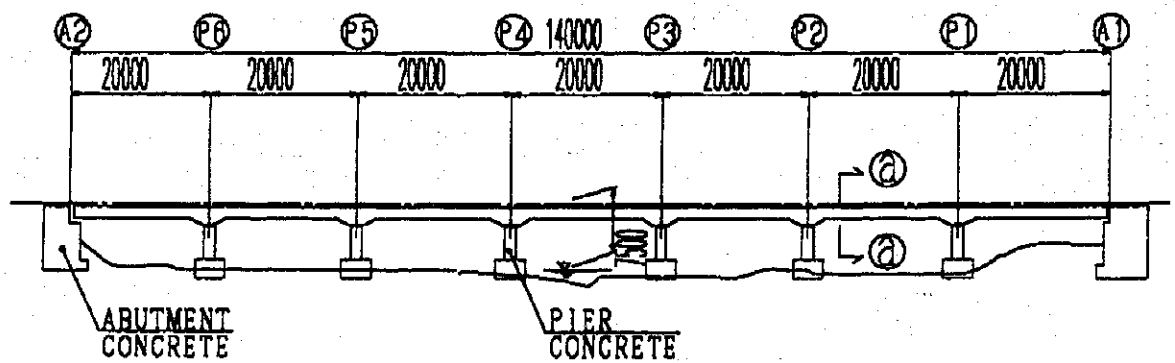
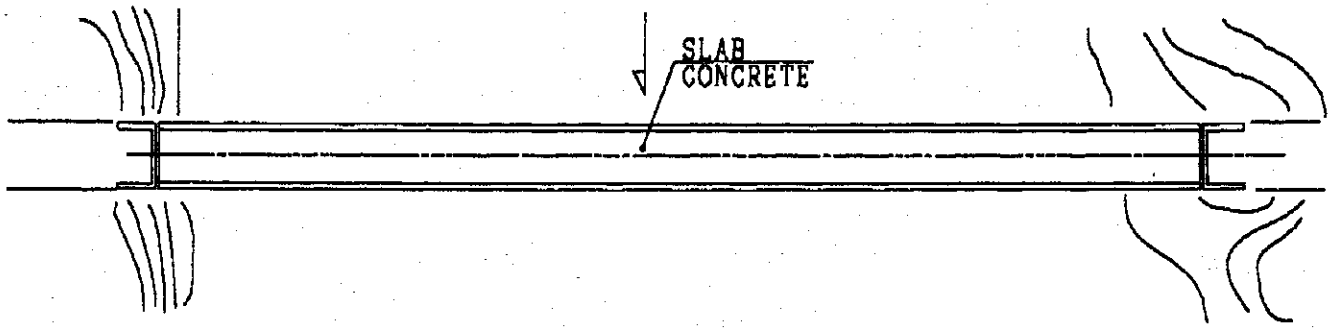
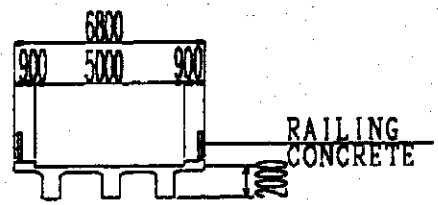
(10) CAUTIN

BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	CAUTIN	BRIDGE LENGTH	140.00m
REGION	IX	BRIDGE WIDTH	7.00m
ROUTE NAME		TRAFFIC VOLUME	

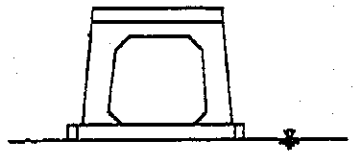
NOTE Same structure type and year of built as QUINCHILCA.
Using roller bearing shoe at the both end of girder.
Concrete members are looked to be weathered intensity.







SECTION ⓐ-ⓐ

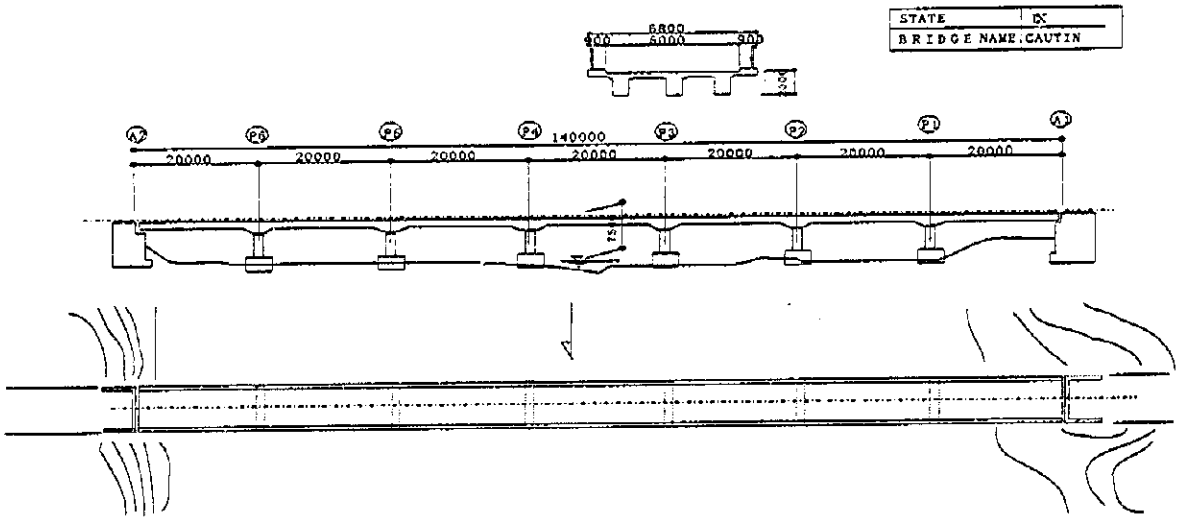


PIER P1~P6

ABUTMENT A1, A2

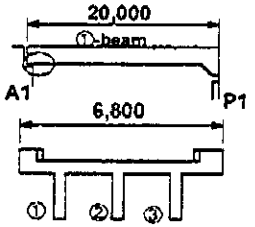
I-01(I-II)

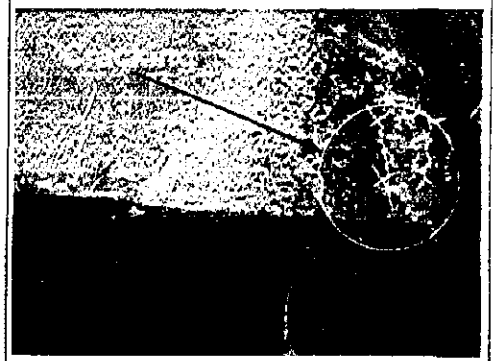
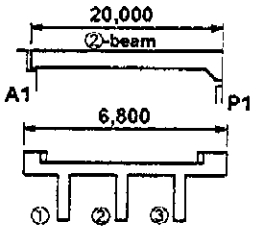
BRIDGE NO. C BRIDGE NAME : CAUTIN

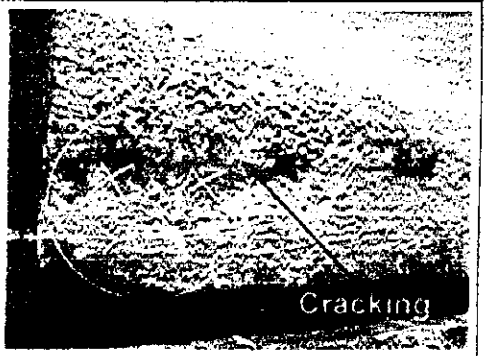


B. DAMAGE RANK AND DECISION ON REHABILITATION

(1) Concrete Materials

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">Beam</td><td> 

X: main part
Y< 0.2mm
Z: over 50cm</td><td rowspan="3">Cracking</td><td>Cracking
<table><tr><th>X</th><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="4">Large</td><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>III</td></tr><tr><td rowspan="2">Medium</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td>Small</td><td>III</td><td>IV</td></tr><tr><td rowspan="3">Small</td><td rowspan="2">Small</td><td>Large</td><td>V</td><td>V</td></tr><tr><td>Small</td><td></td><td>V</td></tr></table>Condition is sound</td><td>V</td><td>  </td></tr>
<tr><td> 

X: main part
Y< 0.2mm
Z: over 50cm</td><td>Cracking
<table><tr><th>X</th><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="4">Large</td><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>III</td></tr><tr><td rowspan="2">Medium</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td>Small</td><td>III</td><td>IV</td></tr><tr><td rowspan="3">Small</td><td rowspan="2">Small</td><td>Large</td><td>V</td><td>V</td></tr><tr><td>Small</td><td></td><td>V</td></tr></table>Condition is sound</td><td>V</td><td> 
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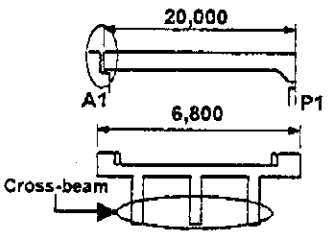
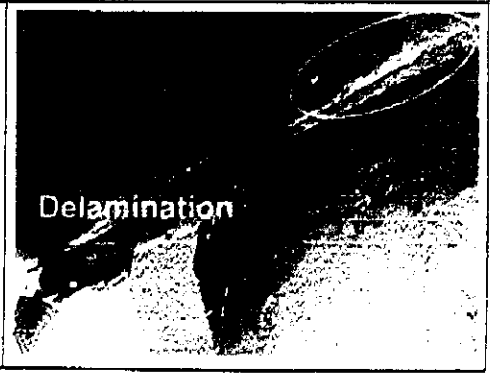
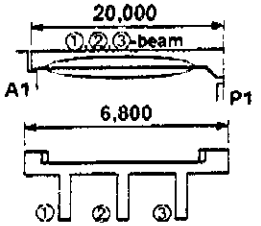
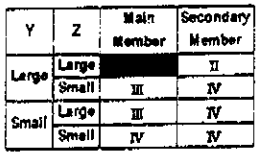
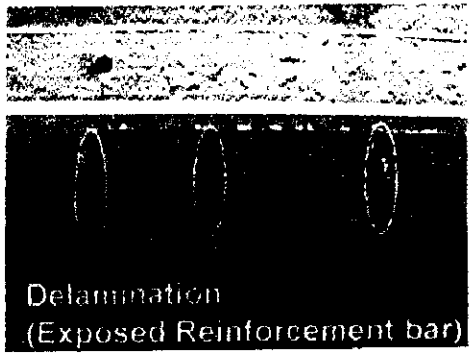
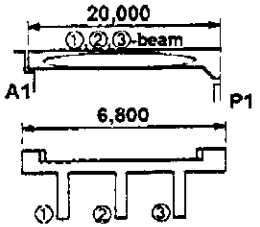
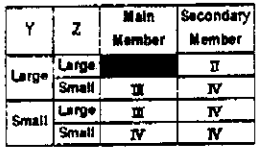
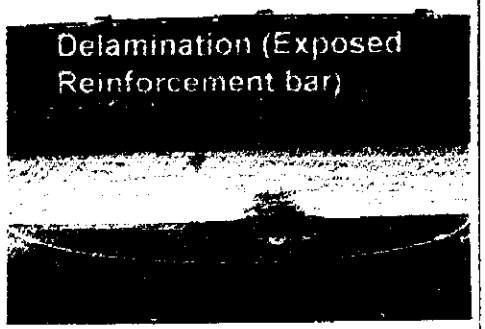
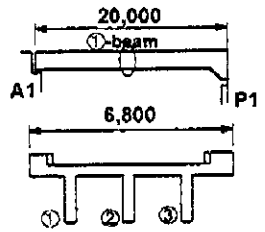
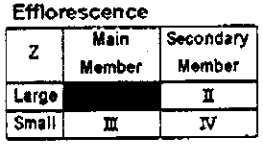
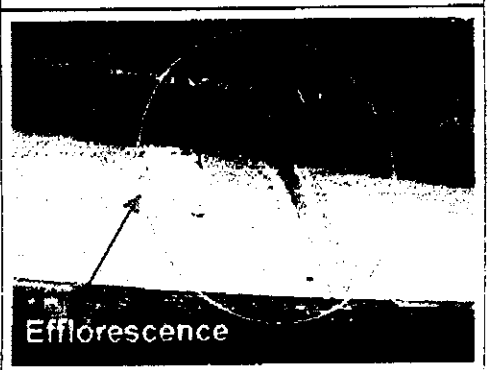
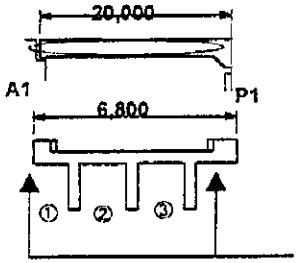
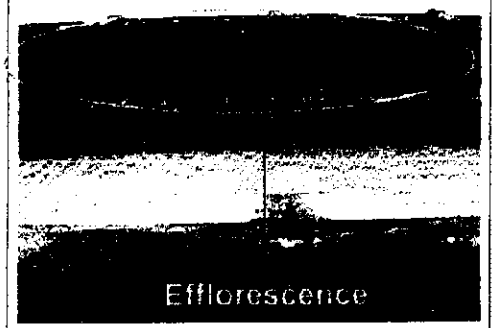
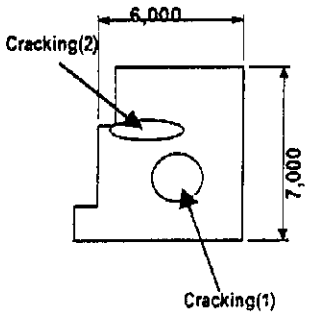
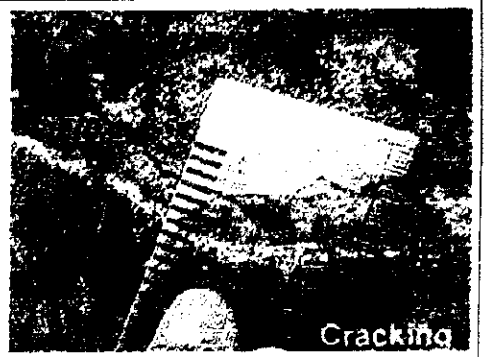
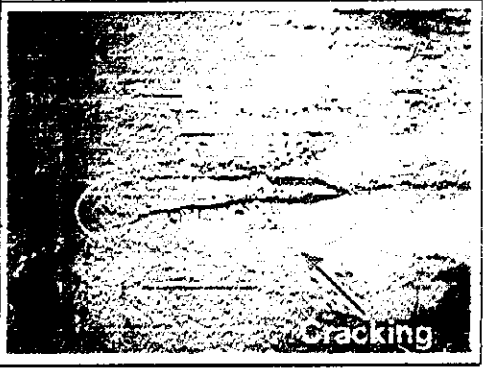
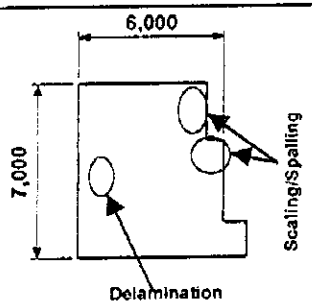
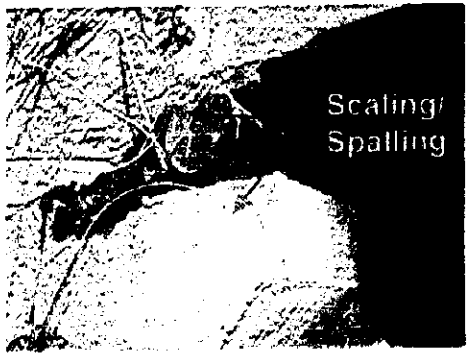
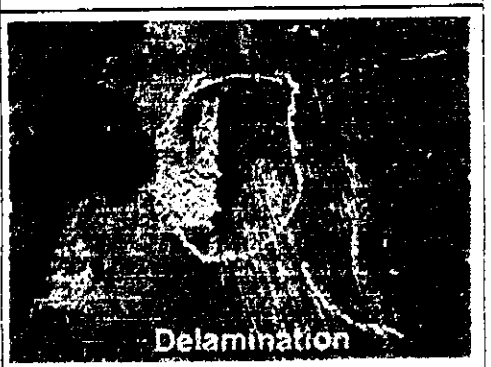
<tr><td> 

Y: no exposed reinforcement bar
Z: over 0.1m2</td><td>Delimination</td><td><table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>III</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
</table>

Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Beam	 Y: exposed reinforcement bar Z: over 0.1m2	Delamination	 Degree of damage is large, so that rehabilitation must be needed.	II	
	 Y: exposed reinforcement bar Z: over 0.1m2		 Degree of damage is large, so that rehabilitation must be needed.	II	
	 Z: over 0.1m2	Efflorescence	Efflorescence  Degree of damage is large, so that rehabilitation must be needed.	II	

Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Slab	 Z: over 0.1m2	Efflorescence	Efflorescence Z: Large — Main Member: Large; Secondary Member: II Z: Small — Main Member: III; Secondary Member: IV Degree of damage is large, so that rehabilitation must be needed.	II	
A1 Abutment	 Cracking (1) X: main part Y ≧ 0.3mm Z: less 50cm	Cracking	Cracking X: Large, Y: Large, Z: Large — Main Member: Large; Secondary Member: II X: Large, Y: Large, Z: Small — Main Member: II; Secondary Member: III X: Large, Y: Medium, Z: Large — Main Member: III; Secondary Member: IV X: Large, Y: Medium, Z: Small — Main Member: III; Secondary Member: IV X: Small, Y: Small, Z: Large — Main Member: V; Secondary Member: V X: Small, Y: Small, Z: Small — Main Member: V; Secondary Member: V Degree of damage is large, so that rehabilitation must be needed.	II	
	Cracking (2) X: main part Y ≧ 0.3mm Z: over 50cm		Cracking X: Large, Y: Large, Z: Large — Main Member: II; Secondary Member: II X: Large, Y: Large, Z: Small — Main Member: III; Secondary Member: III X: Large, Y: Medium, Z: Large — Main Member: III; Secondary Member: IV X: Large, Y: Medium, Z: Small — Main Member: III; Secondary Member: IV X: Small, Y: Small, Z: Large — Main Member: V; Secondary Member: V X: Small, Y: Small, Z: Small — Main Member: V; Secondary Member: V Degree of damage is large, so that rehabilitation must be needed.	II	

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">A1 Abutment</td><td> 

Scaling/ Spalling
Y: no exposed reinforcement bar
Z: less 1.0m2</td><td>Scaling/Spalling</td><td>Scaling/ Spalling
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, the degree must be recorded.</td><td>IV</td><td> 
</td></tr>
<tr><td>Delamination
Y: exposed reinforcement bar
Z: less 1.0m2</td><td>Delamination</td><td>
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Although damage rank is III, reinforcement bar was exposed so that rehabilitation must be needed.</td><td>III*</td><td> 
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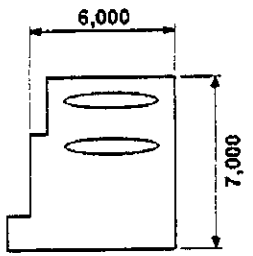
<tr><td> 

Y: no exposed reinforcement bar
Z: less 1.0m2</td><td>Honeycombs</td><td>Honeycombs
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
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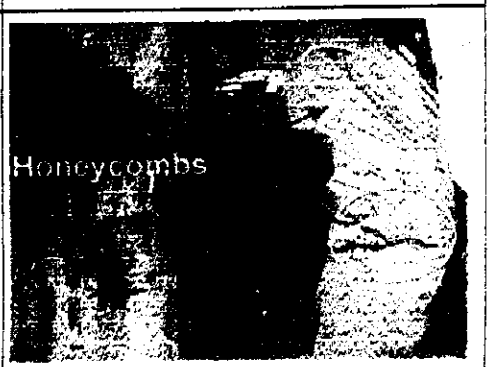
</table>
Damage was observed, the degree must be recorded.</td><td>IV</td><td> 
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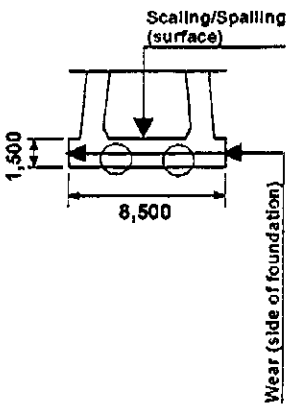
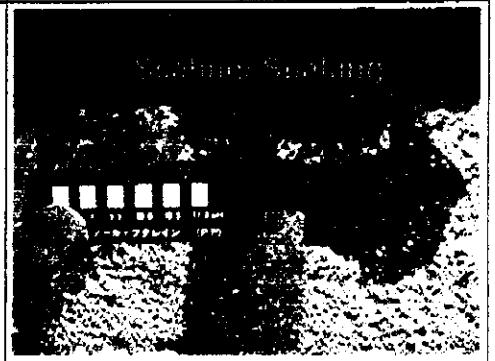
<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">P1 Pier Foundation</td><td rowspan="3"> 

Scaling/ Spalling
Y: no exposed reinforcement bar
Z: over 1.0m2

Wear (1)
Y: no exposed reinforcement bar
Z: over 1.0m2

Wear (2)
Y: exposed reinforcement bar
Z: less 1.0m2
(local part)</td><td>Scaling/Spalling</td><td>Scaling/ Spalling
<table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be needed.</td><td>III</td><td>  </td></tr>
<tr><td rowspan="2">Wear</td><td><table><tr><th>Y</th><th>Z</th><th>All members</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td></tr><tr><td>Small</td><td>III</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td></tr><tr><td>Small</td><td>IV</td></tr></table>
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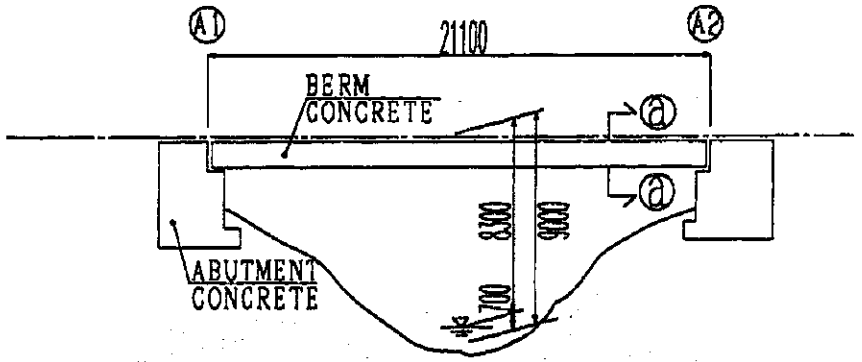
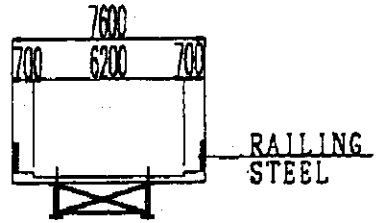
</td></tr>
<tr><td><table><tr><th>Y</th><th>Z</th><th>All members</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td></tr><tr><td>Small</td><td></td></tr><tr><td rowspan="2">Small</td><td>Large</td><td>III</td></tr><tr><td>Small</td><td>IV</td></tr></table>
Although damage rank is III, reinforcement bar was exposed due to wear so that rehabilitation must be needed.</td><td>III*</td><td> 
</td></tr>
</table>

(11) EL INDIO

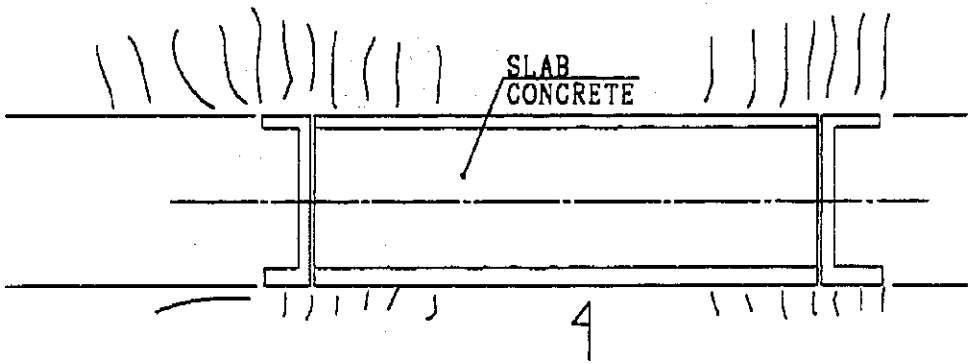
BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	EL INDIO	BRIDGE LENGTH	21.10m
REGION	X	BRIDGE WIDTH	7.60m
ROUTE NAME		TRAFFIC VOLUME	

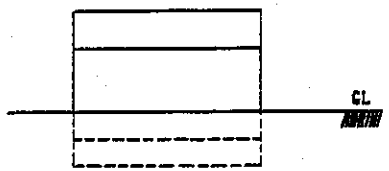
NOTE Typical steel plate girder with concrete slab.
Distance between main beams has been measured 3.5M long, different from as standard.





SECTION ⓐ-ⓐ

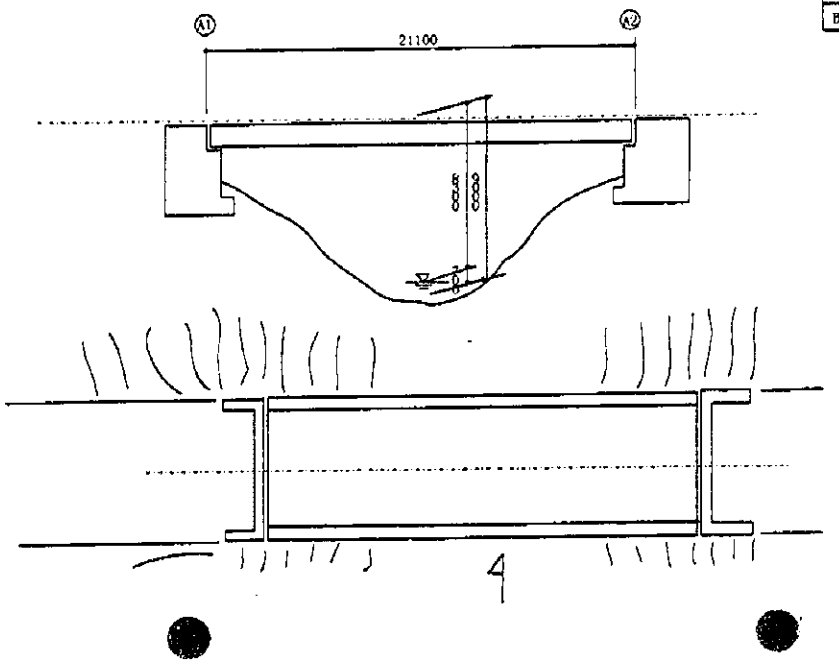




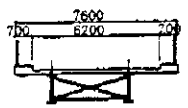
ABUTMENT A1, A2

(II-1)11-1

BRIDGE NO.B BRIDGE NAME: EL INDIO

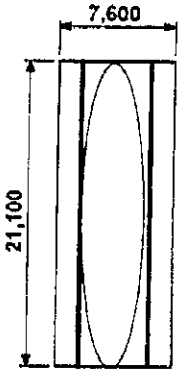


STATE	IX
BRIDGE NAME	EL INDIO

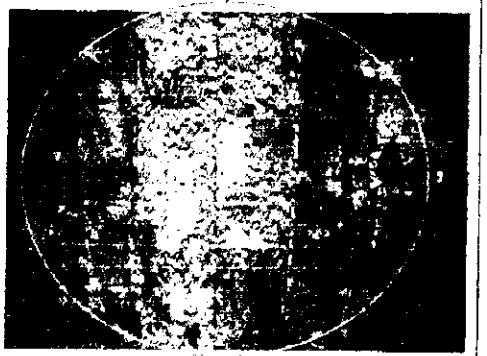
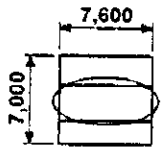


B. DAMAGE RANK AND DECISION ON REHABILITATION

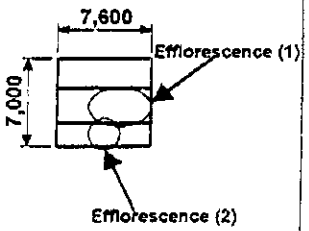
(1) Concrete Materials

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="2">Slab</td><td rowspan="2"> 

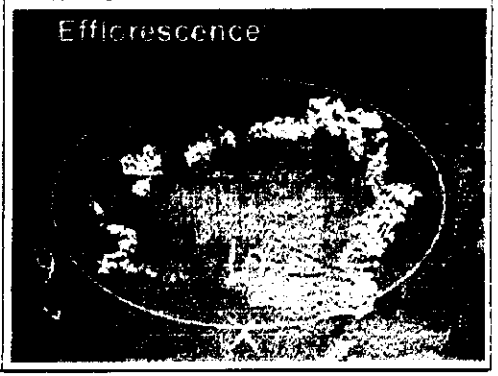
Scaling/ Spalling
Y: no exposed reinforcement bar
Z: over 0.1m2

Efflorescence
Z: over 0.1m2</td><td>Scaling/Spalling</td><td>
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td rowspan="2">Scaling/ Spalling: All area
 
Efflorescence</td></tr>
<tr><td>Efflorescence</td><td>
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td></td><td>II</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td></tr>
<tr><td>A1 Abutment</td><td> 

Y: no exposed reinforcement bar but deep
Z: over 1.0m2</td><td>Scaling/Spalling</td><td>
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
</table>

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="2">A1 Abutment</td><td rowspan="2"> 

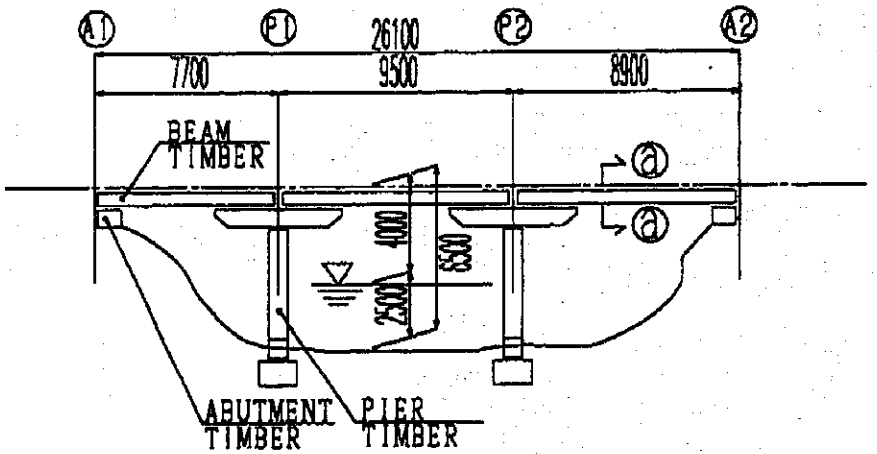
Efflorescence (1)
Z: less 1.0m2

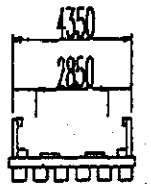
Efflorescence (2)
Z: less 1.0m2 but excessive damage</td><td rowspan="2">Efflorescence</td><td>
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
<tr><td>
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Although damage rank is III, degree of efflorescence damage is excessive so that rehabilitation must be needed.</td><td>*
III</td><td> 
</td></tr>
</table>

(12) QUILLEN

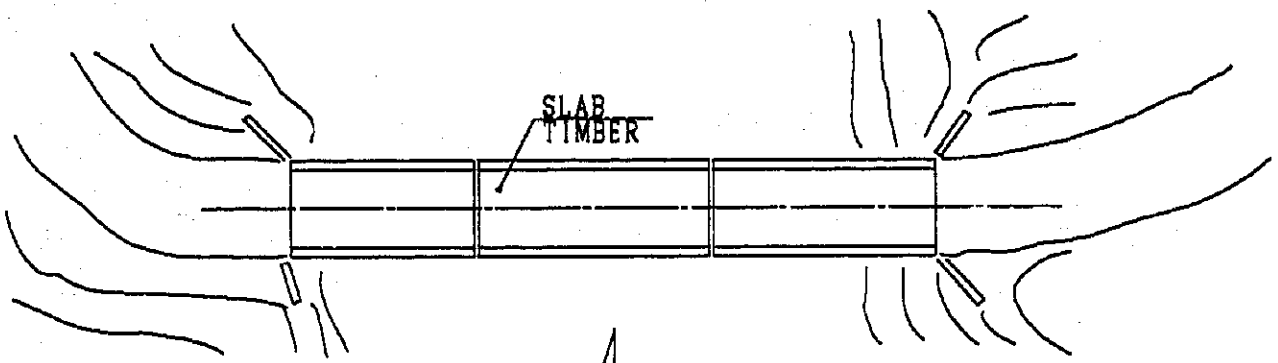
BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	QUILLEN	BRIDGE LENGTH	26.10m
REGION	Ⅸ	BRIDGE WIDTH	4.35m
ROUTE NAME		TRAFFIC VOLUME	

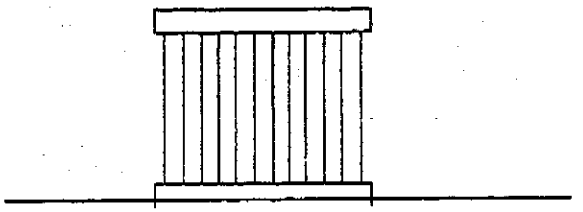
NOTE





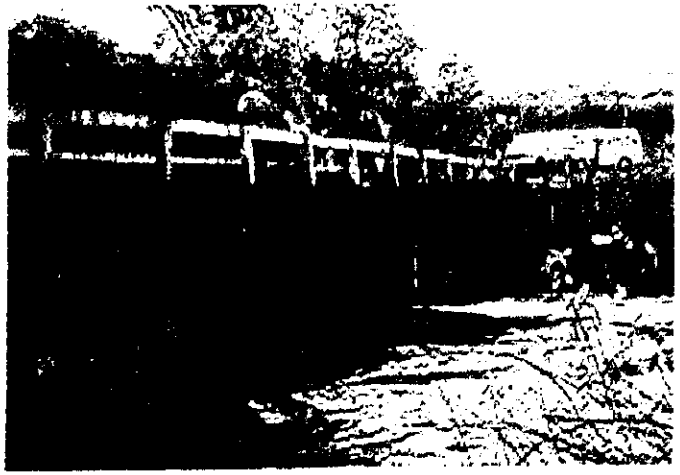
SECTION ⓐ-ⓐ



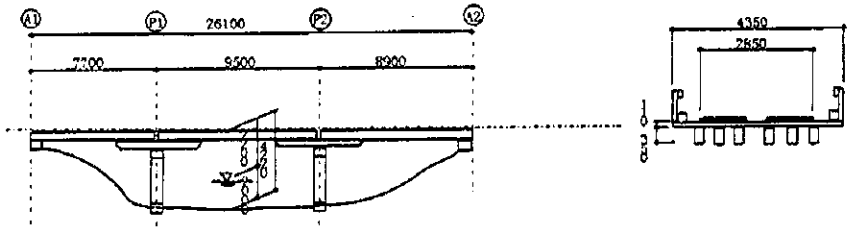


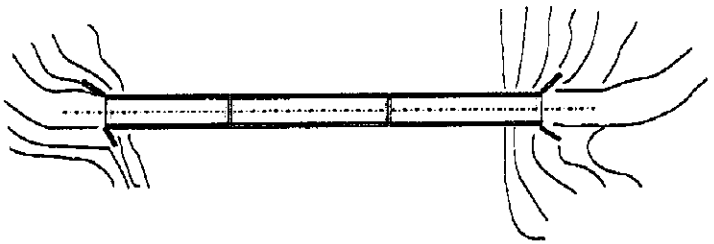
PIER P1, P2

BRIDGE NO. C BRIDGE NAME: QUILLEN



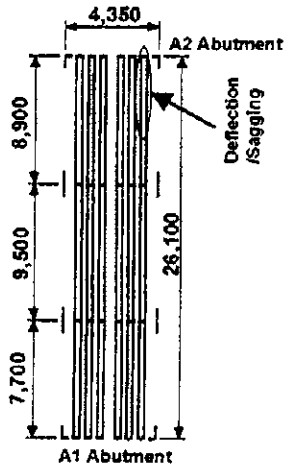
STATE	IX
BRIDGE NAME	QUILLEN





B. DAMAGE RANK AND DECISION ON REHABILITATION

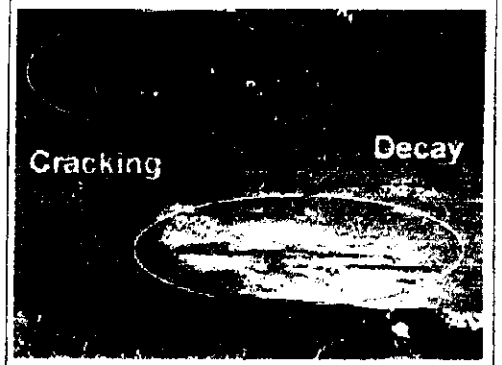
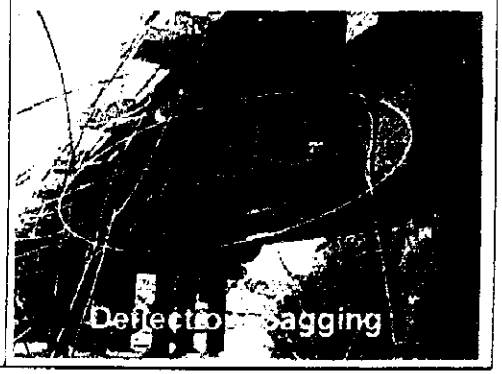
(1) Timber Materials

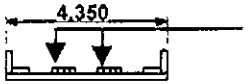
<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">Beam</td><td rowspan="3"> 

Cracking and Decay were observed to whole members.

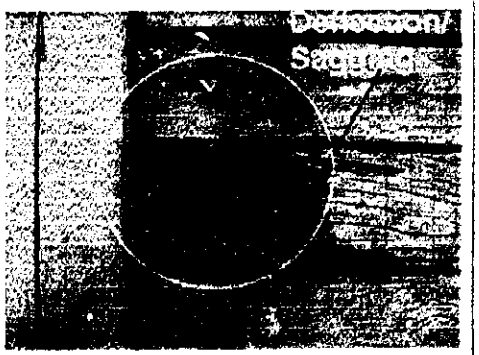
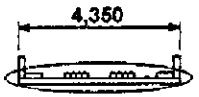
Decay
Z: whole area and excessive damage

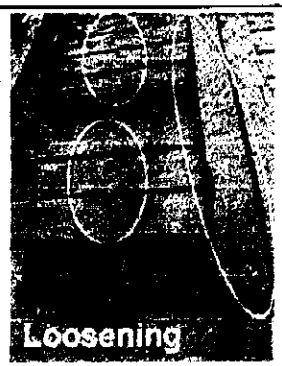
Cracking
X: main part
Y: large (visible)

Deflection/ Sagging
main member
Y: excessive damage</td><td>Decay</td><td><table><tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr><tr><td>Large</td><td></td><td>III</td></tr><tr><td>Small</td><td>III</td><td>IV</td></tr></table>Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td> 
</td></tr>
<tr><td>Cracking</td><td><table><tr><th>X</th><th>Y</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td></td><td>III</td></tr><tr><td>Small</td><td>III</td><td>III</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td>  </td></tr>
<tr><td>Deflection /Sagging</td><td><table><tr><th>Y</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td>Large</td><td></td><td>II</td></tr><tr><td>Small</td><td>III</td><td>IV</td></tr></table>Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td> 
</td></tr>
</table>

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">Slab</td><td> 

Z: local part but excessive damage</td><td>Decay</td><td><table><tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr><tr><td>Large</td><td>II</td><td>III</td></tr><tr><td>Small</td><td></td><td>IV</td></tr></table>Although damage rank is III, the damage is excessive so that rehabilitation must be needed.</td><td>III*</td><td> 
</td></tr>
<tr><td> 

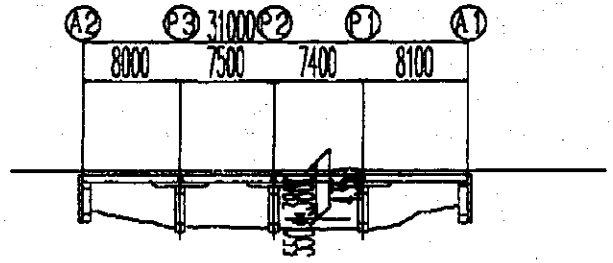
Deflection
Z: local part but excessive damage</td><td>Deflection /Sagging</td><td><table><tr><th>Y</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td></td><td>IV</td></tr></table>Although damage rank is III, the damage is excessive so that rehabilitation must be needed.</td><td>III*</td><td>  </td></tr>
<tr><td> 

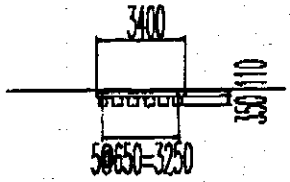
Z: whole connections and excessive loosening</td><td>Loosening</td><td><table><tr><th>Z</th><th>All Members</th></tr><tr><td>Large</td><td></td></tr><tr><td>Small</td><td>IV</td></tr></table>Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td> 
</td></tr>
</table>

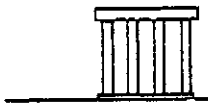
(13) POCULON

BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	POCULON	BRIDGE LENGTH	31.00m
REGION	X	BRIDGE WIDTH	3.40m
ROUTE NAME	R-666	TRAFFIC VOLUME	

NOTE The timber bridge is almost destroyed, or in other word only the remaining planks are useful for a pedestrian to pass one by one. No vehicle can pass at all any more.

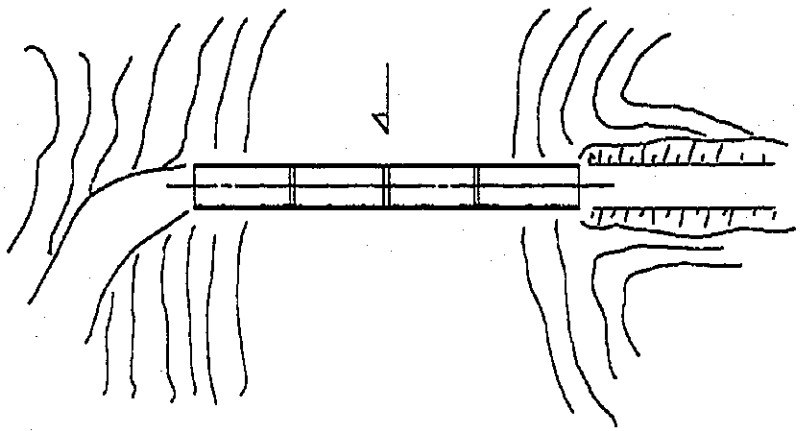






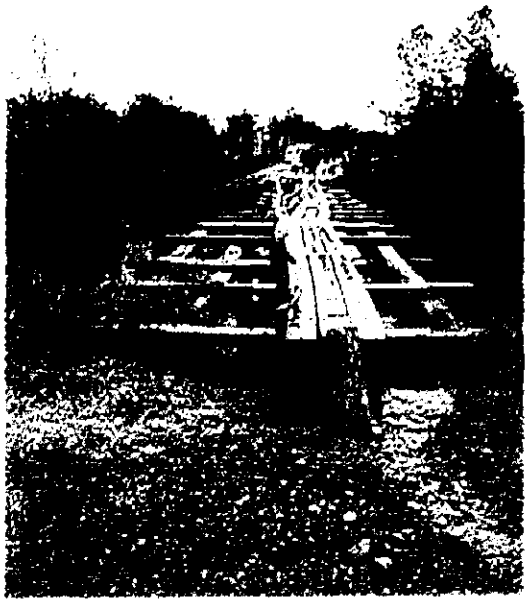
PIER P1~P3

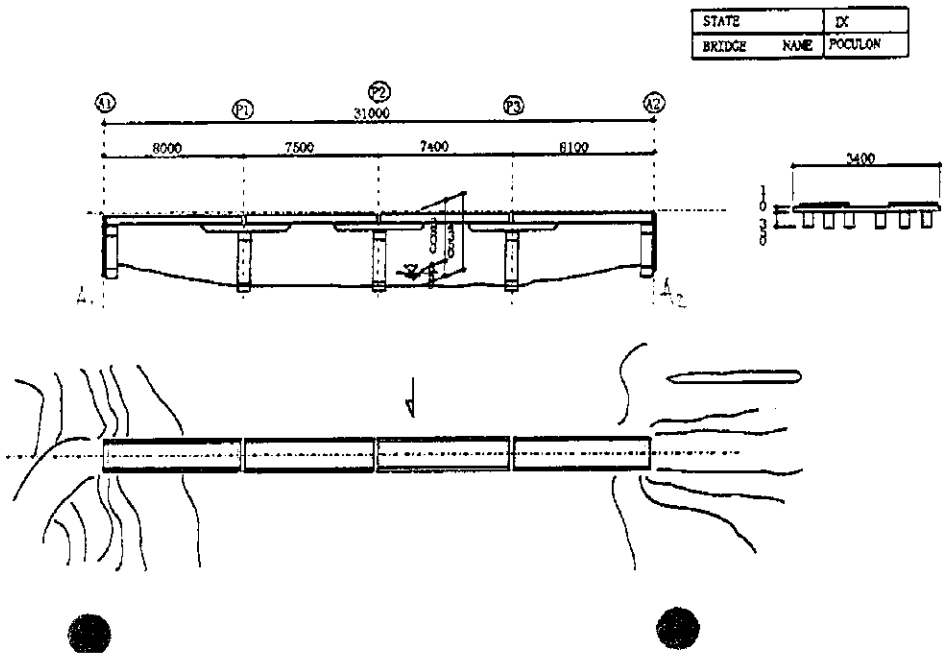
ABUTMENT A1, A2



(II-1)13-1

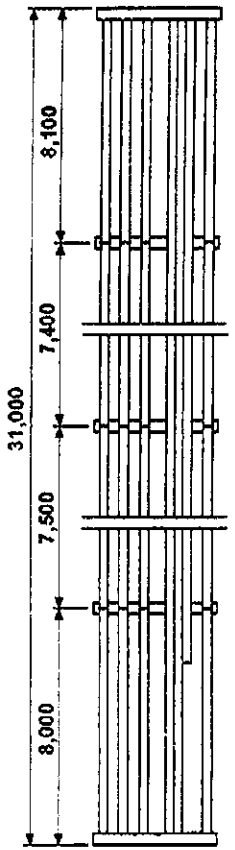
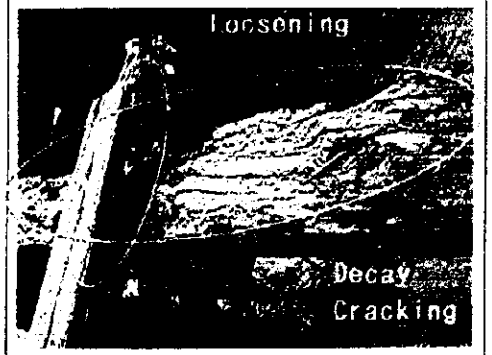
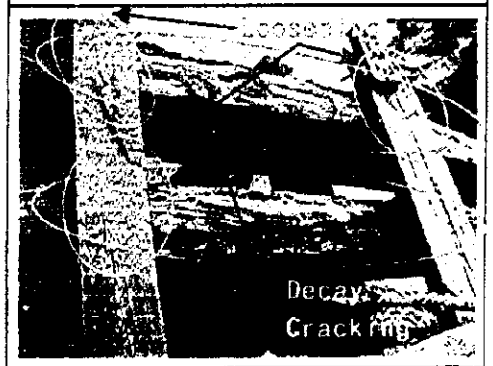
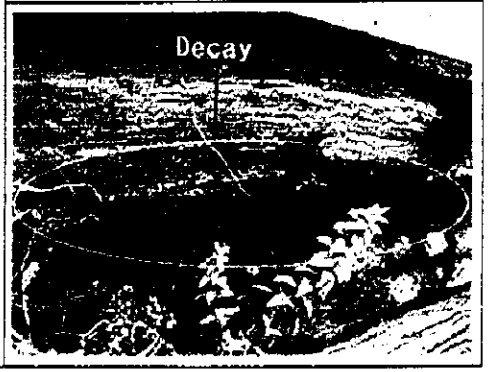
BRIDGE NO.99 BRIDGE NAME: POCULON

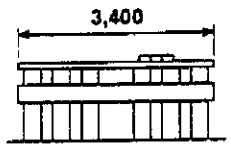


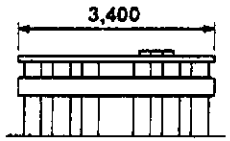
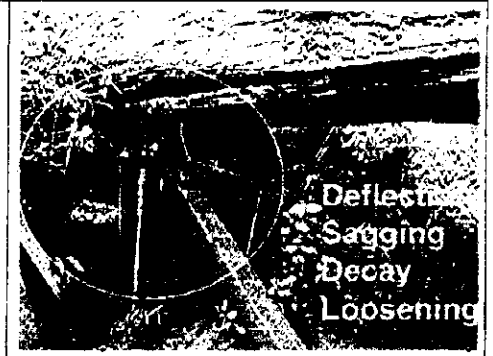
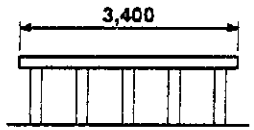


B. DAMAGE RANK AND DECISION ON REHABILITATION

(1) Timber Materials

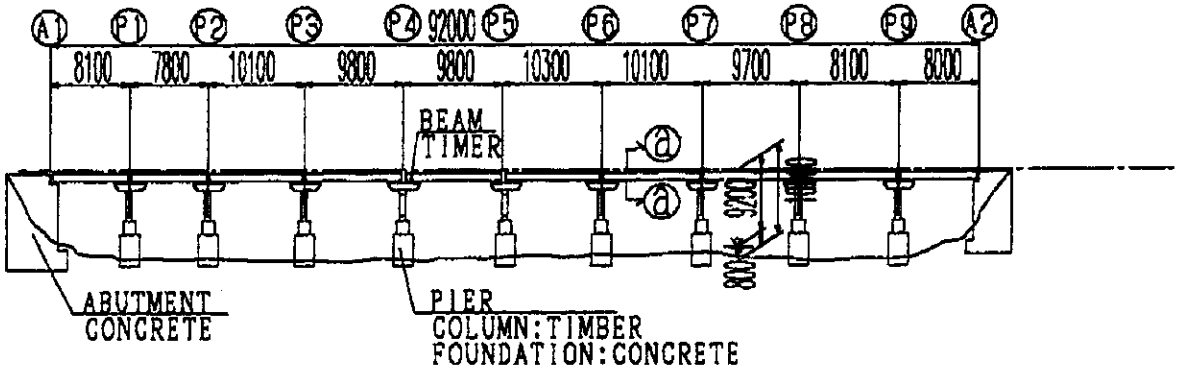
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Beam	 Whole members were damaged	Decay Cracking Loosening	· Impossible to repair	I	  

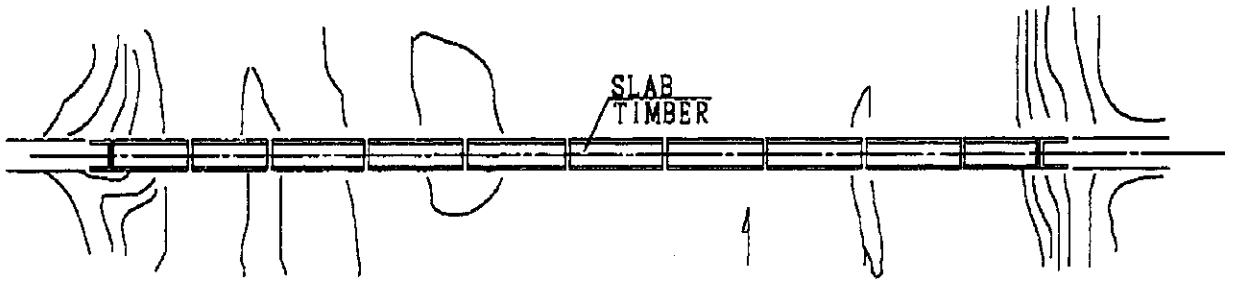
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Slab	See front page Whole members were damaged	Decay Cracking Loosening	Impossible to repair	I	 
A1 Abutment	 Whole members were damaged.	Decay Deflection /Sagging Loosening	Impossible to repair	I	

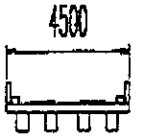
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A2 Abutment	 Whole members were damaged.	Decay Deflection /Sagging Loosening	Impossible to repair	I	
P1,P2,P3 Pier	 Whole members were damaged.	Decay Deflection /Sagging Loosening	Impossible to repair	I	
Hand Railing	No proper hand railing Whole members were damaged.	Decay Deflection /Sagging Loosening	Impossible to repair	I	

(14) MALLECO

BRIDGE NUMBER		YEAR OF BUILT		NOTE
BRIDGE NAME	MALLECO	BRIDGE LENGTH	92.00m	
REGION	X	BRIDGE WIDTH	4.50m	
ROUTE NAME	R-152	TRAFFIC VOLUME		

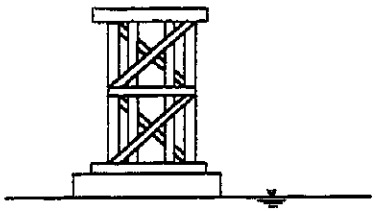






SECTION ⓐ-ⓐ

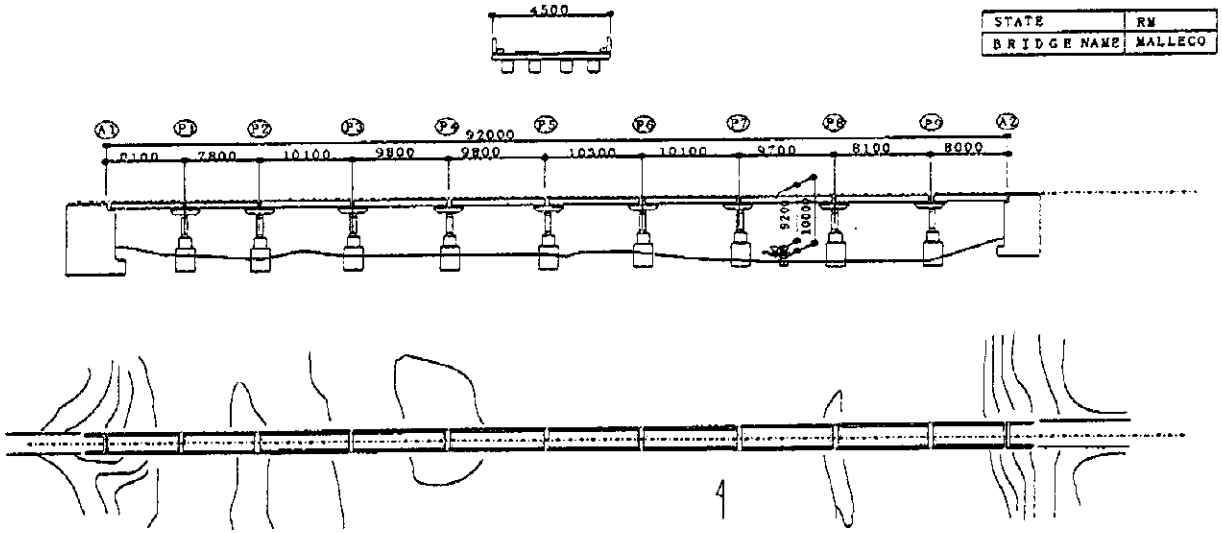
ABUTMENT A1-A2



PIER P1~P9

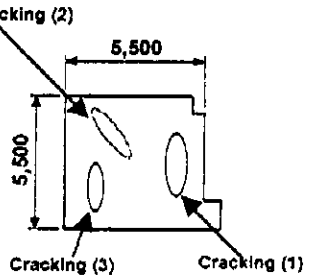
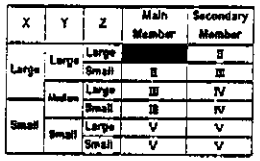
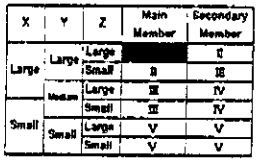
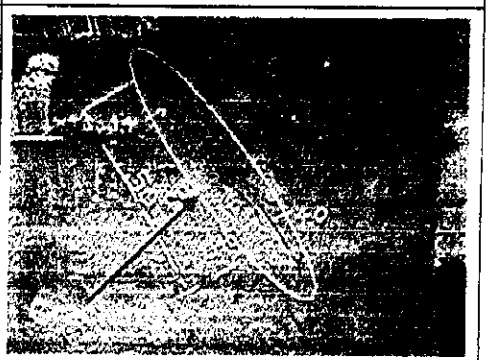
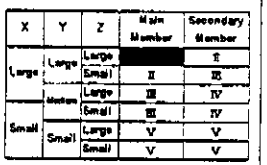
(II-1)14-1

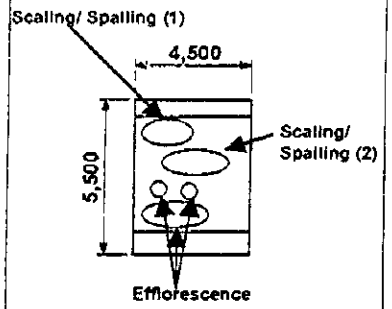
BRIDGE NO. 86 BRIDGE NAME: MALLECO



B. DAMAGE RANK AND DECISION ON REHABILITATION

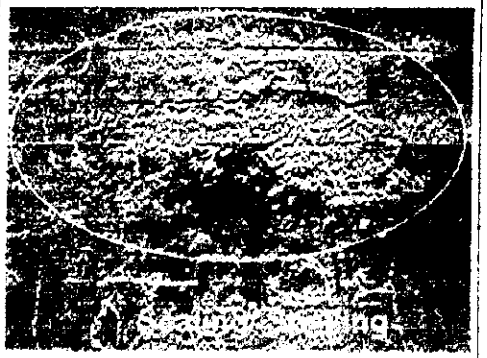
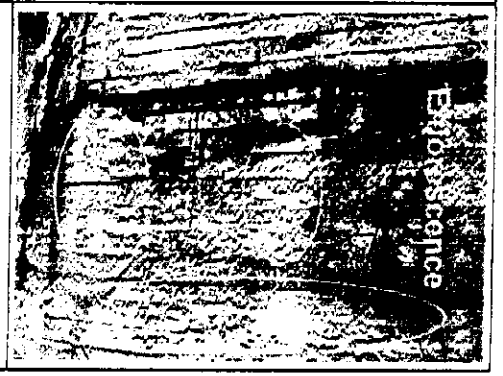
(1) Concrete Materials

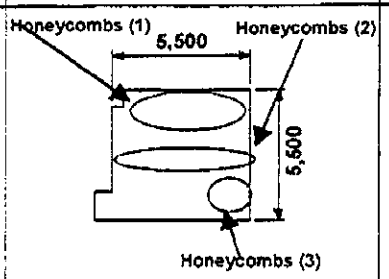
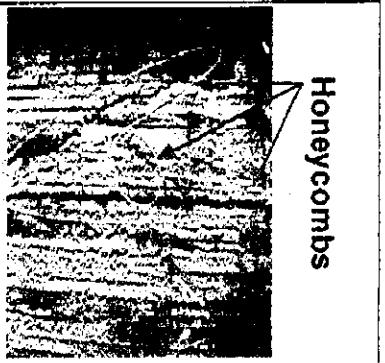
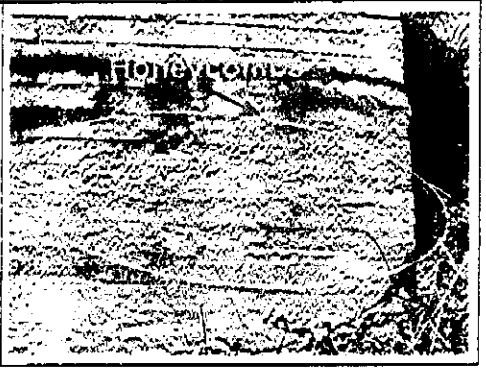
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A1 Abutment	 Cracking (1) X: main part Y ≧ 0.3mm Z: less 50cm Cracking (2) X: main part Y ≧ 0.3mm Z: less 50cm Cracking (3) X: main part Y ≧ 0.3mm Z: less 50cm	Cracking	 Degree of damage is large, so that rehabilitation must be needed.	II	
			 Degree of damage is large, so that rehabilitation must be needed.	II	
			 Degree of damage is large, so that rehabilitation must be needed.	II	

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr>
<td rowspan="3">A1 Abutment</td>
<td rowspan="3">


Scaling/ Spalling (1)
Y: no exposed reinforcement bar but deep
Z: over 1.0m2

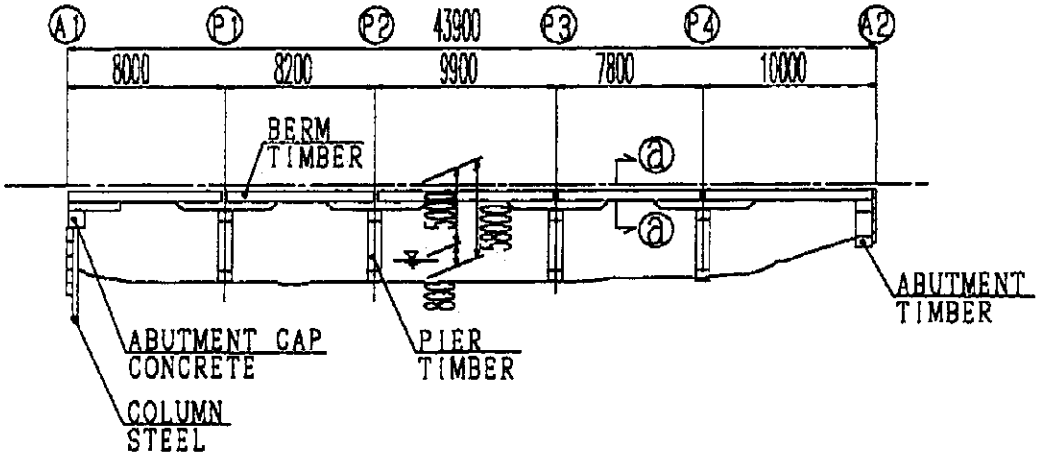
Scaling/ Spalling (2)
Y: no exposed reinforcement bar but deep
Z: over 1.0m2

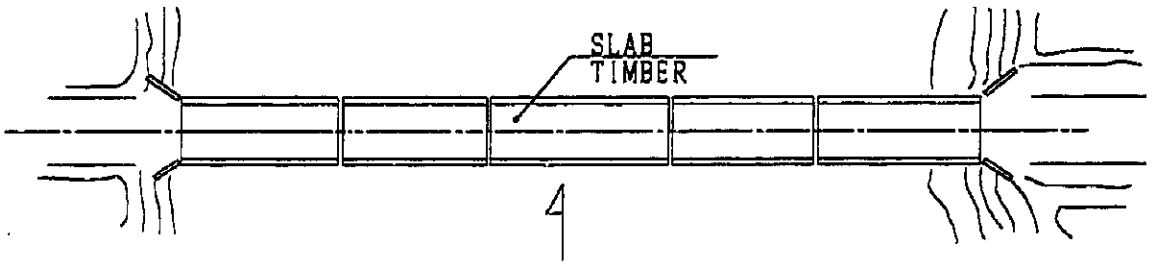
Efflorescence
Z: over 1.0m2
</td>
<td rowspan="3">Scaling/spalling
Efflorescence</td>
<td>
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Although damage rank is III, the degree is large, so that rehabilitation must be needed.
</td>
<td>III*</td>
<td>  </td>
</tr>
<tr>
<td>
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Although damage rank is III, the degree is large, so that rehabilitation must be needed.
</td>
<td>III*</td>
<td>  </td>
</tr>
<tr>
<td>
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td></td><td>II</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.
</td>
<td>II</td>
<td>  </td>
</tr>
</table>

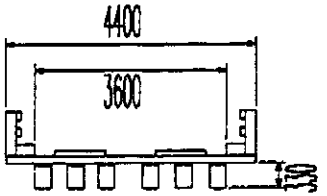
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A1 Abutment		Honeycombs	<table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table> Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	
	Honeycombs (1) Y: no exposed reinforcement bar but deep Z: over 1.0m2		<table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table> Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	
	Honeycombs (2) Y: no exposed reinforcement bar but deep Z: over 1.0m2		<table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table> Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	
	Honeycombs (3) Y: no exposed reinforcement bar but deep Z: over 1.0m2				

(15) MIRAFLORES

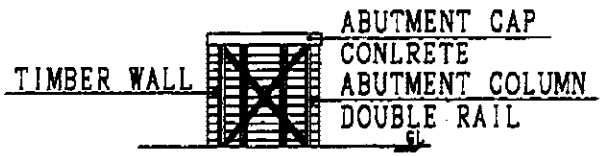
				NOTE
BRIDGE NUMBER		YEAR OF BUILT		
BRIDGE NAME	MIRAFLORES	BRIDGE LENGTH	44.40m	
REGION	X	BRIDGE WIDTH	3.60m	
ROUTE NAME	R-260	TRAFFIC VOLUME		



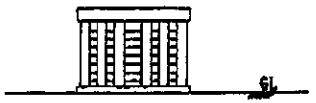




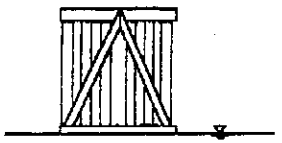
SECTION ⓐ-ⓐ



ABUTMENT Ⓐ1



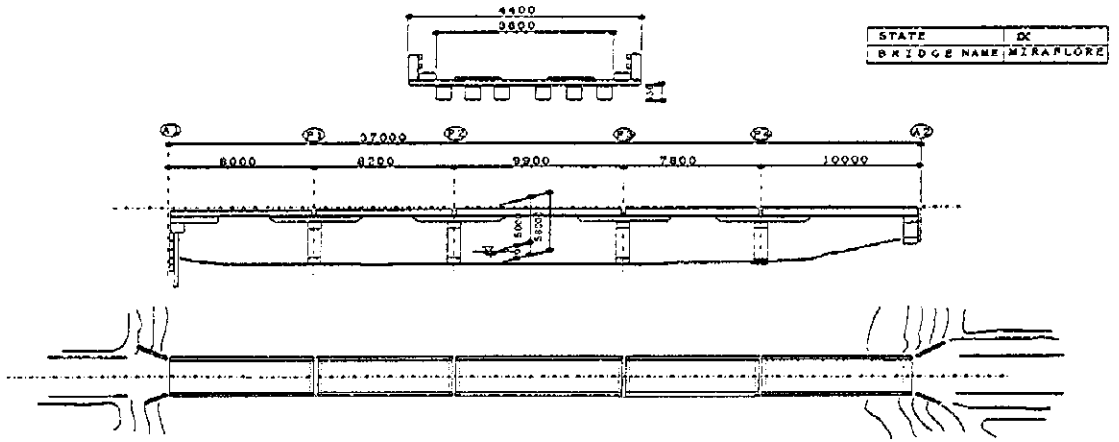
ABUTMENT Ⓐ2



PIER Ⓟ1~Ⓟ4

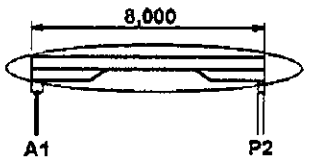
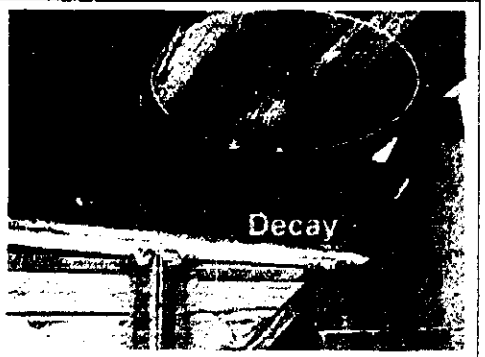
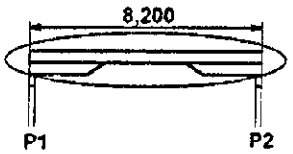
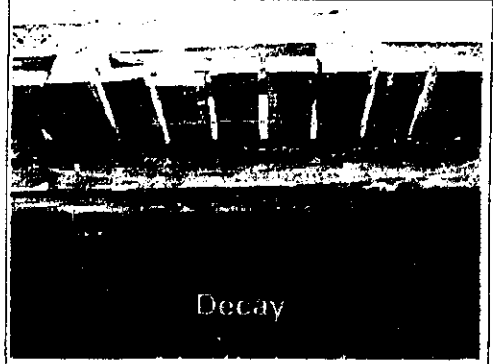
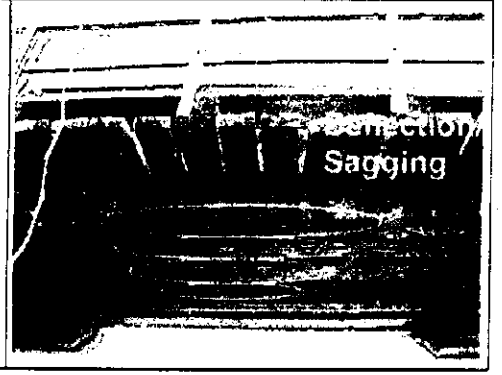
(II-1)15-1

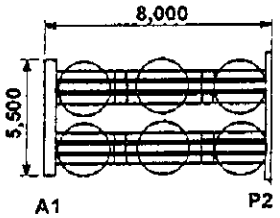
BRIDGE NO.69 BRIDGE NAME: MIRAFLOLES

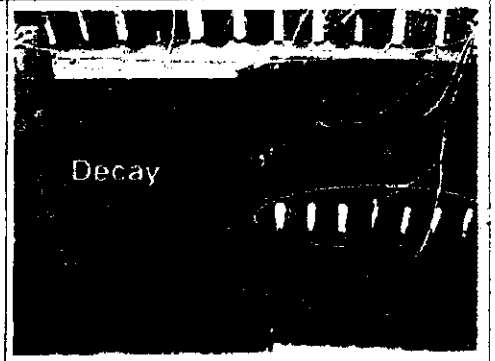
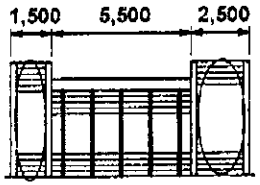


B. DAMAGE RANK AND DECISION ON REHABILITATION

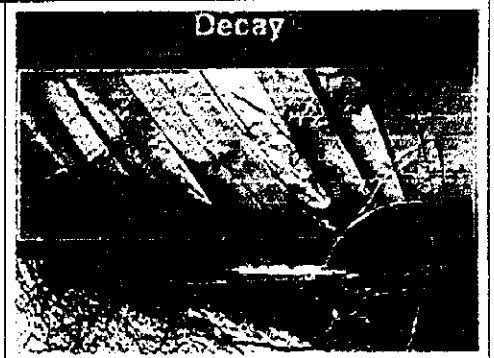
(1) Timber Materials

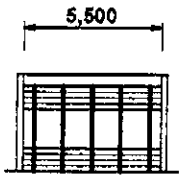
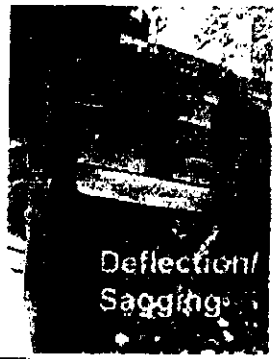
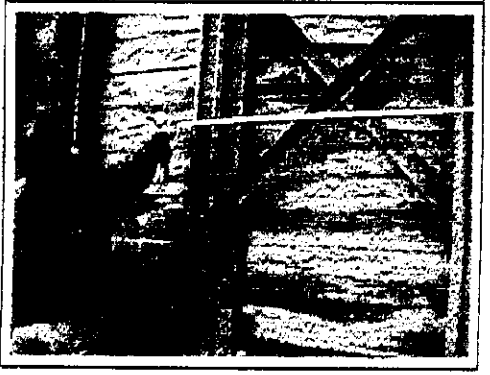
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Bean	 Decay **Z: whole area and excessive damage**	Decay	Z: Main Members: Large; Secondary Members: III Small: III; IV **Degree of damage is large, so that rehabilitation must be needed.**	II	
	 Decay **Z: whole area and excessive damage**		Z: Main Members: Large; Secondary Members: III Small: III; IV **Degree of damage is large, so that rehabilitation must be needed.**	II	
	Deflection/ Sagging main member **Y: visible deflection**	Deflection /Sagging	Y: Main Member: Large; Secondary Member: II Small: III; IV **Degree of damage is large, so that rehabilitation must be needed.**	II	

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td>Slab</td><td> 

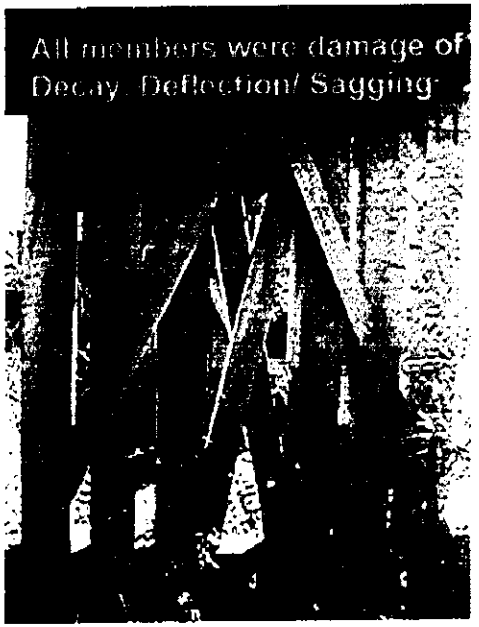
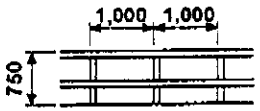
Z: whole area</td><td>Decay</td><td>
<table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td>II</td><td>III</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
<tr><td rowspan="2">A2 Abutment</td><td rowspan="2"> 

Decay (1)
Z: whole area and excessive damage

Decay (2)
Z: whole area</td><td>Decay</td><td>
<table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td></td><td>III</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td> 
</td></tr>
<tr><td>Decay</td><td>
<table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td>II</td><td>III</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
</table>

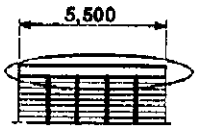
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A1 Abutment		Structural members were almost broken.	Must be replaced	I	  

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="2">P1 ~ P4 Pier</td><td rowspan="2">Decay
Z: local area

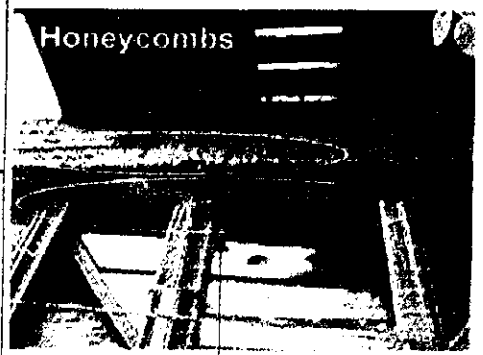
Deflection/ Sagging
main member
Z: excessive damage</td><td>Decay</td><td>
<table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td>II</td><td>III</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.
</td><td>III</td><td rowspan="2"> 
</td></tr>
<tr><td>Deflection /Sagging</td><td>
<table>
<tr><th>Y</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td></td><td>II</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.
</td><td>II</td></tr>
<tr><td>Hand Railing
Side Walk
(Foot Way)</td><td> 

Z: whole area but not excessive loosening</td><td>Loosening</td><td>
<table>
<tr><th>Z</th><th>All Members</th></tr>
<tr><td>Large</td><td></td></tr>
<tr><td>Small</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.
</td><td>II</td><td> 
</td></tr>
</table>

(3) Concrete Materials

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="2">A1 Abutment</td><td rowspan="2"> 

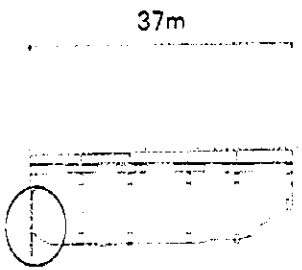
Efflorescence
Z: less 1.0m2

Honeycombs
Y: no exposed reinforcement bar
Y: less 1.0m2</td><td>Efflorescence</td><td>
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td rowspan="2"> 

Efflorescence</td></tr>
<tr><td>Honeycombs</td><td>
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, the degree must be recorded.</td><td>IV</td></tr>
</table>

( )Steel Materials

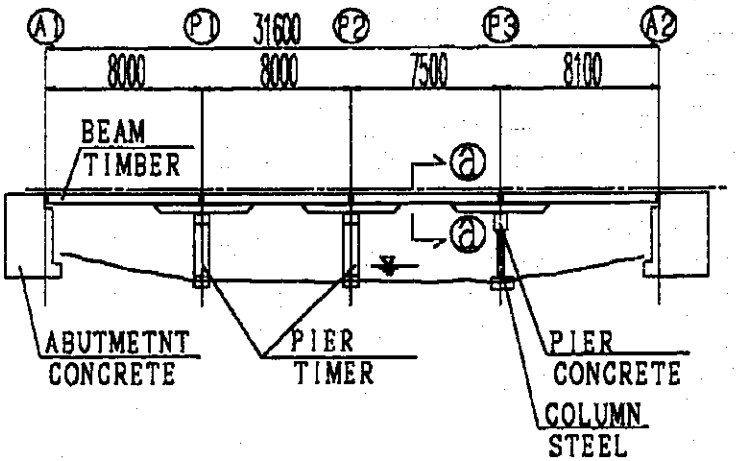
Miraflores

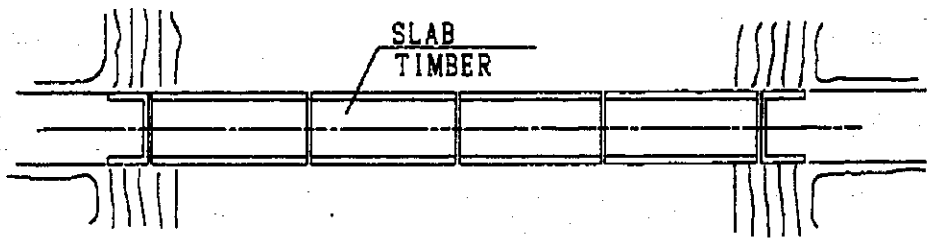
Bridge Componen	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Column		Rusting	Y / Z / All Members: Large / Large / II; Large / Small / II; Small / Large / II; Small / Small / III Y : Means Depth Z : Means Width Need to replace urgently.	II	

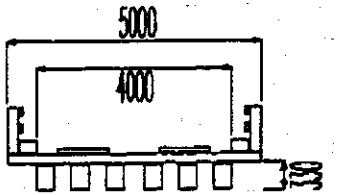
(16) SAN JUAN

BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	SAN JUAN	BRIDGE LENGTH	31.60m
REGION	X	BRIDGE WIDTH	4.00m
ROUTE NAME	S-114	TRAFFIC VOLUME	

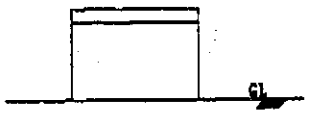
NOTE The timber bridge runs through the town of Trovolhue, and is essential for the residents' life to go to school and hospital. Also for passing traffic, it is important because the bridge leads to 8th Region and resorts areas near beside lakes and the sea. The bridge is frequently closed to traffic for repairs, and every three years reconstructed by timber.



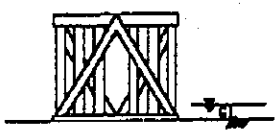




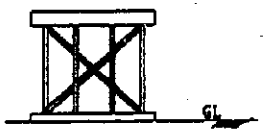
SECTION ⓐ- ⓐ



ABUTMENT A1 A2



PIER P1 ~ P2

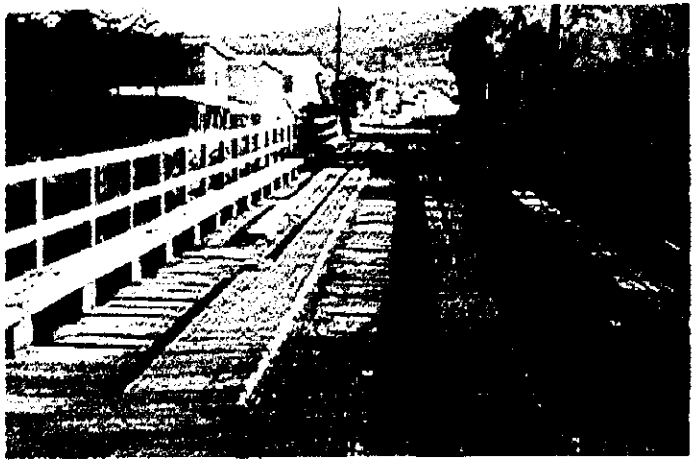


PIER P3

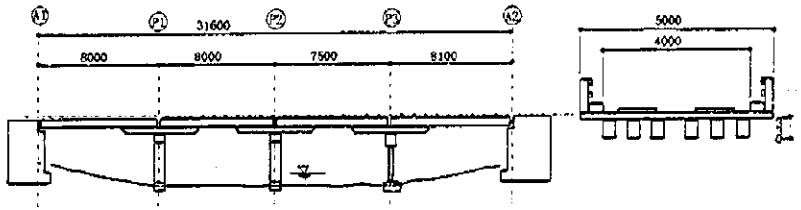
4

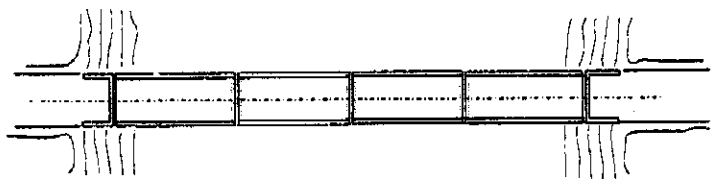
(II-1)16-1

BRIDGE NO.40 BRIDGE NAME: SAN JUAN



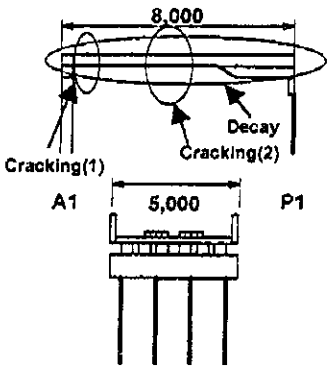
STATE	IX
BRIDGE NAME	SAN JUAN





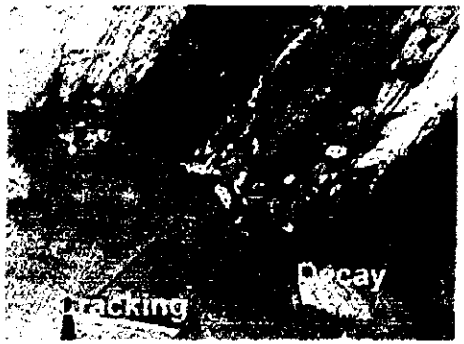
B. DAMAGE RANK AND DECISION ON REHABILITATION

(1) Timber Materials

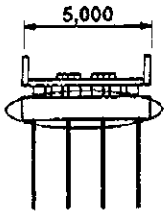
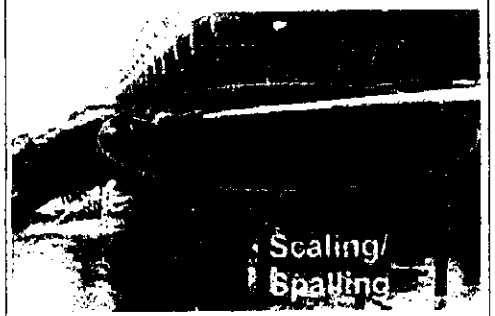
<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">Beam</td><td rowspan="3"> 

Decay
Z: whole area and excessive damage

Cracking (1)
X: main part
Y: large (visible)

Cracking (2)
X: main part
Y: large (visible)</td><td>Decay</td><td><table><tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr><tr><td>Large</td><td></td><td>III</td></tr><tr><td>Small</td><td>III</td><td>IV</td></tr></table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td rowspan="2"> 
</td></tr>
<tr><td>Cracking</td><td><table><tr><th>X</th><th>Y</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td></td><td>III</td></tr><tr><td>Small</td><td>III</td><td>III</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>
Degree of damage is large, so that rehabilitation must be needed. Cracking aroused on members working shearing force</td><td>II</td></tr>
<tr><td>Cracking</td><td><table><tr><th>X</th><th>Y</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td></td><td>III</td></tr><tr><td>Small</td><td>III</td><td>III</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>
Degree of damage is large, so that rehabilitation must be needed. Cracking aroused on members working bending moment.</td><td>II</td><td> 
</td></tr>
</table>

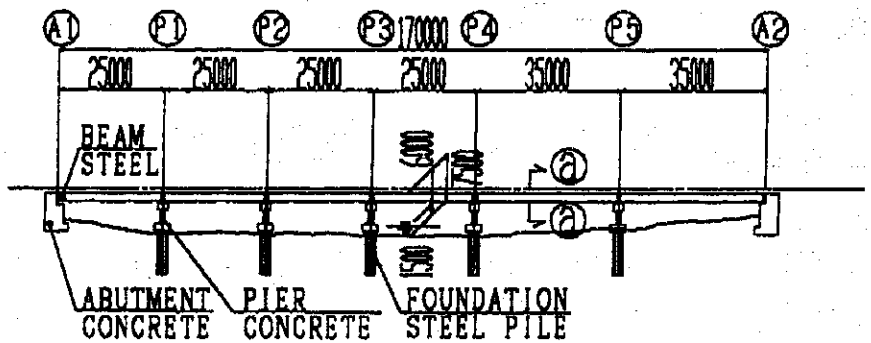
(2) Concrete Members

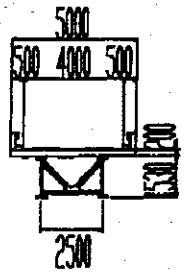
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Pier (Beam)	Y: no exposed reinforcement bar Z: over 1.0m2 	Scaling/Spalling	Scaling/ Spalling Y / Z / Main Member / Secondary Member Large / Large / II / II Large / Small / II / IV Small / Large / [redacted] / IV Small / Small / IV / IV Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	

(17) MEDINA

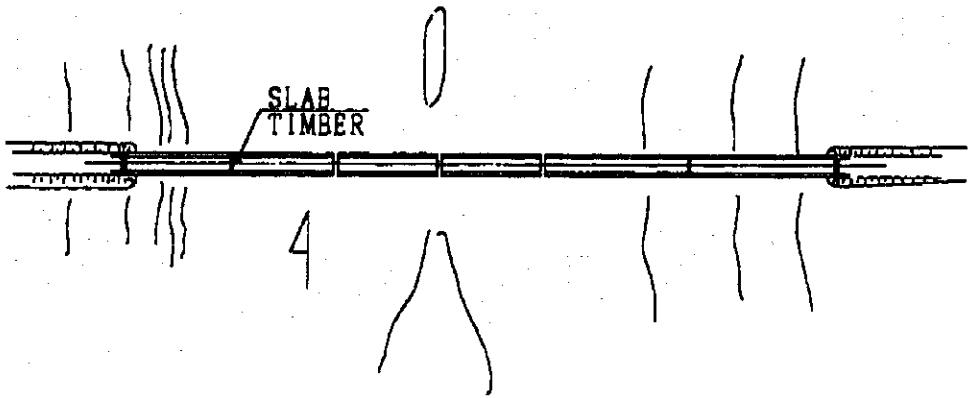
BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	MEDINA	BRIDGE LENGTH	170.00m
REGION	X	BRIDGE WIDTH	4.75m
ROUTE NAME	S-539	TRAFFIC VOLUME	

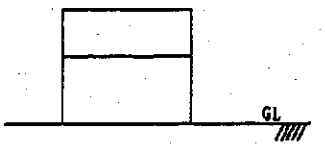
NOTE Loading capacity is signed on boad, 8tons.
Typical bridge type as steel plate girder, but slab is made by timber, so the capacity has been limited by the timber slab.
The steel pile has been composed by tripled railper each.



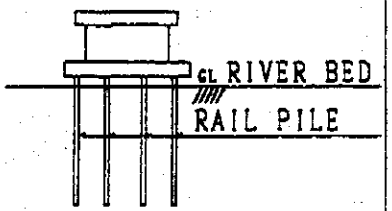


SECTION ⓐ-ⓐ





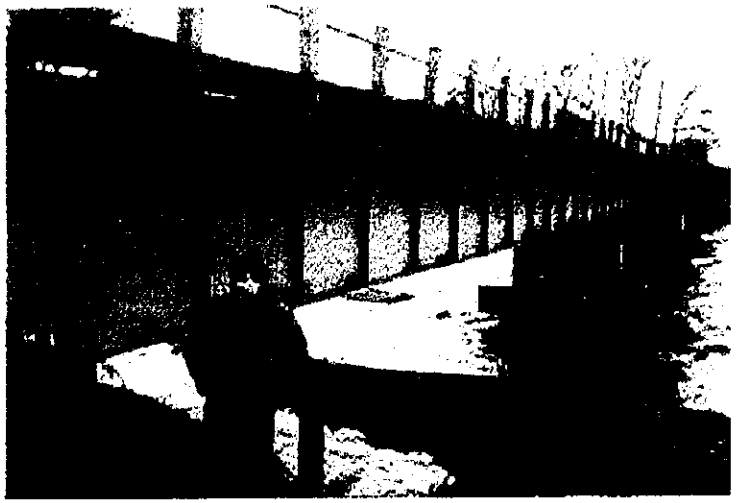
ABUTMENT A1, A2

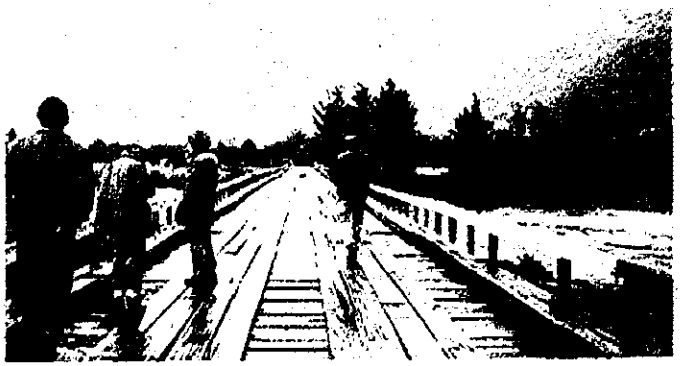


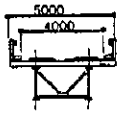
ABUTMENT P1~P2

(II-1)17-1

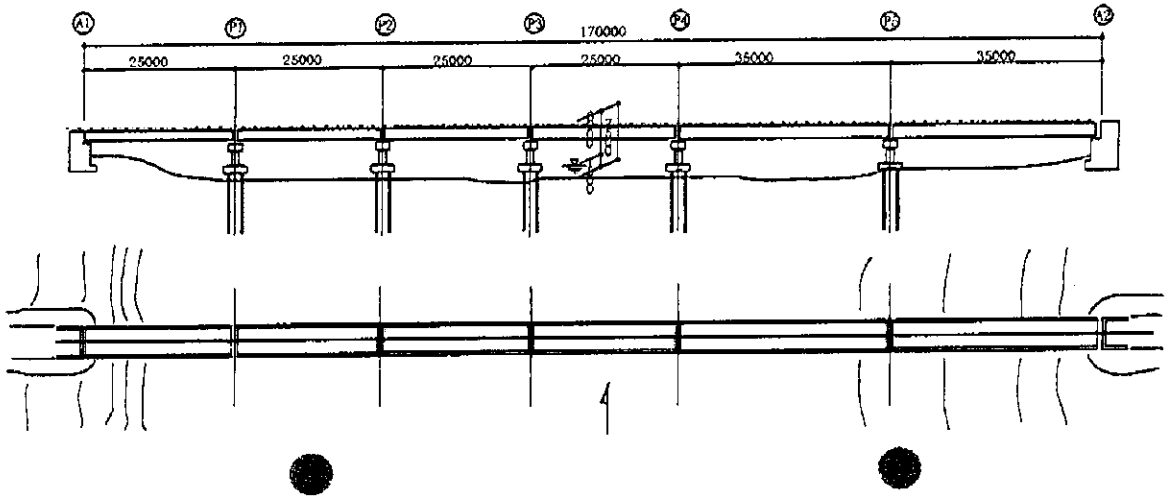
BRIDGE NO.32 BRIDGE NAME: MEDINA





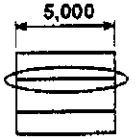


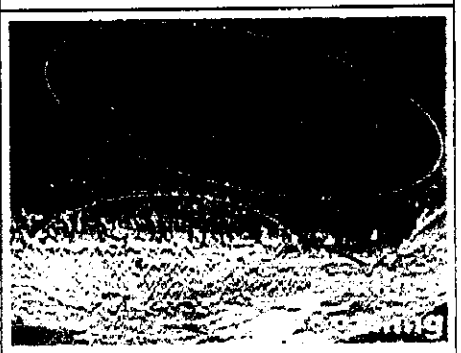
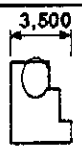
STATE	IX
BRIDGE NAME	MEDINA

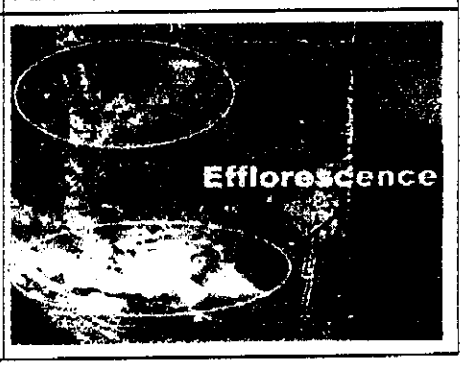


B. DAMAGE RANK AND DECISION ON REHABILITATION

(1) Concrete Materials

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="2">A1 Abutment</td><td> 

Y: exposed reinforcement bar
Z: over 1.0m2</td><td>Scaling/Spalling</td><td>Scaling/spalling
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td></td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td>  </td></tr>
<tr><td> 

Z: over 1.0m2</td><td>Efflorescence</td><td>Efflorescence
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td></td><td>II</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td> 
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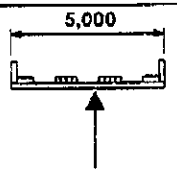
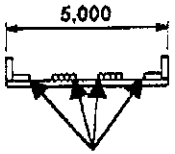
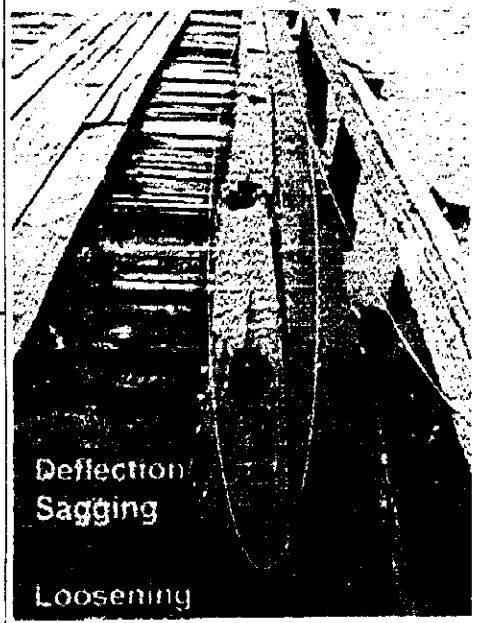
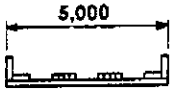
(3) Timber Materials

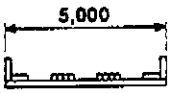
<table>
<tr><td>Slab</td><td> 

Z: whole area, and excessive damage</td><td>Decay</td><td>Decay
<table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td></td><td>III</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td>  </td></tr>
</table>

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td>Slab</td><td> 

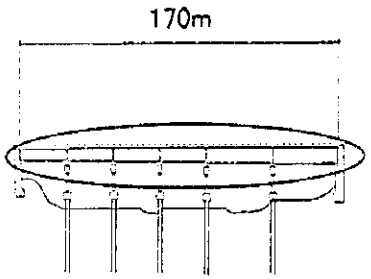
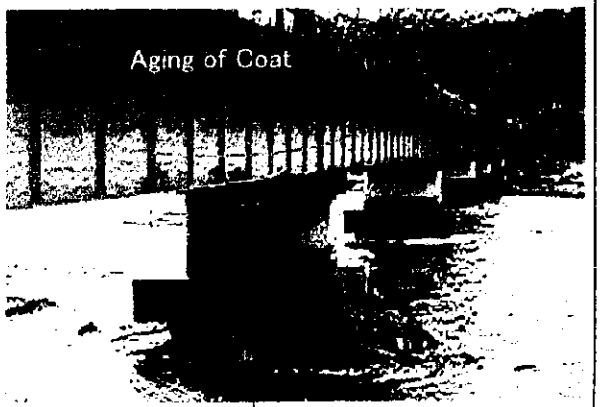
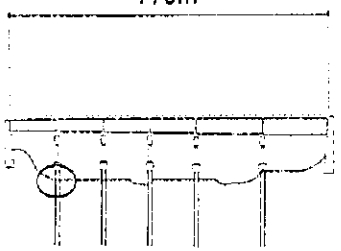
Z: whole connections and excessive loosening</td><td>Loosening</td><td>
<table>
<tr><td>Z</td><td>All Members</td></tr>
<tr><td>Large</td><td></td></tr>
<tr><td>Small</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td rowspan="3"> 


</td></tr>
<tr><td>Hand Railing</td><td> 

Deflection/ Sagging
Secondary member
Y: excessive damage
Loosening
whole connections and excessive loosening</td><td>Deflection /Sagging Loosening</td><td>Deflection/ Sagging
<table>
<tr><td>Y</td><td>Main Member</td><td>Secondary Member</td></tr>
<tr><td>Large</td><td>II</td><td></td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.
Loosening
<table>
<tr><td>Z</td><td>All Members</td></tr>
<tr><td>Large</td><td></td></tr>
<tr><td>Small</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II
Loosening
II</td></tr>
<tr><td>Side Walk</td><td> 

whole connections and excessive loosening</td><td>Loosening</td><td>Loosening
<table>
<tr><td>Z</td><td>All Members</td></tr>
<tr><td>Large</td><td></td></tr>
<tr><td>Small</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td></tr>
</table>

( )**Steel Materials** Medina

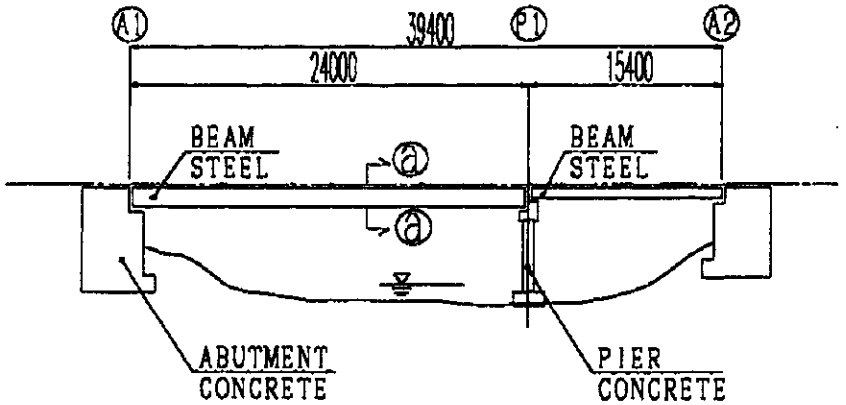
Bridge Componen	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Beam		Aging of Coat	Y / Z / All Members: Large / Large / III; Large / Small / IV; Small / Large / IV; Small / Small / OK Y : Means Depth Z : Means Width	IV	
Pile					Pile(Rail Steel) Difficult to classfy what kind of damage it has.

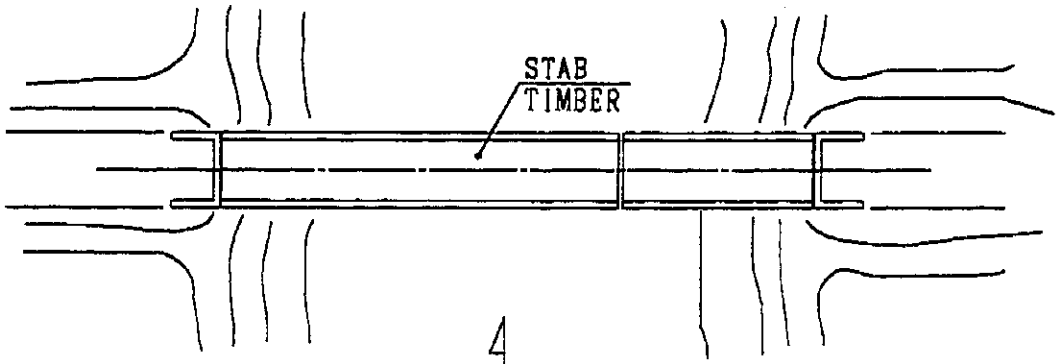
(II-1)17-S

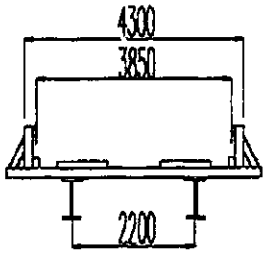
(18) CAUTIN 88

BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	CAUTIN	BRIDGE LENGTH	39.40m
REGION	IX	BRIDGE WIDTH	3.85m
ROUTE NAME	R-925	TRAFFIC VOLUME	6/day(1996)

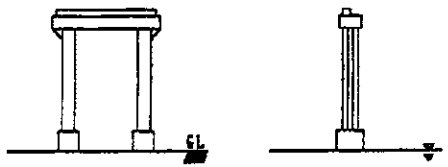
NOTE Few traffic volume all day long. A resident is located near here, so important the bridge for them. Steel beam surface be covered with rust, but not so much.







SECTION ⓐ-ⓐ

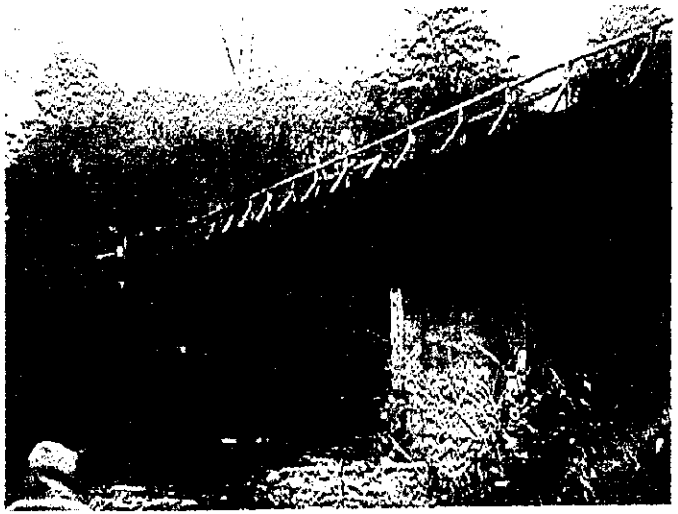


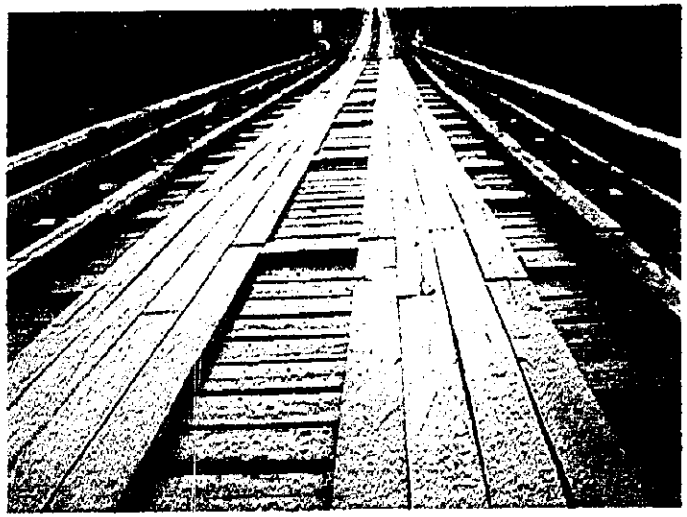
PIER P1

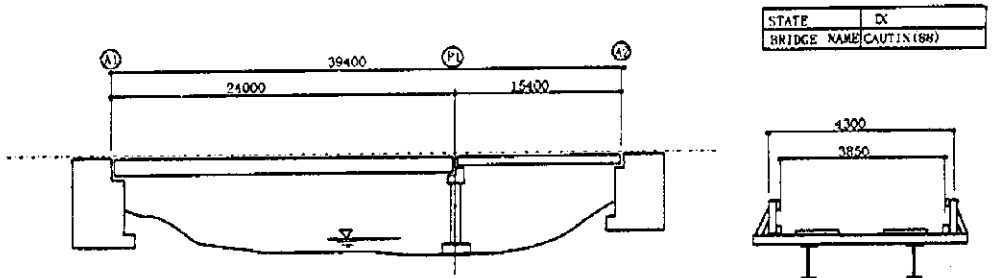
ABUTMENT A1 ABUTMENT A2

(II-1)18-1

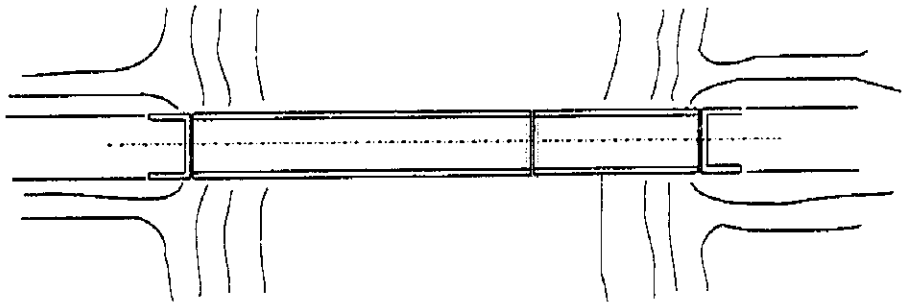
BRIDGE NO. 88 BRIDGE NAME: CAUTIN





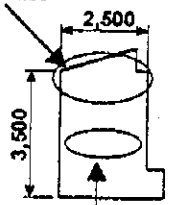


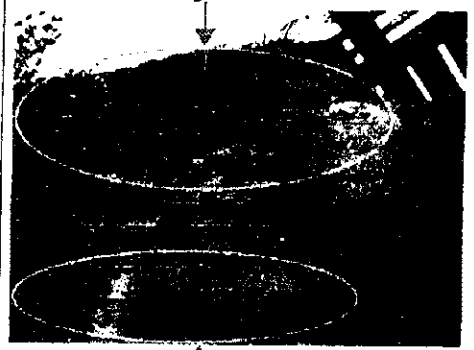
STATE	IX
BRIDGE NAME	CAUTIN (88)

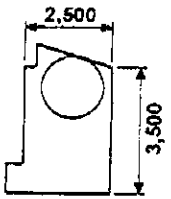


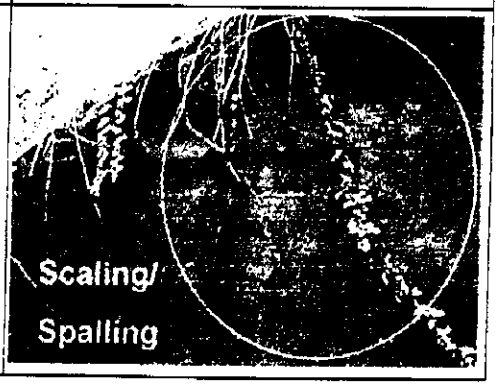
B. DAMAGE RANK AND DECISION ON REHABILITATION

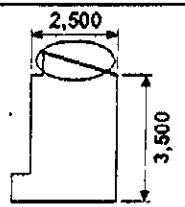
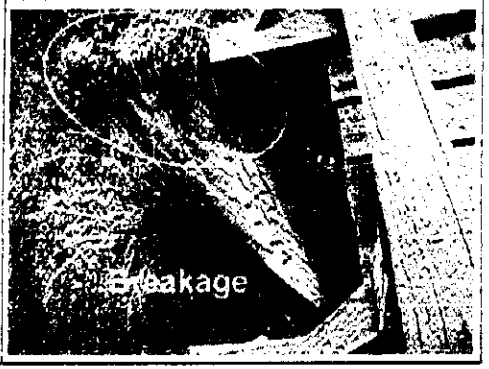
(1) Concrete Materials

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="3">A2 Abutment</td><td>Honeycombs
 

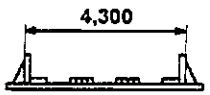
Scaling/ Spalling</td><td>Scaling/Spalling</td><td><table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td>Small</td><td></td><td>IV</td></tr></table>Damage was observed, the degree must be recorded.</td><td>IV</td><td rowspan="2">Honeycombs
 
Scaling/ Spalling</td></tr>
<tr><td>Scaling/ Spalling
Y: no exposed reinforcement bar
Z: less 1.0m2

Honeycombs
Y: no exposed reinforcement bar but deep
Z: over 1.0m2</td><td>Honeycombs</td><td><table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>Although damage rank is III, the degree is excessive so that rehabilitation must be needed.</td><td>III*</td></tr>
<tr><td> 

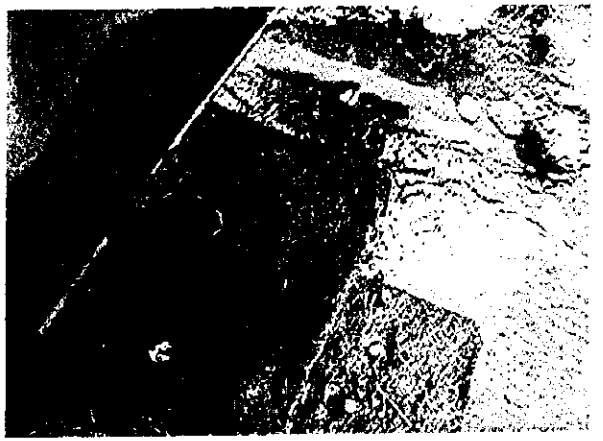
Y: no exposed reinforcement bar
Z: over 1.0m2</td><td>Scaling/Spalling</td><td><table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table>Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
</table>

Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A2 Abutment	 Y: remarkable damage	Breakage	Y: All Members Large: ■ Small: Ⅳ Degree of damage is large, so that rehabilitation must be needed.	Ⅱ	

(3) Timber Materials

Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Hand Railing	 Z: whole connections and not excessive loosening	Loosening	Z: All Members Large: Small: Ⅳ	Ⅱ	

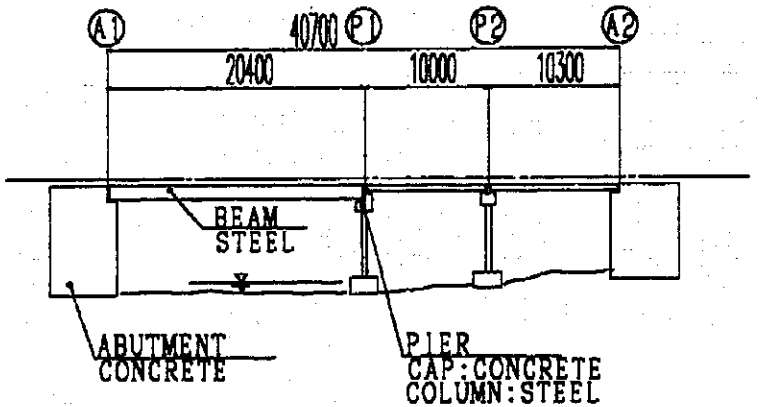
( )Steel Materials　　Cautin 88

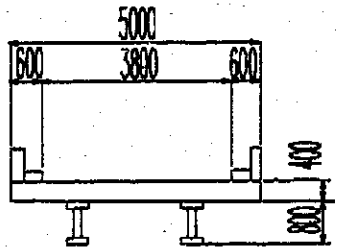
Bridge Componen	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Column	33.4m	Rusting	Y / Z / All Members: Large / Large / Ⅱ; Large / Small / Ⅱ; Small / Large / Ⅱ; Small / Small / Ⅲ Y : Means Depth Z : Means Width	Ⅱ	

(19) SALVA TU ALMA

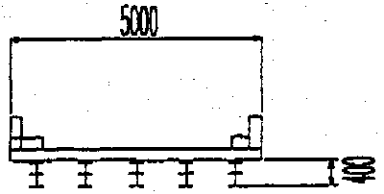
BRIDGE NUMBER		YEAR OF BUILT	
BRIDGE NAME	SALVA TU ALMA	BRIDGE LENGTH	40.70m
REGION	X	BRIDGE WIDTH	4.63m
ROUTE NAME	S-553	TRAFFIC VOLUME	

NOTE

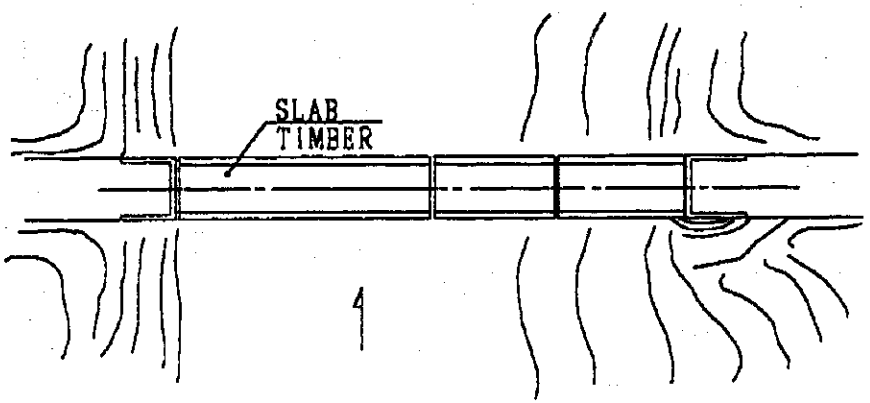


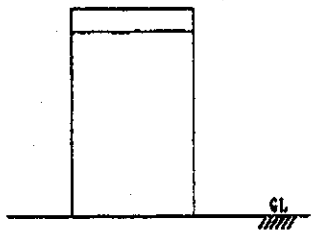


SECTION A1~P1

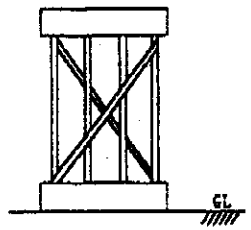


SECTION P1~A2





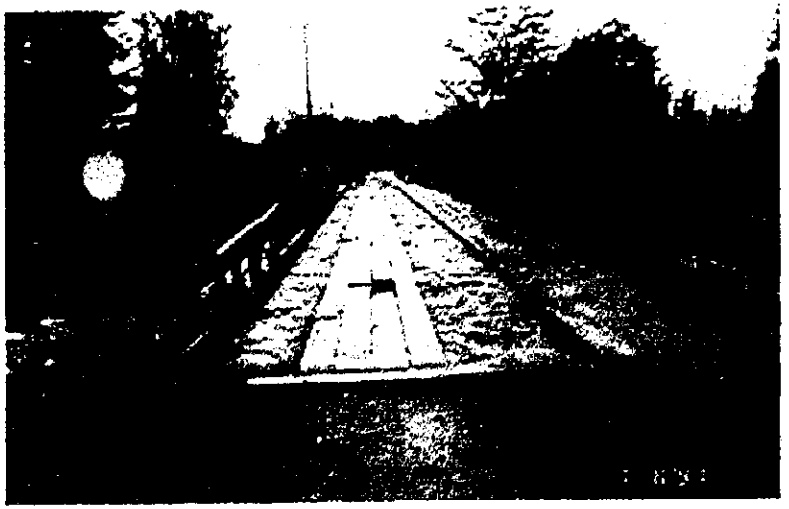
ABUTMENT A1, A2

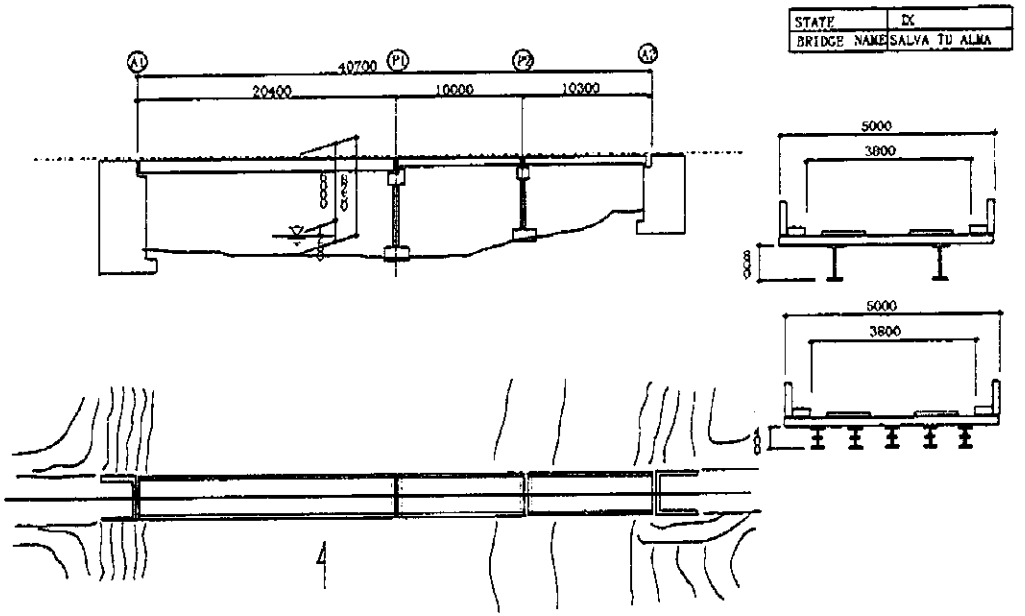


PIER P1, P2

(II-1)19-1

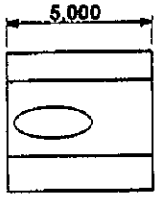
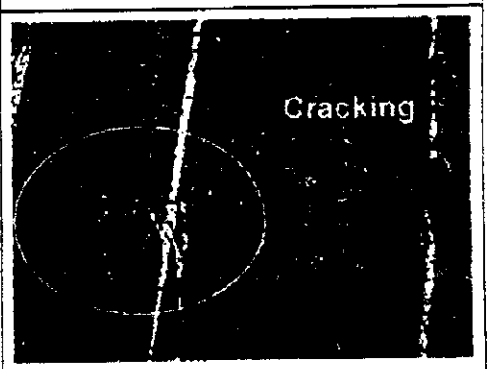
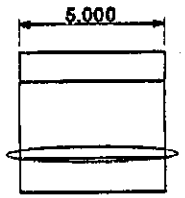
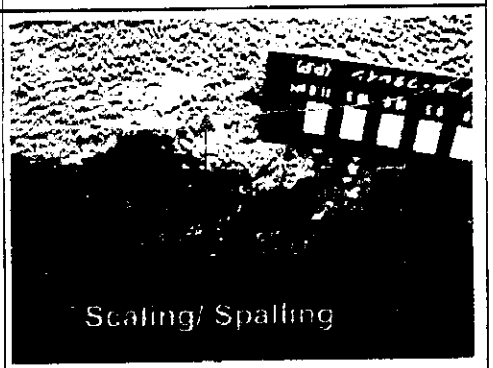
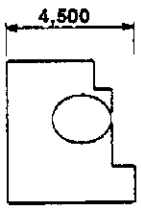
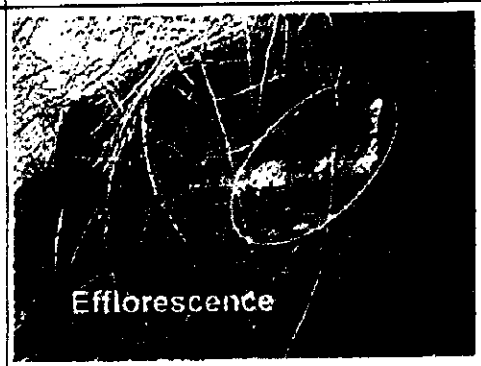
BRIDGE NO. 24 BRIDGE NAME: SALVA TU ALMA

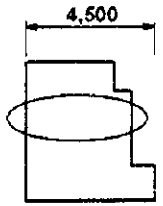
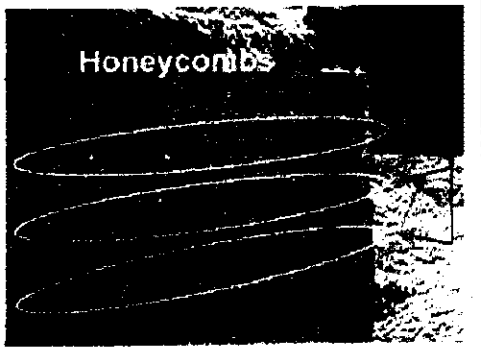




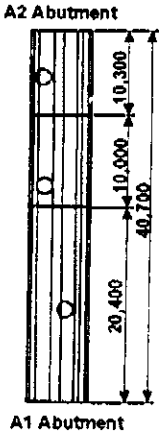
B. DAMAGE RANK AND DECISION ON REHABILITATION

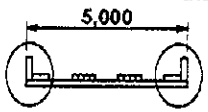
(1) Concrete Materials

Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A2 Abutment	 X: main part Y ≧ 0.3mm Z: less 50cm	Cracking	<table><tr><th>X</th><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="4">Large</td><td rowspan="2">Large</td><td>Large</td><td></td><td>II</td></tr><tr><td>Small</td><td>II</td><td>III</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Small</td><td>IV</td><td>IV</td></tr><tr><td></td><td>Large</td><td>V</td><td>V</td></tr><tr><td></td><td></td><td>Small</td><td>V</td><td>V</td></tr></table> Degree of Damage is large, so that rehabilitation must be needed.	II	
	 Y: no exposed reinforcement bar Z: over 1.0m2	Scaling/Spalling	<table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table> Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	
	 Z: less 1.0m2	Efflorescense	<table><tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td></td><td>IV</td></tr></table> Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	

Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
A2 Abutment	 Y: no exposed reinforcement bar Z: over 1.0m2	Honeycombs	<table><tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr><tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr><tr><td>Small</td><td>II</td><td>IV</td></tr><tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr><tr><td>Small</td><td>IV</td><td>IV</td></tr></table> Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.	III	

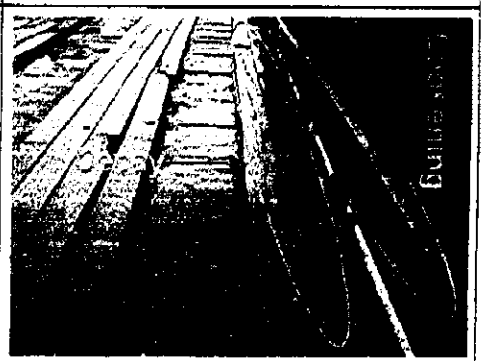
(3) Timber Materials

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td rowspan="2">Slab</td><td rowspan="2"> 

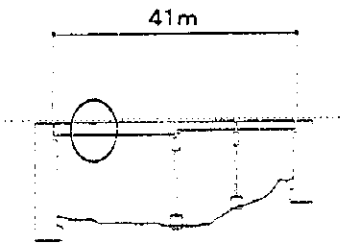
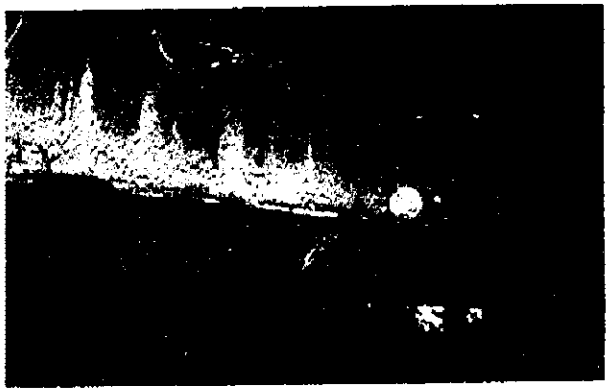
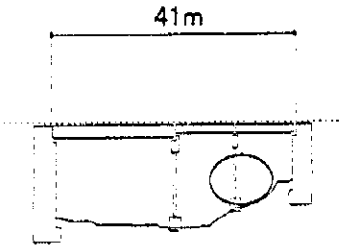
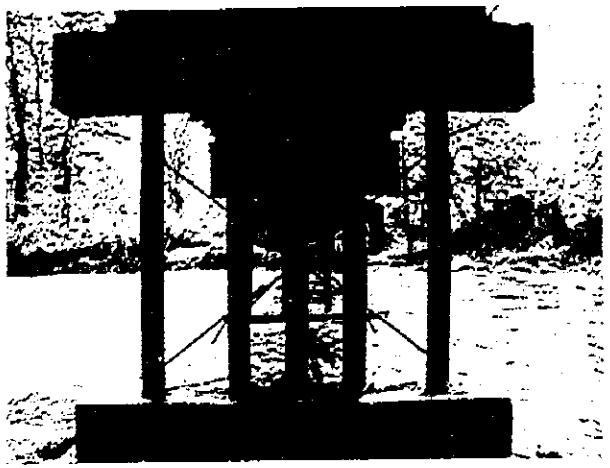
Z: local area</td><td rowspan="2">Decay</td><td rowspan="2"><table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td>II</td><td>III</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td rowspan="2">III</td><td>  </td></tr>
<tr><td> 
</td></tr>
<tr><td>Hand Railing
Side Walk
(Foot Way)</td><td> 

Decay
Z: whole area and excessive damage

Loosening
Z: whole connections and excessive loosening</td><td>Decay
Loosening</td><td>Decay
<table>
<tr><th>Z</th><th>Main Members</th><th>Secondary Members</th></tr>
<tr><td>Large</td><td>II</td><td></td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be needed.
Loosening
<table>
<tr><th>Z</th><th>All Members</th></tr>
<tr><td>Large</td><td></td></tr>
<tr><td>Small</td><td>IV</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>Decay
III

Loosening
II</td><td>  </td></tr>
</table>

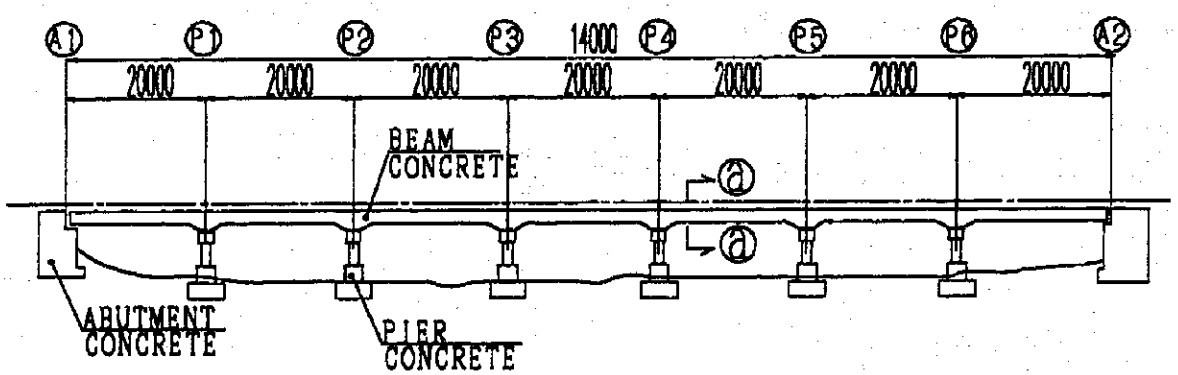
( )Steel Materials Salva Tu Alma

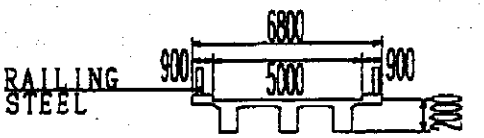
Bridge Componen	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Beam		Rusting	Y / Z / All Members: Large / Large / II; Large / Small / II; Small / Large / II; Small / Small / III Y : Means Depth Z : Means Width It should be available to replace for near future.	II	
Column		Rusting	Y / Z / All Members: Large / Large / II; Large / Small / III; Small / Large / ■; Small / Small / IV Y : Means Depth Z : Means Width Need keeping inspection.		

(II-1)19-6

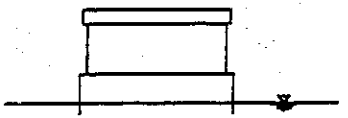
(20) QUINCHILCA

				NOTE
BRIDGE NUMBER		YEAR OF BUILT		
BRIDGE NAME	QUINCHILCA	BRIDGE LENGTH	140.00m	
REGION	X	BRIDGE WIDTH	6.80m	
ROUTE NAME		TRAFFIC VOLUME		

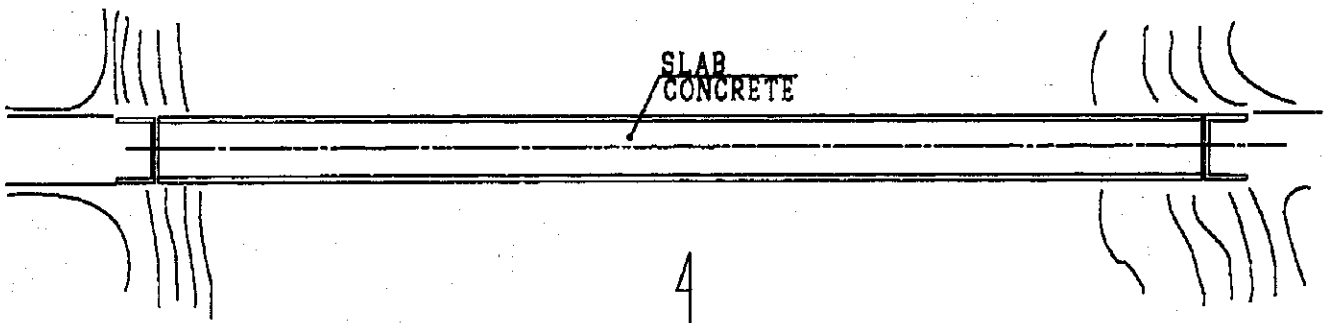


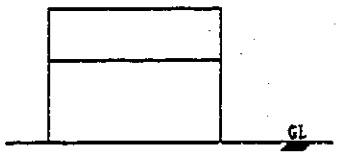


SECTION ⓐ-ⓐ



PIER P1~P6

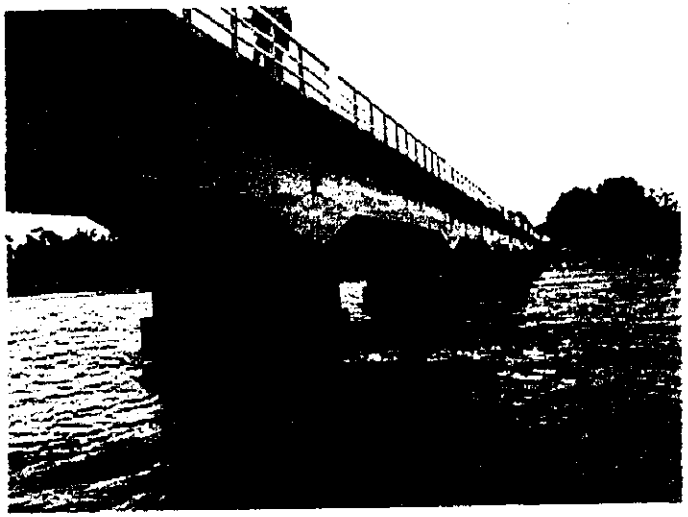


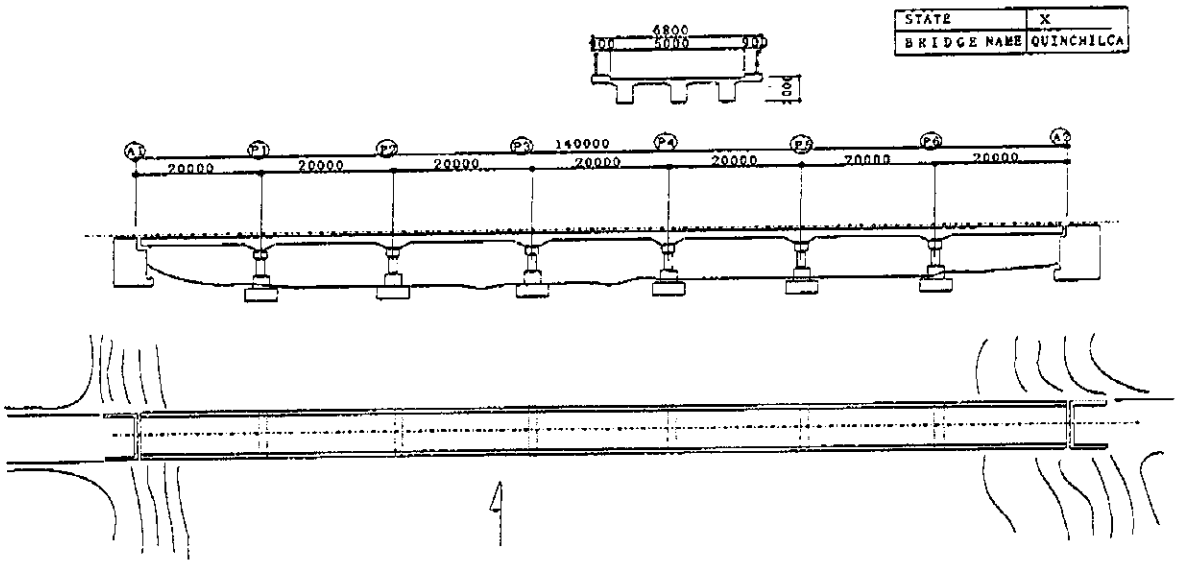


ABUTMENT A1, A2

(II-1)20-1

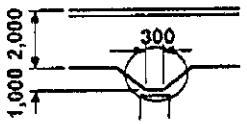
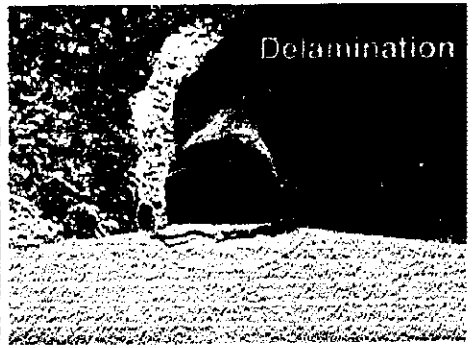
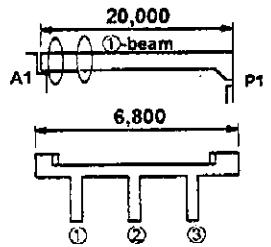
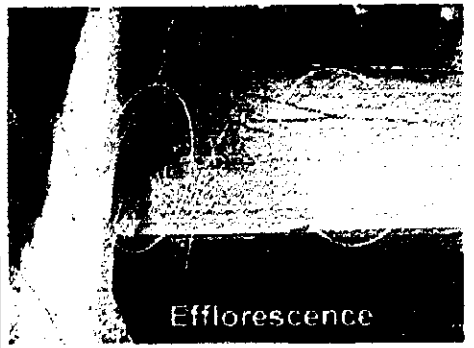
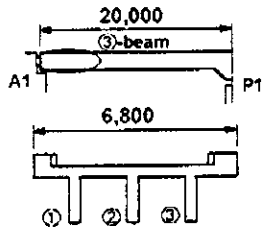
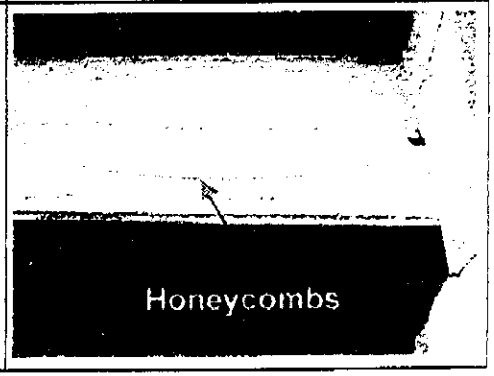
BRIDGE NO. D BRIDGE NAME: QUINCHILCA

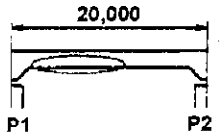


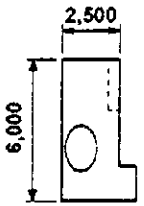


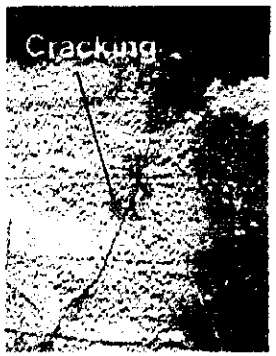
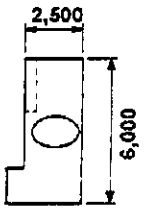
B. DAMAGE RANK AND DECISION ON REHABILITATION

(1) Concrete Materials

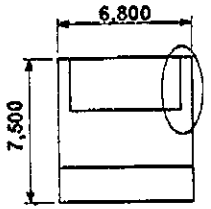
Bridge Component	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Beam	 Y: exposed reinforcement bar Z: over 0.1m2	Delamination	Y / Z: Large/Large = Main Member; Large/Small = Secondary Member; Small/Large = Secondary Member; Small/Small = Secondary Member. Damage is serious, so that rehabilitation must me needed.	II	
	 Z: over 0.1m2 but not excessive	Efflorescence	Efflorescence. Z: Large = Main Member; Small = Secondary Member. Although damage rank II, the degree is not serious so that rehabilitation is not needed.	II	
	 Y: no exposed reinforcement bar Z: less 0.1m2	Honeycombs	Honeycombs. Y / Z: Large/Large = II; Large/Small = II; Small/Large = III; Small/Small = Secondary Member. Damage was observed, the degree must be recorded.	IV	

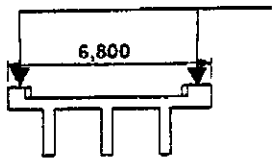
<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td>Beam</td><td> 

Y: no exposed reinforcement bar
Z: less 1.0m2</td><td>Honeycombs</td><td>Honeycombs
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, the degree must be recorded.</td><td>IV</td><td> 
</td></tr>
<tr><td rowspan="2">A1 Abutment</td><td> 

X: main part
Y ≧ 0.3mm
Z: less 50cm</td><td>Cracking</td><td>Cracking
<table>
<tr><th>X</th><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="4">Large</td><td rowspan="2">Large</td><td>Large</td><td></td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>III</td></tr>
<tr><td rowspan="2">Medium</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td>III</td><td>IV</td></tr>
<tr><td rowspan="4">Small</td><td rowspan="2">Small</td><td>Large</td><td>V</td><td>V</td></tr>
<tr><td>Small</td><td>V</td><td>V</td></tr>
</table>
Degree of damage is large, so that rehabilitation must be needed.</td><td>II</td><td> 
</td></tr>
<tr><td> 

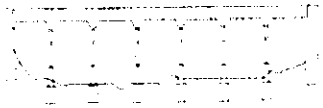
Y: no exposed reinforcement bar and medium deep
Z: over 1.0m2</td><td>Scaling/Spaling</td><td>Scaling/ Spalling
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td></td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td> 
</td></tr>
</table>

<table>
<tr><th>Bridge Component</th><th>Location of Damage</th><th>Damage</th><th>Evaluation of Damage</th><th>Damage Rank</th><th>Picture</th></tr>
<tr><td>A1 Abutment</td><td> 

Z: less 1.0m2</td><td>Efflorescence</td><td>Efflorescence
<table>
<tr><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td></td><td>IV</td></tr>
</table>
Damage was observed, but rehabilitation is not needed. Follow-up inspection must be executed.</td><td>III</td><td>  </td></tr>
<tr><td rowspan="2">Side Walk (Foot Way)</td><td rowspan="2"> 

Scaling/ Spalling (1)
Y: no exposed reinforcement bar
Z: over 1.0m2
Scaling/ Spalling (2)
Y: exposed reinforcement bar
Z: over 1.0m2</td><td rowspan="2">Scaling/Spaling</td><td>Scaling/ Spalling
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td>II</td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td></td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Damage was observed, the degree must be recorded.</td><td>IV</td><td> 
</td></tr>
<tr><td>Scaling/ Spalling
<table>
<tr><th>Y</th><th>Z</th><th>Main Member</th><th>Secondary Member</th></tr>
<tr><td rowspan="2">Large</td><td>Large</td><td>II</td><td></td></tr>
<tr><td>Small</td><td>II</td><td>IV</td></tr>
<tr><td rowspan="2">Small</td><td>Large</td><td>III</td><td>IV</td></tr>
<tr><td>Small</td><td>IV</td><td>IV</td></tr>
</table>
Degree of damage is serious so that rehabilitation must be needed.</td><td>II</td><td> 
</td></tr>
</table>

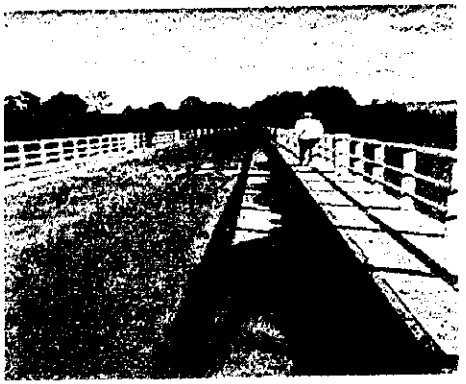
( )Steel Materials　　Quinchilca

Bridge Componen	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Railing	140m 	Aging of Coat	Y : Means Depth Z : Means Width Keeping on inspection.	Ⅳ	

Y	Z	All Members
Large	Large	Ⅲ
	Small	Ⅳ
Small		Ⅳ
	Small	OK

(II-1)20-6

( )Steel Materials Quinchilca

Bridge Componen	Location of Damage	Damage	Evaluation of Damage	Damage Rank	Picture
Railing	140m	Aging of Coat	Y / Z / All Members: Large / Large / III; Large / Small / IV; Small / [redacted] / IV; Small / Small / OK Y : Means Depth Z : Means Width Keeping on inspection.	IV	

APPENDIX II-2

REASONS OF RECONSTRUCTION

Contents

Reasons of Reconstruction

No. 2

Bridge Name: David Garcia

	Technical Reasons		Social Reasons
1	Built in 1930s, the concrete bridge looks seriously deteriorated from the color and the external appearance.	1	Los Andes is the nearest city from the bridge having a population of 55,000.
2	Judging from a neutralization test conducted by spraying a phenolphthalein solution, it is supposed that the concrete has been already neutralized to some extent and the re-bars may be corroded through the neutralization. Accordingly the reinforced concrete must have reduced its load carrying capacity	2	The bridge is located on E-85, an important trunk road, which connects Los Andes, San Felipe and Santa Maria.
3	While a heavy vehicle is passing the bridge, a considerable vibration is felt. It is possible that the vibration comes from some defects of the foundation, because reasonable rigidities of both the superstructure and the substructure are supposedly secured.	3	The traffic volume of the bridge is as much as 6,000 vehicles a day. The width of 6 meters is not enough with that traffic volume.
4	An isolated lime blots the bottom of the concrete slab, and from the fact the depth of cracks in the concrete can be guessed.		
5	At the bridge seat of the abutment, so wide crack as 1 cm was found.		
6	Squatters used to live and make a fire under the bridge. As the result the bottom of the bridge has changed to black by the soot. It is probable for the bridge to be affected adversely.		
7	The concrete is scaled off and the re-bars are exposed on the pier.		

Conclusion

In addition to the age and deterioration, the foundation is very likely to be unstable due to scouring. And furthermore the road way is required to be widened. Thus the reconstruction was proposed.

No. 3

Bridge Name: Granallas PTE. GRANALLAS

	Technical Reasons		Social Reasons
1	The bridge was constructed in 1960s. There's no sign of being maintained in other parts than the timber deck.	1	At present the bridge has one lane only, but MOP has a plan of changing it into two lanes in the future.
2	The steel girders are seriously corroded.	2	As the width of the footpath is as narrow as approximately 60 cm, pedestrians pass through a temporary suspension bridge built parallel to the existing one.
3	The metal bearings have corroded considerably, and cannot work normally as they are expected.		
4	Parts of concrete of the substructure are scaled off and re-bars exposed.		

Both superstructure and substructure are deteriorated, and road way and footpath are not wide enough. The existing structure can not afford the additional load due to the widening of road way and foot path. Reconstruction is the best solution for the bridge.

No. 5

Bridge Name: San Jose PTE. SAN JOSE

	Technical Reasons		Social Reasons
1	Built in 1925 thus it is older than 70 years, and so much deteriorated.	1	San Luis Bridge near San Jose Bridge collapsed because of flood water in July, 1997, and then Polpacio Bridge and Chicauma bridge are threatened to collapse as well. Thus this bridge has become more important than it was before.
2	As the bridge is located at a high elevation, tests of neutralization and Schmidt hammer were impossible to be conducted. Judging from the visual inspection including change of color of the concrete it is very probable that the concrete has been neutralized.	2	The bridge is only 3.5 m wide. When vehicles pass by each other near the bridge, one should wait for the other beside the bridge. And furthermore the access road has a sharp bent to almost perpendicular to the bridge, which gives problems against a traffic safety.
3	Much honeycomb were found on the substructure.		

Seventy years may be a life span of a concrete bridge, and besides the deterioration there are other reasons for which it should be reconstructed completely. They are the poor alignment and insufficient elevation.

No. 6

Bridge Name: Puangue

PTE. PUANGUE

	Technical Reasons		Social Reasons
1	The part of the concrete rigid frame bridge was constructed before 1930, and the part of the concrete continuous bridge was build in 1945. Both were older than 50 years.	1	The bridge lies on the route G-78, which connects the capital Santiago and San Antonio, and works as a bypass of the trunk road No.78.
2	Because the bridge is located at a high elevation, a neutralization test and a Schmidt hammer test could not be made. It is very much probable that the concrete of the rigid frame bridge has been neutralized by the visual inspection results.	2	There are houses, warehouses, church, school and so on, thus the bridge is essential to the community.
3	The main river had flowed below the concrete rigid frame bridge located at the left bank side before the main flow moved rightwards ,and so the existing bridge then was extended toward right side by the 4- span continuous concrete bridge. The original abutment at right side was modified and changed to a pier.	3	The foot pass is too narrow of only 1.0 m and then dangerous for pupils to go to school.
4	According to the MOP's suggestion, the design load of the bridge is not clear but pretty small.	4	MOP plans to reconstruct a bridge with width of 1.5 m for foot pass and 10.0 m for road way instead of 1.2 m and 7.0 m respectively.
5	MOP repaired impermissible large cracks by injecting epoxy which arose on the concrete deck.		
6	Against the defects on the girder of the continuous bridge near a bearing, a temporary treatment was made two years ago by an injection of epoxy.		
7	Crack, scaling and exposition of re-bars were found.		
8	There's no allowance at all below the girder when water level is high.		

MOP decided to reconstruct it considering its damages and importance, and JICA team agreed after the detail inspection for the reasons mentioned above.

No. 7

PTE. SAN JOSE DE MARCHIUE

Bridge Name: San Jose de Marchiue

	Technical Reasons		Social Reasons
1	The concrete deck is badly deteriorated and have damage.		
2	During a flood the deck is covered with water.		

If a problem is only a matter of the deck, it can be repaired. But it is often closed to the traffic. In order to avoid the situation, it was concluded to elevate it by replacing with a new bridge.

No. 8

PTE. ANTIVERO NO.2

Bridge Name: Antivero No. 2

	Technical Reasons		Social Reasons
1	It was built in 1940s and then is seriously deteriorated.	1	The bridge is 6 meter wide, but it is not enough, compared with the traffic volume.
2	A bed which supports Gerber hinge is not wide enough. The improper structure caused diagonal cracks and crush of concrete		
3	Water flow has been changed by the river's scoring action. The river flows diagonally toward the pier No.6 and it scored the riverbed around the pier. Now the foundation is under a serious condition due to the progressive score.		
4	The bearing at the abutment No.2 has been destroyed.		
5	The footing and column of the pier No.5 was repaired by concrete lining method.		

The bridge is older than fifty years, and is not wide enough for the traffic volume of today. It was concluded to reconstruct it for the reason why the existing bridge cannot afford the widening.

No. 13

Bridge Name: Poculon

PTE. POCULON

	Technical Reasons		Social Reasons
1	The girder and deck are almost completely destroyed. Planks are arranged over the bridge to enable only one person pass the bridge. To repair the bridge is impossible.	1	Traffic has to make a detour by taking a route 4 km away.
2	The river bends sharply below the bridge. Thus the bank has been scored and the bridge length is not long enough any more.		
3	Soon after crossing the bridge, the road bends almost at a right angle. Thus the road alignment has to be improved and the bridge must be reconstructed accordingly.		
4	The bridge is covered with flood water frequently, therefore the bridge has to be elevated 2 m higher than as it is.		

There's no need to think of repairing. Only one way to remedy the bridge is reconstruction.

No. 16

Bridge Name: San Juan **PTE. SAN JUAN**

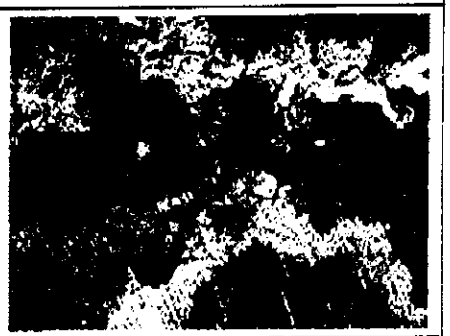
	Technical Reasons		Social Reasons
1	Built in 1985, the bridge has deteriorated much, especially corrosion of the timber is remarkable. The damage has progressed since the last time when the previous inspection was conducted.	1	Many pedestrians pass the bridge, for it runs through the village.
		2	There are five schools including one primary school and a hospital in the village. The bridge is essential for the villagers going to these facilities.
2	Contents of damages observed • A cross beam is crushed and broken, thus three main girders supported by the beam is settled down at the pier No.3. • There's a serious crack at the center of a main girder between the pier No.2 and No.3. The girder dose not function as a main girder effectively any more. • The hand rails are loosely fixed. It is dangerous for the pedestrians especially for the children going to school near the bridge. • The bottom of the timber superstructure remains wet. Mushrooms grow on the timbers, and it can be easily seen how much decayed it is from that fact.	3	It takes only one hour to go to the 8th Region, and thus it is an important bridge also for a passing traffic.
		4	Main loads carried by vehicles are timber and cattle. The load capacity is limited to 10 tons, but much heavier cargo crosses the bridge. And in summer season, lots of tourist bus pass toward resort areas beside the sea and lakes.
		5	There is a detour bridge 1 km down the river, but the access road on the right bank is always covered with water except in summer, and thus it is of no use.
3	There are several parts where the broken timber columns were repaired by splicing with steel plates.	6	Main members of the timber bridge has to be replaced every three years. Problems of inconvenience and economy arises from these repeated repairs.
4	For the severe damages, the bridge has been closed.		

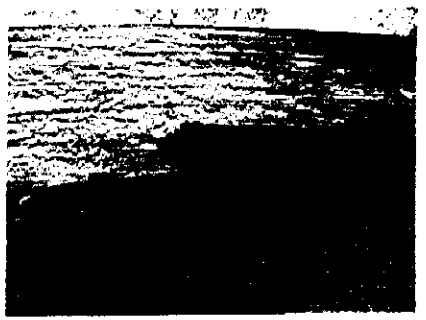
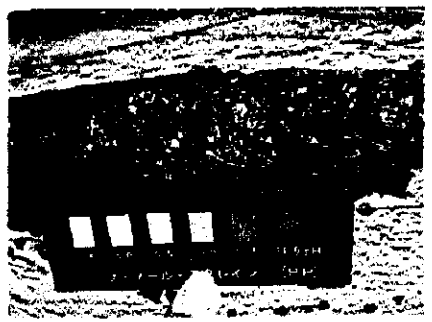
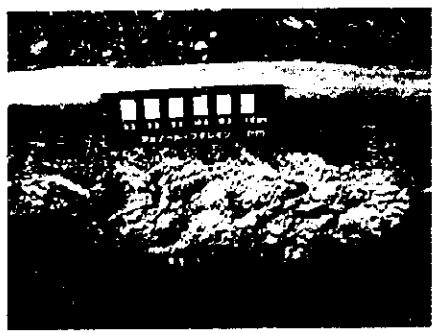
The bridge is frequently closed to traffic for repairing or replacing timber materials. On the other hand it is an essential road. The bridge should be reconstructed of concrete or steel which has a longer life than timber.

APPENDIX II-3

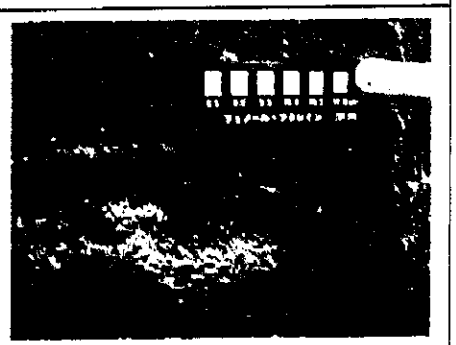
RESULTS OF PHENOLPHTHALEIN LIQUID TEST

Concrete Neutralization Test (1)

Bridge Name Components	Neutralization	Photograph
David García Pier	pH=9.5 slightly neutralized	
Granallas Pier	pH=9.0 neutralized	
Ventanas Abutment	pH=9.0 neutralized	

Bridge Name Components	Neutralization	Photograph
Cautín Beam	pH=9.0 neutralized	
Cautín Abutment	pH=10.5 not neutralized	
El Indio . Abutment	pH=8.5 neutralized	

Concrete Neutralization Test (2)

Bridge Name Components	Neutralization	Photograph
Malleco Abutment	pH=8.5 neutralized	
Medina Abutment	pH=9.0 neutralized	
Cautín 88 Abutment	pH=9.0 neutralized	

Bridge Name Components	Neutralization	Photograph
Salva tu Alma Abutment	pH=10.5 not neutralized	
Quinchilca Abutment	pH=11.0 not neutralized