

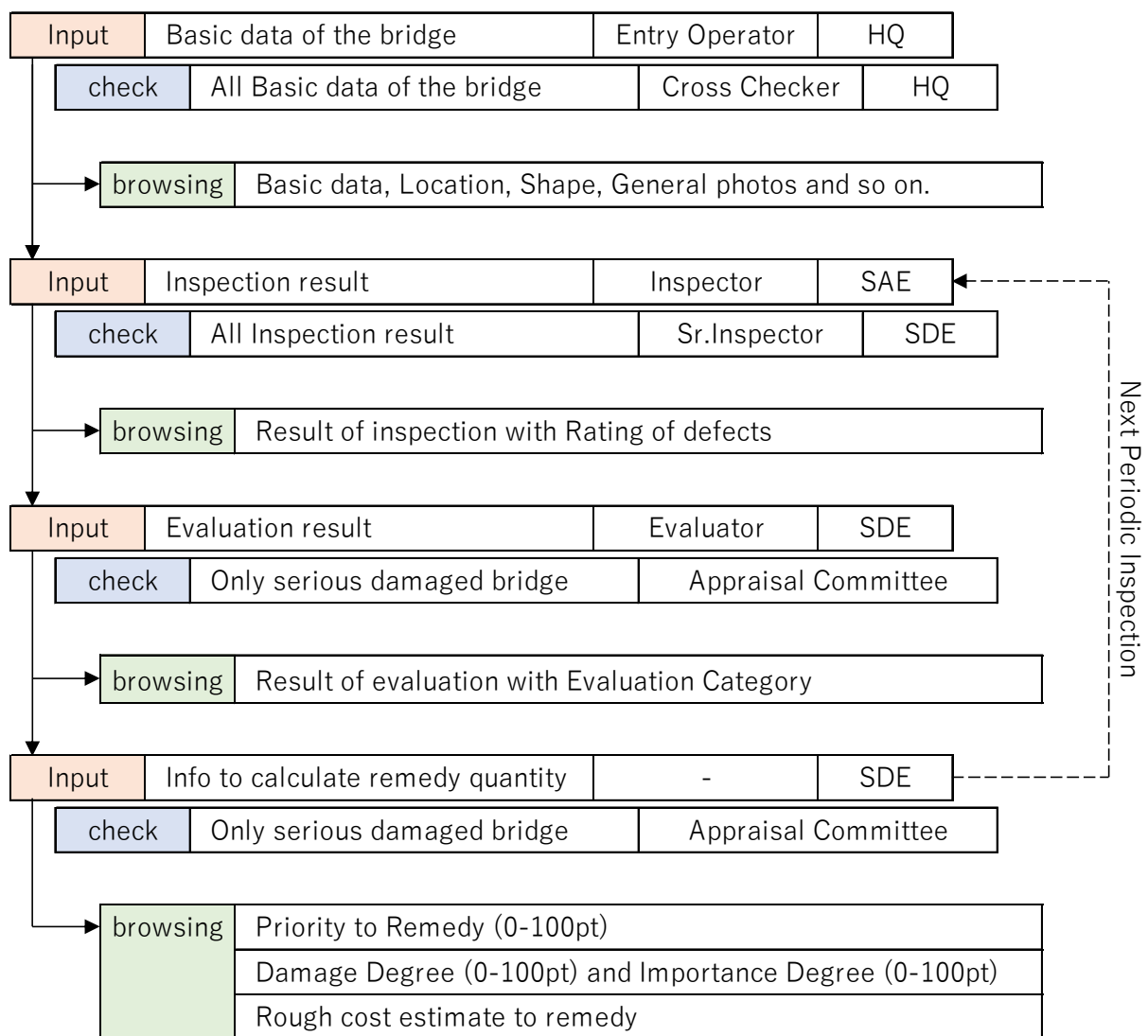
6. HOW TO USE BMS FOR EACH STEP (PERIODIC)

This chapter shows “How to use BMS in Periodic inspection” focused on each step of BMS management.

6.1 Flowchart of BMS in Periodic inspection

Following flowchart shows step of BMS management

After 4 input steps, BMS starts to calculate priority score and rough cost estimate to consider remedy plan for the bridge.

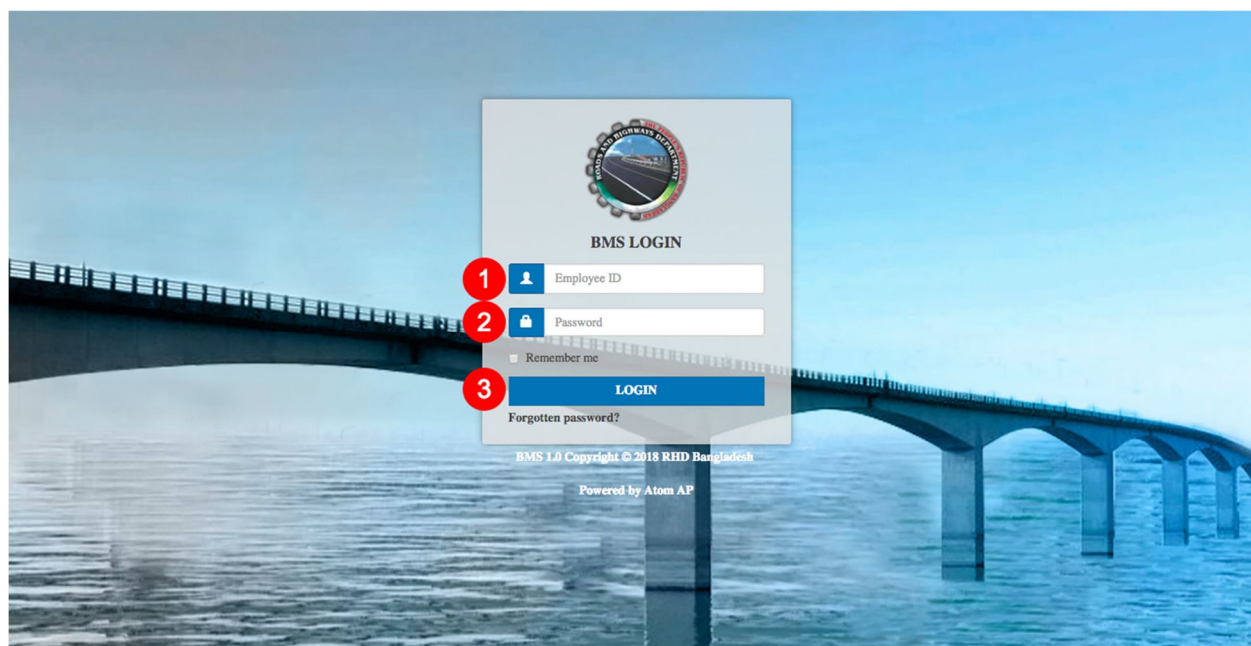


HQ : System section in Head Quarter

SAE : Sub Assistant Engineer

SDE : Sub Divisional Engineer

6.2 Login

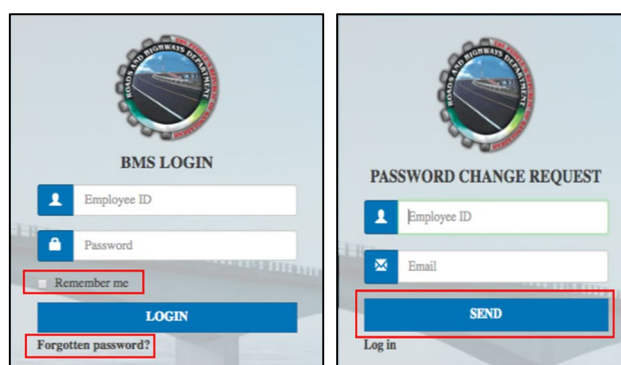


Every user needs to login into BMS to access his functions. To login into BMS -

1. Enter valid **Employee ID**
2. Enter **Password**
3. Click **Login**. Successful login will take to next screen. An error message will show for invalid ID or Password.

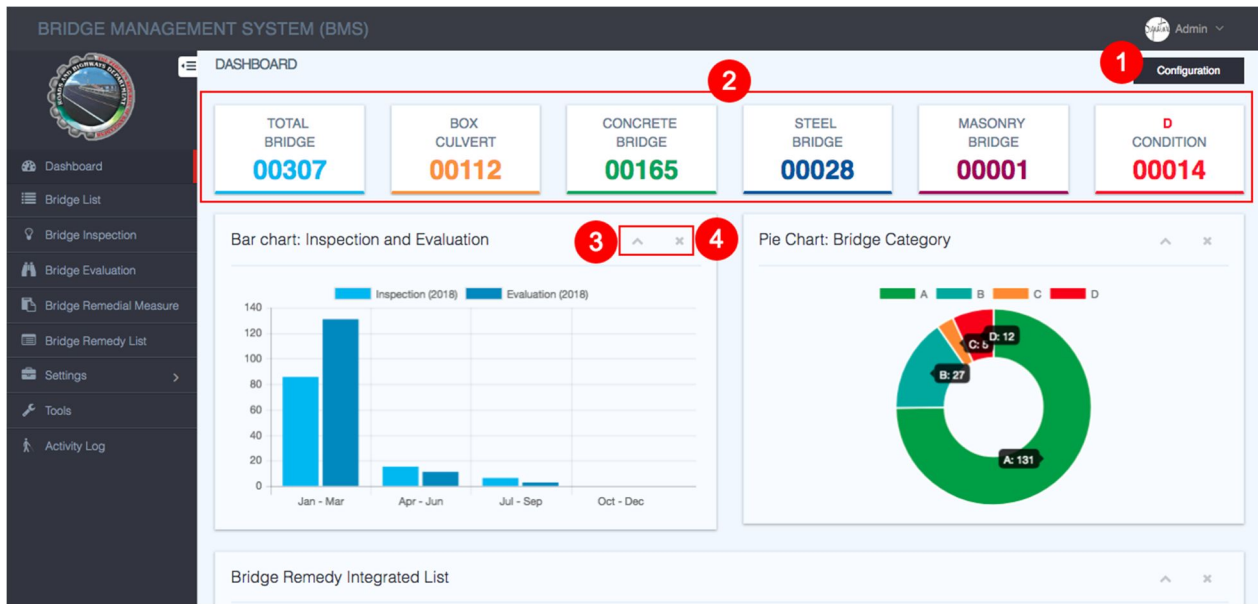
Remember Me: Click on this checkbox to remember the login information into browser.

Forgotten Password: To retrieve password click on this link. It will open another page. Input “**Employee ID**” and “**Email**” and click “**Send**”. A new password will be sent to the inputted email address.



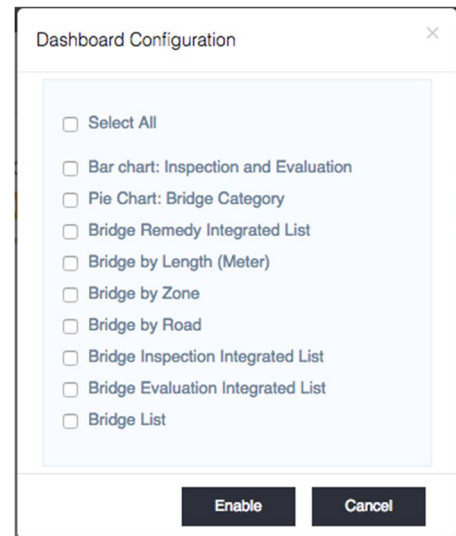
6.3 Dashboard

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public



Dashboard is a common place where user can see the summary of Bridge Basic Data, Inspections Results, Evaluation Results, Bridge Remedy Integrated List.

1. **Configuration:** Dashboard is configurable. To close any section click on the x button from the top-right corner of the section. To enable the section click on **Configuration**. A pop-up window will appear. Select the corresponding section and click **“Enable”**.



2. This section shows an overview of the data available in BMS.
3. To minimize the section click on this ^ button. To maximize the section views again click on this button.
4. To close any section click on this x button. To re-enable that section follow the steps in number 1 (Configuration).

6.4 Input and Browsing of Basic Data

6.4.1. Outline of “Bridge List” page

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

1. Click “**Bridge List**” to view bridge list page.
2. Click “**Add New**” to add new bridge data into BMS.
3. Click “**Draft**” tab to view all bridge data saved as draft.
4. Click “**Need Cross Checking**” tab to view all bridge data for cross checking.
5. Click “**Final**” tab to view all bridge inventory data.
6. Click “**Configure**” to add/remove columns in bridge list table.
7. Click “**Filter**” link to filter bridge name, type, sub-division etc.
8. Click “**Export**” button to download bridge list in excel format.
9. User can change number of rows to show in bridge list table. Example: 10, 25, 50, 100.
10. User can search bridge by any values of bridge data.
11. Bridge list view actions:
 - **Checkbox:** Click this checkbox to select/unselect any bridge.
 - **Eye Icon:** Click this icon to view bridge data.
 - **Edit Icon:** Click this icon to open bridge data in edit mode.
 - **Recycle Bin Icon:** Click this to delete a single bridge data.
 - **Location Icon:** Click this icon to see the bridge location in google map.
 - **File Icon:** Click this icon to view bridge inventory data.
12. Scroll to view all bridge data.
13. Click “**Next**” to see next page. Click “**Previous**” to see previous page.

6.4.2. Preparation to input Basic Data

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

Data Entry Operator and Data Cross Checker prepare following items to input data.

- Paper of Bridge inventory sheet
- Document of BMW's order to add/edit/delete bridge basic information

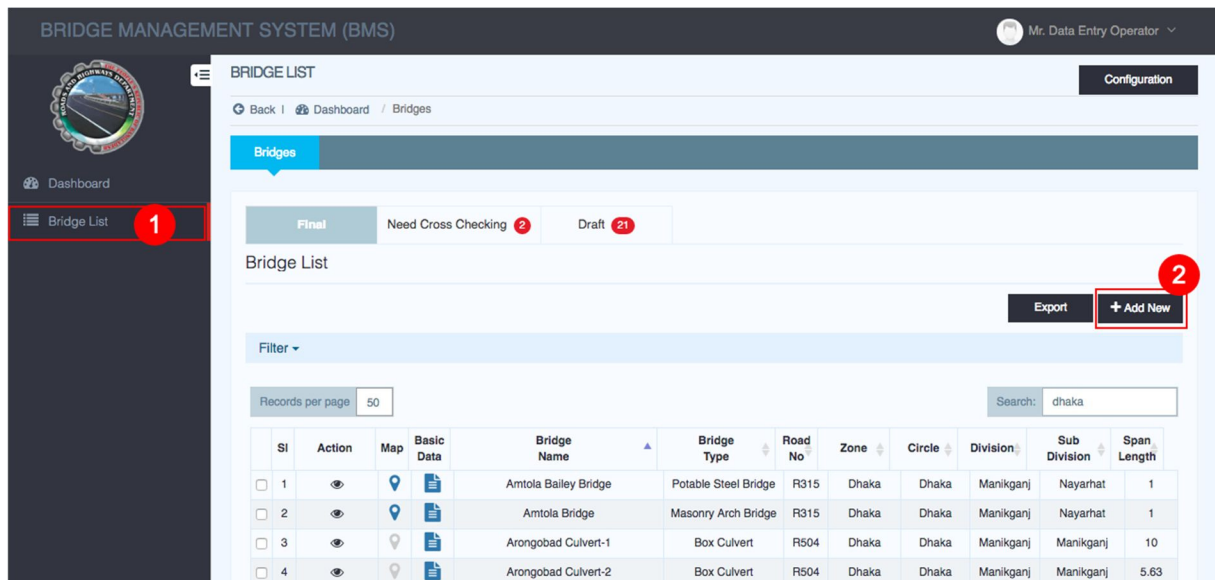
6.4.3. Step-by-step instruction for Data Entry Operator

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

If you are carrying out to input data **before 1st Periodic Inspection** of the bridge, you can refer **“APPENDIX BMS BASIC DATA TEMPORARY INPUT MANUAL”** at the end of this manual.

Case of adding new bridge into BMS

- (1) Click “Bridge List”
- (2) Click “+Add New”
- (3) Input Bridge Basic Data



Note

- You have to input all information with “*”. Inputting information with “*” is mandatory.
- If you don’t have mandatory information before first site inspection, you can follow [Temporary Input] rule in order to input temporary information. After first site inspection, you have to update the temporary information to actual information.

< Bridge Data tab >

The screenshot shows a web-based form for entering bridge data. The form is organized into a grid with tabs for 'Basic Info', 'Shape', 'Road', 'Location', 'Element', and 'Pictures'. The 'Basic Info' tab is active and contains 12 numbered fields. Fields 1-11 are text or dropdown menus, while field 12 is a rich text editor. A 'Public view' checkbox is located below the description field. At the bottom of the form are three buttons: 'Save', 'Reset', and 'Back'.

1. Bridge NO.*

Bridge NO. is made with GPS(Coordinate) based on following basically.

- GPS Latitude : 12 degree 34 minute 56 second
- GPS Longitude : 98 degree 76 minute 54 second
- Bridge NO. : **123456987654** (12 letters)
- If the bridge is “parallel bridge (two bridges are built side by side)”, because GPS of the bridges are same, 13th letter is required in order to distinguish the bridges. Most popular case of parallel bridge is “upper stream side” and “down stream side”. If the bridge locates upper stream side, add “1” as 13th letter. If down stream side, “2”.

2. Bridge Name*

Bridge Name should be inputted following rule.

- First letter of each word is *Capital letter*. You can't use Capital letter except them.
- If it's necessary to input number after bridge name, you can't insert space between bridge name and “-“. Ex. Test River Bridge-1

3. Bridge Type*

Choose a type of the bridge.

Note

If you refer data of BMMS (old system),

- “RCC Girder Bridge” should be inputted as “RC Girder Bridge”.
- “Steel Beam & RCC Slab” should be inputted as “Steel Girder Bridge”.
- “Bailey Bridge” should be inputted as “Portable Steel Bridge”.
- “Slab Culvert” should be inputted as “ Box Culvert”.

4. Completion Year

Input year to complete building the bridge.

5. Reconstruction Year

If the bridge was rebuilt, input year to complete rebuilding the bridge.

If the bridge has not rebuilt, this cell should be blank.

If you don't have the information, this cell should be blank.

6. Design Standard

If you have information of Design Standard to design the bridge, choose it.

7. Design Load

Design Load is maximum load of vehicles in design the bridge.

If you don't have the information, this cell should be blank.

8. Load Restriction (ton)

Load Restriction is set to control heavy vehicles because of damage of the bridge.

If you don't have the information or no restriction, this cell should be blank.

9. Crossing & Public Utility

After choosing crossing condition under the bridge from pull-down menu, new cell to input information of the crossing condition is created automatically. Input the information.

If the bridge has public utility like as gas, water or electricity, input it by same operation. You can input multiple items. If you don't have the information, this cell should be blank.

9. Crossing & Public Utility

Water pipe

If you don't know, no need to choose

Information Of River :

Meghna River

Information Of Water pipe :

a water pipe (owner is unknown) is attached under girde

10. Crossing under Bridge*

Choose nearest condition of under the bridge from pull-down menu.

11. Bridge Owner

Input owner name like as RHD office name.

If you don't have the information, this cell should be blank.

12. Description

Input explanation of the bridge, if it is necessary.




Public View

Public user can look information in this tab, if you click on this check box.

Click on the check box*.

* Check boxes for Public View are set for all tabs in Bridge Info. Click on all check boxes.

< Shape tab >

Basic Info	Shape	Road	Location	Element	Pictures
1. Bridge Length (m)* <input type="text"/> If you don't know, input as 999.000 (modify after inspection) Input to three decimal places (e.g. 12.000)		2. Bridge Width (m)* <input type="text"/> If you don't know, input as 999.000 (modify after inspection) Input to three decimal places (e.g. 12.000)			
3. Bridge Effective Width (m)* <input type="text"/> If you don't know, input as 999.000 (modify after inspection) Input to three decimal places (e.g. 12.000)		4. No. of Span* <input type="text"/> If you don't know, refer Temporary input rule in manual			
5. Input Span Length <input type="text"/>  Input span length for each span. This cell shows total length after input.		6. Span Arrangement <input type="text"/> Span Arrangement generates from Input Span Length			
7. No. of Column <input type="text"/> If you don't know, keep blank (input after inspection)		8. Column Width (m) <input type="text"/> If you don't know, keep blank Input to one decimal place (e.g. 12.0)			
9. Height of Abutment (m) <input type="text"/> If you don't know, keep blank Input to one decimal place (e.g. 12.0)		10. Skew Angle Degree <input type="text"/> If you don't know, keep blank (input after inspection) No need to input after the decimal point (e.g. 90)			
11. Median (m) <input type="text"/> If you don't know, keep blank (input after inspection) Input to three decimal places (e.g. 12.000)		12. Wheel Guard -L (m) <input type="text"/> If you don't know, keep blank (input after inspection) Input to three decimal places (e.g. 12.000)			
13. Wheel Guard -R (m) <input type="text"/> If you don't know, keep blank (input after inspection) Input to three decimal places (e.g. 12.000)		14. Carriage way-L (m) <input type="text"/> If you don't know, keep blank (input after inspection) Input to three decimal places (e.g. 12.000)			
15. Carriage way-R (m) <input type="text"/> If you don't know, keep blank (input after inspection) Give value for Median first, then this field will be enabled		16. Lanes On Structure <input type="text"/> If you don't know, keep blank (input after inspection)			
17. No. of Sidewalk <input type="text"/> If you don't know, keep blank (input after inspection)		18. Sidewalk-L (m) <input type="text"/> If you don't know, keep blank (input after inspection) Input to three decimal places (e.g. 12.000)			
19. Sidewalk-R (m) <input type="text"/> If you don't know, keep blank (input after inspection) Input to three decimal places (e.g. 12.000)		20. No. of Main Girder of Girder Bridge <input type="text"/> No. of Main Girder for Girder Bridge comes from Bridge Element			
21. Interval of Main Girders (m) <input type="text"/> If you can't get this length, refer Temporary input rule Input to three decimal places (e.g. 12.000)		22. Height of Main Girder (m) <input type="text"/> If you can't get this length, refer Temporary input rule Input to three decimal places (e.g. 12.000)			
23. Width of Main Girder (m) <input type="text"/> If you can't get this length, refer Temporary input rule Input to three decimal places (e.g. 12.000)		24. No. of Lines of Cross Beam <input type="text"/>  No. of Lines of Cross Beam for Girder Bridge comes from Bridge Element			
25. No. of Stringer <input type="text"/> If you don't know, keep blank (input after inspection)		26. No. of Hinge <input type="text"/>  No. of Hinge for Girder Bridge comes from Bridge Element			
27. No. of Bearings per each line <input type="text"/> If you don't know, refer Temporary input rule in manual		28. No. of lines of Lateral Bracing <input type="text"/> If you don't know, keep blank (input after inspection)			
<input type="checkbox"/> Public View					
<input type="button" value="Save"/>		<input type="button" value="Reset"/>			

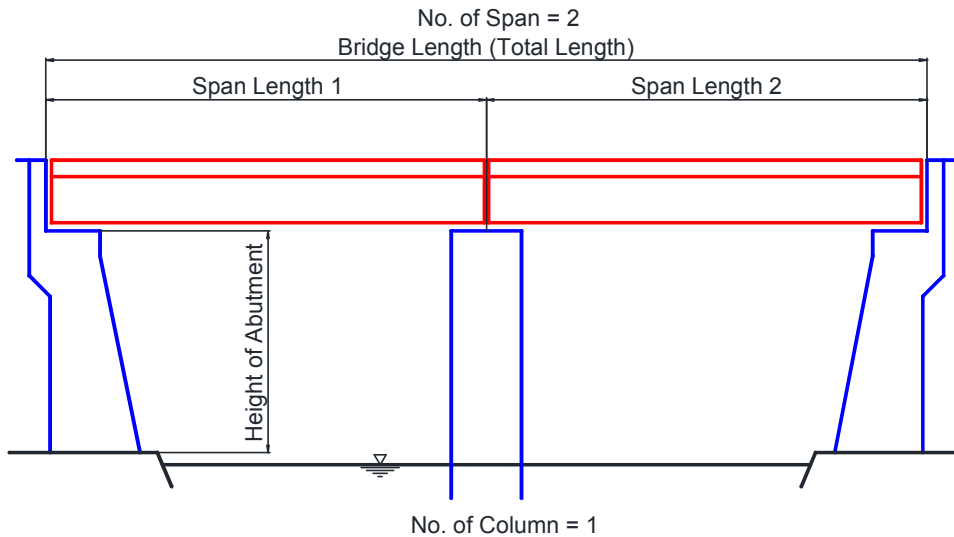
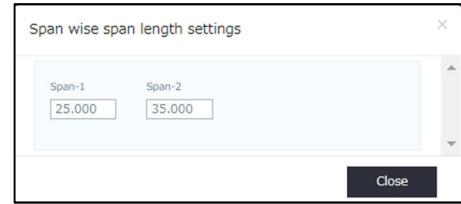
Note

- Each length should be inputted by three decimal places. (e.g. 0.500, 3.125, 30.000)
- When you choose “Box Culvert” in Bridge Data tab, inputting cells in Shape tab are set for culvert automatically.

1. Bridge Length*, 4. No. of Span*,

5. Input Span Length and 6. Span Arrangement

Input length of the bridge. If No. of Span is 1, Span length is same as Bridge Length. After inputting “4. No. of Span”, you can input span lengths in “5. Input Span Length” as same number as No. of Span.



7. No. of Column, 8. Column Width and 9. Height of Abutment

Input shape of substructure.

If you don't have the information, those cells should be blank.

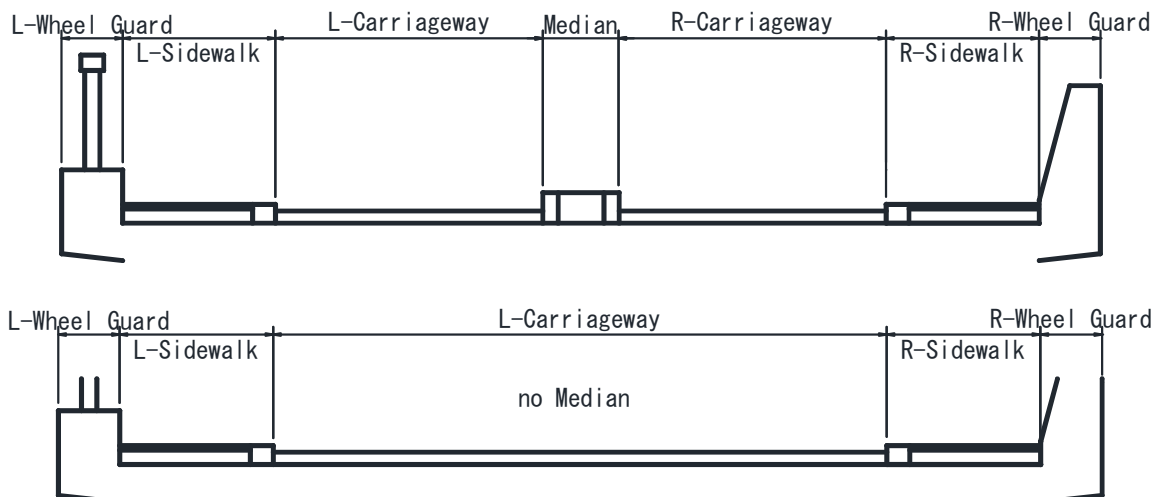
2. Bridge Width*, 3. Bridge Effective Width*,

11. Median, 12(13). L(R)-Wheel guard, 14(15). L(R)-Carriage way,

16. Lanes On Structure, 17. No. of Sidewalk and 18(19). L(R)-Sidewalk

Input width of the bridge referring follow a figure.

If the bridge doesn't have Median, it's not necessary to input R-Carriage way.



21. Interval of Main Girders (except Culvert Bridge),

22. Height of Main Girder (except Culvert Bridge) and

23. Width of Main Girder (except Culvert Bridge)

Input shape of Main Girder.

Each item shows different length by bridge type. Refer following figures.

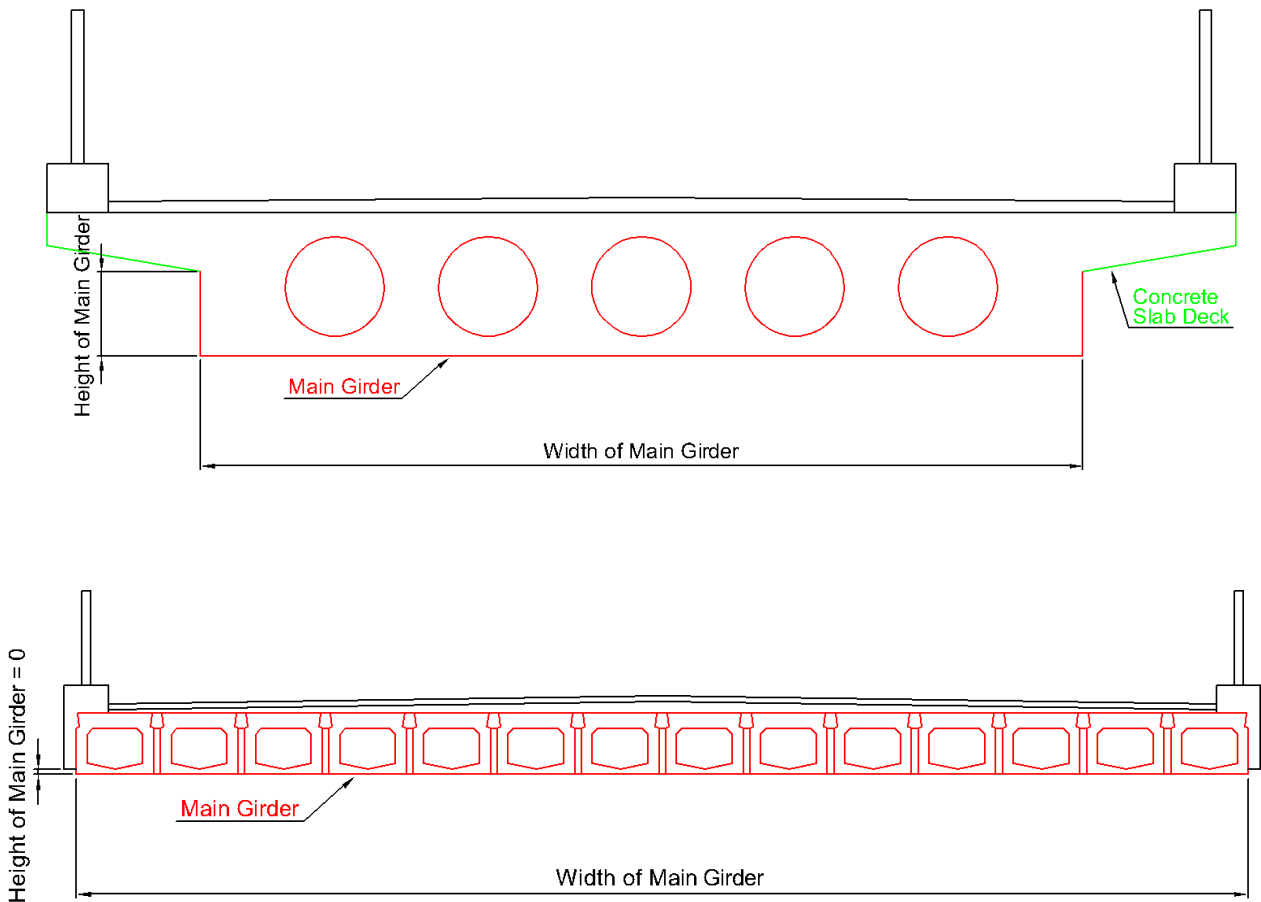
[Temporary Input **after 1st Periodic Inspection** of the bridge]

It may be impossible to measure some length, because of inspector can't approach it.

In that case, the length should be guessed based on photos.

If you can't get the length yet, input temporary figure as following.

[Small Slab Bridge / RC Slab Bridge]



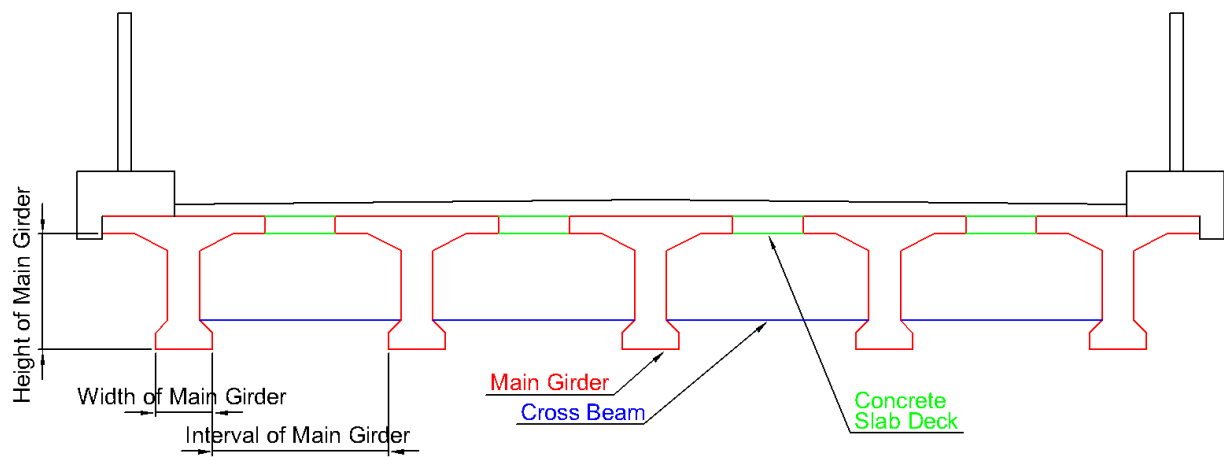
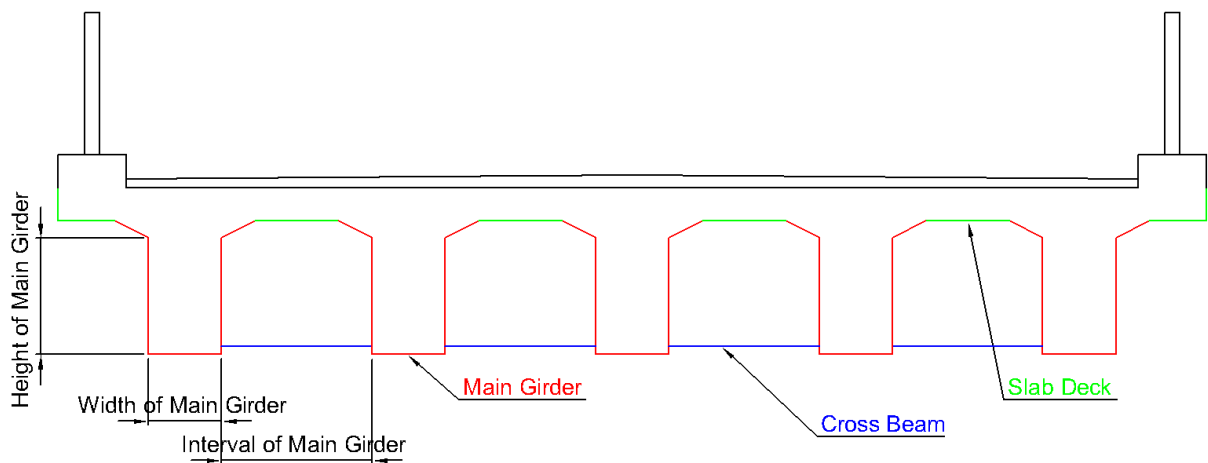
- Interval of Main Girder : input always “0”.
- Height of Main Girder : Temporary = “0”
- Width of Main Girder : Temporary = “Effective Width”

e.g. Temporary input case

If Effective width = 7.500m,

- Interval of Main Girder = 0.000m : always
- Height of Main Girder = 0.000m : temporary
- Width of Main Girder = 7.500m : temporary

[RC Girder Bridge / PC Girder Bridge]



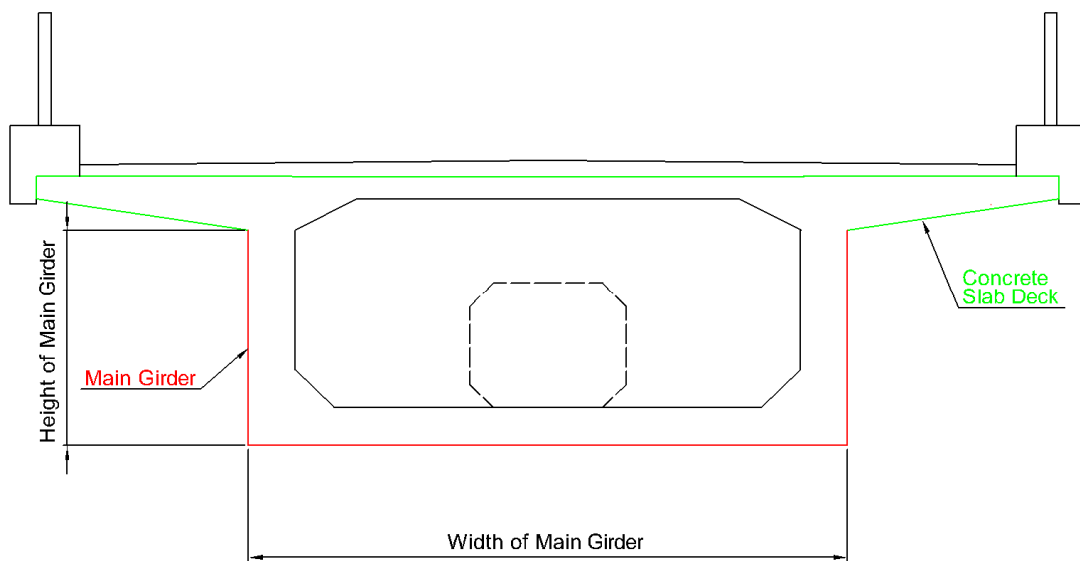
- Interval of Main Girder : Temporary = “Effective Width” / (“NO. of Main Girder” - 1)
- Height of Main Girder : Temporary = “Span Length” / 15
- Width of Main Girder : Temporary = 0.300 m

e.g. Temporary input case

If Span length = 30.000m, Effective width = 10.000m and Number of Main Girder = 5,

- Interval of Main Girder = $10.000\text{m} / (5-1) = 2.500\text{m}$: temporary
- Height of Main Girder = $30.000\text{m} / 15 = 2.000\text{m}$: temporary
- Width of Main Girder = 0.300m : temporary

[RC Box Girder Bridge / PC Box Girder Bridge]



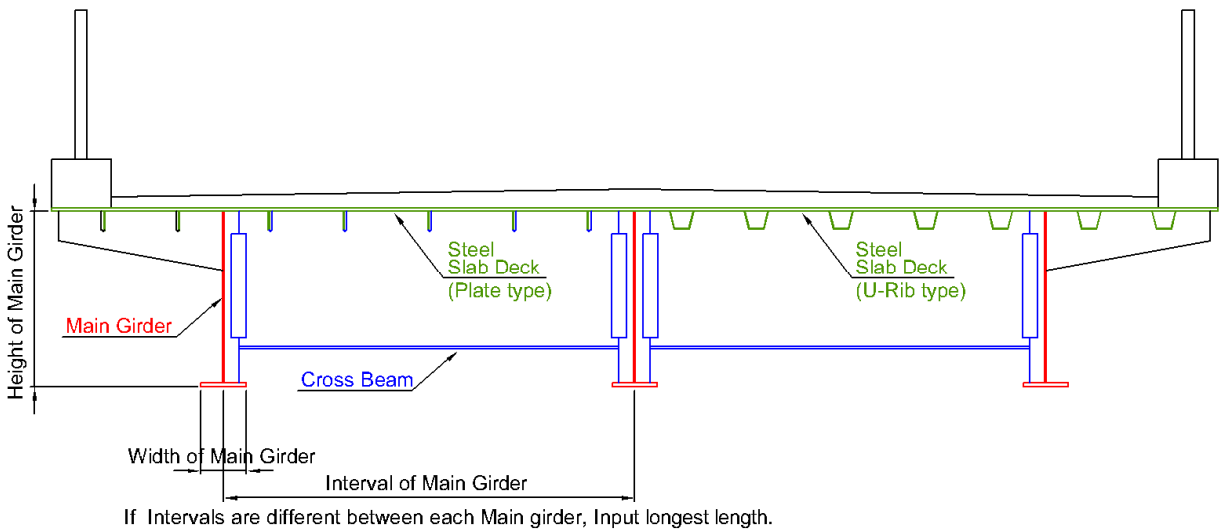
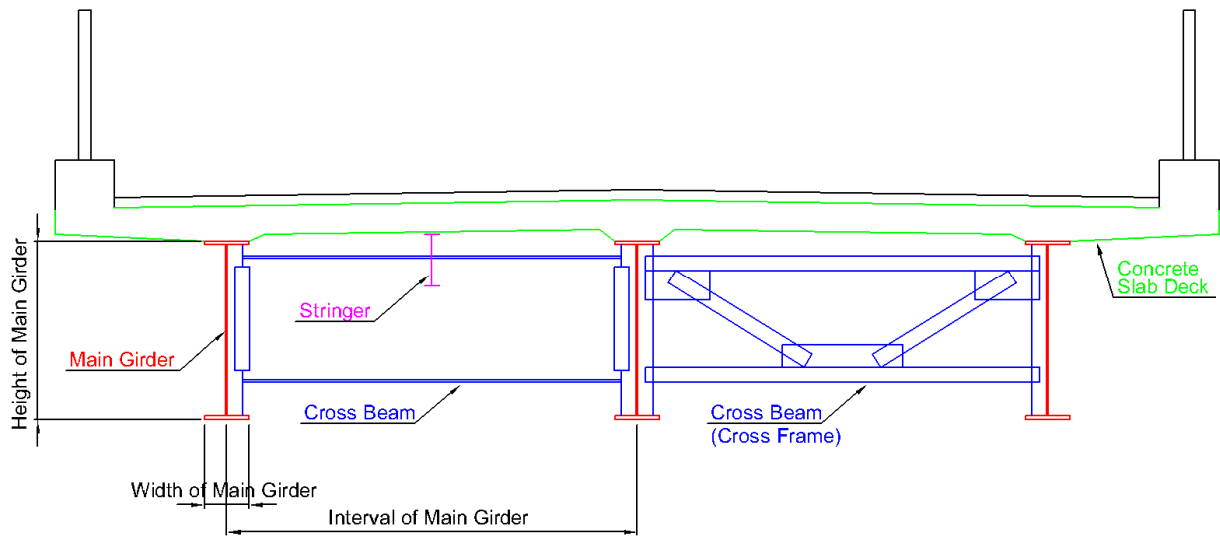
- Interval of Main Girder : input always “0”
- Height of Main Girder : Temporary = “Span Length” / 15
- Width of Main Girder : “Effective Width”

e.g. Temporary input case

If Span length = 30.000m and Effective width = 10.000m,

- Interval of Main Girder = 0.500m : always
- Height of Main Girder = $30.000\text{m} / 15 = 2.000\text{m}$: temporary
- Width of Main Girder = 10.000m : temporary

[Steel Girder Bridge]



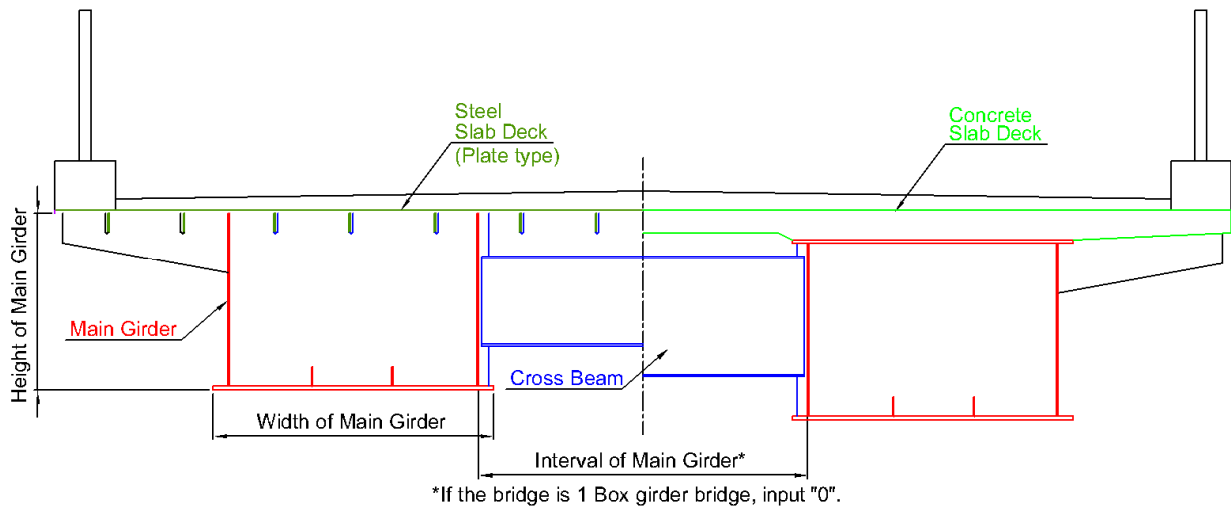
- Interval of Main Girder : Temporary = “Effective Width” / “NO. of Main Girder”
- Height of Main Girder : Temporary = “Span Length” / 15
- Width of Main Girder : Temporary = “Height of Main Girder” / 5

e.g. Temporary input case

If Span length = 30.000m, Effective width = 7.500m and Number of Main Girder = 3,

- Interval of Main Girder = $7.500\text{m} / 3 = 2.500\text{m}$: temporary
- Height of Main Girder = $30.000\text{m} / 15 = 2.000\text{m}$: temporary
- Width of Main Girder = $2.000\text{m} / 5 = 0.400\text{m}$: temporary

[Steel Box Girder Bridge]



(Multiple box girders bridge)

- Height of Main Girder : Temporary = "Span Length" / 15
- Width of Main Girder : Temporary = 2.500m
- Interval of Main Girder : Temporary =
"Effective Width" - "Width of Main Girder" x "NO. of Main Girder"

e.g. Temporary input case (Multiple main girder)

If Span length = 30.000m, Effective width = 10.000m and Number of Main Girder = 2,

- Height of Main Girder = 30.000m / 15 = 2.000m : temporary
- Width of Main Girder = 2.500m : temporary
- Interval of Main Girder = 10.000m - 2.500m x 2 = 5.000m : temporary

(Single box girders bridge)

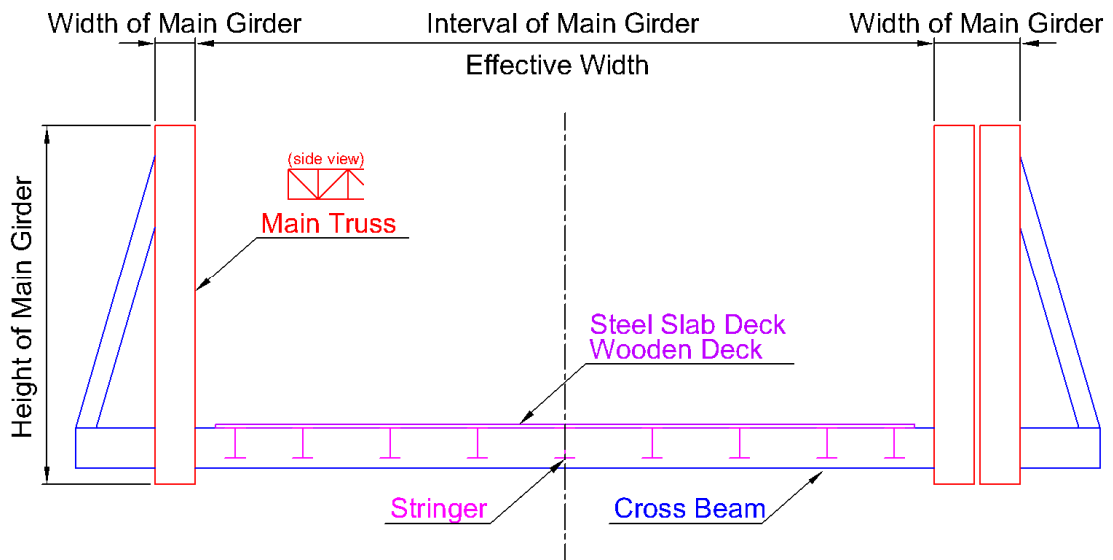
- Height of Main Girder : Temporary = "Span Length" / 15
- Width of Main Girder : Temporary = "Effective Width"
- Interval of Main Girder : input always "0"

e.g. Temporary input case (Multiple main girder)

If Span length = 30.000m, Effective width = 7.500m and Number of Main Girder = 1,

- Height of Main Girder = 30.000m / 15 = 2.000m : temporary
- Width of Main Girder = 7.500m : temporary
- Interval of Main Girder = 0.000m : temporary

[Truss Bridge / Portable Steel Bridge]

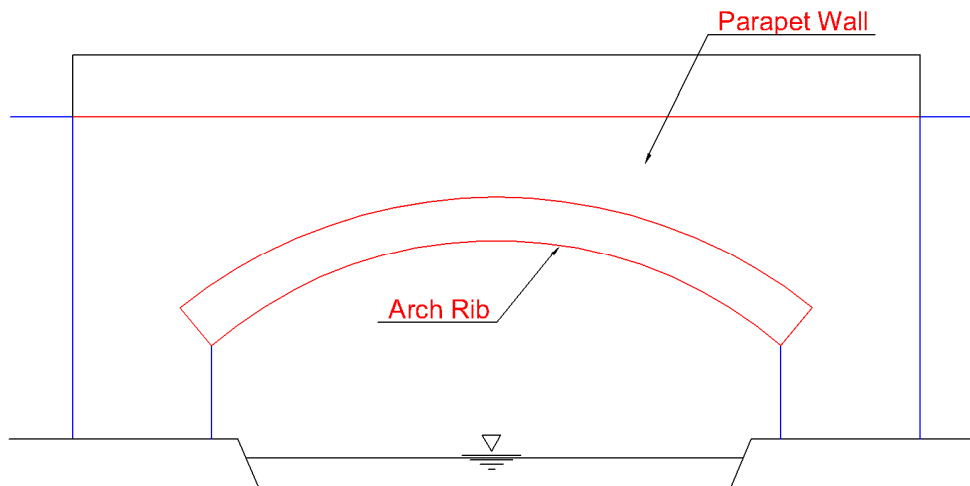


- Interval of Main Girder : always same as “Effective Width”.
- Height of Main Girder : Temporary = 2.000 m
- Width of Main Girder : Temporary = 0.200 m

[Masonry Arch Bridge]

It is not necessary to input girder length of Masonry Arch Bridge because of following reason.

- The shape is markedly different from other bridge types. It is impossible to apply above inputting rules.
- Remedial measures in Bridge Rehabilitation/Strengthening Manual is not applied to Masonry Arch Bridge, because only this bridge is made with masonry. Therefore, this bridge type is not targeted to calculate rough cost estimate to remedy. It means length information to calculate is not required from BMS.



[Mixed Types Bridge]

This bridge type is not shown in Inspection & Evaluation Manual. Mixed Types Bridge is always multiple span bridge and defined as following,

- The bridge consists of multiple types of bridge.

e.g.

1st span : RC Girder Bridge, 2nd span : PC Box girder Bridge, 3rd span : RC Girder Bridge

- The bridge consists of multiple materials.

e.g.

1st span : RC Girder Bridge, 2nd span : Steel Girder Bridge, 3rd span : RC Girder Bridge

- The bridge consists of multiple types and materials.

e.g.

1st span : RC Girder Bridge, 2nd span : Steel Box Girder Bridge, 3rd span : RC Slab Bridge



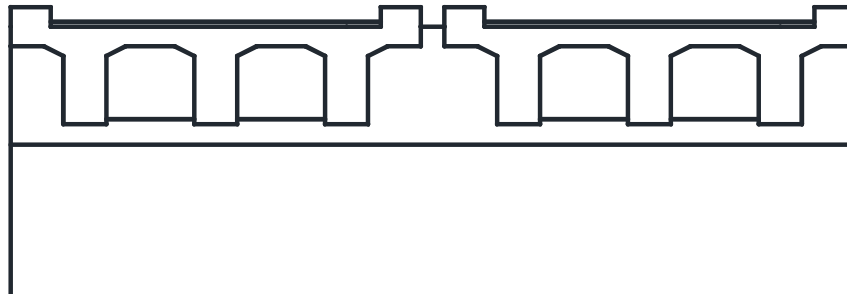
Because only a type of bridge is enabled into BMS, this type is required to manage BMS.

Note

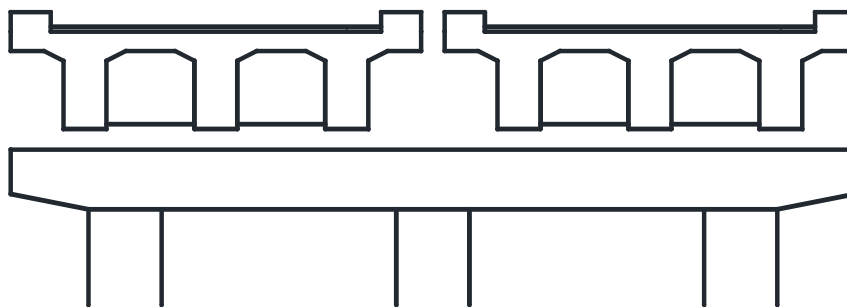
- Number of Main Girder, cross beam and so on of Basic Data should be inputted as maximum number of main girder in all spans.
- Inspection sheet and Evaluation sheet of Mixed Types Bridge consist of “All types of defects” (both of types of defects of “Concrete” or “Steel (rubber)”).
Cells of inspection sheet not required (e.g. concrete defect of steel element) should be inputted as “-“.
Cells of evaluation sheet not required (e.g. concrete defect of steel element) should be inputted as “N“.

[How to input Parallel bridge sharing one substructure]

In the case of “Parallel bridge (two bridges being built side by side.)”, one substructure supports both of two superstructures like as following drawings.



e.g. One Abutment with parallel bridges



e.g. One Pier with parallel bridges

How to input the parallel bridges is shown as following.

- Parallel bridges should be registered as **TWO bridges**. (separated bridges)
- Bridge No. is inputted as following,
Bridge locating upstream side : 12 letters (by GPS) + 1 (**13th letter**)
Bridge locating downstream side : 12 letters (by GPS) + 2 (**13th letter**)
- Each substructure should be inspected as **ONE component**. However, BMS requires result of superstructure and substructure. Therefore, inputting result should be carried out as following,

Bridge locating upstream side

: Result of the superstructure of upstream side + **Result of the substructure***

Bridge locating downstream side

: Result of the superstructure of downstream side + **Result of the substructure***

* Result of the substructure is **same result**.

21. Width of Culver (Box Culvert)

22. Height of Side Wall (Box Culvert)

Input shape of Culvert.

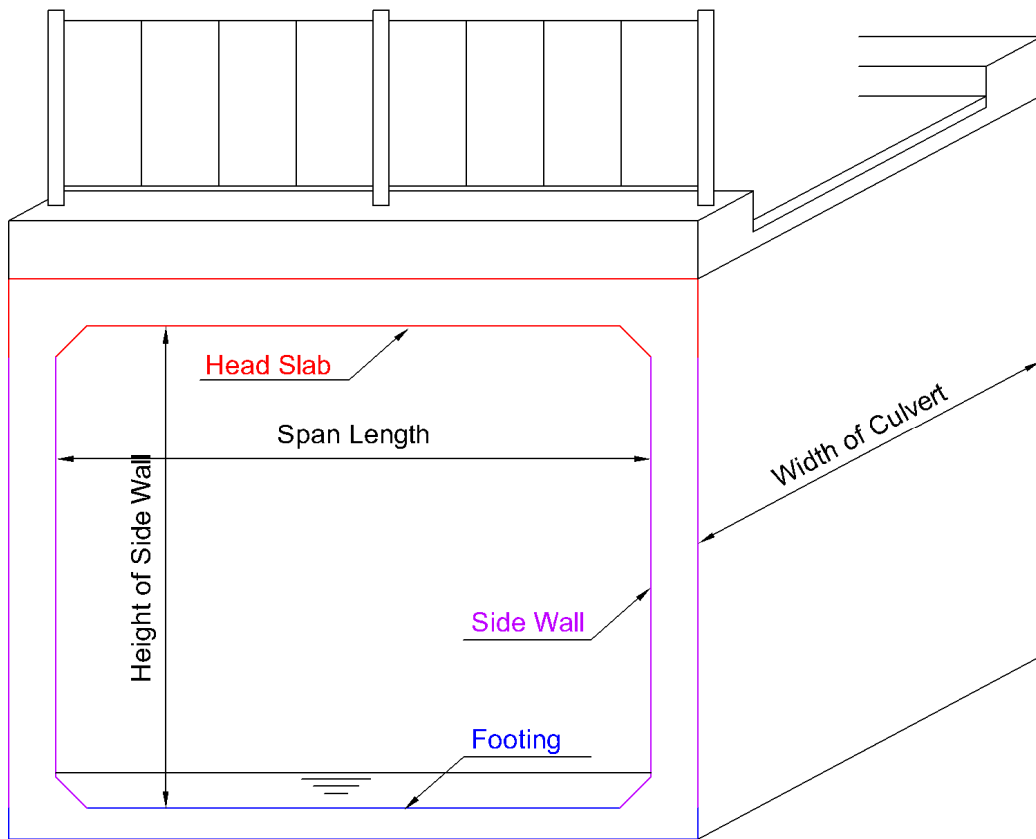
[Temporary Input **after 1st Periodic Inspection** of the bridge]

It may be impossible to measure some length, because of inspector can't approach it.

In that case, the length should be guessed based on photos.

If you can't get the length yet, input temporary figure as following.

[Box Culvert]



- Width of Culver : Same as “Bridge Width”.
- Height of Side Wall : Temporary = 2.000 m

e.g. Temporary input case

If Bridge width = 7.500m,

- Width of Culver = 7.500m : temporary
- Height of Side Wall = 2.000m : temporary

10. Skew Angle Degree

Input angle of “parapet wall” and “direction of traffic”.
Skew angle of bridges are mainly 90° (straight bridge).

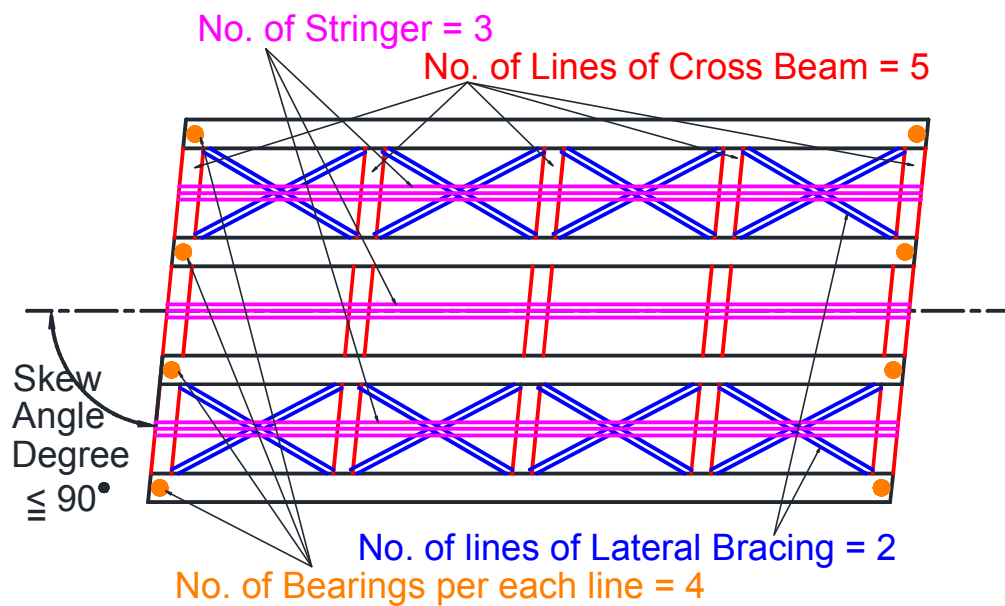
24. No. of Lines of Cross Beam (except Box Culvert)

25. No. of Lines of Stringer (Steel Girder Bridge)

27. No. of Bearings per each line (except Box Culvert)

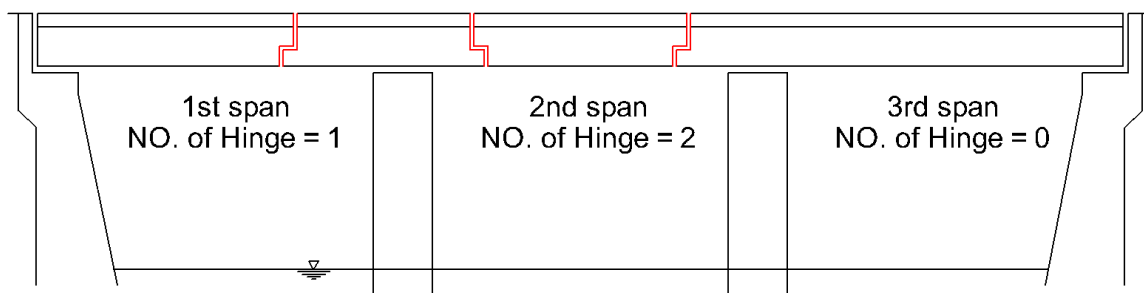
28. No. of Lines of Lateral Bracing (Steel Girder Bridge)

Input number of each lines if the element exists.



26. NO. of Hinge

Input number of the Gerber hinge for each span.



<Road tab>

Basic Info	Shape	Road	Location	Element	Pictures
1. Road Class*		2. Road No*			
<input type="text" value="-- Select --"/>		<input type="text" value="-- Select --"/>			
3. Road Name		4. LRP Name			
<input type="text" value="If you don't know, keep blank"/>		<input type="text" value="If you don't know, keep blank"/>			
		Input three figures and one alphabet (e.g. 001a)			
5. New LRP Name		6. Offset of LRP			
<input type="text" value="If you don't know, keep blank"/>		<input type="text" value="If you don't know, keep blank"/>			
Follow rule of new LRP Name		No need to input after the decimal point (e.g. 255)			
7. Chainage (km)		8. Number of Lanes			
<input type="text" value="If you don't know, keep blank"/>		<input type="text" value="Input same number as Lanes On Structure"/>			
Input to three decimal places (e.g. 12.000)					
9. Approach Road Width		10. Detour/Alternate Route*			
<input type="text" value="If you don't know, keep blank"/>		<input type="text" value="-- Select --"/>			
Input to three decimal places (e.g. 12.000)		If you don't know, input as "None" (modify after inspection)			
11. Traffic Volume*		12. Heavy Vehicle Traffic Rate			
<input type="text" value="-- Select --"/>		<input type="text" value="If you don't know, keep blank"/>			
Refer RMMS database					
13. Census (Year)					
<input type="text" value="If you don't know, keep blank"/>					
Refer RMMS database					
<input type="checkbox"/> Public View					
<input type="button" value="Save"/>		<input type="button" value="Reset"/>			

1. Road Class*, 2. Road No.* and 3. Road Name

Input information of the road.

4. LRP Name

Input LRP Name if you can get it from current BMMS.

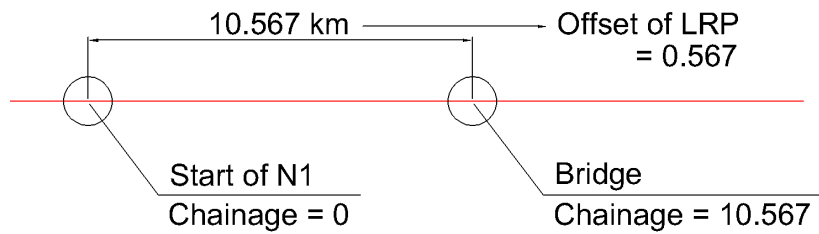
5. New LRP Name

Input New LRP Name of the bridge after putting a new rule of LRP Name.

6. Offset of LRP and 7. Chainage

Chainage is distance between start of the road and bridge location.

Offset of LRP is figure shown as down to the decimal point of Chainage.



8. Number of Lanes

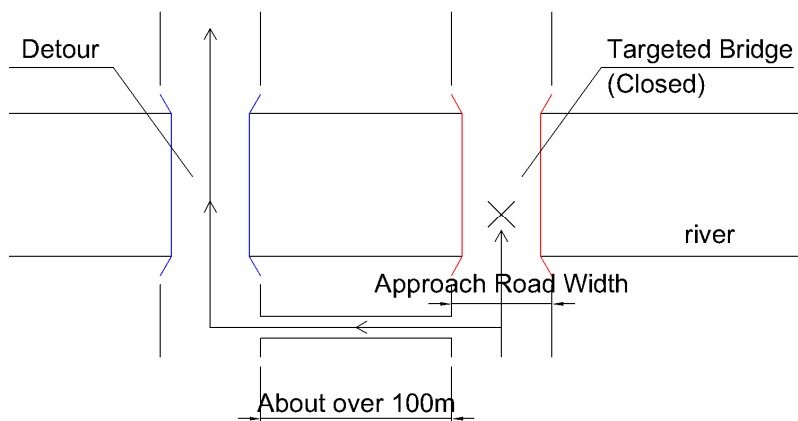
Input number of traffic lanes on the bridge. (same as “16. Lanes On Structure” in Shape)

9. Approach Road Width

Input width of approach road of the bridge.

10. Detour/Alternate Route*

If there is another road near the bridge to be able to use as substitute the bridge, choose “exist”.



Ex.
When targeted bridge is closed, user can use another bridge as Detour.
In this case, importance degree will be set as lower.

11. Traffic Volume*, 12. Heavy Vehicle Traffic Rate and 13. Census

Choose range of Traffic Volume of the bridge.

This volume shows AADT (Annual Average Daily Traffic).

Note

You can refer RMMS (Road Maintenance & Management System) of RHD.

1. Access to <http://www.rhd.gov.bd/RoadDatabase/> and search targeted Road No.
2. Click “Show details” at Traffic (AADT).

Basic Info			
Road No.	N503		
Road Name	Utholi-Aricha Road		
Class	National Highway	Starts at	Utholi
Length	3.269 Km	Ends at	Aricha
Traffic & Other Info			
Traffic (AADT)	7679 (Motorized: 5785 , Non-Motorized: 1894) Show details		
Average width	7.32 (m) Width Detail		
No. of bridges	8		
No. of ferry ghats	0		
Location referencing points - LRPs (what is a LRP?)	14 LRP Listing		
Location			

4. Choose link No. nearest to targeted bridge and check most right column, “Traffic(AADT)”

- Heavy Vehicle Traffic Rate is calculated as
“ {AADT – (total number of truck and bus)} / AADT “ (Micro bus is not including)
- Census is year of last inspection of traffic volume
Census is survey year of each traffic data. If you don’t know, keep blank.

<Location tab>

Basic Info	Shape	Road	Location	Element	Pictures
1. Zone* -- Select --			2. Circle* -- Select --		
3. Division* -- Select --			4. Sub Division* -- Select --		
5. SAE* -- Select --			6. District If you don't know, keep blank		
7. Upazilla If you don't know, keep blank			8. Union If you don't know, keep blank		
9. Village If you don't know, keep blank			10. Country If you don't know, keep blank		
11. GPS Latitude					
Degree If you don't know, keep blank (input after)		Minute If you don't know, keep blank (input after)		Second If you don't know, keep blank (input after)	
12. GPS Longitude					
Degree If you don't know, keep blank (input after)		Minute If you don't know, keep blank (input after)		Second If you don't know, keep blank (input after)	
Reference Level Reference Level					
<input type="checkbox"/> Public View					
Save		Reset			

1. Zone*, 2. Circle*, 3. Division* and 4. Sub Division*

Choose division information of the bridge.

5. SAE*

SAE is Section Officer. Choose one from pull-down menu.

6. District, 7. Upazilla, 8. Union, 9. Village and 10. Country

Input location of the bridge.

First letter of each word is Capital letter. You can't use Capital letter except them.

11. GPS Latitude, 12. GPS Longitude

Input GPS information of the bridge.

They should be inputted as "xx Degree xx Minute xx Second".

Note

GPS information is required to display map and make Bridge No.

Input Reference Level of the bridge. If you don't know, keep blank.

<Element tab>

Basic Info	Shape	Road	Location	Element	Pictures
Superstructure					
<input checked="" type="checkbox"/> Main Girder	-----			3	
<input checked="" type="checkbox"/> Main Girder Hinge	-----			2	
<input checked="" type="checkbox"/> Cross Beam	-----			12	
<input checked="" type="checkbox"/> Deck Slab (Concrete)	RC			4	
<input type="checkbox"/> Stringer	-----				
<input type="checkbox"/> Main Truss	-----				
<input type="checkbox"/> Main Arch	-----				
<input type="checkbox"/> Outer Cable	-----				
<input type="checkbox"/> Main Tower	-----				
<input type="checkbox"/> Head Slab	-----				
<input type="checkbox"/> Lateral Bracing	-----				
<input type="checkbox"/> Deck Slab (PC)	-----				
<input type="checkbox"/> Deck Slab (Steel)	Select Element Type				
<input type="checkbox"/> Arch Rib	-----				
<input type="checkbox"/> Parapet Wall	-----				
Substructure					
<input checked="" type="checkbox"/> Pier	T-shaped Column Type			1	
<input checked="" type="checkbox"/> Abutment	Gravity Type			2	
<input checked="" type="checkbox"/> Foundation	Unknown			3	
<input type="checkbox"/> Wing Wall	-----				
<input type="checkbox"/> Footing	-----				
<input type="checkbox"/> Side Wall	-----				
Bearings					
<input checked="" type="checkbox"/> Bearing (Rubber)	Rubber			2	
<input checked="" type="checkbox"/> Bearing Seat/Bed	-----			2	
<input type="checkbox"/> Bearing (Steel)	Select Element Type			2	
<input type="checkbox"/> Anchor Bolts	-----				
Deck Surface					
<input checked="" type="checkbox"/> Railing (Steel)	Steel			2	
<input checked="" type="checkbox"/> Pavement	Asphalt			1	
<input checked="" type="checkbox"/> Wheel Guard	-----			2	
<input type="checkbox"/> Railing (Concrete)	Select Element Type				
<input type="checkbox"/> Curb	-----				
Drainage System					
<input checked="" type="checkbox"/> Drainage System	-----			1	
Inspection Facilities					
<input checked="" type="checkbox"/> Inspection Facility	-----			1	
Utilities					
<input checked="" type="checkbox"/> Utility Pipe	-----			1	
Expansion Joint					
<input checked="" type="checkbox"/> Expansion Joint (Steel)	Steel			3	
<input type="checkbox"/> Expansion Joint (Rubber)	Select Element Type			3	
Others					
<input checked="" type="checkbox"/> Bridge Approaches	-----			2	
<input checked="" type="checkbox"/> Retaining Wall	-----			2	
<input checked="" type="checkbox"/> Road Sign	-----			1	
<input checked="" type="checkbox"/> Lighting Facility	-----			1	
<input type="checkbox"/> Public View					
Save		Reset			

Information in Element tab is necessary to make Inspection Report Sheet (Blanked) automatically.

- Choose and check boxes of necessary elements and input number of the elements.
- Each bridge type has basic elements to consist the bridge. Click on check box of the elements has checked and fixed automatically.
- You can refer “Temporary Input Manual” in Appendix of this manual.

<Pictures tab>

Pictures in Bridge Inventory, like as general drawings, photos of general view, side view, under the bridge, location map, and drawing of element numbering system are uploaded from this tab. By clicking “+Add New Picture”, you can start to upload a picture.

1. Title*

Input Title of the picture,

2. Order

Order number is made by BMS automatically when the picture uploaded.

You can arrange order of pictures in Bridge Inventory by setting number.

Picture which has lower order number is displayed upper part of the Inventory sheet.

3. Description

You can attach explanation for the picture.

4. Image*

By clicking the “Select a file”, file browser is opened. Choose the picture and click “OK”.

Uploaded picture is displayed as fixed height with same ratio.

Note

It is better that size of uploaded picture is **lower than 1.0 Mbyte**.

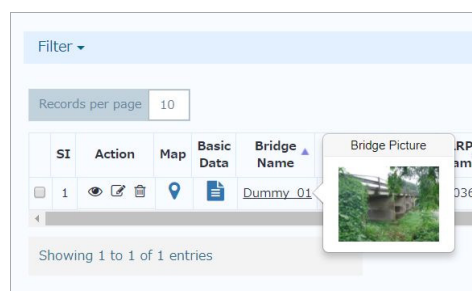
There are no limit size to upload. However, operation of BMS will be slow because of the too large sized picture.

Feature Photo Picture

By clicking on this check box, the photo displays with mouse over the bridge name in Bridge List.

Public View

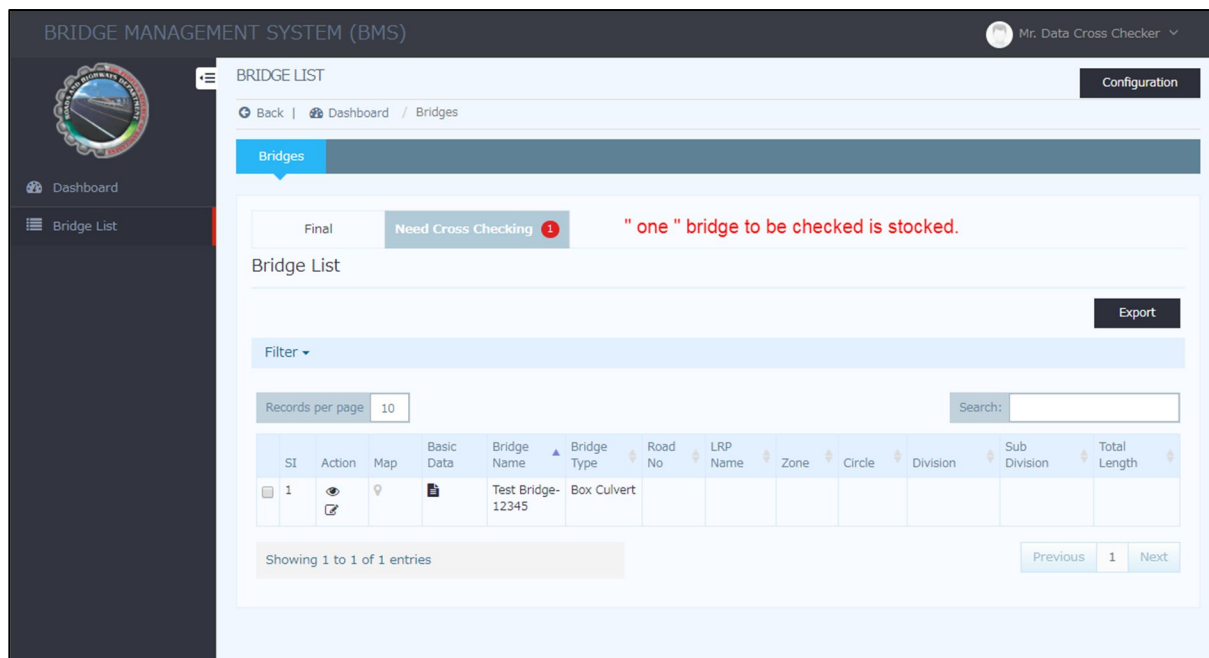
By clicking on this check box, the photo will is opened to Public Users.



6.4.4. Step-by-step instruction for Data Cross Checker

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

If there are some bridges to be cross-checked, white figure with red circle is displayed in “Need Cross Checking” tab. The figure shows number of bridges under waiting to be checked.

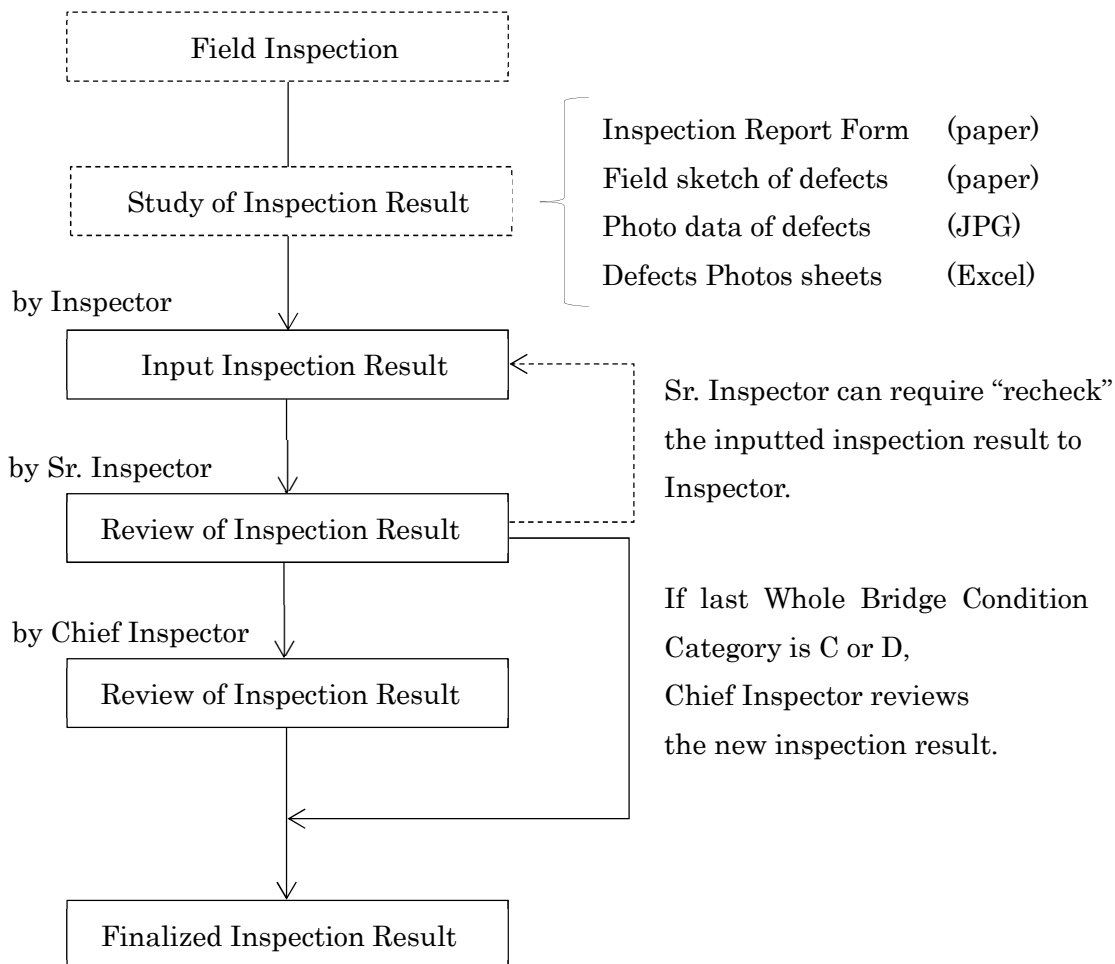


- (a) Click “Bridge List”
- (b) Click “Need Cross Checking”.
- (c) Check all data inputted comparing with Paper of Bridge inventory sheet.
- (d) Click “Edit” in each tab.
- (e) If you found something to modify, edit it.
- (f) Click “Save as final”.

6.5 Input and Browsing of Inspection Result : Bridge Inspection

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

Following flowchart shows outline of “input” and “approval” step of Inspection result in BMS. You can refer “3.7 Bridge Inspector” to understand types of Inspector in the chart. This section shows explanation of “Periodic Inspection”.



6.5.1. Preparation to input Inspection Result.

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

- Blank Inspection sheet written inspection result (paper)
- Field sketch of defects (paper)
- Photo data of defects (JPG)
- Defects Photos sheets (Excel)

6.5.2. Outline of “Bridge Inspection” page

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

The screenshot shows the 'BRIDGE INSPECTION LIST' page in the BMS. The page is divided into two main sections: 'Periodic Inspection Integrated List' and 'Routine Inspection Integrated List'. The 'Periodic' section includes a table with columns for SI, Result Sheet, Report Form, Bridge Name, Bridge Type, Road No, LRP Name, Zone, Circle, Division, Sub-Division, and Map. The 'Routine' section has a similar table with an 'Action' column. Red circles with numbers 1-16 highlight various UI elements and actions.

1. Click **“Prepare Inspection Sheet”**, Select **“Periodic”** and click create.
2. Click **“Blank Sheets”** to view all blank inspection sheets.
3. Click **“Draft”** to view all draft inspection sheets.
4. Click **“Submitted for Review”** to view all inspection sheets submitted for review.
5. Click **“For Approval”** to view all inspection sheets submitted for approval.
6. Click **“Unsigned”** to view all inspection sheets approved but unsigned.
7. Click **“Final”** to view all inspection sheets approved and signed.
8. Click **“Filter”** to filter inspection list.
9. By default most 10 recent inspections data will show. Click to view all inspection sheets.
10. User can change number of rows to show in list table. Example: 10, 25, 50, 100.
11. User can search bridge by any values of bridge data.
12. Click **“Export”** button to download inspection list in excel format.
13. Click **“Prepare Inspection Sheet”**, Select **“Periodic”** or **“Routine”** and click create.
14. Inspection list view actions:
 - **“Recycle Bin Icon”**: Click this icon to delete inspection sheet.
 - **“Book Icon”**: Click this icon to view inspection results.
 - **“File Icon”**: Click this icon to see bridge inventory data.
15. Click **“Next”** to see next page. Click **“Previous”** to see previous page.
16. Click this icon to go to top of the page in one click.

6.5.3. Step-by-step instruction for Inspector

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

Note

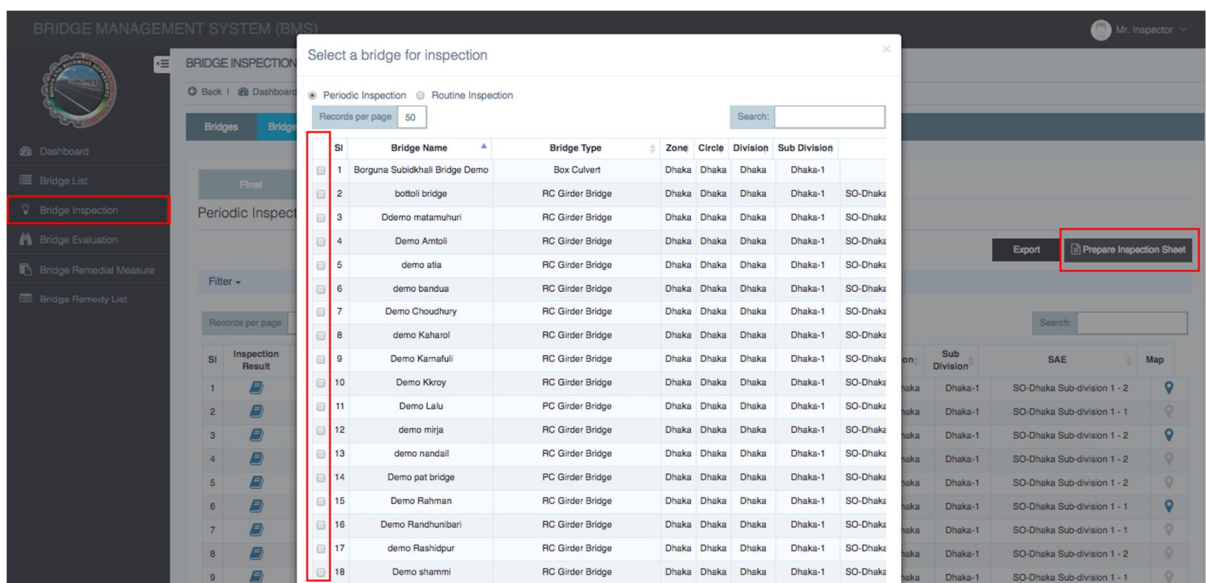
If you find bridge basic data to be modified during field inspection, you have to inform them to Sr. Inspector. After Sr. Inspector confirms and approve them, Sr. Inspector sends email to inform them with specified form to Data Entry Operator.

After the modification and check them, Data Cross Checker sends email to the Sr. Inspector and you. Then you can start to input inspection result.

!! Only for 1st Periodic Inspection in 2018 !!

No need to inform to Data Entry Operator to modify inputted bridge basic data. By approval of Sr. Inspector, Inspector can modify it.

Preparation for Field Inspection



- (a) Click “Prepare Inspection Sheet”.
- (b) Choose “Targeted Bridge” in Periodic Inspection Integrated List and click “New Sheet”.
- (c) Click “Print”. You can get the bridge inventory and last result of inspection of the bridge.
- (d) You bring them to field inspection and note rating of defects into the blanked sheet.

!! Only for 1st Periodic Inspection in 2018 !!

Because this is 1st periodic inspection, last result has not existed.

Therefore, operate from step “e.”

Bridge Inventory

Bridge Inventory consists of following items.

- Bridge basic data with drawings and photos of each view
- Work history
- Element Numbering system
- Field sketch of defects of last periodic inspection
- Defects photos of last periodic inspection
- Last periodic inspection result sheet

- (a) Click “Prepare Inspection Sheet “.
- (b) Choose “Periodic Inspection” and “Targeted Bridge” in Select a bridge for inspection.
- (c) Click “New Sheet”.
- (d) Click “Create”.

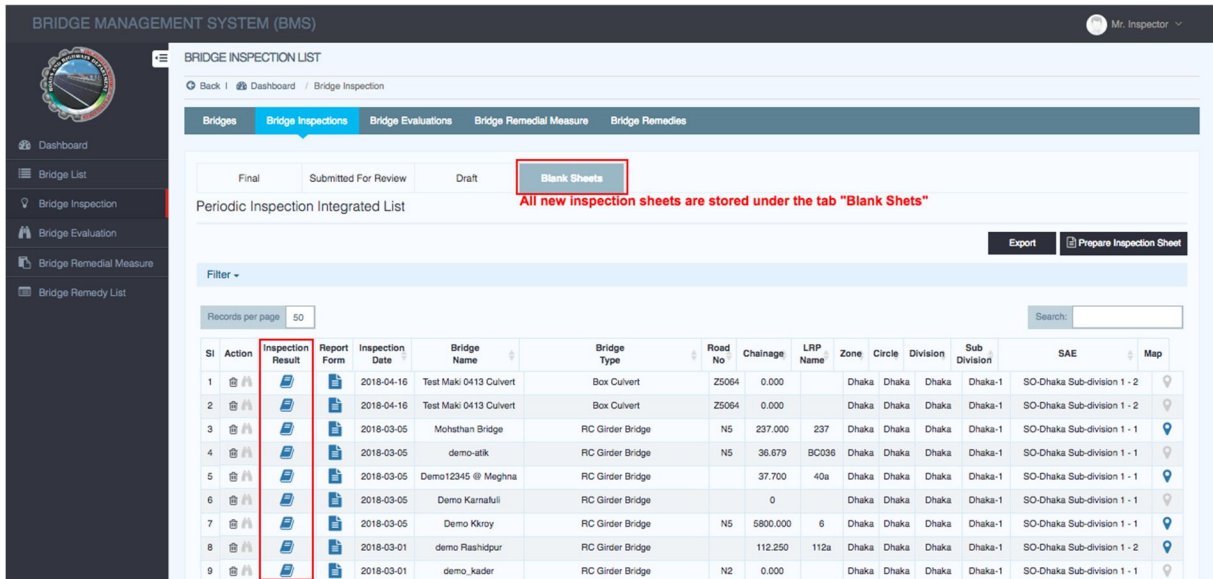
Note

Blanked sheet has pages as same as No. of Spans. It is necessary to print out all pages.

Preparation to input Inspection Result into BMS

- (a) Complete and check the paper documents.
- (b) Take PDF Scan Data of Field sketch of defects.
- (c) Make Defects Photos sheet with Form of Excel.
You can download the form from link at login page of BMS
- (d) Make PDF file of completed Defects Photos sheet.

Input Inspection Result into BMS



- (a) Click “Bridge Inspection”.
- (b) Click “Prepare Inspection Sheet “.
- (c) Choose “Periodic Inspection” and “Targeted Bridge” in Select a bridge for inspection.
- (d) Click “New Sheet”.
- (e) Click “Create”.
- (f) Click “Blank Sheets” in Bridge Inspection.

0% Inspection has been completed

100% input required to proceed to next step

1 2

Fill with "a"

File Number		INS-Z5064--20180416		Bridge Name		Test Maki 0413 Culvert		Superstructure		Box Culvert		Year		2050													
Zone		Dhaka		Circle		Dhaka		Division		Dhaka		Sub-division		Dhaka-1													
SAE				SAE		SO-Dhaka Sub-division 1 - 2																					
Inspection Date		2018-04-16		Inspector		Admin																					
Survey Result		No. of Cross Beam Line		0		Span Length		3.000		No. of Spans		1 /2															
Elements	Defects	Steel			Concrete			Others			Common																
		Corrosion	Crack in Steel	Loose or Missing Bolts	Fracture	Deterioration of Paint System	Crack	Spalling /Exposed Rebar	Water leakage/ Efflorescence	Fallen out of Deck Slab	Cracking of Deck Slab	Delamination	Abnormal Spacing	Difference in Level	Abnormal Bituminous Pavement	Functional Disorder of Bearings	Other Types of Defects	Defects of Reinforced Materials	Abnormal Anchorage	Discoloration/Deterioration	Water Leakage/Puddle	Abnormal Noise/Vibration	Abnormal Deflection	Deformation/Break	Accumulation of Debris	Settlement/Tilt/Movement	Scouring
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Head Slab		01																									
Footing		01																									
		02																									
Side Wall		01																									
		02																									

Input results in white box only

(g) Blanked Inspection sheet is displayed.

(h) Input “Rating of Defects” and fill all cells in the sheet. You can input following characters.

<u>Rating of Defects</u>	
➤ “ - “	: Element doesn't exist in this bridge.
➤ “ N “	: non visible.
< case 1 >	< case2 >
➤ “ a “	: no defect
➤ “ b “	: small defect
➤ “ c “	: medium defect
➤ “ d “	: large defect
	➤ “ a “ : not existing
	➤ “ e “ : existing

Note

Rating of Defects “a” to “e” are defined by each kind of defect. You can refer them to “Appendix of Bridge Inspection Manual” with photos.

Note

If the bridge has multiple spans, you have to input all cells of all spans.

Note

You can use “Save as Draft” function, if you want to stop and discontinue inputting halfway.

(i) When you input “d” or “e”, Inspection Picture Add window is displayed.

Input “Title” and “Description”. And upload a “Image file (JPG)” of the defect.

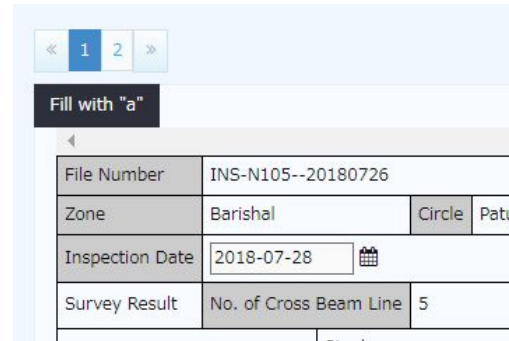
<u>Inspection Picture Add window</u>	
➤ “Title“	
:Input “Element No. , Kind of Defect”.	
➤ “Description“	
: Note explanation of the situation.	
➤ “uploading Image file“	
File type	: JPG or PNG



(j) After completion to input result, (Display “100% inspection has been completed”)

Note

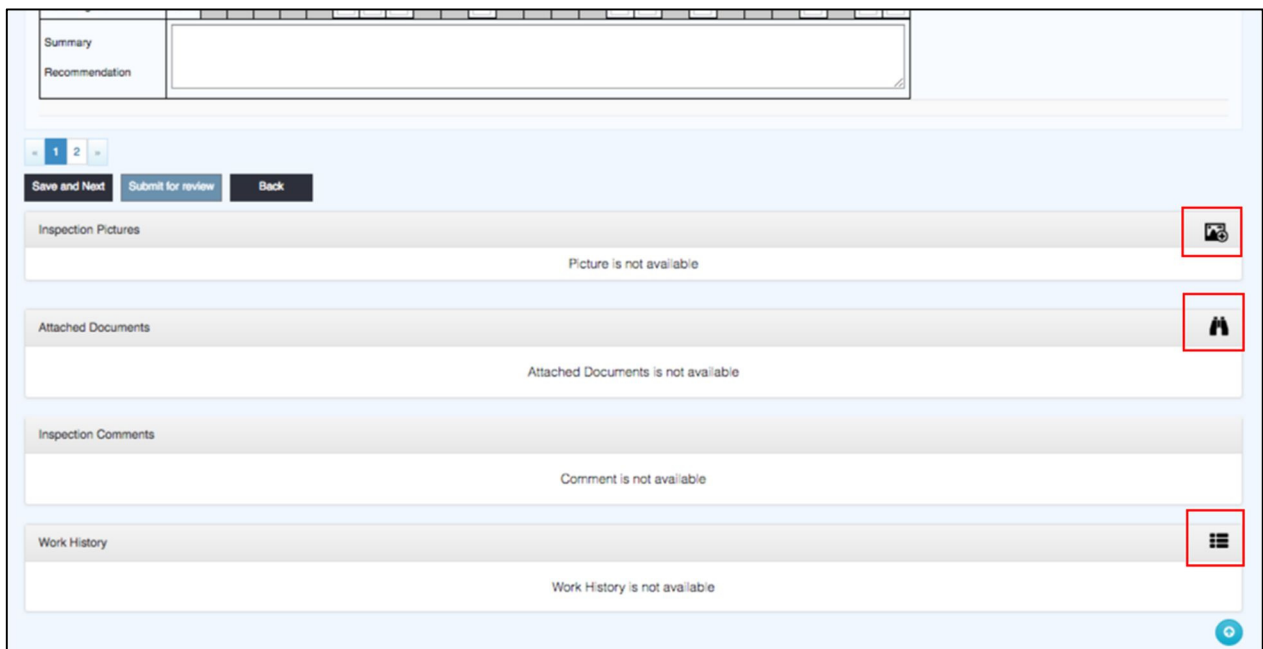
After inputting rating “b, c, d, e”, you can use “Fill with “a”” function. By clicking “Fill with “a””, blank cells are filled with “a” automatically.



(k) Click icon of Attached Documents and upload Field sketch of defects (PDF) and Defects Photos sheet (PDF).

(l) Click icon of Work History and input information as followings,

- Date : choose inspection date
- Type : choose Periodic Inspection.
- Element and Content : input “none”.
- Bridge Rated and Remarks : keep blank.



(m) You can click “Submit for Review”.

Click “Submit for Review”, then the inputted inspection result sheet is submitted to Sr. Inspector with email (automatically sending system).

Recheck and Modification of Inspection Result

If Sr. Inspector decides that it's necessary to modify or re-study of submitted Inspection Result, Sr. Inspector can require the Inspector to recheck it.

- (a) You get email from BMS to recheck inputted Inspection Result.
- (b) Click "Bridge Inspection".
- (c) Click "Need Recheck (x)". (x) shows number of bridges to be rechecked by you.
- (d) Recheck and modify if it's necessary.
- (e) Click "Submit for Review".

6.5.4. Step-by-step instruction for Bridge Sr. Inspector

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr. Inspector Evaluator	Chief Insp.	Public

Sr. Inspector reviews inputted inspection result by Inspector.

When Inspector click “*Submit for Review*”, email to inform it is sent to Sr. Inspector automatically. At the same time, “*Need Review (x)*” in Bridge Inspection shows (x : number of submitted bridges to review).

- (a) Click “Bridge Inspection”.
- (b) Click “Submitted for Review (x)”. Bridges submitted you by Inspector are displayed.
- (c) Choose “Targeted Bridge”.
- (d) Review the result by referring Bridge Inventory, Field sketch of defects (PDF) and Defects Photos sheet (PDF).

Note

Rating of defects “d” and “e” in Inspection Result Sheet shows pop-up photos of the defect by putting mouse cursor on the character.

- (e) Click “Recheck” if you find something strange result.
Then email to inform it is sent to Inspector automatically. At the same time, “Need Recheck (x)” in Bridge Inspection shows (x : number of submitted bridges to recheck).
- (f) Click “Send for Approval” if you don’t find any points to be modified.

Note

When you click “*Send for Approval*”,

- If last Whole Bridge Condition Category (A to D) of the bridge was “A” or “B”, next step is Evaluation by Bridge Evaluator.
- If last Whole Bridge Condition Category (A to D) of the bridge was “C” or “D”, Chief Inspector also reviews the Result of Inspection.

6.5.5. Step-by-step instruction for Bridge Chief Inspector

<i>Sys. Admin</i>	<i>D-Entry</i>	<i>D-Check</i>	<i>Committee</i>
<i>Inspector</i>	<i>Sr.Inspector Evaluator</i>	<i>Chief Insp.</i>	<i>Public</i>

Chief Inspector reviews bridge inspection result approved by Sr. Inspector if the bridge was scored as “C” or “D” in last inspection.

- (a) Click “Bridge Inspection”.
- (b) Click “For Approval (x)”. Bridges submitted you by Sr. Inspector are displayed.
- (c) Choose “Targeted Bridge”.
- (d) Click “Report Form” and open Inventory of the bridge.
- (e) Check “Entire Bridge Condition Category in Last Periodic Inspection” in the Inventory.
 - >> If the Category is “A” or “B”, skip to (h).
 - >> If the Category is “C” or “D”, you have to review inspection result of the bridge..
- (f) Review the result by referring Bridge Inventory, Field sketch of defects (PDF) and Defects Photos sheet (PDF).
- (g) Click “Recheck” if you find something strange result. Then email to inform it is sent to Inspector automatically. At the same time, “Need Recheck (x)” in Bridge Inspection shows (x : number of submitted bridges to recheck).
- (h) Click “Sign & Approval” if you don’t find any points to be modified.

6.6 Input and Browsing of Evaluation Result : Bridge Evaluation

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

Following flowchart shows outline of “input” and “approval” step of Inspection result in BMS. You can refer “3.7 Bridge Inspector” to understand types of Inspector in the chart. This section shows explanation of “Periodic Inspection”.

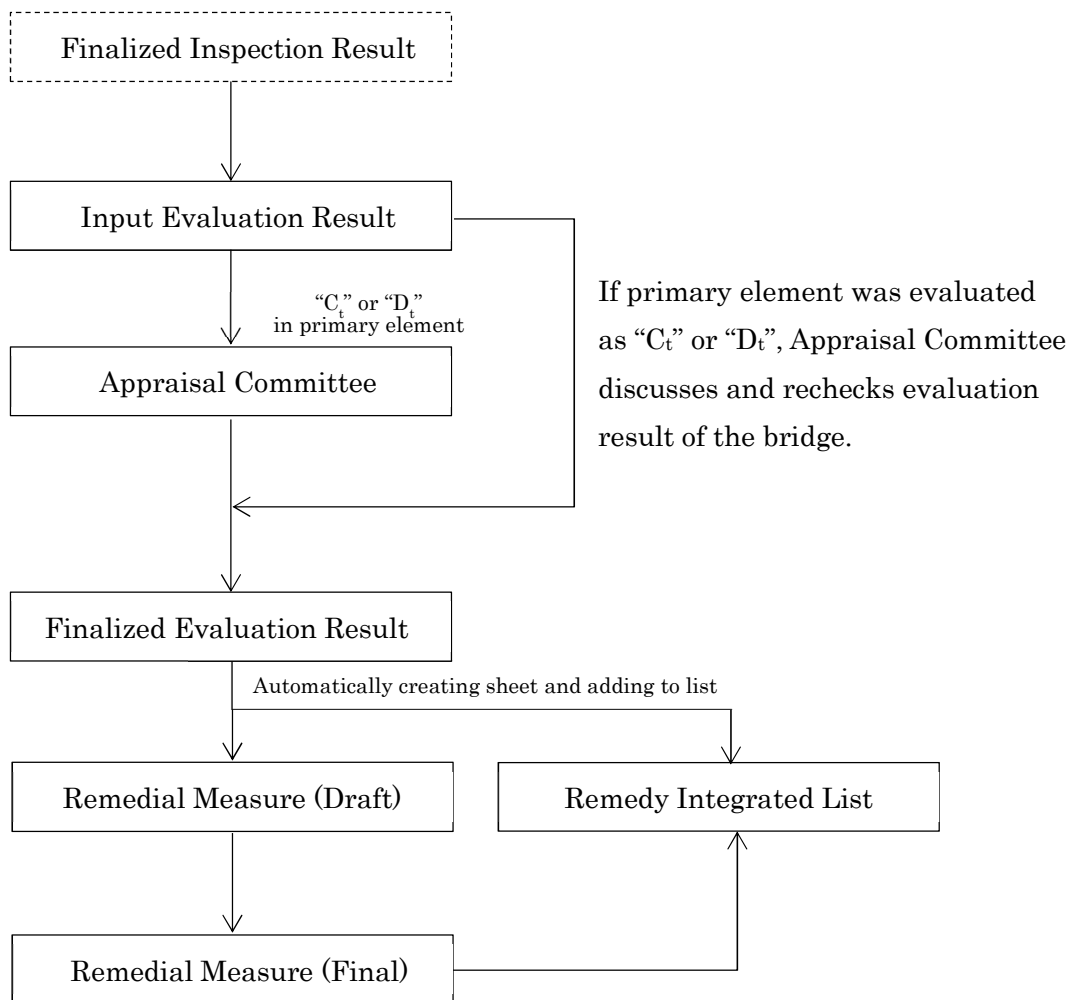


Figure. Flowchart of inputting Evaluation Result into BMS

6.6.1. Preparation to input Evaluation Result

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

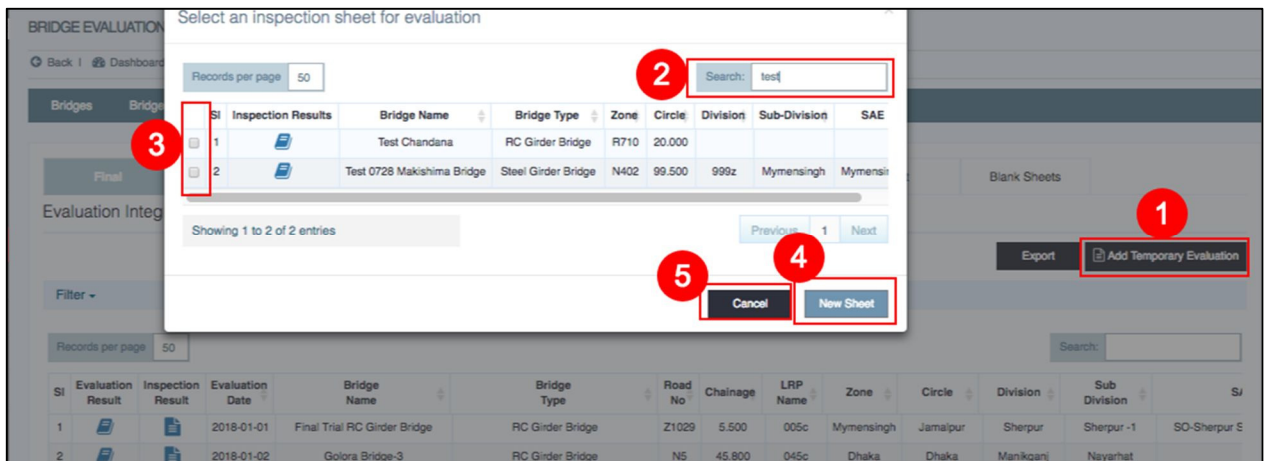
It is better to print out following items.

- Inspection Result sheets
- Field sketch of defects
- Defects Photos sheets

6.6.2. Outline of “Bridge Evaluation” page

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

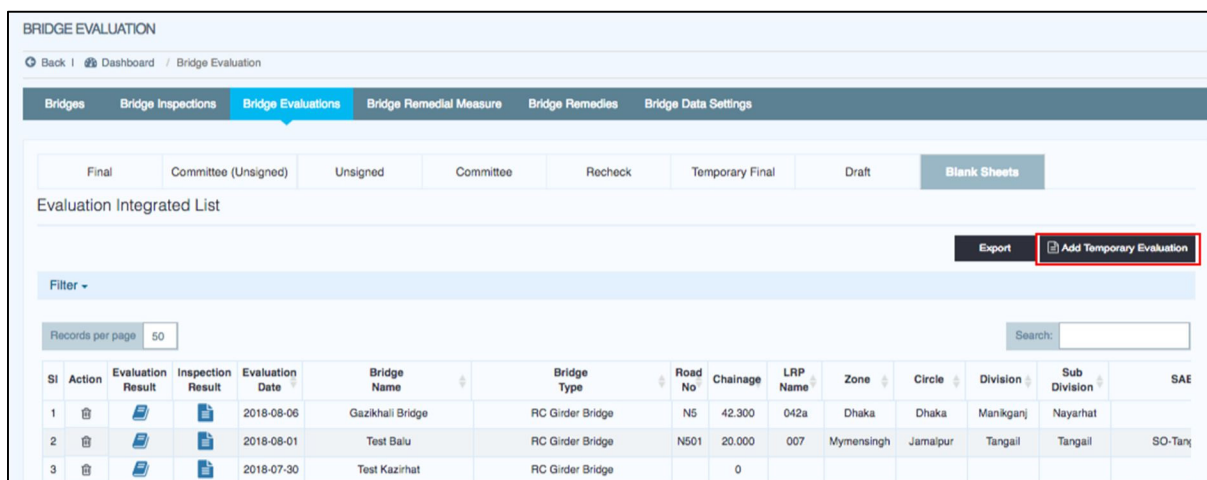
1. Click **“Add Temporary Evaluation”** to create new evaluation sheet.
2. Click **“Blank Sheets”** to view all blank evaluation sheets.
3. Click **“Draft”** to view all draft evaluation sheets.
4. Click **“Temporary Final”** to view all temporary final evaluation results.
5. Click **“Recheck”** to view all evaluation sheets sent for recheck.
6. Click **“Committee”** to view all evaluation results submitted to committee.
7. Click **“Unsigned (Evaluator)”** to view all evaluation results approved but unsigned by evaluator.
8. Click **“Unsigned (Committee)”** to view all evaluation results approved but unsigned by committee.
9. Click **“Final”** to view all final evaluation results approved and signed.
10. Click **“Filter”** to filter evaluation list.
11. Click **“Export”** button to download evaluation list in excel format.
12. User can change number of rows to show in list table. Example: 10, 25, 50, 100.
13. User can search bridge by any values of bridge data.
14. Evaluation list view actions:
 - **“Recycle Bin Icon”**: Click this icon to delete evaluation sheet.
 - **“Book Icon”**: Click this icon to view evaluation results.
 - **“File Icon”**: Click this icon to see bridge inventory data.



1. Click **“Add Temporary Evaluation”**, to create new evaluation sheet.
2. Search bridge from bridge list by name or any other key value.
3. Select a bridge for evaluation.
4. Click **“New Sheet”** to create new sheets.
5. Click **“Cancel”** to cancel creating new sheets.

6.6.3. Step-by-step instruction for Bridge Evaluator

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public



- (a) Click “Bridge Evaluation”.
- (b) Click “Add Temporary Evaluation”.
- (c) Choose “Targeted Bridge” in Select an inspection sheet for evaluation and click “New Sheet”.

Note

In Select an inspection sheet for evaluation, bridges agreeing with following all condition are displayed.

- The bridge has finalized inspection result.
- The bridge has not been created Evaluation sheet after scoring above finalized inspection result.

- (d) Click “Blank Sheets”.
- (e) Click “Evaluation Result” of the targeted bridge.

BRIDGE MANAGEMENT SYSTEM (BMS) Mr. Senior Inspector

EVALUATION EDIT SHEET

100% evaluation has been completed

100%

If you think the defect may do passenger on/under the bridge an injury, check in "Public Safety" box.

If you think it's necessary to carry out Detailed Investigation to get more information and reason of the defect, check in "Detailed Investigation" box.

Choose a category.

File Number	EVA-R23- LRP023-20170303	Bridge Name	test_feb_23	Superstructure		Box Culvert		Year	2003	
Zone	Dhaka	Circle	Dhaka	Division		Sub-division		Sub-Division-1, Dhaka		
Evaluation Date	2017-07-11	Evaluator	Admin	No. of Cross Beam Line	2	No. of Hinge	1	No. of Span	1 / 1	
Component	Element Type	Material	Type of Defects	At	Bt	Ct	Dt	Public Safety	Detailed investigation	Remarks
			1. Corrosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			2. Crack	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			3. Loose or Missing Bolts	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			4. Fracture	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			5. Deterioration of Paint System	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			6. Cracking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			7. Spalling / Exposed Rebar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			8. Water leakage/ Efflorescence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			9. Fallen out of Deck Slab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			10. Crack of Deck Slab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			11. Delamination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			12. Abnormal Spacing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			13. Difference in Level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

(f) Blanked Evaluation sheet is displayed.

Check a box of "Evaluation Category : At, Bt, Ct, Dt or N" for each existing element type.

<u>Evaluation Category</u>
➤ " At " : No Repair
➤ " Bt " : Minor Repair
➤ " Ct " : Major Repair
➤ " Dt " : Emergency
➤ " N " : Not Visible

(g) If there are defects judged to be remedied emergency for Public safety, check a box of "Public safety".

Note

Emergency for Public safety is serious defects to damage road users like pedestrians, vehicles, or pedestrians and passing vehicles under the bridge like as "hard broken railing", "spalling of concrete deck slab", "fallen out of concrete deck slab", "deformation of joint", "corrosion of light or traffic sign" and so on.

You can refer them to "Appendix-7 of Bridge Inspection Manual".

(h) If you require Detailed investigation to get more detail information of the defects, check a box of "Detailed investigation".

Note

There is a limit to understand the damage cause by visual inspection. Because by visual inspection, causes of the damage and future probable progress cannot be predicted all the time. In that case, the detailed investigation is carried out in order to determine the necessity of rehabilitation and strengthening of the particular bridge.

For example, in areas of airborne salt from the sea, or by long longitudinal crack along the reinforcement bar and PC steel, suspicions of chloride attack are considered.

You can refer them to “6.3 Detailed Investigation of Bridge Inspection Manual”.

- (i) After completion to input evaluation category,
 - Click “Save as Final” if “C_t” or “D_t” in primary element doesn’t exist.
 - Click “Submit to Committee” if “C_t” or “D_t” in primary element exists.

6.6.4. Step-by-step instruction for Appraisal Committee

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

Note

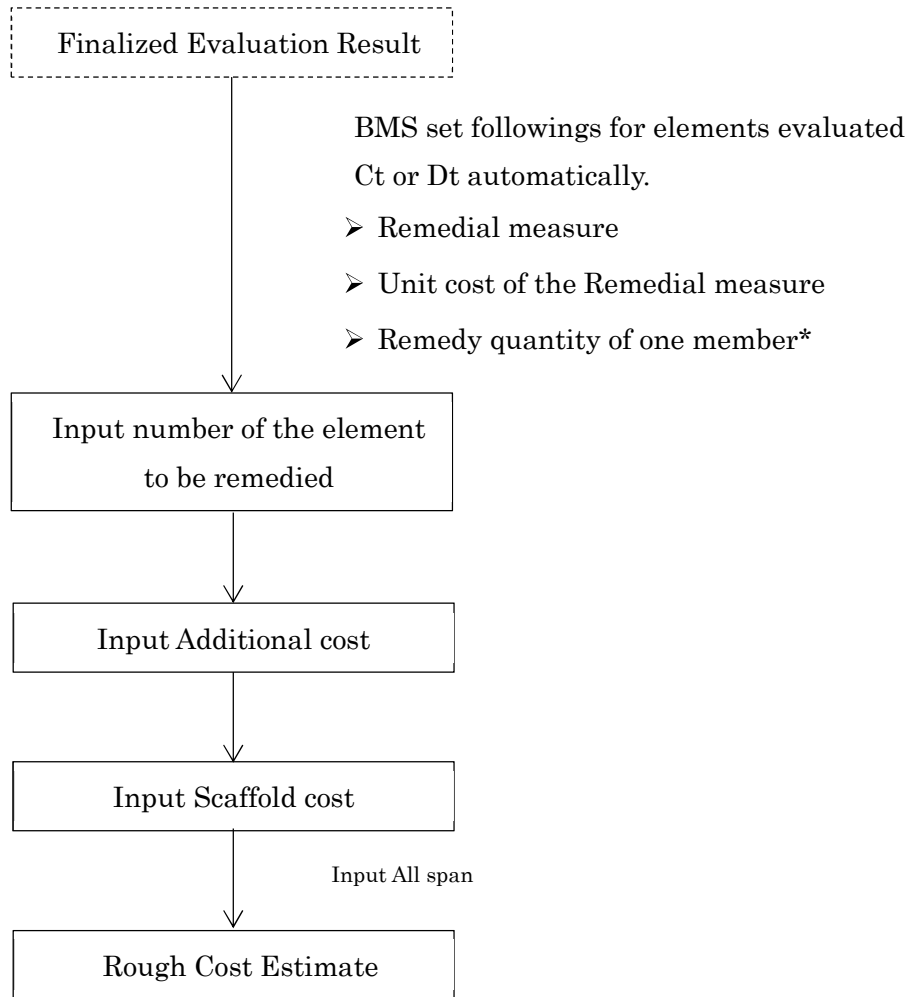
Bridge it has serious damage in primary element should be discussed its evaluated result in Appraisal Committee before the evaluation result uploads to BMS as Final.

- (a) Click “Bridge Evaluation”.
- (b) Click “Committee”.
- (c) Choose “Targeted Bridge”.
- (d) Check and discuss with the EVALUATION APPROVAL SHEET.
- (e) Click “Recheck”, “Approval But Sign Later” or “Sign & Approval”.

6.7 Arrangement of Rough Cost Estimate : Bridge Remedial Measure

<i>Sys. Admin</i>	<i>D-Entry</i>	<i>D-Check</i>	<i>Committee</i>
<i>Inspector</i>	<i>Sr.Inspector Evaluator</i>	<i>Chief Insp.</i>	<i>Public</i>

Rough cost estimate to remedy the bridge is calculated by following flowchart.



* You can refer 9.5 How to calculate Quantity to Remedy.

6.7.1. Preparation to input remedy information

<i>Sys. Admin</i>	<i>D-Entry</i>	<i>D-Check</i>	<i>Committee</i>
<i>Inspector</i>	<i>Sr.Inspector Evaluator</i>	<i>Chief Insp.</i>	<i>Public</i>

It is better to print out following items.

- Inspection Result
- Field sketch of defects
- Defects Photos sheets

6.7.2. Outline of “Bridge Remedial Measure” page

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

The screenshot shows the 'BRIDGE REMEDIAL MEASURE' interface. It includes a sidebar with navigation options like Dashboard, Bridge List, Bridge Inspection, Bridge Evaluation, Bridge Remedial Measure, Bridge Remedy List, Settings, Tools, and Activity Log. The main content area has tabs for Bridges, Bridge Inspections, Bridge Evaluations, Bridge Remedial Measure (selected), Bridge Remedies, and Bridge Data Settings. Below the tabs are buttons for 'Final' (2) and 'Draft' (1). A 'Remedial Measure List' section contains a 'Filter' dropdown (3), a 'Records per page' selector (4) set to 10, and an 'Export' button (5). A search bar (6) is also present. The table below shows columns for SI, Final Count, Result Sheet, Report Form, Evaluation Date, Bridge Name, Bridge Type, Road No, Chainage, LRP Name, Zone, Circle, Division, and Sub Division. Row 1 is highlighted with a red box (7) around the 'Final Count', 'Result Sheet', and 'Report Form' columns.

SI	Final Count	Result Sheet	Report Form	Evaluation Date	Bridge Name	Bridge Type	Road No	Chainage	LRP Name	Zone	Circle	Division	Sub Division
1	1			2018-07-26	Additional OJT Bridge	RC Girder Bridge	Z1029	5.500	005c	Mymensingh	Jamalpur	Sherpur	Sherpur -1
2				2018-07-25	Test_101	Steel Girder Bridge with Concrete Deck	N105	0.000		Barishal	Patuakhali	Barguna	Barguna
3				2018-05-07	Ddemo matamuhuri	RC Girder Bridge	N5	70.250	70a	Dhaka	Dhaka	Dhaka	Dhaka-1
4				2018-04-16	Amtola Bailey Bridge	Potable Steel Bridge	R315	0.000	044a	Dhaka	Dhaka	Manikganj	Nayarhat
5				2018-04-16	Test Maki 0413 Culvert	Box Culvert	Z5064	0.000		Dhaka	Dhaka	Dhaka	Dhaka-1
6	1			2018-04-13	Test Maki 0413 Culvert	Box Culvert	Z5064	0.000		Dhaka	Dhaka	Dhaka	Dhaka-1
7				2018-04-13	Test Maki 0413 Bridge	RC Girder Bridge		0		Cumilla	Cumilla	Brahmanbaria	Brahmanbaria
8				2018-04-11	Dummy Maki Bridge	RC Girder Bridge	N5	0.000		Dhaka	Dhaka	Dhaka	Dhaka-1
9	1			2018-03-08	Ddemo matamuhuri	RC Girder Bridge	N5	70.250	70a	Dhaka	Dhaka	Dhaka	Dhaka-1
10	1			2018-03-08	demo_dtc_D	RC Girder Bridge	N5	182.362	179b	Dhaka	Dhaka	Dhaka	Dhaka-1

1. Click “**Draft**” to view all draft remedial measure sheets.
2. Click “**Final**” to view all finalized remedial sheets.
3. Click “**Filter**” to filter inspection list.
4. User can change number of rows to show in list table. Example: 10, 25, 50, 100, all...
5. Click “**Export**” button to download remedial measure list in excel format.
6. User can search bridge by any values of bridge data.
7. Remedial measure list view actions:
 - o “**Final Count**” shows number of times to finalized remedial measure of the bridge.
 - o “**Book Icon**”: Click this icon to view remedial measure results.
 - o “**File Icon**”: Click this icon to see bridge inventory data.

6.7.3. Step-by-step instruction for Bridge Evaluator

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

- (a) Click “Bridge Remedial Measure”.
- (b) Click “Draft”.
- (c) Click “Result Sheet” of targeted Bridge. Then **Remedial Measure Edit Sheet** is opened.

< Remedial Measure Edit Sheet >

Component	Element Type	Material	Type of Defects	Remedy measure	Unit Cost	Unit	Quantity	No. of Element	Subtotal Cost	Additional Cost	Total Cost
Main Girder	Steel		1. Corrosion								
			2. Crack in Steel								
			3. Loose or Missing Bolts								
			4. Fracture								
			5. Deterioration of Paint System								
	Concrete		6. Crack	Crack Injection	5419	m	108.00	3	1755756	Additional Cost	1755756
			7. Spalling /Exposed Rebar	Fluid Recasting Mortar	95793	m3	18.00	3	5172822	Additional Cost	5172822
			8. Water leakage/ Efflorescence	None	-	-	0.00	0	0	0	0
			9. Fallen out of Deck Slab								
			10. Cracking of Deck Slab								
			11. Delamination	None	-	-	0.00	0	0	0	0
	Others		12. Abnormal Spacing	None	-	-	0.00	0	0	0	0
			13. Difference in Level								
			14. Abnormal Bituminous Pavement								
			15. Functional Disorder of								

1. “Component” shows superstructure, substructure, bearing or others.
2. “Element Type” shows name of targeted element.
3. “Material” shows material type of the element.
4. “Type of Defects” shows name of targeted defect.
5. “Remedy Measure” is set based on Evaluation category automatically.
6. “Unit Cost” is set referring with Remedy measure automatically.
7. “Unit” shows unit of the measure like as BDT/m, BDT/m2 and so on.
8. “Quantity” shows quantity required to be remedied of “one” element.
9. “No. of Element” shows number of element to be remedied. *User has to input.*
10. “Subtotal Cost” shows “Unit cost x Quantity x No. of Element”.
11. User can arrange Subtotal Cost by inputting “Additional Cost”.
12. “Total Cost” shows “Subtotal Cost + Additional Cost” of the combination of remedy.

Defect Type	Remedy Measure	Unit Cost	Unit	Quantity	No. of Element	Subtotal Cost	Additional Cost	Total Cost
22. Abnormal Deflection				0.00	0	0		0
23. Deformation/Break				0.00	0	0		0
24. Accumulation of Debris				0.00	0	0		0
25. Settlement/Tilt/Movement								
26. Scouring								
27. Hard Defect								
Scaffold Cost								
TOTAL						87618198	0	87618198

13. User has to input manually “Scaffold Cost” for targeted span.
14. “TOTAL” shows total cost of targeted span.
15. By clicking “Save and Next”, you can save result of targeted span and go to next span. (Only for multiple span bridge)
16. By clicking “Save as Final”, you can save all result of remedial measure. (You can click this at end span.)

(d) Check the Remedial Measure Edit Sheet, and how many element should be remedied by the remedial measure.

(e) Input “No. of Element” of each combination of element type and defects.

Note

This note shows how to consider “No. of Element” to be remedied.

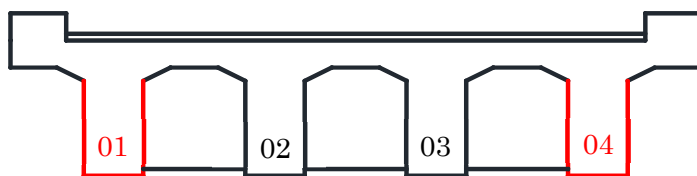
e.g. Serious corrosion of Steel Main Girder

In order to understand how to input No. of Element, it is very important to separate Evaluation category and Rating of defects.

Remedial measure is chosen based on combination of Element Type, Type of Defects and Evaluation category Ct or Dt. Point to be noted is “Not all element of Element type categorized as Ct or Dt is serious damaged”. You can refer following example.

e.g. Concrete Main Girder of RC Girder Bridge (Crack categorized as Dt)

- Evaluator evaluated by referring following inspection result.
Because Main girder 04 has serious damage, Evaluator evaluated as Dt.
- In this case, Main girder 01 and 04 are damaged. **Therefore, the two elements should be remedied.**



Red main girder is damaged.

Inspection Result		Crack	
Main Girder	01	c	← Necessary
Main Girder	02	a	← No need
Main Girder	03	b	← No need
Main Girder	04	d	← Necessary

➤ Default figure of No. of Element in Bridge Remedial Measure is same as element number.

➤ In this case, user should modify it to “2”.

Material	Type of Defects	Remedy measure	Unit Cost	Unit	Quantity	No. of Element
	6. Crack	Crack Filling	89	m	45.00	4

Quantity of ONE element to be remedied.

Default number is “4” (4 main girders). **User should input “2”.**

(e) Input “Scaffold Cost” of each combination of element type and defects.

- Scaffold Cost (bottom of Draft remedial measure sheet) requires to input manually by user, because of difficulty to set area of Scaffold automatically.
- Scaffold cost is calculated by following formula.

$$[\text{Unit Cost of Scaffold (tk/m}^2\text{)}] \times [\text{Span length}] \times [\text{Bridge Width}] \times [\text{ratio of setting area}]$$

Unit cost of Scaffold : Refer Bridge Rehabilitation and Strengthening Manual part 2.

$$= 20,279 \text{ tk/m}^2 \text{ (March 2018)}$$

Span length , Bridge Width : Refer Bridge Inventory.

ratio of setting are : User (mainly Evaluator) considers required area of scaffold to carry out remedy construction like as “all span length”, “1/2 of span length” or “1/4 span length”.



For example of Scaffold

6.8 Browsing Result of BMS : Bridge Remedy List

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

1. Click **“All”** to view all category bridges.
2. Click **“A Category”** to view all A category bridges.
3. Click **“B Category”** to view all B category bridges.
4. Click **“C Category”** to view all C category bridges.
5. Click **“D Category”** to view all D category bridges.
6. Click **“Filter”** to filter remedy list.
7. By default most 50 recent inspections data will show. Click to **“View All”** to see all remedy list.
8. Click **“Export”** button to download remedy list in excel format.
9. User can change number of rows to show in list table. Example: 10, 25, 50, 100.
10. User can search bridge by any values of bridge data.

6.9 Data Analysis with Exported Data

In order to create Annual Needs report based on output of BMS, user can use “Excel sheet for annual report.xls”. User can download the excel file from link at top of Dashboard.

- (a) Click **“Bridge Remedy List”**.
- (b) Confirm **“Latest”** is enabled.
- (c) Arrange Integrated List with Filter, Records per page and Search.
- (d) Click **“Export”** to get exported Excel sheet.
- (d) Open the Excel sheet and follow manual in next page.

Information
Date

BMS Result of Manikganj Area (1st Periodic Inspection)
2018 Jan 16

1. Input information and date.

10. Input Budget Amount.

Budget (BDT)
6,000,000

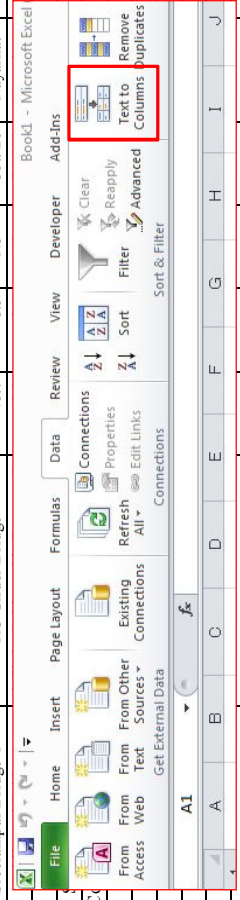
No.	Bridge Name	Bridge Type	Bridge Length	Bridge Width	Road No	Chain -age	Sub -Division	SO	Damage Category	Damage Degree	Importance Degree	Priority to Remedy	Subtotal Cost	Additional Cost	Total Cost	Cumulative Repair Cost
1	Gazikhai Bridge	RC Girder Bridge	113.3	8.1	N5	42.300	Nayarith		D	97	95	3	3,001,951	0	2,112	2,112
2	Golara Bridge-3	RC Girder Bridge	48.7	8.0	N5	45.800	Nayarith						3,026	0	3,001,951	3,004,063
3	Kolia Bailey Bridge	Bailey Bridge with Steel Deck	52.0	3.9	Z5064	11.412	Manikganj						0	0	126,026	3,130,089
4	Kholapara Bridge	RC Girder Bridge	25.4	10.3	R504	18.200	Manikganj						0	0	0	3,130,089
5	Wrishbari Bridge	RC Girder Bridge	13.2	7.9	N5	42.925	Nayarith						3,323	0	0	3,130,089
6	Kaliya-1 Bridge	RC Girder Bridge	150.6	7.0	N5	29.010	Nayarith						0	0	1,453,323	4,583,412
7	N54014680												0	0	0	4,583,412
8	Bymle Bridge												0	0	0	4,583,412
9	Bathuli Bridge-3												197,184	0	0	4,583,412
10	Kashimagar Culvert												65,236	0	197,184	4,780,596
11	Bathoinuri Bailey Bridge-1												0	0	65,236	4,845,832
12	Bathuli Bridge-1	RC Girder Bridge	13.4	8.0	N5	38.800	Nayarith						14,180	0	0	4,845,832
13	Sorupai Bailey Bridge	Bailey Bridge with Steel Deck	36.7	3.4	Z5064	7.812	Manikganj						0	0	14,180	4,860,012
14	Kunduriya Bridge												13,437	0	0	4,860,012
15	Kalamur Bridge-2												1,570,460	225,000	238,437	5,098,449
16	Kalamur Box Culvert												782,889	150,000	1,720,449	6,818,909
17	Dautiya Bridge-2												0	0	0	7,601,798
18	Sharifbag Bailey Bridge												0	0	0	7,601,798
19	Suitpara Bridge												0	0	0	8,351,798
20	Chakrabarti Bridge-2												0	0	0	8,351,798
21	Kaliya Bridge-2												0	0	0	8,924,946
22	Baropara Box Culvert 3												0	0	0	8,924,946
23	Choto Tora												0	0	0	8,924,946
24	Chandra Box												0	0	0	8,924,946
25	Strearapur Bridge-1	RC Girder Bridge	48.7	8.5	N5	35.900	Nayarith						0	0	0	8,924,946
26													0	0	0	9,424,946
27													800,000	0	500,000	9,424,946
28													0	0	0	9,424,946
29													19,372	0	0	9,424,946
30													0	0	0	9,444,318
31													578,217	0	628,217	10,072,535
32													0	0	0	10,072,535
33													0	0	0	10,072,535
34													0	0	0	10,072,535
35													0	0	0	10,072,535
36													0	0	0	10,072,535
37													0	0	0	10,072,535
38													0	0	0	10,072,535
39													0	0	0	10,072,535
40													0	0	0	10,072,535
41													0	0	0	10,072,535
42													0	0	0	10,072,535
43													0	0	0	10,072,535
44													0	0	0	10,072,535
45													0	0	0	10,072,535

You can arrange descending order or ascending order with this switch of each column.

If Cumulative repair cost is over than "Budget Amount", the cell are colored.

Operation 5. to 9. has done for column "P".

Operation 5. to 9. has not done yet for column "Q and R".



2. Copy "Column B to P" of exported excel sheet.
 3. Click "D7" cell.
 4. Right click and Paste it as "Value (V)".
 5. Select all cells of column "P" from "P7" inputted.
 6. Click "Data".
 7. Click "Data Tools".
 8. Click "Text to Columns".
 9. Click "Finish".
- Operation 5. to 9. is necessary for "Q" and "R".

7. HOW TO USE BMS FOR EACH STEP (ROUTINE)

This chapter shows “How to use BMS in Routine inspection” focused on each step of BMS management.

7.1 Outline of BMS in Routine inspection

Routine inspection is simple site inspection to check level of safety and ensure appropriate serviceability on and under the bridge. Inspector inspects the bridge by following Routine inspection sheet and checks “Yes / No” for each item in the sheet.

Result of Routine inspection is out of target to calculate “priority to remedy” and “Rough cost estimate”.

7.2 Input and Browsing of Inspection Result : Bridge Inspection

7.2.1. Preparation to input Inspection Result.

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr/Inspector Evaluator	Chief Insp.	Public

- Bridge inventory sheet (paper)
- Routine Inspection sheet (paper)

7.2.2. Outline of “Bridge Inspection” page

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

You can find “Routine Inspection Integrated List” at bottom of Bridge

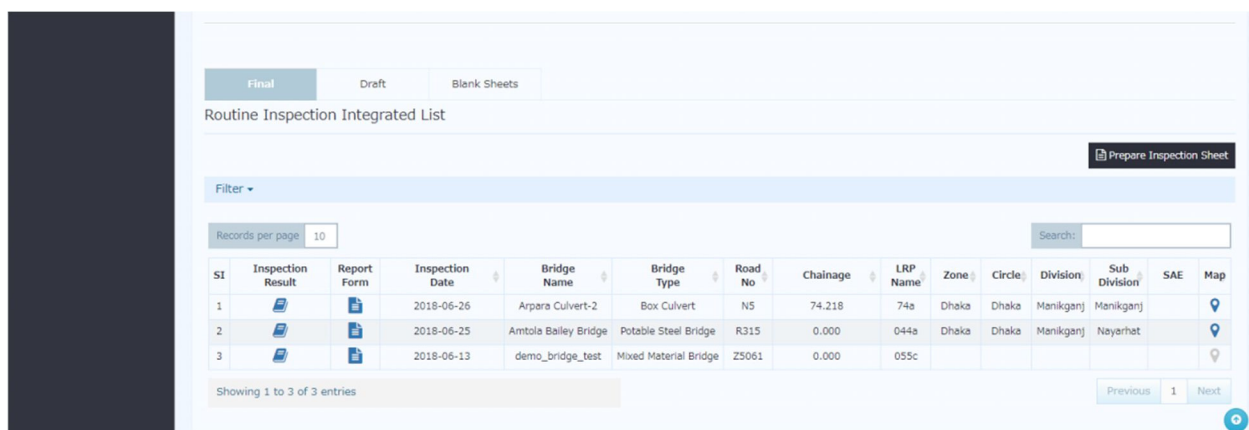
The screenshot shows the 'Routine Inspection Integrated List' interface. At the top, there are three tabs: 'Final' (4), 'Draft' (3), and 'Blank Sheets' (2). A 'Prepare Inspection Sheet' button (1) is located in the top right. Below the tabs is a 'Filter' dropdown (5) and a 'Records per page' selector (6) set to 10. A search bar (7) is also present. The main area contains a table with columns: SI, Inspection Result, Report Form, Inspection Date, Bridge Name, Bridge Type, Road No, Chainage, LRP Name, Zone, Circle, Division, Sub Division, SAE, and Map. The table lists three entries. At the bottom, there is a pagination bar (8) showing 'Showing 1 to 3 of 3 entries' and navigation buttons for 'Previous', '1', and 'Next' (9).

1. Click **“Prepare Inspection Sheet”**, Select **“Routine”** and click create.
2. Click **“Blank Sheets”** to view all blank inspection sheets.
3. Click **“Draft”** to view all draft inspection sheets.
4. Click **“Final”** to view all inspection sheets approved and signed.
5. Click **“Filter”** to filter inspection list.
6. User can change number of rows to show in list table. Example: 10, 25, 50, 100, all...
7. User can search bridge by any values of bridge data.
8. Inspection list view actions:
 - **“Book Icon”**: Click this icon to view inspection results.
 - **“File Icon”**: Click this icon to see bridge inventory data.
9. Click **“Next”** to see next page. Click **“Previous”** to see previous page.

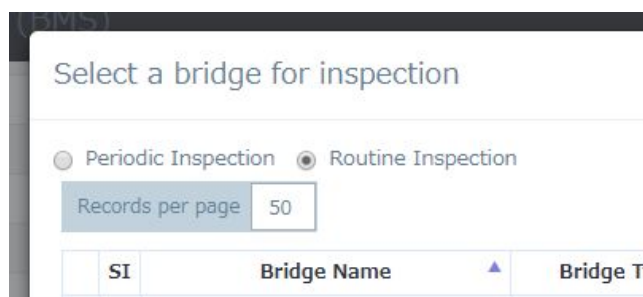
7.2.3. Step-by-step instruction

Sys. Admin	D-Entry	D-Check	Committee
Inspector	Sr.Inspector Evaluator	Chief Insp.	Public

Preparation for Field Inspection



- (a) Click “Bridge Inspection”.
- (b) Choose “Targeted Bridge” in Routine Inspection Integrated List and click “Inspection Form”.
- (c) Click “Print”. You can get the bridge inventory and last result of inspection of the bridge.
- (d) You bring them to field inspection and note rating of defects into the blanked sheet.
- (e) Click “Prepare Inspection Sheet “.
- (f) Choose “Routine Inspection” and “Targeted Bridge” in Select a bridge for inspection.



- (g) Click “New Sheet”.
- (h) Blanked Inspection sheet is displayed. Click “Create”.

Preparation to input Inspection Result into BMS

- (i) Complete and check the paper documents.

Input Routine Inspection Result into BMS

- (j) Click “Blank Sheets” in Bridge Inspection.
- (k) Click “Inspection Result” of the targeted Bridge.

ROUTINE INSPECTION FORM

Back | Dashboard / Inspection / View

File Number	INS-Z1029-005c-20180728			Inspector	Admin	Date	2018-07-28
Zone	Mymensingh	Circle	Jamalpur	Division	Sherpur	Sub-Division	Sherpur -1
Road No.	Z1029	Road Name	unknown			GPS	Lat 89° 59' 59"
						Long	12° 59' 59"
Bridge Name	Additional OJT Bridge		LRP+Offset (m)	500		Chainage (m)	5.500
						Span No.	2
Inspection Elements (*Refer to bottom of form)	Problem (Yes/No)	Rectified (Yes/No)	Maintenance Required (Yes/No)	Inspection Required (Yes/No)	Location and Comments		
Deck Surface							
1 Deck Surface							
• Difference in Level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Abnormal bituminous pavement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Accumulation of debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2 Expansion Joints							
• Material defects*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Abnormal spacing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Accumulation of debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Abnormal anchorage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Abnormal deflection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Deformation /break	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
9 Drainage system							
• Material Defects*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Water leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Deformation /break	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
• Accumulation of debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Material *	Defects description						
Concrete	Crack, spalling/exposed rebar, waterleakage/efflorescence, delamination						
Steel	Corrosion, crack in steel, loose or missing bolt, fracture, deterioration of paint system						
General Comments							

Save as Final | Save | Back

- (l) Check each cell in the sheet if the result is “Yes”.
- (m) Input the Locations and Comments if necessary,
- (n) After inputting, click “Save as Final”.

Note

If you want to save without saving as Final, you can click “Save”. You can continue input of the bridge at Draft tag.

8. HOW TO USE BMS IN OTHER INSPECTION



This chapter shows how to use BMS in “Interim inspection”, “Emergency Inspection” and “Detailed Investigation”. Those inspections are not scheduled inspection, and BMS doesn’t have the form for them.

8.1 Interim Inspection

Interim Inspection is defined in Inspection and Evaluation Manual as following,

- Purpose
To monitor a particularly known or suspected deficiency between the periodic inspections and serves as a supplement of the periodic inspection.
- Scope
To monitor a particularly known or suspected deficiency discovered during periodic inspection, such as foundation settlement or scour, significant member deterioration, or the public's use of a load-posted bridge
- Example:
Bridges posted for a weight limit less than the legal weight limit.
The sign of rapid deterioration of a particular bridge element.
Bridges with potential foundation problems such as scour.

Result of the Interim inspection of the bridge is created as a report (PDF). The Inspector has to upload it into BMS.

- (a) Click “Bridge Inspection”.
- (b) Click “Prepare Inspection Sheet” and create periodic inspection sheet of targeted bridge.
- (c) Open the blank inspection sheet, and click icon of “Attached Document”. 
- (d) Upload the report PDF.
- (e) Input “This is result of Interim Inspection on (Date)” at “Summary” bottom of the sheet.
- (f) Click icon of “Work History” and input information. 
- (g) Click “Fill with a”. After that click “Submit for Review”. If the bridge is multiple span bridge, click “Save and Next” and fill with “a” all sheet.
- (h) Senior inspector and Chief inspector give approval. Evaluation is not necessary.

8.2 Emergency Inspection

Emergency Inspection is defined in Inspection and Evaluation Manual as following,

Emergency Inspection is carried out whenever there is a natural disaster such as flooding, heavy rain, earthquake, landslide, or large accidents such as collision by vehicle/ship or fire or serious accidents on the bridge.

➤ Purpose

To confirm that the bridges remain safe for use or to determine the necessary urgent remedial action required to either ensure the safety of the bridge or to restore the function of the bridge.

Result of the Interim inspection of the bridge is created as a report (PDF). The Inspector has to upload it into BMS.

➤ Scope

The following measures should be taken in addition to collecting the additional information.

To judge the severity of the defect, design documents, as built drawings and a history of maintenance works carried out earlier should be reviewed.

Following investigation and measurement of the defects to the bridges needs to be carried out on site. With this information a decision will be required whether the bridge will needed to be closed to ensure the safety of public traffic.

Because Emergency inspection should be carried out as quickly as possible, Result of the Emergency inspection of the bridge is usually easy report (PDF). The Inspector has to upload it into BMS.

➤ Procedure to upload the report to BMS is same as 8.1 Interim Inspection.

8.3 Detailed Investigation

Detailed Investigation is defined in Inspection and Evaluation Manual as following,

- Purpose
To investigate defect causes or structural condition, behavior or to assess damaged structural components for repair/rehabilitation.
- Scope
The following objectives are covered by detailed investigation.
 - To grasp detailed behavior and actions of defect
 - To monitor the progress of any defect
 - To investigate the cause of defect
 - To test and evaluate material quality or strength
 - To evaluate structural strength

Result of the Emergency Investigate of the bridge is created as a report (PDF). The Inspector has to upload it into BMS.

- Procedure to upload the report to BMS is same as 8.1 Interim Inspection.

9. TECHNICAL NOTE

9.1 How to calculate Damage Degree

Damage degree of combination of “each defect and each element” are calculated based on “Evaluation Category”, “Weight Coefficient of each component”, “Weight Coefficient of each element” and “Weight Coefficient of each type of defects”.

Current two “Weight coefficients” are defined based on manuals in Japan. Because situation of bridge is different between Bangladesh and Japan, the “Weight coefficient” should be upgraded to fit situation in Bangladesh.

Damage Degree of the bridge is calculated by following rule,

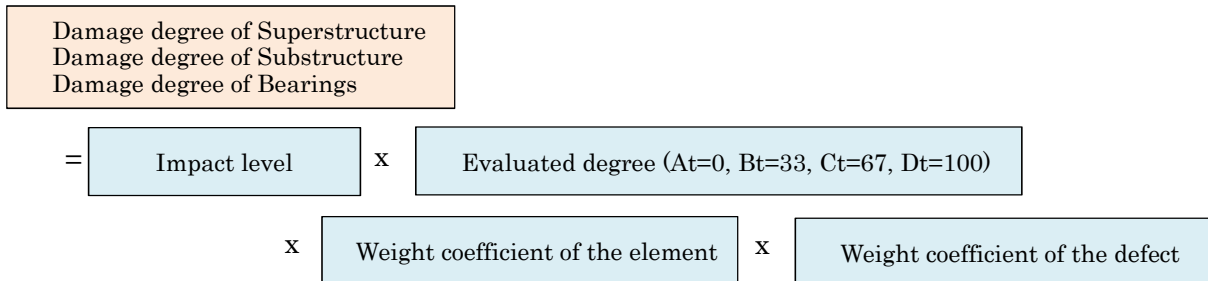
1) Bridge Type with Bearings

$$\begin{aligned} & \text{Damage Degree (max: 100pt)} \\ = & \text{Damage degree of Superstructure (max: 100pt)} \times \text{Impact of Superstructure (= 0.5)} \\ & + \text{Damage degree of Substructure (max: 100pt)} \times \text{Impact of Superstructure (= 0.3)} \\ & + \text{Damage degree of Bearings (max: 20pt)} \times \text{Impact of Superstructure (= 0.2)} \end{aligned}$$

2) Bridge Type without Bearings

$$\begin{aligned} & \text{Damage Degree (max: 100pt)} \\ = & \text{Damage degree of Superstructure (max: 100pt)} \times \text{Impact of Superstructure (= 0.6)} \\ & + \text{Damage degree of Substructure (max: 100pt)} \times \text{Impact of Superstructure (= 0.4)} \end{aligned}$$

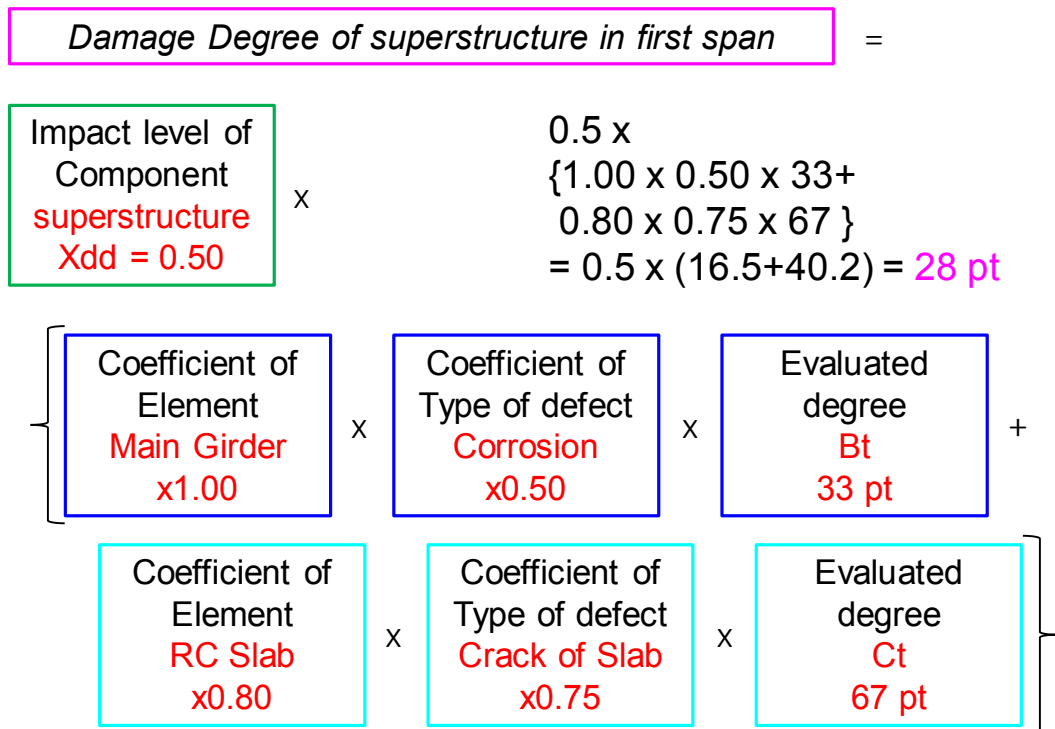
Each Damage degree of component is calculated with “ Impact level ”, “Evaluated degree (Numerical value of the Evaluated Condition Category of the Elements.)” , “Weight coefficient of the element” and “Weight coefficient of the defect” (Figure 6.4).



The Damage degree of each component is calculated by following formula,

“Weight of Component” x

Total score of (“Weight Coefficient by element” x “Weight Coefficient by type of defects”)



The procedure to calculate Bridge Damage Degree is as follows,

- 1) “ Damage degree ” = “ Impact level of Component ” x “ Weight of Element Types ”
x “Weight of Defect” x “Evaluated degree”
- 2) “ Total 1 ” = Σ (“ Damage degree ” focused on each Element Types and each Span No.)
- 3) “ Total 2 ” = largest “ Total 1 ” among spans in the Element Types
- 4) “ Total 3 ” = Σ (“ Damage degree ” focused on each component)
(If point of Total 3 is larger than “Max pt.” of each component, it is revised to the Max pt.)
- 5) “ Bridge Damage Degree ” = Σ (“ Total 3 ” of each component)

Component		Element Types		Span No.	Defect		Evaluated degree	Damage degree	Total 1	Total 2	Total 3		
Max pt	Impact	weight	weight		weight	weight							
Super-structure	50	0.50	Main girder	1.00	1	Corrosion	0.60	C → 67	21	25	25	40	
						Missing bolt	0.20	B → 33	4				
			Cross beam	0.25	2	Corrosion	0.60	B → 33	10	10	3		3
						none	0.00	A → 0	0	0	0		3
			Deck slab	0.80	1	Cracks	0.75	B → 33	10	10	12		12
						Efflorescence	0.13	B → 33	2	2	2		2
					2	Cracks	0.75	B → 33	10	10	10		10
			Sub-structure	30	0.30	Abutment	0.67	1	Cracks	0.43	B → 33		3
2	Cracks	0.43						C → 67	6	6	8	8	
Pier	0.67	1				Cracks	0.43	C → 67	6	6	8	8	
						Efflorescence	0.29	B → 33	2	2	2	2	
Foundation	1.00	1				Scouring	1.00	C → 67	21	21	21	21	
		2				none	0.00	A → 0	0	0	0	0	
Bearings	20	0.20	Bearing	1.00	1	none	0.00	A → 0	0	0	5		
					2	Function Disorder	0.75	B → 33	5	5	5	5	
Bridge Damage Degree											75		

As total point of substructure (37pt) is larger than max point of substructure (30pt), TOTAL POINT is revised to 30pt.

Following 3 tables shows Example of “ Single span RC Girder Bridge.”

Total Damage point of superstructure = 46

Total Damage point of substructure = 21

Total Damage point of bearing = 20 $46pt + 21pt + 20pt = 87pt$

	Weight Coefficient of Element (A)		Weight Coefficient of Defects (B)		Converted Evaluated Score (C)		Damage Point (A)x(B)x(C)	
	SUPERSTRUCTURE	Main Girder	1.00	Cracking	0.33	Bt	33	10.89
1.00			Spalling	0.67	Bt	33	22.11	
1.00			Water leak	0.17	Bt	33	5.61	
1.00			Delamination	0.17	Bt	33	5.61	
1.00			Discolor	0.03	Bt	33	0.99	
Cross Beam		0.25	Cracking	0.40	Bt	33	3.30	
		0.25	Spalling	0.60	Bt	33	4.95	
		0.25	Delamination	0.20	Ct	67	3.35	
		0.25	Discolor	0.05	Bt	33	0.41	
Deck Slab		0.80	Fallen out	1.00	Bt	33	26.40	
		0.80	Crack of DS	0.25	Bt	33	6.60	
		0.80	Delamination	0.03	Bt	33	0.79	
Sub Damage point of Superstructure							91.01 (D)	
Total Damage point of Superstructure					$X_{dd} = 0.50$	46	$X_{dd} \times (D)$	
Maximam point = $X_{dd} \times 100 = 50 > 46$ ok								

	Weight Coefficient of Element (A)		Weight Coefficient of Defects (B)		Converted Evaluated Score (C)		Damage Point (A)x(B)x(C)	
	SUBSTRUCTURE	Abutment	0.67	Cracking	0.43	Ct	67	19.30
0.67			Spalling	0.57	Bt	33	12.60	
0.67			Water leak	0.29	Bt	33	6.41	
0.67			Delamination	0.14	Bt	33	3.10	
0.67			Discolor	0.14	Bt	33	3.10	
0.67			Water leak	0.14	Bt	33	3.10	
Foundation		1.00	Cracking	0.40	Bt	33	13.20	
		1.00	Spalling	0.30	Bt	33	9.90	
Sub Damage point of Substructure							70.70 (D)	
Total Damage point of Substructure					$Y_{dd} = 0.30$	21	$Y_{dd} \times (D)$	
Maximam point = $Y_{dd} \times 100 = 30 > 21$ ok								

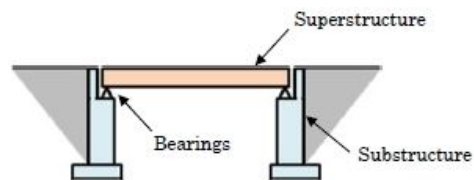
	Weight Coefficient of Element (A)		Weight Coefficient of Defects (B)		Converted Evaluated Score (C)		Damage Point (A)x(B)x(C)	
	BEARING	Bearing	1.00	Corrosion	0.25	Bt	33	8.25
1.00			Crack	1.00	Bt	33	33.00	
1.00			Missing bolt	0.50	Bt	33	16.50	
1.00			Fracture	1.00	Bt	33	33.00	
1.00			Paint system	0.25	Bt	33	8.25	
1.00			Disorder of B	0.75	Bt	33	24.75	
1.00			Debris	0.25	Bt	67	16.75	
1.00			Settlement	0.50	Bt	67	33.50	
Bearing		0.25	Cracking	0.14	Bt	33	1.16	
Seat		0.25	Break	0.29	Bt	33	2.39	
Sub Damage point of Bearing							177.55 (D)	
Total Damage point of Bearing					$Z_{dd} = 0.20$	36	$Z_{dd} \times (D)$	
Maximam point = $Z_{dd} \times 100 = 20 < 36$ 20								

You can refer “Bridge Inspection and Evaluation Manual 6.2 Evaluation of Entire Bridges” for detail information of this issue.

Weight Coefficient by Component

Table 6.6 Impact level of Component (Bridge type with bearings)

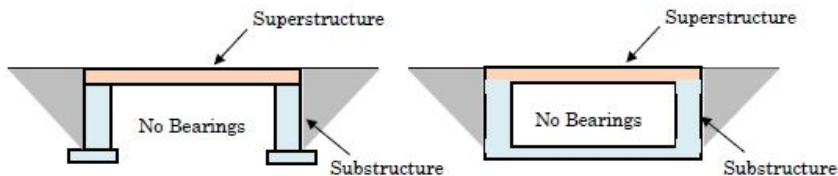
Component	Impact level *)	Details
Superstructure	0.5	This damage directly impacts bridge function.
Substructure	0.3	Compared to superstructure, the impact of this damage to bridge function is not great as the size of the structure is large.
Bearings	0.2	The impact of this damage to bridge function is not great.



RC/PC Girder Bridge, Steel Girder Bridge

Table 6.7 Impact level of Component (Bridge type without bearings)

Component	Impact level	Details
Superstructure	0.6	This damage directly impacts bridge function.
Substructure	0.4	Compared to superstructure, the impact of this damage to bridge function is not great as the size of the structure is large.



Small Slab Bridge (Former “Slab Culvert”)

Box Culvert

Weight Coefficient by Element

Table 6.9 Weight coefficient of the element

Component	Element Types	Weight coefficient *)
Superstructure	Main Girder Main Truss Main Arch Outer Cable Main tower Arch Rib	1.00
	Cross Beam Stringer	0.25
	Deck Slab	0.80
Substructure	Abutment Pier Side Wall Parapet Wall	0.67
	Foundation footing	1.00
Bearings	Bearing Main Body Anchor Bolts	1.00
	Bearing Seat Bearing Bed	0.25

*) Adopted by the local government of Japan

Weight Coefficient by type of defects (Superstructure)

----- Superstructure -----

[Deck - Steel]

Type of defects	Weight coefficient
1. Corrosion	0.50
2. Crack in Steel	1.00
3. Loose or Missing Bolts	0.17
4. Fracture	1.00
5. Deterioration of Paint	0.17
21. Abnormal Noise / Vibration	0.17
23. Deformation / Break	0.17

* When "Crack in Steel and Fracture" is occurred, the Weight coefficient is set as to be 1.0

[Deck - Concrete]

Type of defects	Weight coefficient
7. Spalling / Exposed Rebar	0.10
8. Water leakage / Efflorescence	0.10
9. Fallen out of Deck Slab	1.00
17. Defects of Reinforcing Material for Rehabilitation / Strengthening	0.25
10. Crack of Deck Slab	0.75
11. Delamination	0.03
18. Abnormal Anchorage	0.25
19. Discoloration / Deterioration of Material	0.03

* When "Fallen out of Deck Slab" is occurred, the Weight coefficient is set as to be 1.0

[Main Girder - Steel]

Type of defects	Weight coefficient
1. Corrosion	0.60
2. Crack in Steel	1.00
3. Loose or Missing Bolts	0.20
4. Fracture	1.00
5. Deterioration of Paint	0.20
12. Abnormal Spacing	0.20
21. Abnormal Noise / Vibration	0.20
22. Abnormal Deflection	0.20
23. Deformation / Break	0.20

* When "Crack in Steel" and "Fracture" is occurred, the Weight coefficient is set as to be 1.0

[Main Girder - Concrete]

Type of defects	Weight coefficient
6. Crack	0.33
7. Spalling / Exposed Rebar	0.67
8. Water leakage / Efflorescence	0.17
17. Defects of Reinforcing Material for Rehabilitation / Strengthening	0.30
11. Delamination	0.17
12. Abnormal Spacing	0.17
18. Abnormal Anchorage	0.67
19. Discoloration / Deterioration of Material	0.03
21. Abnormal Noise / Vibration	0.50
22. Abnormal Deflection	0.30
23. Deformation / Break	0.03

* When "Crack + Spalling / Exposed Rebar" is occurred, the Weight coefficient is set as to be 1.0

[Cross Beam - Steel]

Type of defects	Weight coefficient
1. Corrosion	0.33
2. Crack in Steel	1.00
3. Loose or Missing Bolts	0.17
4. Fracture	1.00
5. Deterioration of Paint	0.17
21. Abnormal Noise / Vibration	0.33
23. Deformation / Break	0.17

* When "Crack in Steel" and "Fracture" is occurred, the Weight coefficient is set as to be 1.0

[Cross Beam - Concrete]

Type of defects	Weight coefficient
6. Crack	0.40
7. Spalling / Exposed Rebar	0.60
8. Water leakage / Efflorescence	0.40
17. Defects of Reinforcing Material for Rehabilitation / Strengthening	0.40
11. Delamination	0.20
18. Abnormal Anchorage	0.80
19. Discoloration / Deterioration of Material	0.05
21. Abnormal Noise / Vibration	1.00
23. Deformation / Break	0.05

* When "Crack + Spalling / Exposed Rebar" is occurred, the Weight coefficient is set as to be 1.0

Weight Coefficient by type of defects (Substructure)

----- Substructure -----

[Abutment / Pier - Steel]

Type of defects	Weight coefficient
1. Corrosion	0.60
2. Crack in Steel	1.00
3. Loose or Missing Bolts	0.20
4. Fracture	1.00
5. Deterioration of Paint	0.20
20. Water Leakage / Puddle	0.20
21. Abnormal Noise / Vibration	0.20
23. Deformation / Break	0.20

※When "Crack in Steel" and "Fracture" is occurred, the Weight coefficient is set as to be 1.0

[Abutment / Pier - Concrete]

Type of defects	Weight coefficient
6. Crack	0.43
7. Spalling / Exposed Rebar	0.57
8. Water leakage / Efflorescence	0.29
17. Defects of Reinforcing Material for Rehabilitation / Strengthening	0.57
11. Delamination	0.14
19. Discoloration / Deterioration of Material	0.14
20. Water Leakage / Puddle	0.14
23. Deformation / Break of Structure Element	0.14

※When "Crack + Spalling / Exposed Rebar" is occurred, the Weight coefficient is set as to be 1.0

[Foundation]

Type of defects	Weight coefficient
25. Settlement / Tilt / Movement	0.25
26. Scouring	1.00

※When "Scouring" is occurred, the Weight coefficient is set as to be 1.0

Weight Coefficient by type of defects (Bearing)

----- Bearings -----

[Bearing - Steel]

Type of defects	Weight coefficient
1. Corrosion	0.25
2. Crack in Steel	1.00
3. Loose or Missing Bolts	0.50
4. Fracture	1.00
5. Deterioration of Paint	0.25
15. Functional Disorder of Bearings	0.75
20. Water Leakage / Puddle	0.25
23. Deformation / Break of Structure	0.25
24. Accumulation of Debris	0.25
25. Settlement / Tilt / Movement	0.50

※When "Crack in Steel" and "Fracture" is occurred, the Weight coefficient is set as to be 1.0

[Bearing - Rubber]

Type of defects	Weight coefficient
15. Functional Disorder of Bearings	1.00
20. Water Leakage / Puddle	0.25
23. Deformation / Break	0.13
24. Accumulation of Debris	0.13
25. Settlement / Tilt / Movement	0.88

※When "Function Disorder of Bearings" is occurred, the Weight coefficient is set as to be 1.0

[Bearing Seat/Bed - Concrete]

Type of defects	Weight coefficient
6. Crack	0.14
11. Delamination	0.29
23. Deformation / Break	1.00

※When "Deformation / Break of Structure Element" is occurred, the Weight coefficient is set as to be 1.0

9.2 How to calculate Importance Degree

Importance degree is score calculated by the bridge's influence in the area. This degree is calculated as high point if surrounding area and traffic network receives serious damage because the bridge is closed or falls down.

Importance degree is calculated as total score of following 4 items.

➤ **Class of Road :**

e.g.

If the bridge locating on National road falls down, traffic network in the area gets serious damage. Therefore, high score set for high class road.

➤ **Traffic Volume**

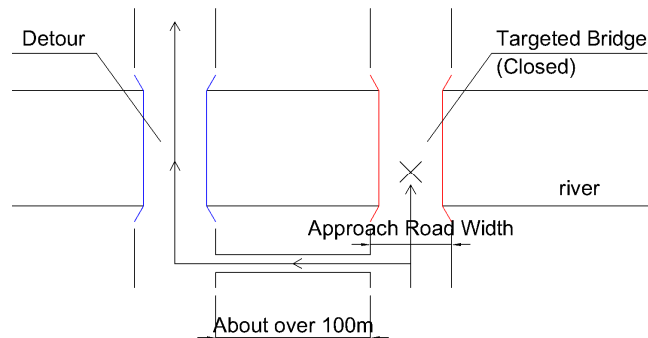
e.g.

If the bridge with large traffic volume falls down, traffic network in the area gets serious damage. Therefore, high score set for large traffic volume.

➤ **Detour/Alternate Route**

e.g.

If the bridge falls down and there is no another bridge (Detour) near fallen bridge, it become difficult to cross the river or road. Therefore, high score set for bridge without Detour.



➤ **Crossing under the Bridge**

e.g.

If the bridge falls down and Railway or National road are going through under the bridge, traffic impact to around the area is serious. Therefore, high score set for bridge important traffic network existing. On the other hand, If under the bridge is river or swamp, this score is low.

Score of current BMS is shown in next page.

[Class of Road]*Maximum score is "30".*

Name	Score
National Road	30
Regional Road	20
Zilla Road	5
Others	0

[Traffic Volume]*Maximum score is "25".*

Name	Score
Over 20,000	25
15,000 to 20,000	20
10,000 to 15,000	15
5,000 to 10,000	10
1,000 to 5,000	5
Under 1,000	0

[Detour/Alternate Route]*Maximum score is "15".*

Name	Score
Detour doesn't exist	15
Detour exists	0

[Crossing under the Bridge]*Maximum score is "30".*

Name	Score
Railway	30
National Road	25
Regional Road	20
Zilla Road	15
Under Pass	10
Chanel	5
Cross Drainage	5
Swamp Land	3
River	1
Others	0
Unknown	0

Note

Total score of Maximum score of each items should be always 100.

- Class of Road : max. 30
- Traffic Volume : max. 25
- Detour : max. 15
- Crossing under bridge : max .30

$$30\text{pt} + 25\text{pt} + 15\text{pt} + 30\text{pt} = 100\text{pt}$$

9.3 How to calculate Priority to Remedy

Priority Remedy is calculated by following formula.

$$\begin{array}{l}
 \text{Priority to Remedy (max: 100pt)} \\
 = \text{Damage degree (max: 100pt)} \times \text{Impact X (= 0.6)} \\
 + \text{Importance Degree (max: 100pt)} \times \text{Impact Y (= 0.4)}
 \end{array}$$

In the future, above Impact X and Y should be arranged to fit Bangladesh situation. System manager can arrange them by editing source code,

9.4 How to choose Remedial Measure

Remedial measure is chosen by combination of “Evaluation Category” and “Type of Defects”. Targeted remedy measure is shown as following table.

e.g. Main Girder (Steel or Concrete)

Type of Defects	Evaluation Category	
	Ct	Dt
Corrosion	Repainting	Supplementing Plate
Crack in Steel	Stop hole + Supplementing Plate	Stop hole + Supplementing Plate
Cracking (Concrete)	Crack Injection	Carbon Fiber Sheet Bonding on Concrete
Spalling / Exposed Rebar	Hand Applied Mortar	-
⋮	⋮	⋮

You can refer all rules of Remedy measure by Appendix TABLE OF SETTINGS IN BMS of this manual.

Note

Some of combination of defect and element don't have remedy measure because of following reason,

- The remedy cost is very cheap comparing with total cost generally.
- The defect is solved by other remedial measure for other defect,.

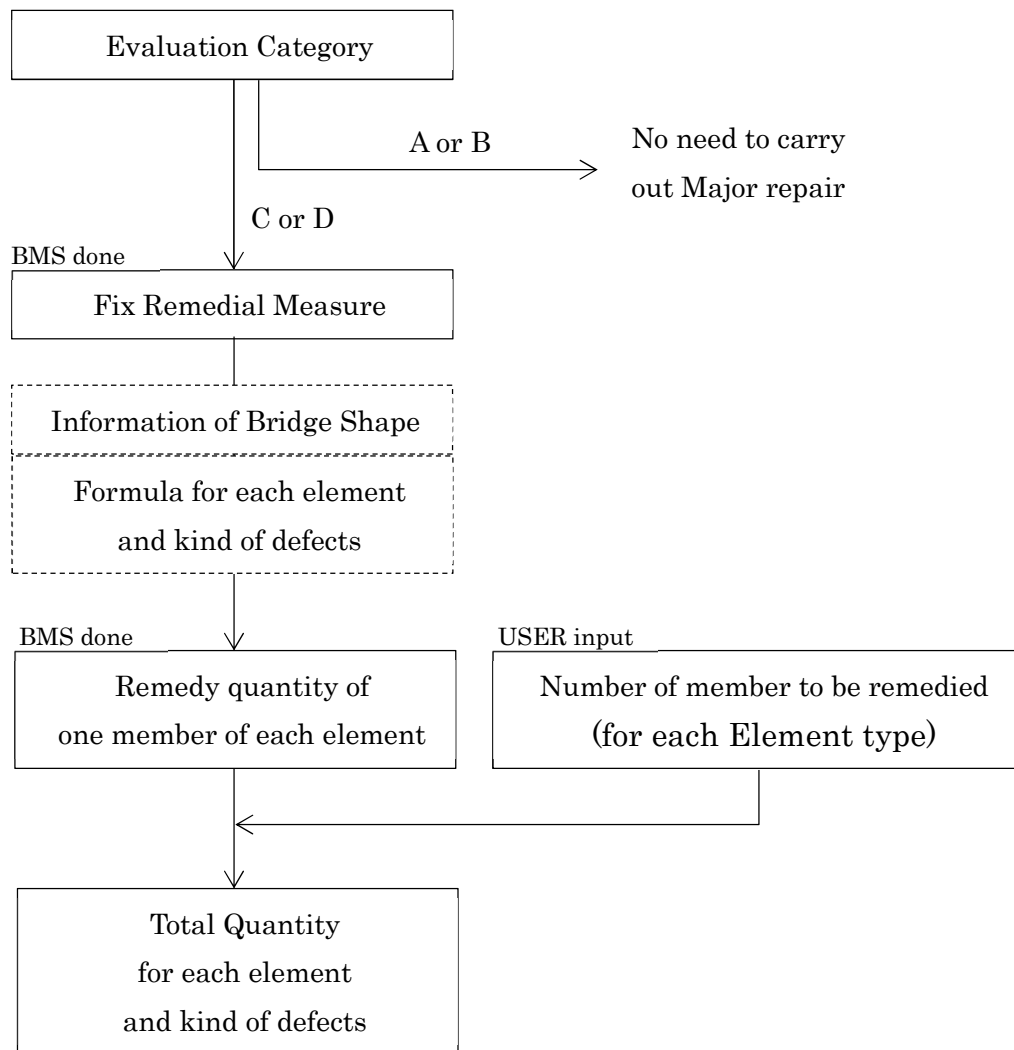
9.5 How to Calculate Quantity to Remedied

Quantity of each member to be remedied are necessary to calculate cost of Remedial Cost.

For example, “Repainting of Steel Member” is required “Area (m²) of deteriorated painting system”, “Crack Injection” of concrete slab deck is required “Length (m) of cracking”.

However, some of defect scale are difficult to measure in site investigation, because of impossibility to carry out Close-up visual inspection.

Therefore, BMS calculates the quantity automatically by referring information of “Bridge Shape in Bridge Info” and “Rating of Defects” and applying them into the formula set in system.



You can refer “Formula for each element and kind of defects” and “Quantity coefficient” by Appendix TABLE OF SETTINGS IN BMS of this manual.

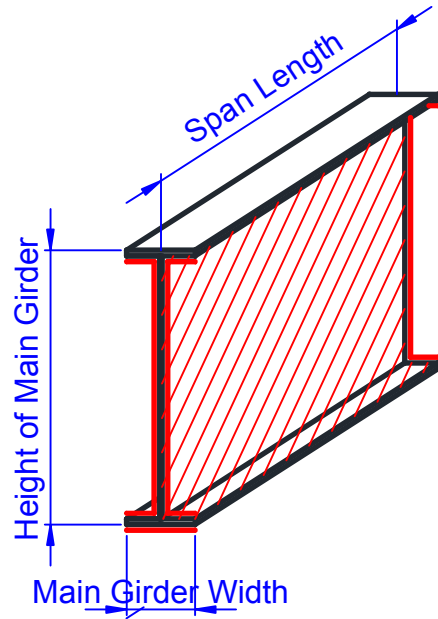
Note

“Formula for each element and kind of defects” is calculated by following rules.

e.g.1 Repainting of Steel I-Girder

- Deterioration of Paint system Ct
- Area to repaint (m2)
- All area of the Main girder

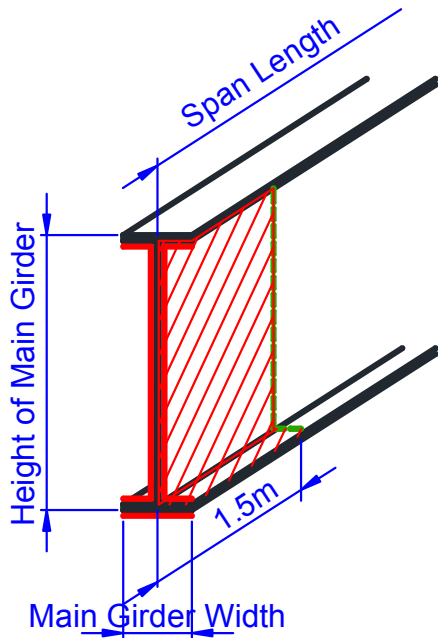
1.0 x ← coefficient
 $(MG\ Width \times 3 + Height\ of\ MG \times 2) \times Span\ Length$
: Basic Formula 207



e.g.2 Supplementing Steel Plate of Steel I-Girder

- Damage of Corrosion Dt Area to cover (m2)
- → 1.5m x 2 side = 3.0m

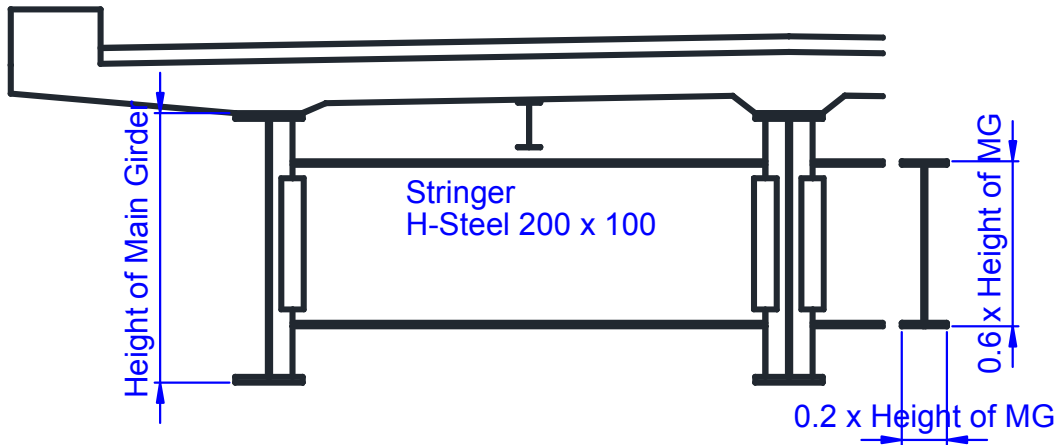
3.0 x ← coefficient
 $(MG\ Width \times 2 + Height\ of\ MG \times 2)$
: Basic Formula 209



e.g.3 In case of Steel Cross Beam or Stringer

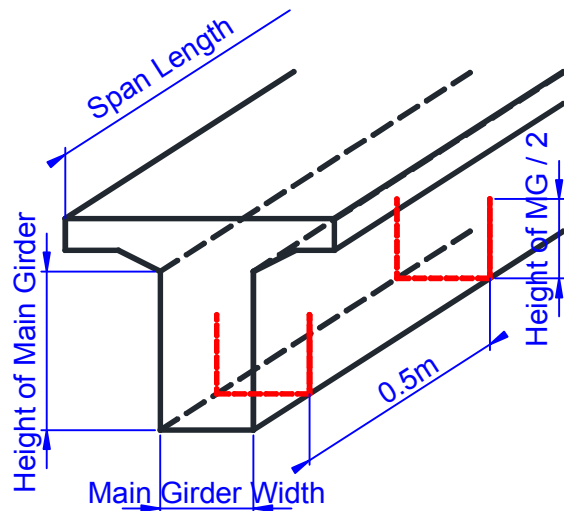
Area to be remedied of steel cross beam or steel stringer is calculated based on following rule.

- Cross beam : Supposing as Full-web cross beam
- Stringer : Supposing as Fixed size steel



e.g.4 Crack Filling of Concrete Girder

- Damage of Crack Ct
- Length of crack (m)
- Crack occurs every 0.5m.
0.5m is border value of
“crack spacing is large or small”



$(Width + Height/2 \times 2) \times Span / 0.5m$

→

$2.0 \times$ ← coefficient

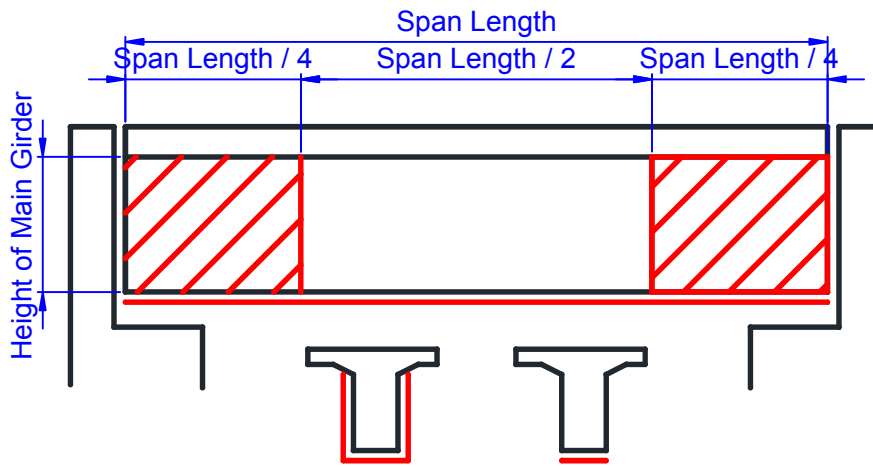
$(MG\ Width \times 1 + Height\ of\ MG \times 1) \times Span\ Length$

: Basic Formula 205

e.g.5 CFS Bonding of Concrete Girder

- Damage of Crack Dt
- Area (m2)
- Reinforcing with Carbon Fiber Sheet.

Width x Span + (Height x 2 x Span/4) x 2 → 1.0 x ← coefficient
(MG Width x1 + Height of MG x1) x Span Length
 : Basic Formula 205



*Red colored area is reinforced with Carbon Fiber Sheet.

e.g.6 Section Repair of Concrete Member

- Damage of Spalling Ct
- Volume (m3)
- Supposing thickness = 5cm

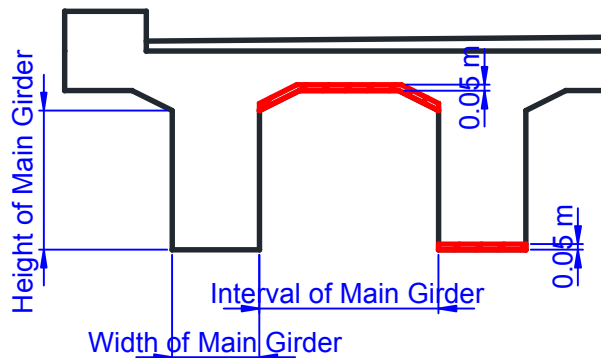


For Concrete Main Girder

0.05 x ← coefficient
MG Width x Span Length
 : Basic Formula 204

For Concrete Deck Slab

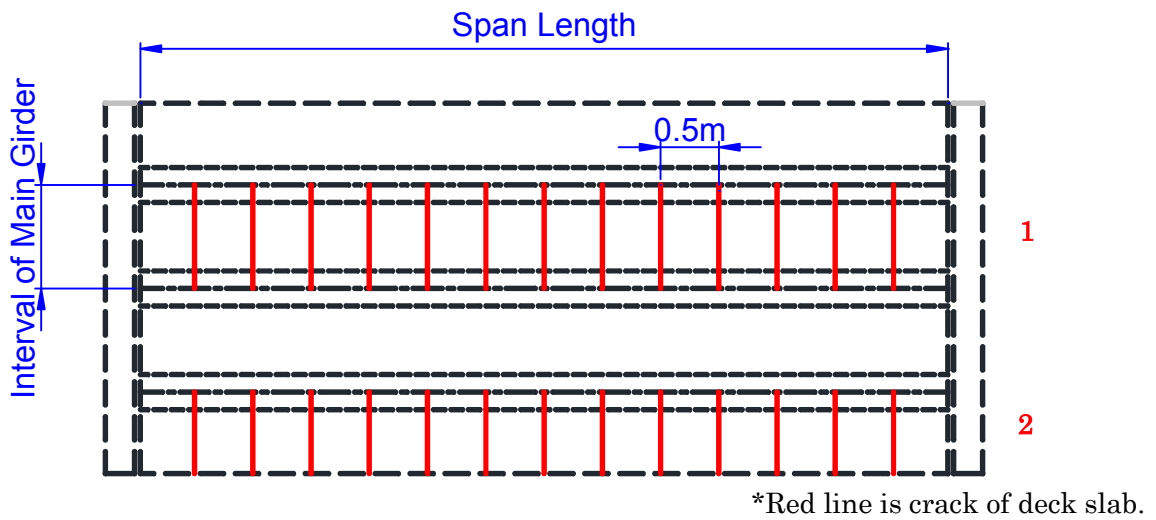
0.05 x ← coefficient
Interval of MG x Span Length
 : Basic Formula 202



e.g.7 Crack Injection of Concrete Deck Slab

- Damage of Crack of Deck Slab Ct
- Length of crack (m)
- Crack occurs every 0.5m to one direction (Supposing)

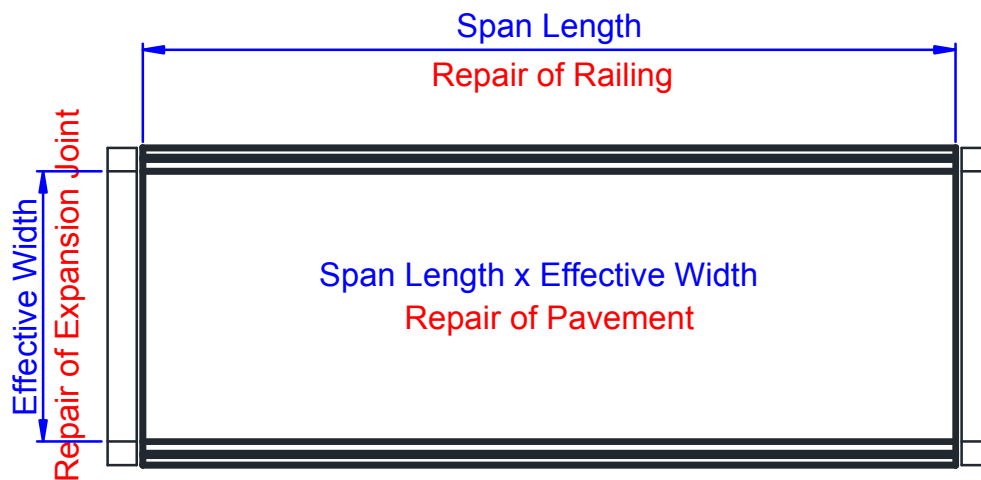
Interval of MG x Span length / 0.5m → 1.0 x ← coefficient
 Interval of MG x Span Length
 : Basic Formula 202



e.g. In case of above drawing,

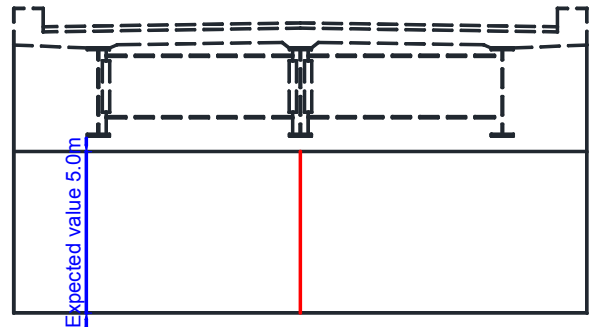
Number of element (to be remedied) in Bridge Remedial Measure is “2”.

e.g.8 Other Remedial Measure of Superstructure



e.g.9 Crack of Abutment

- Crack of Abutment Ct or Dt
- Length of crack (m)
- Large crack occurring at center of vertical wall by reason of concrete drying shrinkage of huge mass concrete. Height of vertical wall is 5.0m set as expected value.



5.0 x ← coefficient

Fix (Fix is same as 1.0) Basic Formula 101

e.g.10 Settlement/Tilt/Movement and Scouring of Footing

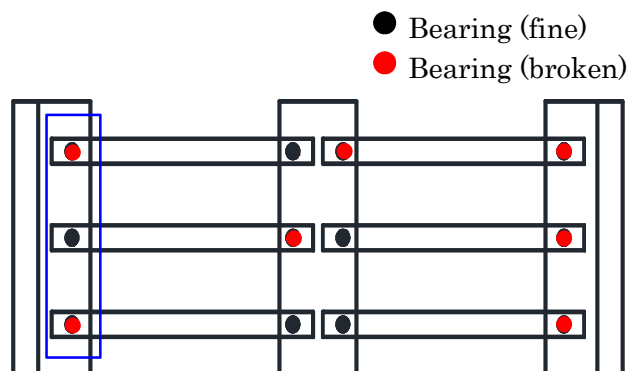
- Settlement/Tilt/Movement and Scouring of Footing Ct or Dt
- Repairing of Settlement, Repairing of Scouring
- Volume of buried work (m³)
- Volume of each footing is fixed as Width 10.0m x Length 5.0m x Depth 3.0m = 150 m³

150 x ← coefficient

Fix (Fix is same as 1.0) Basic Formula 101

e.g.11 Repaint or Replacement of Bearings

- No. of Bearings per each line
(Shape tab of Basic Data) = 3
- No. of Element (to be remedied)
(Draft of Bridge Remedial Measure)
1st span = 3
2nd span = 4



e.g.12 Crack of Box Culvert (Head Slab, Side Wall and Footing)

- Crack of element of Box culvert Ct or Dt
- Length of crack (m)
- Crack occurs every 0.5m. 0.5m is border value of “crack spacing is large or small”

[Crack of Head Slab]

2.0 x ← coefficient

Span Length x Width of Culvert Basic Formula 301

[Crack of Side Wall]

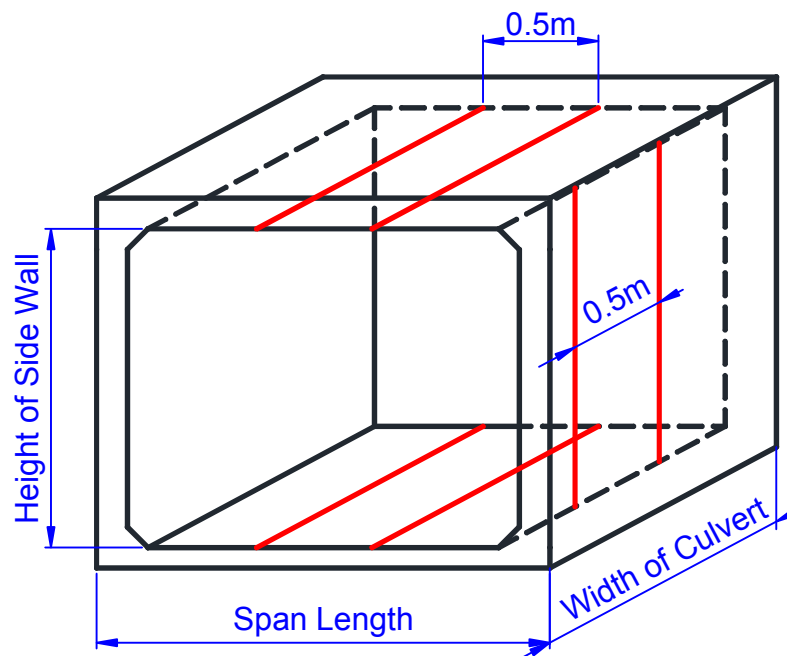
2.0 x ← coefficient

Width of Culvert x Height of Side Wall Basic Formula 303

[Crack of Footing]

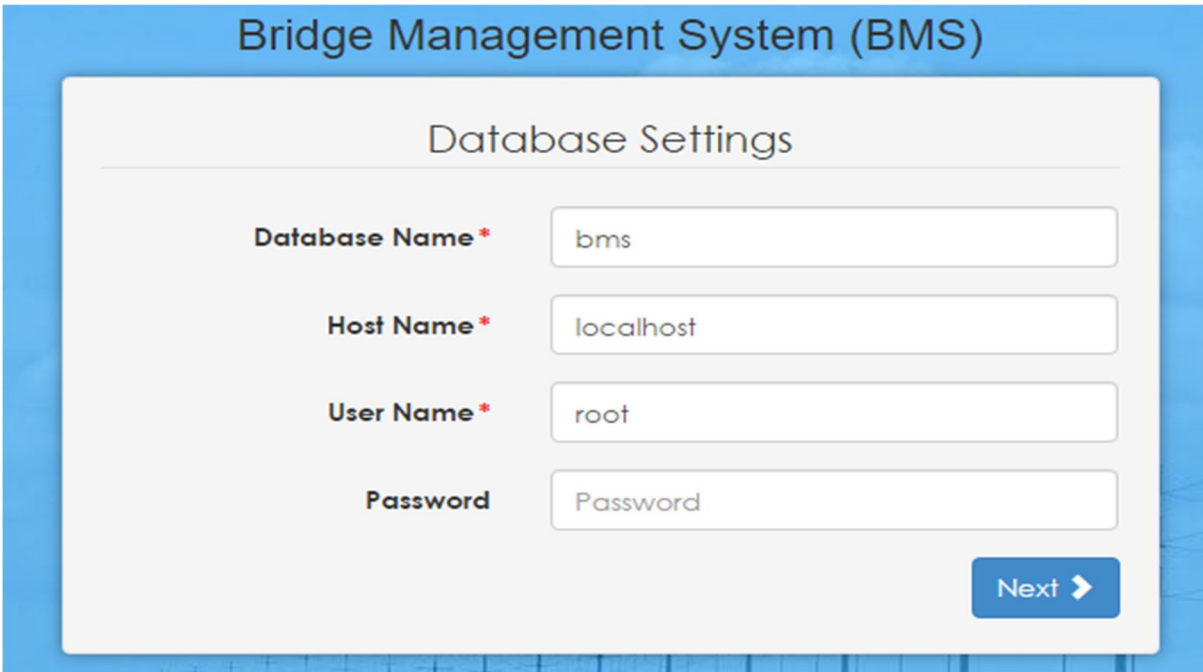
2.0 x ← coefficient

Span Length x Width of Culvert Basic Formula 301



10. HOW TO INSTALL BMS

1. Copy the bms.zip folder to the root of the hosting directory.
2. Unzip the zip file.
3. Create a MySQL database and user if required.
4. Open a browser and type the hosting domain name.
5. Database setting screen will show up.



Bridge Management System (BMS)

Database Settings

Database Name *

Host Name *

User Name *

Password

Next >

6. Enter the database settings information and click next.
7. If database settings are correct a General Settings screen will show up.

Bridge Management System (BMS)

General Configurations

Application Name *	<input type="text" value="Bridge Management System"/>
Application Short Name *	<input type="text" value="BMS"/>
Default Timezone *	<input type="text" value="Asia/Dhaka [BDT +06:00]"/>

- 8. Input the Application Name (For example Bridge Management System or anything else that best names the application), Application short name (Like BMS or anything else that best names the application) and Select Time Zone (Like Asia/Dhaka [BDT +06:00]).
- 9. Click next and Email Settings screen will show up.

Bridge Management System (BMS)

Email Options

Email address from *	<input type="text" value="Email address from"/>
Name from *	<input type="text" value="Name from"/>
Email Subject *	<input type="text" value="Email Subject"/>
SMTP Server *	<input type="text" value="SMTP Server"/>
SMTP Port *	<input type="text" value="SMTP Port"/>
SMTP Login *	<input type="text" value="SMTP Login"/>
SMTP Password *	<input type="text" value="SMTP Password"/>

10. Input the email settings.
11. Click next and Admin Settings screen will show up.

Bridge Management System (BMS)

Admin Settings

User ID *

Full Name *

Password *

Confirm Password *

◀ Back Next ▶

12. Input the BMS Admin user id and password.
13. Click next and “Run Installer” screen will show up.

Bridge Management System (BMS)

Confirm

Everything in the form was correctly filled.

✔ Run Installer

◀ Back

14. Click on “Run Installer” button and wait until the installation completes.