



**Department of
Transportation**



**Office of
Structures**

BrDR Report Generation Tool



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August 6th, 2024 –RADBUG

Presentation Topics

➔ Background

- Previous Report TAG
- User Requests

➔ Report Generation Tool

- Why do we need a new report generation tool?
- Report Concept
- Report Format
- Phase 1

➔ What is the next step?

Background

- ❑ BrDR software has been in use since 1996
- ❑ Many users have requested improved report generating capabilities
- ❑ Report TAG (RTAG) was formed in 2013
 - 7 members
 - Recommended many improvements to reporting features in BrDR

Report to AASHTOWare Bridge Task Force

Prepared by the Br DR Report Technical Advisory Group (RTAG)

RTAG Members:

1	Paul	Campisi	New York State DOT
2	Beckie	Curtis	Michigan DOT
3	Arthur	D'Andrea	Louisiana DOT
4	Jeff	Olsen	Montana DOT
5	Todd	Thompson	South Dakota DOT
6	Cindy	Wang	Ohio DOT
7	Amjad	Waheed	Ohio DOT

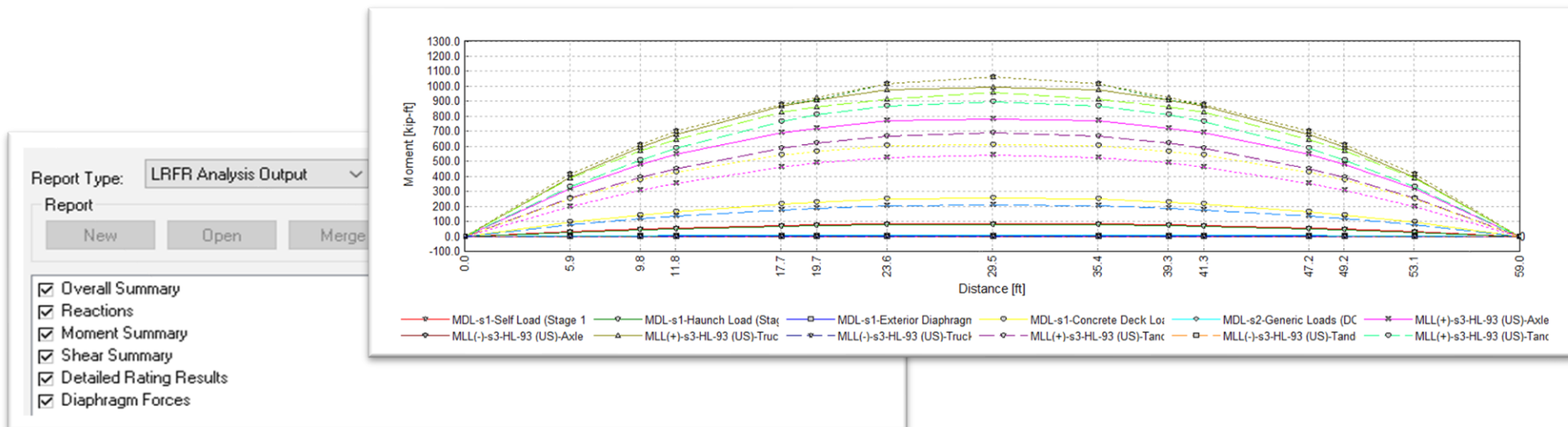
November 2013

Background

- ❑ **2013 User Requests:**
 - **Load Rating Summary Report**
 - **Comprehensive input report**
 - **List Dead Loads in separate columns**
 - **List deflections for DL (by load type, stage) and LL separately**
 - **Provide separate Spec Check Reports with pass/fail summary**
 - **Provide essential cross-sectional properties at critical points**

Background

- Vendor has created many output reports over the years



Vehicle Output Engine Description

Tabular Results:

- Dead Load Action Report
- Live Load Action Report
- Truss Panel Point Concurrent Forces Report
- Truss Panel Point Maximum Forces Report

AASHTO Engine Reports:

- Miscellaneous Reports:
 - Girder Properties
 - Summary Influence Line Loading
 - Detailed Influence Line Loading
 - Capacity Summary
 - Capacity Detailed Computations
 - FE Model for DL Analysis
 - FE Model for LL Analysis
 - LL Influence Lines FE Model
 - LL Influence Lines FE Actions
 - LL Distrib. Factor Computations

Superstructure Component

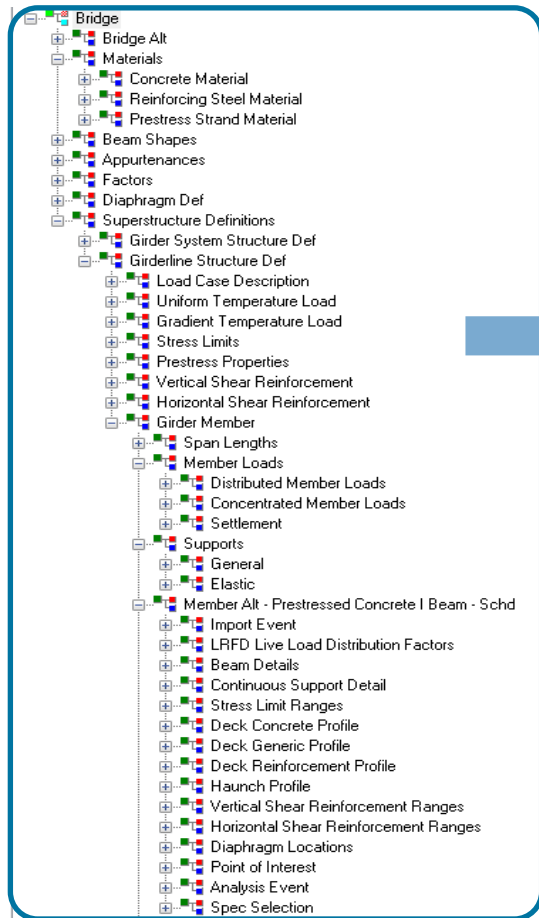
- Stage 1
- Stage 2
- Stage 3
 - Exterior Girder - Left

Specification Reference

- 5.4.2.6 Modulus of Rupture
- 5.4.2.8 Concrete Density Modification Factor
- 6.10.1.1.1b Stresses for Sections in Positive
- 6.10.1.10.1 Hybrid Factor, Rh
- 6.10.1.10.2 Web Load-Shedding Factor, Rb
- 6.10.1.6 Flange Stress and Member Bending
- 6.10.1.7 Minimum Negative Flexure Concrete
- 6.10.1.9.1 Webs without Longitudinal Stiffeners
- 6.10.11.1.2 Transverse Stiffeners - Projecting

Background

- One of the most comprehensive reports is the BWS Report



Bridge

Bridge Id: 40C0044
 Structure Number: 40C0044
 Name: NORTH FORK MERCED RIVER
 Initial ADTSSL:
 Present ADTSSL:
 Limit ADTSSL:

Bridge Alt

Name: 1950 (7/12) HB/MBM
 Description:
 Creation Timestamp: Tuesday, March 09, 2021 14:46:26
 Last Modified Timestamp: Tuesday, March 09, 2021 15:49:09

Superstructure

Name: Span 1 (MDL 1 of 1)
 Description:
 Creation Timestamp: Tuesday, March 09, 2021 14:46:26
 Last Modified Timestamp: Tuesday, March 09, 2021 15:49:09
 Super Structure Alternative Name - Existing: 3 STL Plate Girders
 Super Structure Alternative Name - Current: 3 STL Plate Girders

Superstructure Alternative

Name: 3 STL Plate Girders
 Description:
 Creation Timestamp: Tuesday, March 09, 2021 14:46:26
 Last Modified Timestamp: Tuesday, March 09, 2021 15:49:09
 Superstructure Definition Name: Span 1 (MDL 1 of 1)

Superstructure Loading Path

Materials

Concrete Material

Name: F'c= 3.000 ksi; Assigned per CAStdSpecs
 Description: per Memo to Load Raters 11-1
 28 Day Compressive Strength: 3.000 ksi
 Initial Compressive Strength: 3.000 ksi
 Density For DL: 0.150 kcf
 Density For Modulus Of Elasticity: 0.145 kcf

Superstructure Definitions

Girder System Structure Def

Name: Span 1 (MDL 1 of 1)
 Description:
 Creation Timestamp: Tuesday, March 09, 2021 14:46:26
 Last Modified Timestamp: Tuesday, March 09, 2021 15:49:09
 Number Of Girders: 3
 Number Of Spans: 1
 Girder Spacing Display Type: Perpendicular

Span Lengths

Span Length
 (ft)
 1 59.0000

Load Case Description

Name	Description	Load Type	Stage Name	Load Application Time (Days)
DC1	DC acting on non-composite section	D,DC	Non-composite (Stage 1)	
DC2	DC acting on long-term composite section	D,DC	Composite (long term) (Stage 2)	
DW	DW acting on long-term composite section	D,DW	Composite (long term) (Stage 2)	

Structure Framing Plan Details

Support Skew

Support Number	Skew Degrees	Frame Connections Indicator
1	0.0000	FALSE
2	0.0000	FALSE

Girder Spacings

Bay Number	Start Spacing (ft)	End Spacing (ft)
1	4.5000	4.5000
2	4.5000	4.5000

Diaphragm Locations

Bay Number: 1

Right Member Distance (ft)	Left Member Distance (ft)	Number of Spaces	Spacing (ft)	Weight (kip)
0.00	0.00	1	0.00	0.1125
0.00	0.00	2	19.67	0.1125
59.00	59.00	1	0.00	0.1125

Bay Number: 2

Right Member Distance (ft)	Left Member Distance (ft)	Number of Spaces	Spacing (ft)	Weight (kip)
0.00	0.00	1	0.00	0.1125
0.00	0.00	2	19.67	0.1125
59.00	59.00	1	0.00	0.1125

Background

- BWS Report can be customized
- Vendor provided standard BWS report templates for various bridge types
- Vendor also provided Crystal Report Tool



Background

- ❑ Amjad Waheed presented to User Group in 2015 on the reporting features available in BrDR at that time

Creating Reports & Getting Results Out of AASHTO BrDR

Amjad Waheed, P.E.
Assistant Administrator
Office of Structural Engineering

August 5, 2015

Report Generation Tool – Why?

- ❑ Not all of 2013 requests were implemented
- ❑ With current reporting features, users must piece together separate outputs and reports to produce a comprehensive report
- ❑ Formatting among various analysis results, BWS report, and Spec Articles are not consistent
- ❑ Section properties, Spec Checks, etc must be generated separately and combined into one document

Report Generation Tool – Why?

- ❑ Formatting of existing reports are not efficient, a lot of white space exists, making the reports very lengthy
- ❑ Reporting features are not consistently presented for different structure types in BrDR
- ❑ Crystal Report Tool is not a royalty free software – requires separate purchase by state agencies, additionally it is being sunset.

Report Generation Tool – Why?

- ❑ **State agency workarounds**
 - **Create custom reports, using cut/paste and in-house templates to combine existing reporting features in BrDR**
 - **Consumes a lot of time, especially updating the custom reports with each new release of BrDR**

Report Generation Tool – Why?

- ❑ **Current Report TAG**
 - **Goal: Prepare mock-ups for the content and formatting requirements for a comprehensive and easy to use report generation tool**

Name	Role
Johnson, Michael	Idaho TD, Chair
Ruby, Jeff	Kansas DOT, Vice Chair
Trees, Geoff	BrDR Contractor
Albert, Joseph	New York State DOT
Bucci, Mark	Louisiana DOTD
Chernioglo, Igor	California DOT
Huda, Ratan	New York State DOT
Patria, Christopher	Connecticut DOT
Paulson, Steven	Tennessee DOT
Smith, Mary	Montana DOT
Thompson, Todd	South Dakota DOT
Waheed, Amjad	Ohio DOT
Wang, Cindy	Ohio DOT

- **13 members**

Report Generation Tool - Concept

- ❑ Create a REPORTS ribbon within the Bridge Workspace in the Modernized BrDR software
- ❑ Five buttons within the ribbon to generate various reports
- ❑ BrDR will have several standard templates to generate reports
- ❑ “Report Template Editor” will also be provided to create/modify/save report templates for user customized reports
- ❑ Data will be presented in tabular format, with capability for user to add comments(options being investigated), titles, and graphics to complete the report.

Note:
All graphics
are conceptual



Report Generation Tool - Format

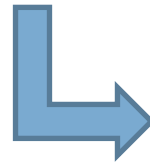
1. Bridge Level Report

2. Superstructure Level Report



One for each different
superstructure type within
the bridge

3. Member Level Report



One for each different
member type within the
superstructure

Report Template Editor

- ❑ **Use Report Template Editor to customize reports**
 - **Left side of screen shows available components to be included in your report.**
 - **Right side of screen shows the style editing and font properties to be able to customize the look of your report.**
 - **Middle of the screen is the preview for the individual component and the entire compiled report for the components you have selected.**

Report Template Editor

Report Editor

File

New Open Save Save As Refresh Print Duplicate Delete Close

Document Print Edit

Template

Search

- Single Tee W
- Multiple Tee
- U Beam Window
- Factors
 - LFR Window
 - LRFD Window
 - LRFR Window
- Materials
 - Concrete Window
 - Prestress Bar Window
 - Prestress Strand Window

Section Contents

- LRFD Window
 - Factors - LRFD
 - Summary
 - Load factors
 - Load factors (cont'd)
 - Limit states
 - Concrete
 - Steel
 - Wood
 - Buried structures
 - Load modifiers
 - Specifications

Report

Summary Report

LRFD Window

Factors - LRFD

Summary

Name: 1994 AASHTO LRFD Specifications
Description: AASHTO LRFD Bridge Design Specifications, First Edition, 1994 including 1996 and 1997 Interim Specifications

Load factors

Limit state	DC min	DC max	D
STRENGTH-I	0.900	1.250	
STRENGTH-II	0.900	1.250	
STRENGTH-III	0.900	1.250	
STRENGTH-IV	1.500	1.500	
STRENGTH-V	0.900	1.250	
SERVICE-I	1.000	1.000	
SERVICE-II	1.000	1.000	
SERVICE-III	1.000	1.000	
FATIGUE-I	0.000	0.000	
EXTREME EVENT-I	0.900	1.250	
EXTREME EVENT-II	0.900	1.250	

Load factors (cont'd)

Component	LL max
Prestressed concrete components designed using the refined estimates of time-dependent losses as specified in Article 5.9.5.4 in conjunction with taking advantage of the elastic gain	0.800
All other prestressed concrete components	0.800

Limit states

Limit state	Reinforced concrete	Prestressed concrete
STRENGTH-I	True	True
STRENGTH-II	True	True
STRENGTH-III	False	False
STRENGTH-IV	False	False
STRENGTH-V	False	False
SERVICE-I	True	True
SERVICE-II	False	False

Styles

Styles

- Default Header Block Style
- Default Table Block Style
- Default List Block Style
- Default Header Font
- Default Data Header Font
- Default Column Font
- Default Row Font

New Delete Edit

Properties

Properties

LRFD Window

Header font style: Default Header

Hide header:

Margins

Top margin: 0

Bottom margin: 0

Left margin: 0.25

Apply

Bridge Level Report

- ❑ **Input Data (*Phases 1 & 2*)**
 - **General Bridge Information, location, etc.**
 - **Number of structures, traffic information**
 - **FE Model**
- ❑ **Output Data (*Future Phases*)**
 - **Analysis results**
 - **Design summary**
(Controlling rating for entire bridge)
 - **Rating summary**

Bridge Level Report

User will have ability to reorganize and customize components of the report. Previews for individual report components will be available

The screenshot displays the 'Report Editor' application window. The main area shows a report template for a 'Bridge Window' section. The report content includes:

BWS Detailed Report

Bridge Window

Summary
 Bridge ID: PCITrainingBridge6
 NBI structure ID (8): PCITrainBridge6

Description
 Name: PCITrainingBridge6(LRFD)
 Description: This is PCI Design Example 9.9.6, which uses Load and Resistance Factor Design (LRFD)
 Location:
 Facility carried (7):
 Feat. Intersected (6):
 Default units: US Customary
 Year built:
 Length: ft
 Route number: -1
 MI post: mi
 District:
 County:
 Owner:
 Maintainer:
 Administrative Area: Unknown
 National Highway System Indicator:
 Functional Class: Unknown

Alternatives

Existing	Current	Name
True	True	Bridge Alternative #1

Global Reference Point
 X plane coordinate: 0.00 ft
 Y plane coordinate: 0.00 ft
 Elevation: ft

The interface also features a 'File' menu with options like New, Open, Save, Print, Duplicate, Delete, and Close. A 'Section Contents' pane on the left lists report components such as Bridge Window, Summary, Description, Alternatives, Global Reference Point, Traffic, Custom Agency Fields, Bridge Association, and another Bridge Window. A 'Styles' pane on the right allows for customizing report elements like Default Header Block Style, Default Table Block Style, and various fonts. A 'Properties' pane at the bottom right shows settings for the 'Bridge Window' section, including 'Header font style' (Default Header), 'Hide header' (checkbox), and 'Margins' (Top: 0, Bottom: 0, Left: 0.25).

Superstructure Level Report

User will have ability to reorganize and customize components of the report.
Previews for individual report components will be available

☐ Input Data(*Phases 1 & 2*)

- Load case description
- Framing plan, typical section, etc.
- Superstructure loads

☐ Output Data (*Future Phases*)

- Analysis results
- Design summary
- Rating summary
(Controlling rating for entire superstructure)

Superstructure Level Report

User will have ability to reorganize and customize components of the report.
 Previews for individual report components will be available

Report Editor

File

New Open Save Save As Refresh Print Duplicate Delete Close

Document Print Edit

Template

Search

- Superstructure Definitions
 - Girder System Superstru
 - Girder System Super
 - Impact/Dynamic Loa
 - Load Case Descripti
 - Structure Framing Pl
 - Bracing Deterioratio
 - Bracing Spec Check
 - Structure Typical Sec
 - Superstructure Load
 - Stress Limit - Concre

Section Contents

- Girder System Superstructure Defini
 - Definition
 - Summary
 - Span
 - Horizontal Curvature Along
 - Modeling
 - Analysis
 - Consider structural slab thic
 - Consider structural slab thic
 - Consider wearing surface fo
 - Consider wearing surface fo
 - Considered Iner for

Report

Summary Report

BWS Detailed Report

Superstructure Definitions

Girder System Superstructure Definition Window

Definition

Summary

Name: Structure Definition #1
 Description:
 Default units: US Customary
 Number of spans: 3
 Number of girders: 4

Span

Span	Length (ft)
0	110
1	120
2	110

Horizontal Curvature Along Line

Horizontal curvature:
 Superstructure alignment type: Curved
 Distance from PC to first support line: ft
 Start tangent length: ft
 Radius: ft
 Direction: Left
 End tangent length: ft
 Distance from last support line to PT: ft
 Design speed: mph
 Superelevation: %

Modeling

Modeling type: Multi Girder System
 With frame structure simplified definition:
 Deck type: Concrete Deck
 Average humidity: 70.000 %
 Steel Member alt.types: False
 P/S Member alt.types: True
 R/C Member alt.types: False
 Timber Member alt.types: False
 P/T Member alt.types: False

Styles

Styles

- Default Header Block Style
- Default Table Block Style
- Default List Block Style
- Default Header Font
- Default Data Header Font
- Default Column Font
- Default Row Font

New Delete Edit

Properties

Properties

Girder System Superstructure Definition Window

Header font style: Default Header Font

Hide header:

Margins

Top margin: 0

Bottom margin: 0

Left margin: 0.25

Apply

Member Level Report

- ❑ **Input Data (*Phases 1 & 2*)**
 - **Member description**
 - **Girder profile, loads**
 - **Deck profile, Haunch profile, etc.**

- ❑ **Output Data (*Future Phases*)**
 - **Analysis results**
(DL and LL demands)
 - **Design summary**
(Design ratios, spec checks)
 - **Rating summary**
(Detailed rating for that member)

Member Level Report

User will have ability to reorganize and customize components of the report.
 Previews for individual report components will be available

The screenshot displays the Report Editor interface. The main report area shows three sections, each titled "Girder Member Window". Each section includes a Summary, Alternatives table, and Spans table.

Section 1: Girder Member Window

Summary
 Name: G1
 Description:
 Link with: None
 Number of spans: 3

Alternatives

Existing	Current	Name

Spans

Span no.	Span length (ft)
1	110
2	120
3	110

Section 2: Girder Member Window

Summary
 Name: G2
 Description:
 Link with: None
 Number of spans: 3

Alternatives

Existing	Current	Name
True	True	Member Alternative #2 (9.9.6)

Spans

Span no.	Span length (ft)
1	110
2	120
3	110

Section 3: Girder Member Window

Summary
 Name: G3
 Description:
 Link with: None

The interface also includes a File menu (New, Open, Save, Save As, Refresh, Print, Duplicate, Delete, Close), a Template pane, a Section Contents pane, and a Styles/Properties pane for customizing the report's appearance.

Upcoming Releases

- ❑ **Phase 2 of the Report Tool will be included in the BrDR 7.7 release**
 - **BWS Reports for remaining superstructure types**
 - **FE Model / Girder Member Alternative report**
 - **Microsoft Word report exporter and writer**
- ❑ **Phase 3 (Likely 7.8 but workplan not finalized)**
 - **LFR, LRFR, and LRFD Analysis Output Reports**
 - **All remaining currently supported engine reports excluding substructure reports**
 - **Advanced printing features**
- ❑ **Future Phases**
 - **BWS reports for substructure**
 - **Engine reports for substructure**
 - **Schematics and graphics**

What are the next steps?

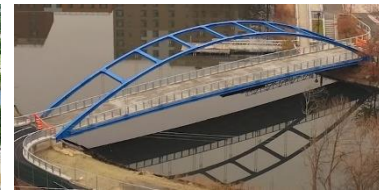
- Phase 2 to be rolled out in Version 7.7.**
- Vendor has been and will continue to produce detailed mockups of reporting features for future phases.**
- Report TAG and Vendor currently working together to customize report tool for future phases.**

Do not worry!!

- ❑ **All existing reporting features will remain in BrDR and BrR until the Report Generation Tool is complete and fully functional. (Future Phases)**
- ❑ **Existing reporting tools will be left as is and be moved to new REPORTS tab ribbon once the report tool is rolled out. (Future Phases)**
- ❑ **Existing reporting features will be sunset with new Report Generation Tool eventually. There will be adequate advance warning of when the existing report tool will be sunset. (Future Phases)**
- ❑ **Looking for input from users! This is the time to fine tune the report tool to tailor it for the specific needs of all users. Reach out to the Chair of the Report TAG or submit a ticket to JIRA with your comments and/or suggestions (Mike Johnson).**



**Department of
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Thank You!

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