Practice Notes

ALEXANDRA BRIDGE No 262 over BLACKWOOD RIVER

STRUCTURES ENGINEERING

Document No: 6702/02/221, 222 & 223
This information is owned and controlled by the Senior Engineer Structures. The Structures Information and Standards Manager is the delegated custodian. All comments and requests for changes are to be submitted to the delegated custodian.

AUTHORISATION

As head of Structures Engineering of Main Roads Western Australia, I authorise the issue and use of this document.

[Signature]

SENIOR ENGINEER STRUCTURES

Date: 6/09/10

Document No. 6706-02-221, 222 & 223

All controlled copies shall be marked accordingly
PRACTICE NOTES

1.0 INTRODUCTION

2.0 SUBSTRUCTURE

3.0 SUPERSTRUCTURE

4.0 RAILINGS AND MISCELLANEOUS DETAILS
1.0 INTRODUCTION

1.1 Purpose

The principle purpose of these Practice Notes is to :-

- Ensure uniformity of standard practices and details in the Structures Engineering documentation;
- Record variations from Load Rating and Refurbishment Design Manual for Existing Timber Bridges (6706/02/2227) approved for use in the Structures Engineering documentation;
- Clarify confusing or ambiguous areas of the Design Code; and
- Ensure that construction feedback and design innovations receive widespread circulation.

1.2 OSH Design Report

- The Designer is required by regulation relating to the National Standard for Construction Work to provide Clients with a written report on the Occupational Safety and Health (OSH) aspects of their design. For guidance and further details refer to the Bridge Branch Design Information Manual – Section 18 – Preparation of Design Report (Occupational Safety and Health).
- Structures Engineering (SE) as custodians of these Practice Notes are the Designer’s in the first instance. Accordingly SE has reviewed the Practice Notes to assess the potential risks that may arise during construction.
- It is clear that many of the repair details contained in the Practice Notes contain significant potential risks during the construction phase which must be planned for. Many types of pile repairs, stringer replacements and halfcap repairs involve replacing structural elements which require the temporary support of the structure and the handling of large elements in restricted spaces.
- To support the use of the details in these Practice Notes, specific Specifications have been developed and should be referenced or included in the construction documents. These standard Specifications include but are not limited to Specifications for Falsework, Formwork and Timber Bridges.
- It is the view of SE as the Designer that the details in these Practice Notes have been demonstrated to be achievable safely provided always that the builder is experienced, observes the requirements of the Specifications and exercises a duty of care.

1.3 Notes for the User

- The details shown in the Practice Notes are for guidance only. Although structural element sizes are given, the designer shall confirm the element sizes for the particular Project.
- It is a requirement to update the General Notes for each Project.
• Any work undertaken by the designer should also consider the relevant Main Roads Western Australia (MRWA) series 800 Specifications.

• The designer shall ensure that all construction design documentation includes reference to the appropriate Specifications. The contract documentation must provide appropriate advice on construction loads, requirements for propping and any necessary Hold Points.

• The Practice Notes are intended as a guide for use by others in the preparation of design drawings for repair and maintenance activities. As such it is not practical to anticipate all the applications for which these Practice Notes will be used. In the event that the designer has cause to amend any of the Practice Note details or has included details that are not covered by the these Practice Notes, then a risk assessment report shall be prepared (for example refer to Practice Note PN30-4213).

1.4 Customer Feedback

If a need is identified for a new detail or an amendment to an existing Practice Note please notify the Structures Information and Standards Manager, who will arrange the review and if necessary the updating of the Practice Notes.
This information is owned and controlled by the Senior Engineer Structures. The Structures Information and Standards Manager is the delegated custodian. All comments and requests for changes are to be submitted to the delegated custodian.

AUTHORISATION

As head of Structures Engineering of Main Roads Western Australia, I authorise the issue and use of this document.

[Signature]

SENIOR ENGINEER STRUCTURES

Date: 6/04/10

Document No. 6706-02-221

All controlled copies shall be marked accordingly
TABLE OF CONTENTS

2.1 PILE REPAIRS

| PN30-2101 | Pile Banding Table | 8 |
| PN30-2102 | Pile Banding Detail - Type 3 | 9 |
| PN30-2103 | Pier Pile Repair Detail - Type 1 | 10 |
| PN30-2104 | Pier Pile Repair Detail - Type 1A | 11 |
| PN30-2105 | Pier Pile Repair Detail - Type 2 | 12 |
| PN30-2106 | Pier Pile Repair Detail - Type 2A | 13 |
| PN30-2107 | Pier Pile Repair Detail - Type 3 | 14 |
| PN30-2108 | Pier Pile Repair Detail - Type 3A | 15 |
| PN30-2109 | Pier Pile Repair Detail - Type 4 - Sheet 1 | 16 |
| PN30-2110 | Pier Pile Repair Detail - Type 4 - Sheet 2 | 17 |
| PN30-2111 | Pier Pile Repair Detail - Type 4 - Sheet 3 | 18 |
| PN30-2112 | Pier Pile Repair Detail - Type 4 - Sheet 4 | 19 |
| PN30-2113 | Pier Pile Repair Detail - Type 5 | 20 |
| PN30-2114 | Pier Pile Repair Detail - Type 6 | 21 |
| PN30-2115 | Pier Pile Repair Detail - Type 6A | 22 |
| PN30-2116 | Pier Pile Strengthening Detail | 23 |
| PN30-2117 | Steel Pier Pile / Timber Halfcap Bearing Details - Types 1, 2 & 3 | 24 |
| PN30-2118 | Steel Pier Pile / Timber Halfcap Strengthening Bearing Details - Types 1, 2 & 3 | 25 |
| PN30-2119 | Steel Pier Pile / Halfcap Connection Details | 26 |
| PN30-2120 | Steel Abutment Pile / Timber Fullcap Bearing Details - (Bridge Deck over Pile) | 27 |
| PN30-2121 | Steel Abutment Pile / Timber Fullcap Bearing Details - (no Bridge Deck over Pile) | 28 |
| PN30-2122 | Abutment Pile Repair Detail - Type 1 | 29 |
# TABLE OF CONTENTS

## 2.1 PILE REPAIRS cont.

- PN30-2123 - Abutment Pile Repair Detail - Type 1A .................................................. 30  
- PN30-2124 - Abutment Pile Repair Detail - Type 2 .................................................. 31  
- PN30-2125 - Abutment/Wingwall Pile Repair Detail - Type 1 ................................. 32  
- PN30-2126 - Wingwall Pile Repair Detail - Type 1 .................................................. 33  
- PN30-2127 - Wingwall Pile Repair Detail - Type 2 .................................................. 34  
- PN30-2128 - Wingwall Pile Repair Detail - Type 3 .................................................. 35  
- PN30-2129 - Abutment Pile Restraint Detail ......................................................... 36

### DRIVEN PILES

- PN30-2130 - Driven Pile - Splice Detail ................................................................. 37  
- PN30-2131 - Pile Driving Notes ........................................................................... 38  
- PN30-2132 - Driven Pier Pile / Timber Halfcap Bearing Detail ............................. 39  
- PN30-2133 - Driven Abutment Pile / Timber Fullcap Bearing Detail .................... 40

## 2.2 ABUTMENT REPAIRS ................................................................. 41

- PN30-2201 - Abutment / Wingwall Sheeting Repair Detail  
  (Reinforced Concrete Option) .................................................................................. 42  
- PN30-2202 - Abutment / Wingwall Sheeting Repair Detail  
  (Timber Option) - Type 1 ...................................................................................... 43  
- PN30-2202A - Abutment / Wingwall Sheeting Repair Detail  
  (Timber Option) - Type 2 ...................................................................................... 44  
- PN30-2202B - Abutment / Wingwall Sheeting Repair Detail  
  (Timber Option) - Type 3 ...................................................................................... 45  
- PN30-2203 - Abutment / Wingwall Scour Repair Detail ......................................... 46  
- PN30-2204 - Wingwall Extension Detail - Type 1 ................................................. 47  
- PN30-2205 - Wingwall Extension Detail - Type 2 ................................................. 48
# TABLE OF CONTENTS

## 2.2 ABUTMENT REPAIRS cont.

- PN30-2206 - Abutment No. 1 - Retaining Wall Detail ........................................... 49
- PN30-2207 - Sheeting / Spiking Rail Support Detail ............................................. 50

## 2.3 HALFCAP / FULLCAP REPAIRS ................................................................. 51

### PIER HALFCAP REPAIRS

- PN30-2301 - Pier Halfcaps Replacement Detail .................................................... 52
- PN30-2302 - Pier Halfcap Replacement Detail ....................................................... 53
- PN30-2303 - Pier Halfcaps Strengthening Detail (Timber Piles) ............................ 54
- PN30-2304 - Pier Halfcap Strengthening Detail (Timber Piles) ............................ 55
- PN30-2304A - Pier Halfcap Strengthening Detail (Timber Piles – with Angle to Corbel) .......................................................... 56
- PN30-2305 - Pier Halfcaps Strengthening Detail (Steel Piles) .............................. 57
- PN30-2306 - Pier Halfcap Strengthening Detail (Steel Piles) .............................. 58
- PN30-2307 - Pier Halfcaps Strengthening Detail – RHS Steel Packers (Timber Piles) ......................................................................... 59
- PN30-2308 - Pier Halfcap Strengthening Detail – RHS Steel Packers (Timber Piles) ......................................................................... 60
- PN30-2309 - Pier Halfcaps Strengthening Detail – RHS Steel Packers (Steel Piles) ......................................................................... 61
- PN30-2310 - Pier Halfcap Strengthening Detail – RHS Steel Packers (Steel Piles) ......................................................................... 62
- PN30-2311 - Pier Halfcaps Strengthening and Widening Detail ............................ 63
- PN30-2312 - Pier Halfcaps Strengthening and Widening Detail – RHS Steel Packers ......................................................................... 64
- PN30-2313 - Steel Pier Pile / Pier Halfcaps Replacement Detail – Type 1 ................. 65
### TABLE OF CONTENTS

#### 2.3 HALFCAP / FULLCAP REPAIRS cont.

**PIER HALFCAP REPAIRS**

PN30-2314 - Steel Pier Pile / Pier Halfcaps Replacement Detail – Type 1A ................................................................. 66

PN30-2315 - Steel Pier Pile / Pier Halfcaps Replacement Detail – Type 2 ........................................................................... 67

PN30-2316 - Steel Pier Pile / Pier Halfcaps Replacement Detail – Type 3 ................................................................. 68

**ABUTMENT FULLCAP REPAIRS**

PN30-2317 - Abutment Fullcap Strengthening Detail (Timber Piles) .......... 69

PN30-2317A- Abutment Fullcap Strengthening Detail (Timber Piles with Angle Cleat) ................................................................. 70

PN30-2317B- Abutment Fullcap Strengthening Detail (Timber Piles with Stringer Angle Cleats) .................................................... 71

PN30-2317C- Abutment Fullcap Strengthening Detail (Timber Piles with Angle Cleat and Stringer Angle Cleats) ......................... 72

PN30-2318 - Steel Abutment Piles / Abutment Fullcap Strengthening Detail ........................................................................ 73

PN30-2319 - Abutment Fullcap Strengthening Detail – RHS Steel Packers (Timber Piles) ............................................................. 74

PN30-2319A- Abutment Fullcap Strengthening Detail – RHS Steel Packers (Timber Piles with Angle Cleats) ......................... 75

PN30-2320 - Steel Abutment Piles / Abutment Fullcap Strengthening Detail – RHS Steel Packers ........................................ 76

PN30-2321 - Abutment Fullcap Strengthening and Widening Detail – (Timber Piles) ................................................................. 77

PN30-2321A- Abutment Fullcap Strengthening and Widening Detail – (Timber Piles with Angle Cleat) ........................................... 78

PN30-2322 - Steel Abutment Piles / Abutment Fullcap Strengthening and Widening Detail ......................................................... 79
## TABLE OF CONTENTS

### 2.3 HALFCAP / FULLCAP REPAIRS cont.

### ABUTMENT FULLCAP REPAIRS

| PN30-2323  | Abutment Fullcap Strengthening and Widening Detail – RHS Steel Packers (Timber Piles) | 80 |
| PN30-2323A | Abutment Fullcap Strengthening and Widening Detail – RHS Steel Packers (Timber Piles with Angle Cleat) | 81 |
| PN30-2324  | Steel Abutment Piles / Abutment Fullcap Strengthening and Widening Detail – RHS Steel Packers | 82 |
| PN30-2325  | Abutment Fullcap Replacement Detail | 83 |
| PN30-2325A | Abutment Fullcap Replacement Detail (Timber Piles with Angle Cleat) | 84 |
| PN30-2326  | Steel Abutment Pile / Abutment Fullcap Replacement Detail – Type 1 | 85 |
| PN30-2327  | Steel Abutment Pile / Abutment Fullcap Replacement Detail – Type 2 | 86 |

### PILE BEARING

| PN30-2328  | Pile Bearing Details (Timber Piles > or = Ø340) | 87 |
| PN30-2329  | Pile Bearing Details (Timber Piles < Ø340) | 88 |
2.1

PILE REPAIRS
### PILE REPAIRS

**Please place a tick in the appropriate location & number off (e.g. ✓✓ or ✓x2)**

<table>
<thead>
<tr>
<th>SUPPORT</th>
<th>PILE N°</th>
<th>LOCATION &amp; N° OFF BANDS</th>
<th>NOM. DIA. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PILE N°</td>
<td>TOP</td>
<td>MIDDLE</td>
</tr>
<tr>
<td>ABUT N° 1</td>
<td>X</td>
<td>✓</td>
<td>✓✓</td>
</tr>
<tr>
<td>PIER N° 1</td>
<td>X</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>PIER N° X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABUT N° 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M - DENOTES MULTI BANDS AT 600 MAX. CENTRES FOR LENGTH OF SPLIT.
* DIAMETERS SHOWN ARE TAKEN FROM THE "DETAILED INSPECTION REPORT" AND SHALL BE VERIFIED ON SITE AT SPLIT LOCATIONS.

**PILE BANDING TABLE**

REFER TO STANDARD DRG. N° 9530-0072

REFER TO PILE BEARING DETAIL - TYPE 3 (XX30-XXXX)

---

**Pile Banding Table**

PN30-2101
PILE REPAIRS

NOTE:
REMOVE ANY FOREIGN MATTER FROM TIMBER PILE GAPS.
PRECOMPRESS PILE RADially TO CLOSE ALL GAPS USING CHAIN AND RATCHET.
INSTALL STEEL BAND THEN FILLET WELD CLOSE WHILE APPLYING TENSION FROM A SECOND CHAIN AND RATCHET WHICH IS TACK WELDED TO BAND.

PLAN

PILE BANDING DETAIL - TYPE 3
N.T.S

NOTE:
THIS IS THE NON-PREFERRED BANDING METHOD.
FOR THE PREFERRED BANDING METHOD REFER TO STANDARD DRAWING № 9530-0072.

Pile Banding Detail - Type 3
PN30-2102
PILE REPAIRS

NOTE: HALF CAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS AND UNTIL CONCRETE HAS BEEN PLACED A MINIMUM OF 3 DAYS.

SECTION A

- CAP PLATE
- Ø20 THREADED ROD TO BE PLACED IN HEAVY DUTY PVC SLEEVE AND PACKED WITH DENSO PASTE (TYP)

SECTION B

- SHIM 90x90x90 THICKNESS TO SUIT (TYP)
- Ø900 CONCRETE FOOTING
- Ø10x100 LONG SPIKE (TYP)
- Ø10x250 LONG SPIKE (TYP)

END AND UP TO 100 ABOVE CUT SURFACE OF PILE SHALL BE SEALED WITH TWO COATS OF BITUMINOUS PAINT.

200 PFC (TYP)

250x125x250 CAP PLATE WITH 2-Ø12 HOLES FOR SPIKES.

PROVIDE UNIFORM SEATING SQUARE TO AXIS OF PILE. SHIM BETWEEN BASE PLATE AND TIMBER PILE TO ENSURE TIGHT FIT BETWEEN CUT PILE FACES.

EXISTING TIMBER PILE, CUT OUT SECTION OF UNSOUND TIMBER - 250 MIN BELOW EXISTING G.L.

DRG NUMBER - REFER TO PLAN DRAWING

PIER PILE REPAIR DETAIL - TYPE 1

PIER N° X - PILE N° X

SELECT OPTION

ENGINEER SHALL DECIDE WHICH OPTION TO USE

Pier Pile Repair Detail – Type 1
PN30-2103
Pier Pile Repair Detail – Type 1A
PN30-2104
PILE REPAIRS

SECTION A
1:20

NOTE: HAFNCAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS AND UNTIL CONCRETE HAS BEEN PLACED A MINIMUM OF 3 DAYS.

EXISTING GENERAL G.L. OR PERMANENT W.L. OR HIGH TIDE - WHICH EVER IS HIGHER.

PIER PILE REPAIR DETAIL – TYPE 2
PIER N° X - PILE N° X
1:20

ENGINEER SHALL DECIDE WHICH OPTION TO USE.

WELDED OPTION

PN30-2105
PILE REPAIRS

SECTION A
120

BEARING PLATE (FOR PILE = Ø350)

FLOWS

Ø900 CONCRETE FOOTING

SHM BETWEEN UC AND BEARING PLATE FOR PILE = Ø350 OR BETWEEN UC AND UA's FOR PILE = Ø350 TO ENSURE A TIGHT FIT BETWEEN CUT PILE FACE AND HALF CAPS.

NOTE: HALF CAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS AND UNTIL CONCRETE HAS BEEN PLACED A MINIMUM OF 3 DAYS.

PROPOSED UC PILE

PROPOSED CONCRETE POT

Ø10x100 LONG SPIKE (TYP)

EXISTING TIMBER PILE

EMBEARING ARRANGEMENT FOR

PILES = Ø350
PIER N° X - PILE N° X
PIER N° X - PILE N° X 1/2

SHM 90x90x
THICKNESS TO SUIT

150x100x10 UA
x300 LONG (TYP)

55
(TYP)

200 UC 52 PILE

EXISTING GENERAL G.L.

EXISTING GENERAL G.L. OR PERMANENT W.L. OR HIGH TIDE - WHICH EVER IS HIGHER.

4-M20 BOLTS

ELEVATION

200 UC 52 PILE (CUT POT END OF PILE ON SITE TO SUIT)

N16 HOOP BARS AT TOP & BOTTOM.

Ø10x100 LONG SPIKE (TYP)

150x10FLx150 BEARING PLATE (FOR PILE = Ø350)

SHIM 90x90x
THICKNESS ID,SAT.

4-M20 HOLE FOR SPIKE LOCATION OF HOLE TO SUIT ANGLE POSITION.

5L81 FABRIC

150x100x10 UA x300 LONG

CUTBACK EXISTING TIMBER PILE TO SOUND TIMBER - 250 MIN BELOW EXISTING G.L.

150x100x10 UA x300 LONG (TYP)

55
(TYP)

PIER N° X - PILE N° X
120

PIER PILE REPAIR DETAIL - TYPE 2A

XX30-XXXX

BOLTED OPTION

ENGINEER SHALL DECIDE WHICH OPTION TO USE

Pier Pile Repair Detail – Type 2A
PN30-2106
PILE REPAIRS

NOTE: HALF CAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS AND UNTIL CONCRETE HAS BEEN PLACED A MINIMUM OF 3 DAYS.

SECTION A

NOTE: FIXING OF STEEL PILE TO EXISTING TIMBER HALF CAPS MUST BE PIER STEEL PILE / TIMBER HALF CAP BEARING - TYPE 3 AS PER PN30-2117.

PIER PILE REPAIR DETAIL - TYPE 3

PIER N° X - PILE N° X

WELDED OPTION

ENGINEER SHALL DECIDE WHICH OPTION TO USE

THIS PAGE SHALL BE READ IN CONJUNCTION WITH:
- PIER HALF CAP REPAIRS (WITH STEEL PILE)
- PILE BEARING

Pier Pile Repair Detail – Type 3
PN30-2107
PIECE REPAIRS

NOTE: HALF CAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS AND CONCRETE HAS BEEN PLACED A MINIMUM OF 3 DAYS.

BEARING ARRANGEMENT FOR PILES = Φ350
PIER N° X - PILE N° X
PIER N° X - PILE N° X

ELEVATION

PIER PILE REPAIR DETAIL - TYPE 3A
PIER N° X - PILE N° X

BOLTED OPTION

ENGINEER SHALL DECIDE WHICH OPTION TO USE

PIER PILE REPAIR DETAIL – TYPE 3A
PN30-2108
# PILE REPAIRS

<table>
<thead>
<tr>
<th>PIER N°</th>
<th>PILE N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

## PIER PILE REPAIR – TYPE 4 TABLE

PILE REPAIR TYPE SHALL BE CONFIRMED ON SITE ONLY AFTER THOROUGH WATER BLASTING/CLEANING.

DRG NUMBER - REFER TO PLAN DRAWING

---

Pier Pile Repair Detail – Type 4 – Sheet 1
PN30-2109
### Table of Types of Pier Pile Repairs - Type 4 (Information for Determining Type of Repair to Pier Piles with Reduced Section)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>4A</th>
<th>4B</th>
<th>4C</th>
<th>4D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Timber Condition</strong></td>
<td>Pile timber in good condition, numerous surface splits, width at face typically 5mm to 10mm, and reducing quickly with depth, splits not interconnected.</td>
<td>Similar to '4A' but more significant loss of section at water bolt locations, #60 holes and central pipe, timber annulus &gt; 90mm.</td>
<td>Similar to '4B', even greater loss of section at water bolt locations, some interconnected, larger central pipe, some splits join with pipe void, timber annulus &gt; 80mm.</td>
<td>Similar to '4C', significant loss of section and or non-symmetry of timber retained.</td>
</tr>
<tr>
<td><strong>Timber Cross Sectional Area</strong></td>
<td>90% Original cross sectional area of timber capable of carrying loading.</td>
<td>70% Original cross sectional area of timber capable of carrying loading.</td>
<td>Capable of carrying axial dead load only during repair procedure, need for steel sleeve to supplement timber strength. Minimum area of good timber available shall be equivalent to 250 x 250mm symmetrically located about the pile.</td>
<td>Incapable of carrying dead loads in axial compression. Area of good timber available less than 250 x 250mm and/or not symmetrically located about pile.</td>
</tr>
<tr>
<td><strong>Timber Section Stability</strong></td>
<td>Good</td>
<td>Adequate</td>
<td>Consideration for pile stability during the works, i.e. removal of unacceptable material may reveal the condition '4D'.</td>
<td>Alternative support for pile load during the work is required.</td>
</tr>
<tr>
<td><strong>Work Required</strong></td>
<td>High pressure water jet preparation, plug one end of existing bolt holes and fill hole with epoxy 391 MRO epoxy or similar approved, seal individual splits &gt; 10mm width with epoxy 161% or similar approved.</td>
<td>High pressure water jet preparation, then wrap with 0.8 mm thick clear acrylic before applying epoxy 391 MRO epoxy or similar approved.</td>
<td>High pressure water jet cleaning, then fit steel sleeve and fill with Conextra UW grout or similar approved.</td>
<td>High pressure water jet preparation, cut away deterioration zone and add a section, then fit steel sleeve and fill with Conextra UW grout or similar approved.</td>
</tr>
</tbody>
</table>
PILE REPAIRS

SECTION B
1:10

Cementitious grout CONBEXTRA UW by Fosroc (or similar approved) min 40mm thick, max 75mm thick between pile and sleeve (typ)

SECTION A
1:10

NOTE: Site measure and fabricate sleeve with diameters to suit grout thicknesses in the range 40min to 75max around piles.

DETAIL 3
1:25

DETAIL 2
1:25

DETAIL 1
1:15

SLEEVE DETAIL
1:20

NOTE: For corrosion protection of sleeves refer to specification

SLEEVE DETAIL – PIER PILE REPAIR – TYPE 4C & 4D

Pier Pile Repair Detail – Type 4 – Sheet 4
DIMENSION 'X' SHALL BE DETERMINED BY ENGINEER

DENSO WRAP "SEASHIELD SERIES 60 SYSTEM" OR SIMILAR APPROVED TO BE APPLIED ACCORDING TO MANUFACTURER'S SPECIFICATION, BY MANUFACTURER'S PRE QUALIFIED SUBCONTRACTORS. DETAILS OF PREQUALIFICATION OR MANUFACTURER'S ENDORSEMENT OF THE SUBCONTRACTOR TO BE PROVIDED TO SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORKS

HIGH WATER LEVEL

X

500 MIN

000

PIER PILE REPAIR DETAIL - TYPE 5

PIER N° X - PILE N° X

1:20

DRG NUMBER - REFER TO PLAN DRAWING

XX30-XXXX
PILE REPAIRS

NOTE: HALF CAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS AND UNTIL CONCRETE HAS BEEN PLACED A MINIMUM OF 3 DAYS.

SECTION A

TO BE USED ONLY WHEN PIER PILE REPAIR TYPES 2 AND 2A ARE FOUND TO HAVE INADEQUATE CAPACITIES FROM DETAIL DESIGN ANALYSIS

PROPOSED 310 UC 97 PILE (CUT POT END OF PILE ON SITE TO SUIT)

SIZE OF PROPOSED PILE IS TO BE DETERMINED BY ENGINEERING ANALYSIS. 310 UC 97 DRAWN.

EXISTING GENERAL G.L. OR PERMANENT W.L. OR HIGH TIDE - WHICH EVER IS HIGHER.

DRG NUMBER - REFER TO PLAN DRAWING

PIER PILE REPAIR DETAIL - TYPE 6

XX30-xxxx

WELDED OPTION

ENGINEER SHALL DECIDE WHICH OPTION TO USE

THIS PAGE SHALL BE READ IN CONJUNCTION WITH:

- PIER HALF CAP REPAIRS (WITH STEEL PILE)
- PILE BEARING

Pier Pile Repair Detail – Type 6

PN30-2114
PIE PILE STRENGTHENING DETAILS
PIER N° X - PILE N° X
XX30-XXX

NOTE:
- DESIGN ENGINEER TO ASSESS
- SUITABILITY OF STRENGTHENING
- HEMMER SHOWN ON DETAIL

Pier Pile Strengthening Detail
PN30-2116
PILE REPAIRS

STEEL PIER PILE/TIMBER HALFCAP

BEARING DETAIL - TYPE 1

PIER No. X - PILE No. X

PIER No. X - PILE No. X

120

EXISTING TIMBER HALFCAP

12FL STIFFENER (TYP)

200 UC 52

ELEVATION

REFER TO HALFCAP CONNECTION DETAILS

PROPOSED PILE

Φ20 THREADED ROD WITH 1-65x5FLx65 WASHER

[PN30-2118]

VIEW A

PREFERRED OPTION

TIMBER HALFCAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS

STEEL PIER PILE/TIMBER HALFCAP

BEARING DETAIL - TYPE 2

PIER No. X - PILE No. X

PIER No. X - PILE No. X

120

EXISTING TIMBER HALFCAP

ELEVATION

REFER TO HALFCAP CONNECTION DETAILS

PROPOSED PILE

Φ20 THREADED ROD WITH 1-65x5FLx65 WASHER (TYP)

[PN30-2118]

50x18FLx200 (TYP)

250x50x16 PL

CAP PLATE

(YP)

30

(YP)

200 UC 52x1550

ELEVATION

PORED PILE SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.

200 UC 52 PILE DRAWN

THIS PAGE SHALL BE READ IN CONJUNCTION WITH PIER-STEEL PIER/TIMBER HALFCAP CONNECTION

ENGINEER SHALL CHOOSE OPTION TO SUIT

NON PREFERRED

STEEL PIER PILE/TIMBER HALFCAP BEARING

DETAIL - TYPE 3

PIER No. X - PILE No. X

PIER No. X - PILE No. X

120

EXISTING TIMBER DECKING

EXISTING TIMBER STRINGER

15 CHAMFER

(PILE FLANGES)

200 UC 52 PILE

ELEVATION

REFER TO HALFCAP CONNECTION DETAILS

200 UC 52 PILE

CAP PLATE

STIFFENER

[PN30-2118]

VIEW A

TIMBER HALFCAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITIONS

Steel Pier Pile / Timber Halfcap Bearing Details

Types 1, 2 & 3

PN30-2117
Steel Pier Pile / Timber Halfcap Strengthening Bearing Details

Types 1, 2 & 3

PN30-2118
Steel Pier Pile / Halfcap Connection Details
PN30-2119
Steel Abutment Pile / Timber Fullcap Bearing Details
(Bridge Deck over Pile)

PN30-2120
PILE REPAIRS

STEEL ABUTMENT PILE/TIMBER FULLCAP BEARING DETAIL

PAINTED BLACK

OPTION 2

ENGINEER TO CHOOSE
OPTION TO SUIT

Steel Abutment Pile / Timber Fullcap Bearing Details
(no Bridge Deck over Pile)

PN30-2121
PILE REPAIRS

SECTION A

- If less than 60, then relocate SL51 fabric, L = 250, vertical bars and top N/S perimeter bar to inside of flange, trim fabric to suit.
- Provide 400 holes at 200 CRS vertically in web for N/S and additional N/S = 650 long bars.

SECTION B

FILLCAPS SHALL BE PROPPED DURING CONSTRUCTION TO THEIR ORIGINAL POSITION AND ABUTMENT SHEETING IS TO BE SAFELY PROPPED.
- Do not remove props until proposed pile is in position and concrete has been placed for 7 days.

SECTION C

- Proposed pile & prop size will vary according to engineering requirements including height of pile above ground (200 UC 52 shown).
Abutment Pile Repair Detail – Type 2
PN30-2124
PILE REPAIRS

**SECTION A**

- **Existing Abutment Timber Sheeting**
- **Existing Wingwall Timber Sheeting**
- **Slat Fabric (Galv) 25 Cover**
- **SHIM 65x65x9 Thickness to Suit**

**SECTION B**

- **Full Caps Shall Be Primed During Construction to Their Original Positions and Abutment Sheeting Is to Be Safely Primed. Do Not Remove Primps Until Proposed Pile Is in Position and Concrete Has Been Placed a Minimum of Three Days.**

**SECTION C**

- **#60 Holes at 200 CRS**
- **Additional #6 x 650 Long Bars.**
- **200 UC 52**
- **Pack with Solid Timber for Full Height of Replaced Timber Pile Above Concrete Surrounding. Secure Packer to Timber Sheeting.**

**ELEVATION**

- **Abutment/Wingwall Pile Repair Detail - Type 1**
  - Abutment N° X - Pile N° X
  - **CODE:** PN30-2125
  - **Engineer Shall Decide Which Welded Option to Use**

**NOTES:**

- Abutment/Wingwall Pile Repair Detail - Type 1
- **PN30-2125**
- **CODE:** PN30-2125
- **ENGINEER SHALL DECIDE WHICH WELDED OPTION TO USE**

**DIAGRAM:**

- Existing Abutment Timber Sheeting
- Existing Wingwall Timber Sheeting
- Slat Fabric (Galv) 25 Cover
- Shim 65x65x9 Thickness to Suit
- Full Caps Shall Be Primed During Construction to Their Original Positions and Abutment Sheeting Is to Be Safely Primed. Do Not Remove Primps Until Proposed Pile Is in Position and Concrete Has Been Placed a Minimum of Three Days.
- #60 Holes at 200 CRS
- Additional #6 x 650 Long Bars.
- 200 UC 52
- Pack with Solid Timber for Full Height of Replaced Timber Pile Above Concrete Surrounding. Secure Packer to Timber Sheeting.

**ELEVATION:**

- Solid Timber Packer
- Existing Timber Sheeting
- Slat Fabric (Galv) 25 Cover
- Shim 65x65x9 Thickness to Suit
- Full Caps Shall Be Primed During Construction to Their Original Positions and Abutment Sheeting Is to Be Safely Primed. Do Not Remove Primps Until Proposed Pile Is in Position and Concrete Has Been Placed a Minimum of Three Days.
- #60 Holes at 200 CRS
- Additional #6 x 650 Long Bars.
- 200 UC 52
- Pack with Solid Timber for Full Height of Replaced Timber Pile Above Concrete Surrounding. Secure Packer to Timber Sheeting.
Wingwall Pile Repair Detail – Type 2

PN30-2127

MAIN ROADS Western Australia

PNSUBSTRUCT.doc

Structures Engineering – Practice Notes

6706-02-221 – Issue April 2010

Page 34 of 88
Wingwall Pile Repair Detail – Type 3

PN30-2128
PILE REPAIRS

PROPOSED PILE SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 200 UC 52 PILE DRAWN
FULLCAP DETAILS NOT SHOWN REFER TO RELEVANT SECTION.

EXISTING TIMBER DECK

200x200x13 EA x250 LONG WITH 2-M10 x 75 LONG COACH SCREWS AT 175 CRS AND 2-Ø18x75 LONG SLOTTED HOLES FOR M16 BOLTS

EXISTING TIMBER STRINGER

SLOTTED HOLE

2-M16 BOLTS AT GAUGE OF UC PILE

ABUTMENT PILE RESTRAINT DETAIL
ABUTMENT Nº X - PILE Nº X
1:20

DRG NUMBER - REFER TO PLAN DRAWING
XX30-XXXX

HEADROOM EXCEEDS 1750 & NO OVERLAY

Abutment Pile Restraint Detail
PN30-2129
PILE REPAIRS

SECTION A

DETAIL 1

GROUND LEVEL

PILE SPLICE (TYP)

1

200 UC 52 DRIVEN PILE

NOTE: PILE SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
200 UC 52 PILE DRAWN

PILE TOE R.L.

PILE SPLICE 1:10

Driven Pile – Splice Detail

PN30-2130
PILE REPAIRS

PILE DRIVING NOTES

1. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION.

2. PILE DRIVING TOLERANCES SHALL BE:
   a) DEVIATION FROM VERTICAL IN A 3 METRE TEMPLATE ±15mm.
   b) DEVIATION FROM PLAN POSITION 50mm IN ANY DIRECTION.
   c) MAXIMUM VARIATION FROM SPECIFIED CUT OFF LEVEL ±5mm.

3. WHERE PILES ARE DRIVEN WITH A DIESEL HAMMER - THE DRIVING HELMET INTERNAL DIAMETER SHALL NOT EXCEED THE PILE SIZE BY MORE THAN 20mm.

4. PILES MUST BE DRIVEN TO A REQUIRED SET TO BE DETERMINED ON SITE USING THE 'HILEY' FORMULA AND BY CONSIDERING THE TEMPORARY COMPRESSION.

5. ONE REPRESENTATIVE TEMPORARY COMPRESSION GRAPH MUST BE TAKEN FOR EACH GROUP OF SIMILAR PILES (-I.E. PILES OF SIMILAR SIZE) AT FINAL SET.

6. ALL STEEL PILING TO 3 METRES BELOW GROUND LEVEL AND UP TO TOP OF PILES SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH AS/NZS 4680. ALL PILING BURIED MORE THAN 3 METRES BELOW GROUND MAY BE LEFT BLACK (UNTREATED).

7. ANTICIPATED MINIMUM SET REQUIREMENTS ARE APPROXIMATELY [XX] BLOWS/250mm OF A PILE DRIVING UNIT (HAMMER RATED ENERGY OF [XX]kJ PER BLOW) DEPENDING ON THE RESULTS REQUIRED FOR 3 & 4 - TO BE CONFIRMED ONCE TEMPORARY COMPRESSION GRAPHS REQUIRED IN 4 HAVE BEEN SUBMITTED TO THE DESIGN ENGINEER.

[XX] ENGINEER TO CONFIRM FROM DESIGN.
PILE REPAIRS

SECTION C
1:10

2-250 PFC x 500 LONG

2-400x170x16 PL

PROPOSED PILE SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 200 UC 52 PILE DRAWN

EXISTING TIMBER HALFCAP

NOTCH BOTH HALFCAPS EQUALLY TO SUIT

SECTION B
1:20

DETAIL 1
1:10

PILE CUT OFF

2-400x170x16 PL

Φ20 THREADED ROD WITH 65x5FLX65 WASHER TO TIMBER FACE (TYP)

250 PFC

PROPOSED 200 UC 52 DRIVEN PILE

PIER PILE/TIMBER HALFCAP BEARING DETAIL

XX36-XXXX

1:20

PROPOSED DRIVEN PILE

EXISTING TIMBER DECKING

EXISTING TIMBER STRINGER

EXISTING TIMBER CORBEL

EXISTING TIMBER HALFCAP

EXISTING TIMBER PILE

VIEW A
1:20

Driven Pier Pile / Timber Halfcap Bearing Detail
PN30-2132
Driven Abutment Pile / Timber Fullcap Bearing Detail

PN30-2133
Abutment / Wingwall Sheeting Repair Detail (Reinforced Concrete Option)

PN30-2201
ABUTMENT REPAIRS

PLAN

TRIM ABUTMENT TIMBER SHEETING TO SUIT TIMBER PLANK REPAIRS

EXISTING WINGWALL TIMBER SHEETING

ABUTMENT

EXISTING ABUTMENT TIMBER SHEETING

150x95x8 UA, Ø12 x 75 LONG COACH SCREWS WITH WASHERS (TYP)

230x75 THICK TIMBER PLANK (TYP)

40 MAX - TRIM EXISTING PILE TO SUIT (TYP)

EXISTING TIMBER PILE (TYP)

55 TYP

75 NRESSING

ELEVATION

EXISTING TIMBER SHEETING

ROTTEH AREA OF EXISTING SHEETING TYP

230x75 THICK TIMBER PLANK (TYP)

PN30-2202

Abutment / Wingwall Sheeting Repair Detail (Timber Option) – Type 1

MAIN ROADS Western Australia
PNSUBSTRUCT.doc

Structures Engineering – Practice Notes
6706-02-221 – Issue April 2010

Page 43 of 88
Abutment / Wingwall Sheeting Repair Detail (Timber Option) - Type 2
PN30-2202A
Abutment / Wingwall Sheeting Repair Detail (Timber Option) – Type 3
PN30-2202B
ABUTMENT REPAIRS

SECTION A
1:10

PLAN

ABUTMENT / WINGWALL SCOUR REPAIR DETAIL
1:10

Abutment / Wingwall Scour Repair Detail
PN30-2203
ABUTMENT REPAIRS

Wingwall Extension Detail – Type 2
PN30-2205
ABUTMENT REPAIRS

Sheeting / Spiking Rail Support Detail
PN30-2207
2.3

HALFCAP / FULLCAP REPAIRS
HALFCAP / FULLCAP REPAIRS

**ENGINEER TO DETERMINE IF**

- MINIMUM BEARING GIVES SUFFICIENT BEARING AREA FOR PILE DIAMETERS AND LOADINGS.

**NOTE: IF HALFCAP CHANNEL IS SUPPORTED BY MORE THAN 2 PILES THEN DRG REQUIRES BOXED NOTE & PILE BEARING DETAILS ON DRG N° XX30-XXX**

**EXISTING TIMBER PILE**

- MINIMUM BEARING IF BEARING IS <75 THEN REFER TO "HALFCAP OR FULLCAP TO PILE BEARING DETAILS" ON DRG N° XX30-XXX

- GAP BETWEEN RECESS IN EXISTING PILE AND 300 PFC VARIES, PROVIDE 150x150 OR 200x240 LONG GALV STEEL SHIM PLATES AS REQUIRED. TACK WELD SHIM PLATES TOGETHER AFTET PLACEMENT. MAKE GOOD GALV SURFACE BY APPLYING COLD GALV.

**DETAIL 1 (AT PILE)**

- 380 PFC

- 150x65, 8x10 OR 200x120 LONG GALV STEEL SHIM IF REQUIRED. TACK WELD STEEL SHIMS TOGETHER AFTER PLACEMENT. MAKE GOOD GALV SURFACE BY APPLYING COLD GALV.

**TRANSITION IMPACT AREA**

- REMOVE IF ALL PILES ARE TIMBER

- DRILL HOLES ON SITE TO SUIT EXISTING HALFCAP CONNECTION, PROVIDE M20 BOLTS.

- EXISTING HALFCAP CONNECTION PROVIDE STEEL PACKERS TO SUIT

- EXISTING STEEL PILE

**PIER HALFCAPS REPLACEMENT DETAIL**

**PN30-2301**

---

**Pier Halfcaps Replacement Detail**

**PN40-2301**

---

**VIEW A**

**EXISTING TIMBER CORBEL**

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH 6x90 THREADED ROD WITH 65x50x65 WASHER TO TIMBER FACE AND FIXED TO PCF HALFCAP WITH 2 M20 BOLTS IN SITE DRILLED #22 HOLES (TY)

**REMOVE EXISTING TIMBER HALFCAPS ONLY AFTER PROPPING STRINGERS & CORBELS**

**NOTCH CORBEL TO SUIT (TY)**

**300/PHALFCAP REPLACEMENT**

**NOTE: HALFCAP CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 300 PFC HALFCAP DRAWN**

**SUBJECT TO CORBEL CONDITION REFER ENGINEER**

---

**STRINGER/CORBEL BRACKET DETAILS**

- 2 BRACKETS REQUIRED PER STRINGER OR CORBEL CONNECTION --
  1 AS DRAWN
  1 OPPOSITE HAND

---

**ELEVATION**

**PIER HALFCAPS REPLACEMENT DETAIL**

**PN30-2301**

---

**PLAN**

**DETAIL**

**AT PILE**

- 380 PFC

**STRINGER/CORBEL BRACKET**

- EXISTING TIMBER PILE

- 300 PFC

**IPE 40-2301**

---

**PIER HALFCAPS REPLACEMENT DETAIL**

**PN30-2301**

---

**VIEW A**

**EXISTING TIMBER CORBEL**

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH 6x90 THREADED ROD WITH 65x50x65 WASHER TO TIMBER FACE AND FIXED TO PCF HALFCAP WITH 2 M20 BOLTS IN SITE DRILLED #22 HOLES (TY)

**REMOVE EXISTING TIMBER HALFCAPS ONLY AFTER PROPPING STRINGERS & CORBELS**

**NOTCH CORBEL TO SUIT (TY)**

**300/PHALFCAP REPLACEMENT**

**NOTE: HALFCAP CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 300 PFC HALFCAP DRAWN**

**SUBJECT TO CORBEL CONDITION REFER ENGINEER**

---

**PIER HALFCAPS REPLACEMENT DETAIL**

**PN30-2301**

---

**VIEW A**

**EXISTING TIMBER CORBEL**

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH 6x90 THREADED ROD WITH 65x50x65 WASHER TO TIMBER FACE AND FIXED TO PCF HALFCAP WITH 2 M20 BOLTS IN SITE DRILLED #22 HOLES (TY)

**REMOVE EXISTING TIMBER HALFCAPS ONLY AFTER PROPPING STRINGERS & CORBELS**

**NOTCH CORBEL TO SUIT (TY)**

**300/PHALFCAP REPLACEMENT**

**NOTE: HALFCAP CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 300 PFC HALFCAP DRAWN**

**SUBJECT TO CORBEL CONDITION REFER ENGINEER**

---

**PIER HALFCAPS REPLACEMENT DETAIL**

**PN30-2301**

---

**VIEW A**

**EXISTING TIMBER CORBEL**

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH 6x90 THREADED ROD WITH 65x50x65 WASHER TO TIMBER FACE AND FIXED TO PCF HALFCAP WITH 2 M20 BOLTS IN SITE DRILLED #22 HOLES (TY)

**REMOVE EXISTING TIMBER HALFCAPS ONLY AFTER PROPPING STRINGERS & CORBELS**

**NOTCH CORBEL TO SUIT (TY)**

**300/PHALFCAP REPLACEMENT**

**NOTE: HALFCAP CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 300 PFC HALFCAP DRAWN**

**SUBJECT TO CORBEL CONDITION REFER ENGINEER**

---

**PIER HALFCAPS REPLACEMENT DETAIL**

**PN30-2301**
HALFCAP / FULLCAP REPAIRS

NOTE: IF HALF CAP CHANNEL IS SUPPORTED BY MORE THAN 2 PILES THEN ORG REQUIRES BOXED NOTE & PILE BEARING DETAILS PSN0-7328 A & OR 7329

EXISTING TIMBER PILE

15x(6.10 OR 12FL)x300 LONG CALY STEEL SHM IF REQUIRED. TACK WELD STEEL SHMS TOGETHER AFTER PLACEMENT. MAKE GOOD GALV. SURFACE BY APPLYING COLD GALV.

TRIM EXISTING TIMBER PILE TO S.JIT PROPOSED 380 PFC.

ENGINEER TO DETERMINE IF 70 MINIMUM BEARING GIVES SUFFICIENT BEARING AREA FOR PILE DIAMETERS AND LOADINGS

EXISTING TIMBER STRINGER

VIEW A

1:20

300 PFC

DETAIL 1

SAT PILE

300 PFC

1:10

NOTCH CORBEL TO SUIT (TYPI)

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH #28 THREADED ROD WITH 65X65X65 WASHER TO TIMBER FACE AND FIXED TO PILE HALFCAP WITH 2 MB8 BOLTS IN SITE DRILLED #22 HOLES (TYPI)

REMOVE EXISTING TIMBER HALFCAP ONLY AFTER PROPPING STRINGERS & CORBELS

NOTE: HALF CAP CHANNEL WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS

380 PFC HALFCAP DRAWN

300 PFC HALFCAP REPLACEMENT

NOTE: IF ALL PILES ARE TIMBER

EXISTING TIMBER CORBEL

55 (TYPI)

#20 THREADED ROD WITH 65X65X65 WASHER TO TIMBER FACE (TYPI)

EXISTING STRINGER/ CORBEL

#22 HOLE (TYPI)

20 x 22 CHAMFER

125x75x10 UA TRIM VERTICAL LEG TO SUIT

ELEVATION

STRINGER/CORBEL BRACKET DETAILS

15

2 - BRACKETS REQUIRED PER STRINGER OR CORBEL CONNECTION -- 1 - AS DRAWN

1 - OPPOSITE HAND

PN30-2302

Pier Halfcap Replacement Detail

5

PN30-2302

Pier Halfcap Replacement Detail

PIER N° X - ABUTMENT N° 1 SIDE

PN30-2302

PIER N° X - ABUTMENT N° 2 SIDE

PN30-2302

PN30-2302

DRG NUMBER - REFER TO PLAN DRAWING

XX30-XXXX
HALFCAP / FULLCAP REPAIRS

NOTE: If halfcap channel is supported by more than 2 piles, then HDG requires box HDG pile bearings. Box HDG pile bearings are LPS 2308 8 or 2329.

If bearing is < 90 then refer to "HALFCAP OR FULLCAP PILE BEARING DETAILS" in DRG No. XXX-XXX.

EXISTING TIMBER PILE

13x6/8.6 or 12x8.6x300 long galval steel shim if required.
Tack weld steel shims together after placement.
Make good galval surface by applying cold galval
Trim existing timber pile to suit proposed 300 PFC.

DETAIL 1

100

300 PFC

EXISTING TIMBER STRAINER (TYP)

EXISTING TIMBER DECK

4# threaded rods at 300 c/c PAXPAX with 650# washer
to timber face (TYP)

REPLACE EXISTING TIMBER HALFCAP AND SHOUPHT EXISTING BOLT TO CLEAR
PROPOSED HALFCAP STRENGTHENING. PROVIDE NEW 650# WASHER
AND TIGHTER BOLT (TYP).

ELEVATION

REPLACE EXISTING TIMBER HALFCAP WITH SHOUPHT EXISTING BOLT
TO CLEAR PROPOSED HALFCAP STRENGTHENING. PROVIDE NEW 650# WASHER
AND TIGHTER BOLT (TYP).

REPLACE 13x6/8.6 or 12x8.6x300 long galval steel shim if required.
Tack weld steel shims together after placement.
Make good galval surface by applying cold galval
Trim existing timber pile to suit proposed 300 PFC.

SECTION A

50 MM

(TYP)

THREADED ROD WITH 650# WASHER TO TIMBER FACE (50-300 PFC) .

REPLACE EXISTING TIMBER HALFCAP

EXISTING TIMBER STRAINER (TYP)

EXISTING TIMBER DECK

4# threaded rods at 300 c/c PAXPAX with 650# washer
to timber face (TYP)

REPLACE EXISTING TIMBER HALFCAP

AND SHOUPHT EXISTING BOLT TO CLEAR
PROPOSED HALFCAP STRENGTHENING. PROVIDE NEW 650# WASHER
AND TIGHTER BOLT (TYP).

ELEVATION

Pier Halfcaps Strengthening Detail
(Timber Piles)
PN30-2303

Pier No. X

120

Note: Halfcap channel must vary according to engineering requirements.
300 PFC halfcap drain. This detail is only to be used where there is no significant permanent bowing or crushing.
In the underside of the existing timber halfcap, engineer to determine.

Pier Halfcaps Strengthening Detail
(Timber Piles)
PN30-2303

Pier No. X

120

Note: Halfcap channel must vary according to engineering requirements.
300 PFC halfcap drain. This detail is only to be used where there is no significant permanent bowing or crushing.
In the underside of the existing timber halfcap, engineer to determine.
HALFCAP / FULLCAP REPAIRS

**DETAIL 1**

1.6H x 6.19 or 12PL x 340 LONG
GALV STEEL, SHIP IF REQUIRED.
TACK WELD STEEL, SHIMS
TOGETHER AFTER PLACEMENT.
MAKE GOOD GALV. SURFACE
BY APPLYING COLD GALV
TRIM EXISTING TIMBER PILE
to suit Proposed 300 PFC.

2. MINIMUM BEARING
1.9H x 6.19 or 12PL x 340 LONG
GALV STEEL. SHIP IF REQUIRED.
TACK WELD STEEL, SHIMS
TOGETHER AFTER PLACEMENT.
MAKE GOOD GALV. SURFACE
BY APPLYING COLD GALV
TRIM EXISTING TIMBER PILE
to suit Proposed 300 PFC.

ENGINEER TO DETERMINE IF
1. IRON CHANNEL GIVES
SUFFICIENT BEARING AREA
FOR PILE DIAMETERS AND
LOADINGS.

EXISTING TIMBER PILE

Existing Timber Stringer (Typ)

Existing Timber Halfcap

430 threaded rods
at 600 max.
with 46x65 washer
To Timber Face (Typ)

Existing Timber Decking

Existing Timber Halfcap

Existing Timber Halfcap (Typ)

Existing Timber Pile

**SECTION A**

100 PFC Halfcap Strengthening

50 - 300 PFC

60 - 300 PFC

60 - 300 PFC

**NOTE:** HALF CAP STRENGTHENING CHANNELS
WILL VARY ACCORDING TO ENGINEERING
REQUIREMENTS.

300 PFC HALF CAP DRAWN. THIS DETAIL IS
ONLY TO BE USED WHERE THERE IS NO
SIGNIFICANT PERMANENT BOWING OR CRUSHING
IN THE UNDERSIDE OF THE EXISTING TIMBER HALF CAP.

ELEVATION

PIER HALF CAP STRENGTHENING DETAIL

(Pier # X)

PN30-2304
NOTE: HALF CAP STRENGTHENING CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. 300 PFC HALF CAP DRAWN. THIS DETAIL IS ONLY TO BE USED WHERE THERE IS NO SIGNIFICANT PERMANENT BOWING OR CRUSHING IN THE UNDERSIDE OF THE EXISTING TIMBER HALF CAP (ENGINEER TO DETERMINE).
NOTE: HALFCAP STRENGTHENING CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.

300 PFC HALFCAP DRAWN. THIS DETAIL IS ONLY TO BE USED WHERE THERE IS NO SIGNIFICANT PERMANENT BOWING OR CRUSHING IN THE UNDERSIDE OF THE EXISTING TIMBER HALFCAP (ENGINEER TO DETERMINE).

EXISTING TIMBER STRINGER (TYP)
EXISTING TIMBER DECKING

THREADED ROD WITH 65x5FLx65 WASHER TO TIMBER FACE (TYP)

PROPOSED PFC HALFCAP STRENGTHENING

M20 BOLTS

TRIM EXISTING UC BRACKET TO FACE OF EXISTING UC PILE

SUPPORT BRACKET 200 UC 52 x 100 LONG EXISTING UC PILE

NOTE: PROP STRINGERS & CORBELS PRIOR TO INSTALLING HALFCAP STRENGTHENING. INSTALL HALFCAP STRENGTHENING BY JACKING AGAINST TIMBER HALFCAP TO REMOVE ALL BOWS, DEFLECTIONS AND PROVIDE CONTINUOUS SUPPORT TO THE EXISTING TIMBER HALFCAP.

SECTION A

EXISTING UC PILE (TYP)

EXISTING UC PILE

EXHISTING TIMBER CORBEL (TYP)

EXISTING TIMBER HALFCAP

EXISTING UC PILE

RECESS EXISTING TIMBER HALFCAP AND SHORTEN EXISTING BOLT TO CLEAR PROPOSED HALFCAP STRENGTHENING. PROVIDE NEW 65x5FLx65 WASHER AND TIGHTEN BOLT (TYP).

ELEVATION

PIER HALFCAP STRENGTHENING DETAIL
PIER N° X

XX30-XXXX
HALFCAP / FULLCAP REPAIRS

NOTE: IF HALFCAP CHANNEL IS SUPPORTED BY MORE THAN 2 PILES THEN DRG REQUIREMENTS MUST BE OBTAINED FOR EACH PILE.BEARING DETAILS DEFAULTED TO DRG NO. 330-X3X-X3X.

ENGINEER TO DETERMINE IF TO SEPARATE BEARING GIVES SUFFICIENT BEARING AREA FOR FLEXURAL TENSION AND COMPRESSION.

SECTION A

EXISTING TIMBER PILE

RHS STEEL PACKER

THREADED ROD

EXISTING TIMBER HALFCAP

ELEVATION

PIER HALFCAP STRENGTHENING DETAIL

PIER 8" X 120

50 MN

PROPOSED PFC HALFCAP STRENGTHENING (TYPE)

EXISTING TIMBER GIRDLE

25 M8

100X50 X 5 RHS STEEL PACKER (TYPE)

PIER HALFCAP STRENGTHENING DETAIL

PN30-2307

Pier Halfcaps Strengthening Detail – RHS Steel Packers (Timber Piles)
HALFCAP / FULLCAP REPAIRS

NOTE: If fullcap channel is supported by more than 2 piles, then ORG requires details PHN-230B

ENGINEER TO DETERMINE IF TO MINIMUM BEARING GIVES SUFFICIENT BEARING AREA FOR PILE DIAMETERS AND LOADINGS

ADJUST HALFCAP STRENGTHENING CHANNELS TO VARY ACCORDING TO ENGINEERING REQUIREMENTS.

300 PFC HALFCAP DRAWN. THIS DETAIL IS ONLY TO BE USED WHERE THERE IS NO SIGNIFICANT PERMANENT BOWING OR CRUSHING IN THE UNDERSIDE OF THE EXISTING TIMBER HALFCAP ENGINEER TO DETERMINE.

THREADED ROD WITH 65X60MM WASHER TO TIMBER FACE

EXISTING TIMBER PILE

EXISTING TIMBER HALFCAP (TYPE)

1/2"-THREADED ROD

EXISTING TIMBER PILE

SECTION A

ELEVATION

PIER HALFCAP STRENGTHENING DETAIL

PIER NO X

NOTE: PROP STRINGERS & CORBELS PRIOR TO INSTALLING HALFCAP STRENGTHENING. INSTALL STRENGTHENING BY JAKING AGAINST TIMBER HALFCAP TO REMOVE ALL BOWS, DROPPINGS AND PROVIDE CONTINUOUS SUPPORT TO THE EXISTING TIMBER HALFCAP.

PIER HALFCAP STRENGTHENING DETAIL – RHS STEEL PACKERS (TIMBER PILES)

PN30-230B

MAIN ROADS Western Australia
PNSUBSTRUCT.doc Structures Engineering – Practice Notes
6706-02-221 – Issue April 2010
Page 60 of 88
Pier Halfcaps Strengthening Detail – RHS Steel Packers (Steel Piles)
PN30-2309
NOTE: HALF CAP STRENGTHENING CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
300 PFC HALF CAP DRAWN. THIS DETAIL IS ONLY TO BE USED WHERE THERE IS NO SIGNIFICANT PERMANENT BOWING OR CRUSHING IN THE UNDERSIDE OF THE EXISTING TIMBER HALF CAP (ENGINEER TO DETERMINE).

TYPICAL STEEL PACKER TO PFC WELDING DETAIL

300 PFC

EXISTING TIMBER STRINGER (TYP)
EXISTING TIMBER DECKING

380 PFC

#30 THREADED RODS AT 900 CRS MAXIMUM (A MINIMUM OF 1 - #30 ROD PER PACKER) WITH 65x50x5.0 WASHED TO TIMBER FACE (TYP)

SECTION A

ELEVATION

PIER HALF CAP STRENGTHENING DETAIL
PPIR N° X - ABUTMENT N° X SIDE

120
Pier Halfcaps Strengthening and Widening Detail

PN30-2311
Steel Pier Pile / Pier Halfcaps Replacement Detail

Type 1

PN30-2313
HALFCAP / FULLCAP REPAIRS

STRINGER/CORBEL BRACKET DETAILS
5
2 - BRACKETS REQUIRED PER STRINGER OR CORBEL CONNECTION
1 - AS DRAWN
1 - OPPOSITE HAND

EXISTING TIMBER STRINGER

NOTCH CORBEL TO SUIT (TYP)

EXISTING TIMBER CORBEL

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH #20 THREADED ROD WITH 65x5FLx65 WASHER TO TIMBER FACE AND FIXED TO PFC HALFCAP WITH 2 - #20 BOLTS IN SITE DRILLED #22 HOLES (TYP)

NOTE: HALFCAP CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS
300 PFC HALFCAP DRAWN

"NOTE THESE DETAILS ARE ONLY APPLICABLE WHERE BOTH HALFCAPS AND ALL PIER PILES ARE REPLACED BY STEEL SECTIONS - BECAUSE GAP BETWEEN PROPOSED STEEL HALFCAPS HAS TO MATCH THE SIZE OF THE PROPOSED STEEL PILE"

Steel Pier Pile / Pier Halfcaps Replacement Detail
Type 1A
PN30-2314
Steel Pier Pile / Pier Halfcaps Replacement Detail
Type 2
PN30-2315

NOTE THESE DETAILS ARE ONLY APPLICABLE WHERE BOTH HALFCAPS AND PIER PILES ARE REPLACED BY STEEL SECTIONS - BECAUSE GAP BETWEEN PROPOSED STEEL HALFCAPS HAS TO MATCH THE SIZE OF THE PROPOSED STEEL PILE
HALFCAP / FULLCAP REPAIRS

STRINGER/CORBEL BRACKET DETAILS

15
- 2 - BRACKETS REQUIRED PER STRINGER OR CORBEL CONNECTION
- 1 - AS DRAWN
- 1 - OPPOSITE HAND

 Steel Pier Pile / Pier Halfcaps Replacement Detail
Type 3
PN30-2316
HALFCAP / FULLCAP REPAIRS

Abutment Fullcap Strengthening Detail
(Timber Piles)
PN30-2317

NOTE: PROD STRINGS PRIOR TO INSTALLING FULLCAP STRENGTHENING. INSTALL FULLCAP STRENGTHENING BY JOCKERING AGAINST TIMBER FULLCAP TO REMOVE ALL BOWS, DEFLECTIONS, AND PROVIDE CONTINUOUS SUPPORT TO THE EXISTING TIMBER FULLCAP.

NOTE: FULLCAP STRENGTHENING CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
130 PFC FULLCAP drawings. This detail is only to be used where there is no significant permanent bowing or crushing in the underside of the existing timber fullcap (engineer to determine).

Abutment N° X - PILE N° X
Abutment N° X - PILE N° X

MAIN ROADS Western Australia
PNSUBSTRUCT.doc

Structures Engineering – Practice Notes
6706-02-221 – Issue April 2010

Page 69 of 88
HALFCAP / FULLCAP REPAIRS

**Detail 1**

- #10 threaded rods with M6 x 100 mm washers to timber face
- Existing timber pile
- 10 mm x 100 mm cleat
- Minimum bearing

TRIM EXISTING TIMBER PILE TO SUIT PROPOSED 300 PFC

**Section A**

- Threaded rod with M6 x 100 mm washer to timber face
- Existing timber pile
- Notch pile to suit
- 10 mm x 100 mm cleat
- PROPOSED PFC FULLCAP STRENGTHENING

50 mm (Typ)

**Elevation**

- Abutment Fullcap Strengthening Detail
- Abutment No. X - Pile No. X
- Abutment No. X - Pile No. X 120

**Note:** Prop strainers prior to installing PFC STRENGTHENING. Install PFC STRENGTHENING by jacking against timber Fullcap to remove all rows, deflecting and providing continuous support to the existing timber Fullcap.

- #25 threaded rods, at 300 CDS maximum with M6 x 100 mm washer to timber face (Typ)
- Existing timber deck

- 1 - M28 x 250 LBS coach screw (sight drill #22 / hole in PFC)

**Abutment Fullcap Strengthening Detail**

(Timber Piles with Angle Cleat)

PN30-2317A
Abutment Fullcap Strengthening Detail
(Timber Piles with Angle Cleat and Stringer Angle Cleats)

PN30-2317C
Steel Abutment Piles / Abutment Fullcap Strengthening Detail

PN30-2018

SECTION A
1/20

DETAIL 1
1/10

FOR PILE RESTRAINTS REFER TO RELEVANT DETAILS.
PROPOSED FULLCAP & PILE SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
300 PFC FULLCAP DRAWN.
200 UC 52 PILE DRAWN.

THESE DETAILS ARE RELEVANT FOR NON DRIVEN PILES.

EXISTING TIMBER SHEETING
EXISTING TIMBER FULLCAP

STEEL PACKERS
25xW6,8,10 OR 12FL x HEIGHT TO SUIT PFC

PROPOSED PFC FULLCAP STRENGTHENING
250 UC 90 x 200 LONG

PROPOSED PILE

EXISTING TIMBER STRINGER (TYP)

EXISTING TIMBER DECKING

#20 THREADED RODS AT 900 CRS MAXIMUM WITH 65x6FLx65 WASHER TO TIMBER FACE (TYP)

2M20 BOLTS (TYP)

#8 SCREW BOLT (TYP)

DENOTES LOCATION OF STEEL PACKER BEHIND PFC

RECESS EXISTING TIMBER FULLCAP AND SHORTEN EXISTING BOLT TO CLEAR PROPOSED FULLCAP STRENGTHENING.
PROVIDE NEW 65x6FLx65 WASHER AND TIGHTEN BOLT (TYP)

NOTE: INSTALL FULLCAP STRENGTHENING BY JACKING AGAINST TIMBER FULLCAP TO REMOVE ALL BOWS, DEFLECTIONS AND PROVIDE CONTINUOUS SUPPORT TO THE EXISTING TIMBER FULLCAP. ENGINEER TO DETERMINE.

NOTE: FULLCAP STRENGTHENING CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
300 PFC FULLCAP DRAWN. THIS DETAIL IS ONLY TO BE USED WHERE THERE IS NO SIGNIFICANT PERMANENT BOWING OR CRUSHING IN THE UNDERSIDE OF THE EXISTING TIMBER FULLCAP (ENGINEER TO DETERMINE).

ELEVATION

STEEL ABUTMENT PILES / ABUTMENT FULLCAP STRENGTHENING DETAIL

ABUTMENT N° X - PILE N° X
ABUTMENT N° X - PILE N° X
1/20

DRG NUMBER - REFER TO PLAN DRAWING
HALFCAP / FULLCAP REPAIRS

NOTE: If FULLCAP CHANNEL IS SUPPORTED BY MORE THAN 2 PILES THEN BRG REQUIREMENTS PER BOXED NOTE 6 & PILE BEARING DETAILS PN30-2328 

NOTE: MINIMUM BEARING GIVES SUFFICIENT BEARING AREA FOR PILE DIAMETERS AND LOADINGS

DETAIL 1

EXISTING TIMBER PILE

PROPOSED PFC FULLCAP STRENGTHENING

SECTION A

EXISTING TIMBER PILE

RHS STEEL PACKER

#20 5/8" THREADED ROD & WASHERS TO TIMBER FACE

EXISTING TIMBER DECKING

PROPOSED PFC FULLCAP STRENGTHENING

SECTION B

EXISTING TIMBER PILE

RHS STEEL PACKER

#20 5/8" THREADED ROD & WASHERS TO TIMBER FACE

EXISTING TIMBER DECKING

PROPOSED PFC FULLCAP STRENGTHENING

ELEVATION

Abutment Fullcap Strengthening Detail - RHS Steel Packers (Timber Piles)

PN30-2319

Abutment N° X - PILE N° X TO PILE N° X

Abutment N° X - PILE N° X TO PILE N° X

Page 74 of 88
HALFCAP / FULLCAP REPAIRS

**NOTE:** ALL DRAWINGS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

**SECTION A**

**DETAIL 1**

**300 PFC**

**ELEVATION**

**ABUTMENT FULLCAP STRENGTHENING DETAIL**

**RHS Steel Packers (Timber Piles with Angle Cleat)**

**PN30-2319A**
Abutment Fullcap Strengthening and Widening Detail – (Timber Piles)

PN30-2321
Abutment Fullcap Strengthening and Widening Detail – (Timber Piles with Angle Cleat)

PN30-2321A
HALFCAP / FULLCAP REPAIRS

Abutment Fullcap Strengthening and Widening
Detail – RHS Steel Packers (Timber Piles)
PN30-2323

MAIN ROADS Western Australia
PNSUBSTRUCT.doc
Page 80 of 88
Abutment Fullcap Strengthening and Widening Detail
RHS Steel Packers (Timber Piles with Angle Cleat)

PN30-2323A
Steel Abutment Piles / Abutment Fullcap Strengthening and Widening Detail - RHS Steel Packers

HALFCAP / FULLCAP REPAIRS
HALFCAP / FULLCAP REPAIRS

NOTE: IF FULLCAP CHANNEL IS SUPPORTED BY MORE THAN 2 PILES THEN ORG REQUIRE BOXED NOTE & PILE BEARING DETAILS PN30-2320 A/OR 2329

ENGINEER TO DETERMINE IF 70 MINIMUM BEARING GIVES SUFFICIENT BEARING AREA FOR PILE DIAMETERS AND LOADINGS

EXISTING TIMBER PILE

70 MINIMUM BEARING
IF BEARING IS < 70 THEN REFER TO "FULLCAP OR FULLCAP TO PILE BEARING DETAILS" ON DRG N° XX30-XXX

EXISTING TIMBER PILE

GAP BETWEEN RECESS IN EXISTING PILE AND 300 PFC VARIES, PROVIDE 100x10 OR 20FLx300 LONG GALV. STEEL SHIM PLATES AS REQUIRED. TACK WELD SHIM PLATES TOGETHER AFTER PLACEMENT, MAKE GOOD GALV. SURFACE BY APPLYING COLD GALV

TRIM EXISTING TIMBER PILE TO SUIT PROPOSED 380 PFC.

125x75x10 UA

20 x 20 CHAMFER

75x75x10 EA TRIM VERTICAL LEG TO SUIT

1/5 - BRACKETS REQUIRED PER STRINGER/ CORBEL CONNECTION --
1 - AS DRAWN
1 - OPPOSITE HAND

NOTE: RELOCATE EXISTING PILE BANDS AS REQUIRED TO SUIT PROPOSED HALFCAP REPAIRS

SECTION A

#20 "U" THREADED ROD (TYP)

NOTCH STRINGER TO SUIT (TYP)

PROPOSED 300 PFC FULLCAP REPLACEMENT

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH #20 THREADED ROD WITH 65x57x65 WASHER TO TIMBER FACE AND FIXED TO PFC FULLCAP WITH 2 - M20 BOLTS IN SITE DRILLED #22 HOLES (TYP)

REMOVE EXISTING TIMBER FULLCAP ONLY AFTER PROPPING STRINGERS

NOTE: FULLCAP REPLACEMENT CHANNEL WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
300 PFC FULLCAP DRAWN

Abutment Fullcap Replacement Detail

PN30-2325

MAIN ROADS Western Australia
PNSUBSTRUCT.doc

Structures Engineering – Practice Notes
6706-02-221 – Issue April 2010
Page 83 of 88
HALFCAP / FULLCAP REPAIRS

NOTE: IF FULLCAP CHANNEL IS SUPPORTED BY MORE THAN 2 PILES THEN DRG REQUIRES GASKET NOTE & PILE BEARING DETAILS PN30-2328 &/OR 2329

SECTION A

NOTE: FULLCAP REPLACEMENT CHANNEL WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
300 PFC FULLCAP DRAWN.

Abutment Fullcap Replacement Detail
(Timber Piles with Angle Cleat)

PN30-2325A
HALFCAP / FULLCAP REPAIRS

FOR PILE RESTRAINTS REFER TO RELEVANT DETAILS.
PROPOSED FULLCAP & PILE SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS.
30 FT PFC FULLCAP DRAWN
200 UC 52 PILE DRAWN
THREE DETAILS ARE RELEVANT FOR NON DRIVEN PILES.

ELEVATION

STRINGER/CORBEL BRACKET DETAILS
15
2 - BRACKETS REQUIRED PER STRINGER OR CORBEL CONNECTION --
1 - AS DRAWN
1 - OPPOSITE HAND

SECTION A

55
(TYP)

EXISTING TIMBER SHEETING

200x200x13 EA x 400 LONG

TIMBER PACKER

PROPOSED PILE

STRINGER/CORBEL BRACKET FIXED TO CORBELS WITH #20 THREAD OD ROD WITH 65x5FLx55 WASHER TO TIMBER FACE AND FIXED TO PFC FULLCAP WITH 2 - M20 BOLTS IN SITE DRILLED #22 HOLES (TYP)
REMOVE EXISTING TIMBER FULLCAP ONLY AFTER PROPPING STRINGERS

EXISTING TIMBER STRINGER (TYP)

EXISTING TIMBER DECKING

M20 BOLTS (TYP)

200 UC 52 PILE

180x16FLx180 STIFFENER

PROPOSED 300 PFC FULLCAP REPLACEMENT

Steel Abutment Pile / Abutment Fullcap Replacement Detail - Type 1

PN30-2326

MAIN ROADS Western Australia
PNSUBSTRUCT.doc

Structures Engineering - Practice Notes
6706-02-221 - Issue April 2010
Page 65 of 88
HALFCAP / FULLCAP REPAIRS

FOR PILE RESTRAINTS
REFER TO RELEVANT DETAILS.

PROPOSED FULLCAP & PILE
SIZE WILL VARY ACCORDING TO
ENGINEERING REQUIREMENTS:
300 PFC FULLCAP DRAWN
200 UC 52 PILE DRAWN

THESE DETAILS ARE RELEVANT
FOR NON DRIVEN PILES.

STRINGER/CORBEL BRACKET
DETAILS

1.5
2 - BRACKETS REQUIRED PER STRINGER OR
CORBEL CONNECTION
1 - AS DRAWN
1 - OPPOSITE HAND

EXISTING TIMBER STRINGER
TO SUIT (TYP)

EXISTING TIMBER
DECKING

STEEL ABUTMENT PILE/ABUTMENT FULLCAP
REPLACEMENT DETAIL - TYPE 1
PN30-2327

Steel Abutment Pile / Abutment Fullcap
Replacement Detail - Type 2
HALFCAP / FULLCAP REPAIRS

Pile Bearing Details (Timber Piles > or = Ø340)

SECTION A

SECTION B

SECTION C

NOTE: HALFCAP/FULLCAP CHANNELS WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS. (100 PFC HALFCAP/FULLCAP DRAWN)

FOR SMALLER PILE DIAMETERS ENGINEER TO CHECK BEARING AREAS REQUIRED.

ALSO REFER TO PNS30-2329

NOTE: RELOCATE EXISTING PILE BANDS AS REQUIRED TO SUIT PROPOSED HALFCAP REPAIRS

SECTIONAL ELEVATION

TYPE 1

TO BE USED WHERE DIMENSION 'A' (FACE OF PILE TO WEB OF CHANNEL) IS BETWEEN 50-70mm.

SECTIONAL ELEVATION

TYPE 2

TO BE USED WHERE DIMENSION 'A' (FACE OF PILE TO WEB OF CHANNEL) IS BETWEEN 35-50mm.

SECTIONAL ELEVATION

TYPE 3

TO BE USED WHERE DIMENSION 'A' (FACE OF PILE TO WEB OF CHANNEL) IS BETWEEN 0-35mm.

TIMBER PILE > OR = Ø340

HALFCAP OR FULLCAP TO PILE BEARING DETAILS

VIEW D
Pile Bearing Details (Timber Piles < Ø340)

SECTION A

SECTION B

SECTION C

SECTIONAL ELEVATION

TYPE 1

TYPE 2

TYPE 3


TIMBER PILE < Ø340

HALF CAP OR FULL CAP TO PILE BEARING DETAILS
This information is owned and controlled by the Senior Engineer Structures. The Structures Information and Standards Manager is the delegated custodian. All comments and requests for changes are to be submitted to the delegated custodian.

**AUTHORISATION**

As head of Structures Engineering of Main Roads Western Australia, I authorise the issue and use of this document.

[Signature]

SENIOR ENGINEER STRUCTURES

Date: 6/04/10

Document No. 6706-02-222

All controlled copies shall be marked accordingly
TABLE OF CONTENTS

3.1 STRINGER & CORBEL REPAIRS .................................................. 5

PN30-3101 - Pier Stringer Replacement Detail – Type 1 ..................... 6
PN30-3102 - Pier Stringer Replacement Detail – Type 1 (Existing Concrete Overlay) ...................................................... 7
PN30-3103 - Pier – Stringer Replacement Detail – Type 2 ................... 8
PN30-3104 - Pier – Stringer & Corbel Replacement Detail – Type 1 ....... 9
PN30-3105 - Pier – Stringer & Corbel Replacement Detail – Type 1 (Existing Concrete Overlay) ........................................... 10
PN30-3106 - Pier – Stringer & Corbel Replacement Detail – Type 2 ....... 11
PN30-3107 - Pier – Stringer & Corbel Replacement Detail – Type 2 (Existing Concrete Overlay) ............................................. 12
PN30-3108 - Pier – Stringer & Corbel Replacement Detail – Type 3 (Proposed Concrete Overlay with Timber Decking cutback to Proposed Stringer Replacement) ........................................... 13
PN30-3109 - Pier – Stringer & Corbel Replacement Detail – Type 3A (Proposed Concrete Overlay with Timber Decking cutback to Proposed Stringer Replacement) ........................................... 14
PN30-3110 - Pier – Stringer & Corbel Strengthening Detail .................. 15
PN30-3111 - Pier – Stringer & Corbel Strengthening Detail (Existing Concrete Overlay) ...................................................... 16
PN30-3112 - Pier – Widening & Additional Stringer Detail .................. 17
PN30-3113 - Abutment – Stringer Replacement Detail – Type 1 ............ 18
PN30-3114 - Abutment – Stringer Replacement Detail – Type 1 (Existing Concrete Overlay) ...................................................... 19
PN30-3115 - Abutment – Stringer Replacement Detail – Type 2 ............ 20
PN30-3115A - Abutment – Stringer Replacement Detail – Type 2 (Timber Piles with Angle Cleat) ................................................. 21
PN30-3116 - Abutment – Stringer Replacement Detail – Type 2 (Existing Concrete Overlay) ...................................................... 22
# TABLE OF CONTENTS

## 3.1 STRINGER & CORBEL REPAIRS cont.

| PN30-316A | Abutment – Stringer Replacement Detail – Type 2 (Existing Concrete Overlay) (Timber Piles with Angle Cleat) | 23 |
| PN30-3117 | Abutment – Stringer Strengthening Detail | 24 |
| PN30-3118 | Abutment – Stringer Strengthening Detail (Existing Concrete Overlay) | 25 |
| PN30-3119 | Abutment – Widening & Additional Stringer Detail | 26 |
| PN30-3120 | Steel Stringer Packing Detail | 27 |
| PN30-3121 | Pier – Timber Stringer Bolting Detail | 28 |
| PN30-3122 | Timber Stringer & Timber Corbel Bolting Details | 29 |
| PN30-3123 | Steel Stringer Replacement Detail | 30 |

## 3.2 OVERLAY DETAILS

| PN30-3201 | Example Overlay Plan & Details (Concrete) | 32 |
| PN30-3202 | Example Overlay Plan & Details (Reinforcement) | 33 |
| PN30-3203 | Deck Drainage Guidelines | 34 |
| PN30-3204 | Kerb Concrete & Downpipe Details | 35 |
| PN30-3205 | Kerb Concrete & Downpipe Details - Permanent Formwork | 36 |
| PN30-3206 | Existing Scupper Repair Detail | 37 |
| PN30-3207 | Kerb & Deck Edge Reinforcement Details | 38 |
| PN30-3208 | Kerb Reinforcement Details at Contraction Joint & Splice Detail | 39 |
| PN30-3209 | Kerb Permanent Formwork Detail | 40 |
| PN30-3210 | Deck Fabric Lap Details | 41 |
| PN30-3210A | Deck Construction Joint Detail (Bridge without Road Seal) | 42 |
| PN30-3211 | Pier Contraction Joint Details | 43 |
### TABLE OF CONTENTS

#### 3.2 OVERLAY DETAILS cont.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN30-3212</td>
<td>Drop Panel Details</td>
<td>44</td>
</tr>
<tr>
<td>PN30-3213</td>
<td>Sill Beam Details – Type 1 (for Bridges with Approach Slabs)</td>
<td>45</td>
</tr>
<tr>
<td>PN30-3213A</td>
<td>Sill Beam Details – Type 2 (for Bridges with Approach Slabs)</td>
<td>46</td>
</tr>
<tr>
<td>PN30-3214</td>
<td>Fabric Schedule Table</td>
<td>47</td>
</tr>
</tbody>
</table>
3.1

STRINGER & CORBEL REPAIRS
Pier - Stringer Replacement Detail

Type 1

PN30-3101
STRINGER & CORBEL REPAIRS

STRINGER REPLACEMENT DETAIL – TYPE 2  xx30-xxxx

SPAN No. X - STRINGER No. X
1:20

NOTE: STRINGER SIZE WILL VARY ACROSS TO ENGINEERING REQUIREMENTS
410 UB 54 STRINGER DRAWN

DRG NUMBER - REFER TO PLAN DRAWING

Pier - Stringer Replacement Detail
Type 2
PN30-3103
STRINGER & CORBEL REPAIRS

Pier - Stringer & Corbel Replacement Detail
Type 1

PN30-3104
Pier - Stringer & Corbel Replacement Detail
Type 2
PN30-3106
PIER - STRINGER & CORBEL REPLACEMENT

DETAIL - TYPE 2

SPAN # X - PIER # X - STRINGER # X

NOTE: STRINGER & CORBEL SIZE WILL VARY ACCORDING TO ENGINEERING REQUIREMENTS

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN

NOTE: STRINGER & CORBEL DRAWN
**Proposed Concrete Overlay with Timber Decking**

**Deck Fabric**

**Proposed Stringer Flange**

**Anchor Bolt - M16x120 Long Bolt with 30 O.D. x 3 Thick Washer**

**Drill #18 Hole in Stringer Flange**

**PROPOSED STRINGER FLANGE**

**SECTION**

**120**

**PIER**

**PROPOSED CONCRETE OVERLAY**

**EXISTING TIMBER DECK**

**PROPOSED STEEL STRINGER**

**ANCHOR BOLT M16x120 LONG BOLT (TYP)**

**ANCHOR BOLTS AT 1000 CTS (TYP)**

**1000 (TYP)**

**PIER**

**#20 Threaded Rod Every Third Deck Plank**

**PROPOSED STEEL STRINGER**

**ANCHOR BOLT M16x120 LONG BOLT (TYP)**

**PROPOSED CONCRETE OVERLAY**

**EXISTING TIMBER DECK**

**PROPOSED STEEL CORBEL (TYP)**

**200x16x10 or 12FLx300 Long Steel Packers, Used to Wedge Steel Stringer Tight Against Existing Decking. Tack Weld Steel Packers To Corbel After Placement.**

**#20 Threaded Rod With 65x5FLx65 Washer To Timber Face (TYP)**

**PROPOSED STEEL STRINGER (TYP)**
Pier - Stringer & Corbel Replacement Detail – Type 3A
(Proposed Concrete Overlay with Timber Decking
cutback to Proposed Stringer Replacement)

PN30-3109
Pier - Stringer & Corbel Strengthening Detail

PN30-3110
STRINGER & CORBEL REPAIRS

Pier - Stringer & Corbel Strengthening Detail
(Existing Concrete Overlay)

PN30-3111
Abutment - Stringer Replacement Detail - Type 1

**TACK WELD OR CENTRE PUNCH BOLT THREAD TO NUT TO PREVENT UNCOING OF NUT (TYP)***

**NOTE:**
Steel Stringer shall be fabricated to allow adequate clearance from Abutment Sheeting to facilitate installation.

**FIX LOOSE PLANKS TO ADJACENT BOLTED PLANKS WITH #10x200 LONG SPIKE (TYP)**

**SEASONED JARRAH TIMBER PACKER OR STEEL SHEMS TO SUIT EXISTING TIMBER ABUTMENT SHEETING**

**#20 THREADED ROD WITH 65x5FLx50 WASHER TO TIMBER FACE (TYP)**

**ABUTMENT - STRINGER REPLACEMENT DETAIL - TYPE 1**

**ORG NUMBER - REFER TO PLAN DRAWING**
Abutment - Stringer Replacement Detail - Type 1
(Existing Concrete Overlay)

PN30-3114
Abutment - Stringer Replacement Detail - Type 2

(Timber Piles with Angle Cleat)

NOTE:
Steel stringer shall be fabricated to allow adequate clearance from abutment sheeting to facilitate installation.

Timber packer or steel shims fixed to sheeting with #12 clout head nails.

Steel packers.

EXISTING TIMBER FULLCAP

150 x 150 x 14 EA
x 300 LON (TYP)

SECTIONAL ELEVATION A

1:20

NOTE:
Refer to various fullcap strengthening details (PN30-2313 to 2327) for appropriate detail to be included on drawings. PN30-2314A was used for this example.

THIS DETAIL SHALL BE USED ONLY WHEN STEEL FULLCAP STRINGER REPLACEMENT AND NOTCHING OF EXISTING TIMBER FULLCAP OCCURS. FOR FURTHER STRINGER DETAILS REFER TO RELEVANT DETAILS.

ABUTMENT - STRINGER REPLACEMENT DETAIL - TYPE 2

XX38-XXXX

ABUTMENT N° X - STRINGER N° X

ABUTMENT N° X - STRINGER N° X

1:20

NOTE:
Proposed steel stringer and PFC fullcap strengthening size will vary according to engineering requirements.

DOUBLE STRINGER REPLACEMENT DRAWN

300 PFC FULLCAP STRENGTHENER DRAWN

DRG NUMBER - REFER TO PLAN DRAWING.
Abutment - Stringer Replacement Detail - Type 2
(Existing Concrete Overlay)

PN30-316
Abutment - Stringer Strengthening Detail

PN30-3117
Abutment - Stringer Strengthening Detail

(Existing Concrete Overlay) PN30-3118

NOTE:
STEEL STRINGER SHALL BE FABRICATED TO ALLOW ADEQUATE CLEARANCE FROM ABUTMENT SHEETING TO FACILITATE INSTALLATION.

SECTIONAL ELEVATION

NOTE:
GAP BETWEEN STRINGER AND DECK SHALL BE SUITABLY PACKED REFER TO STRINGER PACKING DETAIL.

ABUTMENT - STRINGER STRENGTHENING DETAIL

NOTE:
DIMENSIONS DENOTED THUS SHALL BE SITE MEASURED PRIOR TO FABRICATION & CONSTRUCTION.

MODIFIED FLANGE DETAILS

ELEVATION

ABUTMENT NO. X - STRINGER NO. X

120
STRINGER & CORBEL REPAIRS

Abutment – Widening & Additional Stringer Detail

PN30-3119
STRINGER & CORBEL REPAIRS

EXISTING TIMBER DECKING

PROPOSED UB STEEL STRINGER

THE FOLLOWING IS APPLICABLE:--
WHERE GAP BETWEEN DECK PLANKS AND STRINGER IS LESS THAN 20mm PACK GAPS WITH STEEL SHIMS (TACK WELD TO UB STRINGER)
WHERE GAP BETWEEN DECK PLANKS AND STRINGER IS MORE THAN 20mm PACK GAPS WITH "EMACO S88C" GROUT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS (MASTER BUILDERS TECHNOLOGIES) OR SIMILAR APPROVED. PROVIDE FORM TO ONE FACE OF UB TO PREVENT GROUT LEAKAGE. TROWEL FINISH OPPOSITE FACE.

STEEL STRINGER PACKING DETAIL
(ALL DECK PLANKS REQUIRE BEARING ON STRINGER AS SHOWN)
1:10

Steel Stringer Packing Detail
PN30-3120
PIER - TIMBER STRINGER BOLTING DETAILS

SPAN N° X - STRINGER N° X - PIER N° X

1:20

NOTE: DIMENSIONS DENOTED THUS ∀ SHALL BE SITE MEASURED PRIOR TO FABRICATION & CONSTRUCTION.

150 PFC x 2000 LONG NOM.

HORIZONTAL SPLIT IN STRINGER

PROPOSED CONCRETE DECK

EXISTING TIMBER DECKING

EXISTING TIMBER CORBEL

EXISTING TIMBER HALFCAP

- PROVIDE IF VERTICAL SPLITS TO STRINGER END EXCEEDS 1500 LENGTH

- PROVIDE IF HORIZONTAL SPLIT EXTENDS 500 BEYOND ø24 BOLT

ø20 THREADED ROD
REFER TO "STRINGER & CORBEL BOLTING DETAILS"

ø24 THREADED RODS (TYP UNQ)

CURVED WASHER WITH A SHOP DRILLED ø28 HOLE INSTEAD OF THE STANDARD ø24 HOLE FOR ALL ø24 THREADED RODS.
FOR CURVED WASHER REFER TO DRG 9530-0072

NOTE: THIS DETAIL IS ONLY APPLICABLE FOR BRIDGE MAINTENANCE WHERE A PROPOSED CONCRETE OVERLAY IS INTENDED.
THIS DETAIL IS TO BE REFERRED TO IN THE "BOLTING REQUIREMENT TABLE".
STRINGER & CORBEL REPAIRS

NOTE:
TACK WELD OR CENTRE PUNCH BOLT THREAD TO NUT TO PREVENT UNDOING OF NUT (TYP)

15x16FL x50 WHEELER
SPLIT IN TIMBER
CURVED WASHER
EXISTING TIMBER DECK

VERTICAL BOLT

EXISTING BITUMINOUS SEAL
EXISTING CONCRETE DECK
EXISTING TIMBER DECK

65x16FL x50 WASHER ON EPOXY SEALANT

DRAWN WITH BITUMINOUS SEAL
IF NO BITUMINOUS SEAL
ACCESS INTO CONCRETE
25mm AND REFILL WITH
EPOXY SEAL.

VERTICAL BOLT
WHERE BRIDGE HAS AN
EXISTING CONCRETE OVERLAY

SPLIT IN TIMBER
THREADED ROD
CURVED WASHER

HORIZONTAL BOLT

SPLIT IN TIMBER
THREADED ROD
CURVED WASHER

THREADED ROD
(SHOULD BE AT 90° TO SPLIT 75°)

DIAGONAL BOLT

SPLIT IN TIMBER
THREADED ROD
CURVED WASHER

THREADED ROD
(SHOULD BE AT 90° TO SPLIT 75°)

DIAGONAL BOLT

STRINGER & CORBEL Bolting Details

120

NOTE:
FOR CURVED WASHER DETAILS REFER TO DRG NO 9590-0072

<table>
<thead>
<tr>
<th>PIER N°</th>
<th>CORBEL N°</th>
<th>LOCATION/DETECTION</th>
<th>LEFT</th>
<th>RIGHT</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPAN N°</th>
<th>STRINGER N°</th>
<th>LOCATION/DETECTION</th>
<th>LEFT 1</th>
<th>MIDDLE</th>
<th>LEFT 2</th>
<th>END 1</th>
<th>END 2</th>
<th>END 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE:
1. STRINGERS & CORBELS ARE NUMBERED FROM LEFT TO RIGHT IN INCREASING CHAINAGE.
2. ALL BOLTS USED SHALL BE #29 THREADED ROD UNLESS OTHERWISE NOTED AND COATED WITH DENGO OIL BEFORE INSTALLATION.
3. BOLTS SHALL BE AT 600 CENTRES FOR LENGTH OF SPLITS GREATER THAN 50mm WIDE.
4. BOLT DIRECTION ABBREVIATIONS USED:
   H - HORIZONTAL
   V - VERTICAL
   D - DIAGONAL
   C - CROSS

BOLTING REQUIREMENT TABLE

Timber Stringer & Timber Corbel Bolting Details
PN30-3122
3.2

OVERLAY REPAIRS
OVERLAY DETAILS

DOWNPIPE

1. BRIDGE WITH TWO WAY CROSSFALL :-

1.1. ONE DOWNPIPE ON EACH SIDE IN APPROXIMATELY THE CENTRE OF EACH SPAN.

2. BRIDGE WITH SUPER ELEVATION :-

2.1. ONE DOWNPIPE ON LOW SIDE IN APPROXIMATELY THE CENTRE OF EACH SPAN.

3. REFER KERB CONCRETE & DOWNPIPE DETAILS - PRACTICE NOTES PN30-3204 & PN30-3205.

SCUPPERS (EXISTING)

1. REFER EXISTING SCUPPER REPAIR DETAIL - PRACTICE NOTES PN30-3206.

Deck Drainage Guidelines
PN30-3203
OVERLAY DETAILS

NOTE:
APPLY SILICON SEALANT TO DOWNTURN FLAP AND PERIMETER OF HOLE

GALV. 0.8 THICK PGI SHEET

HOLE SIZE TO MATCH EXISTING SCUPPER SIZE

EXISTING SCUPPER

EXISTING TIMBER DECK

SCUPPER PLATE

2-30x2.8 CLOUT HEAD NAILS (GALV) (4 NAILS TOTAL)

EXISTING STRINGER

100

SCUPPER PLATE DETAIL
TYPICAL ALL SCUPPERS
1:20

NOTE:
INSTALL SCUPPER PLATES AT ALL EXISTING SCUPPER LOCATIONS ONLY AFTER CLEARING

Existing Scupper Repair Detail
PN30-3206
OVERLAY DETAILS

DETAILED POST OMITTED

Deck depth at curb face 300-199

DETAILED POST OMITTED

Deck depth at curb face 300-

DETAILED POST OMITTED

Deck depth “x” 130+

Kerb & Deck Edge Reinforcement Details

PN30-3207
OVERLAY DETAILS

NOTE
PIER CONTRACTION JOINTS MAY BE RELOCATED LEFT OR RIGHT OF PIER \( \phi \) BY UPTO 200 mm TO AVOID ANCHOR RODS.

KERB CONTRACTION JOINT DETAIL
1:10

SL81 KERB FABRIC TYPE 4 (TYP)

KERB FABRIC SPLICE DETAIL
1:10

3-N12 BARS (TYP)

N12 BAR (TYP)

S-L81 KERB FABRIC TYPE 4 (TYP)

Kerb Reinforcement Details at Contraction
Joint & Splice Detail
PN30-3208
OVERLAY DETAILS

2 THICK GALV SHEET
2000 LONG

PROP FORMWORK
TO SUIT

VARIES - 500 MAXIMUM

10

30

230

10

100 MIN.

25 (TYP)

120

POP RIVET OR SELF TAPPER SCREW AT 250 CRS STAGGERED (TYP)

KERB PERMANENT FORMWORK
(NON-PREFERRED OPTION)

1:5

Note:
Not for locations within 50km of the coast and salt river or lake environments.
At preliminary design stage check preferred option with Project Manager prior to documentation.

Kerb Permanent Formwork Detail
PN30-3209
OVERLAY DETAILS

Deck Fabric Lap Details
PN30-3210
Deck Construction Joint Detail
(Bridge without Road Seal)

PN30-3210A
Pier Contraction Joint Details

PN30-3211
OVERLAY DETAILS

EXISTING ROAD PAVEMENT SHALL BE SAW CUT TO MIN. DEPTH OF 100 mm PRIOR TO EXCAVATION.

EXISTING DECK
EXISTING SHEETING

30 THICK EXPANDED FOAM (FOSROC EXPANDAFoAM SHEET/STRIP BY FOSROC CONSTRUCTION PRODUCTS) OR SIMILAR APPROVED

VARES

MIN

EXCAVATED FACE

SECTION (B)

1:10

FOR CONCRETE
OVERLAY ORG

SL81 DECK FABRIC TYPE X

SL81 DROP PANEL FABRIC TYPE X

SL81 DECK FABRIC TYPE X

SL81 DROP PANEL FABRIC TYPE X

75

SECTION (B)

1:10

FOR REINFORCED
OVERLAY ORG

SL81 FABRIC

SL81 FABRIC

75

SECTION (B)

1:10

FOR REINFORCED
OVERLAY ORG

875

\[875\]

Drop Panel Details

PN30-3212
OVERLAY DETAILS

SECTION 6

SECTION A

Sill Beam Details – Type 1
(for Bridges with Approach Slabs)
PN30-3213
OVERLAY DETAILS

Sill Beam Details – Type 2
(for Bridges with Approach Slabs)
PN30-3213A
OVERLAY DETAILS

<table>
<thead>
<tr>
<th>FABRIC TYPE</th>
<th>N° OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>X</td>
</tr>
</tbody>
</table>

FABRIC SCHEDULE TABLE
REFER DRAWING N° 9030-0243

Fabric Schedule Table
PN30-3214
RAILING & MISCELLANEOUS DETAILS

This information is owned and controlled by the Senior Engineer Structures. The Structures Information and Standards Manager is the delegated custodian. All comments and requests for changes are to be submitted to the delegated custodian.

AUTHORISATION

As head of Structures Engineering of Main Roads Western Australia, I authorise the issue and use of this document.

[Signature]
SENIOR ENGINEER STRUCTURES
Date: 6/04/10

Document No. 6706-02-223

All controlled copies shall be marked accordingly
# TABLE OF CONTENTS

## 4.1 RAILING DETAILS

| PN30-4101 | Example Drawing - Guardrail Layout & Details | 5 |
| PN30-4102 | Guardrail Components Quantity Table | 6 |
| PN30-4103 | Guardrail Guidelines for Thriebeam & Toprailing Expansion Joints | 7 |
| PN30-4104 | Post Connection Details | 8 |
| PN30-4105 | Formation Widening Details | 9 |
| PN30-4106 | Balustrade & Guardrail Post Details for Maintenance of Existing Concrete Bridges | 10 |
| PN30-4107 | Guardrail Post - Footing Detail for New Concrete Bridges | 11 |
| PN30-4108 | Guardrail Beam (‘W’ Beam & Thriebeam) Lapping Detail and Notes for Guardrail | 12 |
| PN30-4109 | Width Marker Details | 13 |

## 4.2 MISCELLANEOUS DETAILS

| PN30-4201 | Example Drawing - Index & General Information (for Bridge Maintenance Projects) | 15 |
| PN30-4202 | Design Information Summary (for Bridge Maintenance Projects) | 16 |
| PN30-4203 | General Notes (for Bridge Maintenance Projects) | 17 |
| PN30-4204 | Preventative Maintenance Work Table | 18 |
| PN30-4205 | Legend (for Bridge Maintenance Projects) | 19 |
| PN30-4206 | Spoon Drain Detail | 20 |
| PN30-4207 | Example Drawing - Approach Slab Plan & Details (for Bridge Maintenance Projects) | 21 |
| PN30-4208 | Example Drawing - Expansion Joint Details (for Bridge Maintenance Projects) | 22 |
TABLE OF CONTENTS

4.2 MISCELLANEOUS DETAILS cont.

PN30-4209 - Example Drawing - Expansion Joint Details - 8200 width between kerbs (for Bridge Maintenance Projects) .................. 23
PN30-4210 - Example Drawing - Cover Sheet (for Bridge Maintenance Projects) ................................................................. 24
PN30-4211 - Example Drawing - Cover Sheet (for Bridge Maintenance Projects Contract Books) ............................................. 25
PN30-4212 - A2 Drawing Set Divider Sheets (Standard Drawings and Drawings for Information divider sheets) ..................... 26
PN30-4213 - Example : Designer’s O.S.H. Risk Assessment Report (for Bridge Maintenance Projects) ..................................... 27
4.1

RAILING DETAILS
### Guardrail Components Quantity Table

**PN30-4102**

<table>
<thead>
<tr>
<th>Post Type</th>
<th>Blockout Type</th>
<th>W Beam Type</th>
<th>Thirbeam Type</th>
<th>Stiffener Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT1</td>
<td>TB1</td>
<td>WB1</td>
<td>TB1</td>
<td>Thirbeam</td>
</tr>
<tr>
<td>PT2</td>
<td>TB2</td>
<td>WB2</td>
<td>TB2</td>
<td></td>
</tr>
<tr>
<td>PT3</td>
<td>TB3</td>
<td>WB3</td>
<td>TB3</td>
<td></td>
</tr>
<tr>
<td>PT4</td>
<td>TB4</td>
<td>WB4</td>
<td>TB4</td>
<td></td>
</tr>
<tr>
<td>PT5</td>
<td>TB5</td>
<td>WB5</td>
<td>TB5</td>
<td></td>
</tr>
<tr>
<td>PT6</td>
<td>TB6</td>
<td>WB6</td>
<td>TB6</td>
<td></td>
</tr>
<tr>
<td>PT7</td>
<td>TB7</td>
<td>WB7</td>
<td>TB7</td>
<td></td>
</tr>
<tr>
<td>PT8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** These quantities do not include extruder type end terminal components. The quantities are based on 8 post end terminals being installed.
RAILING DETAILS

Guardrail Guidelines for Thriebeam & Toprailing, Expansion Joints

PN30-4103
RAILING DETAILS

POST CONNECTION DETAILS

1:10

Post Connection Details

PN30-4104

NOTE: ENGINEER TO CHECK THAT
 CONNECTION PLATE FITS ABOVE
 BOTTOM CHAMFER (OR BOTTOM
 OF KERB PERMANENT FORMWORK)
 THICKEN OVERLAY AS REQUIRED
 TO SUIT.
RAILING DETAILS

DIMENSION TO MATCH THAT BETWEEN BRIDGE KERB AND BARRER

PROPOSED BATTER

150 THICK CEMENT SEAL STABILISED GRAVEL (WHERE APPLICABLE)

300 MAX BENCH

EXISTING BATTER

THRIEBEAM & TRANSITION BEAM

725 ± 10 ABOVE ADJACENT ROAD SURFACE

PROPOSED BATTER 1:4

1000 TO 1800

'W' BEAM

FORMATION WIDENING DETAILS

1:20

Formation Widening Details

PN30-4105
RAILING DETAILS

BRIDGE CROSS SECTION
158

DETAIL 1

DETAIL 2

DETAIL 3

DETAIL 4

DETAIL 5

Balustrade & Guardrail Post Details for Maintenance of Existing Concrete Bridges
PN30-4106
RAILING DETAILS

RHS BALUSTRADE POST OR 100x100x9.0 RHS GUARDRAIL POST

NOMINAL FGL

250 (NOM)

900 NOMINAL

600 NOMINAL

Ø600 MASS CONCRETE FOOTING

RHS GUARDRAIL & BALUSTRADE POST FOOTING DETAIL 1:10

NOTE: THIS DETAIL IS TO BE USED FOR RHS BALUSTRADE POSTS & FOR MAINTENANCE OF EXISTING RHS GUARDRAIL POSTS.

Guardrail Post – Footing Detail for New Concrete Bridges
PN30-4107
**GUARDRAIL BEAM LAPPING DETAIL**

**NOTES:**

1. FOR GENERAL NOTES REFER TO DRAWING NO. XX30-XXXX.
2. EXTRUDER TYPE END TERMINALS SHALL MEET WITH THE REQUIREMENTS OF NCHRP-350 TEST LEVEL 3.
   END TERMINAL TYPES TO BE SUBMITTED TO THE SUPERINTENDENT FOR APPROVAL.

8 POST END TERMINALS OF APPROX LENGTH 15.2 - 15.8m ARE SHOWN IF A LESSER LENGTH OF END TERMINAL IS SUBMITTED THEN DETAILS OF ADDITIONAL 'W' BEAM & GUARDRAIL POSTS ARE REQUIRED.
NOTE
WHERE GUARDRAILING IS STRAIGHT WIDTH MARKERS (STD SIGNS) D4-3B(L) - LHS ROAD & D4-3B(R) - RHS ROAD CAN BE ATTACHED TO END OF GUARDRAILING.

WIDTH MARKER (STD SIGNS) D4-3B(L) - LHS ROAD & D4-3B(R) - RHS ROAD

POST FOOTING (FOR DETAILS REFER TO MRWA DRAWING N° 9548-106)

76x38x2.0 RHS POST

WIDTH MARKER DETAILS
WIDTH MARKER D4-3B(R) - SHOWN 1:20

Width Marker Details
PN30-4109
4.2

MISCELLANEOUS DETAILS
MISCELLANEOUS DETAILS

REFURBISHMENT DESIGN INFORMATION SUMMARY

1. DESIGN IN ACCORDANCE WITH AS 5100 BRIDGE DESIGN CODE 2004.
2. DEAD LOADS AS PER CODE.
3. TRAFFIC LOADS:
   3.1. DESIGN VEHICLES
       T44 = XXX%
       [SM1600] = XXX%
       HLP320 = XXX%
       GROUP 1 VEHICLE 1 = XXX%
       GROUP 1 VEHICLE 2 = XXX%
       GROUP 1 VEHICLE 3 = XXX%
       GROUP 1 VEHICLE 4 = XXX%
   3.2. LOAD RATING DURING LANE RESTRICTIONS
       TYPE OF RESTRICTION: XXXXXXXXXXXXXX
       T44 STANDARD LOADING = XXX%
       HLP320 CONSTRUCTION versus HLP320 CENTRAL (PRE-REFURBISHMENT) = XXX%
       GROUP 2 VEHICLE 5 CONSTRUCTION versus GROUP 2 VEHICLE 5 (PRE-REFURBISHMENT) = XXX%
       HLP320 = XXX%
       GROUP 2 VEHICLE 5 = XXX%
4. BARRIERS:
   AS 5100 XXXX PERFORMANCE LEVEL BARRIERS.

ENGINEER TO PROVIDE ACTUAL DESIGN DATA FOR EACH INDIVIDUAL BRIDGE & DELETE IRRELEVANT INFORMATION.

NOTES:
1. VALUES FOR DESIGN VEHICLES ARE NOT TO EXCEED 100% (E.G. IF DESIGN T44 IS 132% THEN T44 ABOVE TO BE NOTED 100%).
2. TYPE OF RESTRICTION MUST STATE THE CONSTRUCTION CONFIGURATION (E.G. TEMPORARY LANE 3.7m WIDE ADJACENT TO LHS OR RHS KERBI).
3. FOR NON-TIMBER STRUCTURES, LOAD RATING DURING LANE RESTRICTIONS SHALL BE ACTUAL VALUES.
4. FOR TIMBER STRUCTURES, LOAD RATING DURING LANE RESTRICTIONS SHALL NOT EXCEED 100%.

Design Information Summary
(for Bridge Maintenance Projects)
PN30-4202
GENERAL NOTES

1. GENERAL

1.1 ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION AND THE OPERATIONAL SAFETY AND HEALTH ACT 1996.

1.2 NO CHANGES TO DESIGN DETAILS SHALL BE IMPLEMENTED WITHOUT WRITTEN APPROVAL OF THE DESIGN ENGINEER.

1.3 THE BRIDGE SHALL RECEIVE PREVENTATIVE AND PRESERVATION MAINTENANCE IN ACCORDANCE WITH THE SPECIFICATION.

1.4 DIMENSIONS SHALT NOT BE SCALDED FROM THE DRAWINGS.

2. CONCRETE

2.1 CONCRETE SHALL BE CLASS 540 IN ACCORDANCE WITH THE SPECIFICATION.

2.2 CONCRETE SURFACE FINISHES SHALL BE IN ACCORDANCE WITH THE SPECIFICATION.

2.3 ABBREVIATIONS USED:

- "F" FORGED FINISH CLASS F.
- "U" UNFORGED FINISH CLASS U.

3. REINFORCEMENT

3.1 CLEAR COVER TO REINFORCEMENT SHALL BE 40 mm UNLESS OTHERWISE SHOWN.

3.2 BAR LAP LENGTH SHALL BE A MINIMUM OF 40D AND A MAXIMUM OF 40D-100 UNLESS OTHERWISE SHOWN.

3.3 FABRIC OVERLAY SHALL BE A MINIMUM OF TWO CROSSES WIRES ON BOTH SHEETS UNLESS OTHERWISE SHOWN.

3.4 ABBREVIATIONS USED:

- "N" NEAR FACE
- "F" FAIR FACE
- "T" TOP
- "B" BOTTOM
- "E" EQUALLY SPACED

3.5 REINFORCEMENT SHALL CONFORM TO:

- N - 500 MPa, ABSB 4671
- F - 500 MPa, REINFORCING BARS TO AS/NAZ 4671
- R - 250 MPa, PLAIN BARS TO AS/NAZ 4671

4. STEELWORK

4.1 ALL WELDING SHALL BE STRUCTURAL PURPOSE IN ACCORDANCE WITH AS/NZS 1554 AND THE SPECIFICATION.

4.2 ALL BOLTS AND THREAD RODS SHALL BE SUPPLIED WITH NUTS & WASHERS. HEAT TREATED GRADE 8 BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH AS/NZS 1554. ALL OTHER BOLTS AND WASHERS SHALL BE COMMERCIAL GRADE 4.6 IN ACCORDANCE WITH AS 1710 AND AS 1712.

4.3 ALL THREAD RODS SHALL BE DIAMETER 20 UNLESS OTHERWISE SHOWN AND SHALL BE GRADE 80 IN ACCORDANCE WITH AS/NZS 3687.

4.4 AFTER FABRICATION, STEELWORK SHALL BE HOT-DIP GALVANISED AS FOLLOWS:

- "B" BOLTS, NUTS, WASHERS, SPARKS AND THREAD RODS INCREASED AS NECESSARY. AFTER GALVANISING ALL THREAD COMPONENTS SHALL BE ABLE TO BE ASSEMBLED BY HAND.

4.5 ALL OTHER STEELWORK IN ACCORDANCE WITH AS/NZS 4600.

4.6 DAMAGED GALVANISING SHALL BE TREATED WITH A SUITABLE COLD GALVANISING PROCESS IN ACCORDANCE WITH THE SPECIFICATION, EXCEPT WHERE EMERGED IN CONCRETE OR MORE THAN 50%.

4.7 UNLESS OTHERWISE SPECIFIED ALL STRUCTURAL STEEL SECTIONS SHALL BE MINIMUM GRADE 350 IN ACCORDANCE WITH AS/NZS 3670.

4.8 ALL STRUCTURAL STEEL HOLLOW SECTIONS SHALL BE MINIMUM GRADE 350 IN ACCORDANCE WITH AS 1653.

4.9 ALL STRUCTURAL STEEL PLATE SHALL BE MINIMUM GRADE 250 IN ACCORDANCE WITH AS/NZS 3678.

4.10 ALL STRUCTURAL STEEL PLATE (PERMISSIBLE BAND) SHALL BE MINIMUM GRADE 300 IN ACCORDANCE WITH AS/NZS 3670.

4.11 FABRICATION SHALL COMPLY WITH THE REQUIREMENTS OF AS 4100 SECTION 14 & 15 STEEL STRUCTURES.

5. TIMBERWORK

5.1 ALL NEW BOLTS THROUGH TIMBER ELEMENTS SHALL BE COATED WITH DENDAPASTE AND ALL EXPOSED THREADS AND NUTS SHALL BE COATED WITH DENDAPASTE FOLLOWING TIGHTENING OF NUTS IN ACCORDANCE WITH THE SPECIFICATION.

6. EMBANKMENT FORMATION (WHERE EMBANKMENT IS REQUIRED)

6.1 FORMATION EMBANKMENT WHERE REQUIRED SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATION.

6.2 THE FACE OF EXISTING EMBANKMENT SHALL BE SLOPED.

6.3 THE FILL SHALL BE COMPACTED IN LAYERS AND FINAL BATTERS COMPLIED TO SPECIFIED TOLERANCES.

6.4 THE MINIMUM LEVEL OF COMPACTION SHALL NOT BE LESS THAN THAT GIVEN IN THE SPECIFICATION.

7. TRAFFIC MANAGEMENT

7.1 CONCRETE OVERLAY WORKS SHALL BE CONSTRUCTED IN TWO HALVES WITH THE OVERLAY OPEN TO TRAFFIC AT ALL TIMES.

7.2 THE CONTRACTOR SHALL ENSURE THAT THE TRAFFIC MANAGEMENT PLAN ALLOWS FOR SPEED RESTRICTIONS TO ENFORCE A MAXIMUM SPEED OF 120 KPH.

GENERAL MAINTENANCE

1. WHERE THE EXTENT OF DETERIORATION OF STRUCTURAL ELEMENTS IS FOUND ON SITE TO DIFFER FROM THE SCOPE SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL ADVISE THE SUPERINTENDENT'S REPRESENTATIVE IMMEDIATELY, 30 THAT THE CONTRACTOR CAN BE ADVISED OF ANY ADDITIONAL WORK REQUIRED TO BE CARRIED OUT.

2. GENERAL MAINTENANCE SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION AND FOR EXTENT OF WORK REFLECT TO THE "PREVENTATIVE MAINTENANCE WORK PLAN" ON DRAWING M300-36-300.

3. ALL BOLTED AND THREADED ROD CONNECTIONS NOT COVERED BY CLAUSE 190.1, SHALL BE TIGHTENED AND TREATED IN ACCORDANCE WITH CLAUSES 190.3 & 190.5. WHEN FASTENERS HAVE TYPED INTO THE THREAD AND CANNOT BE LOOSENED, FASTENER REPLACEMENT SHALL BE PERMITTED TO IN ACCORDANCE WITH CLAUSE 190.5.

4. ALL HOLES WITHOUT BOLTS IN EXISTING TIMBER ELEMENTS WITHIN 15MM OF GROUND LINE OR WATERLINE, SHALL BE FILLED WITH CONCRETE OR OTHER MATERIALS AS COUPLING TO IMPROVE FLEXURAL STRENGTH.

5. THE END OF ALL NEWLY CUT SURFACES OF EXISTING TIMBER, SHALL RECEIVE END GRAIN TREATMENT IN ACCORDANCE WITH THE SPECIFICATION.

6. INSTALL A NEW BRIDGE WIDTH MARKERS.

7. EXISTING ROAD MARKINGS TO BE REPLACED ON PROPOSED BRIDGE WORKS WITH PATCHING MARKINGS REFER TO SPECIFICATION.

8. INSTALL NEW SCUPPER FLASHINGS TO ALL EXISTING SCUPPERS, FOR DETAILS OF SCUPPER FLASHING REFER TO DRAWING M300-36-300.

9. INSTALL NEW SCUPPER FLASHINGS TO ALL EXISTING SCUPPERS, FOR DETAILS OF SCUPPER FLASHING REFER TO DRAWING M300-36-300.

10. INSTALL NEW SCUPPER FLASHINGS TO ALL EXISTING SCUPPERS, FOR DETAILS OF SCUPPER FLASHING REFER TO DRAWING M300-36-300.

11. INSTALL NEW SCUPPER FLASHINGS TO ALL EXISTING SCUPPERS, FOR DETAILS OF SCUPPER FLASHING REFER TO DRAWING M300-36-300.

12. INSTALL NEW SCUPPER FLASHINGS TO ALL EXISTING SCUPPERS, FOR DETAILS OF SCUPPER FLASHING REFER TO DRAWING M300-36-300.
### MISCELLANEOUS DETAILS

<table>
<thead>
<tr>
<th>CLAUSE NUMBER</th>
<th>DESCRIPTION</th>
<th>REFERENCE ACTIVITY CODE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>850.28</td>
<td>PILES NOTED IN TABLE</td>
<td>021</td>
</tr>
<tr>
<td>850.29</td>
<td>STRINGERS AND CORBELS NOTED IN TABLE</td>
<td>022</td>
</tr>
<tr>
<td>850.30</td>
<td>ALL NEW AND REPLACEMENT BOLTS AND THREADERD RODS</td>
<td>012</td>
</tr>
<tr>
<td>850.34</td>
<td>ALL EXISTING BOLTS AND FASTENERS</td>
<td>012</td>
</tr>
<tr>
<td>850.35</td>
<td>ALL EXISTING WALINGS AND BRACING</td>
<td>-</td>
</tr>
<tr>
<td>850.41.07</td>
<td>ALL TIMBER DECK PLANKS</td>
<td>014</td>
</tr>
<tr>
<td>850.93.01</td>
<td>ALL EXPOSED TIMBER END GRAIN AND ALL NEWLY CUT SURFACES OF EXISTING TIMBER</td>
<td>011</td>
</tr>
<tr>
<td>850.93.02</td>
<td>ALL OUTSIDE TIMBER STRINGERS</td>
<td>016</td>
</tr>
<tr>
<td>850.93.03</td>
<td>ALL INTERNAL STRINGERS</td>
<td>015</td>
</tr>
<tr>
<td>850.93.04</td>
<td>ALL PILES AT GROUND LINE OR 1.0m ABOVE WATER LINE</td>
<td>013</td>
</tr>
<tr>
<td>850.93.05</td>
<td>ALL BEDLOSS AND BEARERS</td>
<td>018</td>
</tr>
<tr>
<td>850.93.06</td>
<td>ALL HALF Caps</td>
<td>-</td>
</tr>
<tr>
<td>850.93.07</td>
<td>EXISTING DECK DRAINAGE</td>
<td>032</td>
</tr>
<tr>
<td>850.93.08</td>
<td>CONTROL AREA AS SPECIFIED</td>
<td>034</td>
</tr>
<tr>
<td>850.93.09</td>
<td>TREAT ENTRE BRIDGE STRUCTURE</td>
<td>042</td>
</tr>
<tr>
<td>850.43</td>
<td>CLEAN-UP AT COMPLETION OF WORKS</td>
<td>-</td>
</tr>
<tr>
<td>850.93.11</td>
<td>ALL TIMBER HANDRAILS</td>
<td>031</td>
</tr>
</tbody>
</table>

* ACTIVITY CODE NUMBERS REFER TO THE ACTIVITIES LISTED IN THE MRWA TIMBER BRIDGE PREVENTATIVE MAINTENANCE STANDARDS DOCUMENT No. 6704/02/2226 WHICH IS AVAILABLE "FOR INFORMATION ONLY".

### PREVENTATIVE MAINTENANCE WORK TABLE

**Preventative Maintenance Work Table**

**PN30-4204**
MISCELLANEOUS DETAILS

LEGEND

○ PILE TO BE BANDED/MULTIBANDED
XX30-XXXX

● PIER PILE REPAIR DETAIL - TYPE 1
XX30-XXXX

● PIER PILE REPAIR DETAIL - TYPE 2
XX30-XXXX

● PIER PILE REPAIR DETAIL - TYPE 3
XX30-XXXX

● PIER PILE REPAIR DETAIL - TYPE 4
XX30-XXXX

● PIER PILE REPAIR DETAIL - TYPE 5
XX30-XXXX

● PIER PILE STRENGTHENING DETAILS
XX30-XXXX

■ ABUTMENT PILE REPAIR DETAIL - TYPE 1
XX30-XXXX

◆ ABUTMENT PILE REPAIR DETAIL - TYPE 2
XX30-XXXX

▲ WINGWALL PILE REPAIR DETAIL - TYPE 1
XX30-XXXX

◆ WINGWALL PILE REPAIR DETAIL - TYPE 2
XX30-XXXX

▲ WINGWALL PILE REPAIR DETAIL - TYPE 3
XX30-XXXX

▌ PROPOSED DRIVEN STEEL PILE
XX30-XXXX

▌ ABUTMENT/WINGWALL SHEETING REPAIR DETAIL
XX30-XXXX

▌ ABUTMENT/WINGWALL SHEETING REPAIR DETAIL
XX30-XXXX

▌ ABUTMENT/WINGWALL SCOUR REPAIR DETAIL
XX30-XXXX

▌ ROCK PROTECTION
XX30-XXXX

Legend (for Bridge Maintenance Projects)
PN30-4205
MISCELLANEOUS DETAILS

DIMENSION X SHALL BE DETERMINED BY ENGINEER

Φ900 SEMICIRCLE GRouted ROCK PROTECTION TOE OF BATTER

SPOON DRAIN (TYP)

TRAFFIC BARRIER POST (TYP)

150 WIDE INSITU KERB PROFILED TO SUIT BRIDGE KERB (TYP)

PART PLAN
1:100

DIMENSION XX SHALL BE:
1. 1000 MIN. FROM END OF WINGWALL OR
2. AS ADVISED BY ENGINEER.

125 * (INSITU OPTION)

225 x 600 CONCRETE SURFACE DRAIN (BY GALVINS OR SIMILAR APPROVED) OR * APPROVED INSITU CONSTRUCTION.

SECTION A
1:20

* APPROVED INSITU CONSTRUCTION OF A MASS CONCRETE DRAIN REQUIRES REINFORCING (MINIMUM REINF SL41 FABRIC WITH 50 MINIMUM COVER TOP AND BOTTOM) SL81 OFFCUTS CAN BE USED. LAP MESH AS REQUIRED.

Spoon Drain Detail
PN30-4206
Example Drawing – Approach Slab Plan & Details
(for Bridge Maintenance Projects)

PN30-4207
Example Drawing – Expansion Joint Details
(for Bridge Maintenance Projects)
PN30-4208
Example Drawing – Expansion Joint Details – 8200 width
between kerbs (for Bridge Maintenance Projects)
PN30-4209
SOUTH WEST REGION

BRIDGE REFURBISHMENT

BRIDGE No 493
OVER PERUP RIVER
MANJIMUP - MT. BARKER ROAD M24 - (SLK 32.27)
SHIRE OF MANJIMUP

DRAWINGS

REDUCED DRAWINGS
NOT TO BE SCALLED

ONLY ONE COPY WITH
THIS HEADING IS
REQUIRED

AS CONSTRUCTED
COPY
## MISCELLANEOUS DETAILS

### DESIGNER’S O.S.H. RISK ASSESSMENT REPORT

<table>
<thead>
<tr>
<th>Bridge No.</th>
<th>Designer :-</th>
<th>Date :-</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Activity</strong></td>
<td><strong>Designer Identified Hazard</strong></td>
<td><strong>Likelihood Level</strong></td>
</tr>
<tr>
<td>Structural Repairs &amp; alterations requiring temporary support</td>
<td>Instability &amp; possible collapse</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

1. The Designer is required by regulations relating to the National Standard for Construction Work to provide a “Designer’s OSH Report” to the Client (MRWA).

2. Structures Engineering considers that for the work described in the Practice Notes, when undertaken by a pre-qualified and experienced Contractor in conjunction with the relevant Specifications, the Residual Risk is acceptable and will be addressed by the Contractor’s OSH management systems and no additional Report is required.

3. Should the Practice Notes be altered to suit a particular project, then the Designer who has made the alteration is responsible for preparing a design report as per note 1.

4. In preparing the Report the Designer may assume that the Contractor is an experienced builder, unless it is known to the contrary, and **identify those hazards that maybe of a non-standard nature, unusual, specific to the design or otherwise noteworthy.**

5. The Designer should also refer to Structures Engineering’s “Bridge Branch Design Information Manual” – Section 18 – Preparation of Design Report (Occupational Safety and Health) for guidance.

### Example: Designer’s O.S.H. Risk Assessment Report (for Bridge Maintenance Projects)

PN30-4213