1.5.12 IRR South

Inspecton result

		Span No.	1

		Damages of steel members				Damages of concrete members						Others							
		Corrosion	Cracking	Missing bolts	Fracture	Cracking, Water leakage, Free lime	No.	Rebar exposure	Pop-outs	Deck cracking	Damages at anchorage of PC tender	Level difference of road surface	Functional damage of bearings	Damages in substructures	Damages in pavemnents	Damages in expansion joints	Damages in cable	Remarks
Girder	01					a		a			a							
	02					a		a			a							
	03					a		a			a							
Crossbeam	01					a		a			a							
	02					a		a			a							
	03					a		a			a							
Deck	01							a	a	c								
	02							a	a	a								
	03							a	a	c								
cable	01										a							
Pier	01					c		a										
	02					c		a										
Abuttment	01																	
	02																	
Road surface												a						
Pavement															a			
Barriers Railings	01															a		
	02															a		
	03															a		
	04															a		
Expansion joints	01																a	

Estimation of repair quantity

Bridge name	IRR South	Span No.	1

	Subject		Quantity	Remarks
1	Span length		68.83 m	Length of 1 span
2	Road width for pavement		28.57 m	Width for pavement area (Vehicle lane)
3	Total road width		35.57 m	Deck width
4	Area of bridge surface		2,448.3 m^2	Span length x Total width
5	Area of pavement		1,966.5 m^2	Span length x Width for pavement
6	Barriers & railings	01	concrete	Type of barriers & railings
		02	concrete	Same as above
		03	concrete	Same as above
		04	concrete	Same as above
7	Expansion joints	01	steel	Type of expansion joint
		-	-	Same as above

	Crack length		Quantity	Remarks
8	Total crack length L		97.9 m	A of bridge surf. x 0.040
	Girder	01	9.8 m	L × 0.100 assumed as 10%
		02	58.8 m	L × 0.600 assumed as 60%
		03	9.8 m	L × 0.100 assumed as 10%
	Crossbeam	01	2.9 m	L × 0.030 assumed as 3%
		02	13.7 m	L × 0.140 assumed as 14%
		03	2.9 m	L × 0.030 assumed as 3%

	Area of rebarb exposure		Quantity	Remarks
9	Total area A		19.6 m^2	A of bridge surf. x 0.008
	Girder	01	2.0 m^2	L × 0.100 assumed as 10%
		02	11.8 m^2	L × 0.600 assumed as 60%
		03	2.0 m^2	L × 0.100 assumed as 10%
	Crossbeam	01	0.6 m^2	L × 0.030 assumed as 3%
		02	2.7 m^2	L × 0.140 assumed as 14%
		03	0.6 m^2	L × 0.030 assumed as 3%

	Repaired area of deck	Quantity	Remarks
10	Divided area A	578.2 m^2	Deck width = 8.4 m Deck width for pos. x span length
	Area of rebarb exposure	69.4 m^2	A × 0.120
	Area of deck cracking	358.5 m^2	A × 0.620

	Repair quanity of pylon & substructure	Quantity	Remarks
11	Cracking, Water leakage, Free lime	5.54 m	per substructure
	Rebar exposure	2.24 m^2	per substructure

	Concrete barrier	Quantity	Remarks
12	Rebar exposure	9.79 m^2	A of bridge surf. x 0.004

Countermeasure classification of members

Member	No.	Damage	Damage classification		Countermeasure classification
			Classification	Judge	
Girder	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
Crossbeam	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5

Bridge name		IRR South	Span No.		1
Member	No.	Damage	Damage classification		Countermeasure classification
			Classification	Judge	
Deck	01	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3
	02	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	a	-	5
	03	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3
Substructure	01	Cracking, Water leakage, Free lime	c	-	3
		Rebar exposure	a	-	5
		Damages in substructures	a	-	5
	02	Cracking, Water leakage, Free lime	c	-	3
		Rebar exposure	a	-	5
		Damages in substructures	a	-	5
Road surface	01	Level difference of road surface	a	-	5
		Damages in pavemnents	a	-	5
Barriers Railings	01	Damages in barriers	a	-	5
	02	Damages in barriers	a	-	5
	03	Damages in barriers	a	-	5
	04	Damages in barriers	a	-	5
Expansion joints	01	Damages in expansion joints	a	-	5

Approximate repair price for countermeasure

Bridge name	IRR South					Span No.		1								
Member	No.	Damage	Damage classification	Countermeasure classification	Repair method	Repair quantity	Unit	Approximate unit price (B)	Approximate repair price (B)	Approximate repair price for countermeasure classification 1 & 2 (B)	countermeasure classification 3		countermeasure classification 4		Planned repair & reconstruction	
											Repair price (B)	Remaining years up to countermeasure cl. 2	Repair price (B)	Remaining years up to countermeasure cl. 2	Repair price (B)	Life cycle
Girder	01	Cracking/Water leakage/Free lime	a	5	Resin injection	9.8	m	5,000	49,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.0	m^2	17,500	35,000	-	-	7	-	15	35,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	58.8	m	5,000	294,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	11.8	m^2	17,500	206,500	-	-	7	-	15	206,500	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	9.8	m	5,000	49,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.0	m^2	17,500	35,000	-	-	7	-	15	35,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Crossbeam	01	Cracking/Water leakage/Free lime	a	5	Resin injection	2.9	m	5,000	14,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.6	m^2	17,500	10,500	-	-	7	-	15	10,500	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	13.7	m	5,000	68,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.7	m^2	17,500	47,300	-	-	7	-	15	47,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	2.9	m	5,000	14,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.6	m^2	17,500	10,500	-	-	7	-	15	10,500	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Deck	01	Rebar exposure	a	5	Patching	69.4	m^2	17,500	1,214,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	358.5	m^2	22,500	8,066,300	-	8,066,300	12	-	25	8,066,300	50
	02	Rebar exposure	a	5	Patching	69.4	m^2	17,500	1,214,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	358.5	m^2	22,500	8,066,300	-	-	12	-	25	8,066,300	50
	03	Rebar exposure	a	5	Patching	69.4	m^2	17,500	1,214,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	358.5	m^2	22,500	8,066,300	-	8,066,300	12	-	25	8,066,300	50
Substructure	01	Cracking/Water leakage/Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m^2	17,500	39,200	-	-	7	-	15	39,200	30
		Damages in substructures	a	5	Foot protection	-	Pier / pylon	1,750,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m^2	17,500	39,200	-	-	7	-	15	39,200	30
		Damages in substructures	a	5	Foot protection	-	Pier / pylon	1,750,000	-	-	-	-	-	-	-	-
Road surface	01	Level difference of road surface	a	5	Pavement replacement	-	m^2	5,000	-	-	-	5	-	10	-	20
		Damages in pavements	a	5	same as above	1,966.5	m^2	5,000	9,832,400	-	-	5	-	10	9,832,400	20
Barriers Railings	01	Damages in barriers	a	5	Patching.	9.79	m^2	120,000	1,174,800	-	-	7	-	15	1,174,800	30
	02	Damages in barriers	a	5	Patching.	9.79	〃	120,000	1,174,800	-	-	7	-	15	1,174,800	30
	03	Damages in barriers	a	5	Patching.	9.79	〃	120,000	1,174,800	-	-	7	-	15	1,174,800	30
	04	Damages in barriers	a	5	Patching.	9.79	〃	120,000	1,174,800	-	-	7	-	15	1,174,800	30
Expansion joints	01	Damages in expansion joints	a	5	change of steel exp.	35.6	m	5,000	177,900	-	-	7	-	15	177,900	30

Inspecton result

		Span No.	2

		Damages of steel members				Damages of concrete members						Others							
		Corrosion	Cracking	Missing bolts	Fracture	Cracking, Water leakage, Free lime	No.	Rebar exposure	Pop-outs	Deck cracking	Damages at anchorage of PC tender	Level difference of road surface	Functional damage of bearings	Damages in substructures	Damages in pavemments	Damages in expansion joints	Damages in cable	Remarks
Girder	01					a		a			a							
	02					a		a			a							
	03					a		a			a							
Crossbeam	01					a		a			a							
	02					a		a			a							
	03					a		a			a							
Deck	01							a	a	c								
	02							a	a	a								
	03							a	a	a								
cable	01										a							
Pier	01					a		a										
Road surface												a						
Pavement															a			
Barriers Railings	01															a		
	02															a		
	03															a		
	04															a		

Estimation of repair quantity

Bridge name	IRR South	Span No.	2

	Subject		Quantity	Remarks
1	Span length		83.50 m	Length of 1 span
2	Road width for pavement		28.57 m	Width for pavement area (Vehicle lane)
3	Total road width		35.57 m	Deck width
4	Area of bridge surface		2,970.1 m^2	Span length x Total width
5	Area of pavement		2,385.6 m^2	Span length x Width for pavement
6	Barriers & railings	01	concrete	Type of barriers & railings
		02	concrete	Same as above
		03	concrete	Same as above
		04	concrete	Same as above
7	Expansion joints	01	steel	Type of expansion joint
		-	-	Same as above

	Crack length		Quantity	Remarks
8	Total crack length L		118.8 m	A of bridge surf. x 0.040
	Girder	01	11.9 m	L × 0.100 assumed as 10%
		02	71.3 m	L × 0.600 assumed as 60%
		03	11.9 m	L × 0.100 assumed as 10%
	Crossbeam	01	3.6 m	L × 0.030 assumed as 3%
		02	16.6 m	L × 0.140 assumed as 14%
		03	3.6 m	L × 0.030 assumed as 3%

	Area of rebarb exposure		Quantity	Remarks
9	Total area A		23.8 m^2	A of bridge surf. x 0.008
	Girder	01	2.4 m^2	L × 0.100 assumed as 10%
		02	14.3 m^2	L × 0.600 assumed as 60%
		03	2.4 m^2	L × 0.100 assumed as 10%
	Crossbeam	01	0.7 m^2	L × 0.030 assumed as 3%
		02	3.3 m^2	L × 0.140 assumed as 14%
		03	0.7 m^2	L × 0.030 assumed as 3%

	Repaired area of deck	Quantity	Remarks
10	Divided area A	701.4 m^2	Deck width = 8.4 m Deck width for pos. x span length
	Area of rebarb exposure	84.2 m^2	A × 0.120
	Area of deck cracking	434.9 m^2	A × 0.620

	Repair quanity of pylon & substructure	Quantity	Remarks
11	Cracking, Water leakage, Free lime	5.54 m	per substructure
	Rebar exposure	2.24 m^2	per substructure

	Concrete barrier	Quantity	Remarks
12	Rebar exposure	11.88 m^2	A of bridge surf. x 0.004

Countermeasure classification of members

Member	No.	Damage	Damage classification: Classification	Damage classification: Judge	Countermeasure classification
Girder	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
Crossbeam	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5

Bridge name	IRR South		Span No.		2
Member	No.	Damage	Damage classification: Classification	Damage classification: Judge	Countermeasure classification
Deck	01	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3
	02	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	a	-	5
	03	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	a	-	5
Substructure	01	Cracking, Water leakage, Free lime	a	3	5
		Rebar exposure	a	-	5
		Damages in substructures	a	-	5
Road surface	01	Level difference of road surface	a	-	5
		Damages in pavemnents	a	-	5
Barriers Railings	01	Damages in barriers	a	-	5
	02	Damages in barriers	a	-	5
	03	Damages in barriers	a	-	5
	04	Damages in barriers	a	-	5
Expansion joints	01	Damages in expansion joints	a	-	5

Approximate repair price for countermeasure

Bridge name	IRR South					Span No.		2								
Member	No.	Damage	Damage classification	Countermeasure classification	Repair method	Repair quantity	Unit	Approximate unit price (B)	Approximate repair price (B)	Approximate repair price for countermeasure classification 1 & 2 (B)	countermeasure classification 3		countermeasure classification 4		Planned repair & reconstruction	
											Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Life cycle
Girder	01	Cracking/Water leakage/Free lime	a	5	Resin injection	11.9	m	5,000	59,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.4	m^2	17,500	42,000	-	-	7	-	15	42,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	71.3	m	5,000	356,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	14.3	m^2	17,500	250,300	-	-	7	-	15	250,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	11.9	m	5,000	59,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.4	m^2	17,500	42,000	-	-	7	-	15	42,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Crossbeam	01	Cracking/Water leakage/Free lime	a	5	Resin injection	3.6	m	5,000	18,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.7	m^2	17,500	12,300	-	-	7	-	15	12,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	16.6	m	5,000	83,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	3.3	m^2	17,500	57,800	-	-	7	-	15	57,800	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	3.6	m	5,000	18,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.7	m^2	17,500	12,300	-	-	7	-	15	12,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Deck	01	Rebar exposure	a	5	Patching	84.2	m^2	17,500	1,473,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	434.9	m^2	22,500	9,785,300	-	9,785,300	12	-	25	9,785,300	50
	02	Rebar exposure	a	5	Patching	84.2	m^2	17,500	1,473,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	434.9	m^2	22,500	9,785,300	-	-	12	-	25	9,785,300	50
	03	Rebar exposure	a	5	Patching	84.2	m^2	17,500	1,473,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	434.9	m^2	22,500	9,785,300	-	-	12	-	25	9,785,300	50
Substructure	01	Cracking/Water leakage/Free lime	a	5	Resin injection	5.54	m	5,000	27,700	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m^2	17,500	39,200	-	-	7	-	15	39,200	30
		Damages in substructures	a	5	Foot protection	-	er / pyl	1,750,000	-	-	-	-	-	-	-	-
Road surface	01	Level difference of road surface	a	5	Pavement replacement	-	m^2	5,000	-	-	-	5	-	10	-	20
		Damages in pavemnents	a	5	same as above	2,385.6	m^2	5,000	11,928,000	-	-	5	-	10	11,928,000	20
Barriers Railings	01	Damages in barriers	a	5	Patching.	11.88	m^2	120,000	1,425,600	-	-	7	-	15	1,425,600	30
	02	Damages in barriers	a	5	Patching.	11.88	//	120,000	1,425,600	-	-	7	-	15	1,425,600	30
	03	Damages in barriers	a	5	Patching.	11.88	//	120,000	1,425,600	-	-	7	-	15	1,425,600	30
	04	Damages in barriers	a	5	Patching.	11.88	//	120,000	1,425,600	-	-	7	-	15	1,425,600	30
Expansion joints	01	Damages in expansion joints	a	5	change of steel exp.	35.6	m	5,000	177,900	-	-	7	-	15	177,900	30

Inspecton result

Span No.	3

		Damages of steel members				Damages of concrete members						Others						Remarks
		Corrosion	Cracking	Missing bolts	Fracture	Cracking, Water leakage, Free lime	No.	Rebar exposure	Pop-outs	Deck cracking	Damages at anchorage of PC tender	Level difference of road surface	Functional damage of bearings	Damages in substructures	Damages in pavements	Damages in expansion joints	Damages in cable	
Girder	01	a	a	a	a													
	02	a	a	a	a													
	03	a	a	a	a													
	04	a	a	a	a													
Crossbeam	01	a	a	a	a													
	02	a	a	a	a													
	03	a	a	a	a													
Deck	01							a	a	a	a							
	02							a	a	a	a							
	03							a	a	a	a							
	04							a	a	a	a							
	05							a	a	a	a							
Main tower	01					c	—	a			a			a				
	02					c	—	a			a			a				
cable	01										e							
	02										e							
Bearings	101												a					
	102												a					
	103												a					
	104												a					
	201												a					
	202												a					
	203												a					
	204												a					
Road surface												a						
Pavement															a			
Barriers Railings	01															a		
	02															a		
	03															a		
	04															a		

Estimation of repair quantity

Bridge name	012 IRR Sorth	Span No.	3

	Subject		Quantity	Remarks
1	Span length		398.0 m	Length of 1 span
2	Road width for pavement		28.57 m	Width for pavement area (Vehicle lane)
3	Total road width		35.57 m	Deck width
4	Area of bridge surface		14,156.9 m^2	Span length x Total width
5	Area of pavement		11,370.9 m^2	Span length x Width for pavement
6	Barriers & railings	01	concrete	Type of barriers & railings
		02	concrete	Same as above
		03	concrete	Same as above
		04	concrete	Same as above
7	Expansion joints	01	steel	Type of expansion joint
		-	-	Same as above

	Painting area		Girder height	Number of members	Coefficient	Painting area	Remarks
8	Girder	01～04	3.200	1	1.300	3,320.0 m^2	
	Crossbeam	01	3.200	1	1.100	260.0 m^2	
		02	3.200	74	1.100	18,540.0 m^2	
		03	3.200	1	1.100	260.0 m^2	

	Repaired area of deck	Quantity	Remarks
9	Divided area A	2,831.4 m^2	5 Division
	Area of rebarb exposure	339.8 m^2	A × 0.120
	Area of deck cracking	1,755.5 m^3	A × 0.620

	Repair quanity of pylon & substructure	Quantity	Remarks
10	Cracking, Water leakage, Free lime	5.54 m	per substructure
	Rebar exposure	2.24 m^2	per substructure

	Concrete barrier	Quantity	Remarks
11	Rebar exposure	56.63 m^2	A of bridge surf. x 0.004

Countermeasure classification of members

Bridge name			012 IRR Sorth			Span No.			3		
Member	No.	Damage	Damage classification		Countermeasure classification	Member	No.	Damage	Damage classification		Countermeasure classification
			Classification	Judge					Classification	Judge	
Girder	01	Corrosion	a	-	5	Deck	03	Rebar exposure	a	-	5
		Cracking	a	-	5			Pop-outs	a	-	5
		Missing bolts	a	-	5			Deck cracking	a	-	5
		Fracture	a	-	5			Damages at anchorage of PC tendon	a	-	5
	02	Corrosion	a	-	5		04	Rebar exposure	a	-	5
		Cracking	a	-	5			Pop-outs	a	-	5
		Missing bolts	a	-	5			Deck cracking	a	-	5
		Fracture	a	-	5			Damages at anchorage of PC tendon	a	-	5
	03	Corrosion	a	-	5		05	Rebar exposure	a	-	5
		Cracking	a	-	5			Pop-outs	a	-	5
		Missing bolts	a	-	5			Deck cracking	a	-	5
		Fracture	a	-	5			Damages at anchorage of PC tendon	a	-	5
	04	Corrosion	a	-	5	Main tower	01	Cracking, Water leakage, Free lime	c	3	3
		Cracking	a	-	5			Rebar exposure	a	-	5
		Missing bolts	a	-	5			Damages at anchorage of PC tendon	a	-	5
		Fracture	a	-	5		02	Cracking, Water leakage, Free lime	c	3	3
Crossbeam	01	Corrosion	a	-	5			Rebar exposure	a	-	5
		Cracking	a	-	5			Damages at anchorage of PC tendon	a	-	5
		Missing bolts	a	-	5	Cable	01	Damages at anchorage of PC tendon	e	-	2
		Fracture	a	-	5		02	Damages at anchorage of PC tendon	e	-	2
	02	Corrosion	a	-	5	Bearings	101	Functional damage of bearings	a	-	5
		Cracking	a	-	5		102	Functional damage of bearings	a	-	5
		Missing bolts	a	-	5		103	Functional damage of bearings	a	-	5
		Fracture	a	-	5		104	Functional damage of bearings	a	-	5
	03	Corrosion	a	-	5		201	Functional damage of bearings	a	-	5
		Cracking	a	-	5		202	Functional damage of bearings	a	-	5
		Missing bolts	a	-	5		203	Functional damage of bearings	a	-	5
		Fracture	a	-	5		204	Functional damage of bearings	a	-	5
Deck	01	Rebar exposure	a	-	5	Road surface	01	Level difference of road surface	a	-	5
		Pop-outs	a	-	5			Damages in pavemnents	a	-	5
		Deck cracking	a	-	5	Barriers Railings	01	Damages in barriers	a	-	5
		Damages at anchorage of PC tendon	a	-	5		02	Damages in barriers	a	-	5
	02	Rebar exposure	a	-	5		03	Damages in barriers	a	-	5
		Pop-outs	a	-	5		04	Damages in barriers	a	-	5
		Deck cracking	a	-	5						
		Damages at anchorage of PC tendon	a	-	5						

Approximate repair price for countermeasures

Bridge name	012 IRR South					Span No.		3			countermeasure classification		countermeasure classification		Planned repair & reconstruction	
Member	No.	Damage	Damage classification	Countermeasure classification	Repair method	Repair quantity	Unit	Approximate unit price (A)	Approximate repair price (B)	Approximate repair price for countermeasure classification 1 & 2 (B)	Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Life cycle
Girder	01	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
	02	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
	03	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
	04	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
Crossbeam	01	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
	02	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
	03	Corrosion	a	5	Repainting	3,320.0	m^2	3,500	11,620,000	-	-	5	-	10	11,620,000	20
		Cracking	a	5	Reinf. with steel pl.	-	Pos.	166,700	-	-	-	-	-	-	-	-
		Missing bolts	a	5	Bolt change for splice pl.	-	Pos.	133,400	-	-	-	-	-	-	-	-
		Fracture	a	5	Reinf. for fracture	-	Pos.	166,700	-	-	-	-	-	-	-	-
Work stand worker						14,156.9	m^2	3,000	42,470,600						42,470,600	
Deck	01	Rebar exposure	a	5	Patching	339.8	m^2	17,500	5,946,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	1,755.5	m^2	22,500	39,498,800	-	-	7	-	15	39,498,800	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
	02	Rebar exposure	a	5	Patching	339.8	m^2	17,500	5,946,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	1,755.5	m^2	22,500	39,498,800	-	-	7	-	15	39,498,800	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
	03	Rebar exposure	a	5	Patching	339.8	m^2	17,500	5,946,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	1,755.5	m^2	22,500	39,498,800	-	-	7	-	15	39,498,800	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
	04	Rebar exposure	a	5	Patching	339.8	m^2	17,500	5,946,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	1,755.5	m^2	22,500	39,498,800	-	-	7	-	15	39,498,800	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
	05	Rebar exposure	a	5	Patching	339.8	m^2	17,500	5,946,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	1,755.5	m^2	22,500	39,498,800	-	-	7	-	15	39,498,800	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
Main tower	01	Cracking, Water leakage, Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m	17,500	39,200	-	-	7	-	15	39,200	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
	02	Cracking, Water leakage, Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m	17,500	39,200	-	-	7	-	15	39,200	30
		Damages at anchorage of PC tendon	a	5	CFR (upper & bottom)	-	Pos.	45,000	-	-	-	-	-	-	-	-
Cable	01	Damages at anchorage of PC tendon	c	2	CFR (upper & bottom)	1.0	Pos.	45,000	45,000	45,000	-	-	-	-	-	-
	02	Damages at anchorage of PC tendon	c	2	CFR (upper & bottom)	1.0	Pos.	45,000	45,000	45,000	-	-	-	-	-	-
Bearings	101	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	102	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	103	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	104	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	201	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	202	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	203	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
	204	Functional damage of bearings	a	5	Metal spraying	1.0	Pos.	120,000	120,000	-	-	7	-	15	120,000	30
Road surface	01	Level difference of road surface	a	5	Pavement replacement	11,370.9	m^2	5,000	56,854,300	-	-	5	-	10	-	20
		Damages in pavements	a	5	same as above	11,370.9	m^2	5,000	56,854,300	-	-	5	-	10	56,854,300	20
Barriers Railings	01	Damages in barriers	a	5	Patching	56.63	m	17,500	991,100	-	-	7	-	15	991,100	30
	02	Damages in barriers	a	5	Patching	56.63	m	17,500	991,100	-	-	7	-	15	991,100	30
	03	Damages in barriers	a	5	Patching	56.63	m	17,500	991,100	-	-	7	-	15	991,100	30
	04	Damages in barriers	a	5	Patching	56.63	m	17,500	991,100	-	-	7	-	15	991,100	30

Inspecton result

		Span No.	4

		Damages of steel members				Damages of concrete members						Others						
		Corrosion	Cracking	Missing bolts	Fracture	Cracking, Water leakage, Free lime	No.	Rebar exposure	Pop-outs	Deck cracking	Damages at anchorage of PC tender	Level difference of road surface	Functional damage of bearings	Damages in substructures	Damages in pavemments	Damages in expansion joints	Damages in cable	Remarks
Girder	01					a		a			a							
	02					a		a			a							
	03					a		a			a							
Crossbeam	01					a		a			a							
	02					a		a			a							
	03					a		a			a							
Deck	01							a	a	c								
	02							a	a	a								
	03							a	a	c								
cable	01										a							
Pier	01					a		a										
Road surface												a						
Pavement															a			
Barriers Railings	01															a		
	02															a		
	03															a		
	04															a		

Estimation of repair quantity

Bridge name	012 IRR Sorth	Span No.	4

	Subject		Quantity	Remarks
1	Span length		83.50 m	Length of 1 span
2	Road width for pavement		28.57 m	Width for pavement area (Vehicle lane)
3	Total road width		35.57 m	Deck width
4	Area of bridge surface		2,970.1 m^2	Span length x Total width
5	Area of pavement		2,385.6 m^2	Span length x Width for pavement
6	Barriers & railings	01	concrete	Type of barriers & railings
		02	concrete	Same as above
		03	concrete	Same as above
		04	concrete	Same as above
7	Expansion joints	01	steel	Type of expansion joint
		-	-	Same as above

	Crack length		Quantity	Remarks
8	Total crack length L		118.8 m	A of bridge surf. x 0.040
	Girder	01	11.9 m	L × 0.100 assumed as 10%
		02	71.3 m	L × 0.600 assumed as 60%
		03	11.9 m	L × 0.100 assumed as 10%
	Crossbeam	01	3.6 m	L × 0.030 assumed as 3%
		02	16.6 m	L × 0.140 assumed as 14%
		03	3.6 m	L × 0.030 assumed as 3%

	Area of rebarb exposure		Quantity	Remarks
9	Total area A		23.8 m^2	A of bridge surf. x 0.008
	Girder	01	2.4 m^2	L × 0.100 assumed as 10%
		02	14.3 m^2	L × 0.600 assumed as 60%
		03	2.4 m^2	L × 0.100 assumed as 10%
	Crossbeam	01	0.7 m^2	L × 0.030 assumed as 3%
		02	3.3 m^2	L × 0.140 assumed as 14%
		03	0.7 m^2	L × 0.030 assumed as 3%

	Repaired area of deck	Quantity	Remarks
10	Divided area A	701.4 m^2	Deck width = 8.4 m Deck width for pos. x span length
	Area of rebarb exposure	84.2 m^2	A × 0.120
	Area of deck cracking	434.9 m^2	A × 0.620

	Repair quanity of pylon & substructure	Quantity	Remarks
11	Cracking, Water leakage, Free lime	5.54 m	per substructure
	Rebar exposure	2.24 m^2	per substructure

	Concrete barrier	Quantity	Remarks
12	Rebar exposure	11.88 m^2	A of bridge surf. x 0.004

Countermeasure classification of members

Member	No.	Damage	Damage classification: Classification	Damage classification: Judge	Countermeasure classification
Girder	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
Crossbeam	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5

Bridge name	012 IRR Sorth		Span No.		4
Member	No.	Damage	Damage classification: Classification	Damage classification: Judge	Countermeasure classification
Deck	01	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3
	02	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	a	-	5
	03	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3
Substructure	01	Cracking, Water leakage, Free lime	c	3	3
		Rebar exposure	a	-	5
		Damages in substructures	a	-	5
Road surface	01	Level difference of road surface	a	-	5
		Damages in pavemnents	a	-	5
Barriers Railings	01	Damages in barriers	a	-	5
	02	Damages in barriers	a	-	5
	03	Damages in barriers	a	-	5
	04	Damages in barriers	a	-	5
Expansion joints	01	Damages in expansion joints	a	-	5

Approximate repair price for countermeasure

Bridge name	012 IRR Sorth				Span No.		4								
Member	No.	Damage	Damage classification	Countermeasure classification	Repair method	Repair quantity	Unit	Approximate unit price (B)	Approximate repair price (B)	Approximate repair price for countermeasure classification 1 & 2 (B)	countermeasure classification 3		countermeasure classification 4		Planned repair & reconstruction	
											Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Life cycle
Girder	01	Cracking/Water leakage/Free lime	a	5	Resin injection	11.9	m	5,000	59,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.4	m^2	17,500	42,000	-	-	7	-	15	42,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	71.3	m	5,000	356,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	14.3	m^2	17,500	250,300	-	-	7	-	15	250,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	11.9	m	5,000	59,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.4	m^2	17,500	42,000	-	-	7	-	15	42,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Crossbeam	01	Cracking/Water leakage/Free lime	a	5	Resin injection	3.6	m	5,000	18,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.7	m^2	17,500	12,300	-	-	7	-	15	12,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	16.6	m	5,000	83,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	3.3	m^2	17,500	57,800	-	-	7	-	15	57,800	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	3.6	m	5,000	18,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.7	m^2	17,500	12,300	-	-	7	-	15	12,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Deck	01	Rebar exposure	a	5	Patching	84.2	m^2	17,500	1,473,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	434.9	m^2	22,500	9,785,300	-	9,785,300	12	-	25	9,785,300	50
	02	Rebar exposure	a	5	Patching	84.2	m^2	17,500	1,473,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	434.9	m^2	22,500	9,785,300	-	-	12	-	25	9,785,300	50
	03	Rebar exposure	a	5	Patching	84.2	m^2	17,500	1,473,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	434.9	m^2	22,500	9,785,300	-	9,785,300	12	-	25	9,785,300	50
Substructure	01	Cracking/Water leakage/Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m^2	17,500	39,200	-	-	7	-	15	39,200	30
		Damages in substructures	a	5	Foot protection	-	Pier / pylon	1,750,000	-	-	-	-	-	-	-	-
Road surface	01	Level difference of road surface	a	5	Pavement replacement	-	m^2	5,000	-	-	-	5	-	10	-	20
		Damages in pavemnents	a	5	same as above	2,385.6	m^2	5,000	11,928,000	-	-	5	-	10	11,928,000	20
Barriers Railings	01	Damages in barriers	a	5	Patching.	11.88	m^2	120,000	1,425,600	-	-	7	-	15	1,425,600	30
	02	Damages in barriers	a	5	Patching.	11.88	//	120,000	1,425,600	-	-	7	-	15	1,425,600	30
	03	Damages in barriers	a	5	Patching.	11.88	//	120,000	1,425,600	-	-	7	-	15	1,425,600	30
	04	Damages in barriers	a	5	Patching.	11.88	//	120,000	1,425,600	-	-	7	-	15	1,425,600	30

Inspecton result

																					Span No.	5
		Damages of steel members				Damages of concrete members						Others										
		Corrosion	Cracking	Missing bolts	Fracture	Cracking, Water leakage, Free lime	No.	Rebar exposure	Pop-outs	Deck cracking	Damages at anchorage of PC tender	Level difference of road surface	Functional damage of bearings	Damages in substructures	Damages in pavemments	Damages in expansion joints	Damages in cable	Remarks				
Girder	01					a		a			a											
	02					a		a			a											
	03					a		a			a											
Crossbeam	01					a		a			a											
	02					a		a			a											
	03					a		a			a											
Deck	01							a	a	c												
	02							a	a	a												
	03							a	a	c												
cable	01										e											
Pier	01					c		a														
	02					c		a														
Road surface												a										
Pavement															a							
Barriers Railings	01															a						
	02															a						
	03															a						
	04															a						
Expansion joints	01																a					

Estimation of repair quantity

Bridge name	012 IRR Sorth	Span No.	5

	Subject		Quantity	Remarks
1	Span length		50.63 m	Length of 1 span
2	Road width for pavement		29.00 m	Width for pavement area (Vehicle lane)
3	Total road width		35.80 m	Deck width
4	Area of bridge surface		1,812.6 m^2	Span length x Total width
5	Area of pavement		1,468.3 m^2	Span length x Width for pavement
6	Barriers & railings	01	concrete	Type of barriers & railings
		02	concrete	Same as above
		03	concrete	Same as above
		04	concrete	Same as above
7	Expansion joints	01	steel	Type of expansion joint
		-	-	Same as above

	Crack length		Quantity	Remarks
8	Total crack length L		72.5 m	A of bridge surf. x 0.040
	Girder	01	7.3 m	L × 0.100 assumed as 10%
		02	43.5 m	L × 0.600 assumed as 60%
		03	7.3 m	L × 0.100 assumed as 10%
	Crossbeam	01	2.2 m	L × 0.030 assumed as 3%
		02	10.2 m	L × 0.140 assumed as 14%
		03	2.2 m	L × 0.030 assumed as 3%

	Area of rebarb exposure		Quantity	Remarks
9	Total area A		14.5 m^2	A of bridge surf. x 0.008
	Girder	01	1.5 m^2	L × 0.100 assumed as 10%
		02	8.7 m^2	L × 0.600 assumed as 60%
		03	1.5 m^2	L × 0.100 assumed as 10%
	Crossbeam	01	0.4 m^2	L × 0.030 assumed as 3%
		02	2.0 m^2	L × 0.140 assumed as 14%
		03	0.4 m^2	L × 0.030 assumed as 3%

	Repaired area of deck	Quantity	Remarks
10	Divided area A	425.3 m^2	Deck width = 8.4 m Deck width for pos. x span length
	Area of rebarb exposure	51.0 m^2	A × 0.120
	Area of deck cracking	263.7 m^2	A × 0.620

	Repair quanity of pylon & substructure	Quantity	Remarks
11	Cracking, Water leakage, Free lime	5.54 m	per substructure
	Rebar exposure	2.24 m^2	per substructure

	Concrete barrier	Quantity	Remarks
12	Rebar exposure	7.25 m^2	A of bridge surf. x 0.004

Countermeasure classification of members

Member	No.	Damage	Damage classification: Classification	Damage classification: Judge	Countermeasure classification
Girder	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
Crossbeam	01	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	02	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
	03	Cracking, Water leakage, Free lime	a	-	5
		Rebar exposure	a	-	5
		Damages at anchorage of PC tendon	a	-	5
Deck	01	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3

Bridge name	012 IRR Sorth		Span No.		5
Member	No.	Damage	Damage classification: Classification	Damage classification: Judge	Countermeasure classification
Deck	02	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	a	-	5
	03	Rebar exposure	a	-	5
		Pop-outs	a	-	5
		Deck cracking	c	-	3
cable	01	Damages at anchorage of PC tendon	e	-	2
Substructure	01	Cracking, Water leakage, Free lime	c	-	3
		Rebar exposure	a	-	5
		Damages in substructures	a	-	5
	02	Cracking, Water leakage, Free lime	c	-	3
		Rebar exposure	a	-	5
		Damages in substructures	a	-	5
Road surface	01	Level difference of road surface	a	-	5
		Damages in pavements	a	-	5
Barriers Railings	01	Damages in barriers	a	-	5
	02	Damages in barriers	a	-	5
	03	Damages in barriers	a	-	5
	04	Damages in barriers	a	-	5
Expansion joints	01	Damages in expansion joints	a	-	5

Approximate repair price for countermeasure

Bridge name	012 IRR Sorth				Span No.		5									
Member	No.	Damage	Damage classification	Countermeasure classification	Repair method	Repair quantity	Unit	Approximate unit price (B)	Approximate repair price (B)	Approximate repair price for countermeasure classification 1 & 2 (B)	countermeasure classification 3		countermeasure classification 4		Planned repair & reconstruction	
											Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Remaining years up to counter measure cl. 2	Repair price (B)	Life cycle
Girder	01	Cracking/Water leakage/Free lime	a	5	Resin injection	7.3	m	5,000	36,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	1.5	m^2	17,500	26,300	-	-	7	-	15	26,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	43.5	m	5,000	217,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	8.7	m^2	17,500	152,300	-	-	7	-	15	152,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	7.3	m	5,000	36,500	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	1.5	m^2	17,500	26,300	-	-	7	-	15	26,300	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Crossbeam	01	Cracking/Water leakage/Free lime	a	5	Resin injection	2.2	m	5,000	11,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.4	m^2	17,500	7,000	-	-	7	-	15	7,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	a	5	Resin injection	10.2	m	5,000	51,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.0	m^2	17,500	35,000	-	-	7	-	15	35,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
	03	Cracking/Water leakage/Free lime	a	5	Resin injection	2.2	m	5,000	11,000	-	-	7	-	15	-	30
		Rebar exposure	a	5	Patching	0.4	m^2	17,500	7,000	-	-	7	-	15	7,000	30
		Damages at anchorage of PC tendon	a	5	Reinforcement with external PC tendon	-	Pos.	1,000,000	-	-	-	-	-	-	-	-
Deck	01	Rebar exposure	a	5	Patching	51.0	m^2	17,500	892,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	263.7	m^2	22,500	5,933,300	-	5,933,300	12	-	25	5,933,300	50
	02	Rebar exposure	a	5	Patching	51.0	m^2	17,500	892,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	a	5	CFR	263.7	m^2	22,500	5,933,300	-	-	12	-	25	5,933,300	50
	03	Rebar exposure	a	5	Patching	51.0	m^2	17,500	892,500	-	-	7	-	15	-	30
		Pop-outs	a	5	Patching & CFR	-	Pos.	10,000	-	-	-	-	-	-	-	-
		Deck cracking	c	3	CFR	263.7	m^2	22,500	5,933,300	-	5,933,300	12	-	25	5,933,300	50
cable	01	Damages at anchorage of PC tendon	e	2	CFR	1.0	Pos.	45,000	45,000	45,000	-	12	-	25	45,000	50
Substructure	01	Cracking/Water leakage/Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m^2	17,500	39,200	-	-	7	-	15	39,200	30
		Damages in substructures	a	5	Foot protection	-	Pier / pylon	1,750,000	-	-	-	-	-	-	-	-
	02	Cracking/Water leakage/Free lime	c	3	Resin injection	5.54	m	5,000	27,700	-	27,700	7	-	15	-	30
		Rebar exposure	a	5	Patching	2.24	m^2	17,500	39,200	-	-	7	-	15	39,200	30
		Damages in substructures	a	5	Foot protection	-	Pier / pylon	1,750,000	-	-	-	-	-	-	-	-
Road surface	01	Level difference of road surface	a	5	Pavement replacement	-	m^2	5,000	-	-	-	5	-	10	-	20
		Damages in pavements	a	5	same as above	1,468.3	m^2	5,000	7,341,400	-	-	5	-	10	7,341,400	20
Barriers Railings	01	Damages in barriers	a	5	Patching.	7.25	m^2	120,000	870,000	-	-	7	-	15	870,000	30
	02	Damages in barriers	a	5	Patching.	7.25	//	120,000	870,000	-	-	7	-	15	870,000	30
	03	Damages in barriers	a	5	Patching.	7.25	//	120,000	870,000	-	-	7	-	15	870,000	30
	04	Damages in barriers	a	5	Patching.	7.25	//	120,000	870,000	-	-	7	-	15	870,000	30
Expansion joints	01	Damages in expansion joints	a	5	change of steel exp.	35.8	m	5,000	179,000	-	-	7	-	15	179,000	30

Approximate total repair cost

Year	Annual repair cost (B)							Cumnalative cost (B)
	Span No.1	Span No.2	Span No.3	Span No.4	Span No.5	Periodic inspection + reserve for unexpected matters	Bridge total	
2011	-	-	-	-	-	233,400	233,400	233,400
2012	-	-	-	-	-	-	-	233,400
2013	-	-	-	-	-	-	-	233,400
2014	-	-	-	-	-	-	-	233,400
2015	-	-	-	-	-	-	-	233,400
2016	-	-	-	-	-	233,400	233,400	466,800
2017	-	-	-	-	-	-	-	466,800
2018	55,400	27,700	55,400	27,700	55,400	-	221,600	688,400
2019	-	-	-	-	-	-	-	688,400
2020	-	-	-	-	-	-	-	688,400
2021	-	-	-	-	-	233,400	233,400	921,800
2022	-	-	-	-	-	-	-	921,800
2023	11,866,600	-	-	17,460,000	11,866,600	-	41,193,200	42,115,000
2024	-	-	-	-	-	-	-	42,115,000
2025	-	-	-	-	-	-	-	42,115,000
2026	-	-	-	-	-	233,400	233,400	42,348,400
2027	-	-	-	-	-	-	-	42,348,400
2028	-	-	-	-	-	-	-	42,348,400
2029	-	-	-	-	-	-	-	42,348,400
2030	-	-	-	-	-	-	-	42,348,400
2031	7,341,400	10,802,500	139,402,400	10,802,500	7,341,400	233,400	175,923,600	218,272,000
2032	-	-	-	-	-	-	-	218,272,000
2033	-	-	-	-	-	-	-	218,272,000
2034	-	-	-	-	-	-	-	218,272,000
2035	-	-	-	-	-	-	-	218,272,000
2036	-	-	-	-	-	233,400	233,400	218,505,400
2037	-	-	-	-	-	-	-	218,505,400
2038	-	-	-	-	-	-	-	218,505,400
2039	-	-	-	-	-	-	-	218,505,400
2040	-	-	-	-	-	-	-	218,505,400
2041	3,558,400	5,160,800	167,116,000	5,160,800	3,558,400	233,400	184,787,800	403,293,200
2042	-	-	-	-	-	-	-	403,293,200
2043	-	-	-	-	-	-	-	403,293,200
2044	-	-	-	-	-	-	-	403,293,200
2045	-	-	-	-	-	-	-	403,293,200
2046	-	-	-	-	-	233,400	233,400	403,526,600
2047	-	-	-	-	-	-	-	403,526,600
2048	-	-	-	-	-	-	-	403,526,600
2049	-	-	-	-	-	-	-	403,526,600
2050	-	-	-	-	-	-	-	403,526,600
2051	-	-	-	-	-	233,400	233,400	403,760,000
2052	7,341,400	10,802,500	139,402,400	10,802,500	7,341,400	-	175,690,200	579,450,200
2053	-	-	-	-	-	-	-	579,450,200
2054	-	-	-	-	-	-	-	579,450,200
2055	-	-	-	-	-	-	-	579,450,200
2056	-	-	-	-	-	-	-	579,450,200
2057	-	-	-	-	-	233,400	233,400	579,683,600
2058	-	-	-	-	-	-	-	579,683,600
2059	-	-	-	-	-	-	-	579,683,600
2060	-	-	-	-	-	-	-	579,683,600
2061	5,933,300	26,190,000	-	8,730,000	5,933,300	-	-	579,683,600
2062	-	-	-	-	-	233,400	47,020,000	626,703,600
2063	-	-	-	-	-	-	-	626,703,600
2064	-	-	-	-	-	-	-	626,703,600
2065	-	-	-	-	-	-	-	626,703,600
2066	-	-	-	-	-	-	-	626,703,600
2067	-	-	-	-	-	233,400	233,400	626,937,000
2068	-	-	-	-	-	-	-	626,937,000
2069	-	-	-	-	-	-	-	626,937,000
2070	-	-	-	-	-	-	-	626,937,000
2071	-	-	-	-	-	-	-	626,937,000
2072	3,558,400	5,160,800	167,116,000	5,160,800	3,558,400	233,400	233,400	627,170,400
2073	7,341,400	10,802,500	139,402,400	10,802,500	7,341,400	-	184,554,400	811,724,800
2074	11,866,600	-	-	17,460,000	11,866,600	-	175,690,200	987,415,000
2075	-	-	-	-	-	-	41,193,200	1,028,608,200
2076	-	-	-	-	-	-	-	1,028,608,200
2077	-	-	-	-	-	233,400	233,400	1,028,841,600
2078	-	-	-	-	-	-	-	1,028,841,600
2079	-	-	-	-	-	-	-	1,028,841,600
2080	-	-	-	-	-	-	-	1,028,841,600
2081	-	-	-	-	-	-	-	1,028,841,600
2082	-	-	-	-	-	233,400	233,400	1,029,075,000
2083	-	-	-	-	-	-	-	1,029,075,000
2084	-	-	-	-	-	-	-	1,029,075,000
2085	-	-	-	-	-	-	-	1,029,075,000
2086	-	-	-	-	-	-	-	1,029,075,000
2087	-	-	-	-	-	233,400	233,400	1,029,308,400
2088	-	-	-	-	-	-	-	1,029,308,400
2089	-	-	-	-	-	-	-	1,029,308,400
2090	-	-	-	-	-	-	-	1,029,308,400
2091	-	-	-	-	-	-	-	1,029,308,400
2092	-	-	-	-	-	233,400	233,400	1,029,541,800
2093	-	-	-	-	-	-	-	1,029,541,800
2094	7,341,400	10,802,500	139,402,400	10,802,500	7,341,400	-	-	1,029,541,800
2095	-	-	-	-	-	-	175,690,200	1,205,232,000
2096	-	-	-	-	-	-	-	1,205,232,000
2097	-	-	-	-	-	233,400	233,400	1,205,465,400
2098	-	-	-	-	-	-	-	1,205,465,400
2099	-	-	-	-	-	-	-	1,205,465,400
2100	-	-	-	-	-	-	-	1,205,465,400
2101	-	-	-	-	-	-	-	1,205,465,400
2102	-	-	-	-	-	233,400	233,400	1,205,698,800
2103	3,558,400	5,160,800	167,116,000	5,160,800	3,558,400	-	-	1,205,698,800
2104	-	-	-	-	-	-	184,554,400	1,390,253,200
2105	-	-	-	-	-	-	-	1,390,253,200
2106	-	-	-	-	-	-	-	1,390,253,200
2107	-	-	-	-	-	233,400	233,400	1,390,486,600
2108	-	-	-	-	-	-	-	1,390,486,600
2109	-	-	-	-	-	-	-	1,390,486,600
2110	-	-	-	-	-	-	-	1,390,486,600

Estimation of LCC