SOUTH HOLLAND DISTRICT COUNCIL

Application no: H16/0092/92

Applicant: Dept. of Highways & Planning
Lincolnshire County Council
4th Floor, City Hall
Beaumont Fee
Lincoln LN1 1DN

Agent: Engineering Consult. Servi
Unit 16, Witham Park
Waterside South
Lincoln

Description: Demolish extg. bridge & construct new single span reinforced concrete bridge on piled abutments

Location: Horseshoe Bridge
Horseshoe Road (Over South Drove Drain)
Spalding Lincs

Type: COUNTY COUNCIL

Date received: 23-JAN-92

29-APR-92

Dear Sir/Madam

TOWN AND COUNTRY PLANNING ACT 1990

ACKNOWLEDGEMENT OF WITHDRAWAL

Following your withdrawal of the above application, I confirm that no further action will be taken.

Yours faithfully

Director of Planning and Building Control Services

BRIAN SMITH Dip TP MRTPI Director of Planning & Building Control Services

Planning & Building Control Department, Council Offices, Priory Road, Spalding, Lincolnshire. PE11 2XE (Tel: 0775 761161)

DEPARTMENT OF HIGHWAYS AND PLANNING LBC

APPLICATION FOR LISTED BUILDING CONSENT

Town and Country Planning Act 1990
Town and Country Planning General Regulations 1976
Planning (Listed Buildings and Conservation Areas) Act 1990

Four completed copies of this form and plans should be sent to the Chief Executive

	For official use only
Application No.	H16/0092/92
Date Received	23 JAN 1992
Grid Reference	

PART 1 - to be completed by or on behalf of all applicants as far as applicable to the particular proposal

1. **Applicant** (complete details below in block capitals) **Agent** (if any) to whom correspondence should be sent (complete details below in block capitals)

Name DEPT. OF HIGHWAYS + PLANNING LINCS. COUNTY COUNCIL
Address 4TH FLOOR, CITY HALL, BEAUMONT FEE, LINCOLN LN1 1DN
Tel. No .....

Name ENGINEERING CONSULTANCY SERVICE
Address UNIT 16, WITHAM PARK, WATERSIDE SOUTH, LINCOLN
Tel. No (0522) 552923

2. **Particulars of proposal for which Listed Building Consent is sought.**

(a) Full address or location of the building(s) to which the application relates
HORSESHOE BRIDGE, HORSESHOE ROAD OVER SOUTH DROVE DRAIN, SPALDING, LINCS, GRID REF: TF 218 211

(b) Applicant's interest, eg owner, tenant, prospective purchaser
OWNER

(c) Status of building(s) eg Listed Grade I/Grade II/ Grade II*
GRADE II

(d) Particulars of proposed works
DEMOLISH EXISTING BRIDGE AND CONSTRUCT A NEW SINGLE SPAN REINFORCED CONCRETE BRIDGE ON PILED ABUTMENTS.

(e) List of drawings and plans submitted with the application which should include photographs, a location plan 1:2500 scale and a block plan 1:500 scale.
a) LOCATION PLAN
b) EXISTING ELEVATION
c) PROPOSED ELEVATION

3. **Particulars of application**

State whether this application is for:-

	State Yes or No	
(a) Demolition of a Listed Building	YES	If 'Yes' and redevelopment is proposed has planning permission been: *applied for/granted N/A If so, state date and number of application/permission
(b) Extension of a Listed Building	NO	
(c) Alterations to a Listed Building	NO	If 'Yes' the proposed works may require planning permission. Has any necessary permission been: *applied for/granted If so, state date and number of application/permission

PART 2

Application is hereby made for listed building consent to carry out the works described herein and on the attached plans.

I have completed the relevant certificate.

Signed ... C.N. Besley ... C.N. BESLEY

* On behalf of LINCOLNSHIRE COUNTY COUNCIL
(Insert applicant's name if signed by an agent)

Date ..... 13/1/92 ..... A.T. Hey

* Delete if not applicable

Note An appropriate certificate must accompany this application. The following certificate will be appropriate if you are the sole owner of the building(s). Only one copy need be completed. Certificates B, C or D can be obtained from your Council Offices.

Certificate under Section 11 of the Planning (Listed Buildings and Conservation Areas) Act 1990

Certificate A

I hereby certify that:-

1. No person other than ~~myself~~ the applicant was an owner (a) of any part of the building(s) to which the ~~appeal~~ *application relates at ~~the appellant~~ the beginning of the period of 20 days before the ~~date of the accompanying appeal~~ *application

Signed ..... C.N. Besley .....

* On behalf of LINCS C.C.
(Insert applicant's name if signed by an agent)

Date ..... 13/1/92 ..... A.T. Hey

* Delete whichever is not applicable

(a) Owner means a person having a freehold interest or a leasehold interest the unexpired term of which was not less than seven years.

ADDITIONAL INFORMATION

SEE ATTACHED SHEETS

YOUR APPLICATION CANNOT BE CONSIDERED UNLESS YOU HAVE SIGNED PART 2 OF THIS FORM AND COMPLETED AND SIGNED AN APPROPRIATE CERTIFICATE

PART 2

Application is hereby made for listed building consent to carry out the works described herein and on the attached plans.

I have completed the relevant certificate.

Signed ...C.N.Besley... C.N. BESLEY

* On behalf of LINCOLNSHIRE COUNTY COUNCIL
(Insert applicant's name if signed by an agent)

Date ...13/1/92... A.T. Hey

* Delete if not applicable

Note An appropriate certificate must accompany this application. The following certificate will be appropriate if you are the sole owner of the building(s). Only one copy need be completed. Certificates B, C or D can be obtained from your Council Offices.

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Certificate A

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1. No person other than ~~myself~~ the applicant was an owner (a) of any part of the building(s) to which the ~~appeal~~ *application relates at ~~the appellant~~ *application the beginning of the period of 20 days before the date of the accompanying appeal

Signed ...C.N.Besley...

* On behalf of LINCS C.C.
(Insert applicant's name if signed by an agent)

Date ...13/1/92... A.T. Hey

* Delete whichever is not applicable

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ADDITIONAL INFORMATION

SEE ATTACHED SHEETS

YOUR APPLICATION CANNOT BE CONSIDERED UNLESS YOU HAVE SIGNED PART 2 OF THIS FORM AND COMPLETED AND SIGNED AN APPROPRIATE CERTIFICATE

ADMIN RECORD SHEET

INITIAL

Submitted Fee £ NIL

Receipt Issued ..... No. .....

Date First Received 23 JAN 1992

REGISTRATION

REFERENCE H16/0092/92

Cross-Ref ...../.....

Date 24/1/92

VALIDATION Date 24/1/92

Type ~~LBC~~ D COUNTY COUNCIL Earliest permission date (Cert B) .....

Site area ..... No. of dwellings ..... Floorspace .....

New build/site enlargement/redevelopment/change of use/extension/alteration demolition

Earlier permission ref .....

BM:-	Siting	Design	Ext app	Access	Lands
Previous					
Current					

Description

Technical: Certificate ☐ Site plans ☐ Description ☐ Accuracy ☐ Incomplete form ☐

S65 Advert required ☐ Expiry date .....

Fees: Nil fee – previous app ☐ – type ☐ Discounted fee ☐ Ref ..... Reason .....

Correct fee £ NIL Additional £ ..... Receipt no. .....

Refund £ ..... Issued .....

CONSTRAINTS Date 23.1.

Index Sheets [illegible] OS Nos ..... Grid Ref 5 [illegible] 3 [illegible]

Ward [illegible] Parish [illegible]

Inside IBD NO Inside LP Area NO

TR Rural ☐ TR Bypass ✓ Level crossing ✓ Footpath ☐

CA ☐ LB ☐ TPO ☐ Other: Grade

Linked to site.....Ref..... Linked to property.....Ref.....

Planning Records:
Earlier apps

B Reg Records:
Already submitted Ref.....
Requested .....

Inputs completed.....

Check formalize when on site

APPLICATION ASSESSMENT

Notes for Case Officer

Site Notes: Accuracy | Neighbours | Other

Boundaries | Site Features

Inspected by:
date:

Residents notified on site visit:

Case Officer Conclusions (issues)

Case Officer Recommendations (summary).
(details overleaf)

Delegation
Recommended approvals — | Confirmed by Case Officer:

Departure from policy — Yes ____ | No ____

Ward member request — Yes ____ | No ____

Recommend approval against material objection — Yes ____ | No ____

Any objection received? No
If yes, is any obj. material? No
Yes | No

[Reason:

Other circumstances needing Committee decision — Yes ____ | No ____

Flagged by Senior Officer
Signed ____

[Reason:

ALL OF ABOVE

Recommended refusals —

Refusal on adopted policy grounds on first applic. — No ____ | Yes ____

Nil fees (not first Submission)

Other info. viz.
Signed ____

ANY ONE OF ABOVE

Committee report
Sub-Committee:
SV recommended ____
Est/Tpd. recommended ____

Delegation confirmed by Senior Officer
____

Recommendation/draft report produced ____ Amended/confirmed ____

FURTHER INFORMATION/CONSULTATIONS

APPLICATION REF:

DIRECTIONS

Art 7 (Outlines)

RM :

	Siting	Design	Ext App	Access	Lands
Previous					
Current					
Required					

Reg 4 (or equiv) Scale drawing ..... Highway S/W ..... Agric appraisal .....

Precise details, for non-standard requirement:

See NRM when file returned to PM

CONSULTATION/PUBLICITY REQUIRED

Publicity : General PM 3-2-92
Departure
Setting of LB Viz

Consults : Dept of Transport
Env Health
Conservation consults : Local
Local & National
English Heritage LBC I, II*
Setting I, II*
Major CA

Consultant : Name
Order No:

Other :

REVALIDATION

Information satisfactory/unsatisfactory

Further direction - details:

Amended description:

Reconsultations required -
Parish Council
Ward Members
Residents
Advertise
Other

New valid date .....

Re-Registered .....
Ack/Reception/Filesheet .....
Consultation .....

BRIAN SMITH Dip TP MRTPI District Planning Officer

Planning Department
Council Offices,
Priory Road, Spalding,
Lincolnshire. PE11 2XE
Telephone: (0775) 761161

SOUTH HOLLAND DISTRICT COUNCIL

Application no: H16/0092/92

Type: COUNTY COUNCIL

Applicant: Dept. of Highways & Planning
Tel:

Agent: Engineering Consult. Service
0522 552923

Description: Demolish extg. bridge & construct new single span reinforced concrete bridge on piled abutments

Location: Horseshoe Bridge
Horseshoe Road (Over South Drove Drain)
Spalding Lincs

Valid date: 23-JAN-92
Target dates:
To case officer 28-JAN-92
Inspected by 02-FEB-92
Extra contacts 07-FEB-92
Report if not clear by 13-FEB-92

Terminal date: ~~20~~ 19-MAR-92-FEB-92
Target Committee: 03-MAR-92
Report deadline: 18-FEB-92

Case Officer:
P J UDY

DEVELOPMENT/CONSTRAINTS

Size:
Category: Redevelopment
Listed building: GRADE II
Conservation Area:

CONSULTATIONS CARRIED OUT

		Sent	Expiry
Cllr C F Fisher	0775 725983	31-JAN-92	14-FEB-92
Cllr Mrs A M Newton	0775 762210	31-JAN-92	14-FEB-92
Cllr R C West	0775 760231 (Of	31-JAN-92	14-FEB-92
Site/Press Advert LBC		04-FEB-92	25-FEB-92

L.C.C – Obs direct to L.C.C [illegible] 5/3/92

Land and Buildings Consultancy

A Professional Consultancy of Lincolnshire County Council

Estate Management Land Agency
Design & Building Services

County Offices, Newland, Lincoln LN1 1ZA
Telephone (0522) 552222 Fax Lincoln (0522) 552611

L&BC

Keith Stevens
Dipl Arch RIBA
General Manager

When calling please ask for

MRS H WILCOCK
Direct Line (0522) 552646

Planning Department
South Holland District Council
Priory Road
Spalding
LINCS

MY REF: 171/HW/SJW

27 January 1992

Dear Sir

PROPOSED DEVELOPMENT AT HORSESHOE ROAD, SPALDING

I attach, herewith, a copy of a Notice relating to proposed development at Horseshoe Road, Spalding, which will be published in the Spalding Guardian on 31 January 1992 and posted on and in the vicinity of the site during the period 31 January 1992-14 February 1992 inclusive. It would be appreciated if the proposal for Deemed Planning Permission and all plans and other documents relating thereto could be available for inspection at your offices until 21 February 1992.

Yours faithfully

H. Wilcock

for General Manager

S.H.D.C. PLANNING DEPT.
RECEIVED
29 JAN 1992

A. M. Hey FRICS
Head of Practice
Estate Services

J. D. Trafford FRICS
Head of Practice
Design Services

J. L. Wilcox BSc CEng MIEE MCIBSE
Head of Practice
Building Services

S. J. Parkinson MAAT
Business Manager

PLANNING (LISTED BUILDINGS AND CONSERVATION AREAS) ACT 1990
PLANNING (LISTED BUILDINGS AND CONSERVATION AREAS)
REGULATIONS 1990

NOTICE UNDER REGULATION 13 of the Planning (Listed Buildings and Conservation Areas) Regulations 1990 in respect of the proposed demolition of Horseshoe Bridge, a Grade II listed Building at Horseshoe Road, Spalding. It is also proposed to construct a replacement single span reinforced concrete bridge on piled abutments.

NOTICE IS HEREBY GIVEN that the Lincolnshire County Council propose to apply to the Secretary of State for the Environment for Listed Building Consent to demolish the existing bridge.

A copy of the application for Listed Building Consent and of all plans and other documents relating thereto may be inspected by members of the public either at the Department of Highways and Planning, City Hall (Fourth Floor), Beaumont Fee, Lincoln or at the Planning Department, South Holland District Council, Priory Road, Spalding at all reasonable hours until 21 February 1991.

Any person who wishes to object to the application should do so in writing, by the above date, to the County Council addressed to the Director of Highways and Planning, City Hall (Fourth Floor), Beaumont Fee, Lincoln,
LN1 1DN.

J EMMERSON
Director of Highways and Planning

31 January 1992

SCHEDULE

SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF ..0092/92..

The following building shall be added:-

SPALDING

TF 22 SW **HORSESHOE BRIDGE**

4/232

II

Road bridge over South Drove Drain. 1910-12. Designed by L.G. Mouchel and Partners (Civil Engineers) for the Deeping Fen Trustees. Using Ferro-Concrete construction (Hennebique System). Reinforced concrete. A simple span bridge supported on straight sided abutments. 45 foot span. Concrete parapets with 10 panel central section flanked by coped piers with single shallow panels, then further panels on either side finished with smaller coped piers also with shallow panels. Designed to carry a test load of 210lbs per Sq Ft.

Dated:- 28th August 1991.

Signed by authority of the
Secretary of State

Paul J Heron

P. J. HERON
A Senior Executive Officer in the
Department of the Environment

Lincolnshire County Council

Director of Highways and Planning
J Emmerson BSc MSc PhD CEng FICE

4th Floor
City Hall
Beaumont Fee
Lincoln
LN1 1DN

Telephone Lincoln 552222 STD 0522

For further information contact

Mr D Gregory
Telephone
Lincoln 553130

My Ref: SMD/H.16/91/LBC/JS

21 January 1992

Mr B Smith
South Holland District Council
Technical Services Department
Council Offices
Priory Road
SPALDING
Lincs
PE11 2XE

S.H.D.C. PLANNING DEPT.
RECEIVED
23 JAN 1992
Acknowledge YES/NO

Dear Sir

APPLICATION TO THE SECRETARY OF STATE FOR THE ENVIRONMENT FOR LISTED BUILDING CONSENT

TO DEMOLISH EXISTING BRIDGE AND CONSTRUCT A NEW SINGLE SPAN REINFORCED CONCRETE BRIDGE ON PILED ABUTMENTS
AT HORSESHOE BRIDGE, HORSESHOE ROAD, OVER SOUTH DROVE DRAIN, SPALDING

I enclose for your attention a copy of the above application by this Council.

Would you please let me have a planning reference number and your Council's observations as soon as possible for eventual transmission to the Secretary of State.

Please note that I have consulted the following:

Ancient Monuments Society
Council for British Archaeology
Society for the Protection of Ancient Buildings
The Georgian Group
The Victorian Society
Royal Commission on Historical Monuments

The application will be publicised by site notice and press insertion pursuant to Section 67 of the Town and Country Planning Act 1990.

Should you wish to discuss any aspects of this case with my staff, perhaps you would contact Mr Gregory on Lincoln 553130.

Yours faithfully

Director of Highways and Planning

SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF 0092/92

SCHEDULE

SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF 0092/192

The following building shall be added:-

SPALDING

TF 22 SW **HORSESHOE BRIDGE**

4/232

II

Road bridge over South Drove Drain. 1910-12. Designed by L.G. Mouchel and Partners (Civil Engineers) for the Deeping Fen Trustees. Using Ferro-Concrete construction (Hennebique System). Reinforced concrete. A simple span bridge supported on straight sided abutments. 45 foot span. Concrete parapets with 10 panel central section flanked by coped piers with single shallow panels, then further panels on either side finished with smaller coped piers also with shallow panels. Designed to carry a test load of 210lbs per Sq Ft.

Dated:- 28th August 1991.

Signed by authority of the Secretary of State

Paul J Heron

P. J. HERON
A Senior Executive Officer in the Department of the Environment

SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF 0092/92

HORSESHOE BRIDGE, SPALDING

REASONS FOR NEW BRIDGE

1. At the request of the Department of Transport, Lincolnshire County Council as Highway Authority has embarked on a programme of assessment of all older highway bridges. The objective is to strengthen or replace those found to be deficient in advance of the introduction of 40 tonne lorries to Britain's roads in 1999. A restriction of 12 tons was imposed on Horseshoe Bridge in the early 1970s. A recent assessment to current standards has demonstrated that a 3.5 tonne restriction should now be applied. Construction of a new bridge will remove this restriction and allow the passage of all permitted construction and use vehicles.

2. Existing parapets are made of solid reinforced concrete resulting in dangerously poor visibility at intersections either end of the bridge.

3. These parapets form part of the main structural bridge members and hence cannot be replaced by steel or aluminium parapets which would provide good visibility.

4. The existing footways are less than 0.5m wide and are hence sub-standard.

5. Long term maintenance of the bridge would also be avoided.

POSSIBLE ALTERNATIVES

1. Alternative route - 4 Km.

2. Replacement bridge alongside existing

   i) Transition curves not possible as roadway would be too close to existing residences (one on either side of bridge).

   ii) "Mini" roundabouts at each end of bridge not possible as approach road cannot be reduced to a 30 mph speed limit.

   iii) "Normal" (60 mph approach) roundabouts with associated roadworks would be prohibitively expensive - estimated at three times the cost of the bridge works alone.

3. Strengthen existing bridge

   i) Could be done with steel beams, but problems with the abutments - not designed for the higher loads required.

   ii) Installation of new steelwork would be difficult especially at the abutments.

   iii) Steel plate bonding could be used to increase the capacity of the existing reinforced concrete beams, however the weight restriction would only increase to 7.5 tonnes, far less than the required limit.

FURTHER PROBLEMS

1. Existing parapets are not adequate for safety criterion. Therefore need to

24 DEC 1991
HIGHWAYS AND PLANNING

provide new safety fencing which cannot comply with BE5 regarding length of approach and departure on either side of bridge due to intersections. Only solution would be sub-standard anchorage with bollards.

2. Minimum clearance from safety fencing to bridge parapet is 750mm with a further minimum of 600mm to the edge of the carriageway (assuming a new line of kerbing is installed). This would then leave a carriageway width of 6.2 - 2x (.75 + .6) = 3.5m i.e. only 1 lane of traffic can use the bridge i.e. traffic signals would be required at either end of the bridge.

3. Posts for new safety fencing would have to be bolted to the existing structure with possible structural problems as post centres do not match existing beam centres.

BR. . SMITH Dip TP MRTPI
Director of Planning & Building Control Services
Planning & Building Control Department,
Council Offices,
Priory Road, Spalding,
Lincolnshire. PE11 2XE

Telephone: (0775) 761161
Fax: (0775) 710772

SOUTH HOLLAND DISTRICT COUNCIL

Application no: H16/0092/92

Applicant: Dept. of Highways & Planning
Lincolnshire County Council
4th Floor, City Hall
Beaumont Fee
Lincoln LN1 1DN

Agent: Engineering Consult. Servi
Unit 16, Witham Park
Waterside South
Lincoln

Description: Demolish extg. bridge & construct new single span reinforced concrete bridge on piled abutments
Location: Horseshoe Bridge Horseshoe Road (Over South Drove Drain) Spalding Lincs

Type: COUNTY COUNCIL

07-MAY-92

Dear Sir/Madam,

PLANNING APPLICATION

You wrote to the Council concerning the above proposal, and I can now advise you that the application has been withdrawn and no further action will therefore be taken on it. Thank you for your interest.

Yours faithfully
B SMITH
Director of Planning and Building Control Services

Mr B M J Barton
Institute of Civil Engineers
15 Swinstead Road
Corby Glen
Grantham, Lincs. NG33 4NU

c/ P Rawding
Three Ways
South Drove
Spalding Common
Spalding
Lincs.

THE INSTITUTION OF CIVIL ENGINEERS

GREAT GEORGE STREET · WESTMINSTER SW1P 3AA

TELEPHONE: 01-222 7722

TELEX:935637 ICEAS G
FAX: 01-222 7500

Secretary: J.C. McKenzie MA MAI MSc FEng FICE

THE PANEL FOR HISTORICAL ENGINEERING WORKS

Please reply to: 15 Swinstead Road,
Corby Glen,
Grantham,
Lincs. NG33 4NU

B.Smith, Esq.,
Director of Planning,
South Holland District Council,

Thursday, 6th February 1992.

Dear Mr Smith,

Planning Application No. H16/0092/92
Demolition of Horseshoe Bridge, Spalding Common.

Thank you for your letter of 5th February 1992.

I take it that you are aware that Horseshoe Bridge is a listed building? It was listed Grade II by the Department of the Environment on 28th August 1991, their reference HD/5313/274/1-HP452. Are the Department of the Environment aware of the County Council's proposals?

With whom does the final decision on the destruction of a listed building rest?

Yours sincerely,

Barry Barton

B.M.J.Barton, Lincolnshire & S.Humberside Member,
ICE Panel for Historical Engineering Works.

S.H.D.C. PLANNING DEPT.
RECEIVED
10 FEB 1992
Attention of
DPO NRM
DOPO PS
JC ACP
Action by .....
Discuss with .....
Copy to .....
File Nos.
Acknowledge YES/NO
by
date

Home 047 684 763
Work Pelatinge 271 811
out 440

THE INSTITUTION OF CIVIL ENGINEERS

GREAT GEORGE STREET · WESTMINSTER SW1P 3AA

TELEPHONE: 01-222 7722 TELEX:935637 ICEAS G
FAX: 01-222 7500

Secretary: J.C. McKenzie MA MAI MSc FEng FICE

THE PANEL FOR HISTORICAL ENGINEERING WORKS

S.H.D.C. PLANNING DEPT.
RECEIVED
- 5 FEB 1992

Please reply to: 15 Swinstead Road,
Corby Glen,
Grantham, Lincs.
NG33 4NU

Chief Planning Officer,
South Holland District Council,

Monday, 3rd February 1992

Dear Sir,

Planning Application H16/91 - Proposed Demolition of Horseshoe Bridge, Spalding.

I would like formally to object to the proposal by Lincolnshire County Council to demolish Horseshoe Bridge, Spalding, for the following reasons:

1) As far as I am aware, Horseshoe Bridge is the earliest reinforced concrete bridge still extant in Eastern England. The earliest r.c. bridge in Britain was built in the New Forest in 1901 but Horseshoe Bridge must be one of the first r.c. bridges of significant size in the country. (Homersfield Bridge, near Diss, is older but is not a reinforced concrete bridge in the technically accepted sense.)
2) Horseshoe Bridge is a fine and entirely unaltered example of very early r.c. design, exhibiting many features now long obsolete.
3) Although the bridge was built by the Liverpool Ferro-Concrete Construction Co., this company was actually owned by Pattinsons of Sleaford. Horseshoe Bridge therefore pays tribute to Lincolnshire engineering and innovation - the bold initiative of the then Deeping Fen Drainage Trustees in commissioning a r.c. bridge in 1910 should not be overlooked.
4) There is no need whatsoever to demolish this bridge. If it is (as may well be) inadequate for modern traffic loadings, there is plenty of room on the site to construct a new modern bridge alongside the historical one. This would, incidentally, save the County Council the expense of demolition.
5) Within the last ten years or so, LincsC.C. have also demolished Money Bridge, Pinchbeck, the "twin" of Horseshoe Bridge. The subsequent destruction of Horseshoe Bridge would lay Lincolnshire County Council wide open to widespread and entirely justified criticism.

contd...

contd....

I would like to endorse the additional reasons for objection given in the Welland & Deeping IDB's letter of objection addressed to the National Rivers Authority's Northern Area Planning Officer at Lincoln, dated 29/1/92.

I understand that the Society for Lincolnshire History and Archaeology may also be submitting an objection to the County Council's proposals.

Yours Faithfully,

Barry Barton

B.M.J.Barton, Lincs. & S.Humberside Member,
ICE Panel for Historical Engineering Works.

Three Ways
South Drove
Spalding Common
SPALDING
Lincs

19th February 1992

Planning Department
South Holland District Council
Priory Road
SPALDING
Lincs



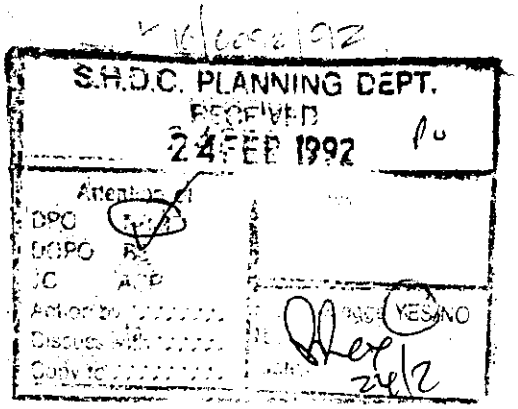
Dear Sir,

I oppose the application to replace Horseshoe Road Bridge on the grounds that it would encourage Juggernauts and other large lorries to take short cuts through the countryside when there is a purposely built bypass available to ensure that they pass the area without delay.

Yours faithfully

P Rawding

P Rawding.



C[illegible]

Three Ways
South Drove
Spalding Common
SPALDING
Lincs

19th February 1992

Mr Quentin Davies M.P.
House of Commons
LONDON
SW1A OAA

Dear Sir

I would like you to know of my objection to the new proposed forty ton bridge at Horseshoe Road, Spalding.

I believe it will encourage Juggernauts and other heavy lorries to take short cuts through the countryside. The lanes to the bridge are not even suitable to carry the size and weight of such traffic. Less than half a mile away there is a purposely built bypass available.

I would appreciate your help and comments.

Yours faithfully

P. Rawding

P Rawding.

S.H.D.C. PLANNING DEPT.
RECEIVED
24 FEB 1992

Attention of	File Nos.
DPO NPM DDPO PS DC ACP	
Action by ..... Discuss with ..... Copy to	Acknowledge YES/NO by date

copy to S.H.D.C

Welland and Deepings
Internal Drainage Board

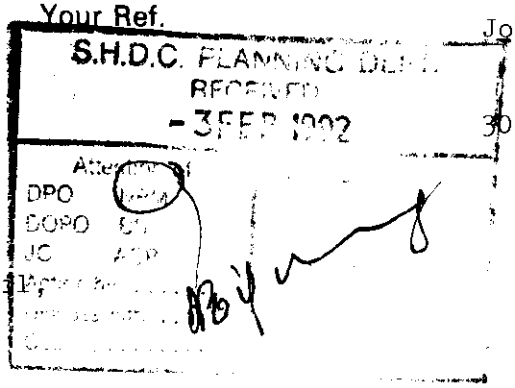
Deeping House,
Welland Terrace,
Spalding, Lincs.
PE11 2TD
Tel: Spalding (0775) 725861
Fax: Spalding (0775) 767689

John Honnor
General Manager

Our Ref. JH/TF
Your Ref.

This matter is being handled by
John Honnor

30th January, 1992



B. Smith,
Director of Planning,
South Holland District Council,
Council Offices,
Priory Road,
Spalding,
Lincs.

Dear Sir,

Ref. No. H16/0092/92
Proposed Demolition and Reconstruction of
Horseshoe Bridge, South Drove Drain, Spalding

I refer to the above planning application and wish to object to the proposals for the following reasons :-

1. Horseshoe Bridge was constructed in 1910 by the Boards predecessors, the Deeping Fen Drainage Trustees, who were pioneers in the use of "ferro-concrete". It is the only bridge of its type surviving locally and perhaps nationally and it is therefore an important part of this Boards heritage and of civil engineering heritage nationally.

2. It has been planned, as a tourist attraction, to produce a drainage heritage trail and the Board are working in conjunction with the South Holland District Council in this respect. Being close to the historical drainage centre of Pode Hole this bridge will feature in the industrial archaeology section.

3. The need for a new bridge is questioned as full capacity road bridges cross the drain 1 km to the north and 2.4 km to the south of Horseshoe Bridge.

4. I am not convinced that the loading capabilities have been fully investigated and suggest that an independant assessment is carried out before a decision is made. I have the original drawings if these are of assistance.

5. The Board and the N.R.A. have a statutory duty under Section 12 of the Land Drainage Act 1991 and Section 16 of the Water Resources Act 1991 to "protect and conserve buildings, sites and objects of archaeological and historical interest.

Yours faithfully,

General Manager.

Anglian Water

Anglian Water
Services Limited

P.O. Box 62
Waterside House
Waterside North
Lincoln LN2 5HA

Telephone 0522 557000
Facsimile 0522 557022

92/92

S.H.D.C. PLANNING DEPT.
RECEIVED
- 1992 PU

District Planning Officer
South Holland District Council
Council Offices, Chatterton Tower
Winfrey Avenue
SPALDING Lincs
PE11 1DB

Our ref SH/920015

Your ref SMD/H.16/91/JS

03-FEB-92

Dear Sir,

Proposal : DEMOLISH EXISTING BRIDGE AND CONSTRUCT SINGLE SPAN BRIDGE
Location : HORSESHOE BRIDGE HORSESHOE ROAD OVER SOUTH DROVE DRAIN
Applicant: LINCOLN COUNTY COUNCIL

With regard to the above-mentioned Application, I would inform you that whilst Anglian Water have no objections to raise in principle to the proposals, I wish to make the following observations.

Your Council as Anglian Water's Agents for sewerage matters should be consulted as to whether any sewers are affected by the proposals.

There is a water main either crossing or adjacent to the site of the proposed development therefore no part of any construction shall be erected within 5 metres of the main and the developer must contact the Customer Services Manager to discuss the matter before work commences. This will ensure that no damage results to the water main.

Yours faithfully,

Les Outram
Principal Engineer
(Development Liaison)

Registered in England No 2366656
Registered Office:
Anglian House Ambury Road
Huntingdon Cambridgeshire PE18 6NZ

B7.

THE INSTITUTION OF CIVIL ENGINEERS 1832

Panel for Historical Engineering Works

1. Type of structure or work Reinforced Concrete Road Bridge. (C24 category T2g1)
   Name HORSESHOE BRIDGE, SPALDING COMMON

2. Location 2 miles SW of Spalding, Lincs. across the South Drove Drain.

3. Name and address of Local Authority
   South Holland District Council,
   Council Offices, Chatterton Tower,
   Winfrey Avenue, Spalding, Lincs.
   PE11 1DB

4. Name and address of Owner
   Lincolnshire County Council,
   County Offices, Newland, Lincoln. LN1 1YL

5. Whereabouts of printed manuscript or photographic records and drawings or technical papers

   A general layout / working drawing of Horseshoe Bridge showing reinforcement details is held by the Welland & Deepings Internal Drainage Board at Spalding as successors to the Deeping Fen Trustees who were responsible for the construction of this bridge. Miscellaneous drawings of two or three other r.c. bridges built by the Trustees at about this time are also held by the IDB. Further information as to the origins of these r.c. bridges may be contained within the Minute Books of the Deeping Fen Trustees and there whereabouts is currently being investigated.

6. O.S. National Grid Reference
   TF 219 211

*7. M-Mark

8. Title

*9.



* (for office use)

10. Description

A single span reinforced concrete bridge of an early and somewhat unusual design. The main structural elements of the 45' span are the twin longitudinal r.c. beams (6'3½" x 8" with 4" webs) which also form the parapet walls. These two beams are linked by nine transverse r.c. beams (20½" x 8") with their integral 5½" r.c. deck. The o/a width of the span is 21'10" with a 19' roadway. The r.c. abutments appear to be founded on r.c. piles. There are no apparent construction joints and the reinforcement of longitudinal beams, lateral beams, deck slab and abutment walls is shown as continuous in the drawing, which is dated August 1910. The structure was tested with an 18 ton steam roller ("or 210lbs per sq.ft.").

11. Industry represented in a) construction: Land Drainage
    b) use: Land Drainage/Road Transport

12. Construction date ~~circa 1911~~ 1910
    Opening date

13. Designer L.G.Mouchel & Partners.
    Contractor ~~not known~~ Liverpool Ferro-Concrete Co.

14. Danger of demolition or damage Considerable. This bridge, although in reasonable structural condition carries a 12ton weight limit and is inadequate for modern traffic loadings.

15. Location of any similar work in existence
    Identical r.c. bridge, Money Bridge at Pinchbeck, recently demolished.

16. Reported by B.M.J.Barton. Date. 23/6/91

HORSESHOE BRIDGE, SPALDING COMMON - B7 Report Notes

From about 1910 until the mid 1920s the then Deeping Fen Trustees were responsible for the building of a number of reinforced concrete bridges to carry public roads across rivers and fen drains for which they were responsible in the Spalding area. In each case the r.c. bridge superseded an earlier bridge which would presumably have been a standard single span brick arch structure of a type ubiquitous in the fens. Why a relatively small and obscure drainage authority should have favoured the use of what was then very much a pioneering material is a matter for speculation.

Considerably more research remains to be done on the precise origins of these r.c. bridges but since only one of the pre - World War I bridges (Horseshoe Bridge) is known to survive, and even that now under threat of reconstruction, it has been decided to submit a B7 whilst it is still in existance. A plea to English Heritage and the Department of the Environment for its "spot listing" was made at the beginning of April 1991 but the matter is still under consideration by those two bodies.

L.G.Mouchel & Partners, using the Hennebique system, were responsible for the design of these bridges of which the pre-1914 ones are believed to be as follows:

Horseshoe Bridge, Spalding Common.
Built c.1911 across the South Drove Drain at grid ref. TF 218211. A single 45' span with integral main beams, lateral beams, deck slab and abutments, all in cast in-situ reinforced concrete. The two slender main beams also double as parapet walls, thereby necessitating substantial transverse beams spanning between them in a ladder arrangement.

Money Bridge, Pinchbeck.
Completed in 1911 across the River Glen at grid ref. TF 215255. Very similar in appearance and almost certainly in design to Horseshoe Bridge. Demolished during the mid-1980s.

Cuckoo Bridge, Spalding Common.
Built c.1911 across the North Drove Drain at grid ref. TF 206205. A single 27' span r.c. arch bridge. Demolished duing the mid-1980s.

Miscellaneous drawings exist in the Welland & Deeping Internal Drainage Board records of other early r.c. bridges. There is a drawing dated May 1910 of a single 27' span r.c. beam bridge - location as yet unknown. Another Mouchel design dated April 1924 exists for a heavily skewed bridge with a single 45' span, believed to be Luck's Bridge on the A16 south west of Spalding (TF 233192) in which case that too is no longer extant. Here the earlier twin parapet wall beam design had given way to the more conventional arrangement of four much shallower longitudinal beams with a superimposed deck slab.

As with railways and canals, since many fen drainage channels were excavated across the line of pre-existing roads responsibility for the construction and upkeep of these bridges lay with the drainage authority. There has however been a tendency in recent years for the Lincolnshire C.C. as the highway authority to take over responsibility for these bridges, usually at the point where the original bridge has become inadequate to meet the demands imposed by modern traffic and reconstruction is envisaged. The Deeping Fen Trustees' bridges are no exception and Horseshoe, Cuckoo, and Money Bridges and a number of others were adopted by the County Council in 1953.

Although still in structurally sound condition, Horseshoe Bridge now carries a twelve ton weight limit and if proposals for the development of a major meat processing plant west of Spalding materialise then the bridge will find itself on the direct route between the plant and the A16 trunk road. The County Council have therefore formulated plans for the "improvment" of Horseshoe Bridge - which will fairly certainly mean its demolition and replacement by a structure capable of taking 38 tonne lorries. The potentially serious consequences of impact damage by a heavy vehicle to either of the parapet walls upon the structural integrity of the briodge is undoubtedly another relevant consideration.

The leading dimensions and a technical description of Horseshoe Bridge are given in the B7 report form itself. Secondary dimensions and additional technical information can be read or deduced from the accompanying working drawing (numbered 6/1/2/2 and dated August 1910) issued by Mouchels to the unnamed contractor. The archaic reinforcement detailing is of considerable interest, down to the instruction to the contractor that the ends of the reinforcing bars should be hammered to a fish tail, presumably to enhance bonding.

The assumed date of construction and completion of Horseshoe Bridge (1911) is inferred from the date on the working drawing and a contemporary photograph showing its twin, Money Bridge at Pinchbeck, complete and being load tested with a steam roller in that year.

BB 26/6/91

Lincolnshire

Department of Highways and Planning
4th Floor
City Hall
Beaumont Fee
Lincoln
LN1 1DN

Your Ref: NRM/SAH H16/0092/92

My Ref: DSW/22/11/81

Subject: HORSESHOE RD, SPALDING

Thank you for your correspondence dated about
the above topic which

is receiving attention:
~~I acknowledge receipt~~ of:
~~has been passed to me for reply~~ from:
~~has been forwarded to~~

If you require further assistance in the meantime please contact
on Lincoln 552222, Ext:

J Emmerson BSc MSc PhD CEng FICE
Director of Highways and Planning

HA/105

N R Midlen

NRM/SAH H16/0092/92

DSW/22/81/JP

25 July 1994

Lincolnshire County Council
Department of Highways and Planning
4th Floor
City Hall
Beaumont Fee
Lincoln

Dear Sir

Horseshoe Bridge, Spalding - Grade II Listed Building

Thank you for your letter of 16 June, and copy of the report on Horseshoe Bridge received on 28 June. They make interesting reading.

Although originally from an engineering background, I can make no claim to have any knowledge of bridge design and no doubt you will bear this in mind in reading the following comments, which I hope will be helpful even if only to indicate their reaction that there may be from lay-people to any proposal to demolish the bridge. You will of course appreciate that that decision is not a matter for my Council but rests with the Secretary of State.

1 The first reaction, given that the analysis shows that the bridge is heavily over-stressed even when not bearing any load at all, is surprise that it is nonetheless managed to survive since 1901, bearing all sorts of loads (I believe a weight limit was only put on fairly recently) without apparent signs of distress. Is there any explanation for this? Do the current methods of assessment impose a greater safety factor than in the past? Is the Departmental Standard of PD21/93 a standard applicable principally to new development rather than the analysis of old development? Is it a Lincolnshire Departmental Standard or Department of Transport Standard?

Cont/....

2 The question of possibly strengthening the bridge, it has, as I understand it, been listed as architectural and historic interest, not because it is a thing of beauty, but because it is an interesting example of the early use of concrete in bridge construction. Provided the original design concept can still be seen and appreciated, I would not have thought that a change in the appearance would have been a matter of the same concern as if it was a beautiful building that might have to be changed to make it safe.

3 It would seem that the major problem is the principle longitudinal members, with the transverse members being reasonably satisfactory. I would have thought there are two possibilities 1) given the excessive depth of concrete and tarmac surfacing might be to strip all this off and put in a new deck which might be largely free-standing, or 2) place some further longitudinal beams underneath the existing decking, building them into the abutments. It might be that a combination of the two is needed. If it was technically possible to insert such strengthening members in such a way that they themselves strengthening the bridge sufficiently, the concern about the concrete parapets would surely disappear also. I assume that the problem with the parapets is that, since they are structurally part of the main load bearing members, any damage to them would immediately seriously weaken the bridge and possibly cause its collapse. I take it there is no inherent problem in having concrete parapets.

4 This leaves the question of the footpaths, and personally I would question to what extent a footpath is needed here. Is there any evidence that pedestrians cross this bridge? It is in a fairly remote position, but even if there are, it does have the advantage that anyone can see traffic coming from a huge distance away. If a footpath was absolutely essential, it might be possible to build a separate bridge to take the foot traffic.

Of course, these various suggestions, even if technically possible, may be rather more expensive than building a new bridge.

Yours faithfully

N R Midlen
Principal Planning Officer (Development Control)

S.H.D.C. PLANNING DEPT.
RECEIVED
17 FEB 1992
Atten
DPO
DOPO
JC
Action
Discuss
Copy

[redacted]

13th Febmary 1992

Dear Mr Midlen,

Horseshoe Bridge, Spalding Common

As promised, a copy of the ICE/PHEW record form relating to Horseshoe Bridge. The report notes attached to it were written before I became aware of the additional material held by the Welland & Deeping Internal Drainage Board and are therefore not entirely up to date.

Yours etc.,

Barry Barton

B.M.J. BARTON.

Engineering Consultancy Service
Unit 16
Witham Park
Waterside South
Lincoln

Mr P J Udy

PJU/LAB/H16/0092/92

27 February 1992

Dear Sir

Demolish Existing Bridge And Construct New Single Span Reinforced Concrete Bridge On Piled Abutments.

I refer to your above application on which I have a number of questions.

1 I would be grateful if you could explain on what basis (calculations and methodology) it has been concluded that the bridge weight limit has to be reduced from 12 tons to 3.5 tonnes. What are the current standards?

2 Has there been any accidents near the bridge and if so could you furnish me with the accident reports?

3 What is the traffic flow along this road and if the footpaths are inadequate why cannot a footbridge be constructed?

4 The issue of the bridge first arose with the Hargreaves abattoir application to the north-east. Since this application has been refused is it still necessary to consider replacing this bridge?

5 What is the maintenance cost of the bridge at present, the cost of demolishing it and erecting a new bridge and the maintenance cost of a new bridge as proposed?

I would appreciate a response within the next 14 days.

Yours faithfully

N R Midlen
Principal Planning Officer
Development Control

Lincolnshire County Council

Director of Highways and Planning
J Emmerson BSc MSc PhD CEng FICE

4th Floor
City Hall
Beaumont Fee
Lincoln
LN1 1DN

Telephone Lincoln 552222 STD 0522

For further information contact

Mr S M P Devlin
Telephone
Lincoln 553126

My Ref: SMD/H16/92/LBC/JS

11 March 1992

Mr B Smith
South Holland District Council
Technical Services Department
Council Offices
Priory Road
SPALDING
Lincs
PE11 2XE

Dear Sir

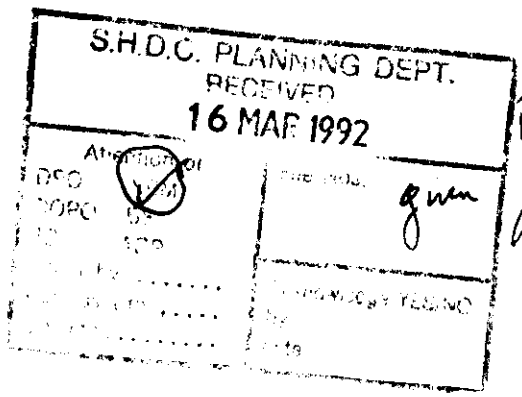
APPLICATION TO THE SECRETARY OF STATE FOR THE ENVIRONMENT FOR LISTED BUILDING CONSENT

TO DEMOLISH EXISTING BRIDGE AND CONSTRUCT A NEW SINGLE SPAN REINFORCED CONCRETE BRIDGE ON PILED ABUTMENTS
AT HORSESHOE BRIDGE, HORSESHOE ROAD, OVER SOUTH DROVE DRAIN, SPALDING

Further to my letter of 21 January 1992 I write to inform you that this application has now been withdrawn pending reassessment of the situation.

Yours faithfully

for Director of Highways and Planning



P.U.

Lincolnshire County Counc

Director of Highways and Planning
J Emmerson BSc MSc PhD CEng

4th Floor
City Hall
Beaumont Fee
Lincoln
LN1 1DN

Telephone Lincoln 552222 STD 05

For further information contact

Telephone Extension

My ref: TROS/3/P1/419

Date: 11th March 1992

F.A.O. Dir P&BCS ~~ENVIRONMENTAL HEALTH~~

Dear Sir

ROUTE C722 - HORSESHOE BRIDGE
SPALDING - MAP REFERENCE TF218 211
7.5 TONNE GROSS VEHICLE WEIGHT RESTRICTION

Please note that it will be necessary to impose the above weight restriction of 7.5 tonnes on the C722 at Horseshoe Bridge Spalding. This restriction will commence 28th March 1992 and continue until work has been completed.

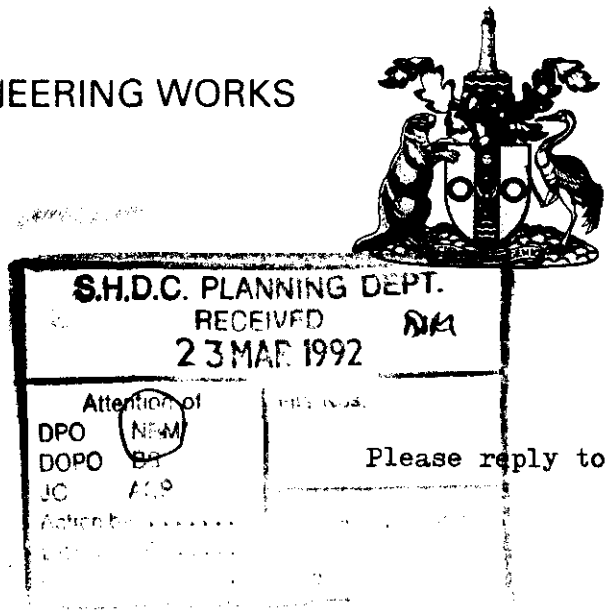
ALTERNATIVE ROUTE VIA: C710 North Drove and C803 East Road

Yours faithfully

for DIRECTOR OF HIGHWAYS AND PLANNING

S.H.D.C. PLANNING DEPT.
RECEIVED
17 MAR 1992
DPO
DOPO
JC ACP
Action by .....
Discuss with .....
Copy to .....
Acknowledge YES/NO
by
date

THE PANEL FOR
HISTORICAL ENGINEERING WORKS



THE INSTITUTION OF CIVIL ENGINEERS

Great George Street
Westminster
London SW1P 3AA
United Kingdom
Telephone 071-222 7722
Telex 935637 Iceas G
Fax 071-222 7500

Director General and Secretary
R. S. Dobson, OBE CEng MICE

Please reply to ... 15 Swinstead Road,
Corby Glen,
Grantham,
Lincs. NG33 4NU

Wednesday, 18th March 1992.

Mr Midlen,
Planning Department,
South Holland District Council,

Dear Mr Midlen,

Horseshoe Bridge, Spalding Common.

Further to our recent telephone conversation, I attach a copy of a letter dated 14th March 1992 from James Sutherland, Chairman of the Institution of Structural Engineers' History Study Group, in which he suggests Ian Hume of English Heritage as someone who could give an authoritative assessment of the load-bearing capacity of Horseshoe Bridge. I am, in theory, qualified to make a stab at it but my estimate would not, I fear, be highly regarded at any public inquiry as my engineering experience has for years been chiefly concerned with land drainage and water resources.

Yours sincerely,

Barry Barton

B.M.J.Barton, Lincolnshire & S.Humberside Member,
I.C.E. Panel for Historical Engineering Works.

R.J.M. Sutherland F Eng. BA. FICE. FI Struct E. *4 Pitt Street London W8 4NX*

071-938 1169

Barry Barton Esq
15 Swinstead Road
Corby Glen
Grantham
Lincs
NG33 4NU

14th March 1992

Dear Dr Barton

Horseshoe Bridge, Spalding Common, Lincs.

Thank you for your letter of 7th March and for the fascinating drawing of this bridge which I found here on my return from a few days in Venice.

Starting with your last question on load-bearing capacity I am not sure that it is so much a knowledge of early reinforced concrete which is needed as an attitude slanted towards preservation and an enquiring mind in relation to real behaviour rather than codes. I anticipate that the County has appraised the bridge in relation to the Departmental Standard BD21/84 *The assessment of highway bridges and structures* if it or a consultant has appraised it at all. In some respects this standard could give a more cheerful answer that the 1910 design method. In other respects it could be more gloomy.

Ian Hume, the Chief Civil and Structural Engineer of English Heritage, would be worth talking to although I am not sure how much he and his department are familiar with current road loadings. You could get him at English Heritage, Keysign House, 429 Oxford Street, London W1R 2HD (direct line I think 071 973 3661). You could say I suggested him. He is very friendly as you may know already. Given a clearer copy of the drawing appraisal should be quite practicable. I would like to have a go together with Harris & Sutherland's bridge appraisal team but, alas, the firm would expect to be paid and I doubt whether the planners could rise to a fee! Best to start with Ian Hume.

My chief worry would be the extent of carbonation and the condition of the reinforcement. The sections are very slender and I suspect that the cover to the bars is small.

Whatever happens the drawings and all documentation would be superb for the collection I mentioned. If being demolished in the end it should be recorded carefully. Did you get onto Mouchel about the records of this and other similar bridges?

Please come back if I can help any more.

Yours sincerely

James

R J M Sutherland

English Heritage
Fortress House 23 Savile Row London W1X 1AB Telephone 071-973 3000 Fax 071-973 3001

The Director of Planning,
South Holland D.C.,
Priory Road,
Spalding
Lincs PE11 2XE

Your Ref: H16/0092/92

26 March 1992

Dear Sir,

HORSESHOE BRIDGE

Thank you for your notification of an application to demolish this early reinforced concrete bridge. I understand that the current application has been withdrawn, but I share the concern expressed in the letters of the various amenity groups and am writing to put on record my own concern that every alternative avenue should be explored before another demolition proposal is entertained.

Yours faithfully

Neil Burton
Inspector of Historic Buildings
East Midlands Team

S.H.D.C. PLANNING DEPT.
RECEIVED
30 MAR 1992
Attention of
DPO NWM
DOPO BS
JC ACP
Action by .....
Discuss with .....
Copy to .....
File Nos.
Acknowledge YES/NO
by
date

POST CTTEE: AS RECOMMENDED.

AGENDA ITEM NO. 13

SOUTH HOLLAND DISTRICT COUNCIL

REPORT TO: THE PLANNING COMMITTEE 14TH APRIL 1992

BY: THE DIRECTOR OF PLANNING AND BUILDING CONTROL SERVICES

1.0 SUBJECT: APPLICATION BY LINCOLNSHIRE COUNTY COUNCIL TO SECRETARY OF STATE FOR THE ENVIRONMENT FOR DEMOLITION OF HORSESHOE BRIDGE LISTED BUILDING CONSENT.

PURPOSE: **To inform Members of the present position.**

1.1 This proposal has received a lot of publicity but I have now received a letter from the County Council saying that the application has been withdrawn pending reassessment of the situation.

1.2 RECOMMENDATION

That the report be noted.

Background papers: H16/0092/92

Local Government (Access to Information) Act 1985

The Officer to whom reference should be made concerning inspection of the background papers is the Director of Planning and Building Control Services, Council Offices, Priory Road, Spalding, Lincs. Tel: (0775) 761161

H16/92/92 PJU

PLANNING COMMITTEE - 14th April, 1992

291. WEST DROVE, GEDNEY HILL - SECTION 106 AGREEMENT

The Director of Planning and Building Control Services reported that planning permission H07/1145/90 for a dwelling in connection with a golf complex at West Drove, Gedney Hill had been granted subject to the applicants first entering into an agreement under the provisions of Section 106 of the Town and Country Planning Act 1990 to ensure that the development would not be occupied except by the owner or manager of or a person employed in connection with the management of the golf complex.

The applicant had now stated that difficulties were being encountered in obtaining a mortgage for the proposed development and had requested an amendment to the wording of the agreement to extend the occupancy of the new dwelling to any person involved in agricultural activities.

The Committee was informed that a number of requests had recently been received for modifications to existing Section 106 Agreements in view of difficulties encountered in obtaining mortgages and it was felt that as a general policy, prior to such requests being considered, information should be sought from the lending institution as to the exact reason why a mortgage had been refused.

RESOLVED:

(a) Consideration of the current request be deferred, and the applicant be requested to give the lending institution authority to divulge the circumstances relating to the refusal of the mortgage; and

(b) In future, prior to consideration of requests for modifications of Section 106 Agreements resulting from difficulties in obtaining appropriate finance, information be sought from the financial institutions involved regarding the reasons behind their decisions to refuse loan applications, and the applicants be required to permit the financial institutions to divulge such information.

292. HORSESHOE BRIDGE, SPALDING - LISTED BUILDING CONSENT

The Director of Planning and Building Control Services reported that the Lincolnshire County Council had now withdrawn their application for the demolition of Horseshoe Bridge, Spalding, pending reassessment of the situation.

RESOLVED: The report be noted.

293. APPEALS

(a) Appeals Received

Receipt of the undermentioned appeals was reported:-

(i) By G D Spelman Ltd against refusal of planning permission for the change of use of shop to flats at Bridge Road, Sutton Bridge (Written representations).

(ii) By Hurnfield Hargate Ltd against an enforcement notice relating to non-compliance with planning conditions for overnight lorry park at Washway Road, Fleet (Written representations).

SOCIETY FOR LINCOLNSHIRE HISTORY AND ARCHAEOLOGY



Jews' Court, Steep Hill, Lincoln LN2 1LS Telephone 0522 521337
Charity No 504766

9/4/92

S.H.D.C. PLANNING DEPT.
RECEIVED
27 MAR 1992 P.O

No Report 14/4

Director of Planning,
South Holland District Council,
Chatterton Tower,
Winfrey Avenue,
SPALDING,
Lincs. PE11 1DB

25th March, 1992

OBJECTION

Dear Sir,

HORSESHOE BRIDGE, SPALDING

I am writing on behalf of this Society to object to the proposed demolition and reconstruction of Horseshoe Bridge, South Drove Drain, Spalding.

Horseshoe Bridge is one of the oldest surviving reinforced concrete bridges of significant size in Britain, and almost certainly the oldest such bridge in eastern England. It is particularly valuable as it is a fine example that is complete and has not been altered since its construction in the early years of this century. It incorporates many unusual and now obsolete technical features. There was previously a virtually identical bridge at Money Bridge, Pinchbeck but that has recently been demolished and that makes the retention of Horseshoe Bridge even more important

Horseshoe Bridge was built by a local firm, Pattinson's of Sleaford, as part of a pioneering use of this new material by the Deeping Fen Drainage Trustees. In view of the historic importance of this bridge we believe that the new bridge should be built **alongside** the existing bridge so that the historic structure can be retained for future generations. We understand that the Welland and Deepings Internal Drainage Board already have plans to include this bridge in a drainage heritage trail which they are developing with your Council.

We hope that your Council will refuse this application in view of the historic importance of the bridge and the availability of an alternative location for a replacement bridge.

Yours sincerely,

Neil R Wright

Neil R. Wright,
Chairman, Industrial Archaeology Committee.

COUNTY OFFICES
NEWLAND · LINCOLN

LINCOLNSHIRE COUNTY COUNCIL

HIGHWAYS & PLANNING DEPARTMENT

4th Floor, City Hall, Beaumont Fee, Lincoln LN1 1DN
Telephone (0522) 552222 Fax (0522) 553149

My Ref: DSW/22/11/81/JP

Director: J. Emmerson

South Holland District Council
Planning Department
Council Offices
Priory Road
SPALDING
Lincolnshire
PE11 2XE

For further information contact
Mr D S Walton
Telephone Lincoln (0522) 553058

16 June 1994

Dear Sir

HORSESHOE BRIDGE, SPALDING, C722 - BRIDGE NO. 22/11/81

I write to appraise you of recent developments with respect to the above bridge.

In 1992 the County Council applied for listed building consent to demolish the bridge. During the consultation period a number of concerns were expressed and the County Council decided to withdraw their application to allow a more rigorous analysis to be carried out by an independent external consultant. A temporary 7.5T GVW restriction was converted to a permanent restriction after public consultation in February 1993.

The rigorous analysis has now been completed and the submitted report confirms the serious strength deficiencies. Pending a long term decision on the future of the bridge an emergency 3T GVW restriction is to be imposed immediately.

The edge beams which are the principal structural members are seriously understrength and can only be upgraded by very major works which would involve a complete change in appearance of the elevations of the bridge. Furthermore, there is a serious problem with respect to the requirement that these principal members must not be used to provide parapet containment. Any strengthening scheme would require the introduction of a safety fence with the required set back and the minimum space between it and the edge beam (i.e. the existing parapet) for pedestrian use. This would leave a severely restricted carriageway which only be suitable for single lane traffic which would then have to be controlled by traffic signals. To summarise strengthening options will only be viable if a change in the appearance of the elevations, due to additional structural members below the edge beams, are considered acceptable and if the drainage authority accepts a reduction in the waterway area.

Another option that the County Council may wish to pursue is to reconsider an application for listed building consent to demolish the bridge to allow a new bridge to be built on the site.

If neither of the above options prove to be acceptable then the County Council would be left with no alternative but to close the bridge to all vehicular traffic in accordance with the recommendations of the Rigorous Report now in our possession.

Yours faithfully

D. S. Walton

Director of Highways & Planning

19254.d51

S.H.D.C. PLANNING DEPT.
RECEIVED
20 JUN 1994

Can we have a copy of report? requested

NRM

COUNTY OFFICES
NEWLAND · LINCOLN

LINCOLNSHIRE COUNTY COUNCIL

HIGHWAYS & PLANNING DEPARTMENT

4th Floor, City Hall, Beaumont Fee, Lincoln LN1 1DN
Telephone (0522) 552222 Fax (0522) 553149

Director: J. Emmerson

My Ref: DSW/22/11/81/JP

South Holland District Council
Planning Department
Council Offices
Priory Road
Spalding
Lincolnshire
PE11 2XE

For further information contact
Mr D S Walton
Telephone Lincoln (0522) 553058

28 June 1994

For the attention of Mr SThorn

Dear Sir

HORSESHOE BRIDGE, SPALDING - C722 - BRIDGE NO. 22/11/81

With reference to your telephone request on 27 June 1994 please find enclosed a black and white copy of the Rigorous Analysis Report for the above structure. The main bulk of the report consists of calculations which are contained in Appendix G and are not included in the enclosure.

I trust that the information supplied is adequate for your requirements.

Yours faithfully

D. S. Walton

Director of Highways & Planning

19544.d51

BURKS GREEN & PARTNERS

LINCOLNSHIRE COUNTY COUNCIL

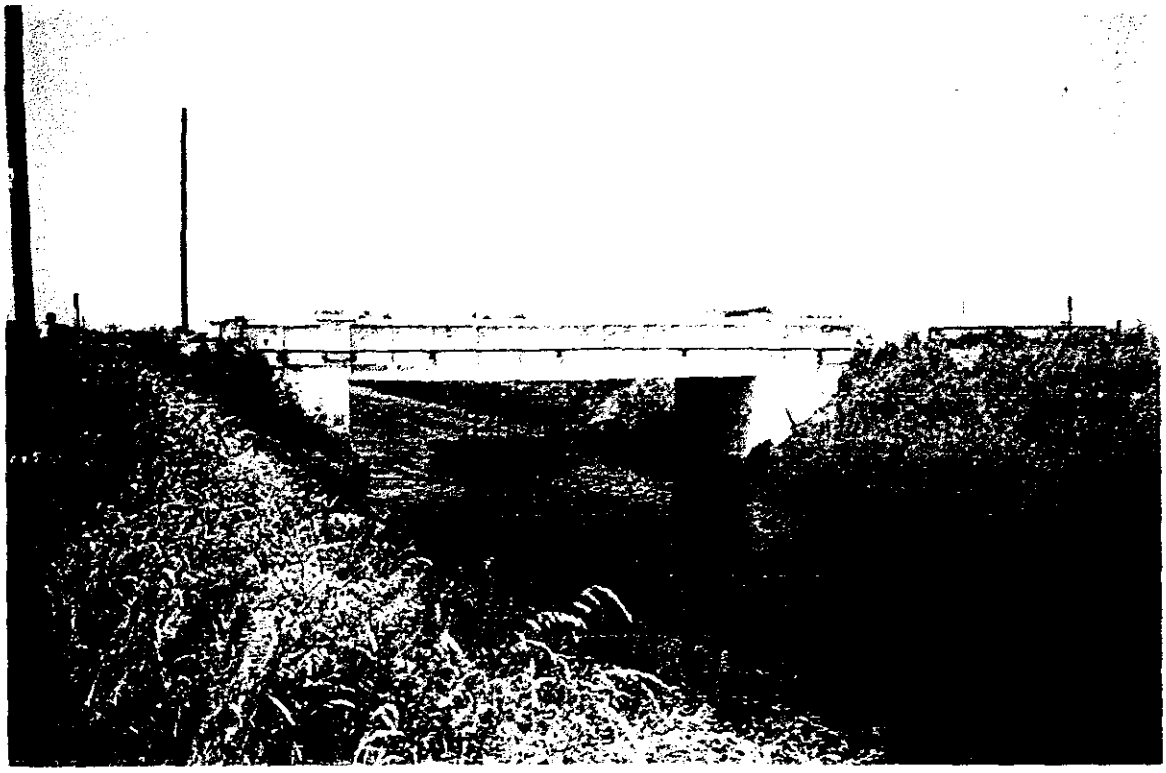
DEPARTMENT OF HIGHWAYS AND PLANNING

HORSESHOE BRIDGE

REF NO. 5M157

BRIDGE NO. 22/11/81

PRINCIPAL INSPECTION AND RIGOROUS ANALYSIS REPORT



Job No: 11714
Revision No:
Written by: DJF
Reviewed by:
Date: April 1994

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SUMMARY

The results of the rigorous analysis revealed that the bridge deck is not capable of supporting any live load without becoming over stressed.

It is recommended that immediate action should be taken to restrict the traffic over the bridge to one lane, introduce temporary measures to prevent vehicles from mounting the footways, and the current weight restriction of 7.5 tonnes vehicles should be amended to 3 tonnes as an interim measure.

Significant problems relating to strengthening of the existing bridge are discussed and recommendations made.

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1.0 INTRODUCTION

1.1 Background

Horseshoe Bridge spans over South Drove Drain and is located on the C722 route west of Spalding at O.S. reference 21802110. The bridge is a single span insitu reinforced concrete structure spanning onto insitu reinforced concrete abutments. The bridge deck comprises two edge beams spanning between abutments. Nine transverse beams span between the edge beams and support the deck slab. Apart from acting as the principal longitudinal beams the edge beams also form the bridge parapets. A degree of continuity is provided where the slab meets the abutment walls. The abutment walls are stiffened by horizontal ribs and are tied to the wing walls. Two beams tie the free ends of the wing walls together. Original drawings indicate the date of construction of the bridge to be around 1903 and give a test load capacity of an 18 ton steam roller or 210 lbs/ft² (10kN/m²). General views of the structure may be seen in Plates 1 to 4.

1.2 Previous Work

In 1970 an assessment was made by others under the "Bridgeguard" exercises, and a weight limit imposed.

In the financial year 1990/1991 Lincolnshire County Council commenced a further assessment programme and a decision was taken to construct a new bridge without further analysis. However, later in 1991 the bridge was included on a list of buildings and structures of special architectural or historic interest by the Secretary of State for the Environment. Because of the listed status of the bridge, it was decided that a rigorous analysis should be undertaken to establish the appropriate weight limit that should be imposed if the bridge were to remain.

1.3 Present Brief

Acting on the instructions of Lincolnshire County Council Burks Green and Partners Ltd carried out a Principal Inspection of the bridge on 6 July 1993 and subsequently carried out investigation work on the bridge on 9 November 1993. This was followed by a rigorous analysis of the structure. The survey involved the following:

i) Determination of salient dimensions to check against available drawings.

ii) Carrying out a visual inspection.

iii) Production of a photographic record.

iv) Determining the depth of pavement construction.

v) Checking reinforcement details by direct investigation and cover meter survey.

vi) Establishing concrete strength by the removal and testing of cores.

It should be noted that the bridge was not inspected below water level.

Since the bridge is a listed structure, the local agent of English Heritage at Lincolnshire County Council would only permit limited investigation work. They also stipulated that any work undertaken must not adversely effect the external appearance of the bridge. After consultation with the local agent of English Heritage at Lincolnshire County Council it was agreed that a trial hole be excavated on the top of the deck, that a small area on the bottom of an edge beam and 2 areas in a transverse beam could be broken out, and that 3 concrete cores could be taken.

2.0 PRINCIPAL INSPECTION AND TESTING

2.1 Principal Inspection

As part of the rigorous assessment of the bridge a Principal Inspection was undertaken to establish the external condition of the structure.

The edge beams seemed to be generally in reasonable condition, but some degree of sag was visible (see Plate 5). The underside of the top flange had suffered spalling in places and reinforcement was visible with varying degrees of corrosion present. Elsewhere the edge beams appeared sound. Cracks were visible in the webs of the edge beams towards each abutment. From their nature and position it was thought that these were possibly shear cracks. (see Plate 6).

The transverse beams and underside of the structural deck were in variable condition. The transverse beams had numerous areas where spalling had taken place exposing the reinforcement (see Plates 7, 8 and 9). It was apparent, however, that the reinforcement in these areas had only suffered minor corrosion which will not seriously have reduced its capacity at present. The underside of the slab is in similar condition to the transverse beams (see Plate 10).

2.2 *Investigation and testing.*

As part of the rigorous assessment, investigation and testing work was undertaken to check the strength of the concrete structure, and that the reinforcement details shown on the existing drawings matched that 'as built'. A dimensional and level survey was also undertaken to confirm that the bridge layout, profile, and details were in accordance with the existing drawings.

Excavation of a trial hole (Plate 11) established that the deck slab thickness was 140mm. This was overlaid with 240mm of mass concrete and 200mm of bituminous surfacing. On breaking into the deck slab, reinforcing steel was found. However, the quantity and positioning of it did not fully match that shown on the existing drawings. Enlarging the excavation to gain further information could not be undertaken due to the constraints imposed by English Heritage.

The area broken out on one of the edge beams demonstrated that the bottom reinforcement details as shown on the existing drawings are accurate. The cover to the main bottom reinforcement was found to be 80mm.

Areas of concrete were also broken out on a transverse beam in order to check the reinforcement details. It was found that the main reinforcement in the bottom of the beam consisted of four, 33mm diameter mild steel bars. At a distance of 1200mm from the edge beam two of these bars are curtailed and turn up into the top of the deck slab. At a distance of 340mm from the edge beam the remaining two bars are cranked up to pass over the bottom main reinforcing bars in the edge beams. These details are consistent with the information shown on the existing drawings.

The concrete cores were taken from the middle of the bridge deck. The cores were taken for testing and, from the compressive strength results, a calculated worst credible strength of 37N/mm^2 was obtained.

The level survey undertaken as part of the investigation work confirmed that the surfacing thickness was reasonably consistent over the area of the deck. This indicated that the mass concrete sub-base and surfacing thicknesses found in the trial hole could reasonably be assumed to apply over the whole deck for the purposes of the rigorous analysis calculations.

A cover meter survey was carried out on the underside of the deck slab to try to establish the pattern of reinforcement within the slab. On the existing drawings the reinforcement is called up as alternate straight and "curved" bars spanning between the transverse beams. There is no cross section through the slab but it would appear that these bars must be curved in elevation in order to pass over the reinforcement in the transverse beams. The survey seemed to verify this, however there was a variance in the recorded cover levels at bar positions and in the recorded centres of the bar reinforcement. Therefore the information obtained can only be taken as a guide to what is actually in the slab.

2.3 Brief summary of investigation and testing.

The survey produced dimensions which were inconsistent with those shown on the existing drawings for the edge beams and transverse beams. The edge beams were found to be 72mm deeper overall than shown on the existing drawings. Their bottom section was 305mm wide x 550mm deep compared with the 203mm x 521mm deep shown on the existing drawings and their top section 305mm wide x 160mm deep compared with 482mm x 178mm deep. The transverse beams were found to be 29mm deeper than shown on the existing drawings.

The trial hole excavation established that the overall surfacing and deck slab thicknesses, were greater than expected. In the simple assessment undertaken by others the overall surfacing was taken as 275mm. Our investigations showed the actual overall thickness to be 440mm. On the drawings the deck slab thickness is shown to be 125mm, this compares with an actual measurement of 140mm taken on site.

The reinforcement details shown on the existing drawings correlated reasonably with those found during the investigation work on site. The only area of main reinforcement where the detail is a little uncertain is that in the deck slab. However, since good correlation was obtained elsewhere it was decided, for the purposes of the rigorous assessment, that the reinforcement details shown on the existing drawings would be assumed to be correct.

The concrete cores showed the concrete to be in good condition, a calculated worst credible strength of 37N/mm² was obtained.

3. INTERPRETATION OF CALCULATIONS

3.1 Rigorous Analysis

A simple assessment of this structure, prepared by others, indicated a capacity of 3.0 tonnes assessment loading. A rigorous analysis was recommended in order to take advantage of the more favourable distribution of loads likely to be obtained. A grillage analysis has been used for this purpose.

In a structure of this type there are numerous arrangements of live load which are valid. Rigorous treatment of each case would generate vast quantities of data, the majority of which would be of no relevance. As an example, when advantage is taken of shear enhancement close to a support, the critical position for shear is unlikely to be at the support. The shear capacity must therefore be compared with the applied shear force throughout the length of the beam and for alternative positions of the knife edge load. Inevitably, many of the KEL positions considered are non critical.

This bridge was found to be heavily over stressed, there was therefore no benefit in refining the analysis to determine the level of overstress with a high degree of accuracy.

In order to minimise the time spent on non-critical load cases the following approach was adopted:

i) Initially, a limited number of load cases were applied to the grillage model. The live loading considered was restricted to HA (UDL & KEL) with a view to firstly examining the edge beams. Critical C & U vehicles detailed in Appendix D of Departmental Standard BD21/93, are appropriate for the assessment of the transverse beams. However, these were not considered in the initial grillage.

ii) The initial rigorous analysis clearly demonstrated that flexure in the edge beams was the controlling factor with respect to the capacity of the primary bridge elements.

iii) By inspection, it was clear, for the following reasons, that the transverse beams did not dictate the capacity of the bridge:

   a) Load effects induced in the transverse beams by HA (UDL & KEL) loading were markedly less onerous than for the edge beams.

   b) Load effects in the transverse beams, as indicated by simple assessment procedures were also markedly less onerous than for the edge beams.

   Rigorous analysis of the load effects from the various vehicles in Appendix D of BD21/93 was, therefore, unnecessary.

The rigorous analysis has demonstrated that torsional moments induced in the structure are relatively small and have little influence on the behaviour of the bridge. If the structure were re-analysed ignoring torsional stiffnesses, any variation in primary bending moments and shear forces would be negligible. The torsional moments indicated in the rigorous analysis have therefore been ignored.

The main edge beams continue a considerable distance behind the front face of the abutment. This gives the impression of moment continuity at the supports. However, the reinforcement provided in the top of the edge beam throughout the span is largely curtailed at the support. Only nominal reinforcement continues in the top of the beam beyond this point. The edge beams have therefore been treated as simply supported beams.

The structure is suffering from the effects of reinforcement corrosion, spalling and cracking. A condition factor of less than 1.0 is therefore appropriate. However, no reduction has been made in the calculations to take account of this because remedial works could be employed to enhance the condition factor of the bridge if it was found to be structurally adequate in other respects.

3.2 Results of rigorous analysis

As mentioned above the capacity of the bridge is governed by flexure in the edge beams. The flexural capacity of an edge beam was found to be 1620kNm. This compares with an applied moment of 3970kNm (comprising 1920kNm due to dead and superimposed dead loads, and 2050 kNm due to live loads) The bending moment diagrams are shown in graph 1. The bridge has therefore been shown to be inadequate to carry any live load. This is at variance with the previous simple assessment calculations, prepared by others, in which an assessment capacity of 3 tonnes was obtained. This is entirely due to an underestimate of the depth of fill and surfacing assumed in these earlier calculations. However, it is relevant to note that the superimposed dead loads on this bridge are abnormally high. 240mm of insitu reinforced concrete and 200mm of bituminous material have been provided over the structural deck. If this concrete and surfacing were removed and replaced with 100mm of bituminous surfacing then a 3.0 tonnes assessment capacity could be demonstrated.

The applied shear force for the HA load case with KEL at mid span is shown in graph 2 and is compared with the shear capacity. The graph presents the capacity both with and without links since, over part of the beam, some of the available shear reinforcement is used in providing adequate load transfer for the beam's bottom loaded condition. The critical condition occurs at approximately the quarter points where capacity is limited to 7.5 tonne assessment loading. Although the load case examined was that of the KEL at mid span, it may be seen, by inspection, that adequate surplus capacity exists at the support to cater for load cases generating higher shear forces at this position.

Calculations using simple assessment techniques have indicated that the transverse beams and slab are not excessively overstressed under full assessment loading.

Flexure in the edge beams presents the major problem, with respect to this bridge. In all other respects, removal of excess superimposed dead load in combination with localised strengthening (such as plate bonding) represents a viable approach to achieving the desired capacity.

4. DISCUSSION

4.1 General Condition

The overall condition of the bridge is reasonable considering the age of the structure. However, there are now signs of distress developing in the structure. As mentioned earlier, diagonal cracks have developed in the main edge beams towards the supports. These have the appearance of shear cracks although this diagnosis does not appear to be supported by the results of the analysis. There is a visible sag in the structure which is perhaps more than would be expected from that arising during construction of the bridge. Spalling of concrete from all parts of the deck is apparent and this has led to corrosion of reinforcement. The corrosion at present is only minor and can be treated.

4.2 Rigorous Analysis

The rigorous analysis has shown that the capacity of the structure is governed by the flexural capacity of the edge beams. These elements were found to be inadequate to accept any live loading. Shear in the edge beams is also a consideration but the deficiency in this respect is less significant. The slab and transverse beams are also overstressed under full HA loading but, again, not as excessively as the edge beams.

It is clear, therefore, that significant strengthening would be necessary to allow the bridge to remain in service for anything other than very light traffic.

4.3 Consideration of Strengthening Measures/Remedial Works

Consideration has been given, in principal, to the possibility of strengthening the structure to cater for the required loading. As a listed structure a primary consideration for any strengthening proposals must be to avoid any effect on the appearance of the bridge. It is probable that reasonable strengthening measures could be devised to enhance the bridge deck. However, the edge beams, which are the principal structural members, are seriously deficient. The strength of the these members could only be upgraded by very major works which would involve a complete change in the appearance of the elevations of the bridge.

Furthermore, there is a serious problem with respect to the requirement that these principal members must not be used to provide parapet containment. (BD52/93 Cl 2.14) Upgrading of the structure would also therefore involve the addition of safety fences or parapets to provide vehicle containment and protect the edge beams. The carriageway width is already below current standards. The introduction of a safety fence with the required set back and with minimum space between it and the edge beam for occasional pedestrian use would leave a severely restricted carriageway width which, at best, and with some relaxation of DTp recommendations would only be suitable for a single lane of traffic which would then have to be controlled by traffic lights. If safety fences were to be provided to protect the parapets then strengthening measures would be necessary to enable the bridge deck to sustain any loading transferred from them.

The above represents a preliminary view of strengthening implications. Our brief did not include any detailed review of possible strengthening measures and the comments made above are not a result of any exhaustive study of the possibilities.

If the bridge is to remain, then, in addition to strengthening and other provisions as described above, it will be necessary to carry out general remedial works involving patch repairs to spalling concrete as identified in the Principal Inspection. Before carrying out such remedial measures the bridge should be subject to an investigation to establish levels of chloride contamination and, if appropriate, this should be followed by half cell and resistivity testing.

4.4 Interim Weight Limit

In the short term it is our view that the bridge may remain open to traffic pending a decision on its future. However, it will be necessary to introduce temporary protection to minimise the likelihood of parapet impact and to restrict traffic over the bridge to a single lane. Control of traffic by means of traffic lights will almost certainly be required. The existing 7.5 tonne weight limit should be reduced to 3 tonnes.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 **We recommend that** the bridge be subject either to demolition and replacement or to substantial strengthening. If the latter option is selected we believe that strengthening cannot be applied without:

a) Considerable effect on the present appearance on the bridge.

b) Permanent narrowing of the bridge to a single lane with traffic light control.

5.2 **We recommend that**, should it be decided to retain the structure, testing should be carried out to assess chloride contamination and, if necessary, the likelihood of extensive corrosion of reinforcement taking place.

5.3 **We recommend that**, in the short term, the bridge may continue to carry traffic pending a decision upon its future. A weight limit of 3 tonnes should be imposed and measures taken to provide protection to the edge beams and enforce single lane trafficking over the structure.

APPENDIX A - Photographs



Plate 1 - Elevation on bridge looking north

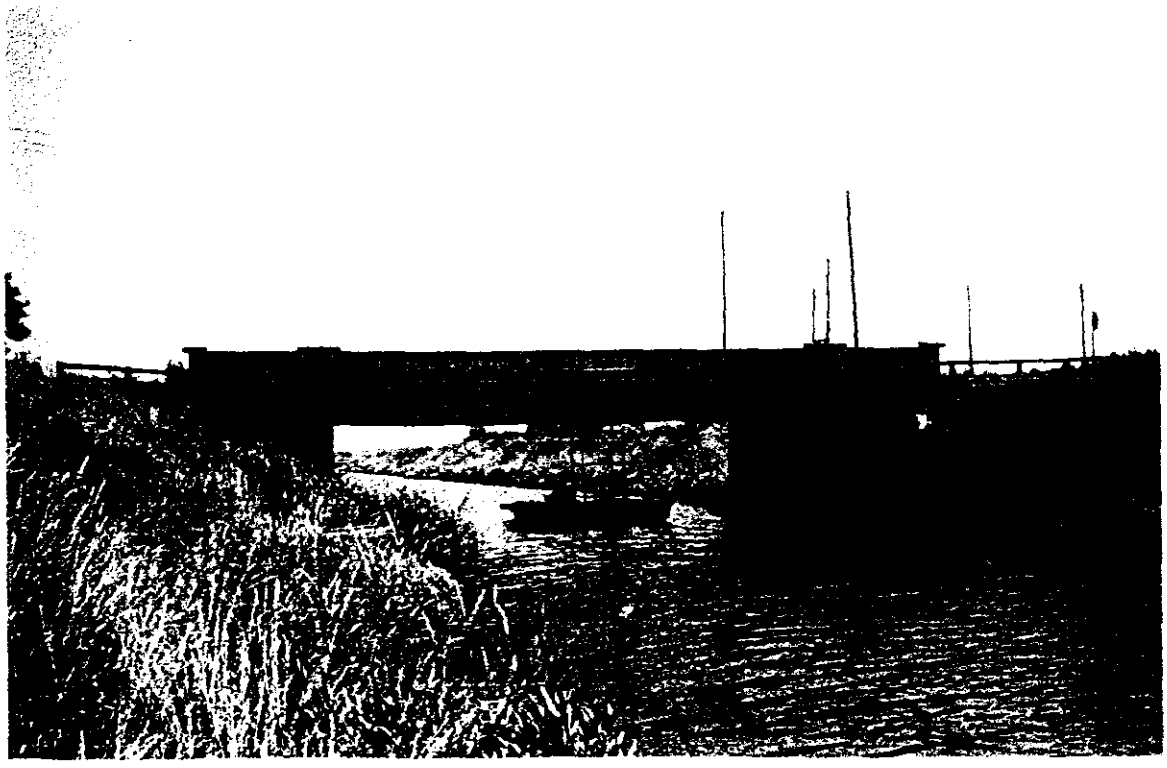


Plate 2 - Elevation on bridge looking south



Plate 3 - View on bridge looking east



Plate 4 - View on bridge looking west

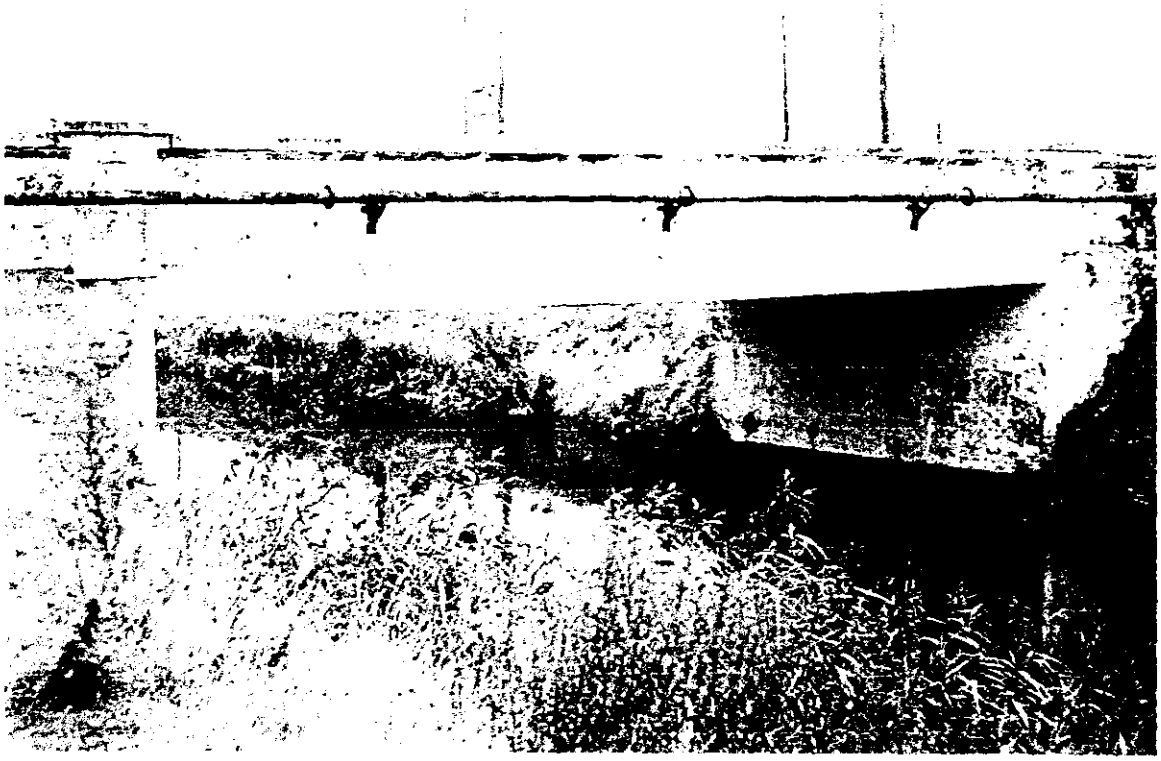


Plate 5 - Elevation of the bridge looking south and showing general condition including visible sag to edge beam and spalling to the underside of the top of the edge beam.

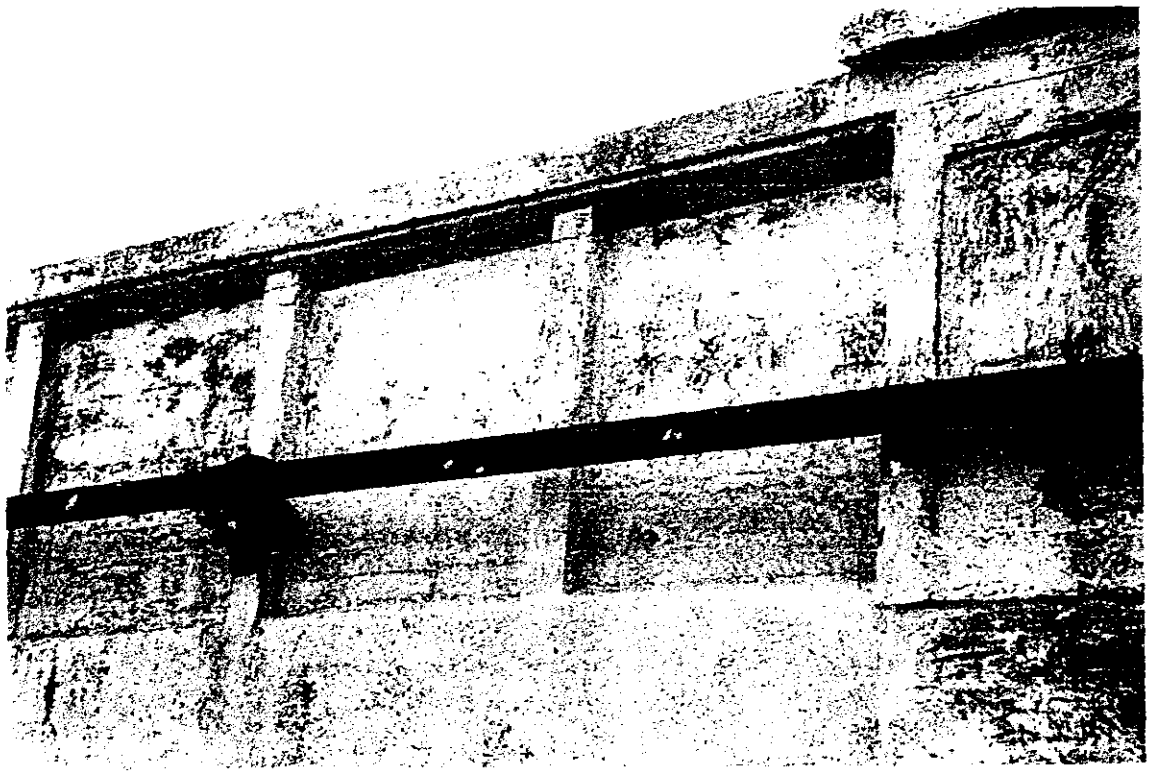


Plate 6 - Elevation on edge beam showing diagonal cracking

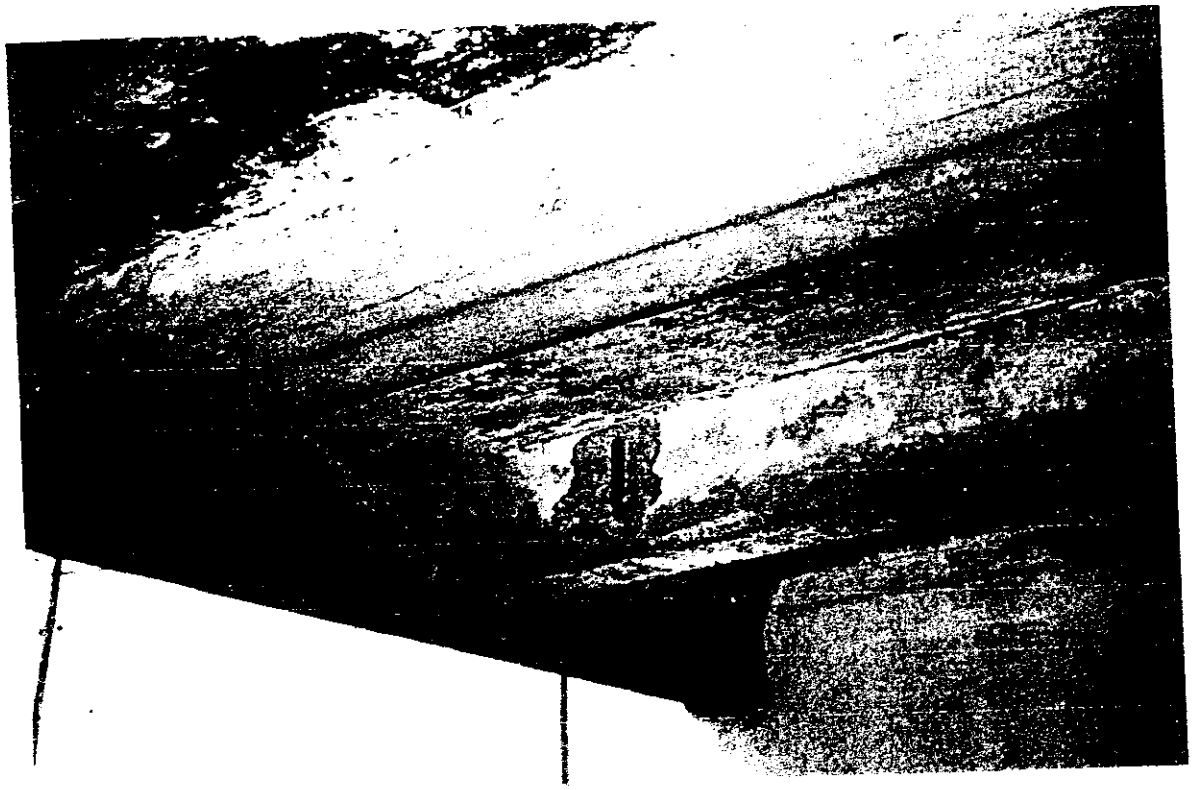


Plate 7 - General condition photograph showing spalling to a link in a transverse beam. The condition occurs in several locations.



Plate 8 - General condition photograph showing spalling to the main reinforcement along the arris of a transverse beam



Plate 9 - General condition photograph showing typical spalling to the underside of a transverse beam

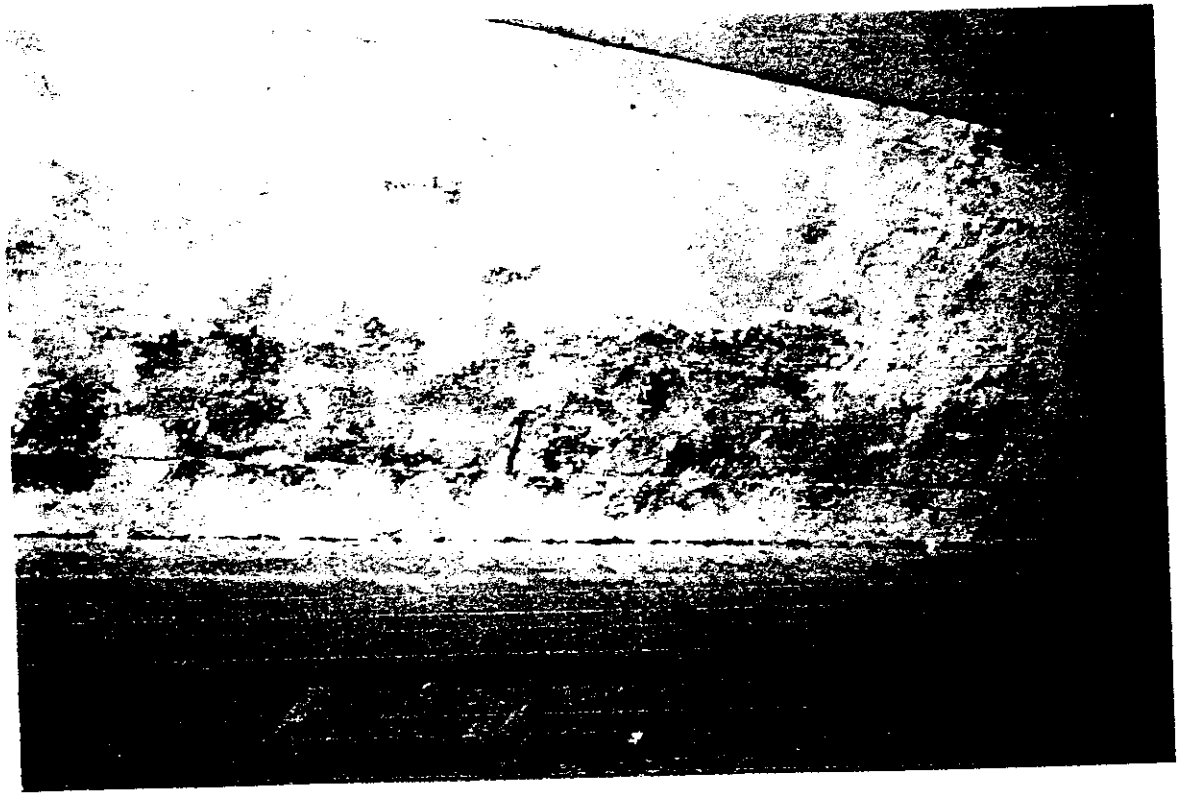


Plate 10 - View on the underside of the deck slab showing general condition.

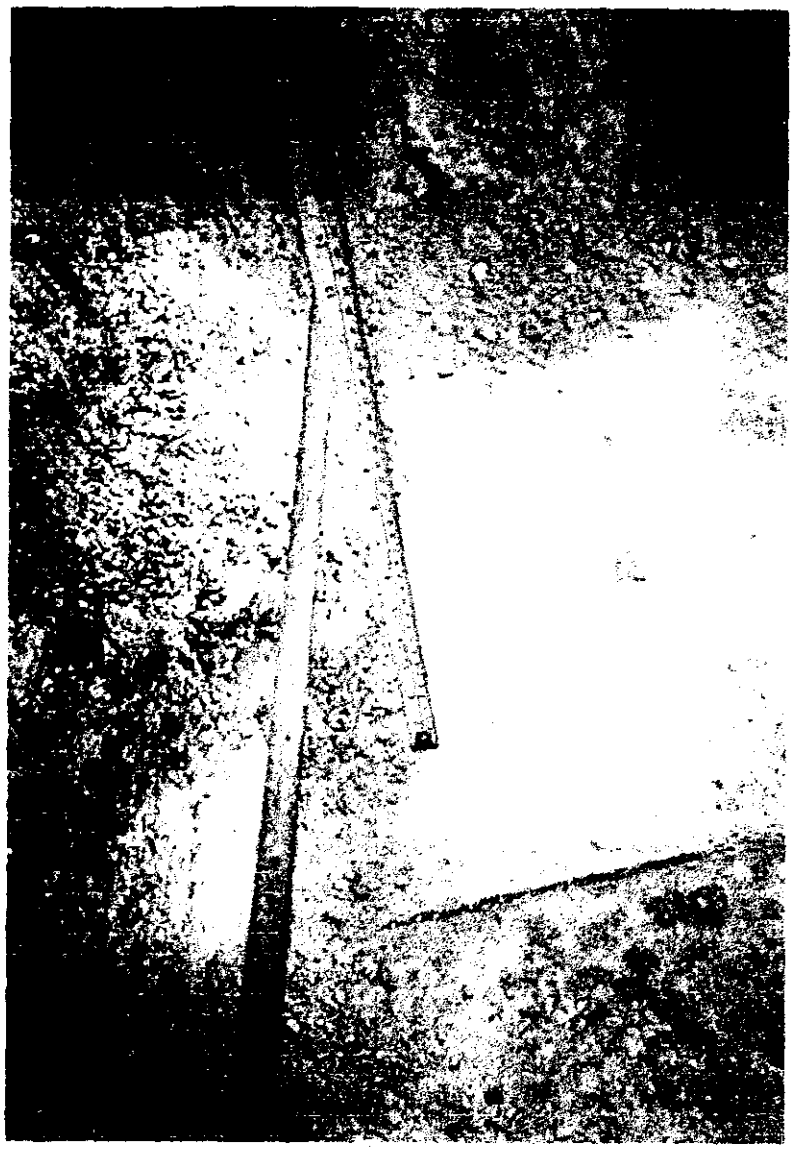


Plate 11 - Excavation work to establish the depth of surfacing and depth of concrete overslab over the reinforced concrete bridge deck. The taped depth indicates the thickness of the overslab.

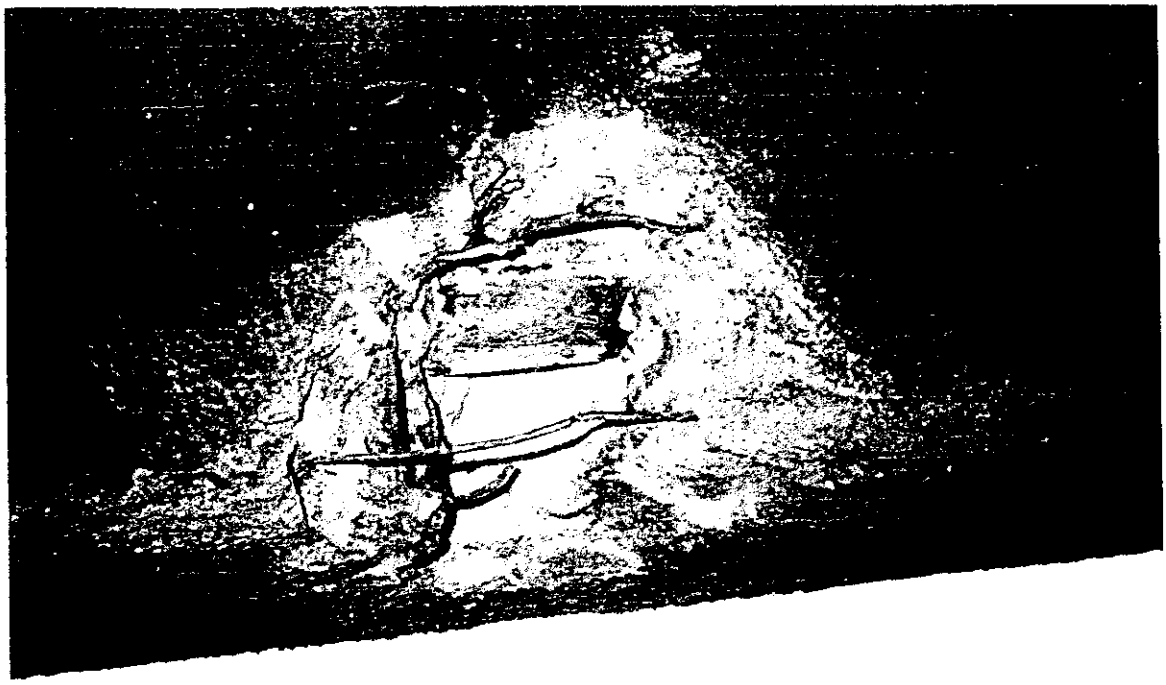
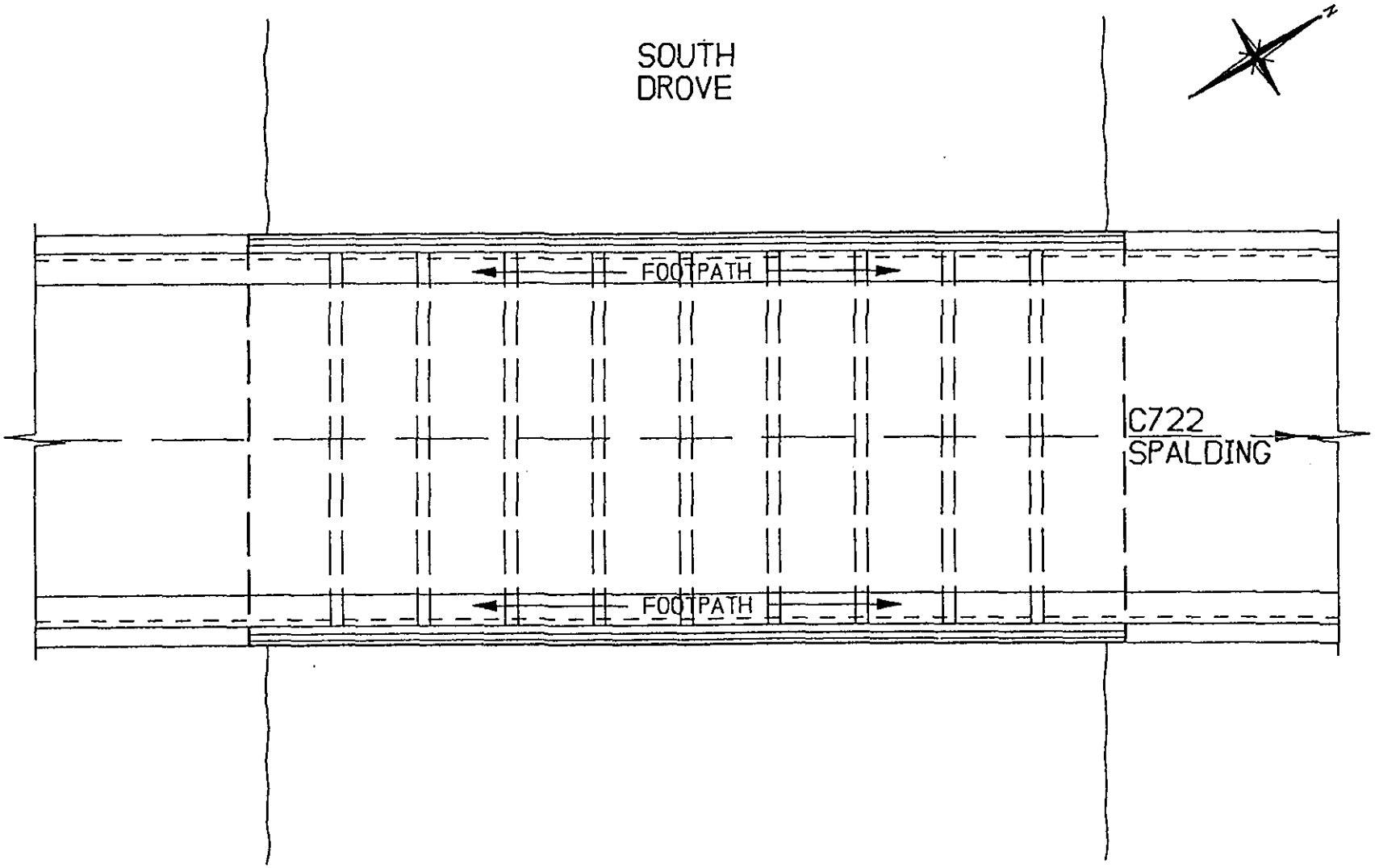


Plate 12 - Exploratory work in one of the edge beams to establish the reinforcement details.

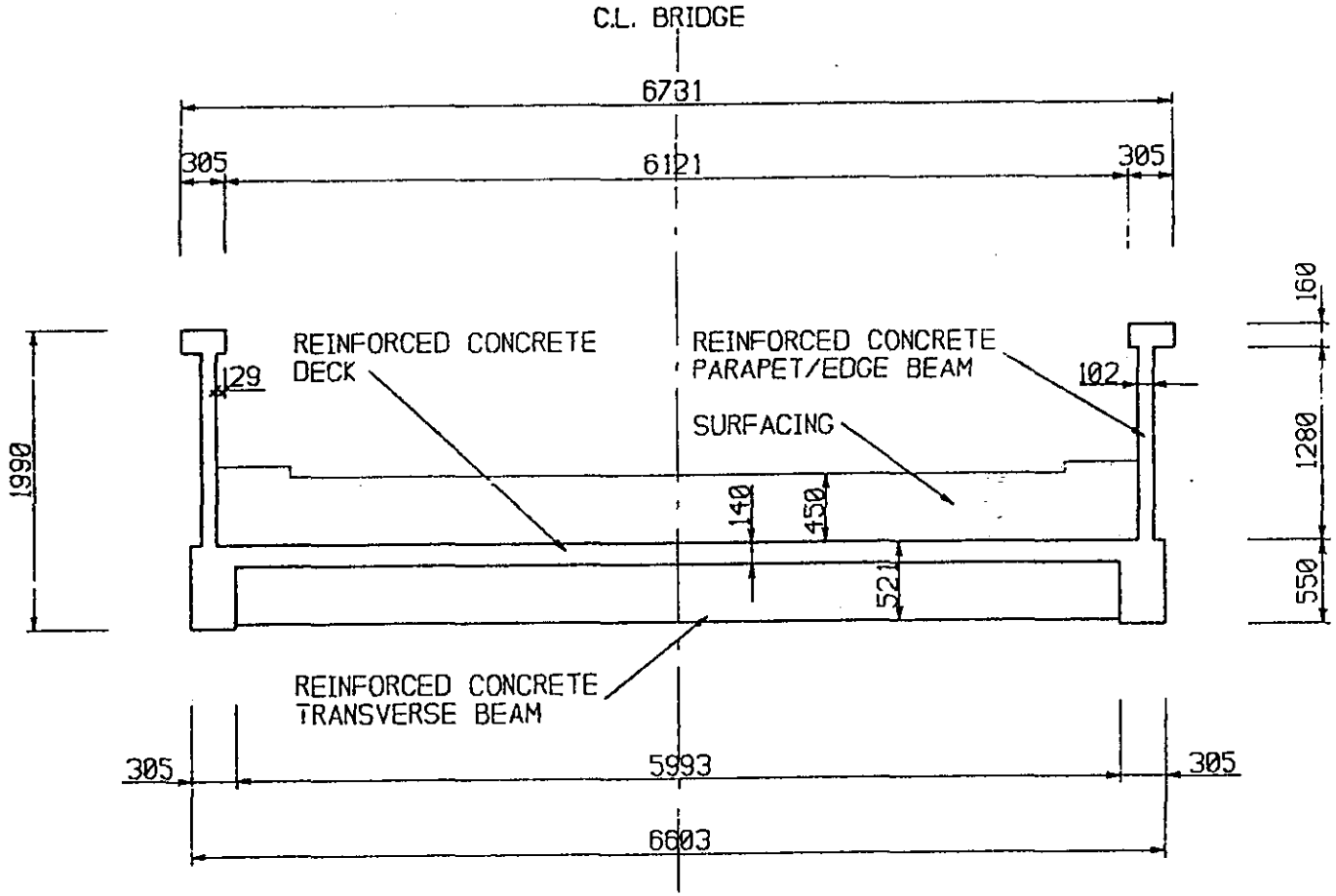
APPENDIX B - Plan and Typical Cross Section



PLAN ON BRIDGE

REV.	AMENDMENTS	REV'D BY	DATE

PROJECT: HORSESHOE BRIDGE, SPALDING	DRAWING No.: 11714/A4/01	SCALE: 1:100	DATE: MAR 94	STATUS: FOR INFORMATION
SECTION: PLAN ON BRIDGE	DRAWN BY: MG	CHECKED: DJP		BURKS GREEN & PARTNERS Consulting Civil & Structural Engineers



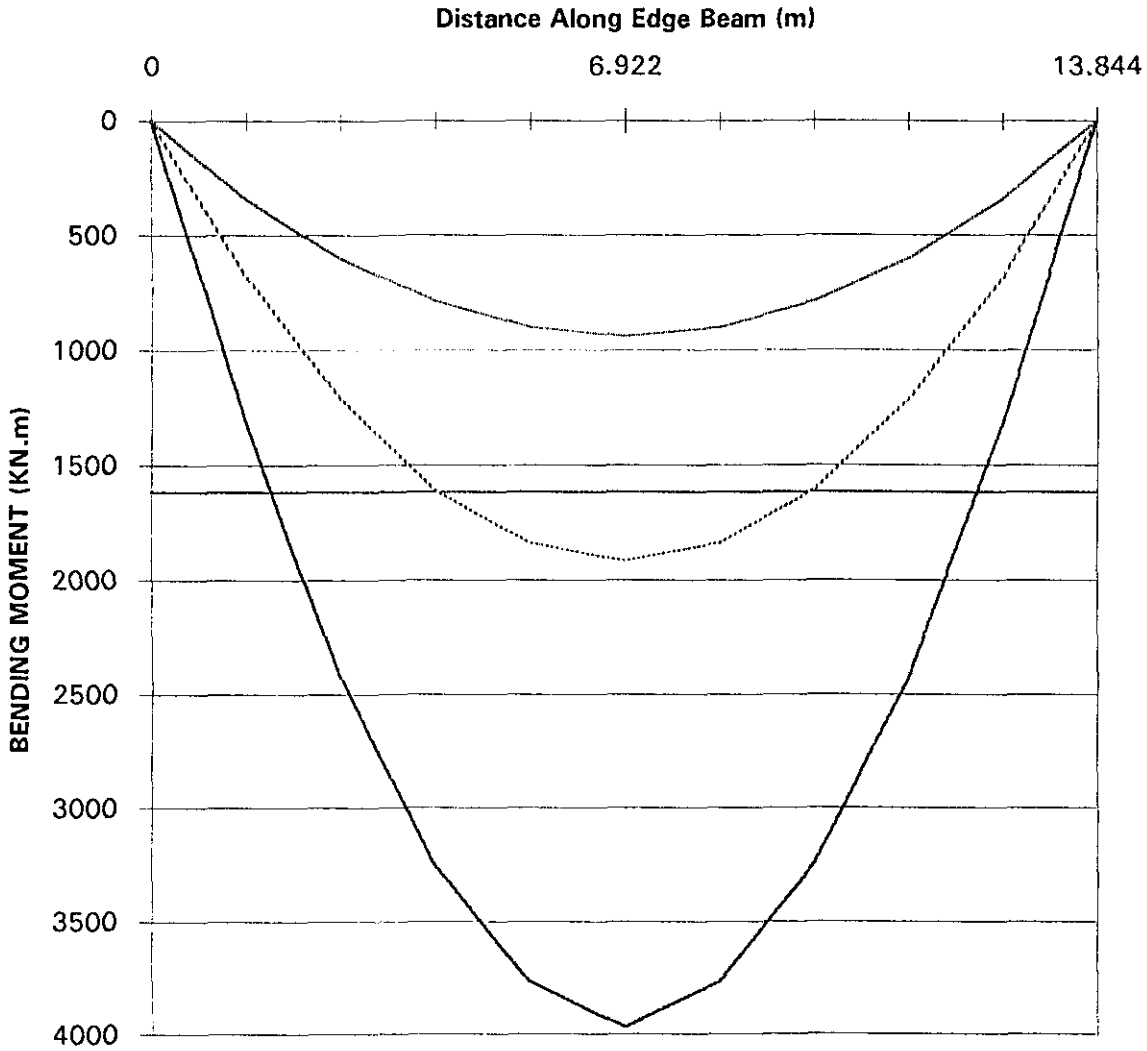
TYPICAL SECTION THROUGH DECK

REV.	AMENDMENTS	REV'D BY	DATE

PROJECT: HORSESHOE BRIDGE, SPALDING	DRAWING No.: 11714/A4/02	SCALE: 1:50	DATE: MAR 94	STATUS: FOR INFORMATION
SECTION: SECTION THROUGH DECK	DRAWN BY: MG	CHECKED: DJV		BURKS GREEN & PARTNERS Consulting Civil & Structural Engineers

APPENDIX C - Graphs and Tables

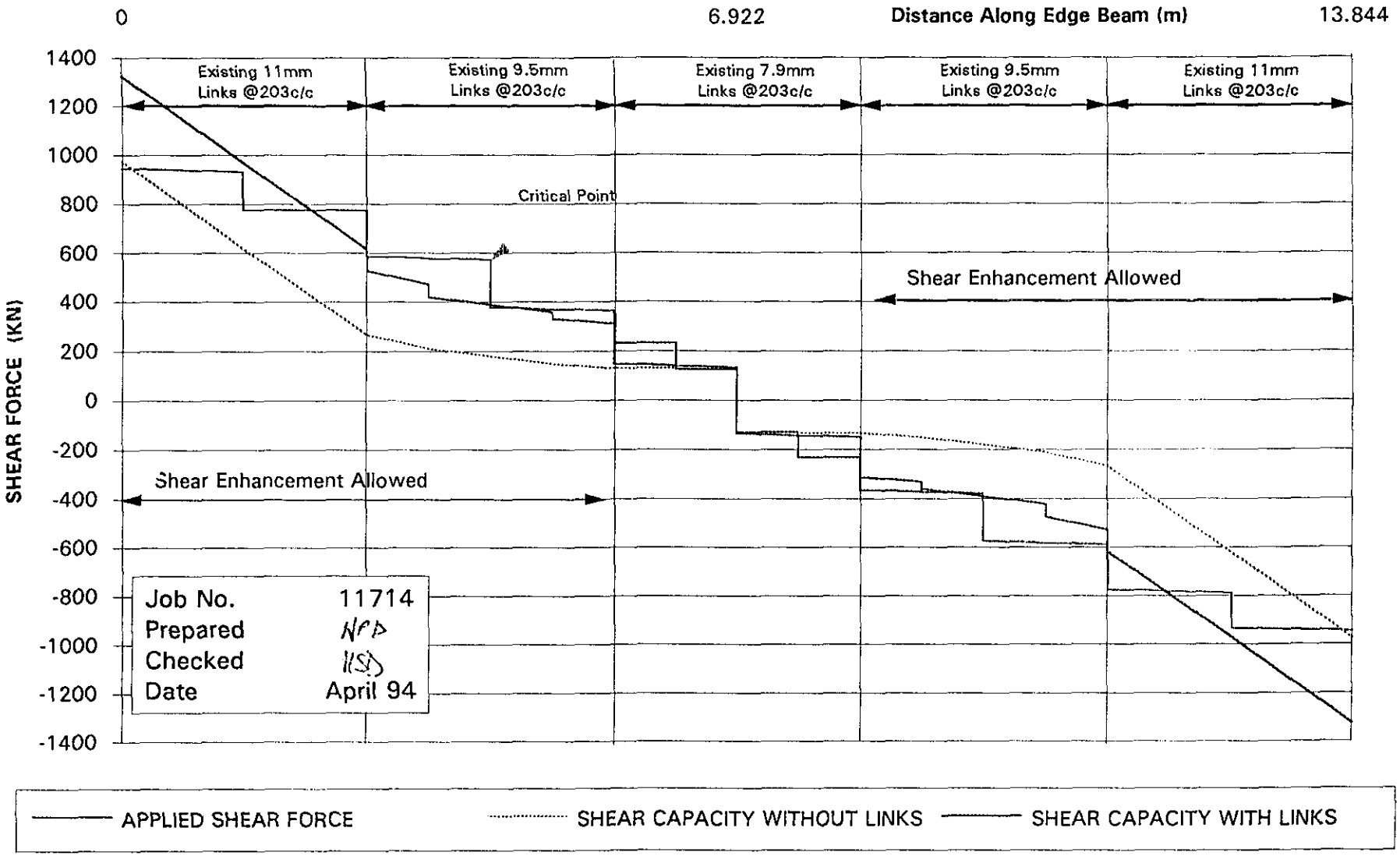
GRAPH 1 - BENDING MOMENT DIAGRAM



Job No.	11714
Prepared	NRS
Checked	HSD
Date	April 94

- BENDING MOMENT CAPACITY OF EXISTING MAIN BEAMS = 1620 KN.m
- DEAD LOAD ONLY
- FULL DEAD AND IMPOSED LOAD
- MOMENT ATTRIBUTED TO THE EXCESS DEPTH OF CONCRETE AND SURFACING

GRAPH 2 - SHEAR FORCE DIAGRAM - DEAD AND IMPOSED LOAD



Job No.	11714
Prepared	NCS
Checked	RSJ
Date	Apr-94

	1620 KN.m CAPACITY	DEAD LOAD ONLY	DEAD + IMPOSED LOAD	EXCESS DEPTH CONC/SURFACING
0	1620	0	0	0
1.354	1620	674	1300	339.625
2.746	1620	1210	2420	603.777
4.138	1620	1610	3250	792.458
5.53	1620	1840	3770	905.666
6.922	1620	1920	3970	943.402
8.314	1620	1840	3770	905.666
9.706	1620	1610	3250	792.458
11.098	1620	1210	2420	603.777
12.49	1620	674	1300	339.625
13.844	1620	0	0	0

TABLE 1 - BENDING MOMENTS

Job No.	11714
Prepared	NRD
Checked	HSD
Date	Apr-94

		APPLIED SHEAR FORCE	SHEAR CAPACITY WITHOUT LINKS	SHEAR CAPACITY WITH LINKS
support	0	946.64	974.8	1325
a	1.354	932.37	*620.75*	*970.95*
	1.354	778.18	*620.75*	*970.95*
b	2.746	773.51	266.7	616.9
	2.746	587.96	266.7	527.9
b/c	3.442	*580.625*	211.7	472.9
	3.442	*580.625*	211.7	420.8
c	4.138	573.29	*180.85*	*389.95*
	4.138	378.44	*180.85*	*389.95*
c/d	4.834	*371.1*	150	359.1
	4.834	*371.1*	150	330.6
d	5.53	363.76	130.9	311.5
	5.53	148.71	130.9	231.6
d/e	6.226	*141.375*	130.9	231.6
	6.226	*141.375*	127.5	127.5
e	6.922	134.04	127.5	127.5
	6.922	-134.11	-127.5	-127.5
e/f	7.618	*-141.445*	-127.5	-127.5
	7.618	*-141.445*	-130.9	-231.6
f	8.314	-148.78	-130.9	-231.6
	8.314	-363.88	-130.9	-311.5
f/g	9.01	*-371.215*	-150	-330.6
	9.01	*-371.215*	-150	-359.1
h	9.706	-378.55	*-180.85*	*-389.95*
	9.706	-573.18	*-180.85*	*-389.95*
h/j	10.402	*-580.515*	-211.7	-420.8
	10.402	*-580.515*	-211.7	-472.9
k	11.098	-587.85	-266.7	-527.9
	11.098	-773.36	-266.7	-616.9
l	12.49	-788.03	*-620.75*	*970.95*
	12.49	-932.49	*-620.75*	*-970.95*
support	13.844	-946.76	-974.8	-1325

TABLE 2 - SHEAR FORCES (DEAD AND IMPOSED)

APPENDIX D - Structure Inventory Sheet

rg_fs/2c.pak

FORM No H/B/ID.2 rev 02/91 ...

LINCOLNSHIRE COUNTY COUNCIL STRUCTURES INVENTORY DATA SHEET

STRUCTURE No 22/11/81

NOTE.....IF ANY "Geometry Data" IS MISSING Please obtain While on Site....

correct at :- ~~15-03-1992~~ 7-7-93

Structure Group.. A Division South Structure Name Horseshoe Bridge Grid Ref TF 21602110

C701

Parish Name SPALDING ..No 419 Route ~~C722~~ / Old struc No 22/11/81

Agent for Structure Lincs.c.c |Highways
Owner Lincolnshire County Council|HW
Drainage Authority Welland and Deepings IDB

Location Horseshoe Road

Circa 1910

Date of construction 1900 (?check). Navicable..(N
tidal..(N

Name of Watercourse SOUTH DROVE

Drawing No..1| 12491 2| 3|
& Notes...

Ancient Monument...(Code) Y (Category) L2

Inspection Info..CYCLE Gen 2 prin 0 GROUP.....AJ
Equipment Reqd.....

Type of structure Overbridge(Rd o'r Water) CODE..2

Construction R.concrete deck/concrete abutment CODE S3 NO OF SPANS 1

Span (Square)	1 | 13.57 m	2 | 0.00 m	3 | 0.00 m	4 | 0.00	Sum of span dimensions 13.57 m		
(Skew..)	0.00	0.00	0.00	0.00			
Rise at Crown	0.00	0.00	0.00	0.00	Displayed Weight limit ~~8~~ 7.5tonnes		
Rise at qrt point	0.00	0.00	0.00	0.00	at..00-00-0000	05-1992	
Abutment height	3.20	0.00	0.00	0.00			
Soffit to bed ht	0.00	0.00	0.00	0.00	Design loading....1|		
Cover to arch/slab	0.00	0.00	0.00	0.00	at..00-00-0000 ..2|		
Arch/Slab thickness	0.00	0	0	0			
					Assessed loading..1|		
Min Head room	.Round	.Round	at date..		at..00-00-0000 ..2|		

Width between parapets.6.33 Average width road 5.34
Further Data .....

Structure Construction Materials Data

Structure Part	Material .....
Foundation	
Inverts or Apron.....	
Fenders or Training walls.....	
Piers, Columns or Cross Heads..	
Abutments.....	Concrete
Wingwalls or Spandrels.....	Concrete
Retaining or Revet'headwalls...	
Service Ducts.....	
Ring or Jack Arches.....	
Deck slab or Plates.....	Concrete
Main, Edge or Transverse Beams.	Concrete
Parapets rails or walls.....	Concrete
Waterproofing.....	
Expansion Joints.....	
Surfacing.....	Bitumenous
Drainage systems.....	
Paint System .....Upper.....	
Paint System .....Lower.....	
Paint System .....Misc.....	
Other.....	

Services ON/IN Structure

LINCOLNSHIRE COUNTY COUNCIL — as_fs/1a.pmk 7-7-93

ASSESSMENT INSPECTION INFORMATION..... Existing Inspection & Works Data — correct at ~~15-03-1992~~

Division South Parish Name SPALDING ..No 419 | STRUCTURE No 22/11/81 | Corrugated A.Surv R

Grid Ref TF 21802110 — Structure Name Horseshoe Bridge
Location Horseshoe Road — Name of Watercourse SOUTH DROVE — Route ~~C722~~ C701 / Circa 1910
Owner Lincolnshire County Council}HW — Drainage Authority Welland and Deepings IDB — Date of Construction ~~1900~~ ?check

Type of structure Overbridge(Rd o/v Water) NO OF SPANS 1 SPAN (L). 1} 13.57 m .2) 0.00 m .3) 0.00 .4) 0.00 m
Construction R.concrete deck/concrete abutment

Assessment data..Priority..PA..6 Cost code.. Year.. 92/93 Tender Group. 3
Displayed Weight limit. ~~8-7-Stones~~ 00-00-0000 Design Loading. 1{ 2{ 00-00-0000
Assessed Loading.. 1{ 2{ 00-00-0000

Details of last inspections... Next Inspection due (Year) 1993 Cycle Gen... 2 Yrs... Prin.. 0
General...date 14-06-1988
Severity.. 3.1 Comments.... Inspection equipment required

Items 2,5,6,20,22G|10,13,21,24F|
items, 2,1,5,6,8,19,24,10,20,13 G)21 F)|5.Signs of reinforcent blowing:8. Bank scouring at D/stream end:24. Hairline cracks showing thro paintwork. These are vert. Some reinforcnt showing D/stream end:10. Signs of reinforcnt starting to blow:21. Depress at each end over Abuts.
14 06 88:
05 Very isolated spalling due to lack of reinforcement cover.
10} Reinforcement exposed in a number of locations (photos).
13}
21 Slight settlement behind abutments.
24 Spalling beneath coping feature in several places in both parapets (photos).

Principle.date 00-00-0000
Severity.. 3.1 Comments.....

Proposed Works..
Comments..... S AJ

07-07-93

5,6,8,21,22G/13F/10,11,20,24,28P/

5 Isolated spalling

10 Reinforcement exposed and corroding. Shear cracks near supports. Visible sagging at midspan.

11+13 Reinforcement exposed and corroding in a number of locations

20 No evidence of a waterproofing membrane

24/28 Reinforcement exposed and corroding in a number of locations beneath coping.

APPENDIX E - Structure Inspection Report

DEPARTMENT OF HIGHWAYS AND PLANNING

STRUCTURE INSPECTION REPORT

Signed ....G.R. Garner.....
Date ..4/5/94.....

O.S. Ref TF218211..... Type Overbridge.. Bridge No 22.11.81.....
Division South..... Parish Spalding.... Route ..C.Rd.....

Item No.	Part Of Structure	Condition	Item No.	Comments
1	Foundations	—	5	General condition good. Minor isolated spalling
2	Inverts or Aprons	—		
3	Fenders	—	10	Reinforcement exposed and corroding. Shear cracks near supports. Visible sagging at midspan
4	Piers or Columns	—		
5	Abutments	Good		
6	Wing Walls	Good		
7	Retaining Walls or Revetments	—		
8	Approach Embankments	Good		
9	Bearings	—	11	Reinforcement exposed and corroding in a number of locations
10	Main Beams	Poor	13	
11	Transverse Beams	Poor		
12	Diaphragms or Bracings	—		
13	Concrete Slab	Fair		
14	Metal Deck Plates	—	20	No evidence of a waterproofing membrane.
15	Jack Arches	—		
16	Arch Ring	—		
17	Spandrels	—		
18	Tie Rods	—	24/28	Reinforcement exposed and corroding in a number of locations beneath coping.
19	Drainage Systems	—		
20	Waterproofing	Poor		
21	Surfacing	Good		
22	Service Ducts	Good		
23	Expansion Joints	—		
24	Parapets Rails	Poor		
25	Access Gantries or Walkways	—		
26	Machinery	—		
27	Armco	—		
28	Parapets - Edgebeams	Poor		
29				
30				
				CONDITION REPORT (Mark good, fair, poor use comments columns for details)

PROPOSED REMEDIAL WORKS:-

Prepared by .....
Date .....

Item No.	Description of Work
	Not Applicable

When work is completed please sign below and return to Client
Work Completed Signed Resident Engineer
Date

APPENDIX F - Grillage Model and Summary of Results

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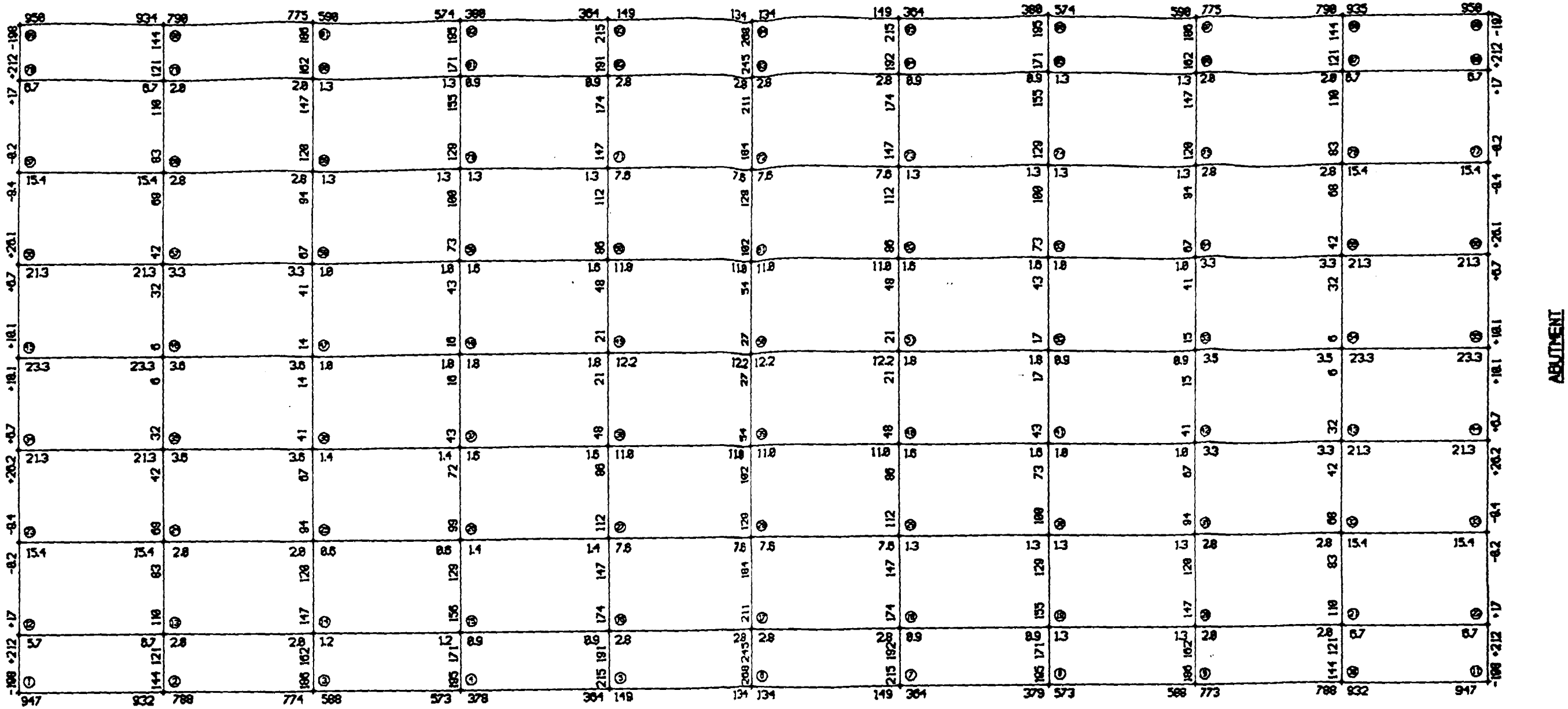
SPAN OF DECK



KEY

- ⑤ JOINT POSITIONS
- 15.4 JOINT REACTIONS
- ⟷ MEMBER
- ◆ JOINT

JOINT REACTIONS (KN)
FULL DEAD AND IMPOSED LOAD

REV.	AMENDMENTS	REV'D BY	DATE

PROJECT
HORSESHOE BRIDGE

SECTION
BRIDGE DECK ANALYSIS (SHEET 1 OF 3)

DRAWING No.	SCALE	DATE
11714/1000	1:20	FEB 94

DRAWN BY	CHECKED
MG	DJP

STATUS
PRELIMINARY

BURKS GREEN & PARTNERS
Consulting Civil & Structural Engineers

SPAN OF DECK

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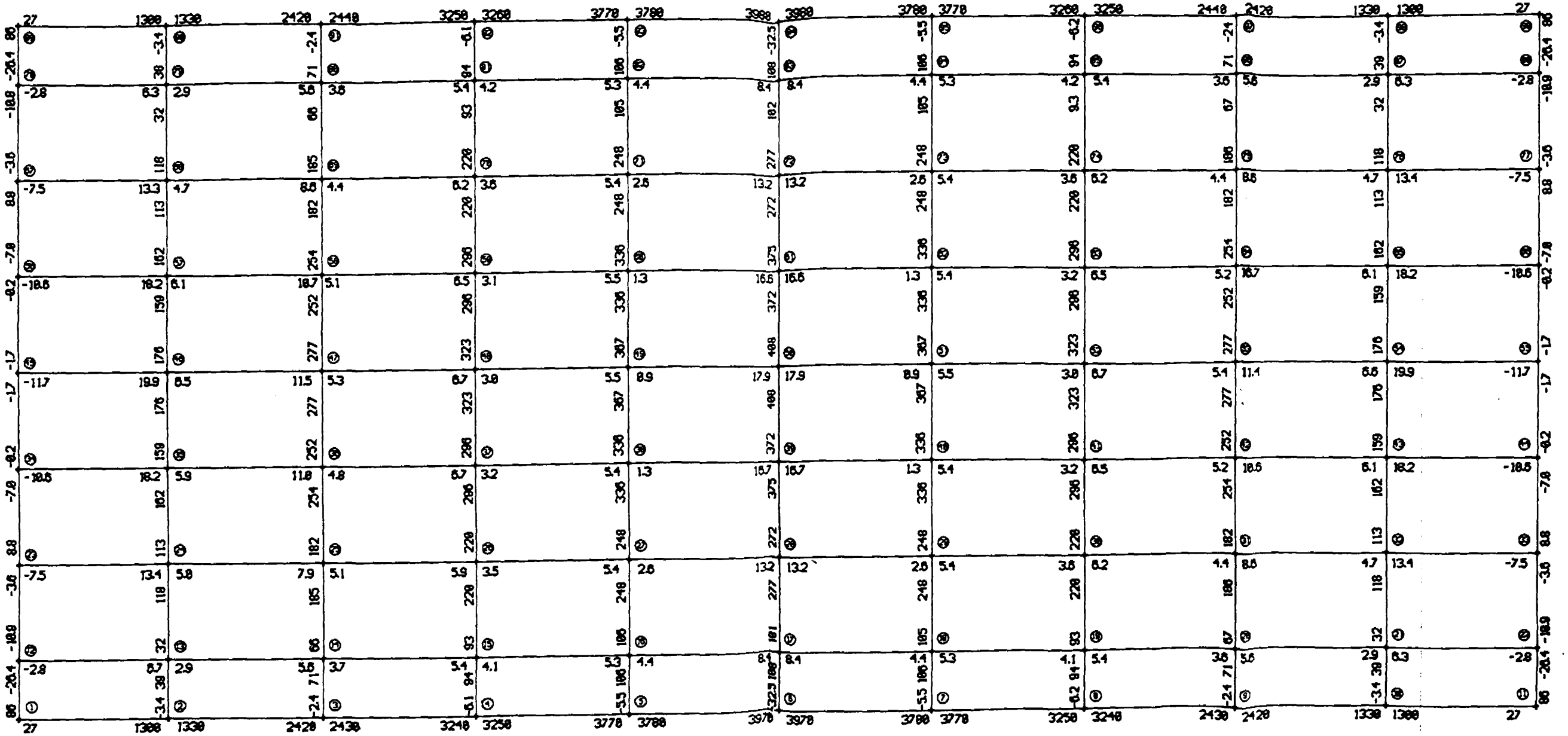

BENDING MOMENTS (KNm)
FULL DEAD AND IMPOSED LOAD

KEY

⑤ JOINT POSITIONS
15.4 JOINT BENDING MOMENTS
←→ MEMBER
• JOINT

REV.	AMENDMENTS	REV'D BY	DATE

PROJECT
HORSESHOE BRIDGE

SECTION
BRIDGE DECK ANALYSIS (SHEET 2 OF 3)

DRAWING No.	SCALE	DATE
11714/1001	1:20	FEB 94

DRAWN BY	CHECKED
MG	DJP

STATUS
PRELIMINARY

BURKS GREEN & PARTNERS
Consulting Civil & Structural Engineers

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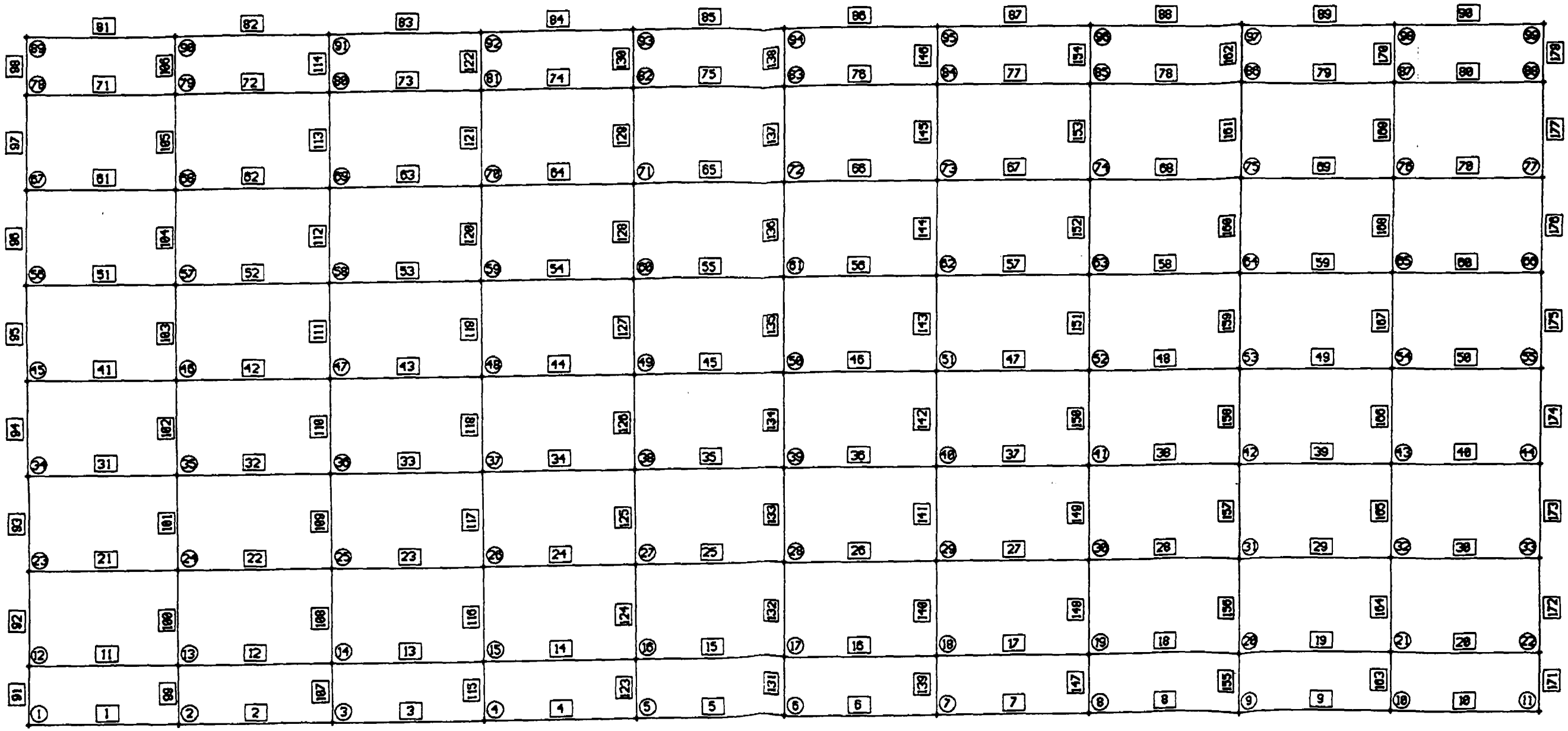
SPAN OF DECK



KEY

⑤ JOINT POSITIONS

[154] MEMBER NUMBER

←→ MEMBER

◆ JOINT

SUPER STRESS ANALYSIS,
MEMBER AND JOINT LAYOUT

REV.	AMENDMENTS	REV'D BY	DATE

PROJECT
HORSESHOE BRIDGE

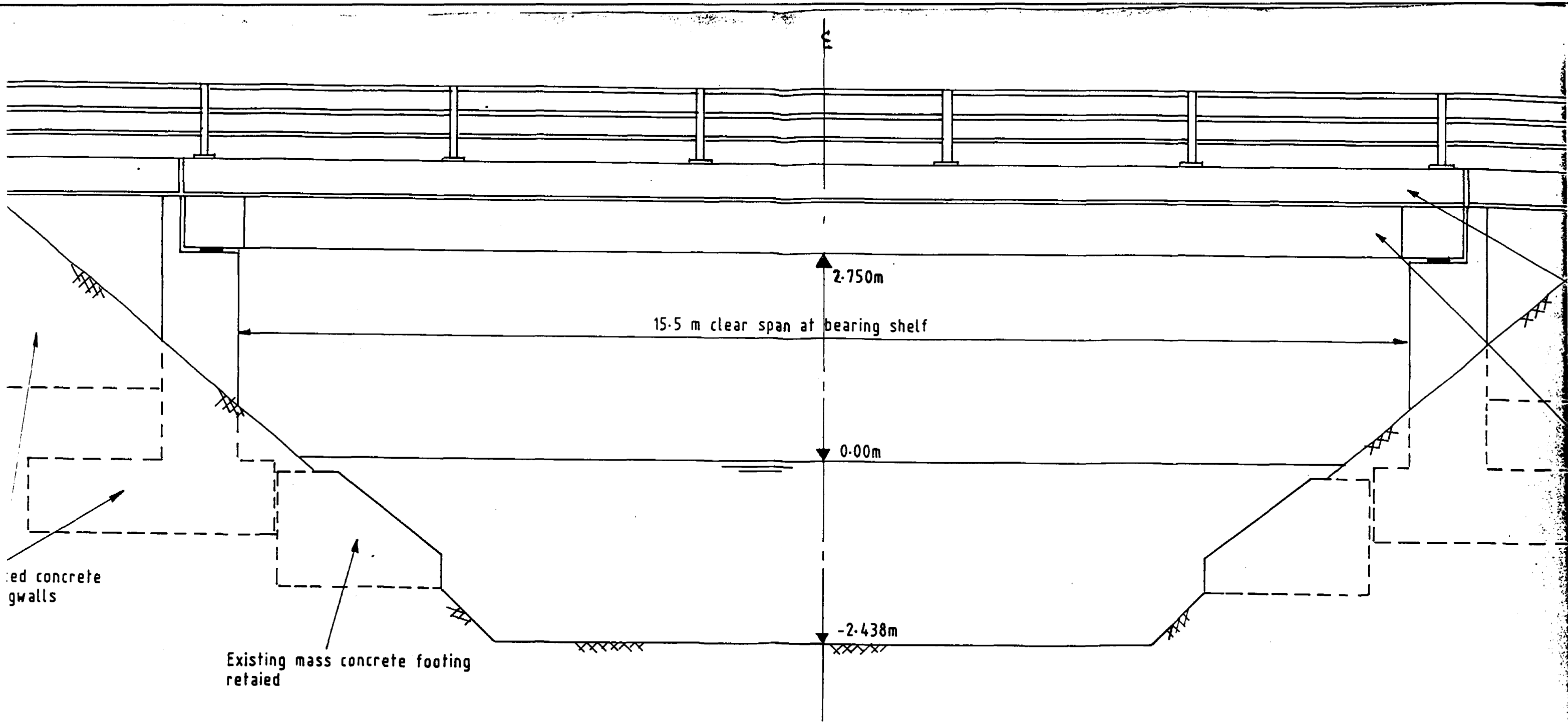
SECTION
BRIDGE DECK ANALYSIS (SHEET 3 OF 3)

DRAWING No.	SCALE	DATE
11714/1002	1:20	FEB 94

DRAWN BY	CHECKED
MG	DJP

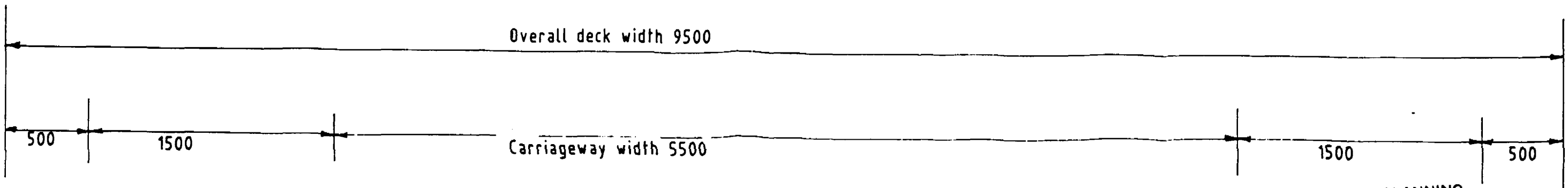
STATUS
PRELIMINARY

BURKS GREEN & PARTNERS
Consulting Civil & Structural Engineers



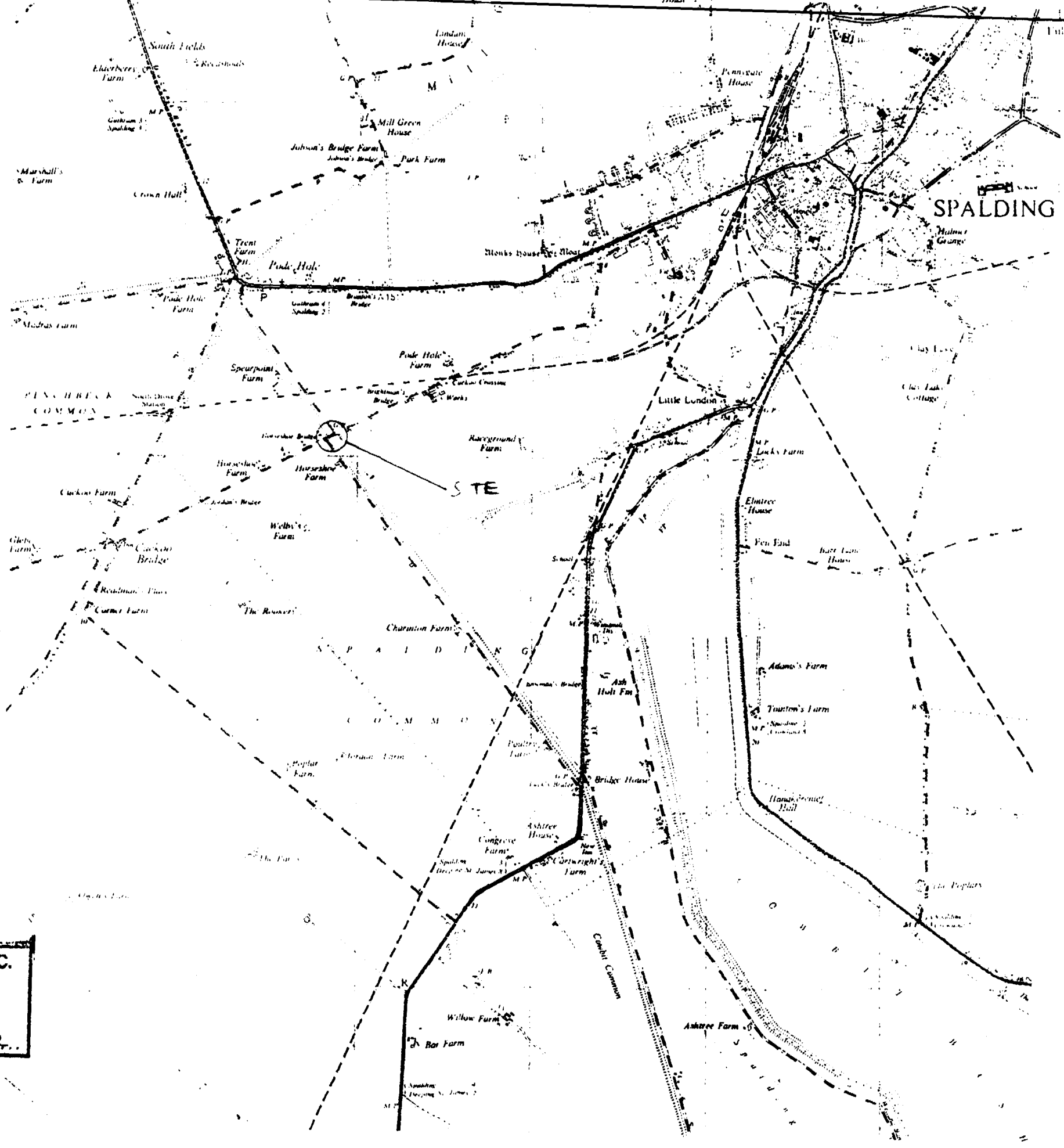
PROPOSED SOUTH ELEVATION Scale :- 1 : 50

SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF 0092/92

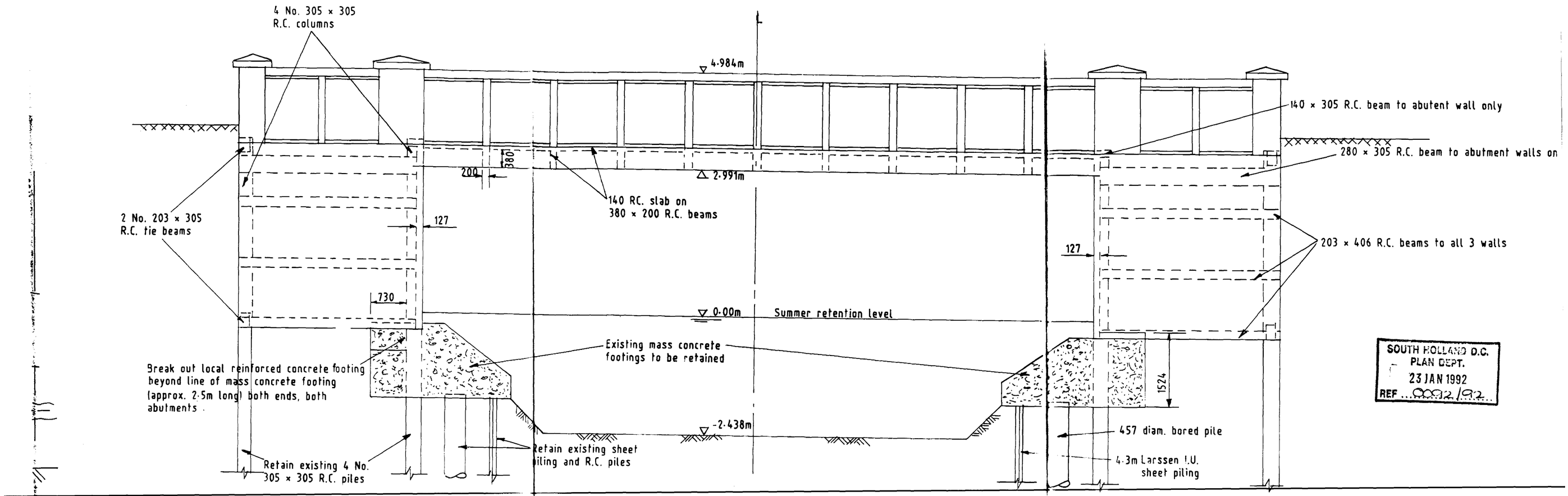


Top of slab to follow slope of surfacing

HIGHWAYS AND PLANNING
24 DEC 1991



SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF ...0092/92...



EXISTING SOUTH ELEVATION Scale:- 1:50

SOUTH HOLLAND D.C.
PLAN DEPT.
23 JAN 1992
REF ...0092/92...