLARDS

FIXTURES (STANDARD) EGRESS LADDERS & GRAB RAILS

Egress Ladders

Egress ladders are installed in locks and on lock lay-bys which have walkways.

Location

- In locks, below stairwells giving access to the lower landing.
- In locks without stairwells, 2 per lock, preferably diagonally opposite (possibly more in larger locks).
- On lay-bys, at either end and at 30m intervals along its length.

Positioning

- Positioned so as not to obstruct boats.
- In a recess of approx. 500mm width and 200mm depth.
- In locks, provided there is room, the down-stream ladder can be installed in the upstream corner of the lock gate recess.
- If the lock chamber has rubbing strakes which are a minimum of 150mm proud of the chamber wall, sufficient to act as a guard, then the ladder can be secured directly to the lock wall next to a strake. Another rubbing timber will then be required to act as a guard against boats coming in the opposite direction, 500mm from the first.
- In the absence of a recess or rubbing strakes, timber fenders can be installed to protect the ladder. In this case it is important to make sure that the width of the lock is not reduced so as to restrict the boat capacity of the chamber.

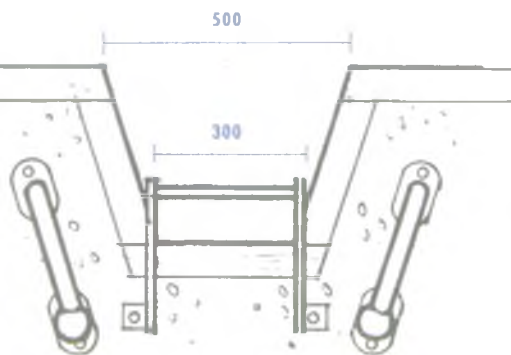


DETAIL SET-UP OF EGRESS LADDER

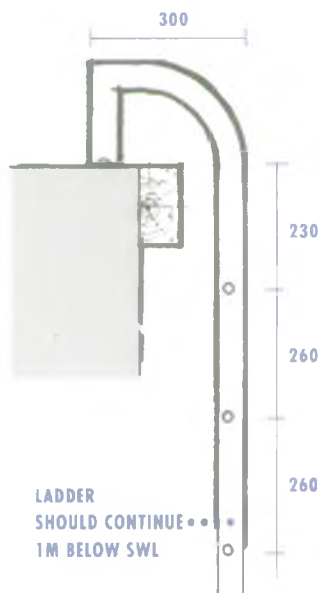
Grab Rails

Grab rails should be provided to assist access onto the walkway. These rails can be visually intrusive and therefore height should be kept to a minimum (750mm high). In some cases it may be possible to integrate a grab rail with another structure, (e.g. a grab rail aiding access onto a stairwell lower landing could be a continuation of the stairwell hand rail.)

For standard grab rail situations there are three optional shapes, of which the type with a ball socket joint would match well with the other tubular steel structures at lock sites.



PLAN OF LAY-BY LADDER & RAIL SET-UP



LADDER
SHOULD CONTINUE • • •
1M BELOW SWL

EGRESS LADDERS & GRAB RAILS

FIXTURES

Construction

Galvanised tubular steel 40mm diameter.



GRAB RAILS

FIXTURES (STANDARD) STAIRWELL SAFETY RAILS

These rails protect boaters from falling into the stairwells on lock gangways. They can be constructed of either tubular steel or timber - the choice of which depends on other site conditions, such as the presence of timber balance beams and riser posts.

Construction

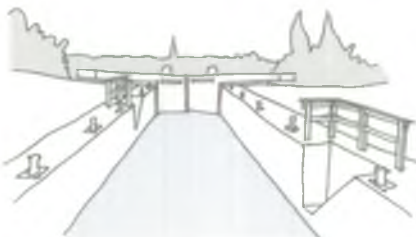
Either: galvanised tubular steel 40mm diameter, with ball socket joints, or: timber soft wood post and rail, similar to Upper Thames lockside high barriers detailed in section 10.5.

Selection Table

MOORING DEVICE	LOCK MECHANISM	BALANCE BEAM	PEDESTAL (HYDRAULIC)
TIMBER POSTS		STEEL	STEEL
BOLLARDS		TIMBER	STEEL



- If timber balance beams and mooring posts are present they will have a primary impact on the pattern of the scene. It is considered that the stairwell rails could interrupt this pattern and therefore the more visually recessive steel frame is chosen rather than bulky timber.



- If timber balance beams are present but in combination with iron bollards rather than timber posts, then less of a pattern is created. So it is therefore considered less of a visual interruption to use timber railings. In fact, they will help to reinforce the feeling of a rural setting, usual to the presence of balance beams.



● If the lock gates are hydraulically operated and the mooring devices are timber posts, then there is still a strong pattern created by the posts and therefore the stairwell railings should be constructed of the visually lighter steel.



● If there is no timber present in any of the prominent fixtures of the lock chamber then timber railings would look out of place. Therefore steel railings should be chosen.

FIXTURES (STANDARD) LAY-BY & LOCKGATE RAILS

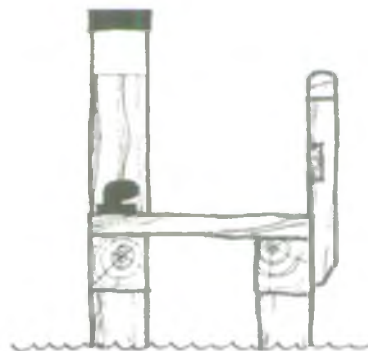
Lay-by Rails

Used on the walkway side of an offshore lay-by to prevent boaters from falling off.

Construction

- Galvanised tubular steel 40mm diameter with ball socket joints.
- Timber post and 2 No. rail with rounded top hand rail, similar to Upper Thames lockside high barriers detailed in Section 10.5.

Note: Sometimes these rails are angled away from the lay-by if the walkway is particularly narrow.



TIMBER LAY-BY & RAILS

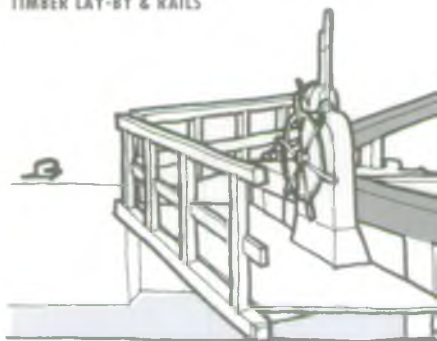
Lockgate Rails

Rails on lockgate gangways protecting pedestrians from falling off into the lock or river.

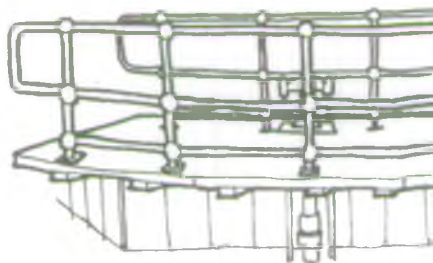
Construction

Soft wood timber on lockgates with balance beams or galvanised tubular steel on hydraulically operated locks.

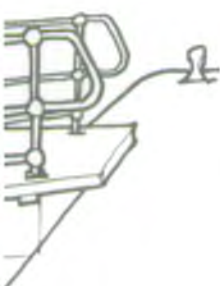
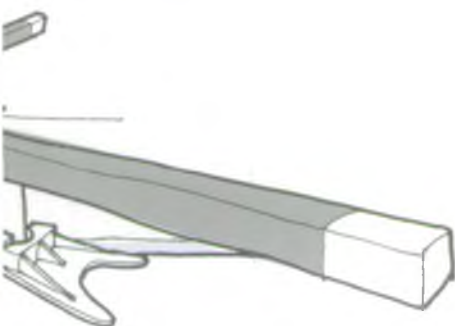
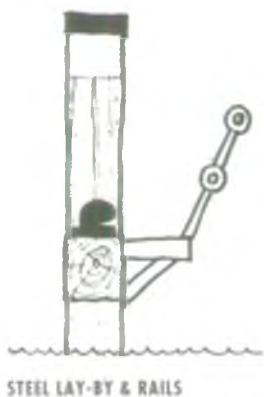
- Timber post and 2 No. rails, with rounded top hand rail, similar to Upper Thames lockside high barriers detailed in Section 10.5.
- Galvanised tubular steel 40mm diameter with ball socket joints.



MANUAL LOCK GATE & RAILS



HYDRAULIC LOCK GATE & RAILS



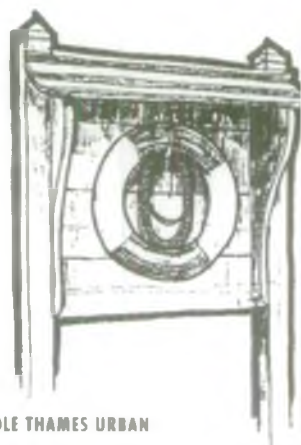
Lifebuoys can be housed in three ways. In a traditional timber frame, on a post and hook or attached by hook to the chamber walkway retaining wall.



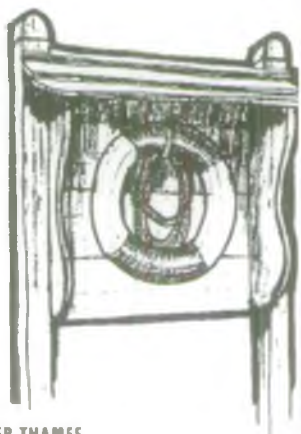
UPPER THAMES



MIDDLE THAMES RURAL

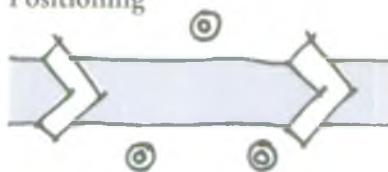


MIDDLE THAMES URBAN



LOWER THAMES

Positioning



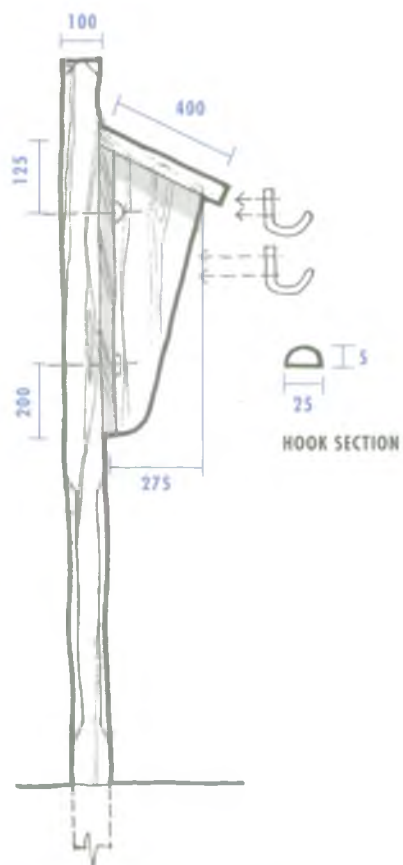
SMALL LOCKS
 LESS THAN
 50 M IN LENGTH



LOCK OFFICE

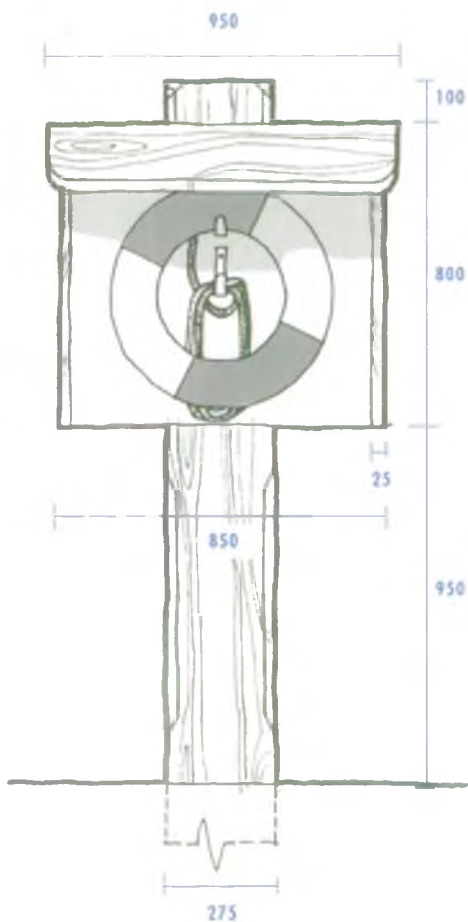


LARGE LOCKS
 GREATER THAN 50 M IN LENGTH



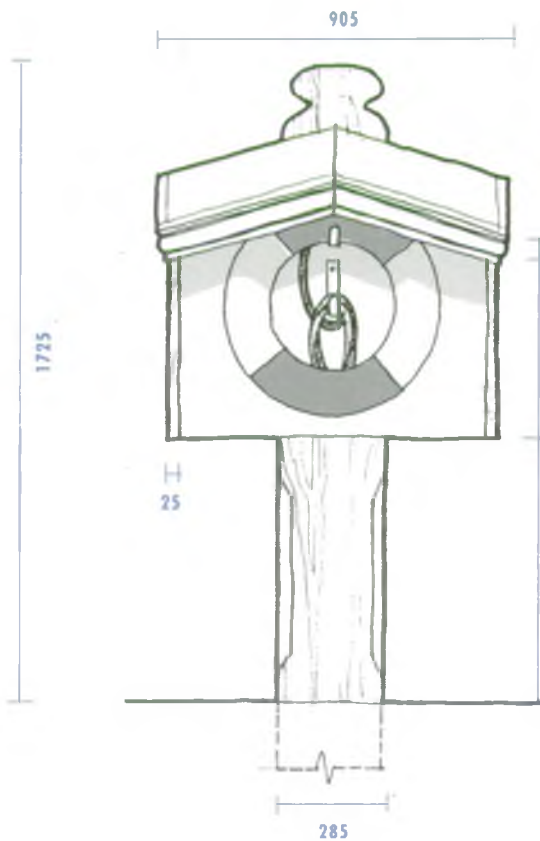
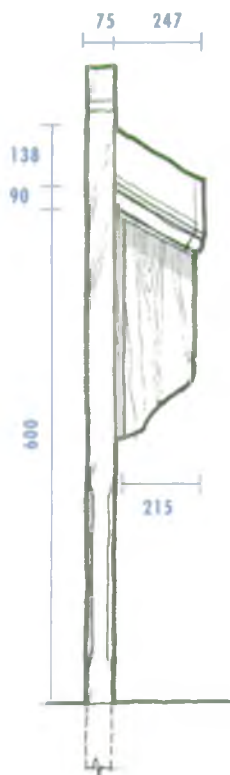
HOOKE SECTION

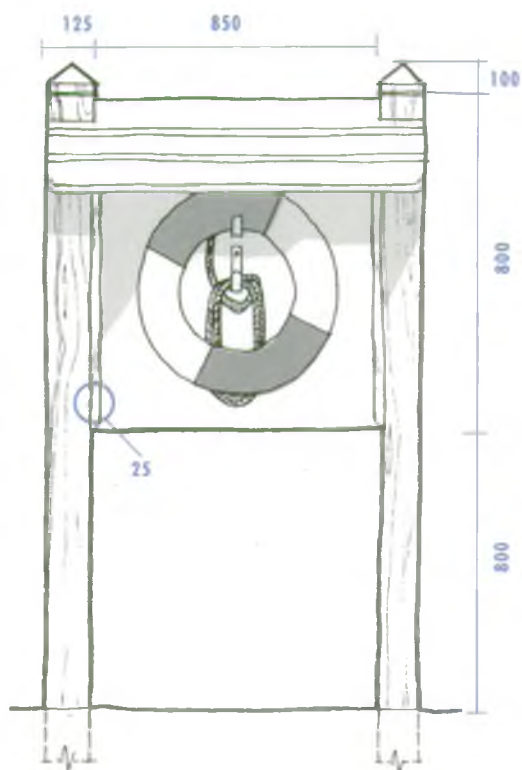
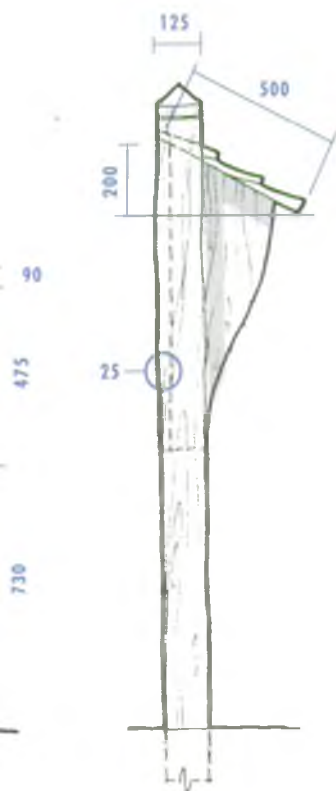
LIFEBUOY HOUSING DETAILS/DIMENSIONS





FIXTURES (NON-STANDARD)
LIFEBUOY HOUSINGS SHEET 2





FIXTURES (NON-STANDARD) RESCUE LADDERS

Usually stored hanging horizontally from a pair of post and hooks (see simple lifebuoy fixing), but it is preferable if they can be stored attached to the lock chamber walkway retaining wall or attached to the lockside barrier fence.

Positioning

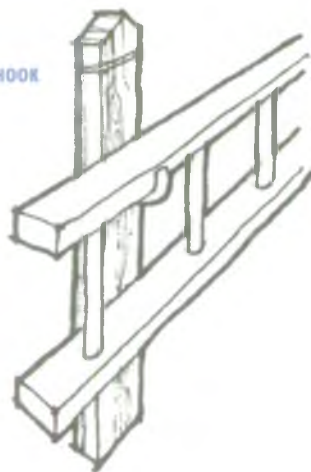
Small locks less than 50 metres in length.
One ladder centrally positioned on the lock office side.

Large locks greater than 50 metres in length.
One ladder centrally positioned on both sides of the lock.

100X75MM SECTION



BRASS HOOK



MIDDLE THAMES URBAN
LADDER POST AND HOOK

LOWER THAMES
LIFEBUOY POST
AND HOOK



MIDDLE
THAMES
RURAL



UPPER
THAMES

ALTERNATIVE TOP DESIGNS

FIXTURES
RESCUE LADDERS





UPPER THAMES



MIDDLE THAMES RURAL

Tourist information points are ideally located at lock sites, where they will be seen by the majority of river users. These structures are quite large and if installed without careful thought to positioning they may become visually intrusive within an open lock scene.

Positioning

It is considered that they are best located towards the end of the lock area, nearest the towpath and visitor access points. Here, the information boards are unlikely to be overlooked. This position, set back from the lock bullnose, allows surveillance by the lock keeper but doesn't intrude on the scene.

Surfacing Surrounds

On busy sites it may be necessary to provide a hard surfacing around info. points rather than a continuous lawn. This will prevent unsightly patches of bare earth otherwise likely to develop. Complicated layouts and contrasting materials should be avoided in surfacing surrounds.^①

Simple layouts and consistent surfacing materials will help a new fixture blend in with the existing lock scene.^②



MIDDLE THAMES URBAN



LOWER THAMES



POSITIONING OF BOARDS

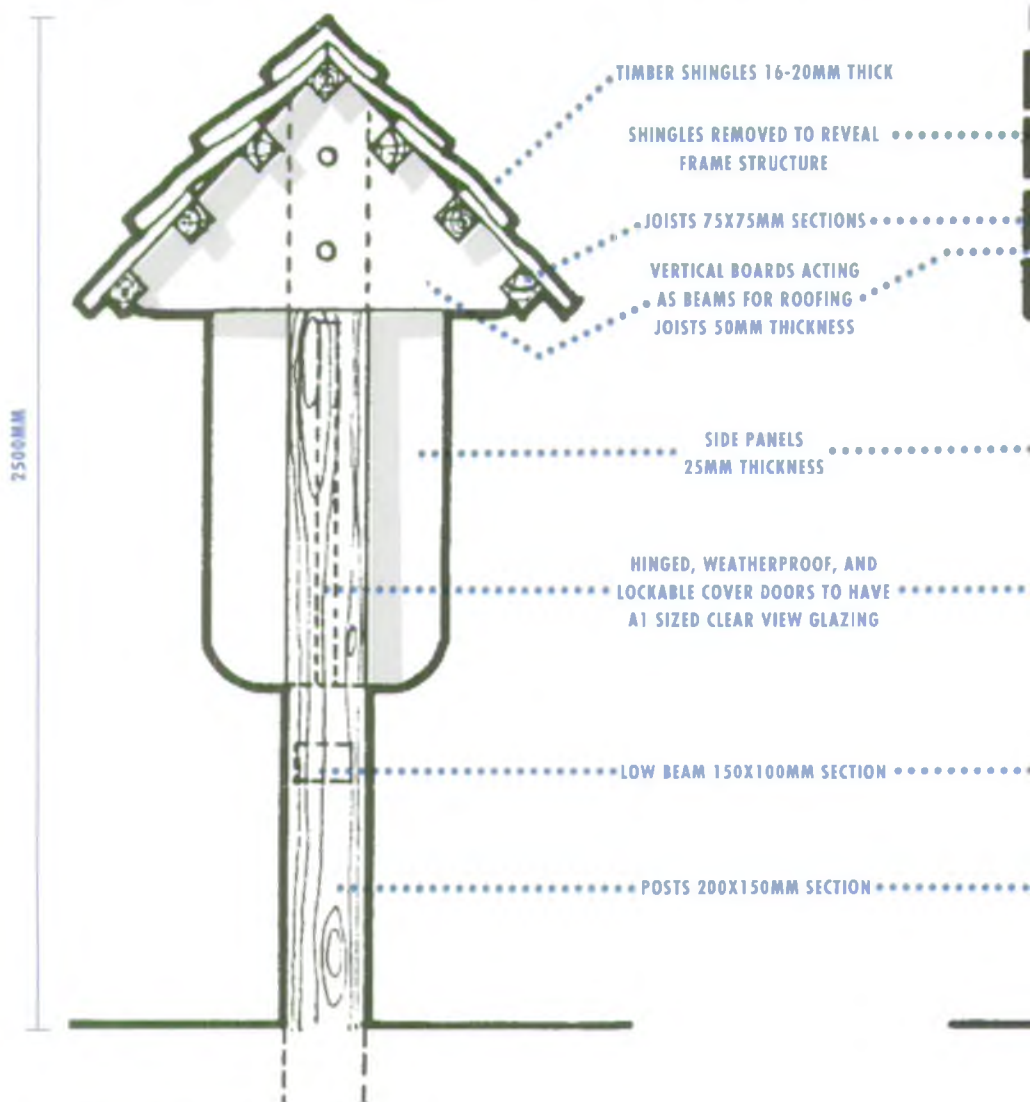


①

SURFACING SURROUNDS

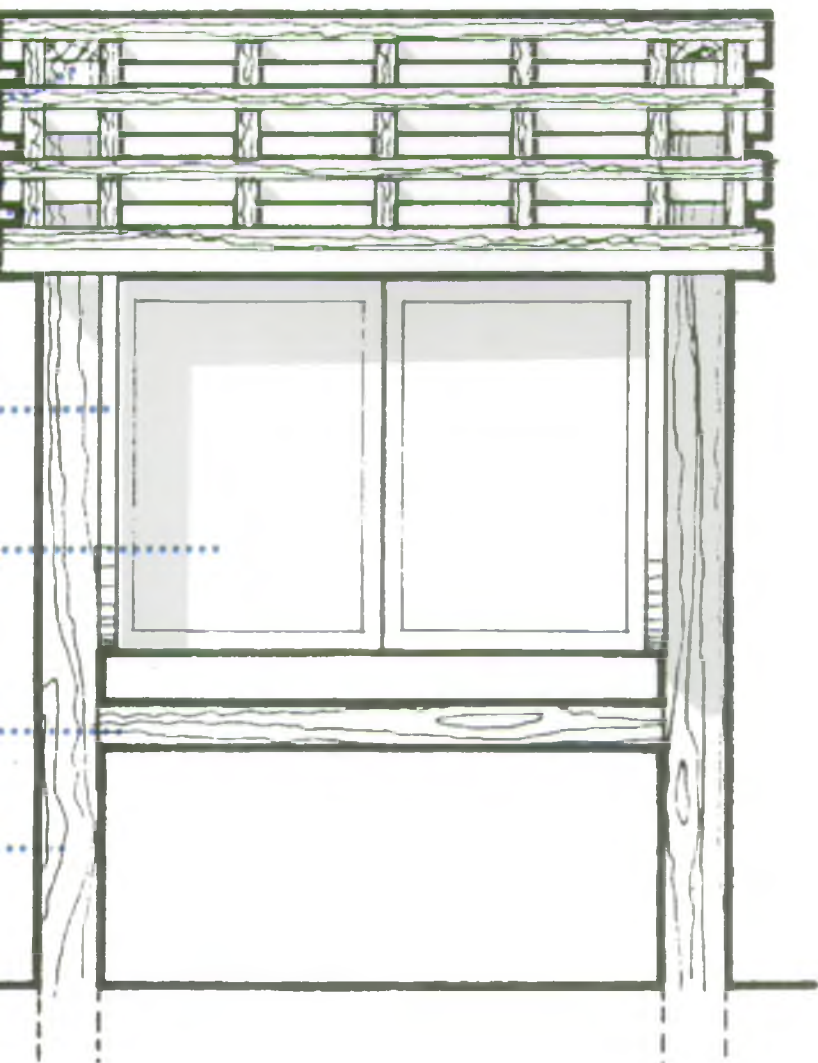


②



DETAILS - TYPICAL SECTION & ELEVATION

2000MM



FIXTURES (NON-STANDARD) BENCHES & SEATS

Positioning

Seating should be placed well back from the lockside where pedestrians can gain a good view of the boating activities without getting in the way.

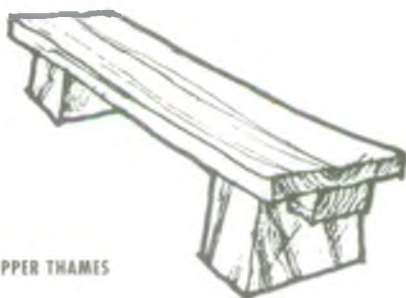
Ideally seating should be placed off the towpath on the side away from the lock. Here an onlooker is in a comfortable position with the whole scene in front and usually a solid barrier behind to provide shelter.

Surface Surround and Trim

On busy sites it may be necessary to provide a hard surfacing around benches rather than a continuous lawn. This will prevent unsightly worn patches otherwise likely to develop. The layout of a hard surface surround should be simple and if possible accommodate a wheelchair next to the bench. Materials used should be matching or coordinate with surrounding hard surfacing.



LAYOUT & SURFACING



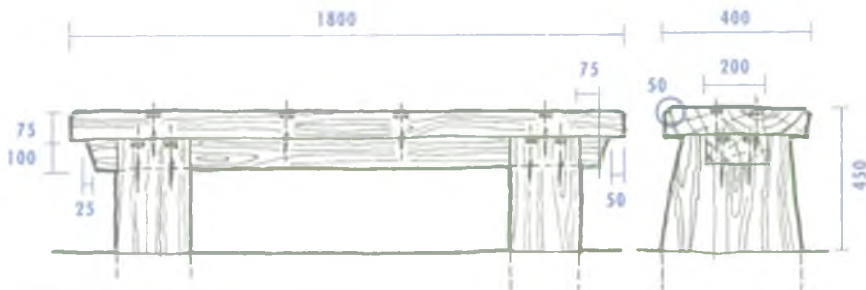
UPPER THAMES



MIDDLE THAMES



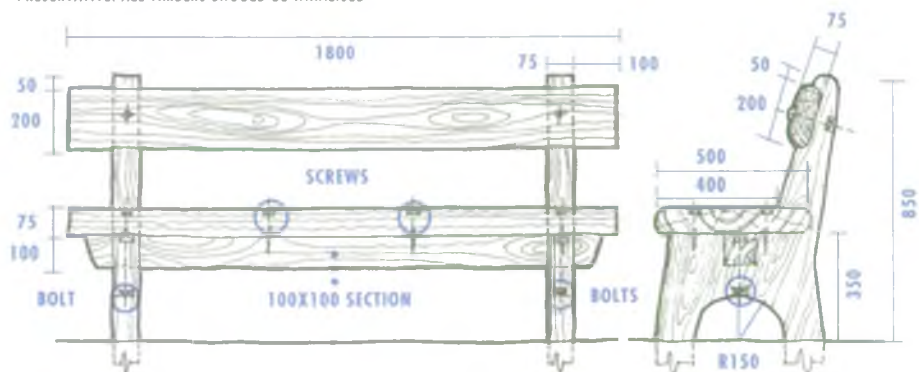
LOWER THAMES



FIXINGS: 6" GALVANISED SCREWS, C/S & PLUGGED

FINISH: CROSS-BEAM & UPRIGHTS CAN BE ROUGH SAWN. TOP BOARD SHOULD BE PLANED SMOOTH

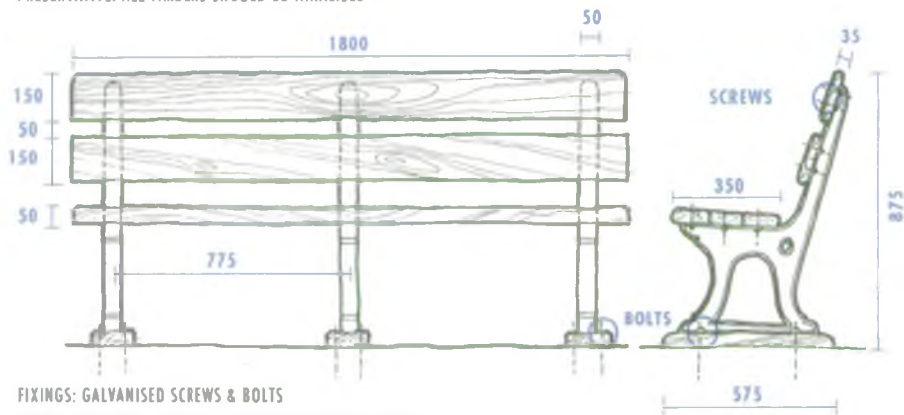
PRESERVATIVE: ALL TIMBERS SHOULD BE TANALISED



FIXINGS: GALVANISED COACH BOLTS C/S & PLUGGED. 6" GALVANISED SCREWS C/S & PLUGGED

FINISH: ALL TIMBERS SHOULD HAVE A SMOOTH PLANED FINISH

PRESERVATIVE: ALL TIMBERS SHOULD BE TANALISED



FIXINGS: GALVANISED SCREWS & BOLTS

FINISH: CAST METAL FRAME. ALL TIMBERS SMOOTH PLANED

PRESERVATIVE: ALL TIMBERS SHOULD BE TANALISED

BENCHES & SEATS

Fences & Rails

In the river lock scene there are many situations where fencing may be required, and although fences can be attractive features it is important to carefully consider whether a barrier is absolutely necessary. There is always the possibility that more subtle methods may be adequate (e.g. low level planting, or change in surface material).

Existing Fences

Significant improvements can often be made by rationalising the range in styles of fences which exist on site. Where structures are considered inappropriate or even redundant then such opportunities should be taken to reassess fencing arrangements.

Careful consideration should be given to juxtapositioning of fences or rails with similar functions.

Ideally there should be strong continuity in design, unless function dictates a definite contrast in style.

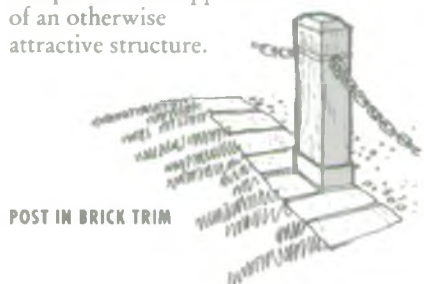
New Timber Fencing

All timber should be pressure treated and allowed to weather to a natural finish. (Section 4.2) (Plate 5)

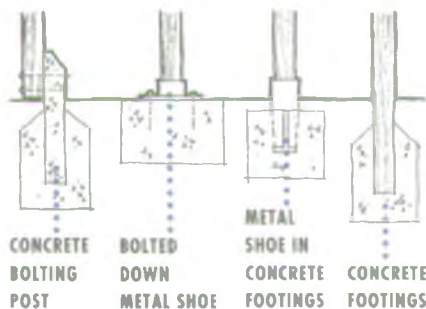
Post Fixings

Choice of materials and method for fixing structures into the ground are often dictated by a preference for reduced future maintenance commitments.

Visual considerations are equally important because inappropriate fixings can compromise the appearance of an otherwise attractive structure.

**POST IN BRICK TRIM**

Timber posts (e.g. fences & lifebuoy housings) on locksites are often set into continuous hard surfaces. In these situations it may be necessary to set posts into permanent floor fixings, simplifying replacement if the post is damaged. There are two fixings available for this purpose: a concrete post for bolting to or a cast metal shoe to set the post into.



SHOES MUST PROVIDE FOR DRAINAGE OF WATER AT THE BASE OF THE POST (EG WEEP HOLES)

The concrete post should only be used when it will be out of view (e.g. against a hedge).

CONCRETE POST FIXINGS ARE ACCEPTABLE WHEN USED DISCREETLY AGAINST A HEDGE

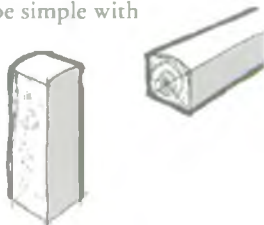


Design Note

Fences and rails designed to respond to the different locksite character sections follow the basic guidelines set out for fixtures in Section 9.1, but more variety and character can be achieved through the detailing of weathered tops to posts and rails.

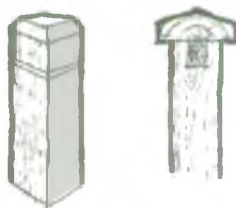
Upper and Mid Rural Thames

Post tops and rails should be slightly cambered but otherwise timber forms should be simple with no additional decoration.



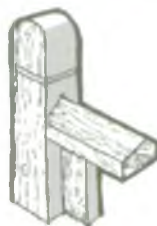
Mid Urban Thames

Chamfered edges should be used in the detailing of post tops and rails, also some simple pencil grooving decoration can be appropriate.



Lower Thames

Post tops should be rounded with rails arris or chamfered. As with Mid Urban Thames, pencil grooving decoration can be appropriate.



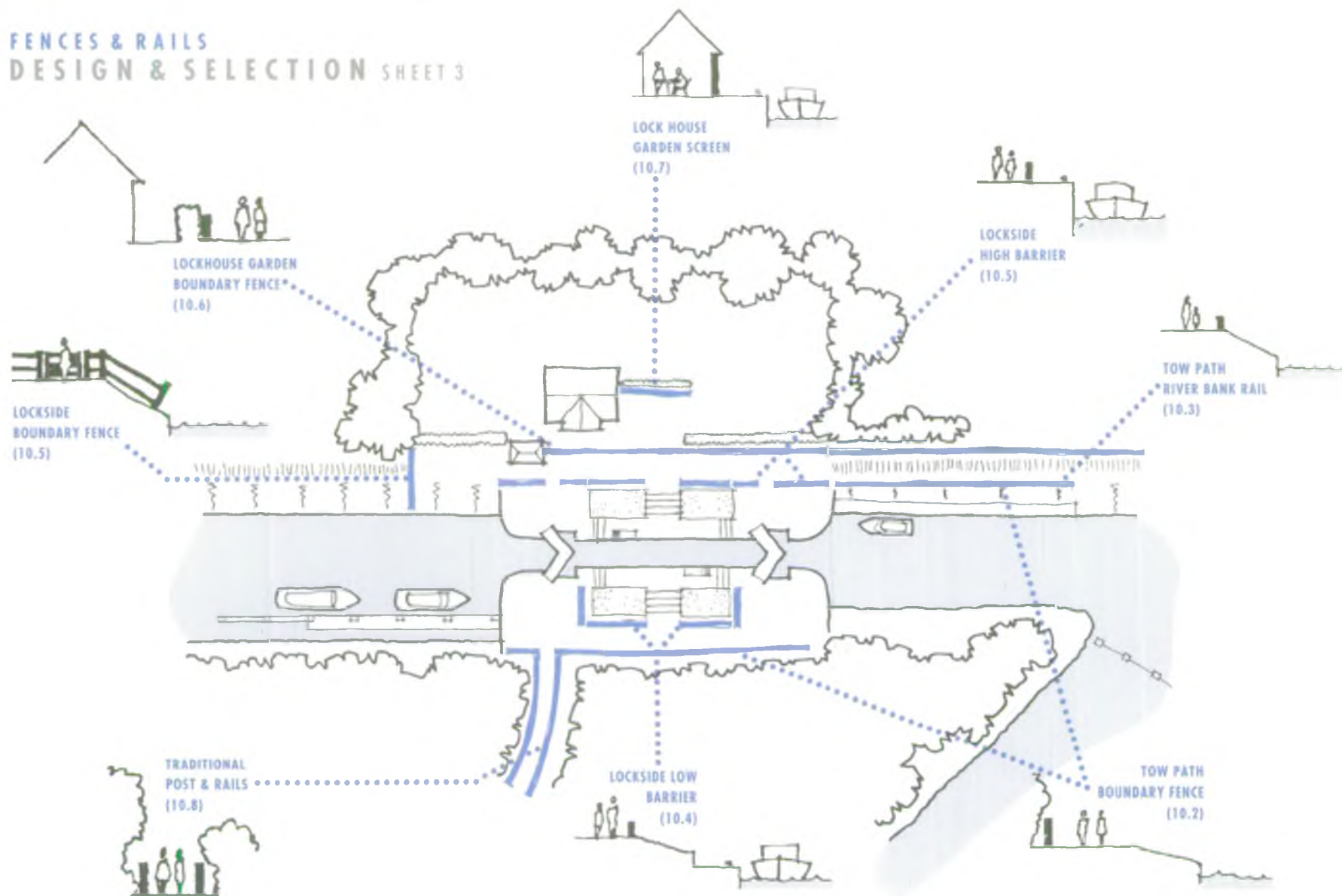
Other relevant sections

- Site planning
- Colour and finishes
- Fixtures
- Access for all

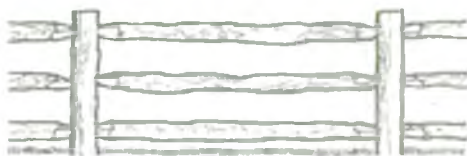
Fences and Rails Selection Table

The following plan and table identify eight different fencing situations, summarising their functions and the table then offers a selection of suitable design options for specific sections of lockside character.

TYPE	FUNCTIONS	SELECTION			
		UPPER	MIDDLE RURAL URBAN	LOWER	
1. TOW PATH BOUNDARY FENCE (SECTION 10.2)	<ul style="list-style-type: none"> ● TO KEEP PEDESTRIANS OFF PRIVATE LAND. ● TO KEEP FARM ANIMALS OFF THE TOW PATH. 	A B C G	B C E G	C D E F	E F
2. TOW PATH RIVER BANK RAILS (SECTION 10.3)	<ul style="list-style-type: none"> ● TO KEEP PEDESTRIANS AWAY FROM DANGEROUS RIVER BANKS. ● TO DETER ANGLERS. ● TO DIRECT PEDESTRIANS TO THE ENTRANCE OF A BRIDGE RAMP. ● TO DIRECT PEDESTRIANS AWAY FROM BOATING LAY-BYS. 	A B C	B C	D E	F G
		SEE ALSO LOCKSIDE BARRIER FOR MORE SUBSTANTIAL RAILS			
3. LOCKSIDE BOUNDARY FENCE	<ul style="list-style-type: none"> ● TO CONTINUE A FARM STOCK FENCE TO THE RIVER EDGE. ● TO KEEP STOCK AWAY FROM THE LOCK SITE AND TO IDENTIFY THE LOCKSIDE BOUNDARY. 	SEE LOCKSIDE HIGH BARRIER			
4. LOCKSIDE LOW BARRIER (SECTION 10.4)	<ul style="list-style-type: none"> ● TO SEPARATE LOCKSIDE ACTIVITIES FROM THE OPERATIONAL AREAS AROUND THE LOCK CHAMBER. 	A	A	B	C
5. LOCKSIDE HIGH BARRIER (SECTION 10.5)	<ul style="list-style-type: none"> ● SIMILAR TO THE LOW BARRIER, BUT WHERE A GREATER DEGREE OF CONTROL IS REQUIRED (E.G. WHERE PEDESTRIANS HAVE ACCESS TO CROSS LOCK GATES). 	A C	A C	B D	B E
6. LOCKHOUSE GARDEN BOUNDARY FENCE (SECTION 10.6)	<ul style="list-style-type: none"> ● TO DEMARCATHE THE EDGE OF A LOCK HOUSE'S FRONT GARDEN AND TO SEPARATE IT FROM THE PUBLIC. 	A B	B C	D E	F G
7. LOCKHOUSE GARDEN SCREEN (SECTION 10.7)	<ul style="list-style-type: none"> ● TO CREATE A VISUAL SCREEN BETWEEN THE PUBLIC LOCKSIDE AND THE LOCKHOUSE PRIVATE GARDEN. 	A D	B C D	B C E	B C E
		A & B ARE PRIMARILY VISUAL SCREENS WHEREAS C, D & E ARE BETTER WIND BREAKS AS THEY REDUCE WIND SPEED WITHOUT CREATING BUFFETING.			
8. TRADITIONAL POSTS AND RAILS (SECTION 10.8)	<ul style="list-style-type: none"> ● VARIOUS FUNCTIONS WITHIN SITES OF PARTICULAR HERITAGE INTEREST. 	OFTEN SITE SPECIFIC IN DESIGN, THESE EXISTING POSTS/RAILS SHOULD BE RETAINED, REINSTATED OR REPLICATED WHEN APPROPRIATE.			



TIMBER



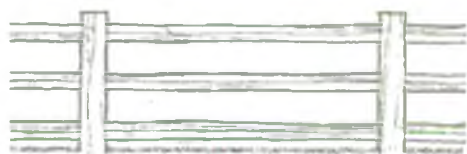
A. CLEFT RAILS WITH MORTICE & TENON JOINS



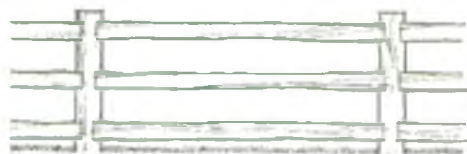
B. SIMPLE POST & WIRE



C. POST & BOARD



D. ARRIS POST & RAIL



E. MORTICED POST & RAIL



METAL



F.1 BOW TOP



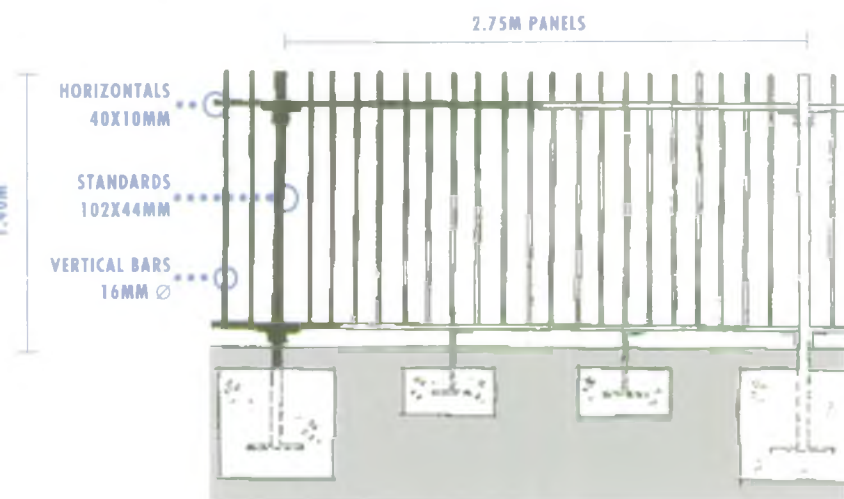
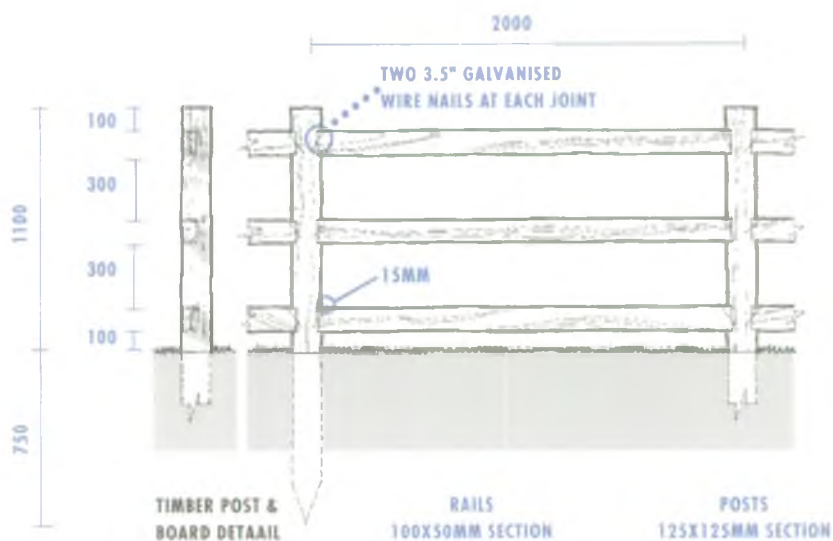
F.2 CRANK TOP



F.3 BLUNT TOP



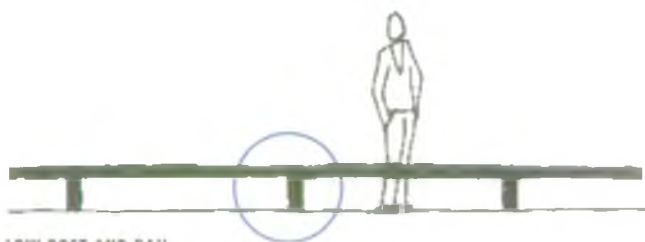
G. ESTATE POST & BARS



MATERIALS: ALL ITEMS GALVANISED SOLID MILD STEEL
JOINTS: WELDED LUGS

METAL BLUNT TOP RAILING DETAIL

TOWPATH BOUNDARY FENCE



LOW POST AND RAIL



A. NATURAL TIMBERS



B. SAWN TIMBERS



C. TIMBER WITH
CURVED TOP RAIL



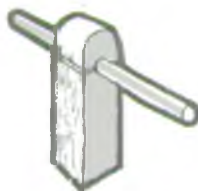
D. TIMBER WITH
CHAMFERED RAIL



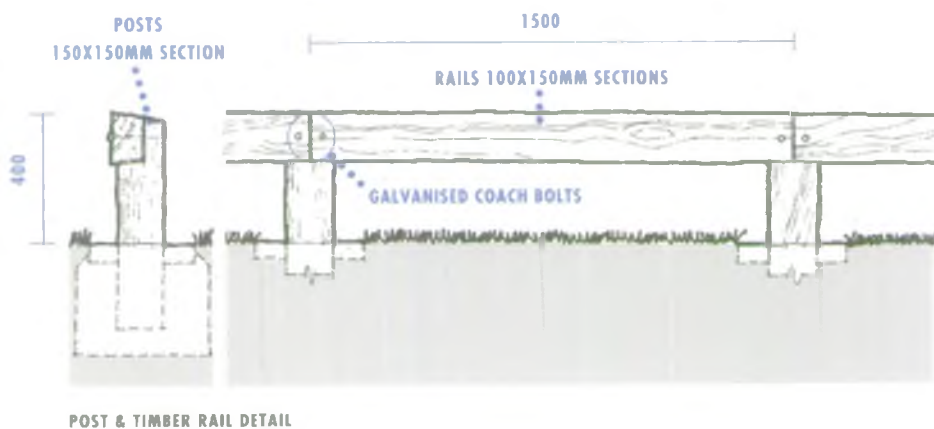
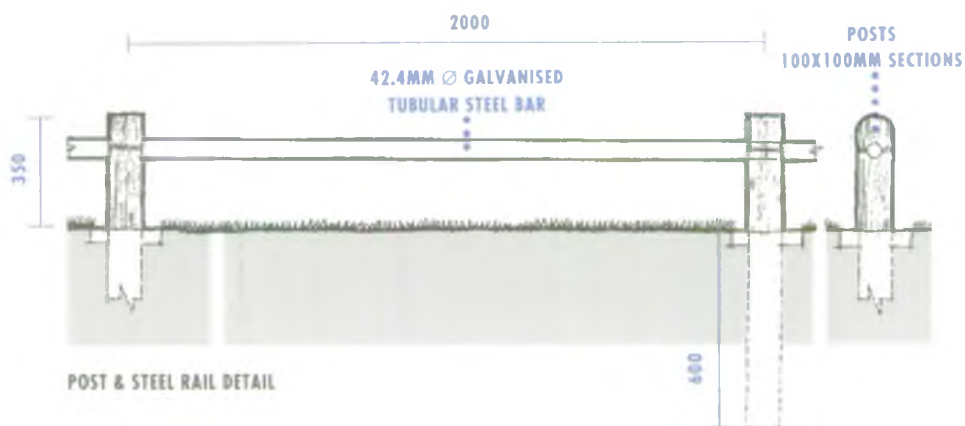
E. CHAMFERED POST
TOP WITH STEEL RAIL

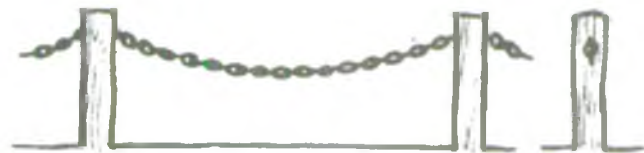


F. SHAPED POST TOP WITH
TIMBER ARRIS RAIL



G. SHAPED POST TOP
WITH STEEL RAIL





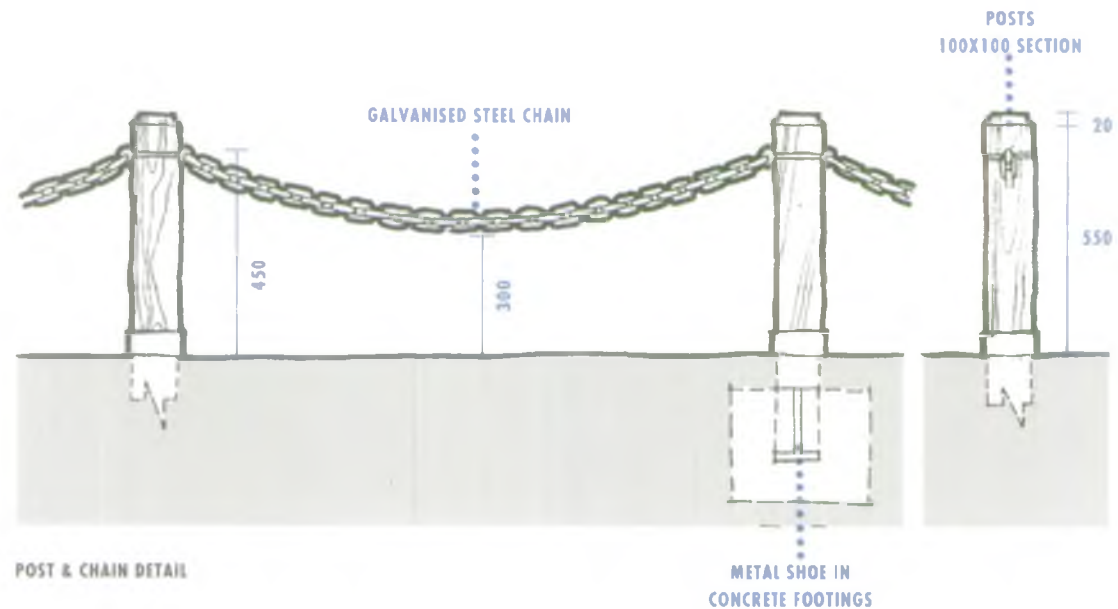
A. CURVED POST TOP



B. CHAMFERED POST TOP



C. ROUND POST TOP





A. POST & RAIL: STURDY, ROUNDED TOP RAIL



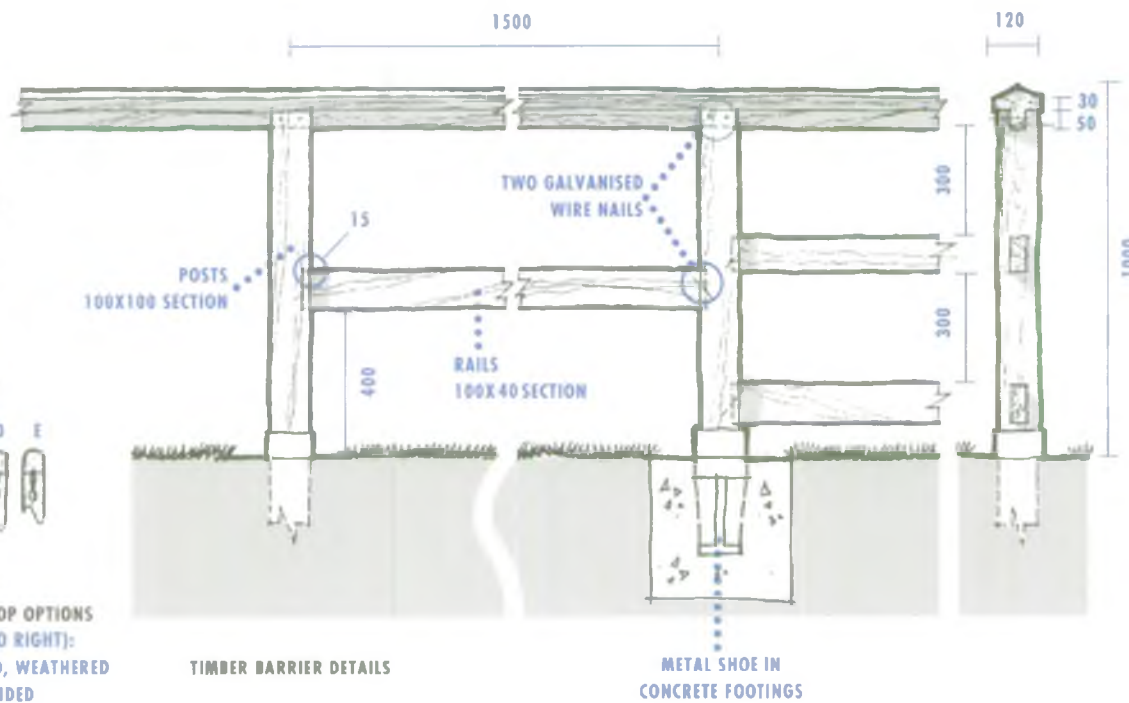
B. POST & MORTICED RAILS: CHAMFERED TOP RAIL



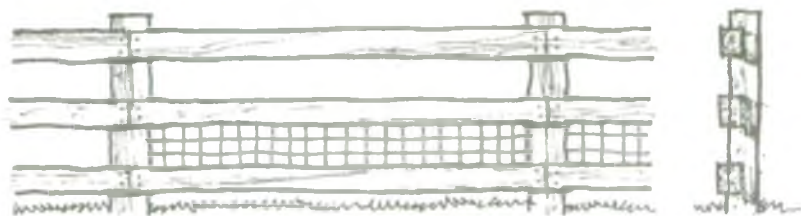
POST & MORTICED RAILS IN COMBINATION WITH STRUNG CHAINS:
CREATES A MORE LIGHT WEIGHT BARRIER
NOTE: VARIOUS ARRANGEMENTS OF RAILS & CHAINS



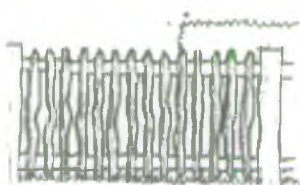
POST TOP OPTIONS
(LEFT TO RIGHT):
CURVED, WEATHERED
& ROUNDED



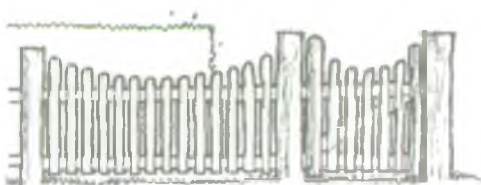
FENCES & RAILS GARDEN BOUNDARY FENCE



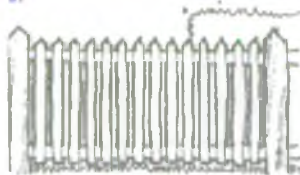
A. POST & RAIL WITH WIRE MESH



B.



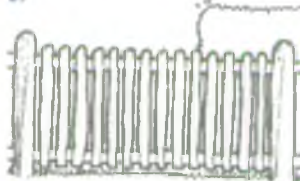
C.



D.



E.



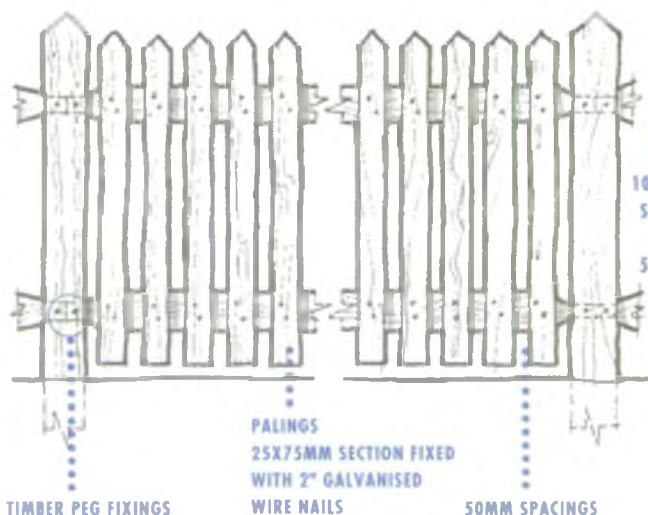
F.



G.

VARIOUS PICKET FENCES
OFTEN USED IN CONJUNCTION WITH A HEDGE

1700-2000



ARRIS RAILS
100X75 SECTION
SHAPED TO FIT
MORTICES
50MM SQUARE

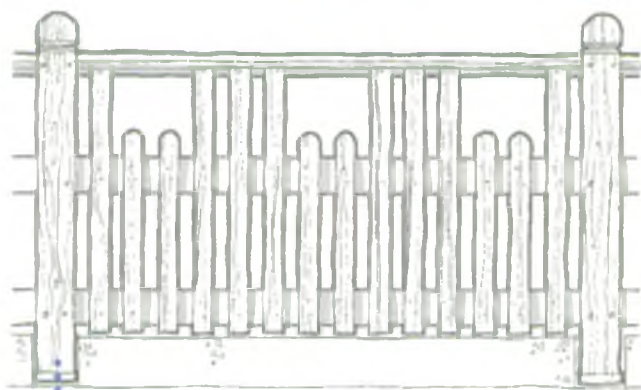
1050

POSTS

125X100 SECTION

1800

135



135

135

360

440

155

170

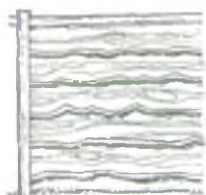
1300

KERB

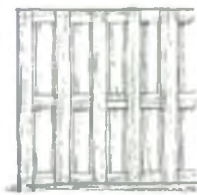
POSTS SIT IN A METAL SHOE
WHICH IS SECURED INTO A CONCRETE KERB

GARDEN BOUNDARY FENCE

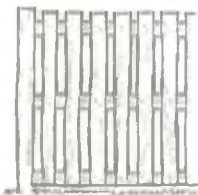




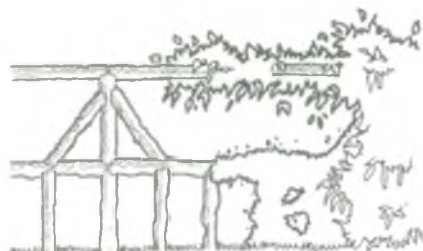
A.
ROUGH TIMBER
OVERLAPPING BOARDS
300-400MM



B.
HIT & MISS
VERTICAL BOARDS



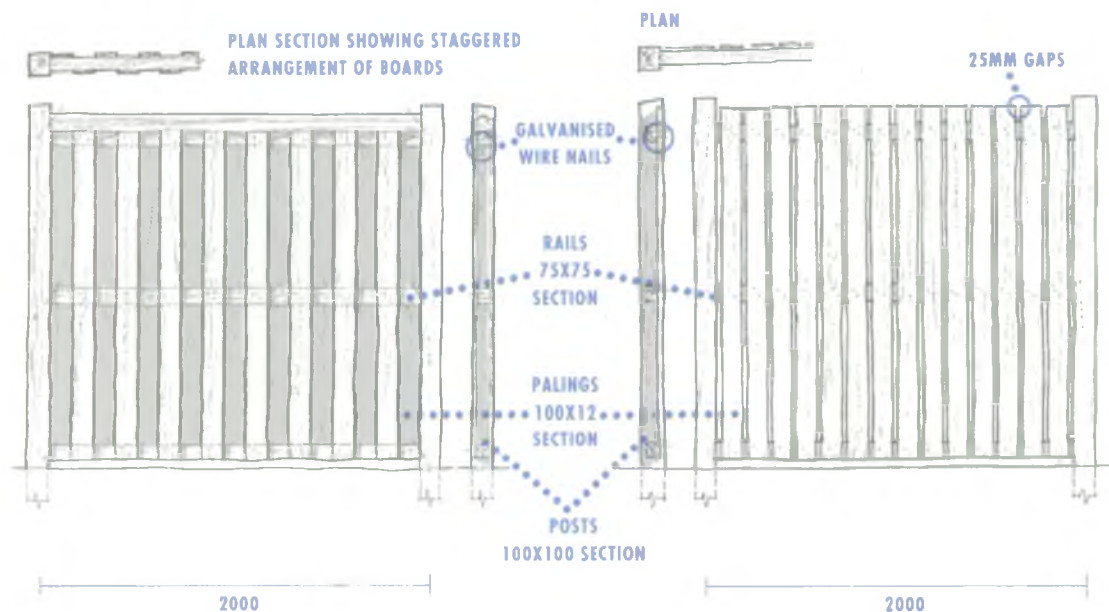
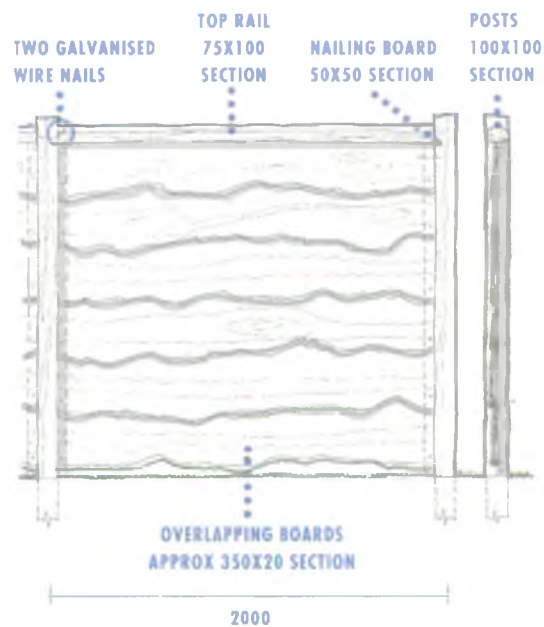
C.
PALISADE
VERTICAL BOARDS



D.
RUSTIC TIMBER TRELLICE



E.
LATTICE WORK TRELLIS



TRADITIONAL POST/RAILS

Traditional Rails

Examples of cast iron rails exist throughout the river, particularly within urban areas and at lock and weir sites. These fixtures should be retained and refurbished wherever possible, because they have a special character which is often lacking in the detail of modern railing systems. (Section 4.3)

It may be feasible to consider replicating the pattern of existing posts in order to reinstate, extend or reintroduce lengths of traditional post and rail on a site. Should the original casting moulds not be available at local workshops, then the post patterns can be measured for reproduction at modern foundries. It may be necessary to produce a substantial number of posts to make the exercise economically viable, but the results can be more rewarding than selecting post patterns from a catalogue which do not match those on site.

- Safety rails located against a waterside promenade or public space are likely to have substantial posts with weathered tops or shaped caps, and embellishments to the rail sockets; usually, they have at least two rails consisting of round, hollow section steel fixed through the post sockets.
- Towpath rails are simple structures with slim posts more widely spaced apart supporting a continuous top rail - originally designed to carry tow ropes over potential snagging points at bridge and mooring sites. The rail consists of either solid or hollow section steel, welded to posts and swept up or down at changes in level. The ends of rails are either downswept or raked into the ground.



EXAMPLE FROM AN OXFORD BACKWATER

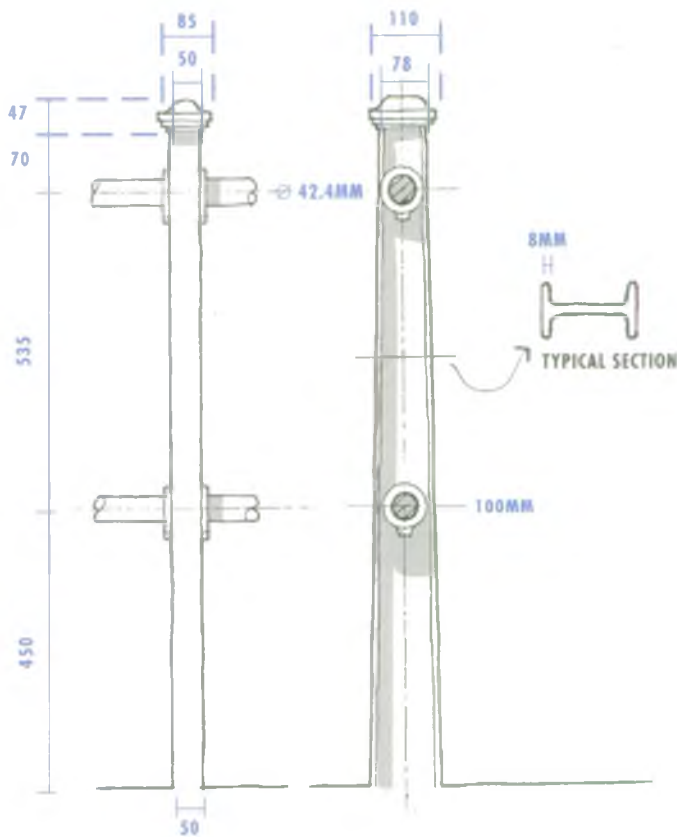


EXAMPLE FROM CAVERSHAM WEIR ISLAND



EXAMPLE FROM SUNBURY LOCK CUT

TOPRAIL
HOLLOW
SECTIONTOPRAIL
SOLID
SECTIONDOWNSWEPT
END



CAVERSHAM WEIR ISLAND RAILS

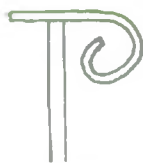
INTERMEDIATE RAIL



RAKED END RAIL

SWEPT TOP RAIL

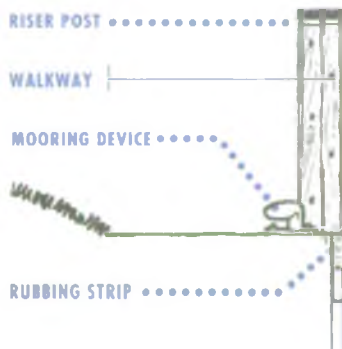
RAKED END RAIL



SCROLL END

The use of a lay-by requires basic skills in manoeuvring craft against the mooring edge in variable conditions, to enable the craft to be secured by a person who has safely transferred from boat to shore.

A characteristic of all craft, whatever the size, is that they are built to horizontal lines and whether the hulls are rounded or angular in profile they all present a horizontal fending edge (or waling). Moorings with a variable freeboard should therefore have vertical components (strakes) to make contact with the waling on craft of various sizes. Some boats employ adjustable fenders, raised or lowered to protect the hull against different mooring edges, although these heavy items are not suitable for small boats and canoes.



SECTION



ELEVATION

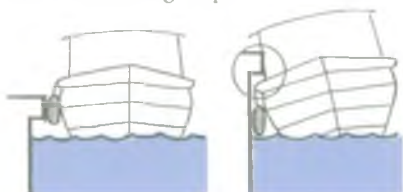
GRAB CHAIN

Moorings edge components

- Walkway. Level landing to allow safe access to or from craft, and handling boats from the shore.
- Mooring device. Bollards or rings to which mooring ropes are secured. Sizes vary to provide for different weight of craft. (See Section 9.2)
- Rubbing strip. Timber rail which presents a kind edge for boat fenders to lie against.
- Strakes. Square section timbers fixed vertically at one metre intervals against timber or steel piled edge below and flush with the horizontal rubbing strip. Designed to make contact with the fending edge of any craft and prevent them getting trapped under the rubbing strip.
- Steamer and Riser Posts. Posts installed intermittently along the length of moorings to prevent boats over-riding the walkway during flood conditions. Steamer piles also allow large boats to lie against lay-bys with low freeboards during normal conditions.

● **Freeboard.** Height between the standard water level and the walkway surface. The freeboard should fulfil four main objectives:

- ensure that at least a part of the walkway is above usual flood water levels.
- allow boat fenders to make full contact with the rubbing strip.



**GOOD MOORING EDGE-
FULL CONTACT
WITH FENDERS**

**FREEBOARD TOO HIGH
HAZARDOUS EDGE-
POTENTIAL DAMAGE**

FREEBOARD DESIGN FOR STANDARD WATER LEVEL

- provide convenient access for persons transferring from boat to shore.
- be the minimum height required in order to reduce the visual impact of lay-by structures.

The standard freeboard height for head lay-bys moorings should normally be approximately 500mm and for tail lay-bys up to 750mm to allow for greater fluctuations in water levels.

Existing moorings in the vicinity with freeboards which work well may be a useful guide for new structures.

Safety accessories

● **Egress Ladders.** Allow for easy access to the walkway if a boater happens to fall into the river. They should be positioned at 30m intervals along the length of all lay-bys, including one at either end. (See Section 9.3)

● **Grab Chains.** Horizontally slung chains, secured just under the waling boards of lay-bys, for assistance if a boater happens to fall into the river. They should be fixed at approx. 2m centres in a staggered relationship to the bollard positions and should hang 150mm below SWL at their lowest point.



LAY-BYS & MOORINGS

MOORING EDGE COMPONENTS SHEET 2

Lay-by and mooring dimensions

CRAFT TYPE LENGTHS	FREEBOARD		WALKWAY WIDTH	FIG.	BOLLARD CENTRES		STEAMER OR RISER POSTS
	LOCKHEAD	LOCKTAIL			LARGE	SMALL	
STEAMERS & LARGE BOATS 20-30M	750MM+	750MM+ & STEAMER PILES	1500MM	①	8.0M		8.0M
NARROW BOATS & LAUNCHES 6-20M	500MM	750MM	1200-1500MM	②	4.0M		8.0M
				③		2.0M	6.0M
				④			3.0M
				⑤		12.0M	4.0M
CANOES & DINGHIES 3-5M	300MM	400MM	1200MM		2.0M RINGS FIXED RECESSED INTO WALKWAY SURFACE		

Lay-by and mooring layouts



① STEAMER PILES AND LARGE BOLLARDS



②



③ SMALL BOLLARDS AND RISER POSTS



④ RISER POSTS FOR MOORINGS ONLY



⑤ LAY-BY WITHOUT RISER POSTS

The 'lay-by' has long been a significant feature on the navigable River Thames - an essential facility for both commercial and leisure craft negotiating the busy lock in river conditions which change dramatically throughout the year.

In the early nineteenth century rows of large 'guard piles' protected craft from the pull of the weirstream. Freestanding 'King piles' were driven in below busy locks in the middle and lower Thames for steamers and barges to hold against. Later, floating booms were installed to link individual piles together.

In the 1950's and 60's many timber 'post and beam' offshore lay-bys were placed at lock head and tail positions throughout the river to cater for increasing numbers of motor launches used largely for leisure purposes. More recently the advent of glass fibre hulls of various sizes, has called for more sophisticated lay-by facilities.

Until recently, most lay-by facilities consisted of timber posts driven into the river bed offshore, often with connecting

beams between posts providing approximately one metre freeboard. (Plate 8)

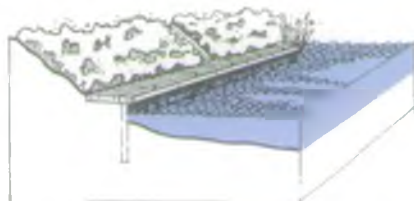
River traffic today includes many more inexperienced boaters using smaller craft and who have difficulty using the offshore lay-by safely in difficult conditions. To alleviate this problem certain lay-bys which require reinstatement are being constructed "onshore" i.e. either built into, or as an extension to the existing shoreline - allowing boaters easy access on to the shore.

The frustration experienced by boaters waiting long periods to enter locks during busy periods have been eased considerably where it is possible for them to use an onshore lay-by.

Onshore lay-by construction can have detrimental effects on bankside conservation interests and where these conflicts arise a balanced solution should have been achieved by careful choice of "on" or "offshore" structures, or even a combination of both. The choice of construction should also be based on a survey of site conditions described in Section 3.3.



POST & BEAM OFF-SHORE LAY-BY



ON-SHORE LAY-BY WITH PILED EDGE

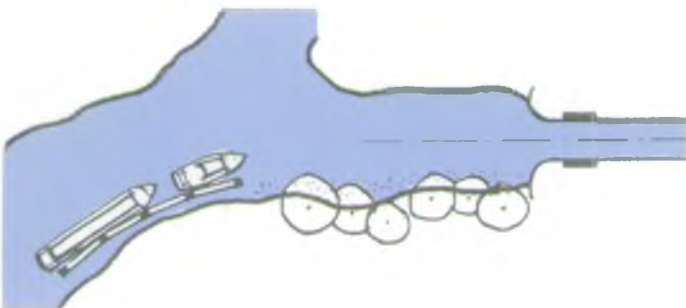
Lay-by Alignment

Ideally the lay-by should be straight, situated in 'calm' water and aligned directly towards the lock chamber. This provides a flat mooring edge for straight or curve sided boats to use and minimum effort to direct the craft into the river stream.



Other considerations include:

- A lay-by which has to be located on a bend in the river should ideally be situated on the inside of the bend away from the 'throw' of the river stream.
- Sharp changes in direction should be avoided as craft can be damaged when negotiating the angle point.
- A lay-by with a curved alignment on a river bend should follow a consistent, convex line to assist boat manoeuvres.



CURVED HEAD LAY-BY

Lay-by length

The extent of the lay-by should be carefully planned to cater effectively for the full range of craft using the lock. Once the length of the lay-by required is established then the best location can be selected. Two main factors dictate the length of the lay-by:

- The lay-by should accommodate at least the number of craft taken by the lock chamber. A large lock will relieve pressure on lay-by space, but equally a small lock often results in queues during busy periods; although this will also depend on -
- The 'batch size' of craft released from locks upstream/downstream of the site. A 'flotilla' of boats arriving simultaneously from a large lock will create regular demand for lay-by space.

The lay-by length should provide for the capacity required during normal conditions. Where extra capacity is required for short busy periods, then to avoid a continuous length of constructed walkway/edge the following options may be appropriate:

- Separate 'supplementary' facilities can be provided nearby.
- The lay-by can be extended with a 'low key' surfacing material such as crushed stone or grass.
- The lay-by can be extended with an offshore structure to avoid disturbing bankside vegetation.
- The total length of onshore lay-by can be divided into separate sections by groups of tree and shrub planting or reed beds. (See Section 11.3)

Ancillary facilities

The type and location of lay-by should respond to the layout of existing or planned facilities which require direct or indirect access from the mooring edge. The lay-by is a 'linear' feature where boats queuing for specific facilities need a clear sequence to follow. Interference with progression of boats along the lay-by can cause safety hazards and considerable frustration to boaters.

The main facilities which require detailed considerations are:

- Waterpoints require direct access adjacent to the mooring edge; they are best located at the end of the lay-by (furthest from the lock) or at a separate mooring edge aside from the lock approaches, not midway along the lay-by. (See Section 12.4)

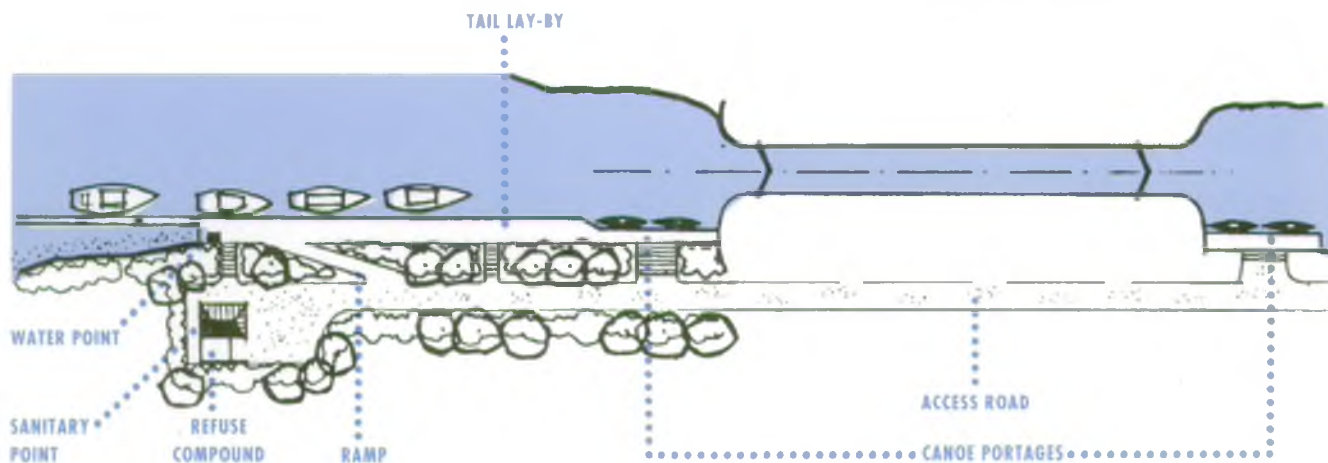
- Canoe portages/landings require direct access to a mooring edge with a low freeboard, and should be located close to the lock tail and the lock head on the **same side** of the lock to avoid canoeists having to cross the lock gates.

Steps approximately 3 metres wide set behind the canoe landing may be required to provide access to the towpath.

- Sanitary station and refuse facilities do not require direct access from the lay-by; however, a clearly marked route must be provided with access for wheelchairs and people with restricted physical capabilities. Ideally these facilities will be located in the vicinity of the water point so that the mooring edge can be utilised; the site will also benefit visually by these facilities being grouped together. (See Sections 12.2 and 12.3)

Other relevant sections

- Site planning
- Paving surfaces
- Ancillary facilities
- Fixtures (standard)



Choice of lay-by construction

	ONSHORE LAY-BY (SEE 11.4)	OFF SHORE LAY-BY (SEE 11.5)	FLOATING PONTOONS
LIFE EXPECTANCY MAINTENANCE/MODIFICATIONS	80 YEARS+ WITH OCCASIONAL REPAIRS TO DAMAGE. REGULAR CLEANING AND PAINTING OF STEELWORK. LIMITED SCOPE FOR CHANGES WITHOUT MAJOR DISTURBANCE TO THE FACILITY.	40 YEARS+ WITH REGULAR MAINTENANCE/REPAIR OF TIMBERS DEPENDING ON QUALITY AND TYPE OF TIMBER USED. SCOPE FOR STRUCTURE TO BE ADJUSTED/EXTENDED IN SECTIONS WITHOUT MAJOR DISTURBANCE. USE OF STRUCTURAL STEEL FRAMEWORK	GENERALLY ROBUST BUT EASILY REPAIRED OR REPLACED WHEN NECESSARY. LOW MAINTENANCE AND EASILY ADAPTED TO NEW SITUATIONS - FLEXIBLE.
ENVIRONMENTAL IMPACTS/BANK PROTECTION	CAN RESULT IN UNAVOIDABLE REMOVAL OF SELECTED TREES AND SHRUBS. STERILISES RIVER BANK HABITAT. PROVIDES LOCAL BANK PROTECTION BUT TRANSFERS WAVE EROSION TO EITHER END OF PILED EDGE. TREE AND SHRUB PLANTING REQUIRED.	ALLOWS RETENTION OF RIVERBANK VEGETATION/HABITATS AND FENDS BOATS OFF RIVER EDGE. ALLOWS REEDS/AQUATIC PLANTING TO PROTECT RIVER BANK BEHIND LAY-BY STRUCTURE.	LIMITED INSTALLATION WORKS/DISTURBANCE ON SITE AND ALLOWS RETENTION OF RIVER BANK VEGETATION. CAN HELP TO SUPPRESS WASH FROM BOATS.
VISUAL IMPACT/FREEBOARDS/ALIGNMENT	HARD PILED EDGE TO FREEBOARD VERY VISIBLE - LOW LANDING LESS VISIBLE. CHANGES IN WALKWAY LEVELS EASILY ACCOMMODATED BY STEPS OR RAMPS. ALIGNMENT LARGELY DICTATED BY EXISTING BANK LINE - NEED TO CUT OR FILL TO ADJUST LINE. NEED TO RESTRICT LENGTHS TO ABSOLUTE MINIMUM REQUIRED.	SHORT LENGTHS (30-40M) LOW VISUAL IMPACT. LONG LENGTHS HIGHLY VISIBLE ESPECIALLY IN OPEN COUNTRY UPSTREAM OF LOCK. SUITED TO ONE OR TWO FREE-BOARD HEIGHTS. FLEXIBLE ALIGNMENT SUBJECT TO ADEQUATE NAVIGABLE MOUTH OF CHANNEL BEING RETAINED.	SUITABLE FOR SHORT LENGTHS WHERE LOW FREEBOARD IS REQUIRED DURING HEAVY FLOOD CONDITIONS. LOCATION IS FLEXIBLE BUT NEEDS TO BE ATTACHED TO RISER PILES IN 'CALM' WATER AT EASILY SUPERVISED SITES.
SAFETY/EFFICIENCY/EASE OF USE	VERY SAFE FACILITY NO HANDRAIL REQUIRED. ONLY ONE MOORING EDGE AVAILABLE TO BOATS. EASY TO USE WITH STEPS OR RAMPS PROVIDED UP TO LOCK PATHS WHERE NECESSARY.	OFF SHORE LOCATION REQUIRES SAFETY RAILS TO BACK EDGE. MIDSTREAM LAY-BY CAN PROVIDE DOUBLE EDGE MOORING. MOVEMENT OFTEN RESTRICTED BY A SINGLE ACCESS WALKWAY ONTO THE SHORE. CAN BE SUBJECTED TO UNDER LAY-BY CURRENTS. NON SLIP DECKING NORMALLY REQUIRED. (SECTION 8.2)	NARROW PONTOON MAY REQUIRE SAFETY RAILS. SUITABLE FOR SMALLER CRAFT TO USE IN RESTRICTED AREAS WHERE NOT SUBJECT TO STRONG RIVER CURRENTS. NON SLIP SURFACE VERY IMPORTANT.
CONSTRUCTION/SKILLS/MATERIALS	WIDE RANGE - PILING, TIMBER CONCRETE, BLOCKWORK. HARD MATERIALS DO REINFORCE URBAN CHARACTER - IMPORTANT TO RETAIN SOME TIMBER COMPONENTS IN WATERSIDE LOCATION.	LIMITED TO TIMBER AND STEEL WORKS. NATURAL WEATHERED FINISH TO TIMBER IDEAL FOR WATERSIDE LOCATIONS.	ASSEMBLED ON SITE AND EASILY INSTALLED AT ACCESSIBLE SITES.

LAY-BYS & MOORINGS RIVER MOORING PROPOSALS

Many of the considerations which influence lay-by design also apply to linear river moorings, although the latter do not normally receive the intensity of use associated with the lock lay-by.

Where moorings are proposed for either weirstream or isolated stretches of river it should be possible to integrate them sensitively with the existing bankside conditions and avoid disturbance of good marginal habitat or mature trees. (See Section 3.3)

The design of mooring edges and bank stabilisation techniques can be combined to create sensitive treatments which prevent the riverbanks from having an overdeveloped appearance - particularly at sites with rural landscape settings.

There are a number of ways to achieve this:

- The total number of moorings required can be broken down into separate short lengths of mooring edge to accommodate small groups of boats.
- The breaks between moorings can be planned to coincide with existing bankside trees, shrubs or marginal aquatic vegetation which help to screen the ranks of boats and act as a windbreak.
- The breaks can be designed to accommodate new bankside or aquatic planting using appropriate bank rivetment techniques.
- Onshore access can be made more informal in appearance by keeping walkway width to a minimum (i.e. 1 m), and wherever site conditions allow, sympathetic surface treatments such as mown grass, well compacted crushed stone or sealed gravel should be used behind textured concrete capping.
- In all cases where piled edges are used to retain the bank, freeboards should be kept to a minimum height with an appropriate capping and cladding option applied, to reduce visual intrusion.
- A backdrop of existing mature trees can help to reduce the scale and visual impact of linear moorings.

Trees in close proximity to moorings should be inspected by a qualified arboriculturist to ensure that potentially hazardous overhanging branches are identified and removed.

Other relevant sections

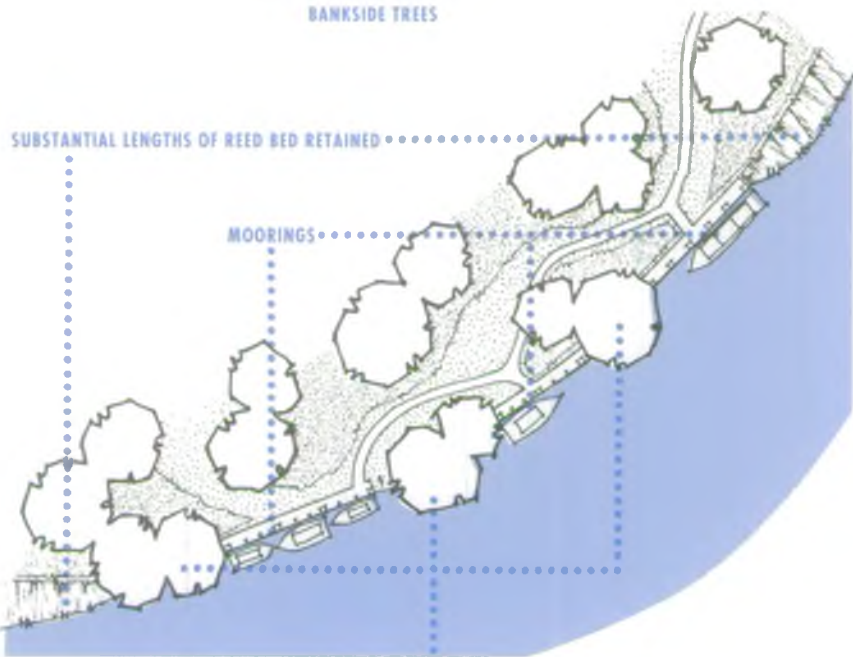
- Site planning
- Paving surfaces



REEDS PLANTED INTO ANCHORED
BAGS AT RIVER EDGE

PILE DRIVING CONSTRUCTION
WORK TO CLEAR THE CANOPY OF
BANKSIDE TREES

MOORING FREEBOARD AS LOW
AS POSSIBLE WITH REINSTATED
BANK GRADED SMOOTHLY TO
MARRY WALKWAY LEVEL WITH
NATURAL BANK LEVELS



EXISTING TREES AND VALUABLE NATURAL BANKS RETAINED, BREAKING UP MOORING LENGTHS

LAY-BYS & MOORINGS RIVER MOORING PROPOSALS

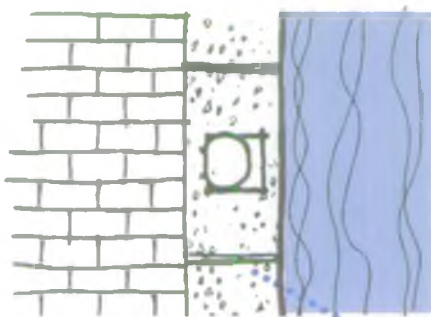
Onshore lay-bys/moorings are usually constructed from a base of interlocking steel piles. Steel piles can present a very stark and 'hard' edge; however, measures can be taken to reduce the visual impact using appropriate materials to disguise the appearance of steel piles. The height of exposed piling above the standard water level should be reduced to the minimum needed to achieve the required freeboard.

Capping

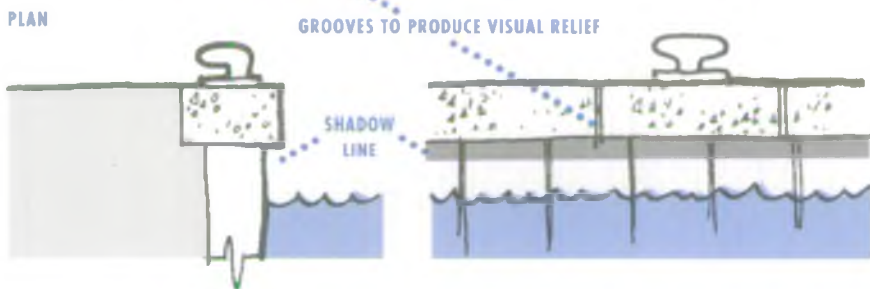
The piles should be capped with a material which relates to the proposed walkway surfacing.

The capping has an important visual and functional role in lay-by design:

- The capping demarcates the waterside edge to the walkway and so highlights the potential hazard area to pedestrians.
- The capping material should have a textured quality providing a non-slip/skid surface for boaters' use.
- Protects the piled edge from impact damage and provides effective drainage of surface water off the walkway into the river.
- Bollards, rings and 'rubbing strips' can be fixed through or into the capping material so they are easily identified and located at consistent intervals.
- Concrete capping can be detailed to create visual 'relief' and 'texture' by use of profiling and shadowlines to mask the piled edge below.



PLAN



CONCRETE CAPPING: SECTION & ELEVATION

The materials used for capping should be carefully selected and detailed.

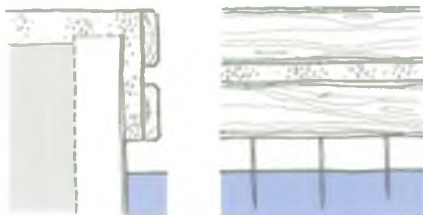
- Concrete can look very stark and 'white' and takes a long time to weather down. An exposed aggregate finish using washed river gravel as the bulk aggregate will successfully 'age' the finished appearance of capping cast in-situ and provide a textured surface (e.g. Shepperton head lay-by).

- Brick relates well to adjacent brick structures (walls, steps, paths, etc). Engineering bricks should be used with a water absorption rating of less than 10%. Blue single bullnose bricks laid on a mortar bed over concrete create a pleasing appearance.

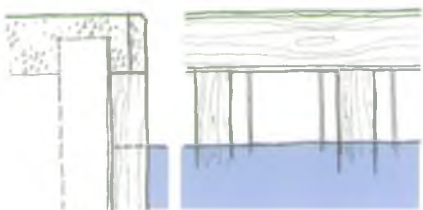
- Timber capping is an appropriate material for straight lengths where angles do not have to be cut. The timber should be either hardwood or pressure impregnated softwood treated with a natural finish stain. Good quality timber is essential and it should be planed smooth and laid heartwood down with fixing screws countersunk to ensure that the effects of initial weathering do not cause splintering and cracking. (Section 4.2)

Countersunk holes should be sealed with an appropriate waterproof filler.

- Alternatively, at low key sites a strongly defined capping may not be required. In these situations the walk-way surface could continue right up to the rubbing strip board.



HORIZONTAL RAILS: SECTION & ELEVATION



VERTICAL STRAKES: SECTION & ELEVATION

Cladding

Freeboards in excess of 450mm (18") will generally require the face of the piles to be clad, preferably with timber. Cladding consists of either horizontal rails and/or vertical 'strake posts' bolted onto the piles above water level.

These components should be clean and free of projections to enable craft to moor safely against the piled edge.

Riser Posts (steamer piles)

These posts set at regular intervals along the mooring edge of the lay-by are vertical extensions of the rubbing strakes above the walkway level. Their height is related to the average flood levels so that craft are held off the lay-by and prevented from over-riding the walkway in times of flood.

In the past, riser posts have been constructed of solid timber as part of the lay-by structure and this resulted in problems where regular renewal is required due to impact damage.

Two recent innovations may be appropriate:

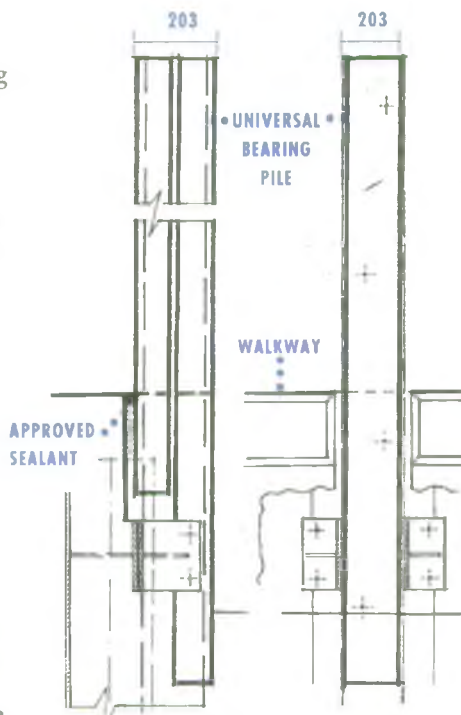
- Timber clad steel posts.

An alternative specification for heavy traffic conditions consists of a steel universal beam structurally integrated with the steel piling. The exposed sides of the beam are fitted with timber cladding bolted through. If damaged the timbers can be replaced easily. ① ② ③

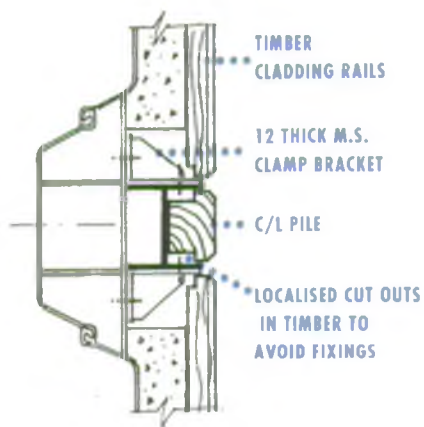
- Riser posts with sliding rings.

At long term moorings where riser posts are required the universal beam posts can be fitted with vertical bars welded to either side of the post, with a steel mooring ring attached to each bar.

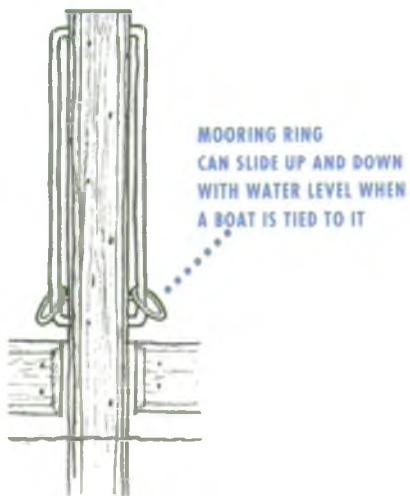
During flood conditions the ring will slide up the bar and allow the craft to rise freely to avoid the possibility of mooring ropes and craft being damaged. ④



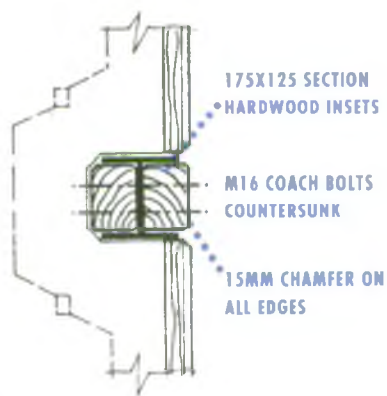
① RISER POST (STEAMER PILE):
SECTION & ELEVATION



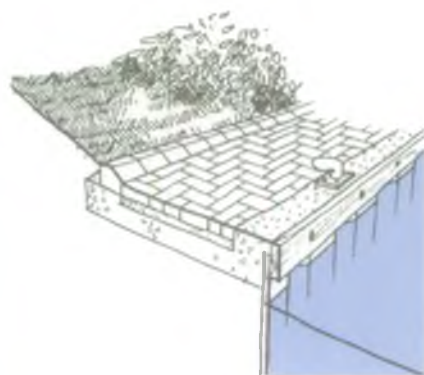
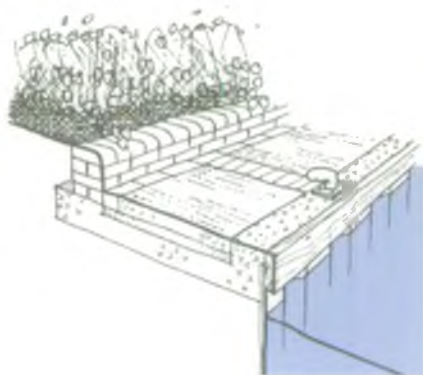
② SECTIONAL PLAN OF RISER POST
BELOW WALKWAY



④ RISER POST WITH
SLIDING MOORING RING



③ SECTIONAL PLAN OF RISER POST
ABOVE WALKWAY



Walkway Surfaces (see Section 8.0)

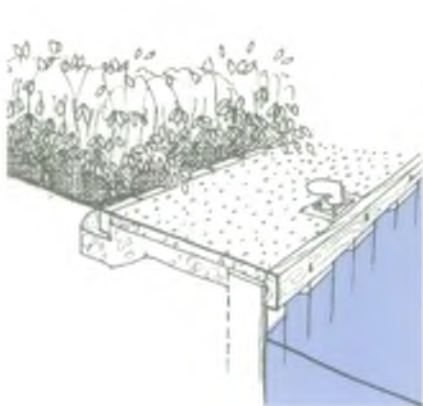
Surface treatment has a significant visual impact on the waterside scene and should reflect the character of quality materials used in nearby surfaces and structures, as well as the predicted usage of the facility. A 'heavy duty' treatment will never look in keeping at a 'low key' site.

- Concrete (cast in situ) - a versatile material sympathetic to both rural and urban locations and easily cast into irregular shapes. As with 'capping' the appearance benefits from an exposed aggregate brushed or tooled finish both to 'age' the look of new concrete and provide a textured 'non-slip' surface. Concrete can be used effectively with brick/block paving as trim/edges or with timber capping. (Plate 17)

- Brick/Block Paving - a more formal treatment introducing colour, texture and pattern with brick bond and jointing. Suitable for suburban/urban situations with brickwork already on site.

Clay bricks and concrete paviors are readily available to numerous specifications; paving units should be carefully selected to match local materials; checking of samples on site will be necessary.

As a rule, clay brick paviors are most suitable for natural red/blue brindle mixtures. Concrete block paviors are artificially pigmented and so more successful in the neutral colours such as Buff/Browns or Charcoal Grey. (Plate 19)



● **Sealed Gravel** - a surface treatment suited to both formal and informal surroundings; it depends upon the colour and texture of aggregate for effect. The compacted aggregate is bound with a bituminous emulsion to give a darker tone or a clear synthetic binder which will show the natural colouring of the chosen aggregate.



● **Crushed stone (Hoggin)** - an informal treatment particularly suitable for rural locations at sites not subject to heavy flooding. A crushed limestone aggregate (local where possible) should be graded from '25mm to dust' so that when rolled the fines form a well bound and compacted surface which can withstand regular use and occasional flooding. (Plate 23)



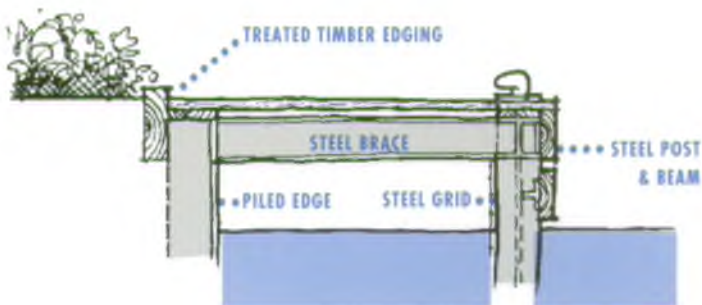
- Grass - an effective and natural treatment for rural sites where the walkway level 'marries in' with adjacent ground levels. The surface requires careful management to establish and retain a grass sward resilient to trampling. The sward can also be integrated with adjacent (wildflower) meadow areas and shrub vegetation.

A grass surface is also suitable for 'supplementary' lay-by facilities used during the height of the season, so the grass can recover out of season.



- Timber Staging - Use of timber decking need not be confined to offshore timber lay-by structures. The treatment is particularly attractive where on-shore landing stages allow water to flow underneath.

Normally, bank revetment such as sheet piling is required at the rear of the stage; the parallel mooring edge, constructed in timber or steel is braced against the revetment; timber decking and walings are screwed or bolted on to the structure. (See Section 11.5)



Metal fixings should be of galvanised steel, and joint details considered carefully to prevent possible splitting of timbers or trapping of moisture which leads to rapid rotting around joints.

Where the staging is located at sites subject to flood conditions the supporting posts can be extended vertically to the appropriate height and detailed as riser posts.

A metal grid may be fixed in position behind the supporting posts and extending below water level to prevent floating debris getting trapped under the staging.

Other relevant sections

- Colour, materials, finishes
- Paving surfaces

Timber Structure

King piles are key structural components in the offshore lay-by.

Traditionally of Greenheart timber to withstand heavy impact from large craft, the posts are of 14" x 14" square sections. (Jarrah or pressure treated Douglas Fir are acceptable alternatives, depending upon availability in required sizes).

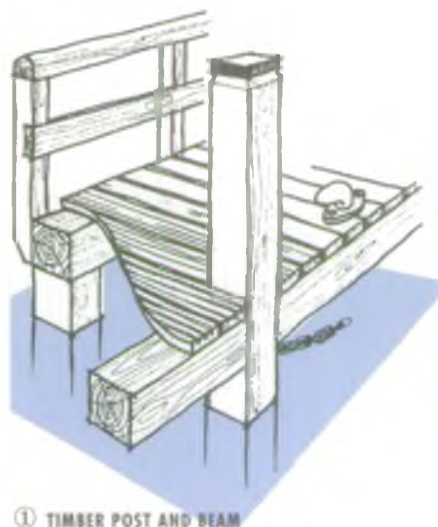
Detailing and finishes to king posts will help to extend their life expectancy.

A natural 'weathered' finish is favoured because in the past a gloss painted finish has accelerated timber rot due to moisture trapped under the paint.

A non-solvent based, translucent stain will help to reduce the effects of initial weathering, e.g. surface splits and checks. (Section 4.2)

The end grain at the head of the pile should be protected by a mild steel capping plate painted black gloss. The four corners of each pile should be chamfered to present a 'kind' edge to mooring ropes.

Beams connecting the king piles to form an offshore lay-by are of pressure treated Douglas Fir, a robust and readily available softwood timber which weathers well.



Contact between end grain and any metal fixings should be minimised to reduce the rate of timber rot due to the travel of trapped moisture. ①

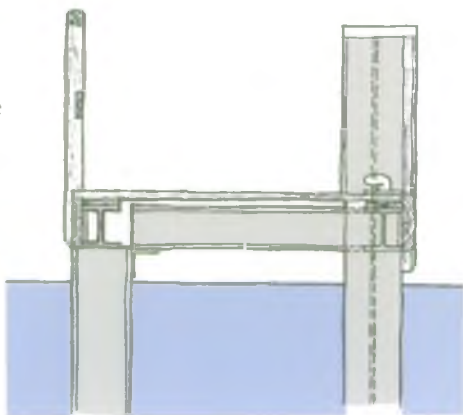
Steel structure

Using steel universal beams for the skeletal structure of the lay-by, timber components can be bolted on to clad the steel frame and provide easily replaceable fending edges which are vulnerable to boat impact damage.^②

Steel framed structures have definite advantages in terms of low maintenance and the responsible use of treated softwood timber such as Douglas Fir for cladding.

However, they are more complicated to build with higher initial cost. Also, where situated adjacent to existing timber structures the 'composite' design may not be as attractive as the simple, 'all-timber' version.

For details on handrails for timber or steel lay-bys consult Sections 9.5 and 10.5.



② STEEL POST AND BEAM WITH TIMBER CLADDING

Washboards

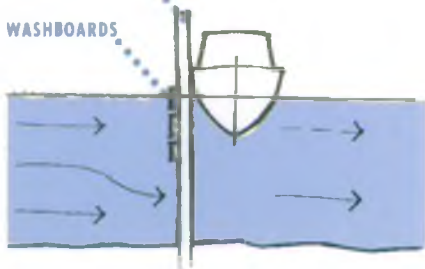
Lay-by structures which are situated downstream of the lock between weirstream and lock cut tend to be affected by the weirstream currents which flow under the lay-by pushing craft from the structure.

Where this problem occurs it is advisable to fit washboards between lay-by posts from just above water level to approximately one metre below with small gaps between each board.

The washboards will create calm water on the mooring side of the lay-by.

OFF-SHORE LAY-BY POST

WASHBOARDS



Decking

Timber Decking — an attractive treatment, sympathetic to most waterside locations. Offshore lay-by structures normally have adequate ventilation around timber components to reduce the potentially damaging effects of damp conditions.

Decking planks should be of an approved hardwood or tanalised softwood screwed heartwood down onto the timber bearers, with 10-15mm gaps between the planks.

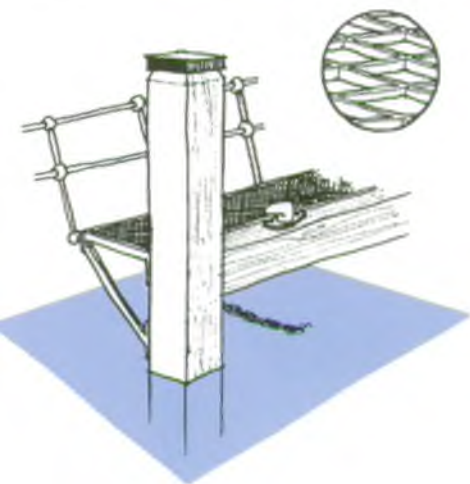
Planks which are left rough sawn have a 'non-slip' texture which may be improved with longitudinal machine grooving to drain water from the surface. Alternatively, a proprietary non-slip textured surface can be applied to the decking planks. (Section 8.2)

Open Steel Grating — a functional treatment which is suitable for attachment to existing structures in locations which are not highly visible or in an elevated position.

Grid patterns vary between those proprietary systems available; however the open diamond or square gratings have a more pleasing appearance than the perforated steel plates.

Other relevant sections

- Colour, materials, finishes
- Fencing and rails
- Paving surfaces



12.1 ANCILLARY FACILITIES SITING & ENCLOSURE

Ancillary facilities comprise a wide range of installations which cater primarily for cruising boaters; they are located at convenient distance intervals throughout the river normally at lock sites which are better able to accommodate them.

This section is primarily concerned with the need to integrate these installations into the lockside scene to reduce any visual intrusion and ensure ease of access and maintenance.

For any proposals of this kind the following considerations should be made:

- Review the operational requirements and constraints:

- vehicular access for servicing
- close proximity of river bank or mooring edge
- restrictions on total length of utility pipe or cable runs

- Can the installations be grouped together under one roof within an existing or new building?

- Are resources available to mitigate visual intrusion through careful use of materials and design of housings?

The following table sets out the access requirements and recommended options for housings with regard to the main installations associated with lock sites.

Other relevant sections

- Site planning
- Colour and finishes
- Lay-bys and moorings
- Buildings

INSTALLATIONS WHICH REQUIRE VEHICULAR SERVICE ACCESS	UTILITY SERVICES REQUIRED (PIPES, CABLES)	UNDER ONE ROOF (EXISTING OR NEW BUILDING)	COMPOUND ENCLOSED AT SIDES	FREESTANDING SERVICE POINT
RELIEF LOCK KEEPERS MESS	●	●		
TOILETS/WASH BASINS (INCLUDING FOR DISABLED PERSONS)	●	●		
SHOWERS (OPTIONAL)	●	●		
ELSAN HOPPERS	●	●		
STORAGE SPACE		●	●	
WHEELER BINS - DRY REFUSE		●	●	
SKIPS - DRY REFUSE			●	
INSTALLATIONS WHICH NEED TO BE CLOSE TO RIVER OR MOORING EDGE				
POTABLE WATER SUPPLY	●			●
PUMP OUT STATION - FOUL WASTE	●			●
GUGAGES (TELEMETRY)	●			●
TELEMETRY OUT STATION (LOCATION MORE FLEXIBLE)	●	●		●

ANCILLARY FACILITIES SANITARY BUILDINGS

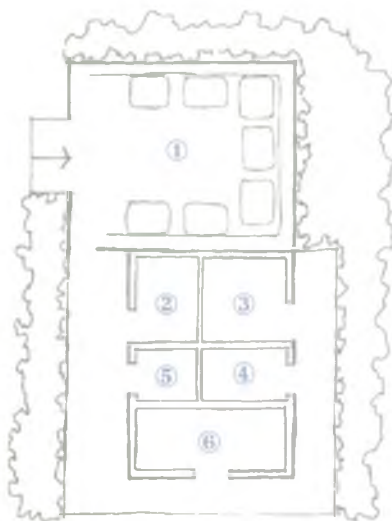
Existing or new buildings can house a collection of compatible facilities which might otherwise stand as individual installations. New buildings should be well removed from and set back behind the lock house. The design of the building should make a contribution to the lock scene by virtue of appropriate materials and careful detailing to roof pitch, eaves, windows and doors.

Ramps for wheelchair access should be provided where necessary.

A setting with a backdrop of mature trees or planting will help to integrate the structure within the site.

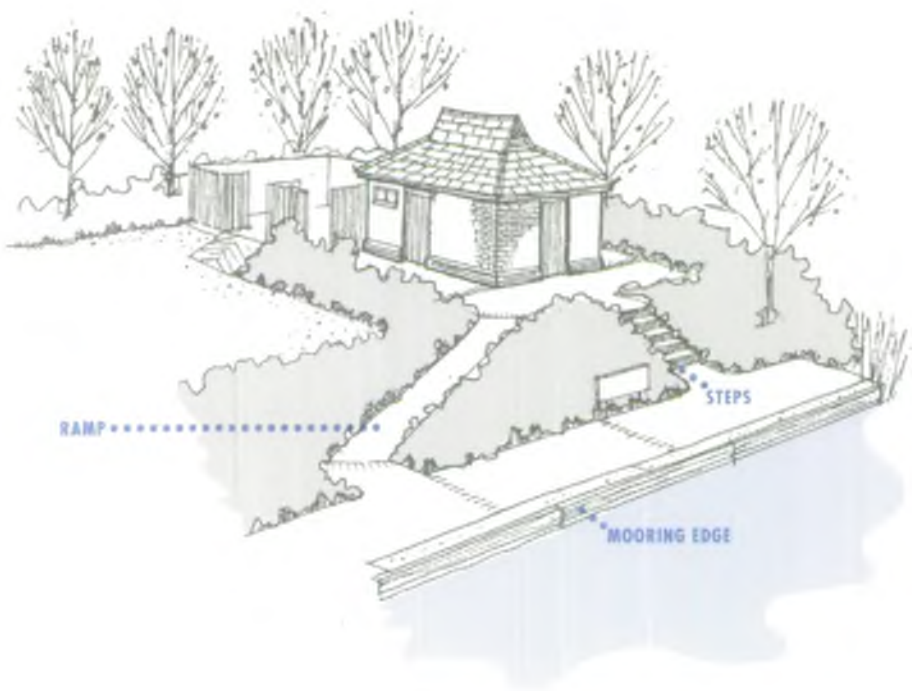
Avoid fixing large signs to the building - they can ruin what might otherwise be a presentable structure.

(See also Section 13.0)



PLAN OF INTEGRATED SANITARY UNIT

- ① REFUSE COMPOUND
- ② ELSAN DISPOSAL
- ③ TOILET
- ④ SHOWER
- ⑤ STORE
- ⑥ PUMP ROOM



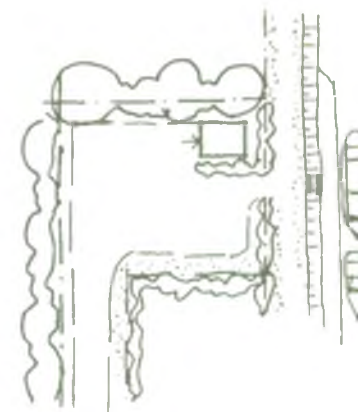
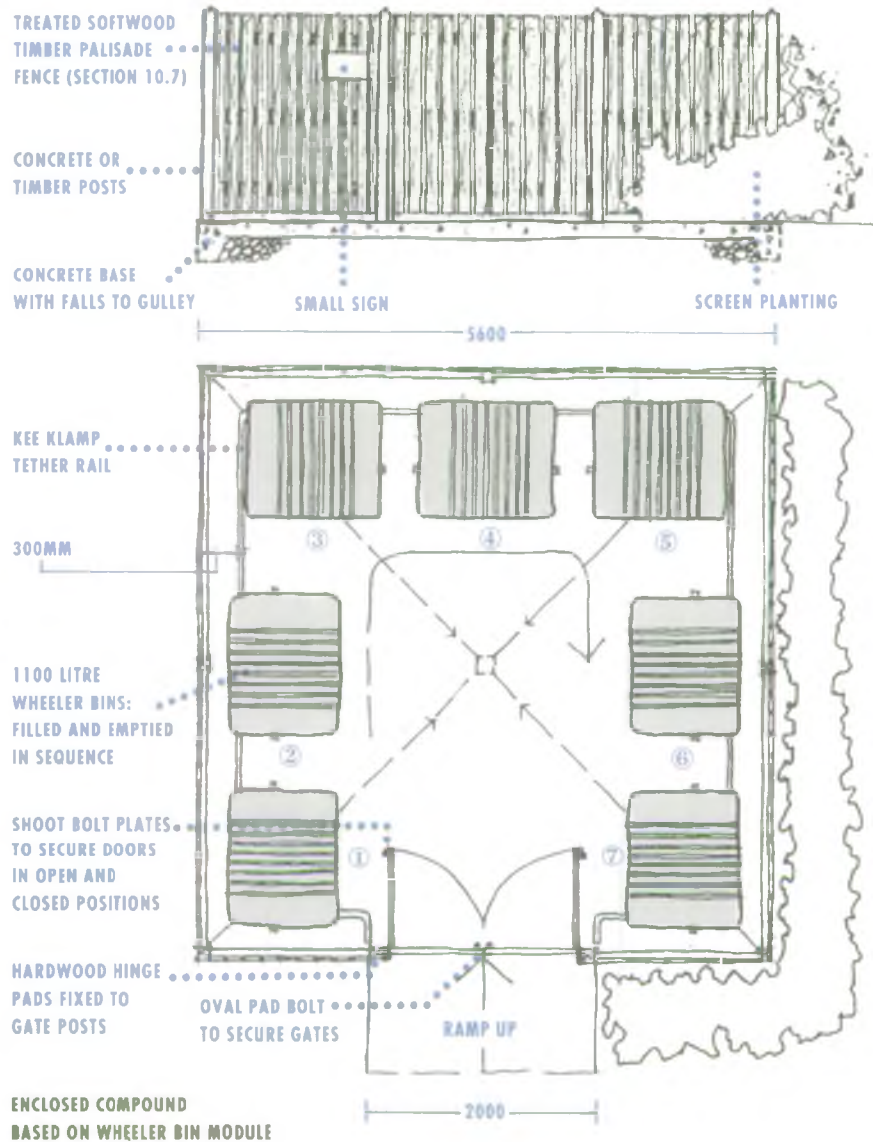
ANCILLARY FACILITIES DRY REFUSE COMPOUNDS

Compounds need to be either concealed from general view or be provided with purpose designed screen fencing designed to reduce visual intrusion. In either case there is a need for adequate service access. (Section 3.4)

These requirements can be met by integrating refuse compounds with existing access routes or parking areas set well back from the riverside and preferably down wind of the lock area.

The wheeler bin 'modular' system allows any number of bins to be housed within a compound having plan dimensions designed to accommodate the numbers of bins required. Bins are filled and emptied regularly in sequence to avoid problems with managing excess waste during the high season.

Skips should be contained within a similar enclosure large enough to accommodate two medium sized skips placed side by side for alternate use. Screen fences such as the vertical palisade or 'hit and miss' details have a pleasing appearance and provide adequate ventilation. (Section 10.7)



COMPOUND LOCATED IN CORNER OF CAR PARK
WITH SCREEN PLANTING

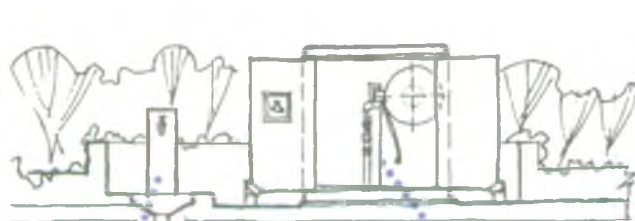


COMPOUND LOCATED BEHIND SANITARY STATION

These installations need to be located close to the river edge and are therefore potentially very intrusive unless given discreet detailing. Water points and pump-out stations are best located against the head lay-by to reduce risk of flood damage and should allow 2 metres of clear walkway to the mooring edge.

The water point should be sufficiently removed from the pump-out station to ensure that water supply and foul hoses do not come into contact. Both points should be located at one end of the lay-by, not midway where they interfere with the passage of boats along the lay-by. Service points are usually contained within a weather-tight fibre glass housing fixed to a concrete base to provide insulation and protection from frost. To mitigate visual intrusion these structures should be set into an existing bank or against a backdrop of planting and painted with an appropriate neutral colour to blend the structure into the scene. (Section 4.1) (Plate 4)

Housings which are unnecessarily clad in brick or stone tend to look out of place unless integrated with adjacent walls or structures. Concrete hardstandings can be given a neat finish with brick trim and edgings integrated with the layout of retaining walls.

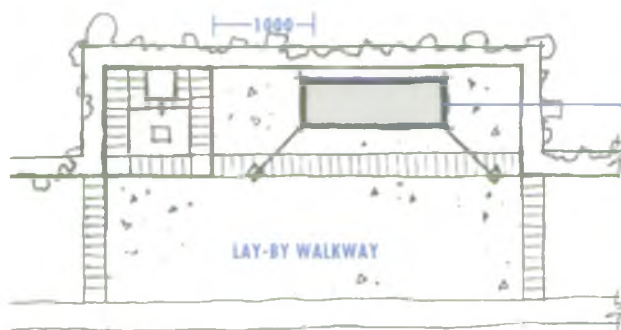


STAND PIPE FOR CONTAINERS
SET INTO BRICK COLUMN WITH
BRICK SURROUND TO DRAINAGE
BASIN (IF REQUIRED)

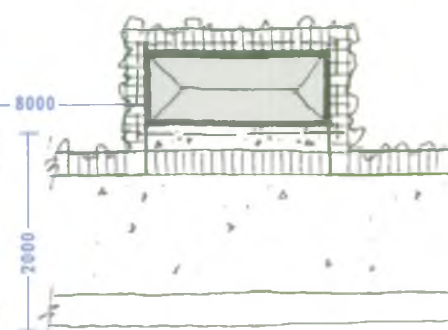
MORGAN MARINE GRP 'J' TYPE CLAM CABINET
(GREEN-DARK FIR) WITH GACORD TYPE 31
FLEXIBLE HOSE FOR BULK WATER SUPPLY.
SET ON CONCRETE BASE WITH BRICK TRIM



50MM DIA FLEXIBLE SUCTION HOSE, COIN OPERATED
PUMP SWITCH AND 12MM DIA FLUSHING HOSE HOUSED
IN BRICK SHELTER WITH PRECAST CONCRETE ROOF.
SET ON CONCRETE BASE WITH BRICK TRIM



POTABLE WATER SUPPLY POINT



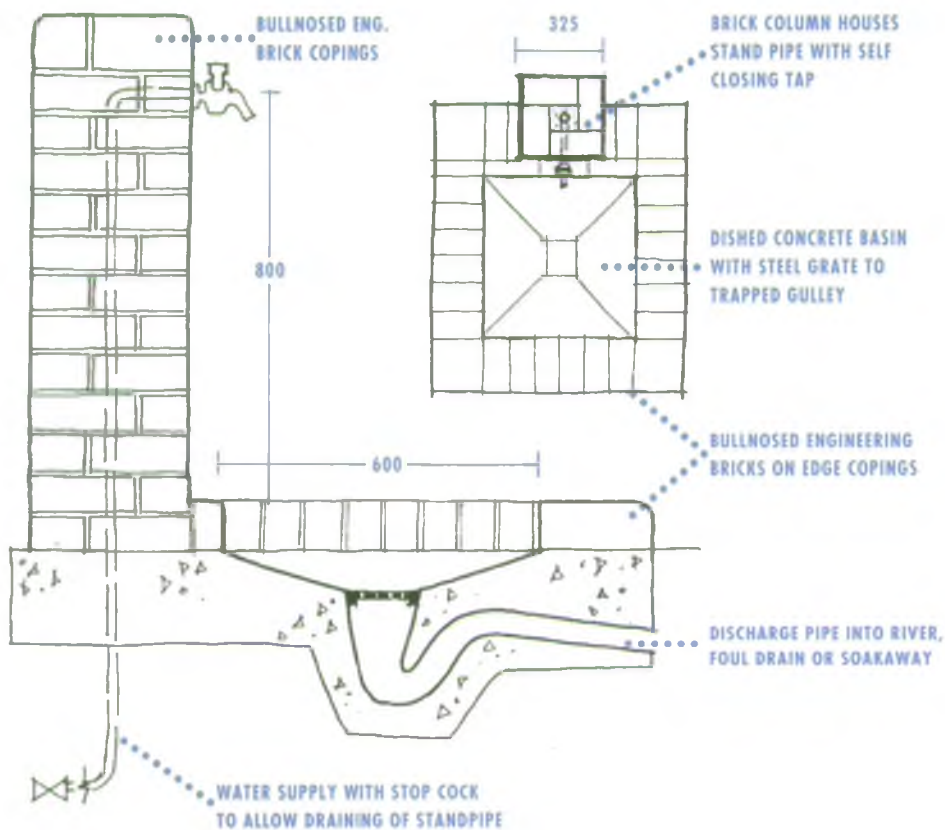
PUMP-OUT STATION



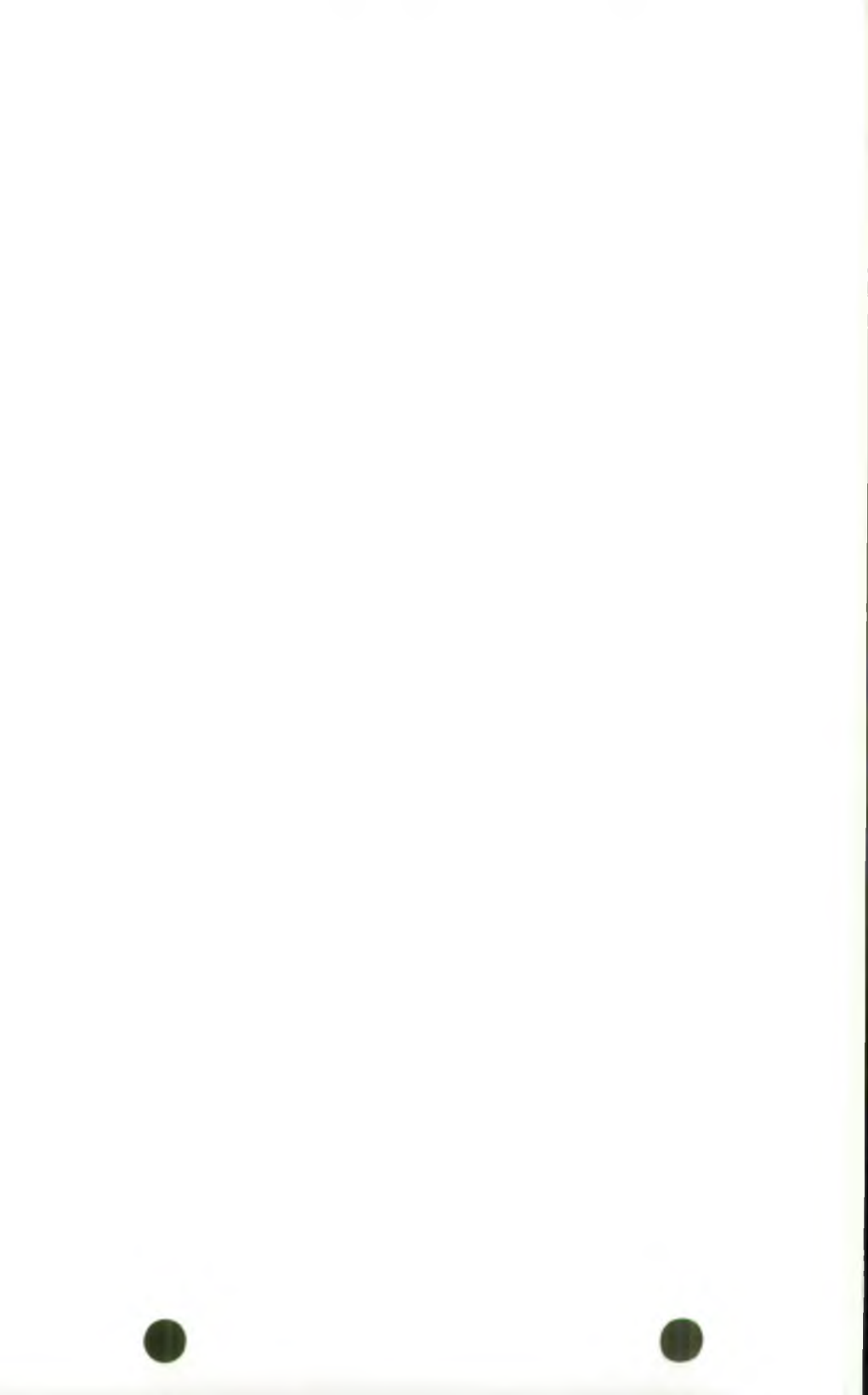
STRUCTURE SET AGAINST BACKDROP OF PLANTING



STRUCTURE SET INTO BANK WITH RETAINING WALL
AND PLANTING

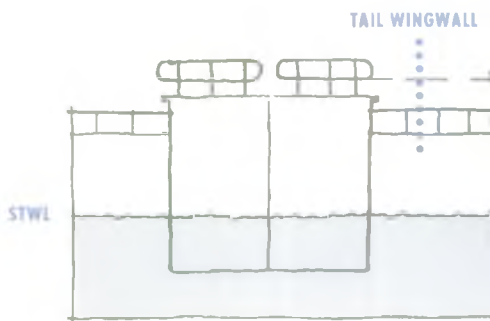


STAND PIPE DETAIL



This equipment is installed to monitor fluctuations in water levels and usually sited in the lock cut to avoid the influence of the weirstream gradient.

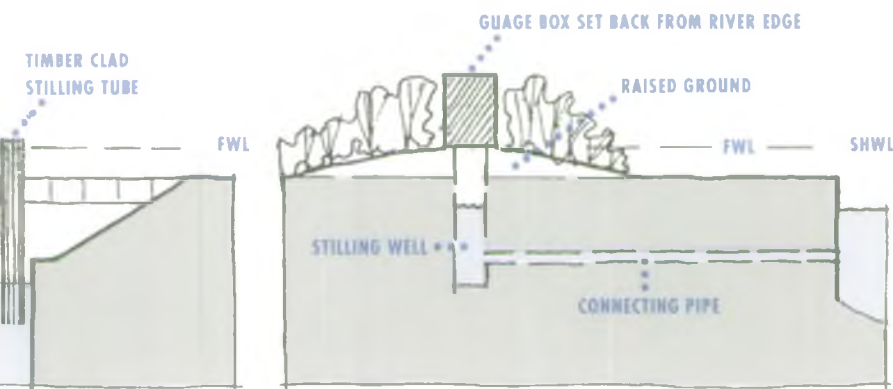
Gauges are installed at either the head or tail end of the lock. The tail gauge comprises a stilling tube which rises to above flood levels and should ideally be placed in an unobtrusive position at the end of the lock wingwall. The tube is normally clad in treated softwood timber, given a dark stain. (Section 4.2)



TAIL WATER LEVEL GAUGE

Head gauges consist of a stilling well with substantial cabinet placed on top which houses the monitoring equipment. The gauge can be set back from the river edge by fitting a connecting pipe from lock cut to stilling well. This allows the cabinet to be set into an embankment together with screen planting.

The position of gauges in relation to the central telemetry out station is influenced by the cost of cable runs etc, however, wherever possible the station should be installed within existing secure buildings or otherwise contained with an individual housing sited out of general view of the lockside.



HEAD WATER LEVEL GAUGE

Potential visitors to river recreation sites, who have restricted physical capabilities are often discouraged when they experience or anticipate awkward access situations. For example, a parent with a pram or pushchair may find it difficult to scale steps, or an ambulant disabled person may feel unsafe on a high cambered bridge deck. Difficulties of this sort can easily be overcome with simple alterations. A gentle ramp instead of steps allows wheelbound access. A handrail fitted to an existing parapet will encourage confidence to negotiate a bridge deck.

Management Notes

Balance of provision: it is important to carefully balance the amount of provision in any site. Easy as it is to underprovide by constructing isolated 'special facilities', it is also possible to

overprovide by removing all obstacles, effectively dulling a potentially exciting riverside experience. For example, to be confronted with a stretch of towpath that has an uneven surface due to protruding roots, stinging nettles on one side and an ill-defined river bank on the other, can be considered a hostile situation by many people. But to clear the nettles, level the path and define the river bank with a piled edge would be a drastic and inappropriate solution. In these circumstances, at points of interest on the route a guardrail could be installed to give something to lean on and encourage confidence to move safely to the water's edge. Elsewhere at difficult sections of the route the path could be levelled and resurfaced or even realigned to provide adequate clearance of rough vegetation, tree roots or the ill-defined river edge.

Maintenance: encroaching undergrowth is a constant threat to accessibility for the disabled, and for the partially sighted overhanging branches can be a dangerous obstruction too.

Maintenance is also required to ensure that path and non-slip surfaces are kept in good condition and the handrails and guardrails remain secure.

Safety procedures: for advice on site specific proposals which concern public safety at lock and weir sites it will be necessary to consult the NRA Safety Officer based at Reading.



Paths

Widths: Busy paths likely to have wheel-chairs passing should have a minimum width of 2.0m, while less used paths can have a width of 1.2m, passing places will be required at regular intervals.

Surfaces (Section 8.0): should be smoothly graded, firm and non-slip.

Ideal materials are:

- Bitmac
- Brushed concrete
- Brick (rough finish)
- Scaled gravel
- Crushed stone (well compacted)

Cambers and cross falls: should be kept to a minimum and where possible cambers should be used rather than crossfalls.

Guard rails should be erected where the path runs close to a dangerous river edge:

- Where the path is on a downward grade towards the river.
- Where the path has a marked crossfall towards the river.
- Where the river edge is ill defined.

(An alternative would be to realign the path.)

Slopes and Ramps

CHANGE IN LEVEL	LENGTH	MAX GRADIENT
<0.25	<3M	1:12
0.25-0.375M	3-6M	1:16
>0.375M	>6M	1:20

Gradients: should be kept constant in any one slope.

Resting platforms: there should be level landings (0.9-1.8m long) at 10m intervals on all slopes and also where a slope changes direction.

Handrails: should be installed on all slopes (on at least one side).

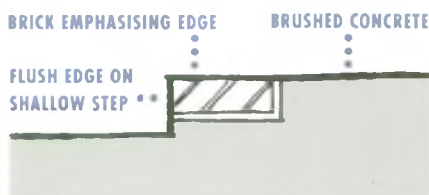
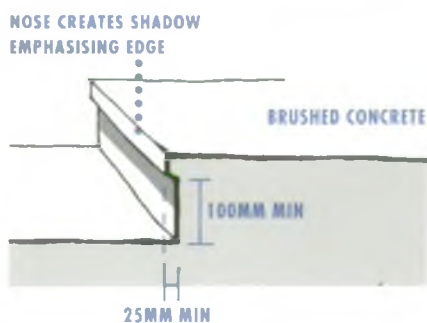
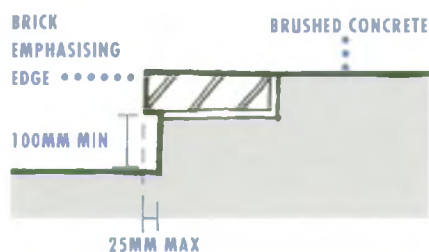
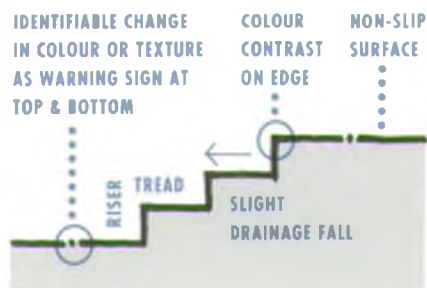
Steps

Step profiles: should be uniform throughout the flight with a maximum riser on 170mm and a minimum tread of 300mm. The ideal dimensions would be 900mm treads (enough to accommodate a wheelchair) and 75mm risers.

Other important details:

- The edge of each step should be pronounced by a contrast in colour or texture.
- There should be an obvious change in colour or texture as a warning at the top and bottom of the steps.
- All surfaces should have non-slip textures.
- Each step should have a slight drainage fall, but ramped treads are unacceptable where wheelchair users are expected.

Handrails: should be installed on all steps intended for use by the general public.



Bridges

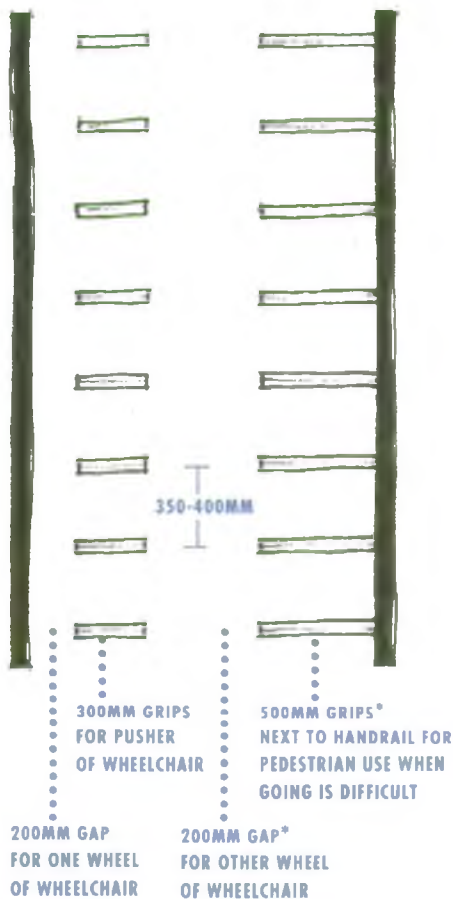
Widths: as paths, with 2.0m as suggested minimum.

Surfaces: Timber or concrete decking is the usual. In the case of timber the boards should be laid across the direction of travel, with gaps 10mm wide. For improved grip additional surface treatments can be incorporated:

- Grooved timbers.
- Epoxy tar sprays spread with grit.
- Proprietary 'stick down' non-slip surfaces. (See Section 8.2)
- Upstanding metal or timber batons fixed to the decking at right angles to the direction of travel.

This last option is often required on cambered footbridges, but as well as aiding with grip it creates an obstacle for wheelchairs, prams and pushchairs and a trip hazard for the partially sighted. Therefore these raised strips should have gaps for the passage of wheelchairs and be highlighted (painted or stained with a contrasting colour) to make them more visible.

Handrails: should be installed on both sides of all cambered bridge decks.



* THESE DIMENSIONS CAN INCREASE
IF THE DECK/BRIDGE IS WIDER

Hand & Guard Rails

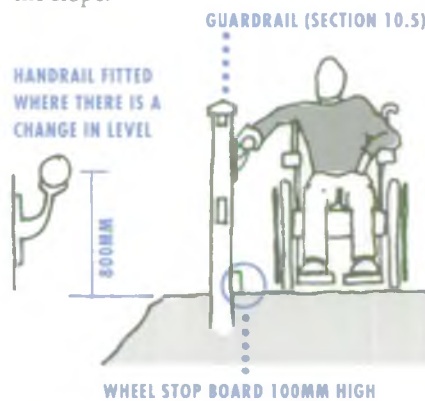
Should be installed on:

- Paths close to a potentially hazardous river edge
- Ramps
- Steps
- Bridges

Handrails should be attached to walls or other existing solid features if convenient, otherwise a guard rail will be required to support the handrail.

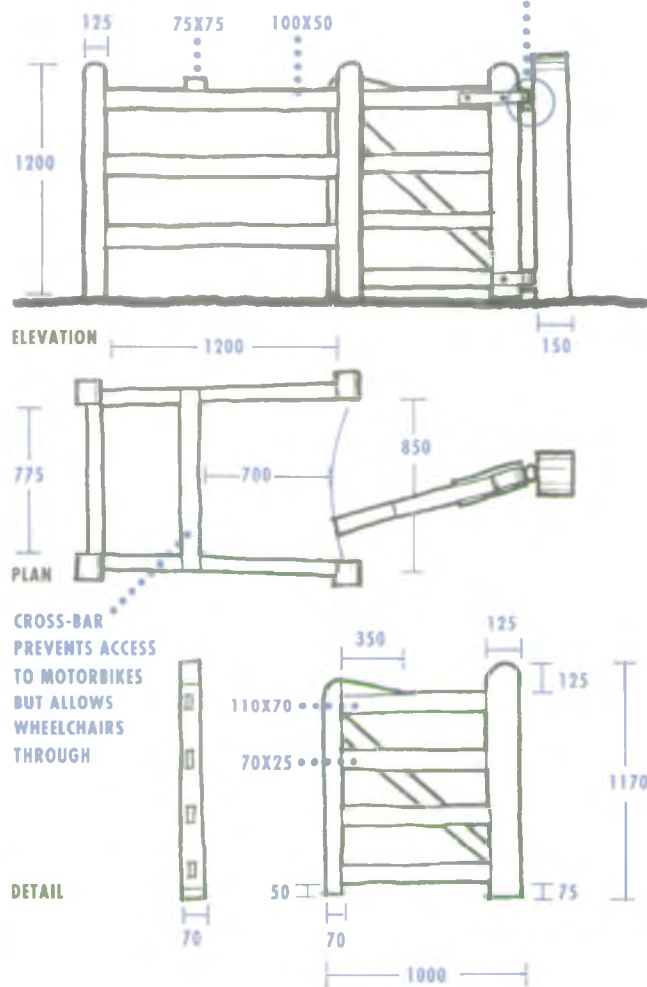
Other important details:

- A wheel stop board should be installed with every guard rail that has a handrail.
- Both guard rail and handrail should extend a short way above and below the slope.

**Gates**

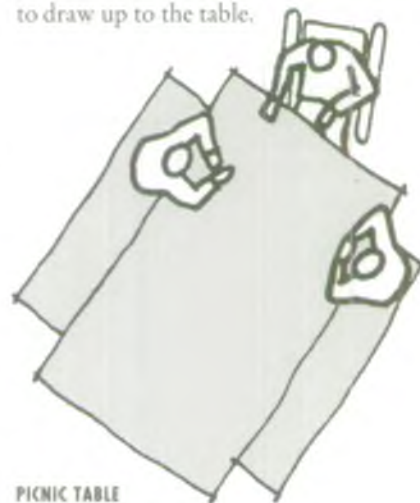
Kissing gates for wheelchair users are the best solution when access for prams and wheelchairs is desirable but access for motorbikes is not.

OFF-SET HINGE OR OTHER SELF CLOSING MECHANISM TO CLOSE GATE TO ONE SIDE

**Seats & Picnic Tables**

Path side benches: should have a space to one side provided to accommodate a wheelchair or pram. (See Section 9.9)

Picnic tables: where set back from a path, over rough or sloped ground, some sort of access path will be required. The tables themselves should have some convenient points free of fixed benches so as to allow a wheelchair to draw up to the table.



PICNIC TABLE WITH SPACE ALLOWING WHEELCHAIR TO DRAW UP



APPENDIX A

SELECTED PRODUCTS & SUPPLIERS

1.0 PAVIORS & BRICKS

Unit paving:

Red Brindle Clay Pavors:

- Baggeridge Red Brindle (dragfaced)
- Blockleys XV111 Brindle Mixture (wirecut)

Blue Clay Pavors:

- Baggeridge Blue (dragfaced)
- Redland, Haunchwood Blue (wirecut)

Concrete Block Pavors:

- Chartwell, Charcoal (chamferred)
- Charcon, Charcoal (chamferred)
- Marshall, Charcoal or Buff (chamferred)

Concrete Setts:

- Charcon, Country Setts
- Marshalls, Rialta Setts

Facing bricks:

Red Brindle:

- Baggeridge, Red Multi Engineering (wirecut)
- Blockleys, Heritage Cadmium Red Brindle, Mellow Grain
- Blockleys, Heritage Heather Brindle, Mellow Grain

Blue:

- Baggeridge, Staffordshire Blue (smooth, dragfaced)
- Baggeridge Blue Brindle Engineering (wirecut)
- Ibstock, Telford Blue (smooth)

Baggeridge Brick Plc
Fir Street

Sedgley

West Midlands DY3 4AA

Tel: (0902) 880666

Blockleys Plc
Sommerfield Road

Trench Lock

Telford

Shropshire TF1 4RY

Tel: (0952) 251933

Charcon

ECC Building Product Ltd

Hulland Ward

Derby DE6 3ET

Tel: (0335) 730600

Ibstock Building Products Ltd.

180 Albany Street

London NW1 4AW

Tel: (071) 387 6633

Marshalls Mono Ltd.

Sunderland Road

Sandy

Bedfordshire

Tel: (0767) 81011

Redland Bricks (South)

Crown Walk

Jewry Street

Winchester

Hants. SO23 8RY

Tel: SO23 8RY

2.0 NON-SLIP APPLICATIONS

Decking panels:

Acme Flooring
St. Peters Road
Huntingdon
Cambridgeshire PE18 7DN
Tel: (0480) 52101

Preformed/stuck down surfaces:

Colas Roads Ltd.
Vale Road
Tonbridge
Kent TN9 1SX
Tel: (0732) 771000

Nufins Ltd.
Brunswick Industrial Estate
Newcastle upon Tyne
NE13 8BA
Tel: (091) 236 4126

3.0 STEEL RAILS & RAILINGS

Post and Rails:

Steelway - Fensecure
Glynwed Engineering Ltd.
Queensgate Works
Bilston Road
Wolverhampton
W. Midlands WV2 2NJ
Tel: (0902) 51733

Lionweld Kennedy Ltd.
Marsh Road
Middlesborough
Cleveland
TS1 5JS
Tel: (0642) 245151

Railings:

Singer and James Ltd.
Roebuck Road,
Hainault
Ilford
Essex IG6 3TZ



APPENDIX A

SELECTED PRODUCTS & SUPPLIERS

4.0 TIMBER

Suppliers of certain imported hardwoods
(noted in brackets) from known
sustainable sources:

(Greenheart)
G.R. Wiltshire & Co.
Main Road,
Claybrooke Magna
Lutterworth
Leicestershire
LE17 5AQ
Tel: (0455) 202666

(Jarrah and Karri)
Jakem Timbers Ltd.
The Old Malt House
125 High Street
Uckfield
East Sussex TN22 1EG

Greenheart Co-op
19 Pleshy Road
Tufnell Park
London N7 0RA

Suppliers of home grown hardwoods:

J. Mitchell
Moorshead Sawmills
Yealmpton
Plymouth
Devon

Homegrown Hardwoods
1-5 Chance Street
London
E1 5DX

5.0 TIMBER TREATMENT (NATURAL FINISHES)

(Focus, Classic, Extra)
Sadolin U.K. Ltd.
Tower Close
St. Peters Industrial Park
Huntingdon
Cambs. PE18 7DR
Tel: (0480) 50041

(Wood Preserver)
Cuprinol Ltd.
Adderwell
Frome
Somerset BA11 1NL
Tel: (0373) 65151

(Tanalith, Tanatone)
Hickson Timber Products Ltd.
Wheldon Road
Castleford
West Yorkshire
WF10 2JT
Tel: (0977) 556565

6.0 PAINTS

(Dulux Weathershield and Gloss)
ICI Paints
Wrexham Road
Slough
SL2 5DS
Tel: (0753) 534225

(Sandtex)
Akzo Coatings Plc
135 Milton Park
Abingdon
Oxfordshire
OX14 4SB
Tel: (0235) 862226

Croda Paints Ltd.
Bankside
Hull
HU5 1SQ
Tel: (0482) 41441

(Hammerite)
Hunting Specialised Products Ltd.
Prudoe
Northumberland
NE42 6LP
Tel: (0661) 830000

7.0 CONCRETE REPAIR & COATINGS

Sika
Watchmead
Welwyn Garden City
Hertfordshire AL7 1BQ
Tel: (0707) 329241

Nufins Ltd.
Brunswick Industrial Estate
Newcastle Upon Tyne
NE13 7BA
Tel: (091) 236 4126

Liquid Plastics Ltd.
P.O. Box 7
London Road
Preston PR1 4AJ
Tel: (0772) 59781

Gunite Contract Services Ltd.
33 Stephenson Road
St. Ives
Cambs. PE17 4WJ
Tel: (0480) 66880