

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
স্থানীয় সরকার প্রকৌশল অধিদপ্তর
“প্রোগ্রাম ফর সাপোর্টিং রুরাল ব্রিজেস (SupRB)”

আগারগাঁও, শেরেবাংলা নগর

ঢাকা-১২০৭।

www.lged.gov.bd



শেখ হাসিনার মূলনীতি
গ্রাম শহরের উন্নতি

স্মারক নং- ৪৬.০২.০০০০.৯২৭.১৪.১২০.২০২০- ৭৪০

তারিখঃ ২০/০৯/২০২০

প্রতি,

ম্যানেজিং ডিরেক্টর

পরামর্শক প্রতিষ্ঠান: _____।

ঠিকানা: _____।

(Contract Package No.:)

বিষয়: এলজিইডি কর্তৃক বাস্তবায়িত “Program for Supporting Rural Bridges (SupRB)” শীর্ষক প্রকল্পের অধীনে মাঠ পর্যায়ে কর্মরত পরামর্শক কর্তৃক গ্রামীণ সড়কে ব্রিজ/কালভার্টের সার্ভে কাজ বাস্তবায়নের নিমিত্ত গাইডলাইন প্রেরণ প্রসংগে।

সূত্র: ৪৬.০২.০০০০.৯২৭.১৪.১২০.২০২০-৭১০, তারিখঃ ১৩/০৯/২০২০ ইং।

উপর্যুক্ত বিষয় ও সূত্রের প্রেক্ষিতে জানানো যাচ্ছে যে, উল্লেখিত প্রকল্পের অধীনে মাঠ পর্যায়ে কর্মরত পরামর্শকবৃন্দ কর্তৃক প্রকল্পের সার্বিক কার্যক্রম সম্পাদনের লক্ষ্যে ইতিমধ্যে **Monthly Performance Monitoring Checklist** প্রেরণ করা হয়েছে। আলোচ্য প্রকল্পের অধীনে উপজেলা ও ইউনিয়ন সড়কে অবস্থিত “ব্রিজ/কালভার্ট সমূহের **Visual Inspection**-এর মাধ্যমে **Segment-wise Condition State (CS)** এবং **General Information** হালনাগাদকরণের লক্ষ্যে সুষ্ঠুভাবে সার্ভে কাজ সম্পাদন” পরামর্শকবৃন্দের **Performance**-এর একটি গুরুত্বপূর্ণ ইস্যু। এলক্ষ্যে সুষ্ঠুভাবে সার্ভে কাজ সম্পাদন করত: **Structure (Bridge/Culvert) Inspection Form** (Attachment-2 in the Monthly Performance Monitoring Checklist) পূরণ করার জন্য প্রকল্প দপ্তরের PMU কর্তৃক ১ (এক)টি গাইডলাইন প্রণয়ন করা হয়েছে।

এমতাবস্থায়, প্রকল্পের আওতায় মাঠ পর্যায়ে উপজেলা ও ইউনিয়ন সড়কে অবস্থিত ব্রিজ/কালভার্ট সমূহের সার্ভে কাজ শুরুর পূর্বে গাইডলাইনটি সঠিকভাবে অনুধাবন করার জন্য আপনার প্রতিষ্ঠানের মাধ্যমে প্রকল্প এড়িয়ায় কর্মরত পরামর্শকবৃন্দকে নির্দেশনা প্রদানে অনুরোধ করা হলো।

বিষয়টি অতীব জরুরী।

সংযুক্তি: ১। গাইডলাইন (Hardcopy) (২৪ পৃষ্ঠা)।

২। Softcopy (PDF File)


২০/৯/২০২০

(মোঃ শাহজাহান মোল্লা)

প্রকল্প পরিচালক

ও

অতিরিক্ত প্রধান প্রকৌশলী

ফোন: ০২-৯১২৯১০০

ই-মেইল: pd.suprb@lged.gov.bd

অনুলিপি সদয় জ্ঞাতার্থেঃ

০১। প্রধান প্রকৌশলী, এলজিইডি, সদর দপ্তর, ঢাকা।

০২। অতিরিক্ত প্রধান প্রকৌশলী (পল্লী অবকাঠামো উন্নয়ন ও ব্যবস্থাপনা), এলজিইডি, ঢাকা।

০৩। অতিরিক্ত প্রধান প্রকৌশলী, এলজিইডি বিভাগঃ

অনুলিপি কার্যার্থেঃ

০১। তত্ত্বাবধায়ক প্রকৌশলী, এলজিইডি, অঞ্চলঃ(১৯টি)।

০২। নির্বাহী প্রকৌশলী, এলজিইডি, জেলাঃ(৬১টি)।

০৩। জনাব....., পদবী: BME/QCE/SS/FRE। পরামর্শক প্রতিষ্ঠান

তাকে তার প্রতিষ্ঠান হতে গাইডলাইন সংগ্রহ করার জন্য অনুরোধ করা হলো।

Guideline to fill-up the Structure (Bridge/Culvert) Inspection Form of Road and Structure Database Management System (RSDMS) Software

Difference of Bridge vs Culvert based on Dimension

1. **Bridge:** Length > 6m
Culvert: Length ≤ 6m

The following information are required for filling up Structure (Bridge/Culvert) Inspection Form of RSDMS Software.

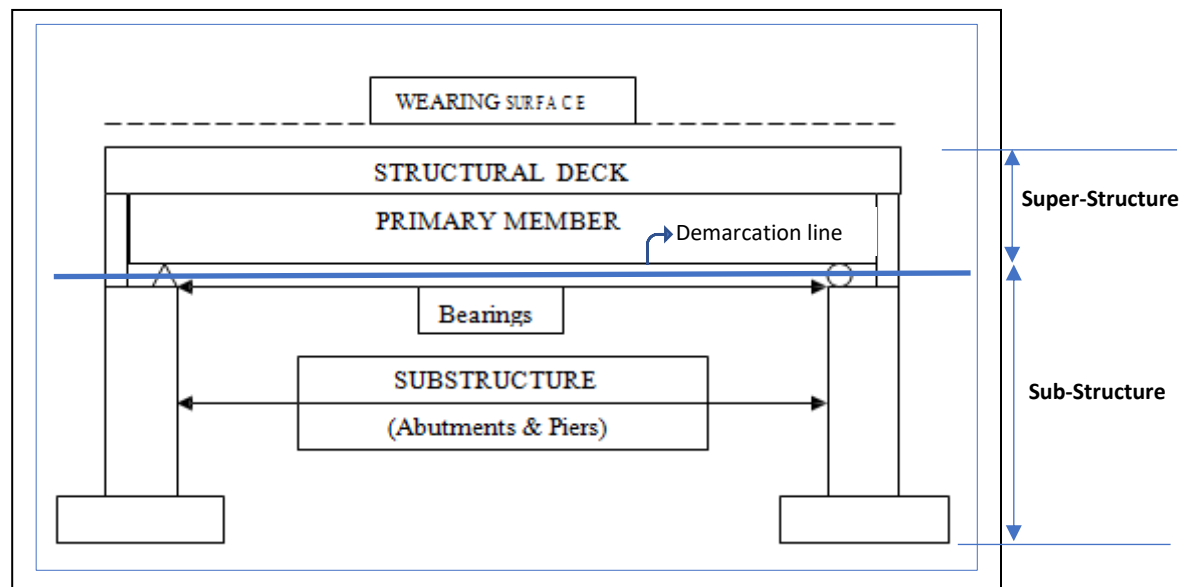
2. Different Parts of Structure (Bridge/Culvert)

► Non-Structural Parts:

- Consists of different components/elements/segments which do not affect the Design life of a Structure.
- Important elements to make a Structure serviceable.
- Rail bar-Rail post, Wearing surface, Wheel guard, Walkway, Expansion joint, Road safety elements, Wingwall (only when expansion joint exists between Abutment and Wingwall), Apron, River training works, Approaches, Protection works, Rain water down pipe, Any Drainage structure on Shoulder and Side slope, Weep hole, Electric post etc.

► Super Structure:

- Consists of different components/elements/segments above Bearing Assembly (hinge/roller/pad).
- Important elements to carry live loads along with own weight.
- Deck, Box Girder, Girder, Cross-girder, Concrete Arch, Hanger of Arch, Checker plate, Top Chord, Bottom Chord, Stinger, Floor Beam, Diagonal and Vertical post, Top bracing, Bottom bracing, Strut, Vertical Panel of Baily Bridge, Connectors of Baily Bridge etc.



Pictorial Presentation of a Structure (Bridge)

► Sub Structure:

- Consists of Bearing Assembly and different components/elements/segments below Bearing Assembly (hinge/roller/pad).

- Important elements to carry the external and internal loads of a Structure and transfer to earth.
- Bearing Assembly, Abutment, Wingwall (only when no expansion joint exists between Abutment and Wingwall), Abutment base, Pier cap, Pier, Bracing, Pile cap, Pile, Whole body of a Culvert.



Wing Wall treated as Non-Structural Component

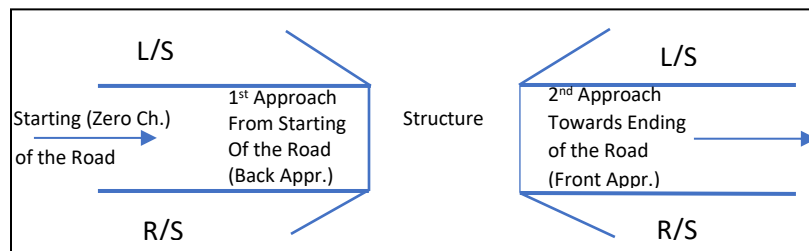


Wing Wall treated as Sub-Structure Component

Back Approach and Front Approach:

► Method of Identification:


- Firstly, identify the starting (Zero chainage) of the road. (Information to be collected from Upazila Office)
- Secondly, start from Zero chainage of road to reach the structure/gap.
- Then the approach of the Structure appears first is called Back Approach.
- And the approach of the Structure appears next is called Front Approach.
- Left side (L/S) means L/S of the Back Approach or Front Approach.
- Right side (R/S) means R/S of the Back Approach or Front Approach.










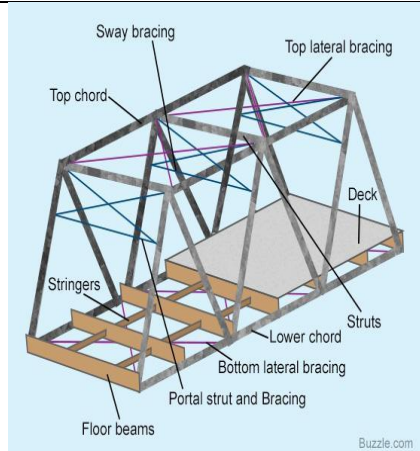
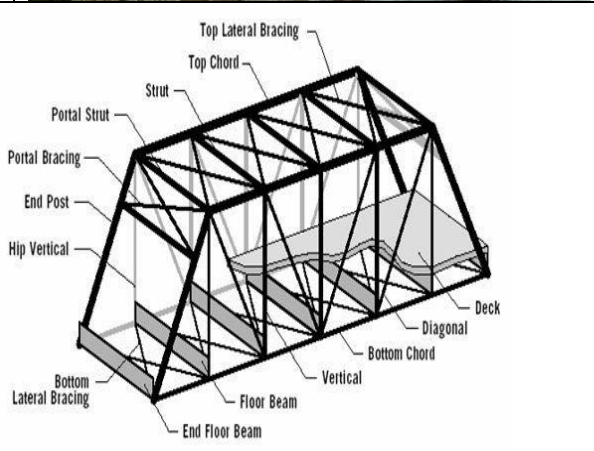
Graphical Presentation of Back Approach and Front Approach






3. Types of Structure:

The types of Structure (Bridge/Culvert) usually shown on Rural Roads under LGED's jurisdiction are given below:

Sl. No.	Type of Structure	Physical Formation	Pictorial Presentation
1.	RCC/PC Girder Bridge	Super Structure: Deck, Girder, Cross-Girder Sub Structure: may have Abutment, Wingwall, Pier cap, Pier, Abutment Base, Pile cap, Pile	

Sl. No.	Type of Structure	Physical Formation	Pictorial Presentation
			
2.	RCC Box Culvert	<p>Sub Structure: Whole body consisted of Top slab, End wall, Wingwall, Intermediate wall, Bottom slab (monolithic casting with End wall and Intermediate Wall), cut-off wall etc.</p> <p>(Foundation type is Box)</p>	
3.	Slab Culvert	<p>Sub Structure: Top slab, Brick Masonry End wall, Wingwall (no Bottom slab)</p> <p>(Length of Structure $\leq 3\text{m}$)</p> <p>(Foundation type Shallow footing)</p>	
4.	Open Foundation Culvert (OFC)	<p>Sub Structure: Top slab, Brick Masonry End wall, Wingwall, Intermediate wall (no Bottom slab)</p> <p>(Length of Structure $> 3\text{m}$)</p> <p>(Foundation type Shallow footing)</p>	







Sl. No.	Type of Structure	Physical Formation	Pictorial Presentation
5.	Steel Baily Bridge	Super Structure: mainly Panel consisted of Deck and Railing, connector etc. Sub Structure: may have Abutment, Wingwall, Pier cap, Pier, Abutment Base, Pile cap, Pile	 
6.	Steel Truss Bridge	Super Structure: Deck, Stinger, Floor beam, Diagonal and Vertical post, Bracing, Strut etc. Sub Structure: may have Abutment, Wingwall, Pier cap, Pier, Abutment Base, Pile cap, Pile	 <div style="display: flex; justify-content: space-around;">   </div>









Sl. No.	Type of Structure	Physical Formation	Pictorial Presentation
7.	PC Box Girder Bridge	Super Structure: Deck, Girder, Cross-Girder Sub Structure: may have Abutment, Wingwall, Pier cap, Pier, Abutment Base, Pile cap, Pile	
8.	RCC Slab Bridge	Super Structure: only Deck Sub Structure: may have Abutment, Wingwall, Pier cap, Pier, Abutment Base, Pile cap, Pile	
9.	Light Traffic Bridge	Super Structure: Deck, Girder, Cross-Girder Sub Structure: may have Abutment, Wingwall, Pier cap, Pier, Abutment Base, Pile cap, Pile (Carriage Width < 3m)	  








4. Different Types of Structure shown in RSDMS Software


1. Box Culvert	6. Box Girder Bridge	9. Bailey Bridge	14. Iron Bridge	19. Others
2. Slab Culvert	7. Arch Bridge	10. Bailey with Steel Deck	15. Wooden Bridge	20. Existing Gap
3. OFC	8. Suspension Bridge	11. Truss with RCC Slab	16. Hydraulic Structure	21. RCC Continuous Girder Bridge
4. RCC Girder Bridge	7. Light Traffic Bridge (Carriage width < 3m)	12. Truss with Steel Deck	17. Pipe Culvert	22. Slab Bridge
5. PC Girder Bridge	8. Steel Beam & RCC Slab	13. Arch Masonry	18. U-Drain	

5. Condition State of Super Structure and Sub Structure Elements of a Structure:





Condition State of a Structure	Type of condition State	Definition w.r.t Structural Element/component/Segment of a Structure	Pictorial Presentation
CS-1	Good (Condition State is 'N' mentioned in the Bridge Inspection Form)	<ul style="list-style-type: none"> ● Element/Component/Segment of a Structure with no deterioration or insignificant deterioration which do not affect the design life of a Structure; ● The structure with elements of Condition State-1 (CS-1) is serviceable. 	   
			
CS-2	Fair (Condition State is 'M' mentioned in the Bridge Inspection Form)	<ul style="list-style-type: none"> ● Element/Component/Segment of a Structure with minor deficiencies which signify a progression of deterioration (possibility of further deterioration) process; ● The structure with elements of Condition State-2 (CS-2) is serviceable. 	




Condition State of a Structure	Type of condition State	Definition w.r.t Structural Element/component/Segment of a Structure	Pictorial Presentation
			
			
CS-3	Poor (Condition State is 'H' mentioned in the Bridge Inspection Form)	<ul style="list-style-type: none"> ● Element/Component/Segment of a Structure with advanced stage of deterioration; ● The structure with elements of Condition State-3 (CS-3) is almost close of danger in providing safe service. 	
			

Condition State of a Structure	Type of condition State	Definition w.r.t Structural Element/component/Segment of a Structure	Pictorial Presentation
			
CS-4	Severe (Condition State is 'S' mentioned in the Bridge Inspection Form)	<ul style="list-style-type: none"> ● Element/Component/Segment of a Structure with deterioration to such an extent that a structural review may be required to determine its strength and serviceability/functionality; ● The structure with elements of Condition State-4 (CS-4) is in out of service. 	     

Condition State of a Structure	Type of condition State	Definition w.r.t Structural Element/component/Segment of a Structure	Pictorial Presentation
			

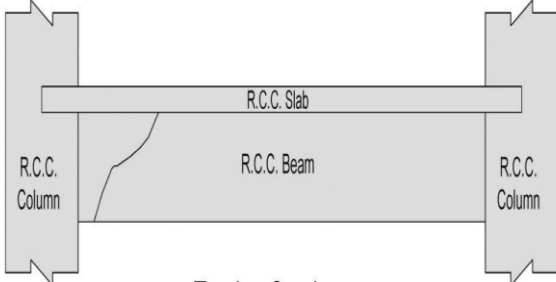
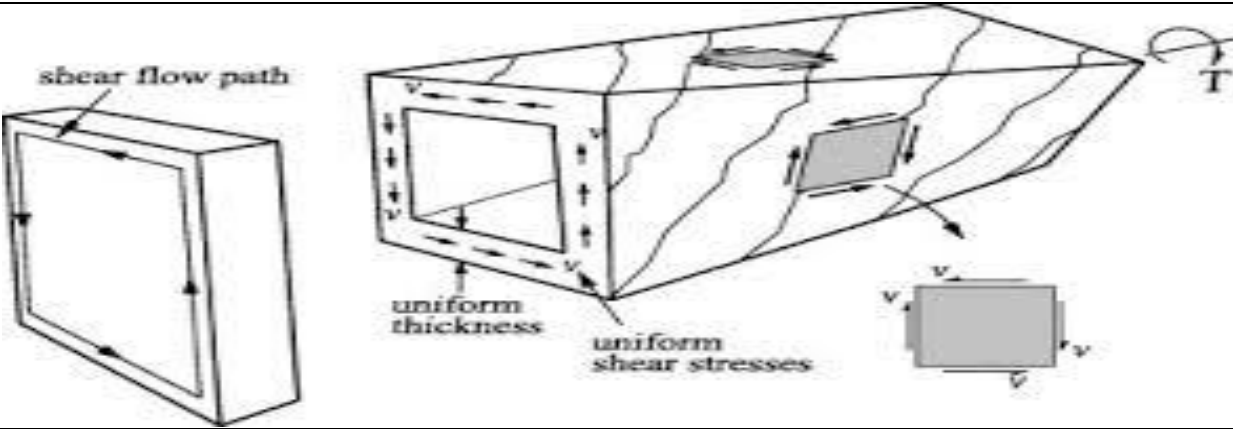
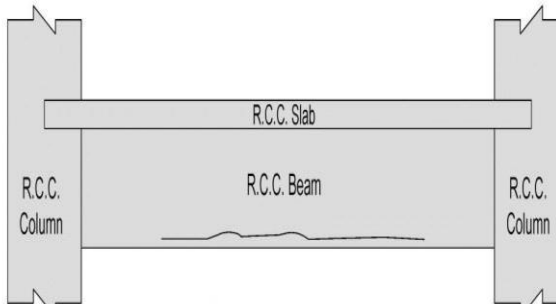
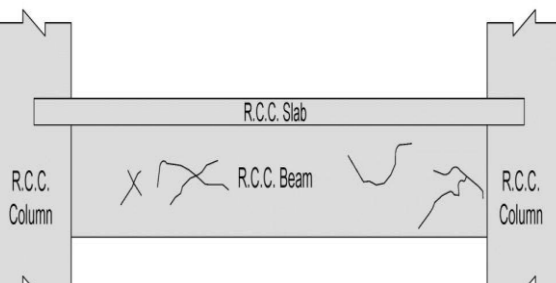
6. Condition State of Non-Structural Elements of a Structure:

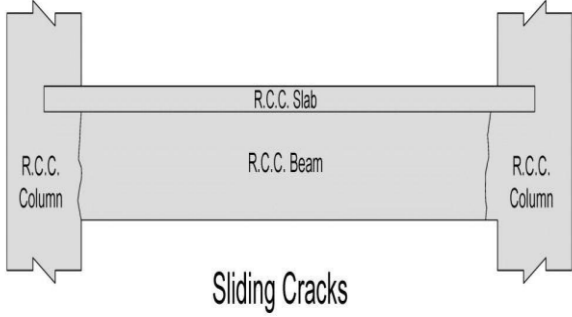
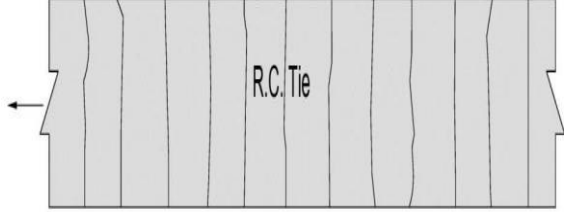
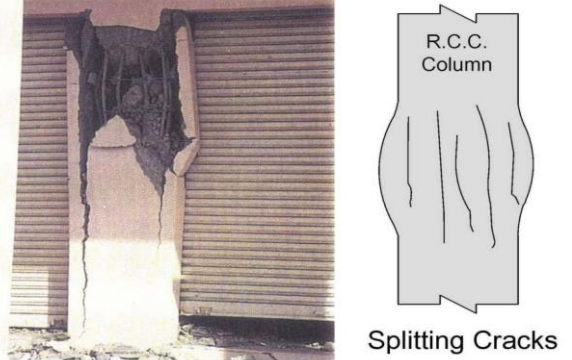
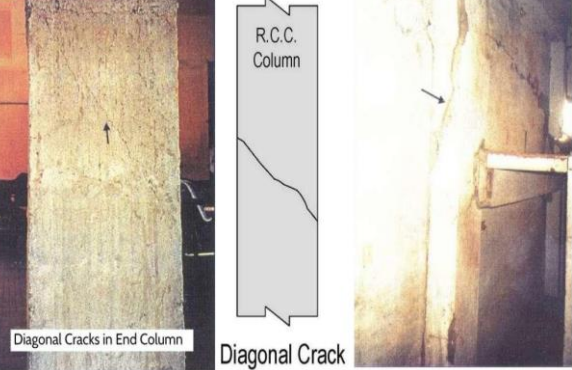
Condition State of a Structure	Type of condition State	Pictorial Presentation	
CS-1	Good (Condition State is 'G' mentioned in the Bridge Inspection Form)		
CS-2	Fair (Condition State is 'F' mentioned in the Bridge Inspection Form)		


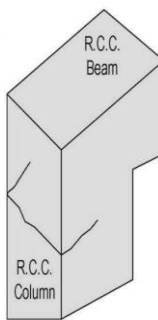
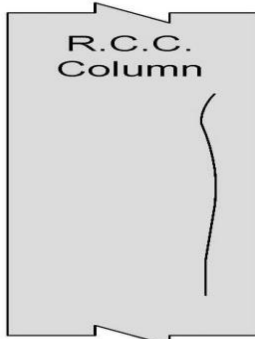

Condition State of a Structure	Type of condition State	Pictorial Presentation	
CS-3	Poor (Condition State is 'P' mentioned in the Bridge Inspection Form)	 	 
CS-4	Severe (Condition State is 'S' mentioned in the Bridge Inspection Form)	 	 

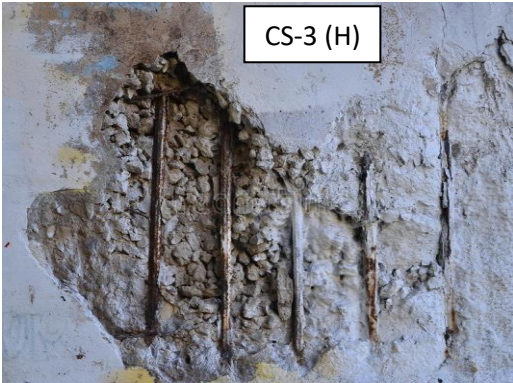



7. Types of Defect observed in an Element/Component/Segment of a Structure:




Types of Defects	Description (including Pictures)
1. Cracks	<div data-bbox="483 321 889 751"> <p>Flexure Cracks</p> </div> <div data-bbox="938 331 1507 741"> <p>Member: R C Beam</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Originates in maximum moment region (in the image, this region is in center of the beam, it varies as per support Conditions of beam) • May be single or in groups • Maximum width at bottom/top of beam <p>Possible Reasons:</p> <ul style="list-style-type: none"> • Flexural capacity of the beam is inadequate. • When Cross section of the beam or main reinforcement in beam is insufficient </div>
	<div data-bbox="305 804 857 1245"> <p>Shear Cracks</p> </div> <div data-bbox="906 825 1507 1245"> <p>Member: R C Beam</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Originates nearer to supports. • Maybe single or in groups • Maximum width at neutral axis region or at bottom of beam. <p>Possible Reasons:</p> <ul style="list-style-type: none"> • Shear Capacity of the beam is inadequate. • Cross section or torsional reinforcement insufficient. • Both here happen due to loading more than designed load. </div>
	<div data-bbox="297 1329 857 1770"> <p>(a) Web-shear cracking</p> <p>(b) Flexure-shear cracking</p> </div> <div data-bbox="938 1329 1507 1770"> <p>Applied load</p> <p>Continuous support</p> <p>Simple support</p> <p>Flexural and flexure-shear</p> <p>Web-shear</p> <p>Flexural and flexure-shear</p> <p>Web-shear</p> </div>

 <p style="text-align: center;">Torsion Cracks</p>	<p>Member: R C Beam</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Originates nearer to maximum torsion region. • Single generally uniform width. Appears over the whole periphery in helical form <p>Possible Reasons</p> <ul style="list-style-type: none"> • Torsional strength of the beam is inadequate. • Cross-section or torsional reinforcement insufficient.
	
 <p style="text-align: center;">Bond Cracks</p>	<p>Known as Corrosion Crack</p> <p>Member: R C Beam</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Runs along the line of reinforcement. • Uniform width in general <p>Possible Reasons:</p> <ul style="list-style-type: none"> • Bond between reinforcing bars and concrete not satisfactory. • May be due to corrosion of bars/fire damage.
 <p style="text-align: center;">Shrinkage Cracks</p>	<p>Member: R C Beam</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • No regular pattern or thickness and in general superficial. <p>Possible Reasons:</p> <ul style="list-style-type: none"> • Curing is inadequate or no control over water-cement ratio. • Usage of an excessively rich mix. • Shrinkage reinforcement, if any, insufficient.

	<p>Member R C Beam</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Runs vertically at the edge of supports. • Maximum width at bottom of the beam. <p>Possible Reasons</p> <ul style="list-style-type: none"> • Concrete in a beam is disturbed at an early age when adequate strength not realized. • Maybe due to disturbance of formwork at green stage or early de-shuttering.
	<p>Member: Reinforced Concrete Tie</p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Appear over whole periphery. Generally over the whole length of the member. • Parallel to each other. Uniformly observed <p>Possible Reasons:</p> <ul style="list-style-type: none"> • Capacity of the member in tension is inadequate. • Tensile reinforcement is insufficient.
	<p>Member: Reinforced Concrete <u>Column</u></p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Building in that region. • Short parallel vertical cracks. • Varying widths <p>Possible Reasons</p> <ul style="list-style-type: none"> • Inferior quality concrete. • Load carrying capacity of the column exceeded either due to
	<p>Member: Reinforced Concrete <u>Column</u></p> <p>Important Characteristics:</p> <ul style="list-style-type: none"> • Runs diagonally across the section. • Can occur anywhere in the height. • Uniform thickness. <p>Possible Reasons</p> <ul style="list-style-type: none"> • Load carrying capacity of the column is inadequate. • Cross-section or main reinforcement is insufficient.

	 Horizontal Crack	<p>Member: Reinforced Concrete <u>Column</u></p> <p>Important Characteristics:</p> <ul style="list-style-type: none">● Occurs near the beam-column junction. <p>Possible Reasons</p> <ul style="list-style-type: none">● Moment resistance capacity of column inadequate in the corresponding region.● Inadequate quantum of reinforcement or disposition of reinforcement not satisfactory.
 Bond Crack	<p>Known as Corrosion Crack</p> <p>Member: Reinforced Concrete Column</p> <p>Important Characteristics:</p> <ul style="list-style-type: none">● Runs along the line of reinforcement.● Uniform width in general <p>Possible Reasons:</p> <ul style="list-style-type: none">● Bond between reinforcing bars and concrete not satisfactory.● May be due to corrosion of bars.	
2. Concrete Spalling/ Reveling/ Corrosion	 2020-8-18 09:46	<p>Spalling of Concrete:</p> <ul style="list-style-type: none">● Spalling is a break-away of the Concrete surface which often extends to the top layers of reinforcing steel.● Spalls may be 150mm or more in diameter and 25mm or more in depth.● And the occurrence of smaller spalls also possible as per ACI 302.1R-4.● Spalling leaves the concrete surface patchy and pitted while exposing aggregate underneath.
	<p>Causes of Spalling:</p> <ul style="list-style-type: none">● Corrosion of embedded reinforcing steel● Freeze and thaw cycling● Inadequate depth of cover over reinforcement● Low quality concrete cover over reinforcing steel● Joint spalls are often caused by improperly constructed joints <p>Severity of Concrete spalling:</p> <ul style="list-style-type: none">● Depending on spalled area and depth of spalled concrete of a component	

<p>3. Rebar Exposed (Rusted, Section Loss)</p>		<ul style="list-style-type: none"> • A spalled concrete area in individual component of the structure without performing any treatment in the long run has tendency to exposing reinforcing steel. • Non-rusty reinforcement may be exposed due to damage of low-quality concrete cover. [CS-2 (F)] • Severity depends on the concrete area covering rusted reinforcement. [CS-3 (H)/CS-4 (S)]
		<p>Exposed rebar (Epoxy coated) [CS-2 (M)]</p>
<p>4. Damaged or Missing Section/ Section Loss</p>		

5. Settlement	
6. Tilting	 <div data-bbox="784 1209 1206 1272">Pier in tilting Position [CS-4 (S)]</div>
7. Movements/ Displacement	 <div data-bbox="797 1738 1219 1791">Transverse Movement of Girder</div>

8. Scouring	 <div data-bbox="477 625 1463 709"> <ul style="list-style-type: none"> ● Severity depends on exposing area of Sub-Structure component and area of Bank eroded </div>
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8. Process of filling up the Structure Inspection Form:

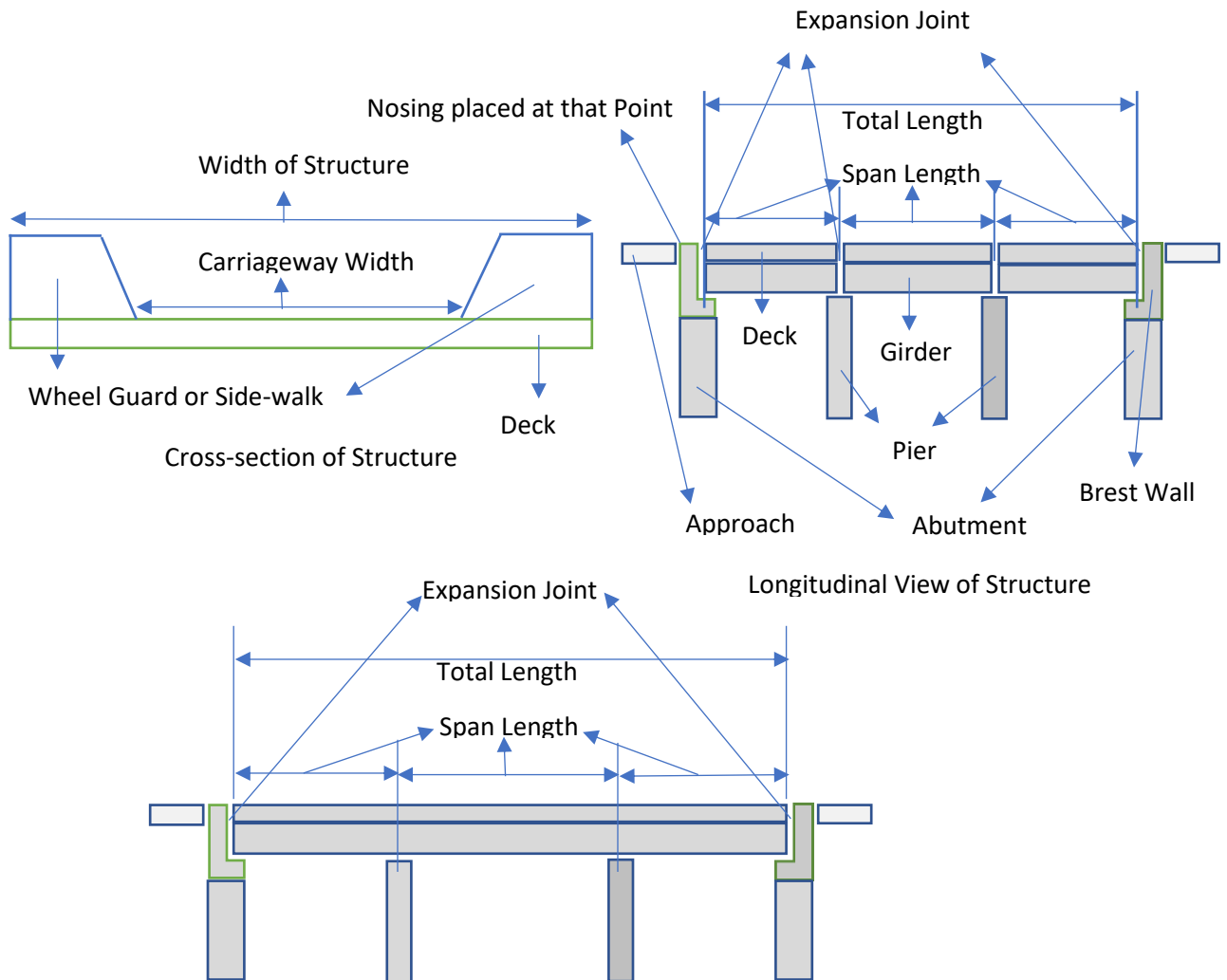
Name of the Items	Description of the Items	Method of writing down the Information against each Item	Source of Collection during survey
1. Location			
Division, District, Upazila, Road ID, Road name, Construction year, Structure ID, Chainage and Load Restriction, Latitude & Longitude	Location identifies the exact location of a Structure.	Write down the information in the concerned fields of the form during survey	<ul style="list-style-type: none"> ● Please collect the information from the Upazila Engineer's Office. ● Chainage of the Structure should be checked through field survey. ● Construction year of the Structure should be checked through conversation with local people. ● Latitude and Longitude should be identified by the Smart Cell Phone.
2. Structure Type			
Different types of Structure under LGED's jurisdiction are described in Sl. No. 4	Definition of main types of Structure are described in Sl. No. 3	Put down the tick marks in the concerned fields of the form during survey	<ul style="list-style-type: none"> ● Please collect the information through field survey. ● Cross check the information with previously input data and put down a tick mark against correct information. ● Type of water way have to be collected through public discussion at site. ● Please take the cleared coloured photograph (size: 5"x3") from L/S or R/S of both back and front approaches.
3. Super- Structure Details			
i) Width (Total Width)	Out to out distance in meter between two Wheel guards or Side-walks	Write down the measurements or tick marks in	<ul style="list-style-type: none"> ● Please collect the information through field survey.

Name of the Items	Description of the Items	Method of writing down the Information against each Item	Source of Collection during survey
ii) Carriageway Width	Inner distance in meter between two Wheel guards or Side-walks	the concerned fields of the form where necessary during survey	<ul style="list-style-type: none">Measurements have to be taken from Bridge top.Boxes in the Sl. No. 3 of the format is applicable only for RCC Box Culvert.While measuring the similar Spans, Span Lengths have to be calculated by the formula i.e. total length divided by number of spans.While measuring the different length of Spans, please take the measurements by the measuring tape.While measuring the Span Lengths of RCC Continuous Girder Bridge with multiple Span, please stand on two center lines of adjacent Pier Caps and then take the measurement.Information of the Source of electricity and number of Light Post have to be taken if electric post on the Structure exists.Span lengths have to be measured from back approach to front approach for Structure with multiple Span.
iii) Total length	<ul style="list-style-type: none">Distance in meter between inner sides of two Expansion Joint adjacent to both approaches (total length of the Deck including all Spans of the Structure)In case of Box Culvert, out to out distance in meter between two End walls.		
iv) Span Length	Center to center distance in meter between two adjacent piers		
v) Tie, Hanger and Bracing	Applicable for Truss Bridge (Please see the figure in Sl. No. 3)		
4. Sub- Structure Details			
Abutment/End Wall, Wing wall, Pier/Intermediate Wall, Position of Abutment/Pier, Number of Column in each Abutment/Pier	<ul style="list-style-type: none">Abutment, Wing wall and Pier are the Component/Element /Segment of Sub-Structure for all types of Bridges.End Wall, Wing wall and Intermediate Wall are the Component/Element /Segment of Sub-Structure for all types of Culvert (OFC)	Write down the information or tick marks in the concerned fields of the form where necessary during survey	<ul style="list-style-type: none">Please collect the information through close field survey.Number of columns in each Abutment/Pier should be counted from back approach to front approach for Structure with multiple Span.
5. Foundation Type			
Different types of foundations in Abutment/Wing wall/Pier and Number of piles in each Abutment/Pier	<ul style="list-style-type: none">Footing: Shallow footingPiled foundation: Cast in situ bored pile of Precast pileBox foundation: Applicable for RCC Box CulvertWell foundation: Foundation of large diameter sealed with top and bottom plug made of concrete in between which the	Write down the information or tick marks in the concerned fields of the form where necessary during survey	<ul style="list-style-type: none">Please collect the information through close field survey.Information of foundation type has to be collected from as-built drawing.If no as-built drawing is available, then information has to be collected through

Name of the Items	Description of the Items	Method of writing down the Information against each Item	Source of Collection during survey
	<p>space is filled by sand or dredged materials.</p> <ul style="list-style-type: none"> ● Unknown: no information 		<p>public conversation during field survey.</p> <ul style="list-style-type: none"> ● Cross check the information with previously input data and put down a tick mark against correct information. ● Number of columns in each Abutment/Pier should be counted from back approach to front approach for Structure with multiple Span.
6. Approach Information			
Different type of Protection works in Abutment including approaches, Drainage system, Outlet, Cut-off wall, apron, Material type of Approach road, Approach slab	<ul style="list-style-type: none"> ● Brick Pala wall: Slope protection work is made by Brick work of shallow footing at toe level of the Embankment around Abutment and Approach of Structure. ● Brick Retaining wall: Heavy earth pressure restrained structure is made of Brick work with deep footing. ● RCC Retaining wall: Heavy earth pressure restrained structure is made of RCC. ● Toe wall with CC Block: Slope protection work is made by the combination with CC Block on Slope and Toe wall made of RCC plate or Brick work with Cast-in-situ or Precast pile. ● Toe wall with Rip-rap: Slope protection work is made by the combination with Rip-rap on Slope and Toe wall made of RCC plate or Brick work with Cast-in-situ or Precast pile. ● Drainage System: Road side drain, Slope drain etc. 	Put down the tick marks in the concerned fields of the form during survey	<ul style="list-style-type: none"> ● Please collect the information through close field survey. ● Please take the cleared coloured photograph (size: 5"x3") from L/S or R/S of both back and front approaches as well as around the Abutments.
7. Overall Visual Observation on Condition of Non-Structural Elements			
Different types of Condition in Non-structural components/elements/segments	<ul style="list-style-type: none"> ● There are 28 (twenty-eight) fields in the format for Non-structural components/elements/segments for different types of Structures. ● Condition states given with details in this clause ● NENR: means existing component is in good condition. (example: for Protection work, if the condition state is NENR, then Approach is in good condition) ● NER: means no existence of the component but it is required. 	Write down the correct information provided in the clause in the concerned fields of the form during survey	<ul style="list-style-type: none"> ● Please collect the information through close field survey. ● Cross check the information with previously input data and put down the correct information. ● Please take the cleared and closed coloured photograph (size: 5"x3") of the defective component(s) caption. ● The photograph will have a reference (if possible) to

Name of the Items	Description of the Items	Method of writing down the Information against each Item	Source of Collection during survey
	<p>(example: for Protection work, if the condition state is NER, means that Protection work is not existed but it is required because Approach is in poor/severe condition)</p> <ul style="list-style-type: none"> ● B: Blocked means there is no scope to improve the condition of the concerned component. (No improvement work is done for Embankment Slope because of settlement on Approach Slope) 		<p>verify the future development work of a component.</p> <ul style="list-style-type: none"> ● The photograph will have a Caption which identifies the exact location of a component. (example: If the Protection work of Embankment at L/S of Back approach is in fair/poor/severe condition, then the Caption will contain the information in such a way: Protection Work at L/S of the Back Approach is in Fair (F)/Poor (P)/Severe (S) Condition)
8. Observation of Individual Component of Structure			
Different types of Condition of Individual components/elements /segments in Super-Structure and Sub-Structure of a Structure.	<ul style="list-style-type: none"> ● There are 8 (eight) deteriorations in the Table under the clause. ● There are 4 (four) intensities for every deterioration. ● Any component affected by exposed rebar will also have a defect of concrete spalling. ● N: means deterioration is not appeared i.e. CS-1 in nature. ● M: means deterioration is appeared moderately i.e. CS-2 in nature. ● H: means deterioration is appeared highly i.e. CS-3 in nature. ● S: means deterioration is appeared severely i.e. CS-4 in nature. 	<ul style="list-style-type: none"> ● Write down the total number of similar components in a structure being inspected in the 3rd Column (Quantity) of the table during survey ● Write down the number of defective components according to severity during survey 	<ul style="list-style-type: none"> ● Please collect the information through reaching the defective individual component as closely as possible. ● Deterioration will have to be identified through visual inspection. ● Cross check the information with previously input data and put down the correct information. ● Please take the cleared and closed coloured photograph (size: 5"x3") of the defective component(s). ● The photograph will have a reference (if possible) to verify the future development work of a component. ● The photograph will have a Caption which identifies the exact location of a component. (Example: If Spalling of concrete exists in Deck Soffit of 3rd Span of a Bridge with multiple span, then the Caption will contain the information in such a way: Spalling of Concrete in Deck Soffit near 2nd Pier of 3rd Span of the Bridge from Back Approach)

Name of the Items	Description of the Items	Method of writing down the Information against each Item	Source of Collection during survey
9. Over-all Observation of the Structure			
Carriageway Width, Length of structure, Traffic Volume, Super-Structure and Sub-Structure Over-all condition, Possibility of Capacity Expansion, Information regarding whether Replacement is essential or not	<ul style="list-style-type: none"> ● Carriageway Width, Length of structure will be given for cross checking of previously input data in the concerned field collected by the Survey specialist (SS). ● Traffic Volume will have to be calculated based on the intensity of Vehicle Movement during Survey. 	Write down the information or tick marks in the concerned fields of the form where necessary during survey	<ul style="list-style-type: none"> ● Information will have to be provided by the technical judgement of the Bridge Maintenance Engineer (BME) and Field Resident Engineer (FRE).
10. Over-all Comments of the Inspector (If any):			
Technical Comments on any failures which have not been focused in the format	<ul style="list-style-type: none"> ● Cause of selecting the type of the Intervention. ● Information of Bank erosion at Down- Stream and Up-Stream of the Structure ● Any other technical failure 	Write down the information in bullet form during survey	<ul style="list-style-type: none"> ● Information will have to be provided by the technical judgement of the Bridge Maintenance Engineer (BME) and Field Resident Engineer (FRE).



Longitudinal View of Continuous Girder Bridge

9. Type of Intervention as per Catalogue:

Type of Intervention	Overall Condition State of Super Structure	Overall Condition State of Sub Structure	Overall Condition State of Non-Structure	Additional Information for selection	Limitation of the Intervention
Minor Maintenance	CS-1	CS-1	Cs-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none">● Except Protection work with CS-3/CS-4● Except Pavement approach with CS-4	<ul style="list-style-type: none">● No restriction of Total Bridge Length● Carriage Width $\geq 5.5\text{m}$
Major Maintenance (including Minor Maintenance)	CS-1	CS-2	Cs-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none">● Except Protection work with CS-3/CS-4● Except Pavement approach with CS-4	<ul style="list-style-type: none">● No restriction of Total Bridge Length● Carriage Width $\geq 5.5\text{m}$● Carriage Width in between $\geq 3\text{m}$ and $< 5.5\text{m}$
	CS-2	CS-1			
	CS-2	CS-2			
	CS-1/CS-2	CS-1/CS-2	CS-2/CS-3/CS-4	<ul style="list-style-type: none">● Only for River training work	
	CS-1/CS-2	CS-1/CS-2	CS-3/CS-4	<ul style="list-style-type: none">● only for Protection work	
	CS-1/CS-2	CS-1/CS-2	CS-4	<ul style="list-style-type: none">● only for Pavement approach	
	CS-1/CS-2	CS-1/CS-2	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none">● If Structural review suggests that Capacity Expansion is not possible for Structure with Carriage width between $\geq 3\text{m}$ and $< 5.5\text{m}$ then go for Major Maintenance	
Rehabilitation (including Minor and Major Maintenance)	CS-3/CS-4	CS-1/CS-2	Cs-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none">● Structure for Carriage width $\geq 5.5\text{m}$	<ul style="list-style-type: none">● No restriction of Total Bridge Length
				<ul style="list-style-type: none">● If Structural review suggests that Replacement is not possible for Structure with Carriage width $< 3\text{m}$, then go for Rehabilitation	
				<ul style="list-style-type: none">● If Structural review suggests that Capacity Expansion is not possible for Structure with Carriage width between $\geq 3\text{m}$ and $< 5.5\text{m}$ then go for Rehabilitation	
Capacity Expansion	CS-1/CS-2/ CS-3/CS-4	CS-1/CS-2	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none">● Structure for Carriage width $< 5.5\text{m}$	<ul style="list-style-type: none">● Total Bridge Length $< 100\text{m}$
					<ul style="list-style-type: none">● Attaining minimum minor maintenance of existing structure (if required) to comply with Catalogue-A● Attaining minimum major maintenance of existing structure (if required) to comply with Catalogue-B

Type of Intervention	Overall Condition State of Super Structure	Overall Condition State of Sub Structure	Overall Condition State of Non-Structure	Additional Information for selection	Limitation of the Intervention
					<ul style="list-style-type: none"> Capacity expansion of both super and sub structure of existing structure or capacity expansion of only super structure Attaining minimum minor maintenance of existing structure (if required) to comply with Catalogue-A Attaining minimum major maintenance of existing structure (if required) to comply with Catalogue-B Attaining minimum rehabilitation works of existing structure (if required) to comply with Catalogue-C New construction of bridge (Carriage width ≤ 3.6 m) without any significant and irreversible social and environmental consequences.
Replacement	n.a.	n.a.	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none"> Applicable for Arch Masonry Bridge, Iron Bridge, Wooden Bridge, Light Traffic/Weight Bridge (carriage width < 3 m) 	<ul style="list-style-type: none"> Total Bridge Length < 100 m Replacement of existing structure with new bridge (Carriage width ≥ 5.5 m)
	CS-1/CS-2/ CS-3/CS-4	CS-4	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none"> Structure for Carriage width ≥ 5.5 m 	<ul style="list-style-type: none"> Replacement of existing structure with new bridge (Carriage width ≥ 5.5 m)
	CS-1/CS-2/ CS-3/CS-4	CS-3	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none"> Structure for Carriage width ≥ 5.5 m and Structural review suggests that no Rehabilitation 	<ul style="list-style-type: none"> Replacement of existing structure with new bridge (Carriage width ≥ 5.5 m)
	CS-1/CS-2/ CS-3/CS-4	CS-3/CS-4	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none"> Structure for Carriage width < 5.5 m 	<ul style="list-style-type: none"> Replacement of existing structure with new bridge (Carriage width ≥ 5.5 m)
	CS-3/CS-4	CS-1/CS-2	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none"> If Structural review suggests that Rehabilitation is not possible for Structure with Carriage width < 3 m, then go for Replacement 	<ul style="list-style-type: none"> Replacement of existing structure with new bridge (Carriage width ≥ 5.5 m)
	CS-1/CS-2	CS-1/CS-2	CS-1/CS-2/CS-3/CS-4	<ul style="list-style-type: none"> If Structural review suggests that Capacity Expansion is not possible for Structure with Carriage width < 3 m then go for Replacement 	<ul style="list-style-type: none"> Replacement of existing structure with new bridge (Carriage width ≥ 5.5 m)

Note: Any intervention, if the project authority desires, will be finalized through Structural review.