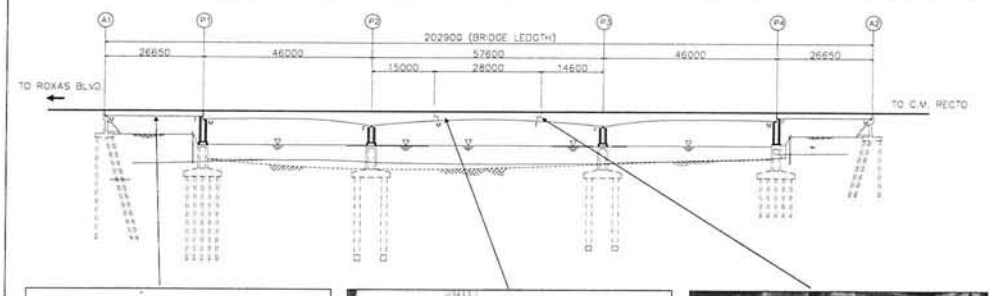
CHAPTER 8

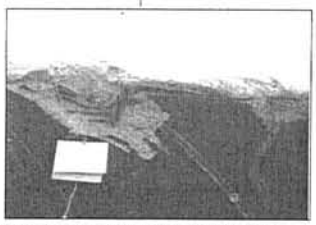
OVERALL EVALUATION OF BRIDGE CONDITION

Appendix 8.6.1-1 (1/20)
OVERALL EVALUATION OF BRIDGE CONDITION

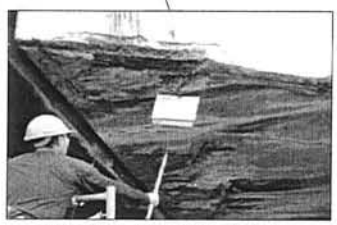
Reference/Bridge Name	Pa1.1 DELPAN BRIDGE (UPSTREAM)		
Location/Name of Road	Manila City Bonifacio Drive	Year Constructed	1965

Elevation





Damaged w/ exposed RSB @ bot. of girder due to truck collision.



Bottom of Box Girder (Gerber). Spall w/ Exposed RSB.

Expansion joint @ gerber. Spalling with exposed rebars.

Length of Bridge	203.70m. (26.65 + 46.00 + 58.40 + 46.00 + 26.65)	No. of Lane	4
		Lane Width	3.70m
Superstructure Type	PC Gerber Box Girder Bridge (5-Span)	Substructure Type	Abutment: Wall ((timber pile)), Pier: Wall ((timber pile))

		Members		Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC BOX GIRDER		*Span 1: Bottom of box girder (Abut 1)	H	0.5m² spalling of concrete with exposed rebars observed due to insufficient vertical clearance, 4.38m < 4.9m < 5.0m, for passing trucks resulting to collision.
				*Span 1: Bottom of box girder at midspan	H	More than 2m² of honeycomb was measured at bottom of girder.
				*Span 1: Bottom of box girder	H	3.85m² of spalling was observed with exposed rebars due to insufficient vertical clearance for passing trucks resulting to collision .
				*Span 2: Sideface of web (Pier 2)	H	There are many locations of spalling with exposed rebars at bottom of girder.
				*Span 3: Bottom of box girder at gerber	H	There are **5 locations** of spalling with exposed rebars at gerbers 1 and 2.
				*Span 3: Gerber Hinge	M	0.15m² to 0.30m² spalling was measured on upstream of downstream box.
		DECK SLAB		*Span 1: Bottom of box girder	S	0.13mm hairline cracks on many locations.
				*Span 2: Bottom of box girder	S	0.05mm hairline cracks and freelime in many locations.
					M	
	Substructure	ABUTMENT		*Span 1: Whole Abutment A	M	Discoloration of surface is observed over the entire abutment due to unsealed expansion.
		PIER		Span 3: Pier 3 body	M	0.4mm wide vertical crack is observed from top to bottom of Pier.
				Span 3: Pier 3	M	1.2m² of spalling with exposed rebars was observed due to vessel collision.
	Foundation				S	Maximum inclination at A1 is 1.1 degrees > 1.0 degree: Allowable inclination angle JRA. In-depth survey necessary.
	Accessory	Span 1: Bearing Shoe			M	Corrosion spread over all bearing shoes of Abut 1 & Pier 1.
	Diagnosis Evaluation *2	**Category "B"**		**: Repairs necessary for box girder concrete damage, spalling, exposed rebars and cracks sealing. : In-depth study necessary to mitigate vertical clearance of side span road under crossing : In-depth study necessary to check Abutment A1 1.1 degree inclination**		

Vulnerability to Disaster	Seismic Resistance	* No as-built drawings. Pier and foundation insufficient under present seismic design requirements. Moderate vulnerability * In-depth study necessary to determine required strengthening.
	Wind Resistance	Not critical to wind action - Low vulnerability
	Flood Resistance	Not critical to flood overtapping - Low vulnerability
	Evaluation	*** Seismic strengthening necessary to comply with new code; * Bridge sufficient to wind and flood action * Bridge vulnerable to seismic action**
Traffic Capacity & Function	Traffic Limit	AASHTO MS18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	31,651 (2002) 4 Lanes (One Direction) Level of service : D (V/C Ratio = 0.82)
	Smooth Driving Condition	Non-steep slope at approach road, non-corrugation and curvature on bridge
	Evaluation	*** Major adjustment necessary to provide sufficient vertical clearance for bridge undercrossing * Meets minimum traffic functionality requirements**
Special Issues	River Navigation	Vertical clearance > regulated ; Horizontal clearance > preferable
	Utilities	None
	Informal Dwellers	Heavy : More than 20 household identified
	Evaluation	*** Squatters identified needs relocation * Minimal social and environmental impact**
Overall Evaluation		*** Bridge reasonably sound and satisfies minimum traffic functionality requirements.**

NOTES

1. Damage Assessment
H : Heavy
M : Medium
S : Small

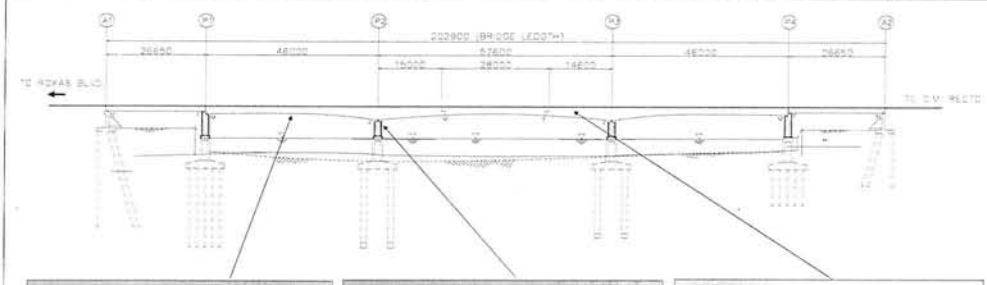
2. Diagnosis Evaluation
"A" : Urgent measures shall be applied; Conduct In-depth Survey
"B" : Urgent measures not required; Conduct In-depth Survey
"C" : In-depth survey not required

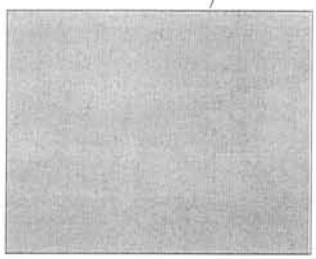
2. Traffic limit in metric tons

Appendix 8.6.1-1 (2/20)
OVERALL EVALUATION OF BRIDGE CONDITION

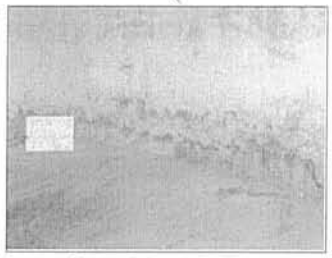
Reference/Bridge Name	Pa1.2 DELPAN BRIDGE (DOWNSTREAM)		
Location/Name of Road	Manila City Bonifacio Drive	Year Constructed	1988

Elevation

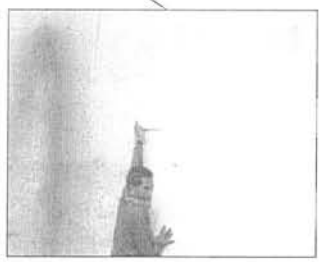




Crack on Box Girder @ midspan (S)



Concrete spall w/ exposed rebars (M)



Cracks on Box Wall Face (S)

Length of Bridge	202.90m. (26.65+46.00+57.60+46.00+26.65)	No. of Lane	4
		Lane Width	3.70m

Superstructure Type	PC Gerber Box Girder Bridge (5-Span)	Substructure Type	Abutment: Wall ((timber pile)), Pier: Wall ((timber pile))

		Members		Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC BOX GIRDER		Span 2: Bottom of Box Girder	S	Irregular pattern of <0.2mm cracks due to alkali - aggregate reaction.
				Span 3: Side face of web (above P3 downstream)	S	Horizontal cracks of 0.10mm width is noted caused by drying shrinkage at construction stage due to big cross section.
				Span 4: Bottom of Box Girder	S	Irregular pattern of <0.2mm cracks due to alkali - aggregate reaction.
		DECK SLAB		Span 3 downstream: Bottom of sidewalk (cantilever)	S	Cracks of 0.12mm width due to inferior compaction of concrete during construction.
	Substructure	ABUTMENT		*Span 1: Whole Abutment A	M	Discoloration of surface is observed over the entire abutment due to unsealed expansion.
		PIER		Span 3: Pier 3 body	M	1.5m2 of exposed rebars at pier wall due to insufficient provision of concrete cover.
				Span 3: Pier 3	M	Spall of 2.0m2 of pier wall side caused by vessel collision.
	Foundation				S	Maximum inclination is 0.57 degree at P4.
	Accessory	Bearing Shoe			S	No Damage
	Diagnosis Evaluation *2	Category "C"	: Repairs necessary to seal concrete cracks : In-depth study not necessary			
Vulnerability to Disaster	Seismic Resistance	* Seismic demand greater than plastic capacity of wall piers. In-depth study necessary to provide sufficient confinement reinforcement. Moderate vulnerability				
	Wind Resistance	Not critical to wind action - Low vulnerability				
	Flood Resistance	Not critical to flood overtapping - Low vulnerability				
	Evaluation	* Not critical to wind and flood action * Study on pier confinement reinforcement strengthening necessary				
Traffic Capacity & Function	Traffic Limit	AASHTO MS18 (HS20) Semi-Trailer Truck (32.7-tons)				
	Volume/ Capacity	31,652 (2002) 4 Lanes (One Direction) Level of service : D (V/C Ratio = 0.82)				
	Smooth Driving Condition	Non-steep slope at approach road, non-corrugation and curvature on bridge				
	Evaluation	* Sufficient condition meets minimum requirement for traffic functionality.				
Special Issues	River Navigation	Vertical clearance > regulated ; Horizontal clearance > preferable				
	Utilities	None				
	Informal Dwellers	Heavy : More than 20 household identified				
	Evaluation	* Minimal social and environmental impact				
Overall Evaluation		* Bridge reasonably sound and meets minimum traffic functionality requirements				

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

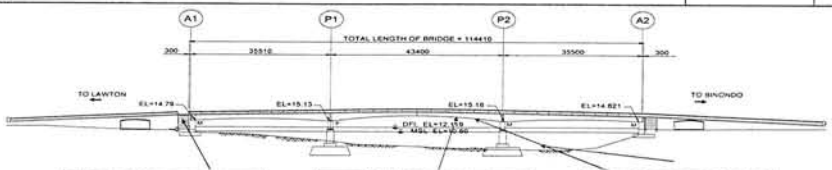
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (3/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	**Pa2 JONES BRIDGE**
Location/Name of Road	Manila City Burgos Street
Year Constructed	1948

Elevation



Corroded Bearing Supports at A1


Ruptured bottom flange and 1/3 height of web


Lateral deformation 280mm

Length of Bridge	114.41m. (35.51 + 43.40 + 35.50)	No. of Lane	4
		Lane Width	3.70m

Superstructure Type	3-Span Continuous Steel Plate Girder Bridge	Substructure Type	Abutment: Wall Type (Spread), Pier: Wall Type (Caisson)

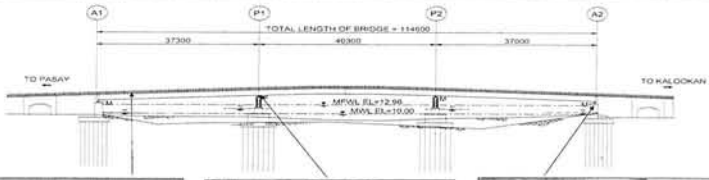
		Members	Location of Damaged Parks	Damage Rating (X,Y,Z)	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	STEEL I-GIRDER	Span 1: Weld portion of steel plates	II	H	Remarkable deterioration due to corrosion.
			Span 1: Lower plate of main girder (Near A1)	II	H	Extensive corrosion of 8 girders.
			Span 2: Bottom flange and web of exterior girder at upstream side	II	HH	Ruptured bottom flange and 1/3 height of web due to vessel collision.
			Span 2: Main girder, G8, Near P2	II	H	Lateral deformation is 280mm due to vessel collision.
			Span 2: Sway bracings	II	H	Ruptured sway braces on 2 locations.
			Span 1,2,3: Sway bracings	II	H	Missing top members in 10 locations.
			Span 3: Sway bracing (A2)	II	H	Corrosion spreads over entire member.
			Span 3: Downstream exterior girder	III	M	Lateral deformation is 50mm.
			Span 3: Interior girder G4, Near A2	II	H	Extensive corrosion.
		DECK SLAB	Span 3: Bottom of Deck Slab	III	M	Cracks at bottom deck with width of 0.3 – 0.8 mm
			Span 3: Bottom of Deck Slab	III	M	Wide area of deterioration to poor construction
	Substructure	ABUTMENT	Abutment A2 Wall	IV	S	Horizontal cracks on wall.
		PIER	Pier 1 Body	IV	S	Vertical cracks of pier body
	Foundation	Existing Caisson		II	H	Does not meet latest code requirement
	Accessory	Abutment A1 Bearing Shoes		II	H	Extensive corrosion of bearing shoes at Abutment A1
		Pier 2 Bearing Shoes		II	H	Extensive corrosion of bearing shoes at Pier 1.
	Diagnosis Evaluation *2	Category "A"	• **Urgent measure for Ruptured Exterior Girder at upstream side is necessary.** • **In-depth study necessary to determine permanent repair/rehabilitation of ruptured girder.** • **Repair / maintenance work necessary to prevent further corrosion and loss of members.**			
Vulnerability to Disaster	Seismic Resistance	• Pier and Foundation (Existing Caisson) are insufficient under latest code seismic requirements, In-depth study is needed to determine required strengthening * High vulnerability				
	Wind Resistance	Not critical to wind action. Low Vulnerability				
	Flood Resistance	Not critical to flood. Low Vulnerability				
	Evaluation	• **Bridge is highly vulnerable to seismic forces. In-depth study is needed to determine required strengthening of substructure.** • **Bridge is sufficient to wind and flood action.**				
Traffic Capacity & Function	Traffic Limit	20-ton Truck, Load Rating: 0.00 Inventory Level, 0.76 Operating Level (Exterior Girder, Upstream Side)				
	Volume/ Capacity	57,216 (2002) 4 Lanes Level of Service: D (V/C Ratio = 0.74)				
	Smooth Driving Condition	Fair				
	Evaluation	* **Traffic functionality reduced by decrease in live load capacity and steep slope at approach.**				
Special Issues	River Navigation	Vertical Clearance < Regulated (Near Piers); Horizontal Clearance: Preferable				
	Utilities	46 – ϕ100 mm PVC Telecommunication Pipe, 2 – ϕ100 mm GI Telephone Line, 1 – ϕ100 mm PVC Electrical Line, 1 – ϕ340 mm Water Line				
	Informal Dwellers	No informal dwellers under Jones Bridge				
	Evaluation	* **Minimal social and environmental impact**				
Overall Evaluation		* **Major rehabilitation of ruptured girder and sway braces are needed, minor measures necessary to improve traffic functionality.** * **Provide vessel collision protection.**				

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (4/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa3 MAC ARTHUR BRIDGE				
Location/Name of Road	Manila City Rizal Street			Year Constructed	1948
Elevation	  Crack @ Bot.Deck Slab near A1  Bearing Shoe Moved/Tilted  Conc. Spall w/ Exp.Rebars @ Abut A2 Coping				
Length of Bridge	114.60m. (35.51 + 43.40 + 35.50)			No. of Lane	4
				Lane Width	3.70m
Superstructure Type	3-Span Continuous Steel Plate Girder Bridge		Substructure Type	Abutment: Wall Type ((Timber Pile)), Pier: Wall Type ((Timber Pile))	

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	STEEL I-GIRDER	Span 1: Bottom flange, G3 near P1	H	9 pieces missing/cut rivets at bottom flange due to vessel collision.
			Span 1: Bottom Splice Plate, G7 near P1	H	Vertical deformation (>5mm) at bottom flange splice.
			Span 2: Bottom Flange, G6	H	About 200 pieces of rivets were missing/cut at bottom flange due to vessel collision.
			Span 2: Bottom of Girder: G4, G7 & G3	H	Bottom flange of Girder were deformed and out of alignment due to vessel collision. 3 locations
			Span 2: Sway Bracing	M	Missing sway brace of bottom members at two locations.
			Span 3: Sway Bracing	H	High corrosion at sway bracing due to influence of utilities progressive corrosion.
		DECK SLAB	Span 1: Bottom of Deck Slab between G2 - G3	S	Transverse cracks of about <0.3mm width at bottom of deck slab.
			Span 1: Bottom of Slab at sidewalk downstream	M	Concrete spall with exposed rebars of 0.2m^2 due to inadequate concrete cover.
			Span 2: Bottom of Deck Slab between G2 & G4	S	Transverse cracks of <0.3mm at the bottom of deck slab. 2 locations
			Span 2: Bottom of Deck Slab between G1 & G2	M	Concrete spall with exposed rebars of <0.3m^2 due to inadequate concrete cover. 2 locations
			Span 2 & 3: Bottom of Deck Slab, Midspan	M	Honeycombs of 0.1 - 0.3m^2 is measured at the bottom of deck slab. 2 locations.
	Substructure	ABUTMENT	Abutment A2, downstream side	H	3.5m2 concrete spall and exposed rebars was noted at A2 wall.
		PIER			
	Foundation			S	Maximum inclination longitudinal at P1 is 2.65 degrees > 1.0 degree: Allowable inclination angle JRA. In-depth survey necessary.
	Accessory	Bearing Shoe at A1, P1, P2 & A2		S	Surface corrosion to all bearing shoes.
	Diagnosis Evaluation *2	Category "B"	: In-depth study necessary to monitor pier inclination (2.65 deg.) : Repairs/maintenance necessary to replace missing rivets and member, and seal cracks on concrete and paint corroded members		

Vulnerability to Disaster	Seismic Resistance	* No as-built plans. Pier and foundation insufficient under present seismic design requirements * High vulnerability
	Wind Resistance	Need to repair sway bracing - Low vulnerability
	Flood Resistance	Not critical to flood overtapping - Low vulnerability
	Evaluation	* Not critical to flood action but needs repair of sway bracing to stabilize under wind action * Need in-depth study on pier strengthening for seismic action
Traffic Capacity & Function	Traffic Limit	MS18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	46,323 (2002) 4 lanes Level of Service: C (V/C Ratio = 0.52)
	Smooth Driving Condition	Steep slope at approach road
	Evaluation	* Sufficient condition for traffic functional requirements.
Special Issues	River Navigation	Vertical clearance > regulated; horizontal clearance < preferable
	Utilities	Deterioration, Left: 12-Φ 100 Asbestos Telephone; Right: 1-Φ 340 GI Waterline
	Informal Dwellers	None
	Evaluation	* Moderate social and environmental impact
Overall Evaluation		* In-depth study necessay to monitor pier inclination * Traffic functionality - sufficient * Replace missing rivets and members, sealing of concrete cracks and painting of corroded members.

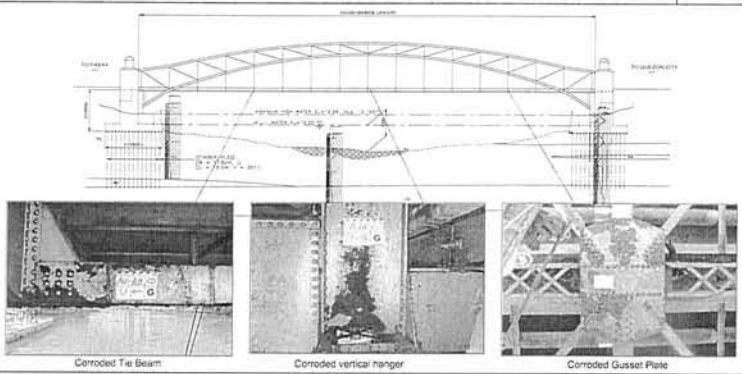
NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

2. Diagnosis Evaluation
   - "a" : Urgent measures shall be applied; Conduct In-depth Survey
   - "b" : Urgent measures not required; Conduct In-depth Survey
   - "c" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (5/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa4 QUEZON BRIDGE		
Location/Name of Road	Manila City Quazon Boulevard	Year Constructed	1946
Elevation			
Length of Bridge	102.40m.	No. of Lane	4
		Lane Width	3.70m
Superstructure Type	3-Main Structure, Single Steel Arch Bridge (1-Span)	Substructure Type	Abutment: Wall Type ((timber pile))

Corroded Tie Beam | Corroded vertical hanger | Corroded Gusset Plate

		Members	Location of Damaged Parks	Damage Rating (X,Y,Z)	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	ARCH MEMBER	Truss A,B,C – Bottom Chord Members	II	H	Corrosion of Member Connections
			Truss A C – Top Chord Members	II	H	Corrosion of Member Connections
			Truss A,B,C – Vertical Members	II	H	Corrosion of Member Connections
			Truss A,B - Hangers	II	H	Corrosion of Member Connections
		FLOOR SYSTEM	Longitudinal Tie Beam	I	HH	Extensive corrosion and loss of section of members
			Gusset Plates	I	HH	Extensive corrosion and loss of section of members
			Ends of Braces	I	HH	Extensive corrosion and loss of section of members
			Ends of Stringers (abutments)	I	HH	Extensive corrosion and loss of section of members
			Additional stringers at abutment	I	HH	Extensive corrosion and loss of section of members
			Stringers supporting the sidewalks	I	HH	Extensive corrosion and loss of section of members
	Substructure	ABUTMENT	Abutments & Pylons	III	M	Cracks on the face of the wall
		PIER				
	Foundation					Not accessible for inspection
	Diagnosis Evaluation *2	Category "A"	Heavily corroded joint connections under the floor deck slab and water leaking at abutments stemmed from insufficient maintenance activities.			

Vulnerability to Disaster	Seismic Resistance	• Pier and Foundation (timber piles) are insufficient under latest code seismic requirements. In-depth study is needed to determine required strengthening. • Moderate Vulnerability.
	Wind Resistance	Not critical to wind action - Low vulnerability
	Flood Resistance	Not critical to flood overtapping - Low vulnerability
	Evaluation	**• Bridge is moderately vulnerable to seismic forces.** **• Bridge is sufficient to wind and flood action.**
Traffic Capacity & Function	Traffic Limit	30-ton Truck Load Rating: 0.92 Inventory Level, 1.59 Operating Level (deck frame, gusset plate and joint connections)
	Volume/ Capacity	85, 137 (2002) 4 Lanes Level of Service: F (V/C Ratio = 1.22)
	Smooth Driving Condition	Good
	Evaluation	**Traffic functionality reduced by decrease in live load capacity.**
Special Issues	River Navigation	Vertical Clearance > Regulated . Horizontal Clearance > Regulated
	Utilities	3 - 340mmϕ G.I. pipe water lines
	Informal Dwellers	(Heavy – 18 households identified)
	Evaluation	*** Moderate social and environmental impact**
Overall Evaluation		*** Replacement / Rehabilitation of corroded connections of deck frame system, minor measures necessary to improve traffic functionality.**

NOTES

1. Damage Assessment
H : Heavy
M : Medium
S : Small

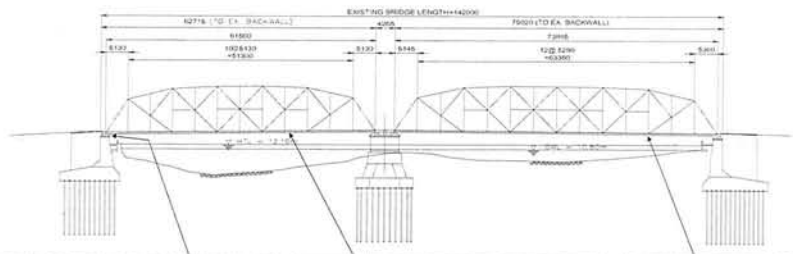
2. Diagnosis Evaluation
"a" : Urgent measures shall be applied; Conduct In-depth Survey
"b" : Urgent measures not required; Conduct In-depth Survey
"c" : In-depth survey not required

2. Traffic limit in metric tons

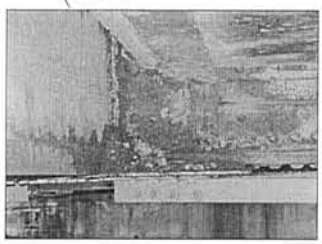
Appendix 8.6.1-1 (6/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa5 AYALA BRIDGE		
Location/Name of Road	Manila City Ayala Boulevard	Year Constructed	1935 EAST 1950 WEST

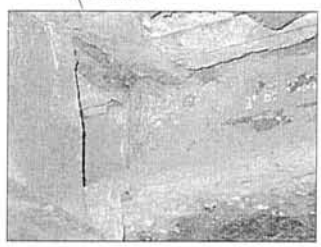
Elevation



Rollers most likely stuck-up due to severe corrosion (H).



Severe corrosion at Main Girder bottom chord (H).



Deformed shape of stringer due to increase in stress and strain (H).

Length of Bridge	142.00m (65.35 + 76.65)	No. of Lane	6
		Lane Width	3.70m
Superstructure Type	Steel Truss Bridge	Substructure Type	Abutment: Closed Type(timber pile), Pier: Wall Type (timber pile)

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	STEEL TRUSS BRIDGE	Bottom Chord/South-East Truss	H	Deformed, heavily corroded
			Stringer/North Span - South Span	H	Missing, loss end section crack (broken / fractured)
			Deck Bracing/South Span - East Truss	H	Missing
			Bottom Chord/South-East	H	Heavily corroded
			Cross Beam/North Span - East Truss	H	Heavily corroded
			Gusset Plate/ North Span Mid-Truss	H	Heavily corroded
		DECK SLAB	Deck Slab/North Span-South Span	M	Crack
			Bearing/ All locations	H	Heavily corroded
			37 Test Location for UFD	S	No Defects
			130 Test Location for UTG	S	7mm to 25mm
			40 Test Locations for Brinell Hardness	S	328 MPA - 540 MPA
			36 Test Locations for Dye Penetrant Test	S	No Defect
	Substructure	ABUTMENT	North Abut/Wall Wingwall	H	Fail in bending, Shear
			South Abut/Wall Wingwall	H	Fail in bending, Shear
		PIER	Wall	M	17 HR (Rigid)
			Confinement	M	Spiral Requirement needed
			Bridge Seat/Coping	S	Sufficient
	Foundation			H	North & South Abut/Compressive Piles C/D=0.72 & 0.67 Piles/ Compressive Piles, C/D Ratio = 0.65
	Accessory				
	Diagnosis Evaluation *2	**Category "A"**	**: Existing bridge needs strengthening to meet the present required strength for a bridge.** **: Pile Foundation can not comply with the new AASHTO Codes.**		

Vulnerability to Disaster	Seismic Resistance	Substructure foundation not sufficient against new seismic design criteria (Div. 1A AASHTO). High vulnerability
	Wind Resistance	Not critical to wind action - Low vulnerability
	Flood Resistance	Not critical to flood overtapping - Low vulnerability
	Evaluation	*** Needs to retrofit substructure to meet the requirements of the new seismic codes (Div. 1A of AASHTO)**
Traffic Capacity & Function	Traffic Limit	3-ton Truck
	Volume/ Capacity	Level of Service: E (V/C=0.80, Hourly Vol = 1,777 Vph, AADT = 40,390 PCU)
	Smooth Driving Condition	Corrugation and Curvature, Fair (Including access road to Hospicio de San Jose)
	Evaluation	*** Insufficient traffic functionality**
Special Issues	River Navigation	Vertical clearance=3.50m < regulated clearance 3.75m
	Utilities	2 Water Piles (D=400mm), 16 Electricity Lines and 8 Telecommunication Lines.
	Informal Dwellers	Light
	Evaluation	*** Historical situation shall be considered.**
Overall Evaluation		*** Major rehabilitation of superstructure and retrofit of substructure necessary.**
		*** Vertical clearance shall be improved at least up to regulatory vertical clearance of 3.75m.**

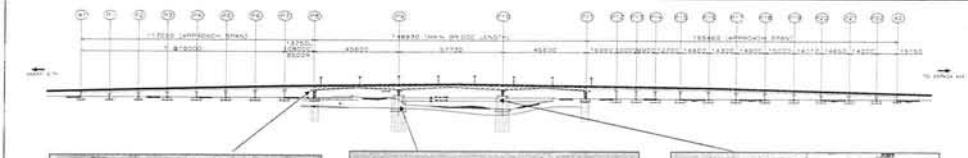
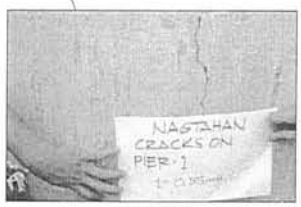
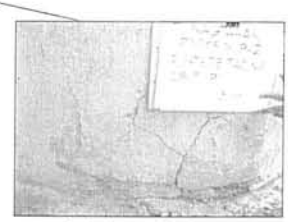
NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (7/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa6 NAGTAHAN BRIDGE		
Location/Name of Road	Manila City Nagtahan Street	Year Constructed	1966
Elevation			
	 Damaged Backwall	 Cracking of concrete @ Pier 1.	 Cracking of concrete @ Pier 2
Length of Bridge	431.39m (7 @ 15+12+45.6+57.73+45.60+15.95+10+9.9+12.7+14.6+14.3+ 14.9+15+14.11+14.65+14.20+15.15)	No. of Lane	8
		Lane Width	3.00m
Superstructure Type	R.C. Girder Bridge (Multi-Span)/ 3 Span Continuous Truss/R.C. Girder (Multi-Span)	Substructure Type	Abut: Wall Type/Pier: Column Bent/Wall Type/ Column Bent

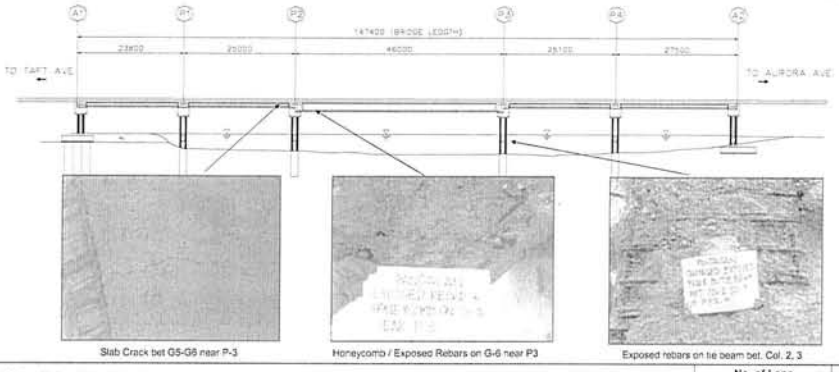
		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	RCDG MEMBER	Span 1: End Diaphragm	M	Honeycomb of End Diaphragm with maximum area = 1.25 m2
			Span 19: Bottom of Girder	M	Typical Horizontal Cracks @ Bottom of Girder No. 1 (Left Side, Facing España) with max. width of 0.20 mm
		TRUSS MEMBER	Bottom Chord at Span 10	M	Corrosion over whole member
			Lateral Bracing at Span 10	M	Corrosion over whole member
			Lateral Bracing at Pier 10	M	Corrosion over whole member
			Vertical Member at Pier 10	M	Corrosion over whole member
			Bottom Chord at Girder 1	S	Surface spot corrosion
			Vertical Member at Pier 9 and Center of Span 11	S	Slight deformation of flanges. 2 locations.
			Diagonal Members at Piers 9 & 10 and Center of Span 10	S	Surface spot corrosion. 3 locations
			Vertical Member at Center of Span 10	S	Local corrosion and rust spots
			Lateral Bracing at Pier 9	S	Local spot corrosion
		DECK SLAB	Span 9: Bottom of Deck Slab	M	0.2m2 Spalling of concrete with exposed rebars
			Deck Slab Bottom Surface at Center of Span 9	M	Inadequate treatment @ construction joint. Spalling of concrete @ girder no. 8, from Span 1-8, with maximum area = 1.45 m2
			Span 19: Bottom of Deck Slab (Sidewalk Portion)	H	Horizontal cracks with width = 1.00 mm, (Typical from P15-A2) @ cantilever deck slab (Sidewalk Portion)
	Substructure	ABUTMENT	Pier 8 Backwall	S	< 1.0m2 Spalling and exposed rebar
			Pier 8 Backwall between Girders 1 & 2	S	0.10m2 honeycomb
			Pier 11	M	1.5m2 concrete spalling
		PIER	Pier 9 and Pier 10 Upper Body	M	0.5mm wide vertical cracks
			Pier 9 Upper Body	M	1.0m2 spalling and exposed rebar
			Pier 9 and Pier 10 Lower Body	M	1.2m2 and 1.0m2 spalling and exposed rebars
	Foundation			M	Maximum inclination longitudinal at P10 is 2.29 degree > 1.0 degree. In-depth survey necessary
				M	Maximum inclination longitudinal at P15 is 0.859 degree
	Accessory	Railings at Pier 8, Center of Spans 9,10 and 11		S	Deformed and missing one member
		Span 8: Expansion Joint		M	Expansion Joint @ Pier No. 8 is too wide, with GAP = 70 mm. :: There is no sealant @ this portion
		Span 15: Expansion Joint		M	Expansion Joint opening is too wide with GAP = 40 mm.
		Span 19: Expansion Joint		M	Expansion Gap is clogged and with GAP = 30 mm.
		Span 23: Expansion Joint		M	Expansion Gap @ A2 is wide, with 45 mm opening
	Diagnosis Evaluation *2	Category "B"	: Maintenance needed to prevent further member corrosion : Repair of concrete cracks necessary : In-depth study necessary to monitor pier inclination (2.29 deg.)		
Vulnerability to Disaster	Seismic Resistance	* No as-built plans. Pier and foundation insufficient under present seismic requirements. High vulnerability			
	Wind Resistance	Not critical to wind action. Low vulnerability			
	Flood Resistance	Not critical to flood overtapping. Low vulnerability			
	Evaluation	* Not critical under wind and flood action * In-depth study needed to monitor pier inclination and strengthening for seismic demand			
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS-20) Semi-Trailer Truck (32.7 tons)			
	Volume/ Capacity	83,148 (2002) 4 Lanes Level of service : D (V/C Ratio = 0.73)			
	Smooth Driving Condition	Non-steep slope, corrugation and curvature			
	Evaluation	* Traffic functionality meets minimum requirements			
Special Issues	River Navigation	Vertical clearance > regulated; horizontal clearance > preferable			
	Utilities	Remarkable corrosion. Left: 8-Φ100 PVC Telephone; Center: 8-Φ PVC Telephone			
	Informal Dwellers	Heavy : More than 20 households identified			
	Evaluation	* Moderate social and environmental impact			
Overall Evaluation		* Bridge reasonably sound but needs in-depth monitoring of pier inclination.			

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small
2. Diagnosis Evaluation
   - "a" : Urgent measures shall be applied; Conduct In-depth Survey
   - "b" : Urgent measures not required; Conduct In-depth Survey
   - "c" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (8/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa7 PANDACAN BRIDGE		
Location/Name of Road	Manila City Thomas Claudio	Year Constructed	1997
Elevation			
	Slab Crack bet G5-G6 near P-3	Honeycomb / Exposed Rebars on G-6 near P3	Exposed rebars on tie beam bet. Col. 2, 3
Length of Bridge	147.40 m (23.8 + 25.0 + 46.0 + 25.1 + 27.5)	No. of Lane	4
		Lane Width	3.00m
Superstructure Type	PC I Girder Bridge (5-Span)	Substructure Type	Abutment: Wall Type, Pier: Column Type

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PCI GIRDER	Span 2: Bottom of PC Girder, G6	H	Honeycomb with exposed rebars of 0.42m2 at bottom of girder is caused by inadequate compaction of construction works.
			Span 2: End pf PC Girder, G1	H	Exposed rebars (0.8m2) at bottom of girder is the result of improper provision of concrete cover.
		DECK SLAB	Span 2: Bottom of Deck Slab	M	Deterioration/discolor at bottom of slab is observed due to insufficient provision of concrete cover.
			Span 3: Bottom of Deck Slab	M	0.3 - 0.35mm crack at bottom of slab is noted due to insufficient provision of concrete cover.
			Span 4: Bottom of Deck Slab	M	0.3 - 0.35mm crack at bottom of slab is noted due to insufficient provision of concrete cover.
	Substructure	ABUTMENT			
		PIER	Span 3: Pier 3 Body (Tie Beam)	M	Remarkable damage on pier tie beam due to vessel collision
			Span 4: Pier 4 Body (Tie Beam)	M	Remarkable damage on pier tie beam due to vessel collision
			Span 4: Pier 4 Body (Tie Beam)	M	Remarkable damage on pier tie beam due to vessel collision
	Foundation			S	Maximum inclination is 0.57 degree at P3.
	Accessory	Elastomeric bearing pad			No Damage
	Diagnosis Evaluation *2	Category "C"	: Repair of concrete cracks and damages necessary : In-depth study not necessary		

Vulnerability to Disaster	Seismic Resistance	* No as-built plans. Need to verify pile bent confinement reinforcement under seismic action. Low vulnerability
	Wind Resistance	Not critical to wind action. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	* Not critical under wind and flood action * Pile bent plastic capacity sufficient under seismic force but needs verification of confinement reinforcement.
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS-20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	18,790 (2002) 4 Lanes Level of service : B (V/C Ratio = 0.32)
	Smooth Driving Condition	Non-steep slope, corrugation and curvature
	Evaluation	* Traffic functionality is sufficient
Special Issues	River Navigation	Vertical clearance > Regulated; Horizontal clearance > preferable
	Utilities	None
	Informal Dwellers	Heavy : More than 20 households identified
	Evaluation	* Moderate social and environmental impact
Overall Evaluation		* Bridge is reasonably sound with sufficient traffic functionality

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

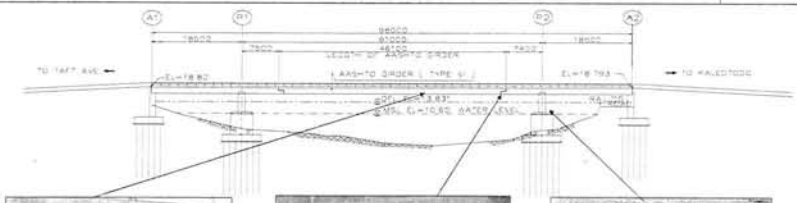
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

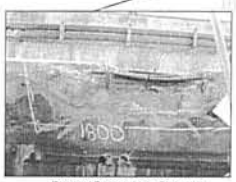
2. Traffic limit in metric tons

Appendix 8.6.1-1 (9/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa8 LAMBINGAN BRIDGE
Location/Name of Road	Manila City Bonifacio Street
Year Constructed	1979

Elevation





Exposed Bars on Main Girder (H)

Cracks on Gerber Hinge 2 (H)

Cracks on Pier 2, Pile Cap (M)

Length of Bridge	98.10m (18.50+61.10+18.50)	No. of Lane	6
		Lane Width	3.20m
Superstructure Type	PC Gerber I Girder Bridge (3-Span)	Substructure Type	Abutment: Wall Type((steel pipe pile)), Pier: Wall Type((steel pipe pile))

		Members		Location of Damaged Parks	Damage Rating (X,Y,Z)	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PCI GIRDER		Span 2: Bottom of Girder G12	III	M	0.2m2 Spalling of concrete due to crack progressing on the girder
				Span 2: Bottom of Girder G12	II	H	0.75m2 of exposed rebars
				Span 2 near P1: Side of Girder G12	III	M	< 0.3m2 of exposed rebars
				Span 2 near P2: Side of Girder G12	III	M	0.18m2 of exposed rebars due to insufficient provision of concrete cover
				Span 2 , Gerber Hinges 1 and 2	II	HH	Cracks on exterior girder at gerber hinges due to insufficient hanger and longitudinal tendons. 4 locations
				Exterior girders at pier supports	II	H	Flexural cracks on exterior girders due to tension stresses at service loads. 4 locations
				Span 2: Midspan of Girder 12	II	H	Longitudinal cracks and exposed rebars caused by vessel collision
		DECK SLAB		Span 2: Bottom of Diaphragm between G8 & G7	III	M	0.2m2 of honeycomb caused by inferior compaction of concrete
				Span 2: Diaphragm between G7 & G6	III	M	Crack width of 0.35mm.
				Span 2: Diaphragm between G1 & G2	III	M	0.25m2 honeycomb caused by inferior compaction of concrete
				Span 2: Diaphragm between G5 & G6	III	M	Crack width of 0.40mm
	Substructure	ABUTMENT		Span 1: Abutment 1	IV	S	0.3mm cracks on two locations
				Span 1, Abutment A1	II	H	Corroded anchor bars, 12 sets (24 pieces)
				Span 3, Abutment A2	II	H	Corroded anchor bars, 12 sets (24 pieces)
		PIER		Span 3: Pier 3 Body (Tie Beam)	III	M	Remarkable damage on pier tie beam due to vessel collision
				Span 4: Pier 4 Body (Tie Beam)	III	M	Remarkable damage on pier tie beam due to vessel collision
				Span 4: Pier 4 Body (Tie Beam)	III	M	Remarkable damage on pier tie beam due to vessel collision
	Foundation				IV	S	Maximum inclination is 0.34 degree longitudinal at A1.
	Accessory	Span 1: Bearing pad at A1, downstream girder			III	M	Deformation of elastomeric pad due to excessive loading.
	Diagnosis Evaluation *2	Category "A"		: Repairs of concrete cracks necessary : Cracks at Gerber hinge parts related to bridge design and/or construction quality.			
Vulnerability to Disaster	Seismic Resistance	* No as-built plans. Pier and foundation details need to be checked under seismic action. Moderate vulnerability					
	Wind Resistance	Not critical to wind action. Low vulnerability					
	Flood Resistance	Not critical to flood overtapping. Low vulnerability					
	Evaluation	• Needs in-depth study on pier and foundation to check adequacy/safety under seismic action. • Not critical to wind and flood action.					
Traffic Capacity & Function	Traffic Limit	20-ton Truck Load Rating : 0.63 Inventory, 1.06 Operating					
	Volume/ Capacity	31,973 (2002) 6 Lanes Level of service : C (V/C Ratio = 0.53)					
	Smooth Driving Condition	Steep slope at approach, corrugation on bridge					
	Evaluation	* Minor profile adjustment necessary at approach * Limitation on traffic load reduces functionality					
Special Issues	River Navigation	Vertical Clearance > regulated, horizontal clearance > preferred					
	Utilities	Water leakage, Right: 2-650 ϕ GI Waterline					
	Informal Dwellers	Medium - 9 Households Identified					
	Evaluation	* Minimal social and environmental impact					
Overall Evaluation		* Bridge needs in-depth study to check superstructure adequacy and improve traffic functionality.					

NOTES

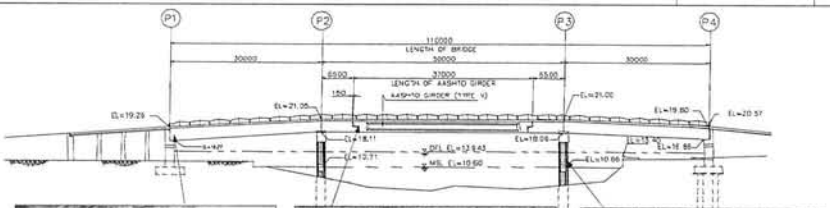
1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

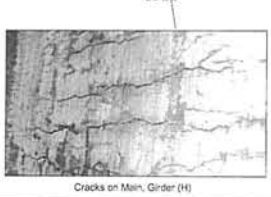
2. Traffic limit in metric tons

Appendix 8.6.1-1 (10/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa9 MAKATI-MANDALUYONG BRIDGE		
Location/Name of Road	Burgos Street Extension	Year Constructed	1986

Elevation




Cracks on Main, Girder (H)


Honey Comb, End Diaphram (H)


Exposed Rebar @ Pier 2 (M)

Length of Bridge	207.489m (6.29+9+9+8.742+30+50+30+7.2+7.558+ 7.533+8.156 + 7.75+8+8+8.26)	No. of Lane	4
		Lane Width	3.70m

Superstructure Type	PC Box Girder with Gerber I Girder Bridge (3-Span), R.C. Flat Slab (4/8 Spans)	Substructure Type	Abutment: Wall Type, Pier: Colum Type (bored pile) , Spread Footing

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC BOX GIRDER	Span 5: Sideface of web near Pier 4, upstream	H	0.6 - 1.5mm horizontal parallel cracks
			Span 5: Sideface of web near Pier 4, downstream	H	0.4 - 0.65mm horizontal parallel cracks
			Span 5: Bottom of PC Girder near Pier 4	H	More than 0.6mm longitudinal crack in one location
			Span 6: Bottom of end Diaphragm between G4 & G5	H	1.5m2 honeycomb in one location
			Span 7: Sideface of web near P7, upstream	H	0.8mm horizontal parallel cracks
			Span 7: Sideface of web near P7, downstream	M	0.3mm horizontal parallel cracks
		RC FLATSLAB	Span 1: Deck Slab Surface	M	Numerous cracks 0.5 mm width is observed on Deck Slab surface. □Typical up to Span 3
			Span 4: Deck Slab Surface	M	Transverse 0.35 mm cracks on Deck Slab surface
			Span 8: Deck Slab Surface	M	Alligator cracks of 0.45 mm maximum width due to drying is shrinkage
	Substructure	ABUTMENT	Span 1: Abutment A1 Wall	H	Horizontal crack @ Abutment A1 wall > 0.6 mm width is observed, possibly poor treatment of construction joint
		PIER	Span 7: Pier No. 6 Body, Column 4	M	1.5m2 spilling of concrete & reinforcement due to alkali-aggregate reaction
	Foundation			S	Maximum inclination at A1 is 0.53 degree.
				S	Maximum inclination at P7 is 0.44 degree.
	Accessory	Span 1: Right & Left lane @ span 1		M	Missing member and corroded member is seem @ Span 1□& Other Spans.
		Span 4: Expansion Jt.		M	Faulting of expansion Jt. Causes tilting of plates of about 25 mm.□Vertical
		Spans 5 & 7: All bearing shoes at P4 & P7		M	corrosion spreads all over the entire shoes
	Diagnosis Evaluation *2	**Category "B"**	**: Urgent repair of concrete cracks necessary** **: In-depth strudy necessary to check/monitor anchor block horizontal cracks**		

Vulnerability to Disaster	Seismic Resistance	* Pile bent insufficient to present seismic demand requirements impact. Moderate vulnerability
	Wind Resistance	Not critical to wind action. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	*** Not critical to wind and flood action** *** Vulnerable to seismic action**
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	41,755 (2002) 4 Lanes Level of service : D (V/C Ratio = 0.70)
	Smooth Driving Condition	Steep slope at approach road, curvature on bridge
	Evaluation	*** Meets minimum traffic functionality requirements**
Special Issues	River Navigation	Vertical clearance > regulated, horizontal clearance>preferred
	Utilities	None
	Informal Dwellers	Medium ; Less than 20 households identified
	Evaluation	*** Minimal social and environmental impact**
Overall Evaluation		*** Bridge reasonably sound but urgent repairs necessary to seal concrete cracks and monitoring of anchor block cracks are required.** *** Traffic functionality is within the minimum requirement.**

NOTES

1. Damage Assessment
H : Heavy
M : Medium
S : Small

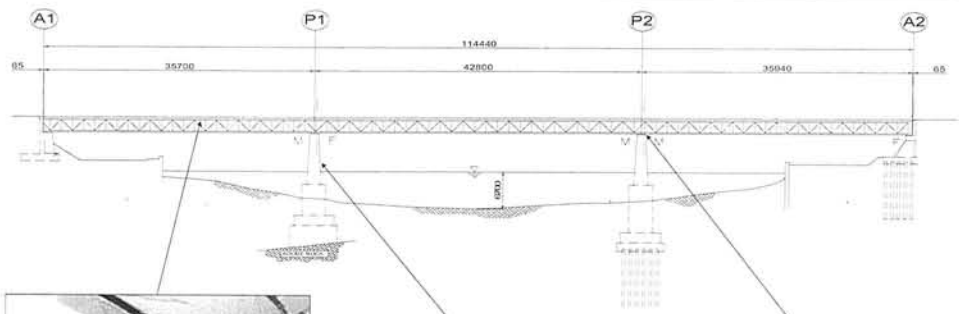
2. Diagnosis Evaluation
"A" : Urgent measures shall be applied; Conduct In-depth Survey
"B" : Urgent measures not required; Conduct In-depth Survey
"C" : In-depth survey not required

2. Traffic limit in metric tons

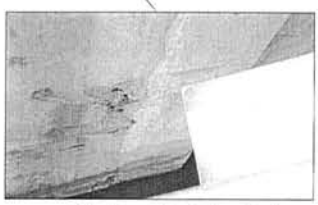
Appendix 8.6.1-1 (11/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa10.1 GUADALUPE BRIDGE (Central)		
Location/Name of Road	EDSA	Year Constructed	1962

Elevation



Deformed Stringer



Spall w/ exposed rebar @ face of pier 1

Vertical crack on face of coping @ Pier 2

Length of Bridge	114.44m. (35.70 +42.80 + 35.94)	No. of Lane	8
		Lane Width	3.00m
Superstructure Type	3-Span Continuous Truss Bridge	Substructure Type	Abutment: Wall Type (spread, timber pile), Pier: Wall Type (spread, timber pile)

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	TRUSS MEMBER	Span 1: Lateral Bracing at Panel 33 - Bay 6, Panel 34 - Bay 4, Panel 35 - Bay 7	M	Broken by vehicle, 3 locations.
			Spans 2 & 3: Sway Bracing at Panel 17 - Bay 8, Bay 9; Panel 6	M	Deformed member, 4 locations.
			Span 3: Top Chord at Girder 2, Panel 4 & 6 - Bay 1	M	Reduction of cross-section due to corrosion, 2 locations.
			Span 3: Sway Bracing at Panels 1 to 2	M	4, 2 & 2 pieces of rivets missing, respectively, 2 locations.
		FLOOR SYSTEM	Span 3: Stinger at Panel 11	M	Deformed flanges
		DECK SLAB			
	Substructure	ABUTMENT	Span 1: Abutment A Coping (Coping face)	M	0.483mm wide random cracks below girder
		PIER	Span 2: Pier 2 Upstream Side Wall	H	1.753mm wide vertical cracks
			Span 2: Pier 2 Wall at Upstream Construction Joint	H	1.194mm wide vertical cracks
			Span 2: Pier 2 Wall at Downstream Side	H	2.794mm wide vertical cracks
			Span 2: Pier 2 Extended Coping	H	2.784mm wide vertical crack
	Foundation			S	Maximum inclination is 0.86 degrees at A1.
	Accessory				
	Diagnosis Evaluation *2	Category "C"	: Repair of damaged/corroded members and cracked concrete needed : In-depth study not necessary		

Vulnerability to Disaster	Seismic Resistance	* Piers and foundations are sufficient under present seismic design requirements. Moderate vulnerability
	Wind Resistance	Sway bracing in-depth study for corrective action necessary. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	*** Not critical to flood action but needs repair of sway bracing** *** In-depth study on substructure seismic resistance necessary**
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	94,329 (2002) 4 Lanes Level of service : F (V/C Ratio = 1.23)
	Smooth Driving Condition	Non-steep slope, corrugation and curvature
	Evaluation	*** Traffic functionality reduced by level of service**
Special Issues	River Navigation	Vertical clearance > regulated; horizontal clearance < preferred
	Utilities	Left: 1-Φ450 Steel Sewerline; Center: 1-Φ Steel Waterline; Right: 1-Φ500 Steel Waterline, 12-Φ100 PVC Telephone
	Informal Dwellers	Light
	Evaluation	*** Social and environmental moderate impact.**
Overall Evaluation		*** Bridge reasonably sound but traffic functionality affected by level of service.**

NOTES

1. Damage Assessment
- H : Heavy
- M : Medium
- S : Small

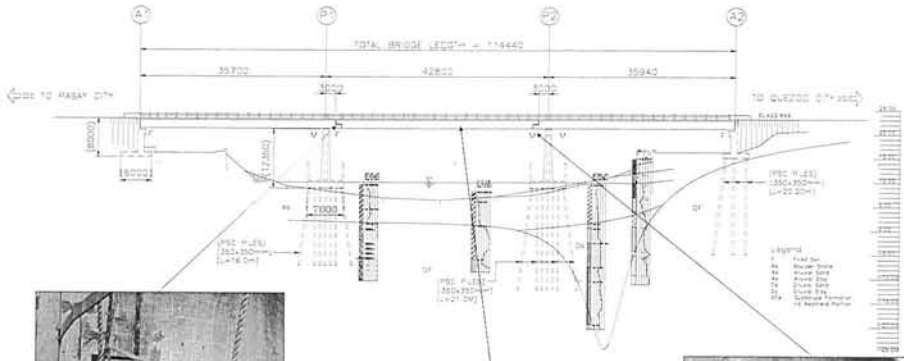
2. Diagnosis Evaluation
- "a" : Urgent measures shall be applied; Conduct In-depth Survey
- "b" : Urgent measures not required; Conduct In-depth Survey
- "c" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (12/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa10.2 GUADALUPE BRIDGE (Both Sides)		
Location/Name of Road	EDSA	Year Constructed	1979

Elevation




Cracks at Gerber Hinge


Exposed Rebar and Spalling at Girder


Cracks at gerber hinge

Length of Bridge	114.44m. (35.70 +42.80 + 35.94)	No. of Lane	4
		Lane Width	3.00m

Superstructure Type	PC Gerber Girder Bridge (3-Span)	Substructure Type	Abutment: Wall Type (spread, PSC pile), Pier: Wall Type (PSC pile)

		Members		Location of Damaged Parks	Damage Rating (X,Y,Z)	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC I GIRDER		Span 2 : Gerber Hinge 1 of Girder 5 to 8	II	H	Corrosion of Exposed Rebars
				Span 2 : Middle span of Girder 5	II	H	Corrosion of Exposed Rebars
				Span 2 : Gerber Hinge 2 of Girder 1	II	H	Corrosion of Exposed Rebars
				Span 1 : Bottom of Center span of Girder 1, 3, 4 to 8	III	M	Cracks and Corrosion of Exposed Rebars
				Span 2 : Gerber Hinge 1 of Girder 1 & 5 to 8	I	HH	Wide Cracks at Gerber Hinge, Spalling and Exposed Rebars
				Span 2 : Middle of Girder 8	III	M	Cracks and Corrosion of Exposed Rebars
				Span 2 : Gerber Hinge 2 of Girder 1, 5, 6 & 8	I	HH	Wide Cracks at Gerber Hinge, Spalling and Exposed Rebars
	Substructure	ABUTMENT		Abutment A2	II	H	Cracks on the face of the abutment
		PIER		Pier 2 Wall (U/S & D/S)	III	M	Corrosion of Exposed Rebars
	Foundation						
	Accessory			Bearing of Girder 8, Pier 1	III	M	Rust is scattered generated extensively
				Bearing of Girder 5, Pier 2	III	M	Rust is scattered generated extensively
	Diagnosis Evaluation *2	**Category "A"**		**• Cracks at Gerber hinge parts related to bridge design and/or construction quality.**			
Vulnerability to Disaster	Seismic Resistance	• Pier and Foundation (PSC piles) are insufficient under latest code seismic requirements, In-depth study is needed to determine required strengthening .					
		• High Vulnerability					
	Wind Resistance	Not critical to wind action. Low vulnerability					
	Flood Resistance	Not critical to flood overtapping. Low vulnerability					
	Evaluation	**• Bridge is highly vulnerable to seismic forces.**					
		• Bridge is sufficient to wind and flood action.					
Traffic Capacity & Function	Traffic Limit	14.4-ton Truck , Load Rating: 0.44 Inventory Level, 0.74 Operating Level (deck frame, gusset plate and joint connections)					
	Volume/ Capacity	94,330 (2002) 4 Lanes Level of Service: F (V/C Ratio = 1.23)					
	Smooth Driving Condition	Good					
	Evaluation	*** Traffic functionality reduced by level of service and load limitations.**					
Special Issues	River Navigation	Vertical Clearance > Regulated ; Horizontal Clearance < Regulated					
	Utilities	20 – 100mmø PVC Telephone lines					
	Informal Dwellers	(Light – 2 households identified)					
	Evaluation	*** Low social and environmental impact**					
Overall Evaluation		*** Urgent measures necessary for gerber hinge connections, traffic functionality is insufficient.**					

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

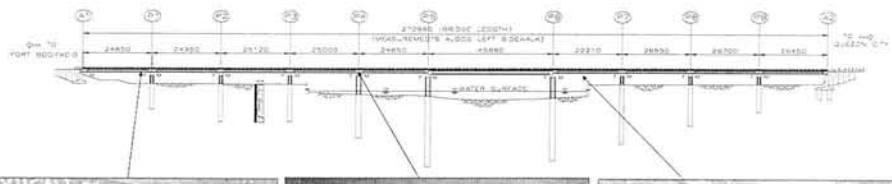
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (13/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa11 C5 BRIDGE
Location/Name of Road	Pasig City
Year Constructed	1997

Elevation



Diag. Crack @ Right Web near End Diaph. @ Bay 1

Honeycomb at Bay 3, End Diaphragm

Random cracks at Bay 1, t=0.203mm

Length of Bridge	272.960 m. (24.85 + 24.95 + 25.12 + 25.0 + 24.85 + 45.88 + 22.21+ 26.95 + 26.70 + 26.45)	No. of Lane	6
		Lane Width	3.00m
Superstructure Type	PC I Girder Bridge (10-Span)	Substructure Type	Abutment: Wall Type (spread, bored pile), Pier: Column Type (bored pile)

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC I GIRDER	Span 6: Top flange at Bay 1 above Pier 6	H	0.3m Φ pothole with remarkable depth above P1 and 0.7mΦ pothole near P2
			Span 8: Bottom of girder flange	H	1.80m² honeycomb on one location
			Span 6: Girders 4 & 8 near Pier 6 Support	M	0.45 - 1.60m² honeycomb on 2 locations
			Span 9: End block upstream	M	2.261mm crack is just construction joint which enabled free lime occurrence in the inferior joint
			Span 9: Girder 12 at end block	M	0.12m² Spalling with exposed rebars on one location
		DECK SLAB	Span 1 & 2: Pothole above P1, 1.2m from P2	H	Missing, fractured, or loose due to corrosion
			Span 4: Bottom of slab at Pier 3, bay 6	H	0.12 to 0.15m² of spalling with exposed rebars, 2 locations
			Span 6: Honeycomb at bottom slab, bay 7& 8	H	0.54m² honeycomb on one location
			Span 6: Crack at bottom of cantilever slab near pier	H	1.09m² honeycomb on one location
			Span 9: End diaphragm at P6, bay 10	M	0.635mm crack on one location
			All Spans: Restraining bars at end diaphragms	H	Missing, fractured, or loose due to corrosion
			Span 7: Deck slab at bay 1 & 2	M	0.12 to 0.15m2 of spalling with exposed rebars, 2 locations
			Span 8: Honeycomb at bottom slab, bay 4	H	0.54m2 honeycomb on one location
			Span 8: End Diaphragm/slab at pier 8	H	1.09m2 honeycomb on one location
			Span 8: End Diaphragm/slab at pier 8	H	0.635mm crack on one location
	Substructure	ABUTMENT	Downstream side of Abut 1	M	0.355mm horizontal crack on one location. This maybe due to less reinforcement at end or shrinkage
			Abut B wall near bearing	H	0.61mm vertical cracks due to increase in load
			Abut B Restraining Bar	H	50% loosening
		PIER	Span 4: Pier 3 coping downstream	M	0.259mm crack due to alkaline aggregate reaction
			Span 6: Pier 6 coping at bay 2	M	0.381 Vertical crack on one location due to increase in load concentration
			Span 5: Pier 6 coping, downstream end	H	2.134mm vertical crack on one location
			Span 8: Pier 8 coping at bottom	H	0.23m2 of insufficient concrete cover on bottom face of coping
			Span 9: Pier 9 coping at bottom	H	3.0m2 of insufficient concrete cover on bottom face of coping
	Foundation			S	Maximum inclination is 0.63 degrees at A2.
	Accessory	All restraining bar		H	Rust spreads the entire bar, some have missing bars and bolts, some are fractured
		Pier 9 coping, bay 11		M	0.33 Vertical crack
	Diagnosis Evaluation *2	Category "B"	* Repairs of cracks and other concrete damages necessary * In-depth monitoring of girder behavior during passage of heavy trucks needed		
Vulnerability to Disaster	Seismic Resistance	Most piers sufficient under seismic demand forces except P8 with C/D = 0.74. Moderate vulnerability			
	Wind Resistance	Not critical to wind action. Low vulnerability			
	Flood Resistance	Not critical to flood overtapping. Low vulnerability			
	Evaluation	* Not critical to wind and flood action * Reasonably sound under seismic action			
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)			
	Volume/ Capacity	92,184 (2002) 6 lanes Level of Service: E (V/C Ratio = 0.85)			
	Smooth Driving Condition	Steep slope at approach road			
	Evaluation	* Traffic functionality limited by level of service			
Special Issues	River Navigation	Vertical clearance > regulation, horizontal clearance < preferred			
	Utilities	None			
	Informal Dwellers	Heavy : More than 20 households identified			
	Evaluation	* Minimal social and environmental impact			
Overall Evaluation		* Bridge reasonably sound, minor repairs necessary.			

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

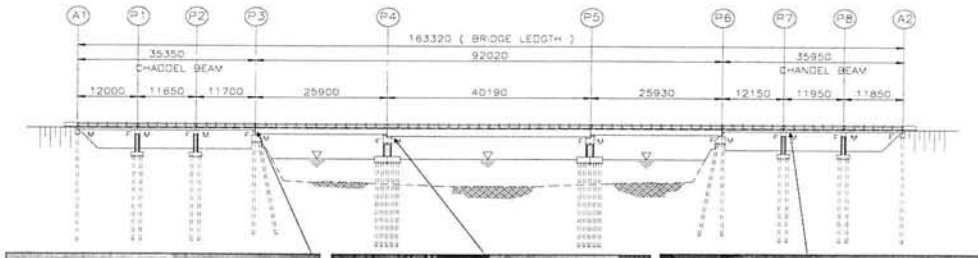
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (14/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Pa12 BAMBANG BRIDGE		
Location/Name of Road	A. Luna Street Pasig City	Year Constructed	1991

Elevation



Diagonal Crack @ End Block on Both Sides

Random Cracks @ Cantilever under end of Shear Block D.S. t=1.00mm

Diagonal Crack @ Inner Face of Web, t=3.00mm

Length of Bridge	163.320m (12.0+11.65+11.7 + 25.9+40.19+25.9+12.15+11.95+11.85)	No. of Lane	2
		Lane Width	3.70m
Superstructure Type	PC I Girder Bridge (3-Span), (*n* Girder, 3 Span + 3 Span))	Substructure Type	Abutment: Wall Type, (PSC Pile), Pier: Column Type (PSC Pile)

		Members		Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC I GIRDER AND CHANNEL TYPE GIRDER		Span 3: End block at both sides of Girder 1, P3	H	0.55mm wide of horizontal crack
				Span 4: End block at both sides of Girder 3 at P4	H	0.60mm wide of diagonal crack
				Span 5: End block of Girder 1 & 4 at Pier 5	H	0.65mm to 0.80mm wide of horizontal & diagonal crack, 2 locations.
				Span 6: End block of Girder 2 & 3 at Pier 5	H	0.45mm to 0.50mm wide of horizontal & diagonal crack, 2 locations.
				Span 6: End block at both sides of Girder 3, P6	H	0.60mm wide of horizontal crack
				Span 6: End block at both sides of Girder 2 at P6	H	0.60mm wide of horizontal crack
				Span 8: Innerface of web at Girder 7 at Pier 7	H	3.00mm wide of diagonal crack
		DECK SLAB		Span 1: Top of Slab	H	1.00mm wide of transverse cracks on top
				Span 3: Bottom of Slab at P3	H	0.35m2 area of exposed rebar
	Substructure	ABUTMENT		Span 1: Abutment A coping near Girder G7	H	1.50mm wide random cracks
				Span 9: Abutment B backwall at upstream side	H	10.00mm wide of fractured on abutment
				Span 9: Face of Abutment B under Girder 5	H	1.50mm wide of vertical crack
				Span 9: Face of Abutment B under Girder 3 to Girder 7	H	1.00mm wide of diagonal crack
				Span 9:Abutment B Backwall at Downstream	H	12.0mm wide of fractured on abutment
		PIER		Span 6: Coping face at Pier 5	M	0.40mm wide of vertical crack
				Span 8: Top of coping at Pier 7 along Bay 8	H	2.50mm wide of diagonal crack
	Foundation				S	Maximum inclination is 0.63 degrees longitudinal at Pier 8.
	Accessory	Span 9: Bearing Plate of Abutment B			M	Corrosion spread of bearing plate under girder 5 and girder 7
	Diagnosis Evaluation *2	**Category "C"**		*** Repair of concrete cracks necessary** *** In-depth survey not necessary**		

Vulnerability to Disaster	Seismic Resistance	* Plastic capacity of piers sufficient under seismic forces but need to check on confinement reinforcement. Low vulnerability
	Wind Resistance	Not critical to wind action. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	*** Not critical under wind, flood and seismic action**
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	20,779 (2002) 2 lanes Level of Service: D (V/C Ratio = 0.46)
	Smooth Driving Condition	Steep slope at approach road, curvature on bridge
	Evaluation	*** Meets minimum traffic functionality requirements**
Special Issues	River Navigation	Vertical clearance > regulation; horizontal clearance < preferred
	Utilities	Left: 6-Φ100 PVC Telephone
	Informal Dwellers	Light : Only 4 households identified
	Evaluation	*** Minimal social and environmental impact**
Overall Evaluation		*** Bridge reasonably sound with minimum traffic functionality.**

NOTES

1. Damage Assessment
H : Heavy
M : Medium
S : Small

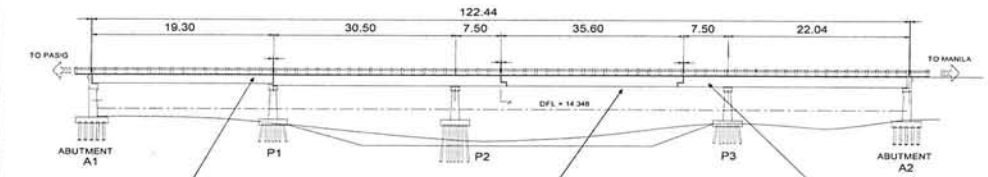
2. Diagnosis Evaluation
"A" : Urgent measures shall be applied; Conduct In-depth Survey
"B" : Urgent measures not required; Conduct In-depth Survey
"C" : In-depth survey not required

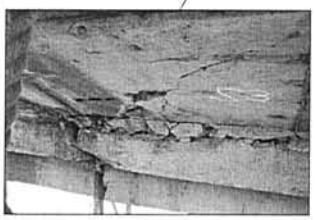
2. Traffic limit in metric tons

Appendix 8.6.1-1 (15/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Ma1.1 VARGAS BRIDGE (Upstream)		
Location/Name of Road	Pasig Boulevard Extension Pasig City	Year Constructed	1992

Elevation




Crack w/ Spall @ Bot. of Cantilever Slab & Flange of Girder, A = 0.15 m2


Large deflection of superstructure


Vertical Crack @ Gerber Hinge, t = 0.35 mm

Length of Bridge	122.440m (19.3+30.5+50.6+22.04)	No. of Lane	2
		Lane Width	3.70m

Superstructure Type	PC Gerber I Girder Bridge (4-Span)	Substructure Type	Abutment: Wall Type (steel pipe pile), Pier: Column Type (steel pipe pile)

		Members	Location of Damaged Parks	Damage Rating (X,Y,Z)	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC I GIRDER	Span 1: Top flange of Girder 3 at Pier 1			1.00mm wide vertical crack.
			Span 3: Face of Girder 1 at Gerber GH1			Spalling with exposed rebar A=0.45m2.
			Span 3: Face of Girder 1 at Gerber GH2			Spalling with exposed rebar A=0.24m2.
			Span 2: Girder G1 at top of Pier 2			Flexural Crack width 2mm, depth of crack 17mm
			Span 3: Girder G1, GH1, L			Crack width 1-3mm, depth of crack 44m
			Span 3: Top flange of Girder 4 at Pier 2			0.45mm wide vertical crack
			Bridge Deck Profile			Settlement of Span 3, 4 giders
			Bridge Deck Profile			Lift-up of Span 2 and Span 4, 8 girders
		DECK SLAB	Span 1: Bottom of slab			0.30m2 area of spalling at bottom
			Span 3: Bottom of Cantilever Slab			3.0mm wide crack at bottom, 1.44m2 area of honey comb
	Substructure	ABUTMENT	Abutment A1, Backwall			Crack width 1.0mm
		PIER	Pier 3 Coping			Wide cracks near bottom of coping, width=5mm
	Foundation	Pier P2 Steel Pile				Foundation sufficient in latest code requirement
	Accessory					
	Diagnosis Evaluation *2	**Category "A"**	**• Repair of cracks in girders necessary** **• In-depth study on deflection and rotation of girder slab necessary to verify safety/adequacy of bridge.** **• In-depth study on gerber hinge connection to determine necessary improvement measures.**			
Vulnerability to Disaster	Seismic Resistance	• Reasonably sufficient under present seismic load requirement but needs improvement on confinement reinforcement. • Low vulnerability.				
	Wind Resistance	• Not critical to wind action. Low Vulnerability				
	Flood Resistance	• Not critical to flood. Low Vulnerability				
	Evaluation	**• Bridge is moderately vulnerable to seismic forces but needs improvement on confinement reinforcement.** **• Bridge is sufficient to wind and flood action.**				
Traffic Capacity & Function	Traffic Limit	27-ton Truck ， Load Rating: 0.83 Inventory Level (Strength Limit State)				
	Volume/ Capacity	26,799 (2002) 2 Lanes (One Direction) Level of Service: E (V/C Ratio = 0.85)				
	Smooth Driving Condition	Fair				
	Evaluation	**• Traffic functionality reduced by decrease in live load capacity and level of service.**				
Special Issues	River Navigation	Vertical Clearance > Regulated; Horizontal Clearance: Preferable				
	Utilities	Left: 8-Φ100 PVC Telephone				
	Informal Dwellers	Heavy : More than 20 households identified				
	Evaluation	**• Moderate social and environmental impact**				
Overall Evaluation		**• Measure on Cracks of PC Girders is necessary, pier protections are needed**				

NOTES

1. Damage Assessment
H : Heavy
M : Medium
S : Small

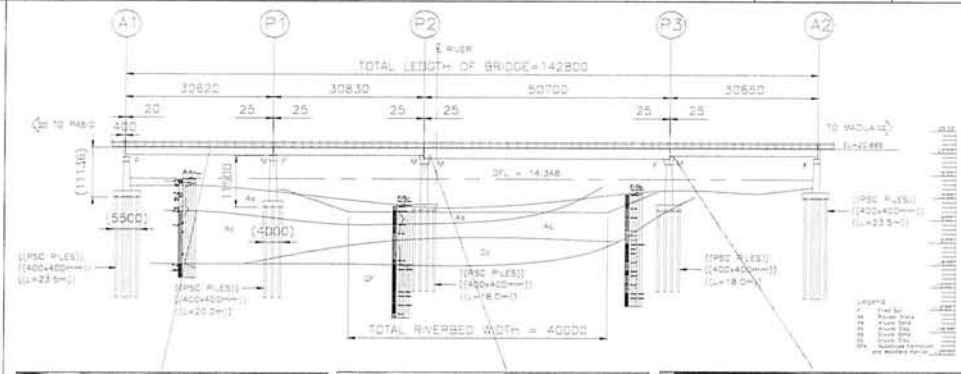
2. Diagnosis Evaluation
"A" : Urgent measures shall be applied; Conduct In-depth Survey
"B" : Urgent measures not required; Conduct In-depth Survey
"C" : In-depth survey not required

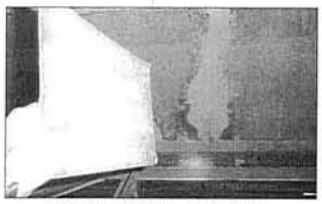
2. Traffic limit in metric tons

Appendix 8.6.1-1 (16/20)
OVERALL EVALUATION OF BRIDGE CONDITION

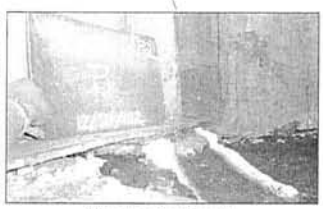
Reference/Bridge Name	Ma1.2 VARGAS BRIDGE (Downstream)		
Location/Name of Road	Pasig Boulevard Extension Pasig City	Year Constructed	1973

Elevation





Crack and exp. Rebar @ Bot. Slab along Bay 2



Bottom Flange Slightly Corroded

Diagonal Crack & Spall @ Coping Face under G-2

Length of Bridge	142.800m (30.62+30.85+50.70+30.65)	No. of Lane	2
		Lane Width	3.70m

Superstructure Type	Steel Plate Girder Bridge (4-Span)	Substructure Type	Abutment: Wall Type ((steel pipe pile)), Pier: Column Type ((steel pipe pile))

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	STEEL GIRDER	Span 1: Bottom flange, above P1	S	Surface rust, local spot
			Span 2: Botom flange, above P1	S	Surface rust, local spot
			Span 3: Bottom flange above bearing at P2	S	Surface rust, local spot
		DECK SLAB	Span 3: Cantilever slab at midspan, upstream side	H	1m2 honeycomb
			Span 3: Cantilever slab at midspan, upstream side	M	0.45mm wide crack, transverse
			Span 3: Cantilever slab above P3, upstream side	H	1m2 honeycomb
			Span 3: Bay 1, above Pier 2	M	0.12m2 exposed rebar
			Span 3: Bay 2, above Pier 2	H	1.5mm wide crack, transverse
	Substructure	ABUTMENT			
		PIER	Span 2: Pier 2 Coping at Bay 1	M	0.6mm wide vertical crack
	Foundation			S	Maximum inclination is 0.52 degrees longitudinal at Pier 1.
	Accessory		Spans 1, 2, 3, & 4 Bearing Shoe	M	Reduction in cross section, common in all bearing shoes
	Diagnosis Evaluation *2	**Category "C"**	*** Urgent repair/maintenance work needed for concrete cracks and corroded steel members.** *** Monitoring of girder behavior under heavy trucks necessary**		

Vulnerability to Disaster	Seismic Resistance	* No as-built plans. In-depth study on Pier performance under seismic action needed. Moderate vulnerability
	Wind Resistance	Not critical to wind action. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	*** Not critical to wind and flood action** *** Needs in-depth study on seismic performance**
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	26,800 (2002) 2 lanes (One Direction) Level of Service: E (V/C Ratio = 0.85)
	Smooth Driving Condition	Non-steep slope, corrugation and curvature
	Evaluation	*** Traffic functionality is limited by level of service**
Special Issues	River Navigation	Vertical clearance > regulated; horizontal clearance < preferred
	Utilities	Left: 1-Φ500 Steel Waterline; Right: 12-Φ100 PVC Telephone
	Informal Dwellers	Heavy : More than 20 households identified
	Evaluation	*** Moderate social and environmental impact**

Overall Evaluation	*** Bridge reasonably sound but needs in-depth monitoring of girder under heavy trucks.**

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

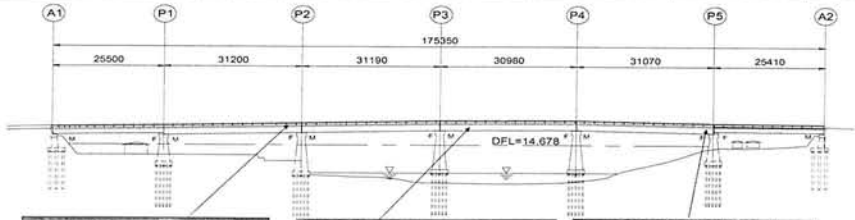
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

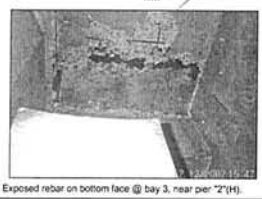
2. Traffic limit in metric tons

Appendix 8.6.1-1 (17/20)
OVERALL EVALUATION OF BRIDGE CONDITION

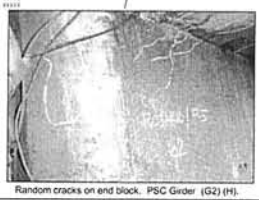
Reference/Bridge Name	Ma2 ROSARIO BRIDGE		
Location/Name of Road	Ortigas Avenue Pasig City	Year Constructed	1952

Elevation




Exposed rebar on bottom face @ bay 3, near pier "2"(H).


Transverse crack of Cantilever slab at downstream side (H).


Random cracks on end block. PSC Girder (G2) (H).

Length of Bridge	175.240m (25.36+31.25+31.17+30.98+31.07+25.41)	No. of Lane	6
		Lane Width	3.20m

Superstructure Type	PC I Girder Bridge (6-Span)	Substructure Type	Abutment: Wall Type (PSC pile, timber pile), Pier: ColumnType (PSC pile, timber pile, steel pipe pile)

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PCI GIRDER	Span 3:Girder 1	M	0.30mm random crack due to bent up of reinforcing bars and sudden temperature change.
			Span 5:Girder 1	H	0.50mm random crack due to bent up of reinforcing bars and sudden temperature change.
			Span 6: Girder 2 (Girder 4, Girder 5)	H	0.813mm random crack due to movement restriction of main girder or impact. 3 locations.
			Span 6: Girder 4	H	1.50mm random crack is caused by splitting of concrete and reinforcement
			Span 6: Girder 5	H	Long crack 1.50mm. The crack is caused by splitting of concrete thus exposing rebars.
		DECK SLAB	Span 1: Bottom Cantilever Slab	H	Transverse crack 0.61mm due to lack of distribution bar.
			Span 1: Bottom of Slab, Bay 3 etc.	H	Random cracks 2.15 mm due to lack of distribution bar.
			Span 2: Bottom of Slab	M	0.255m2 spalling of concrete and reinforcement.
			Span 2: Bottom of Slab at Bay 6, etc.	H	Several random crack 0.61mm caused by lack of slab thickness.
			Span 2Bottom of Slab, Bay 7, etc.	M	Exposed rebar 0.174m2 is caused by splitting of concrete and reinforcement.
			Span 2: Bottom of Cantilever Slab	H	Transverse crack 0.869mm is caused by fatigue due to repeated load.
			Span 2: Bottom of Slab, Bay 1	M	Honey comb 0.12m2
			Span 2: Bottom of Slab	H	Spalling 0.45m2
			Span 3: Bottom of Slab	M	Random cracks 0.35mm is due to shrinkage of plastered concrete.
			Span 4: Bottom of Cantilever	H	Transverse crack 0.61mm due to fatigue by repeated loading.
			Span 5: Bottom of Cantilever	M	Random crack 0.35mm is caused by poor compaction and inferior joints.
			Span 6: Bottom of Cantilever	H	Random crack 0.766mm is caused by lack of rigidity of girder and fatigue by repeated load.
	Substructure	ABUTMENT			
		PIER	Span 2: Coping at Pier 1	M	2mm horizontal crack is caused by presence of mud in aggregates.
			Span 2: Coping at Pier 3	S	Diagonal crack 0.61mm is caused by external shear force.
			Span 5: Coping at Pier 5	M	0.381mm random crack is caused by increase in load, horizontal force or lack of reinforcing bar.
	Foundation			S	Maximum inclination is 0.52 longitudinal at A2.
	Accessory		Spans 1, 2, 3, 4 & 5: Steel Bearing P1, P2, P3, P4 & P5	M	Moderate corrosion, reduction of cross section
			Every girder end	H	Prevention devices with steel rope
	Diagnosis Evaluation *2	**Category "B"**	*** Repairs of concrete cracks necessary** *** In-depth study of deck slab needed**		

Vulnerability to Disaster	Seismic Resistance	* Pier insufficient under present seismic design requirements. Moderate vulnerability
	Wind Resistance	Not critical to wind action. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	*** Not critical to wind and flood action** *** In-depth study needed to verify pier sufficient under present seismic requirement**
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	85,059 (2002) 6 Lanes Level of service : F (V/C Ratio = 1.22)
	Smooth Driving Condition	Non-steep slope, corrugation and curvature
	Evaluation	*** Traffic functionality is limited by level of service**
Special Issues	River Navigation	Vertical clearance > regulated; Horizontal clearance < preferred
	Utilities	Left : 4-ϕ100 mm PVC Telephone; Right : 12 - ϕ100 PVC Telephone
	Informal Dwellers	Heavy : More than 20 households identified
	Evaluation	*** Moderate social and environmental impact**
Overall Evaluation		*** Bridge reasonably sound but in-depth monitoring of slab necessary** *** Traffic functionality is insufficient**

NOTES

1. Damage Assessment
- H : Heavy
- M : Medium
- S : Small

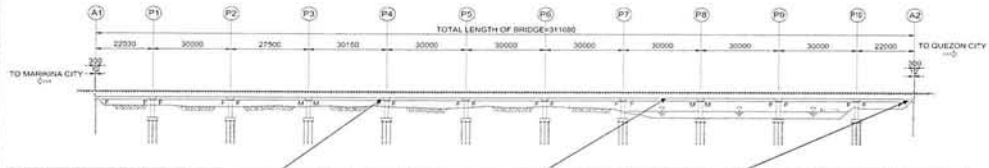
2. Diagnosis Evaluation
- "A" : Urgent measures shall be applied; Conduct In-depth Survey
- "B" : Urgent measures not required; Conduct In-depth Survey
- "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (18/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Ma3 MARCOS BRIDGE		
Location/Name of Road	Marcos Highway Marikina City	Year Constructed	1980

Elevation



Horizontal crack @ Pier 4 Coping (H).

Honey comb on outer face of girder, upstream (H)

Heavy corrosion and deformation of Bearing shoe.(H)

Length of Bridge	311.680m (22.03+30.0+27.5+30.15+6@30.0+22.0)	No. of Lane	6
		Lane Width	3.00m
Superstructure Type	PC I Girder Bridge (11-Span)	Substructure Type	Abutment: Wall Type ((RC pile)), Pier: Column Type ((RC pile))

		Members		Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PCI GIRDER		Span 1 at Bay 7: Bottom flange of Girder 8	M	A = 0.15m2 honeycomb
				Span 2 at Bay 7: Top flange of Girder 7	M	A = 0.15m2 spalling with exposed rebar
				Span 2 at Bay 8: Face of Girder 8	M	A= 0.16m2 honeycomb
				Span 3 at Bay 5: Top flange of Girder 6	M	A = 0.30m2 spalling with exposed rebar
				Span 5 at Bay 2 at Pier 5: Top flange of Girder 3	M	A = 0.12m2 spalling with exposed rebar
				Span 5 at Bay 11 at Pier 4: Bottom flange of Girder 9	M	A = 0.15m2 spalling with exposed rebar
				Span 6 at Bay 7 at Pier 6: Bottom of Girder 8	M	A = 0.12m2 spalling with exposed rebar
				Span 7 at Bay 10 at Pier 6: Bottom flange of Girder 11	M	A = 0.15m2 spalling
				Span 8 at Bay 10 at Pier 7: Bottom of Girder 10	M	A = 0.16m2 spalling with exposed rebar
				Span 10 : Outside face of Girder 12	M	A = 0.18m2 spalling with exposed rebar
		DECK SLAB		Span 4 at Bay 11 at Pier 3: Bottom of slab	M	A = 0.40m2 spalling
				Span 4 at all bays: Bottom of Slab	H	A > 3.0m2 thin concrete cover
				Span 5 at Bay 2 at Pier 5: Bottom of Slab	M	A = 0.30m2 spalling
				Span 5 at Bay 3 at Pier 5: Bottom of Slab	M	t = 0.381mm random cracks at 3 locations
				Span 6 at Bay 11 at Pier 6: Bottom of Slab	H	A = 1.320m2 spalling with exposed rebar
				Span 9 at Bay 1: Bottom of Slab	H	A = 0.72m2 spalling with exposed rebar
	Substructure	ABUTMENT				
		PIER		Spans 1, 2, 3 & 4: Coping of Piers 1, 2, 3, & 4	H	t = 0.30mm to t = 5.00mm random cracks are caused by lack of reinforcing bars. 4 locations
				Spans 1, 2, 3, 4 & 5: Coping of Piers 1, 2, 3, 4 & 5	M	t = 0.10mm to t = 0.30mm random cracks are caused by alkali aggregate reaction. 5 locations
				Spans 1, 2, 4, 5 & 6: Coping of Piers 1, 2, 4, 5 & 6	H	t = 0.30mm to t = 10.00mm vertical/horizontal crack are mainly caused by lack of reinforcing bars. 5 locations
				Spans 1, 2, 3, 4, 5 & 7: Coping of Piers 1, 2, 3, 4, 5 & 7	M	t = 0.10mm to t = 0.30mm vertical/horizontal crack are caused by alkali aggregate reaction. 6 locations
	Foundation				S	Maximum inclination is 0.57 degree transverse at A1 & P10.
	Accessory			Bearing plate and prevention devices	S	Minimum rust
	Diagnosis Evaluation *2	**Category "C"**		*** Repair of concrete cracks needed** *** In-depth study not necessary**		
Vulnerability to Disaster	Seismic Resistance	* No as-built plans. Pier sufficient under present seismic design requirements. Moderate vulnerability				
	Wind Resistance	Not critical to wind action. Low vulnerability				
	Flood Resistance	Not critical to flood overtapping. Low vulnerability				
	Evaluation	*** Not critical to wind and flood action** *** Sufficient to seismic action under assumed reinforcement**				
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)				
	Volume/ Capacity	75,983 (2002) 6 Lanes Level of service : E (V/C Ratio = 0.88)				
	Smooth Driving Condition	Non-steep slope, corrugation and curvature				
	Evaluation	*** Traffic functionality is limited by level of service**				
Special Issues	River Navigation	Vertical clearance > Regulated; Horizontal clearance > preferred				
	Utilities	Right : 4 - ϕ 100 PVC Telephone				
	Informal Dwellers	No identified informal settlers				
	Evaluation	*** Minimal social and environmental impact**				
Overall Evaluation		*** Bridge is reasonably sound with insufficient traffic functionality**				

NOTES

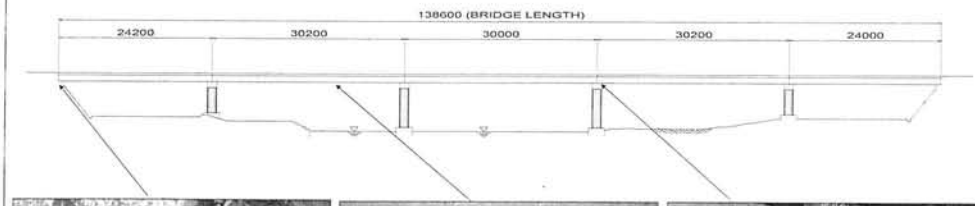
1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small
2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

Appendix 8.6.1-1 (19/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Ma4 MARIKINA BRIDGE		
Location/Name of Road	A. Bonifacio Avenue / E. Rodriguez Avenue Marikina City	Year Constructed	1980

Elevation



Vertical Crack @ Face of Abut Wall, t = 12.00 mm

Honeycomb @ Bot. of deck slab, A = 0.18 m2

Random Cracks @ Front Face , t = 0.50 mm

Length of Bridge	138.200 m. (24.2 + 3 @ 30.0 + 24.0)	No. of Lane	4
		Lane Width	3.40m

Superstructure Type	PC I Girder Bridge (5-Span)	Substructure Type	Abutment: Wall Type ((RC pile)), Pier: Column Type ((RC pile))

		Members	Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PCI GIRDER	Span 1: End of Girder 4	S	0.025mm2 area of spall
			Span 1 : Web of Girder 11 near end block at Bay 11	S	0.15mm wide of diagonal crack
			Span 2: Web of Girder 12	S	0.15mm wide of random cracks
			Span 4: Top flange of Girder 4 at Bay 4	S	0.04mm2 area of honeycomb
			Span 4: Bottom of Girder 6	S	0.03mm2 area of exposed rebar
			Span 5: Bottom of Girder 2 near Abutment B	S	0.01mm2 area of exposed rebar
			Span 5: End block of Girder 2 at PRT 4	S	0.15mm wide of random cracks
		DECK SLAB	Span 2: Deck slab at Bay 2	M	0.35mm wide of crack
			Span 2: Bottom of Deck slab at Bay 2	M	0.35mm wide of transverse crack
			Span 2: Bottom of Deck slab at Bay 3	M	0.18mm2 area of honeycomb
			Span 3: Bottom of Deck slab at Bay 2	M	0.20mm2 area of spall
			Span 3: Bottom of Cantilever Slab	M	0.30mm2 area of spall
			Span 4: Bottom of Deck slab at Bay 9	M	0.20mm2 area of exposed rebar due to thin concrete cover
			Span 4: Bottom of Cantilever Slab	M	0.14mm2 area of spall
			Span 4: Bottom of Deck slab at Bay 9	M	0.35mm wide of horizontal crack
			Span 5: Bottom of Cantilever slab near Pier 4	M	0.20mm2 area of spall
	Substructure	ABUTMENT	Face of Abutment A, Wingwall	H	12.5mm wide of vertical crack
		PIER	Span 2: End of Pier 1 Coping along upstream	M	0.60mm wide of vertical crack
			Span 2: Pier/body near end at downstream	M	0.40mm wide of random cracks
			Span 4: Face of Pier 3 coping	M	0.50mm wide of random cracks
	Foundation			S	Maximum inclination is 0.52 degree transverse at P2.
	Accessory				
	Diagnosis Evaluation *2	**Category "C"**	*** Repair of concrete cracks necessary** *** In-depth study not necessary**		
Vulnerability to Disaster	Seismic Resistance	* Pier and foundation sufficient under seismic action. Moderate vulnerability			
	Wind Resistance	Not critical to wind action. Low vulnerability			
	Flood Resistance	Not critical to flood overtapping. Moderate vulnerability			
	Evaluation	*** Not critical to wind, flood and seismic action**			
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)			
	Volume/ Capacity	54,508 (2002) 4 lanes Level of Service: D (V/C Ratio = 0.77)			
	Smooth Driving Condition	Non-steep slope, corrugation and curvature			
	Evaluation	*** Meets minimum traffic functionality requirements**			
Special Issues	River Navigation	Vertical clearance > regulated; horizontal clearance > preferred			
	Utilities	Left:1-Φ300 Steel Waterline; Right: 4-Φ100 Steel Waterline, 1-Φ150			
	Informal Dwellers	No identified informal settlers			
	Evaluation	*** Minimal social and environmental impact**			
Overall Evaluation		*** Bridge is reasonably sound with sufficient traffic functionality.**			

NOTES

1. Damage Assessment
H : Heavy
M : Medium
S : Small

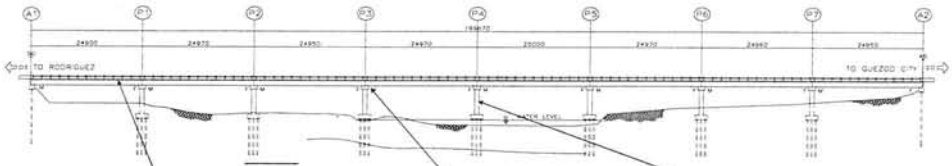
2. Diagnosis Evaluation
"A" : Urgent measures shall be applied; Conduct In-depth Survey
"B" : Urgent measures not required; Conduct In-depth Survey
"C" : In-depth survey not required

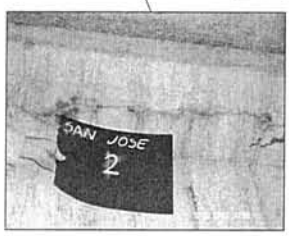
2. Traffic limit in metric tons

Appendix 8.6.1-1 (20/20)
OVERALL EVALUATION OF BRIDGE CONDITION

Reference/Bridge Name	Ma5 SAN JOSE BRIDGE		
Location/Name of Road	Pasig City	Year Constructed	1980

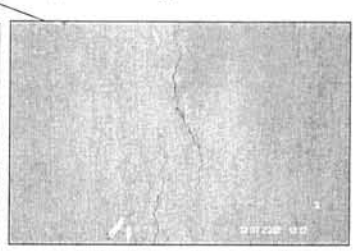
Elevation





Longitudinal craks @ top of flange of girder, t= 0.102mm

Deformed & corroded steel bearing of girder 6 @ Pier 3



Vertical crack on face of coping below girder 3 @ Pier 4

Length of Bridge	199.67 m. (24.90 + 24.97 + 24.97 + 24.95 +25.00 + 24.97 + 24.96 + 24.95)	No. of Lane	4
		Lane Width	3.40m

Superstructure Type	PC I Girder Bridge (8-Span)	Substructure Type	Abutment: Wall Type (RC pile), Pier: Column Type (Rc pile)

		Members		Location of Damaged Parks	Damage Assessment *1	Reason for Assessment
Structural Soundness	Superstructure	PC I GIRDER		Span 4: Top flange of G1	M	0.35mm longitudinal and random cracks due to shrikage
				Span 3: End face of girder 1 &3	S	0.15 to 0.178mm vertical craks on 2 locations.
		DECK SLAB		Span 2: Bottom of skab at bay 4	S	0.002m2 honeycomb on one location
				Span 3: Bottom of slab , 5m from Pier 3	S	0.01m2 exposed rebar on one location
	Substructure	ABUTMENT		Span 1: Downstream side of backwall	S	0.10mm vertical craks on one location
		PIER		Span 1,2,3,4 & 6; Pier 1,2,3,4 &6 Diaphram wall	H	0.61 to 2.0mm vertical cracks near center of Pier, 5 locations
				Span 5: Pier 4 coping below G3	H	1.63mm flexure cracks on one location caused by increase of load.
				Span 5: Pier 5 coping below G1	M	0.40mm cracks cause by negative bending moment.
	Foundation				S	Maximum inclination is 0.34 degree transverse at P6. No damages observed
	Accessory			All Expansion Joints	H	Open joints causes leakage on steel bearings and sediment accumulation.
				All Steel Bearing Shoes	H	Remarkable reduction of cross section due to corrosion of all steel bearing shoes.
	Diagnosis Evaluation *2	Category "C"		* Repair/maintenance work necessary to seal concrete cracks. * Replacement of water tight expansion joint necessary to prevent further corrosion/deterioration of bearing support * In-depth investigation not necessary		

Vulnerability to Disaster	Seismic Resistance	*Pier insufficient to present seismic design requirements. High vulnerability
	Wind Resistance	Not critical to wind action. Low vulnerability
	Flood Resistance	Not critical to flood overtapping. Low vulnerability
	Evaluation	* Not critical to wind and flood action *In-depth study necessary to determine seismic stability/resistance
Traffic Capacity & Function	Traffic Limit	AASHTO MS-18 (HS20) Semi-Trailer Truck (32.7 tons)
	Volume/ Capacity	6,211 (2002) 4 lanes Level of Service: A (V/C Ratio = 0.06)
	Smooth Driving Condition	Non-steep slope, corrugation and curvature
	Evaluation	* Traffic function in very good condition
Special Issues	River Navigation	Vertical clearance > regulated; horizontal > preferred
	Utilities	Right: 4 Cable Lines (Bare)
	Informal Dwellers	Medium
	Evaluation	* Minimal social and environmental impact
Overall Evaluation		* Bridge reasonably sound with very good traffic functionality.

NOTES

1. Damage Assessment
   - H : Heavy
   - M : Medium
   - S : Small

2. Diagnosis Evaluation
   - "A" : Urgent measures shall be applied; Conduct In-depth Survey
   - "B" : Urgent measures not required; Conduct In-depth Survey
   - "C" : In-depth survey not required

2. Traffic limit in metric tons

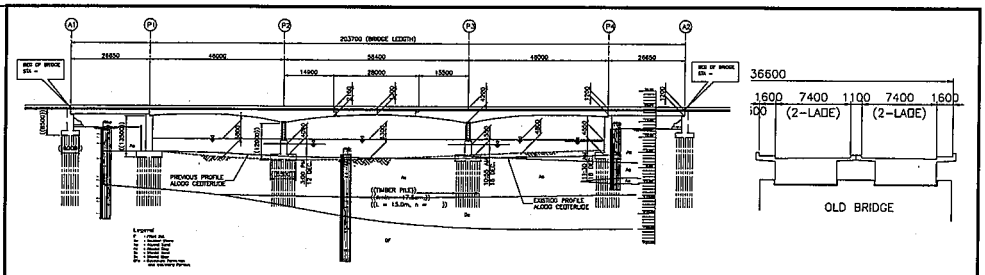
CHAPTER 9

COMPARATIVE STUDY ON IMPROVEMENT MEASURES

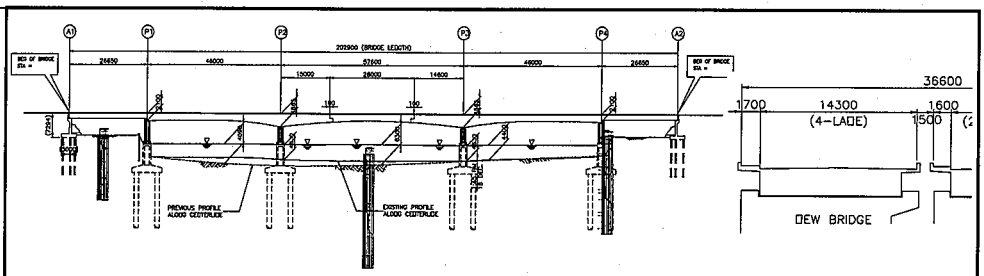
Appendix 9.2.1-1 (1/10)

Comparison of Improvement Measures

Pa1.1 DELPAN BRIDGE (UPSTREAM)

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1965 Superstructure Type: PC Gerber Box Girder Bridge, Substructure Type: Abutment:Wall, Foundation Type: Abutment: ((Timber Pile)), Pier: ((Timber Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete crack, spalling exposed rebars honeycomb * Periodical maintenance work level for damage caused by truck collision	* Repair/sealing of concrete crack, spalling, exposed rebars honeycomb * Depressing of crossing road by excavation due to insufficient vertical clearance for trucks	* Repair/sealing of concrete crack, spalling, exposed rebars honey comb * Jack up of approach span by 60 cm due to insufficient vertical clearance for trucks
	Substructure	* Repair/sealing of concrete crack, spalling exposed rebars	* Repair/sealing of concrete crack, spalling, exposed rebars	* Repair/sealing of concrete crack, spalling, exposed rebars
	Foundation	* No inspection data	* No inspection data	* No inspection data
①Reliability for the structural safety		* RF = 1.26 (Load Rating 41.2 tons) (Minimum) * C/Dpl=1.00 (Body of Pier 3) (Minimum)	* RF = 1.26 (Load Rating 41.2 tons) (Minimum) * C/Dpl=1.00 (Body of Pier 3) (Minimum)	* RF = 1.26 (Load Rating 41.2 tons) (Minimum) * C/Dpl=1.00 (Body of Pier 3) (Minimum)
②Construction Period and Difficulty		* 1 Month (easy)	* 3 Months (moderate)	* 7 Months (hard)
③Traffic Management during Construction		No disturbance of existing traffic	No disturbance of existing traffic	No disturbance of existing traffic
Navigation Clearance	Vertical	Sufficient	Sufficient	Sufficient
	Horizontal	Sufficient	Sufficient	Sufficient
Construction Cost (MP)		13.4	23.7	118.7
Evaluation		3	1	2

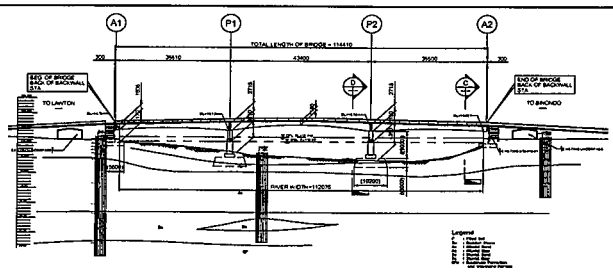
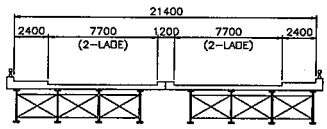
Pa1.2 DELPAN BRIDGE (DOWNSTREAM)

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1988 Superstructure Type: PC Gerber Box Girder Bridge, Substructure Type: Abutment:Wall, Pier: WALL, Foundation Type: Abutment: (PSC Pile), Pier: (Bored Pile, PSC Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks, spalling exposed rebars	* No need	* No need
	Substructure	* Repair/sealing of concrete crack, spalling exposed rebars	* No need	* No need
	Foundation	* No inspection data	* No inspection data	* No inspection data
①Reliability for the structural safety		* RF = 1.27 (Load Rating 41.53 tons) * C/Dpl=1.03 (Body of Pier 3) (Minimum) (Small repair work)	-	-
②Construction Period and Difficulty		* 1 Month (easy)	-	-
③Traffic Management during Construction		No disturbance of existing traffic	-	-
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Sufficient	-	-
Construction Cost (MP)		11.4	-	-
Evaluation		1	-	-

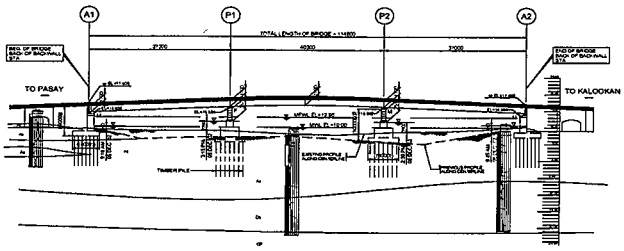
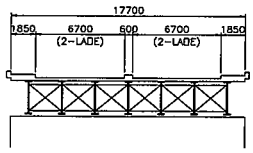
Appendix 9.2.1-1 (2/10)

Comparison of Improvement Measures

Pa2 JONES BRIDGE

Elevation and Cross Section		 		
Construction Year and Bridge Type		Construction Year: 1948 Superstructure Type: 3-Span Continuous Steel Plate Girder Bridge Substructure Type: Abutment:Wall, Pier: Wall, Foundation Type: Abutment: Spread, Pier: (Caisson)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Cleaning/Painting of corroded steel members * Repair of ruptured sway bracings * Repair of ruptured exterior girder by plate patching * Repair of sole plate and girder section at bearing	* Cleaning/Painting of steel structure for whole bridge * Replacement of ruptured sway bracings * Provide additional girder w/ new bearing shoes * Repair & retain existing exterior girder to function as vessel collision protection * Remove and reconstruct deck slab, sidewalk, railing and expansion joint.	* Cleaning/Painting of steel structure for whole bridge * Replacement of ruptured sway bracings * Provide additional girder w/ new bearing shoes * Repair & retain existing exterior girder to function as vessel collision protection * Remove and reconstruct deck slab, sidewalk, railing and expansion joint.
	Substructure	-	* Sealing of concrete crack, spalling & exposed rebars	* Retrofitting of pier wall by full concrete jacket
	Foundation	-	-	* Enlargement of footing / pile cap and addition of bored piles
①Reliability for the structural safety		* RF = 0.00 (Load Rating 0 tons for ruptured girder) * C/Dpl=0.37 (Body of Pier 1) * C/Dpl=0.86 (Foundation of Pier 1) (Less resistance to latest seismic code)	* RF > 1.00 (Load Rating 32.7 tons) * C/Dpl=0.37 (Body of Pier 1) * C/Dpl=0.86 (Foundation of Pier 1) (Less resistance to latest seismic code)	* RF > 1.00 (Load Rating 32.7 tons) * C/Dpl > 1.00 (Body of Pier 1) * C/Dpl > 1.00 (Foundation of Pier 1)
②Construction Period and Difficulty		* 4 Month (easy)	* 18 Months (moderate)	* 24 Months (Hard)
③Traffic Management during Construction		No disturbance of existing traffic	No disturbance of existing traffic	Provision of temporary detour bridge
Navigation Clearance	Vertical	Less by 15cm than a regulatory clearance of 3.75cm	Less by 15cm than a regulatory clearance of 3.75cm	Sufficient
	Horizontal	Less than preferable space of 43m	Less than peferable space of 43m	Less than preferable space of 43m
Construction Cost (MP)		32	161.8	227.2
Evaluation		3	1	2

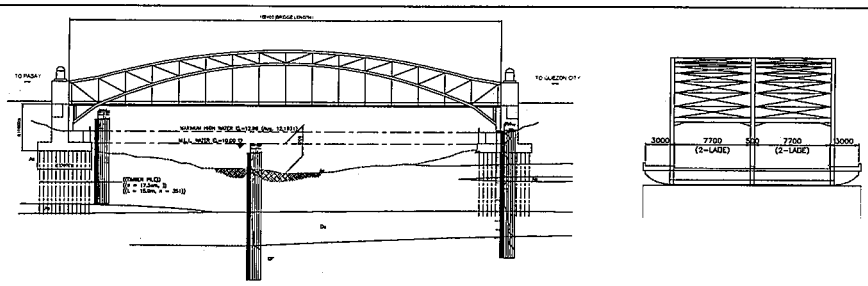
Pa3 Mc ARTHUR BRIDGE

Elevation and Cross Section		 		
Construction Year and Bridge Type		Construction Year: 1988 Superstructure Type: PC Gerber Box Girder Bridge, Substructure Type: Abutment:Wall, Pier: WALL, Foundation Type: Abutment: (PSC Pile), Pier: (Bored Pile, PSC Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Cleaning/Painting of corroded steel members * Repair/sealing of concrete cracks, honeycomb, exposed rebars	* Cleaning/Painting of corroded steel members * Repair/sealing of concrete cracks, honeycomb, exposed rebars * Adding rivets to missing rivet portions	* Cleaning/Painting of corroded steel members * Repair/sealing of concrete cracks, honeycomb, exposed rebars * Adding rivets to missing rivet portions
	Substructure	* Repair/sealing of concrete spalling, exposed rebars	* Repair/sealing of concrete spalling, exposed rebars	* Retrofitting of pier wall by full concrete jacket
	Foundation	* No inspection data	* No inspection data	* Enlargement of footing / pile cap and addition of bored piles
①Reliability for the structural safety		* RF = 1.33 (Load Rating 43.49 tons) * C/Dpl=0.26 (Body of Pier 1) * C/Dpl=0.85 (Foundations of Pier 1)	* RF = 1.33 (Load Rating 43.49 tons) * C/Dpl=0.26 (Body of Pier 1) * C/Dpl=0.85 (Foundations of Pier 1) (Less resistance to latest seismic code)	* RF = 1.33 (Load Rating 43.49 tons) * C/Dpl > 1.00 (Body of Pier 1) * C/Dpl > 1.00 (Foundations of Pier 1)
②Construction Period and Difficulty		* 1 Month (easy)	* 2 Months (moderate)	* 8 Months (Hard)
③Traffic Management during Construction		No disturbance	No disturbance	No disturbance
Navigation Clearance	Vertical	Sufficient	Sufficient	Sufficient
	Horizontal	Less than preferable space of 43m	Less than preferable space of 43m	Less than preferable space of 43m
Construction Cost (MP)		42.5	50.7	95.45
Evaluation		3	1	2

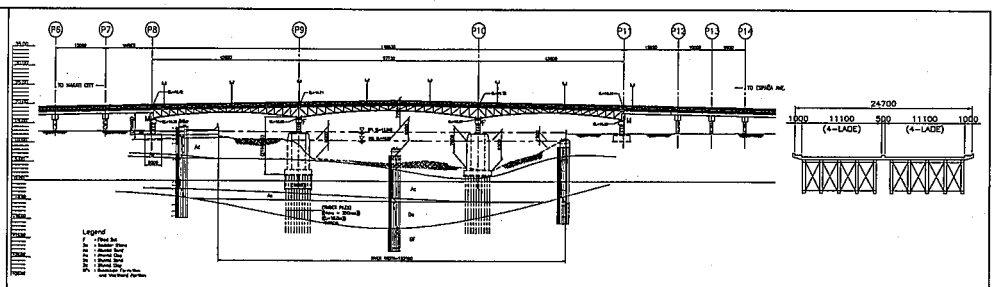
Appendix 9.2.1-1 (3/10)

Comparison of Improvement Measures

Pa4 QUEZON BRIDGE

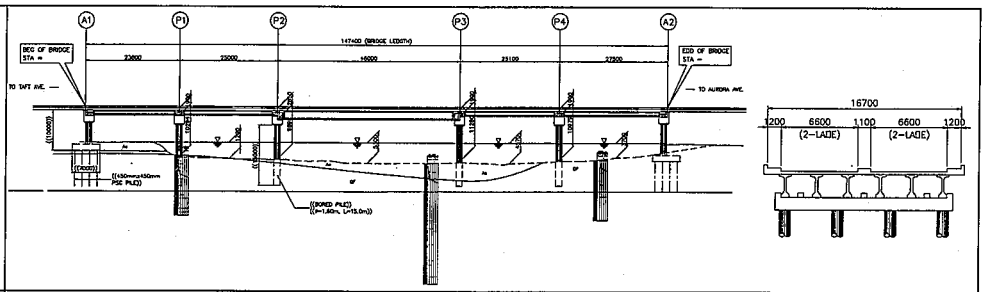
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1946 Superstructure Type: Single Steel Type Arch Bridge, Substructure Type: Abutment:Wall, Foundation Type: Abutment: ((Timber Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Cleaning/Painting of corroded sections of floor * Repair of expansion joint to seal water leakage * Cleaning and painting of corroded gusset plates and replacement of corroded gusset plate	* Cleaning/Painting of corroded steel members * Replacement of expansion joint to seal water leakage * Replacement of gusset plates * Replacement of corroded sections of floor beam longitudinal tie beam & vertical members * Sealing gap between vertical hanger and sidewalk * Remove and reconstruct deck slab near abutment * Replace corroded stringers	* Cleaning/painting of corroded steel members * Replacement of expansion joint to seal water leakage * Replacement of gusset plates * Replacement of corroded sections of floor beam longitudinal tie beam & vertical members * Sealing gap between vertical hanger and sidewalk * Remove and reconstruct deck slab near abutment * Replace corroded stringers
	Substructure	* No damage	* No damage	*No damage
	Foundation	* No inspection data	* No inspection data	* No inspection data
①Reliability for the structural safety		* RF = 0.92 (Load Rating 30.10 tons; for stringer)	* RF = 1.00 (Load Rating 32.7 tons; for stringer)	* RF = 1.00 (Load Rating 32.7 tons; for stringer)
②Construction Period and Difficulty		* 1.5 Months (easy)	* 2 Months (moderate)	* 4 Months (hard)
③Traffic Management during Construction		* Temporary disturbance of existing traffic	* Temporary disturbance of existing traffic	* Temporary disturbance of existing traffic
Navigation Clearance	Vertical	Sufficient	Sufficient	Sufficient
	Horizontal	Sufficient	Sufficient	Sufficient
Construction Cost (MP)		29	119.3	155.2
Evaluation		3	1	2

Pa6 NAGTAHAN BRIDGE

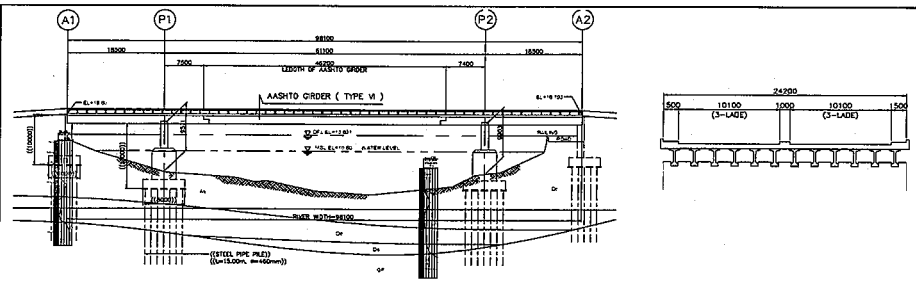
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1966 Superstructure Type: RC Deck Girde, 3-span Continuous Steel Truss Bridge Substructure Type: Abutment:Wall, Pier: Column Bent, Wall, Foundation Type: Abutment: Spread, ((Timber Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Cleaning/Painting of corroded steel members	* Cleaning/Painting of corroded steel members * Rehabilitation of corroded steel members and deformation	* Cleaning/Painting of corroded steel members * Repair of corroded steel members and deformation
	Substructure	* Repair/sealing of concrete crack, honeycomb, spalling exposed rebars	* Repair/sealing of concrete crack, honeycomb, spalling exposed rebars	* Retrofitting of pier wall by full concrete jacket
	Foundation	* No inspection data	* No inspection data	* Enlargement of footing / pile cap and addition of border pile
①Reliability for the structural safety		* RF = 1.03 (Load Rating 33.68 tons) * C/Dpl=0.56 (Column of Pier9, 10) * C/Dpl=0.64 (Foundation of Pier9, 10) (Less resistance to the latest seismic code)	* RF = 1.03 (Load Rating 33.68 tons) * C/Dpl=0.56 (Column of Pier9, 10) * C/Dpl=0.64 (Foundation of Pier9, 10) (Less resistance to the latest seismic code)	* RF = 1.03 (Load Rating 33.68 tons) * C/Dpl > 1.00 (Column of Pier9, 10) * C/Dpl > 1.00 (Foundation of Pier9, 10)
②Construction Period and Difficulty		* 2 Months (easy)	* 4 Months (easy)	* 12 Months (hard)
③Traffic Management during Construction		No disturbance of existing traffic	No disturbance of existing traffic	No disturbance of existing traffic
Navigation Clearance	Vertical	Sufficient	Sufficient	Sufficient
	Horizontal	Sufficient	Sufficient	Sufficient
Construction Cost (MP)		108.22	124.74	286
Evaluation		3	1	2

Comparison of Improvement Measures

Pa7 PANDACAN BRIDGE

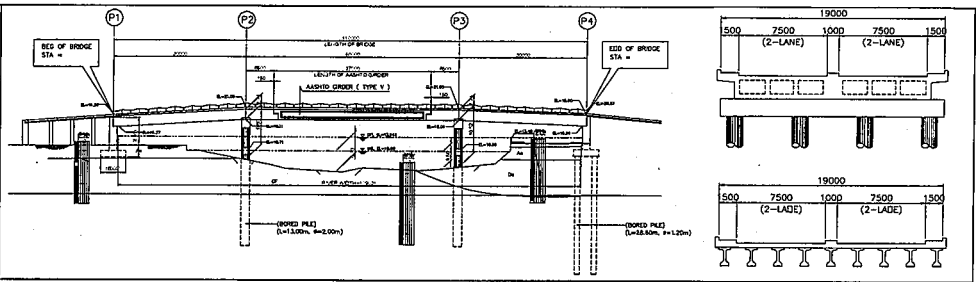
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1997 Superstructure Type: PC I Gerber Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: ((PSC Pile), Pier: (Bored Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks	* No need	* No need
	Substructure	* Repair/sealing of concrete crack, honeycomb, exposed rebars	* No need	* No need
	Foundation	* No inspection data	* No need	* No need
①Reliability for the structural safety		* RF = 1.22 (Load Rating 39.89 tons) * C/Dpl=1.58 (Column of Pier 4)	-	-
②Construction Period and Difficulty		* 1 Month (easy)	-	-
③Traffic Management during Construction		No disturbance of existing traffic	-	-
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Sufficient	-	-
Construction Cost (MP)		12.2	-	-
Evaluation		1	-	-

Pa8 LAMBINGAN BRIDGE

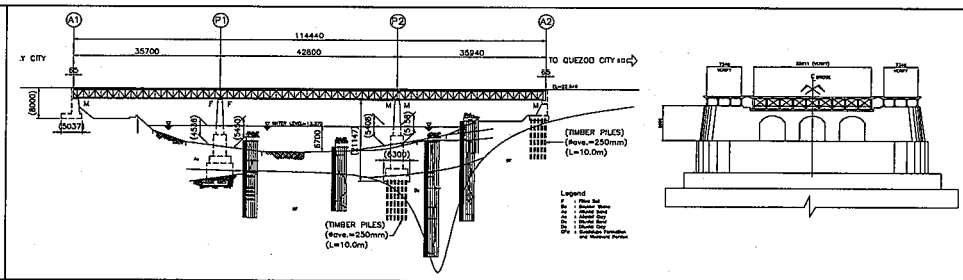
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1979 Superstructure Type: PC Gerber I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Wall, Foundation Type: Abutment: ((Steel Pipe Pile)), Pier ((Steel Pipe Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair and sealing of concrete cracks, honey comb, and spalling. * Additional concrete block dowelled to abut. & girder as uplift countermeasures. * Installation of CFRP (Carbon Fiber Reinforced Polymer) vertically and horizontally * Additional bars at top of girder / pier support	* Additional concrete block dowelled to abut. & girder as uplift countermeasure * Installation of CFRP (Carbon Fiber Reinforced Polymer) * Repair/sealing of concrete cracks, honeycomb and spalling. * Additional bars at top of girder / pier support * Rehabilitation of gerber hinge portion with slanted P/S cables * Reconstruction of diaphragm at gerber hinge	*Additional concrete block doweled to abutment and girder as uplift countermeasure * Repair/sealing of concrete cracks, honeycomb and spalling * Rehabilitation of gerber hinge portion with slanted P/S cables * Reconstruction of diaphragm at gerber hinge
	Substructure	-	-	* Retrofit of pier wall by full height concrete jacket
	Foundation	* No inspection data	* No inspection data	* Retrofitting of wall pier
①Reliability for the structural safety		* RF = 1.00 (Load Rating 32.7 tons) * C/Dpl=0.64 (Wall of Pier 1) * C/Dpl=1.11 (Foundation of Pier)	* RF = 1.00 (Load Rating 32.7 tons) * C/Dpl=0.64 (Wall of Pier 1) * C/Dpl=1.11 (Foundation of Pier)	* RF = 1.00 (Load Rating 32.7 tons) * C/Dpl > 0.64 (Wall of Pier 1) * C/Dpl=1.11 (Foundation of Pier)
②Construction Period and Difficulty		3 Months	8 months	10 months
③Traffic Management during Construction		No disturbance of existing traffic volume	No disturbance of existing traffic volume	No disturbance of existing traffic volume
Navigation Clearance	Vertical	Sufficient	Sufficient	Sufficient
	Horizontal	Sufficient	Sufficient	Sufficient
Construction Cost (MP)		25	48.9	53.7
Evaluation		2	1	3

Comparison of Improvement Measures

Pa9 MAKATI-MANDALUYONG BRIDGE (UPSTREAM)

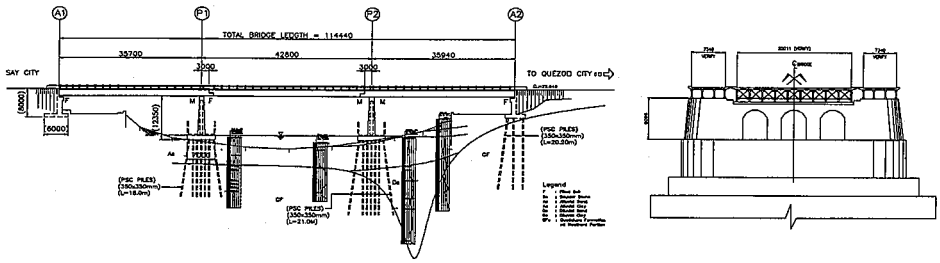
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1986 Superstructure Type: PC Gerber Box Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: (Spread, Bored Pile), Pier: (bored Pile Spread)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete crack, honeycomb, spalling	-	* Repair/sealing of concrete cracks, honeycomb and spalling
	Substructure	* Repair/sealing of concrete crack	-	* Repair/sealing of concrete crack * Retrofitting of pile/column bent
	Foundation	* No inspection data	-	-
①Reliability for the structural safety		* RF = 1.67 (Load Rating 54.61 tons) * C/Dpl=0.81 (Body of Pier 6) (Less resistance to latest seismic code)	-	* RF = 1.67 (Load Rating 54.61 tons) * C/Dpl > 1.00 (Body of Pier 6)
②Construction Period and Difficulty		* 2 Months	-	* 8 Months
③Traffic Management during Construction		* Preservation of existing traffic volume	-	* No disturbance of existing traffic volume
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Sufficient	-	-
Construction Cost (MP)		9.4	-	32.5
Evaluation		2	-	1

Pa10.1 GUADALUPE BRIDGE (CENTRAL)

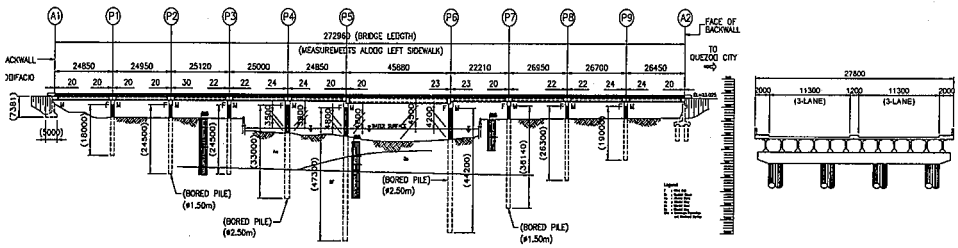
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1962 Superstructure Type: 3-Span continuous Truss Bridge,] Substructure Type: Abutment:Wall, Pier: Wall, Foundation Type: Abutment: (Spread, Timber Pile), Pier: (Spread, Timber Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Cleaning/Painting of corroded steel members	* Cleaning/Painting of corroded steel members * Replacement of damaged members	
	Substructure	* Repair/sealing of concrete cracks	* Repair/sealing of concrete cracks	
	Foundation	* No inspection data	* No inspection data	
①Reliability for the structural safety		* RF = 1.01 (Load Rating 33.03 tons) * C/Dpl=1.27 (Column of Pier) * C/Dpl=1.05 (Foundations of Pier)	* RF = 1.01 (Load Rating 33.03 tons) * C/Dpl=1.27 (Column of Pier) * C/Dpl=1.05 (Foundations of Pier)	
②Construction Period and Difficulty		* 1 Month (easy)	* 2 Months (easy)	
③Traffic Management during Construction		No disturbance of existing traffic	No disturbance of existing traffic	
Navigation Clearance	Vertical	Sufficient	Sufficient	
	Horizontal	Less than a preferable space of 43m	Less than a preferable space of 43m	
Construction Cost (MP)		73.29	94.8	
Evaluation		2	1	

Comparison of Improvement Measures

Pa10.2 GUADALUPE BRIDGE (BOTH SIDES)

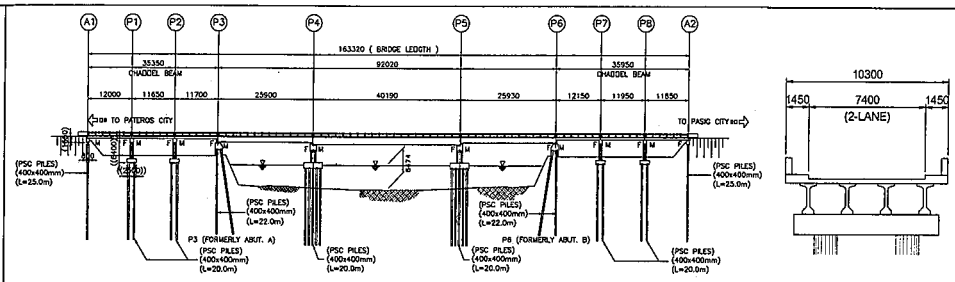
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1979 Superstructure Type: PC Gerber Girder Bridge, Substructure Type: Abutment:Wall, Pier: Wall, Foundation Type: Abutment: (PSC Pile), (Pier: (PSC Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks, honeycomb, exposed rebars	* Repair/sealing of concrete cracks, honeycomb, exposed rebars * Rehabilitation of gerber hinge portion with slanted P/S cables * Replacement of diaphragm and partial replacement of deck slab * Additional elastomeric bearing pads at diaphragm of gerber hinge portion.	* Repair/sealing of concrete cracks, honeycomb, exposed rebars * Rehabilitation of gerber hinge portion with slanted P/S cables * Replacement of diaphragm and partial replacement of deck slab * Additional elastomeric bearing pads at diaphragm of gerber hinge portion.
	Substructure	-	-	* Retrofitting of pier wall by full height concrete jacket
	Foundation	* No countermeasures	* No countermeasures	* Enlargement of pile cap and additional piles.
①Reliability for the structural safety		* RF = 0.44(Load Rating 14.40 tons,at Gerber Hinge * C/Dpl=0.85 (Column of Pier) * C/Dpl=0.22 (Foundations of Pier) (Less resistance to latest seismic code)	* RF > 1.00(Load Rating 32.7 tons) * C/Dpl=0.85 (Column of Pier) * C/Dpl=0.22 (Foundations of Pier)	* RF > 1.00 (Load Rating 32.7 tons) * C/Dpl > 1.00 (Column of Pier) * C/Dpl > 1.00 (Foundations of Pier)
②Construction Period and Difficulty		* 1 Month	* 2 Months	* 6 Months
③Traffic Management during Construction		No disturbance of existing traffic	No disturbance of existing traffic	No disturbance of existing traffic
Navigation Clearance	Vertical	Sufficient	Sufficient	Sufficient
	Horizontal	Less than a preferable space of 43m	Less than a preferable space of 43m	Less than a preferable space of 43m
Construction Cost (MP)		8.3	23.1	29.5
Evaluation		3	1	2

Pa11 C-5 BRIDGE

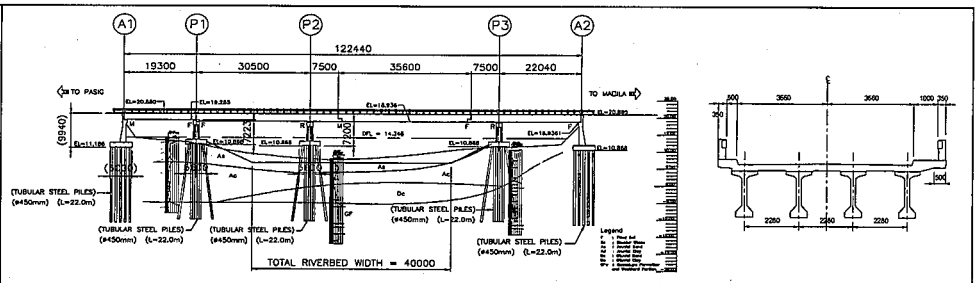
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1998 Superstructure Type: PC I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: (Spread, Bored Pile), Pier: (Bored Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair of concrete cracks, honeycomb, spalling exposed rebars	-	* Repair of concrete cracks, honeycomb, spalling and exposed rebars. * Installation of restrainer cables at discontinuous span. * Make deck slab continuous * Installation of shear keys.
	Substructure	* Repair/sealing of concrete crack	-	* Retrofitting of pier wall by full height concrete jacket
	Foundation	* No inspection data	-	* Enlargement of pilecap and additional piles
①Reliability for the structural safety		* RF = 1.02 (Load Rating 33.25 tons) * C/Dpl=0.74 (Column of Pier 8)	-	* RF = 1.02 (Load Rating 33.25 tons) * C/Dpl > 1.00 (Column of Pier 8)
②Construction Period and Difficulty		* 2 Months (easy)	-	10 months
③Traffic Management during Construction		No disturbance of existing traffic	-	-
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Less than a preferable space of 43m	-	-
Construction Cost (MP)		32.9	-	108.3
Evaluation		1	-	2

Comparison of Improvement Measures

P12 BAMBANG BRIDGE

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1991 Superstructure Type: PC I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: (PSC Pile), Pier: (PSC Pile)		
Alternatives		Repair	Rehabilitation (1)	Rehabilitation (2)
Major Works	Superstructure	* Repair/sealing of concrete cracks, exposed rebars	* No need	* No need
	Substructure	* Repair/sealing of concrete cracks	* No need	* No need
	Foundation	-	-	-
①Reliability for the structural safety		* RF = 1.07 (Load Rating 34.99 tons) * C/Dpl=2.05 (Column of Pier) * C/Dpl=4.89 (PSC Piles) (Small repair works)	-	-
②Construction Period and Difficulty		* 1 Month (easy)		
③Traffic Management during Construction		No disturbance of existing traffic	-	-
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	No disturbance of existing traffic	-	-
Construction Cost (MP)		7.5	-	-
Evaluation		1	-	-

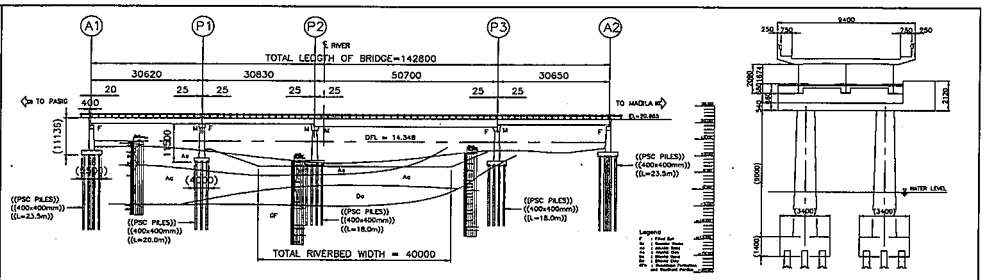
Ma1.1 VARGAS BRIDGE (UPSTREAM)

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1992 Superstructure Type: PC Gerber Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: (Steel Pipe Pile), Pier: (Steel Pipe Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks, honeycomb, spalling & exposed rebars	* Repair/sealing of concrete cracks, honeycomb, spalling & exposed rebars * Rehabilitation of Gerber Hinge portion with slanted P/S cables * Reconstruction of diaphragm/slab at gerber * Installation of external cables on both sides of cantilever span and drop span	
	Substructure	-	-	
	Foundation	-	-	
①Reliability for the structural safety		* RF = 0.83 (Load Rating 27.0 tons) * C/Dpl=1.78 (Column of Pier) * C/Dpl=6.18 (Foundations of Pier)	* RF = 1.00 (Load Rating 32.7 tons) * C/Dpl=1.78 (Column of Pier) * C/Dpl=6.18 (Foundations of Pier)	
②Construction Period and Difficulty		1 Month (easy)	4 Months	
③Traffic Management during Construction		No disturbance of existing traffic	Temporary disturbance of existing traffic	
Navigation Clearance	Vertical	Sufficient	Sufficient	
	Horizontal	Less than a preferable space of 43m	Less than a preferable space of 43m	
Construction Cost (MP)		9.7	24.3	
Evaluation		2	1	

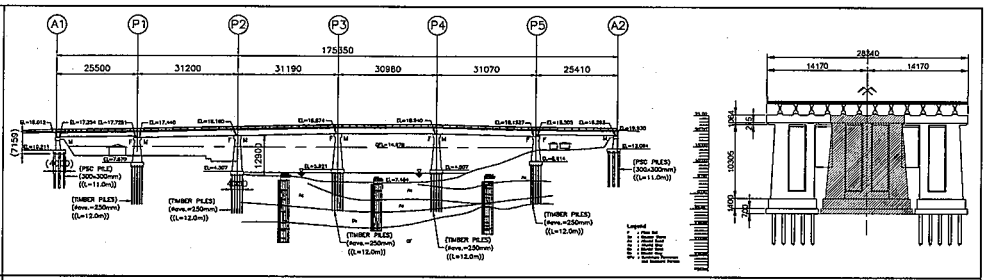
Appendix 9.2.1-1 (8/10)

Comparison of Improvement Measures

Ma1.2 VARGAS BRIDGE (DOWNSTREAM)

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1965 Superstructure Type: PC Gerber Box Girder Bridge, Substructure Type: Abutment:Wall, Foundation Type: Abutment: ((Timber Pile)), Pier: ((Timber Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Cleaning, Painting/maintenance work of corroded steel member * Repairs/sealing of concrete cracks, honeycomb, exposed rebars	* Cleaning, Painting/maintenance work of corroded steel member * Repairs/sealing of concrete cracks, honeycomb, exposed rebars * Rehabilitation of corroded steel members	* No need
	Substructure	* Repair/sealing of concrete cracks	* Repair/sealing of concrete cracks	* No need
	Foundation	* No inspection data	* No inspection data	* No need
①Reliability for the structural safety		* RF = 1.00 (Load Rating 32.73 tons) * C/Dpl=1.19 (Column of Pier) (minimum) * C/Dpl=3.59 (Foundation) (Minimum)	* RF = 1.00 (Load Rating 32.73 tons) * C/Dpl=1.19 (Column of Pier) (minimum) * C/Dpl=3.59 (Foundation) (Minimum)	-
②Construction Period and Difficulty		* 2 Months (easy)	* 6 Months	-
③Traffic Management during Construction		No disturbance of existing traffic	Preservation of existing traffic volume	-
Navigation Clearance	Vertical	Sufficient	Sufficient	-
	Horizontal	-	-	-
Construction Cost (MP)		9.69	18.64	-
Evaluation		2	1	-

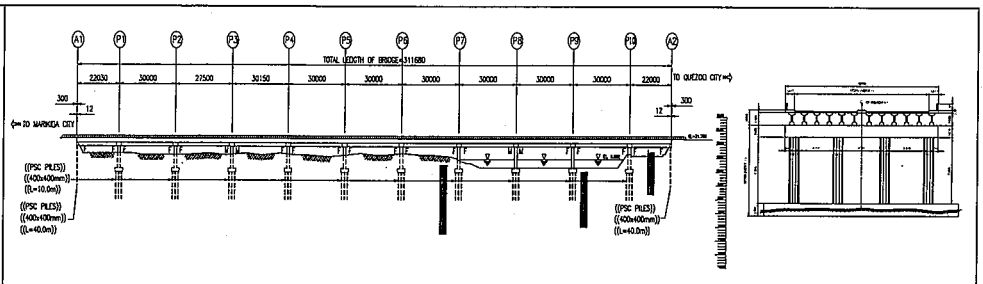
Ma2 ROSARIO BRIDGE

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1952 Superstructure Type: PC I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: (PSC Pile, Timer Pile), Pier: (PSC Pile, Timber Pile, STEEL Pipe Pile)		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks, honeycomb,spalling exposed rebars	* Repair/sealing of concrete cracks, honeycomb,spalling exposed rebars * Rehabilitation of concrete deck slab	* Repair/sealing of concrete cracks, honeycomb,spalling exposed rebars * Rehabilitation of concrete deck slab
	Substructure	* Repair/sealing of concrete cracks	* Repair/sealing of concrete cracks	* Retrofitting of pier wall by full concrete jacket
	Foundation	* No inspection data	* No inspection data	* Enlargement of pilecap and additional piles
①Reliability for the structural safety		* RF = 1.03 (Load Rating 33.68 tons) * C/Dpl=0.69 (Column of Pier) * C/Dpl=0.97 (Foundations of Pier) (Less resistance to latest seismic code)	* RF = 1.03 (Load Rating 33.68 tons) * C/Dpl=0.69 (Column of Pier) * C/Dpl=0.97 (Foundations of Pier) (Less resistance to latest seismic code)	* RF = 1.03 (Load Rating 33.68 tons) * C/Dpl > 1.00 (Column of Pier) * C/Dpl > 1.00 (Foundations of Pier)
②Construction Period and Difficulty		* 2 Months (easy)	* 5 Months (easy)	* 10 Months (hard)
③Traffic Management during Construction		No disturbance of existing traffic	No disturbance of existing traffic	Temporary disturbance of existing traffic
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Less than a preferable space of 43m	Less than a preferable space of 43m	Less than a preferable space of 43m
Construction Cost (MP)		23.4	36.35	43.85
Evaluation		2	1	3

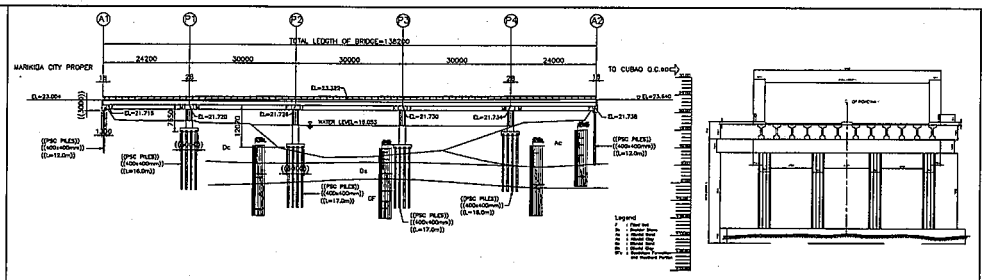
Appendix 9.2.1-1 (9/10)

Comparison of Improvement Measures

Ma3 MARCOS BRIDGE

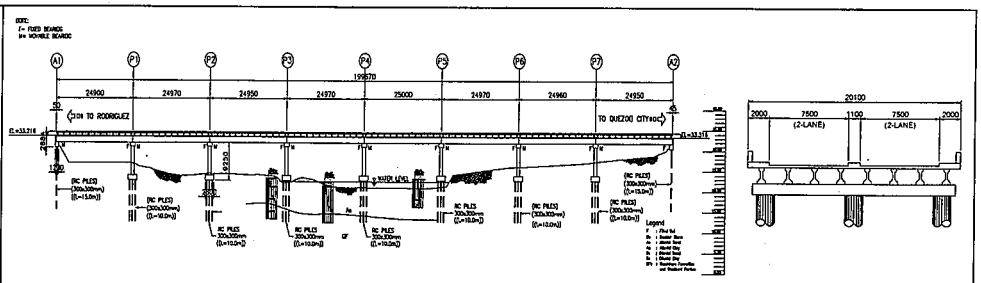
Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1978 Superstructure Type: PC I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: ((PSC Pile)), Pier ((PSC Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks, honeycomb, spalling exposed rebars	* No need	* No need
	Substructure	* Repair/sealing of concrete cracks, exposed rebars	* No need	* No need
	Foundation	* No inspection data	* No need	* No need
①Reliability for the structural safety		* RF = 1.78 (Load Rating 58.21 tons) * C/Dpl=1.47 (Column of Pier)	-	-
②Construction Period and Difficulty		* 1.5 Month (Easy)	-	-
③Traffic Management during Construction		No disturbance of existing traffic	-	-
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Sufficient	-	-
Construction Cost (MP)		25.7	-	-
Evaluation		1	-	-

Ma4 MARIKINA BRIDGE

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1980 Superstructure Type: PC I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: ((PSC Pile)), Pier: ((PSC Pile))		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete cracks, honeycomb, spalling exposed rebars	* No need	* No need
	Substructure	* Repair/sealing of concrete cracks	* No need	* No need
	Foundation	* No inspection data	* No need	* No need
①Reliability for the structural safety		* RF = 1.01 (Load Rating 33.03 tons) * C/Dpl=1.49 (Column of Pier) (Minimum)	-	-
②Construction Period and Difficulty		* 2 Months (easy)	-	-
③Traffic Management during Construction		No disturbance of existing traffic	-	-
Navigation Clearance	Vertical	Sufficient	-	-
	Horizontal	Sufficient	-	-
Construction Cost (MP)		12.4	-	-
Evaluation		1	-	-

Comparison of Improvement Measures

Ma5 SAN JOSE BRIDGE

Elevation and Cross Section				
Construction Year and Bridge Type		Construction Year: 1980 Superstructure Type: PC I Girder Bridge, Substructure Type: Abutment:Wall, Pier: Column, Foundation Type: Abutment: ((RC Pile)), Pier: RC Pile		
Alternatives		Repair	Rehabilitation	Strengthening
Major Works	Superstructure	* Repair/sealing of concrete crack, honeycomb, spalling & exposed rebars	-	* Repair/sealing of concrete crack, honeycomb, exposed rebars * Rehabilitation of water tight expansion joint * Repair/Rehabilitation of corroded bearing shoe
	Substructure	* Repair/sealing of concrete cracks	-	* Retrofitting of pier wall by full height concrete jacket
	Foundation	-		* Enlargement of pile cap and additional piles
①Reliability for the structural safety		* RF = 1.22 (Load Rating 39.89 tons) * C/Dpl=0.68 (Column of Pier) * C/Dpl=0.33 (Foundations of Pier) (Less resistance to latest seismic code)	-	* RF = 1.22 (Load Rating 39.89 tons) * C/Dpl > 1.00 (Column of Pier) * C/Dpl > 1.00 (Foundations of Pier)
②Construction Period and Difficulty		* 1.5 Month	-	* 12 Months
③Traffic Management during Construction		No disturbance of existing traffic	-	Temporary disturbance of existing traffic
Navigation Clearance	Vertical	Sufficient	-	Sufficient
	Horizontal	Sufficient	-	Sufficient
Construction Cost (MP)		17.1	-	103
Evaluation		2	-	1