

5.2.2 Technical Architecture

Conversion to GUIDs and removal of reliance on ODBC drivers

Converting from English to Metric units

Formalized API/SDK for custom development



Conversion to GUIDs

- Virtually all tables have GUID primary key
 - Not attributes
 - Globally unique
 - Support replication (field inspection)
 - Standard naming convention
 - Single primary key / foreign key joins
 - Multi-part key joins largely removed
- Views will be created that will provide a more seamless transition for existing feeds and reports. Legacy columns (e.g. BRKEY) will remain temporarily for a smoother transition



Conversion to GUIDs

- INSPEVNT (simple) example

- Before

- 🔑 BRKEY (PK, FK, varchar(15), not null)

- 🔑 INSPKEY (PK, varchar(4), not null)

- After

- 🔑 INSPEVNT_GD (PK, varchar(32), not null)

- 📄 INSPEVNT_LB (varchar(50), null)

- 🔑 BRIDGE_GD (FK, varchar(32), not null)

Conversion to GUIDs

- PON_ELEM_INSP (complex) example
 - Before (parents/grandparents requiring complex join)
 - 🔑 BRKEY (PK, FK, varchar(15), not null)
 - 🔑 INSPKEY (PK, FK, varchar(4), not null)
 - 🔑 ELEM_KEY (PK, FK, numeric(4,0), not null)
 - 🔑 ELEM_PARENT_KEY (PK, numeric(4,0), not null)
 - 🔑 ENVKEY (PK, FK, numeric(1,0), not null)
 - 🔑 STRUNITKEY (PK, numeric(4,0), not null)
 - 🔑 ELEM_GRANDPARENT_KEY (PK, numeric(4,0), not null)
 - After (parents/grandparents requiring one column to join)
 - 🔑 PON_ELEM_INSP_GD (PK, varchar(32), not null)
 - 📄 PON_ELEM_INSP_LB (varchar(50), null)
 - 🔑 PON_ELEM_DEFS_GD (FK, varchar(32), not null)
 - 🔑 ENVTDEFS_GD (FK, varchar(32), not null)
 - 🔑 BRIDGE_GD (FK, varchar(32), not null)
 - 🔑 INSPEVNT_GD (FK, varchar(32), not null)
 - 🔑 STRUCTURE_UNIT_GD (FK, varchar(32), not null)
 - 📄 PARENT_PON_ELEM_INSP_GD (varchar(32), null)

Impact of GUIDs on your agency

- If your agency is using BrM 'out of the box'
 - **NO** impact



Impact of GUIDs on your agency

- If your agency contains custom forms/reports
 - Going Forward
 - Reports and custom forms will be easier to create when joining tables
 - Naming conventions will remain standardized going forward (easier to map and use)
 - Simplified architecture
 - Immediate impact
 - Existing columns will remain to allow a smooth/temporary transition
 - Forms will eventually need to utilize GUIDs
 - Reports will eventually need to utilize GUIDs



Conversion to English

- All tables in BrM currently store units in Metric units of measure
 - Following NBI coding guide expectations (e.g. XXX.X for vertical clearance)
- All tables registered in DATADICT will have their units automatically converted to English
 - Expected values stored in the database will allow for additional accuracy, as necessary to ensure NBI standards are still met. (e.g. XXXX.X for vertical clearance)



Impact of unit conversion on your agency

- If your agency is using BrM 'out of the box'
 - **NO** impact
- If your agency contains custom forms/reports
 - Immediate impact
 - All **coded** forms will need to be converted to utilize the data being stored in English
 - All reports will need to be converted to utilize the data being stored in English



Formalized API/SDK

- A formal API and development document will be sent with 5.2.2.
- The API/SDK document will give details and a walkthrough on creating custom forms, user controls, as well as accessing non BrM tables.
- The API will give agencies a more ‘future-proof’ stable, direct way to access BrM data, without having to make direct database calls.
 - Example: Custom forms that are affected by the current by the GUID changes and Metric/English changes would have been handled by the API supported calls, and would require little to no agency tweaks.



Formalized API/SDK

- **ALL** tables within your database will be accessible, even non-BrM standard tables.
- BrM standard inspection forms will be able to be modified.
 - Add agency controls
 - Add custom modules



Technical Architecture – What does this actually mean?

- Standardize table structures and relationships.
- Satisfy long standing user request to convert to English Units.
- Custom development document will be created.
- **Significant** speed improvements (still not where we want to be)

Florida_MENNIS2 (.23)	OLD(Admin)	Oracle	4.75
Florida_MENNIS2 (.23)	OLD(Non-Admin)	Oracle	13.42
Florida_MENNIS2 (.23)	NEW	Oracle	1.97
% Improvement (over Non-Admin)			94%

Questions?

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Project Planning and Program Module

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Overview

- The focus of the Project Planning Module is the creation and management of projects.
- Requirements are based on:
 - 5.2 Detail Design Document
 - Project TRT Feedback
 - Task Force Use Cases and Direction

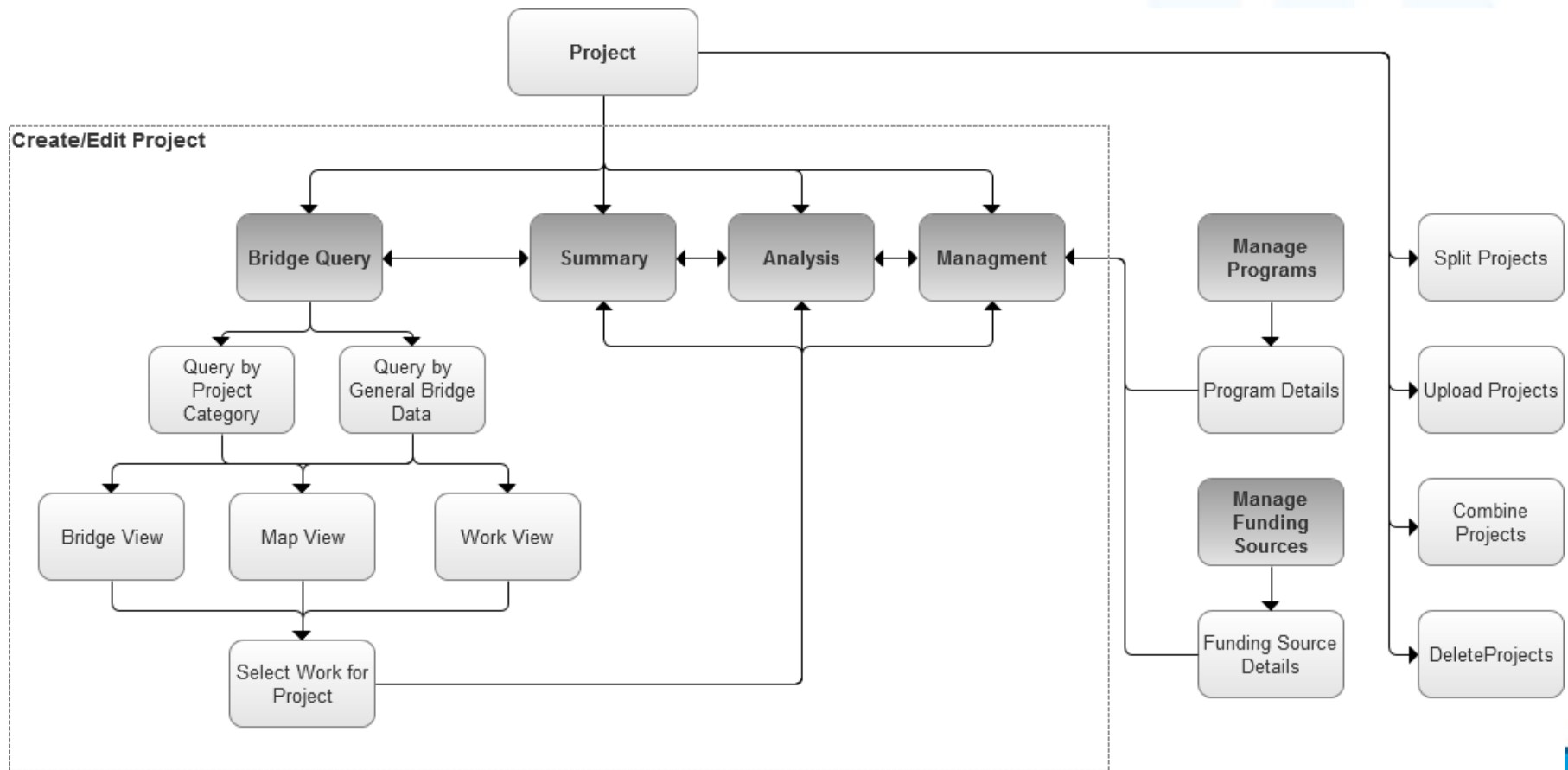


Use Cases

1. Creating a Project from a Single Bridge.
2. Creating a Project Including Multiple Hand-selected Bridges.
3. Creating a Project from a Bridge Analysis Group
4. System Generated Projects (Query).
5. Projects Developed Outside the Bridge Management Software.
6. Editing a Defined Project.
7. Changing the Status of a Project.
8. Deleting a Project.
9. Splitting a project into two projects.
10. Combining multiple projects into a single project



Overall Workflow

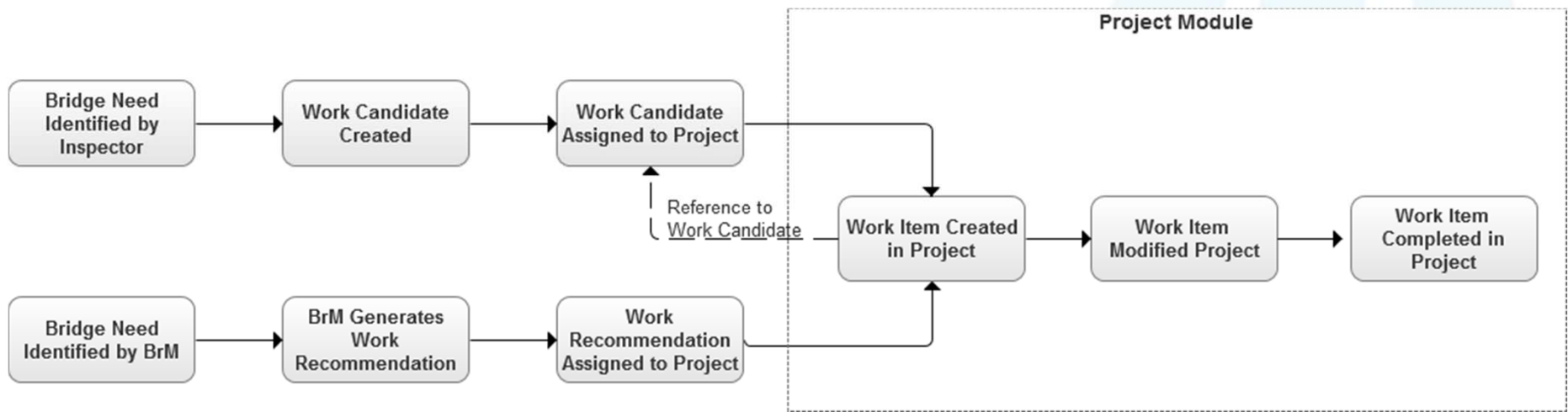


Terminology

- Work Candidates – Work that is identified by an Inspector during the inspection process to address specific bridge needs.
- Work Recommendations – System generated work that is identified based on the Element condition ratings collected during an inspection.
- Work Item – A copy of a Work Candidate or Work Recommendation that has been added to a project.



Work Item Flow



Project Module

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Menu

- Project List
- Manage Layouts
- Manage Filters
- Create / Edit Project
- Upload Project
- Combine Projects
- Split Project
- Manage Programs
- Manage Funding

Bridges Reports Admin Inspection Gateway Analysis Projects

Filter: BrM - None Layout: Default Jump to Project:

Project Name	Project ID	Category	Cost (\$k)	Utility Change	Benefit / Cost (\$k)	Cost (\$k) /Benefit	Year	Status	Description
<input type="checkbox"/> Rehab 1-25 Bridges	1234-2234 -21	Rehabilitation	150.5	60	.025	4.23	2014	Programmed	Project Description
<input type="checkbox"/> County Bridge Painting	2235-5234 -19	Paint	15.0	55	.08	2.65	2016	Planned	Project Description
<input type="checkbox"/> Clark St. Bridge Replace	3234-2234 -55	Replacement	200.3	100	.10	5.22	2015	Proposed	Project Description
<input type="checkbox"/> District 12 Joints	7344-7234 -08	Joint Seals	20.2	48	.10	2.51	2018	Proposed	Project Description
<input checked="" type="checkbox"/> US 79 Deck Paving	5234-5234 -51	Deck Work	55.6	57	.10	3.22	2017	Proposed	Project Description
<input type="checkbox"/> Cobb County Vegetation	3452-2234 -21	Crew Work	13.2	56	.08	2.64	2015	Completed	Project Description
<input type="checkbox"/> Replace 12345	3234-3345 -55	Replacement	160.7	100	.025	3.56	2014	Proposed	Project Description
<input type="checkbox"/> Replace 12345	7344-7234 -08	Replacement	160.7	100	.025	3.56	2014	Programmed	Project Description
<input type="checkbox"/> Replace 12345	3234-2234 -55	Replacement	160.7	100	.025	3.56	2014	Proposed	Project Description
<input type="checkbox"/> Replace 12345	7344-7234 -08	Replacement	160.7	100	.025	3.56	2014	Proposed	Project Description

11 Projects, 1 selected

Bridge View Map View Work View

Bridge ID	District	County	Facility Carried	Feature Intersected	Deck	Superstructure	Substructure	Culvert	Health Index	
04 07598	02	013	JESSE OWENS PKWY	WESTERN CANAL	7 Good	6 Satisfactory	7 Good	7 Good	77.8	
			Action	Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit
			Misc-Paint ID	04 07896-NMIV-045678	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732
			Joints-Rehabilitate	04 07896-NMIV-045678	50.34	52.39	2.05	\$3,002.00	0.6829	\$1
			Bridge-Replacement	04 07896-NMIV-045678	50.34	50.95	0.61	\$91,914.00	0.0066	\$151
			Paint-General	System Generated	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
			Bearings-Replace	04 07896-NMIV-045678	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
			Deck-Resurface	04 07896-NMIV-045678	50.34	51.48	1.14	\$16,800.00	0.0679	\$15
			Deck-Seal	04 07896-NMIV-045678	50.34	51.48	1.14	\$96,300.00	0.0118	\$84
			Approach Railing	System Generated	50.34	51.48	1.14	\$1,693,800.00	0.0007	\$1,486
			Approach Slab-Repair	System Generated	50.34	51.48	1.14	\$139,500.00	0.0082	\$122
			Channel-Repair Washouts/Erosion	04 07896-NMIV-045678	50.34	51.48	1.14	\$169,200.00	0.0067	\$148
> 04 07603	7TH ST S OF GREENWAY PKWY	02	013	7TH STREET		-112.0654944			33.637033	
> 04 07878	DESERT FOOT AT FRYE RD	02	013	DESERT FOOTHILLS		-112.0608444			33.2981246	
> 04 07935	INT ELLIOT RD & 48TH ST	02	013	ELLIOT ROAD & 48TH		-111.973357844922			33.3123077041172	
> 04 08003	0.5 mi N of Buckeye Rd	02	013	75th Ave		-112.2210993			33.4456691	
> 04 08508	.4 MI N OF DUNLAP RD	02	013	25TH AVENUE		-112.1122222			33.5711104	
> 04 08511	1.5 MILE EAST OF 24TH ST	02	013	CENTER FLYOVER		-112.0108333			33.4366663	
> 04 08529	SKY HARBOR AIRPORT TERM 3	02	013	PARKING ENT&EXITS		-112.0069444			33.4361107	
> 04 08530	SKY HARBOR AIRPORT TERM 3	02	013	PARKING ENT&EXIT		-112.0069444			33.4349996	
> 04 09175	19th Av N Of Indian Sch	02	013	19TH AVE		-112.0999107			33.4995774	

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56 items in 6 pages

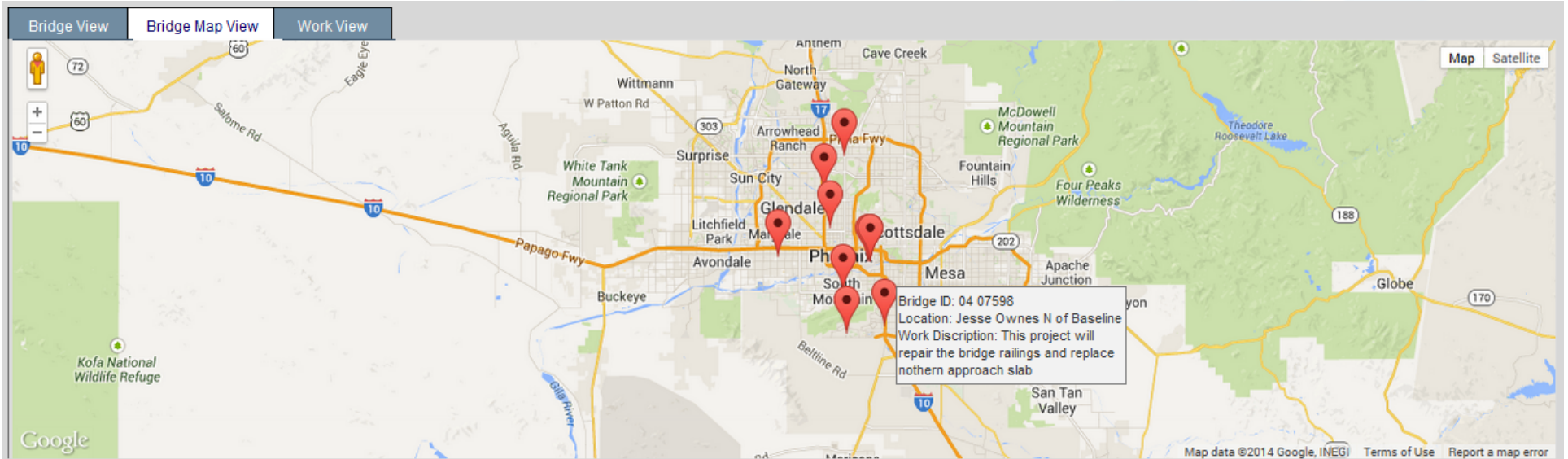


Bridge View

Bridge View		Map View	Work View							
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04 07598	02	013	JESSE OWENS PKWY	WESTERN CANAL	7 Good	6 Satisfactory	7 Good	7 Good	77.8	
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Bridge-Replacement	04 07896-NMIV-045678	50.34	50.95	0.61	\$91,914.00	0.0066	\$151			
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Deck-Seal	04 07896-NMIV-045678	50.34	51.48	1.14	\$96,300.00	0.0118	\$84			
Approach Railing	System Generated	50.34	51.48	1.14	\$1,693,800.00	0.0007	\$1,486			
Approach Slab-Repair	System Generated	50.34	51.48	1.14	\$139,500.00	0.0082	\$122			
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> 04 07603	7TH ST S OF GREENWAY PKWY	02	013	7TH STREET	-112.0654944	33.637033				
> 04 07878	DESERT FOOT AT FRYE RD	02	013	DESERT FOOTHILLS	-112.0608444	33.2981246				
> 04 07935	INT ELIOT RD & 48TH ST	02	013	ELLIOT ROAD & 48TH	-111.973357844922	33.3123077041172				
> 04 08003	0.5 mi N of Buckeye Rd	02	013	75th Ave	-112.2210993	33.4456691				
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> 04 08529	SKY HARBOR AIRPORT TERM 3	02	013	PARKING ENT&EXITS	-112.0069444	33.4361107				
> 04 08530	SKY HARBOR AIRPORT TERM 3	02	013	PARKING ENT&EXIT	-112.0069444	33.4349996				
> 04 09175	19th Av N Of Indian Sch	02	013	19TH AVE	-112.0999107	33.4995774				



Map View



Bridge Needs

Action	Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit
Misc-Paint ID	04 07896-NMIV-045678	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732
Joints-Rehabilitate	04 07896-NMIV-045678	50.34	52.39	2.05	\$3,002.00	0.6829	\$1
Bridge-Replacement	04 07896-NMIV-045678	50.34	50.95	0.61	\$91,914.00	0.0066	\$151
Paint-General	System Generated	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
Bearings-Replace	04 07896-NMIV-045678	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
Deck-Resurface	04 07896-NMIV-045678	50.34	51.48	1.14	\$16,800.00	0.0679	\$15
Deck-Seal	04 07896-NMIV-045678	50.34	51.48	1.14	\$96,300.00	0.0118	\$84
Approach Railing	System Generated	50.34	51.48	1.14	\$1,693,800.00	0.0007	\$1,486
Approach Slab-Repair	System Generated	50.34	51.48	1.14	\$139,500.00	0.0082	\$122
Channel-Repair Washouts/Erosion	04 07896-NMIV-045678	50.34	51.48	1.14	\$169,200.00	0.0067	\$148

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Work View

Bridge View	Bridge Map View	Work View							
Bridge ID	Action	Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$k) ▾	Cost (\$k) / Benefit	
04 07598	Approach Railing-Repair	05 06896-OTIV-077678	50.34	52.5	2.16	\$300.00	7.2	\$0	▲
04 07935	Joints-Rehabilitate	04 07896-NMV-045678	72.28	72.3	0.02	\$3.00	6.6667	\$0	
04 07603	Approach Railing-Repair	05 06896-OTIV-077678	72.28	72.3	0.02	\$4.00	5	\$0	
51 00005	Joints-Rehabilitate	System Generated	86.12	87.43	1.31	\$272.00	4.8162	\$0	
04 07598	Deck-Repair (Potholes)	05 06896-OTIV-077678	50.34	51.48	1.14	\$300.00	3.8	\$0	
04 07935	Approach Railing-Repair	04 07896-NMV-045678	72.28	72.3	0.02	\$6.00	3.3333	\$0	
51 00005	Approach Railing-Repair	System Generated	86.12	87.43	1.31	\$1,088.00	1.204	\$1	
04 07598	Bearings-Clean Assemblies/Paint	04 07896-NMV-045678	50.34	51.48	1.14	\$1,200.00	0.95	\$1	
04 07598	Joints-Rehabilitate	System Generated	50.34	52.39	2.05	\$3,002.00	0.6829	\$1	
04 07598	Approach Railing-Repair	04 07896-NMV-045678	50.34	52.39	2.05	\$6,008.00	0.3412	\$3	
04 07598	Approach Rdway-Patch Bituminous	05 06896-OTIV-077678	50.34	51.48	1.14	\$3,600.00	0.3167	\$3	
51 00005	Bridge Rail-Repair	System Generated	86.12	86.15	0.03	\$98.00	0.3061	\$3	
51 00005	Deck-Repair (Potholes)	System Generated	86.12	86.15	0.03	\$98.00	0.3061	\$3	



Create/Edit Projects

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Create/Edit Project

AASHTOWare Bridge Management 5 Cassini Browser

File Sites Help

Welcome: Pontis User
Database: BrM521 SQL Server Sample DB
[Help ?](#) [Account](#) [LogOut](#)

Menu: Bridges Reports Admin Inspection Gateway Analysis Projects

Project List
Manage Layouts
Manage Filters
Create / Edit Project
Query
Summary
Analysis
Management
Upload Project
Combine Projects
Split Project
Manage Programs
Manage Funding

Save Save & Close Cancel

Selected Project: New Project

Query Summary Analysis Management

Project Category: Paint Filter: Projects - Paint Filter

Bridge View Bridge Map View Display Needs for All Bridges in Filter

Bridge ID	District	County	Facility Carried	Feature Intersected	Owner	On/Off System	Hwy System	Funcn Class	Admin Area	Bridge Grp	Deck	Super	Sub	Culvert	Health Index
04 07598	02	013	Jesse Owens Pkwy	Western Canal	City/Municipal Hwy Agenc	On System	0 Not on NHS	19 Urban Local	01B - Matt Hunter	Historic	7 - Good	5 - Fair	4 - Poor	5 - Fair	68.2
04 07603	02	013	7th Street	7th Street	State Highway Agency	Off System	1 On the NHS	09 Rural Local	12A - Rick Jones	Complex	7 - Good	7 - Good	7 - Good	7 - Good	75.6
04 07980	02	013	Desert Foothills	US 232	City/Municipal Hwy Agenc	On System	1 On the NHS	19 Urban Local	01B - Matt Hunter	Unknown	5 - Fair	7 - Good	5 - Fair	7 - Good	66.5
04 07985	02	013	Elliot Road	48th Street	State Highway Agency	Off System	0 Not on NHS	19 Urban Local	12A - Rick Jones	Historic	4 - Poor	7 - Good	7 - Good	7 - Good	69.8
04 08401	02	013	75th Ave	Spruce Run	City/Municipal Hwy Agenc	On System	0 Not on NHS	09 Rural Local	01B - Matt Hunter	Complex	7 - Good	4 - Poor	7 - Good	4 - Poor	78.2
04 08791	02	013	25th Ave	Elm Street	City/Municipal Hwy Agenc	On System	1 On the NHS	09 Rural Local	12A - Rick Jones	Unknown	7 - Good	7 - Good	7 - Good	7 - Good	70.3
04 07878	02	013	Buckeye Road	Parking Ent & Exits	State Highway Agency	On System	1 On the NHS	19 Urban Local	12A - Rick Jones	Historic	5 - Fair	7 - Good	7 - Good	4 - Poor	88.5
04 07980	02	013	Desert Foothills	US 232	City/Municipal Hwy Agenc	Off System	0 Not on NHS	19 Urban Local	01B - Matt Hunter	Evacuation	5 - Fair	7 - Good	5 - Fair	7 - Good	66.5
04 08401	02	013	75th Ave	Spruce Run	State Highway Agency	Off System	0 Not on NHS	09 Rural Local	01B - Matt Hunter	Evacuation	7 - Good	4 - Poor	7 - Good	4 - Poor	78.2
04 07603	02	013	7th Street	7th Street	City/Municipal Hwy Agenc	Off System	0 Not on NHS	19 Urban Local	12A - Rick Jones	Historic	7 - Good	7 - Good	7 - Good	7 - Good	75.6
04 08791	02	013	25th Ave	Elm Street	City/Municipal Hwy Agenc	On System	0 Not on NHS	09 Rural Local	12A - Rick Jones	Unknown	7 - Good	7 - Good	7 - Good	7 - Good	70.3

Total Bridges: 55

Ready http://localhost:9000/default.aspx Port: 9000

Admin Module – Project Categories

AASHTOWare Bridge Management 5 Cassini Browser

File Sites Help

Welcome: Pontis User
Database: BrM521 SQL Server Sample DB
Help ? Account LogOut

Menu: Bridges Reports Admin Inspection Gateway Analysis Projects

Security
Parameters
Element Spec
Definitions
Elements
Assessments
Benefit Groups
Action Defs
Project Categories
Options
Cost Index
Formulas
Export Options
Data Dict.
Checked Out Bridges
ReNUMBER Brkey
Logging
Navigation & Field Security
Sync Mapping
Utility

Add New Project Category

Project Category: Paint Set as Default Category

Description:

Default Filter: Project - Paint Filter

Default Layout: Project - Paint Layout

Project Category List:
Paint
Joint Seals
Deck Work
Bridge Replacement
Culvert Replacement
Scour Work
Risk Mitigation
Bridge Rail
8 Project Categories
Selected Item: **Delete**

Related Actions:

	Key	Name	Description
<input type="checkbox"/>	0	Do nothing (flex)	Bridge deteriorates according to the TP matrix
<input type="checkbox"/>	09	Deck-Crack Sealing	Sealing Concrete Bridge Deck Cacks
<input type="checkbox"/>	1	Replace Super (flex)	Replace Superstructure
<input type="checkbox"/>	10	Deck-Asphalt Repair	Asphalt Bridge Deck Repair Work
<input type="checkbox"/>	1000	Approach Railing-Repair	Approach Railing-Repair
<input type="checkbox"/>	1001	Approach Railing	Approach Railing
<input type="checkbox"/>	1002	Apprh-Rdway-Mill Approach	Approach Roadway-Mill Approach / Shoulder
<input type="checkbox"/>	1003	Approach Roadway	Approach Roadway

Total Actions: 100

Save

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04 07603	02	013	7th Street	7th Street	State Highway Agency	Off System	1 On the NHS	09 Rural Local	12A - Rick Jones	Complex	7 - Good	7 - Good	7 - Good	7 - Good	75.6
04 07980	02	013	Desert Foothills	US 232	City/Municipal Hwy Agenc	On System	1 On the NHS	19 Urban Local	01B - Matt Hunter	Unknown	5 - Fair	7 - Good	5 - Fair	7 - Good	66.5
04 07985	02	013	Elliot Road	48th Street	State Highway Agency	Off System	0 Not on NHS	19 Urban Local	12A - Rick Jones	Historic	4 - Poor	7 - Good	7 - Good	7 - Good	69.8
04 08401	02	013	75th Ave	Spruce Run	City/Municipal Hwy Agenc	On System	0 Not on NHS	09 Rural Local	01B - Matt Hunter	Complex	7 - Good	4 - Poor	7 - Good	4 - Poor	78.2
04 08791	02	013	25th Ave	Elm Street	City/Municipal Hwy Agenc	On System	1 On the NHS	09 Rural Local	12A - Rick Jones	Unknown	7 - Good	7 - Good	7 - Good	7 - Good	70.3
04 07878	02	013	Buckeye Road	Parking Ent & Exits	State Highway Agency	On System	1 On the NHS	19 Urban Local	12A - Rick Jones	Historic	5 - Fair	7 - Good	7 - Good	4 - Poor	88.5
04 07980	02	013	Desert Foothills	US 232	City/Municipal Hwy Agenc	Off System	0 Not on NHS	19 Urban Local	01B - Matt Hunter	Evacuation	5 - Fair	7 - Good	5 - Fair	7 - Good	66.5
04 08401	02	013	75th Ave	Spruce Run	State Highway Agency	Off System	0 Not on NHS	09 Rural Local	01B - Matt Hunter	Evacuation	7 - Good	4 - Poor	7 - Good	4 - Poor	78.2
04 07603	02	013	7th Street	7th Street	City/Municipal Hwy Agenc	Off System	0 Not on NHS	19 Urban Local	12A - Rick Jones	Historic	7 - Good	7 - Good	7 - Good	7 - Good	75.6
04 08791	02	013	25th Ave	Elm Street	City/Municipal Hwy Agenc	On System	0 Not on NHS	09 Rural Local	12A - Rick Jones	Unknown	7 - Good	7 - Good	7 - Good	7 - Good	70.3

Total Bridges: 55

Bridge Needs

Layout: Projects - Paint Layout Display Category Actions Only Display Work Candidates Only

Bridge ID	Action	Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$K)	Cost / Benefit Existing Project		
<input type="checkbox"/>										
<input type="checkbox"/>	04 07878	Paint-General	04 07896-NMIV-045678	51.37	60.22	8.29	\$10,000	0.8	\$1,206.27	Yes
<input type="checkbox"/>	04 07878	Paint-Misc. Activity	04 07896-NMIV-045678	51.37	55.00	3.36	\$5,000	0.7	\$1,488.10	
<input type="checkbox"/>	04 07878	Paint-Wash	System Generated	51.37	52.10	0.73	\$2,500	0.3	\$3,424	

Add to Project

Selected Bridges and Work

Bridge ID	Location	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$K)	Cost (\$K) / Benefit
04 07598	Jesse Owens N Of Baseline	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732
Action	Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$K)	Cost (\$K) / Benefit
Misc-Paint ID	04 07896-NMIV-045678	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732
Joints-Rehabilitate	04 07896-NMIV-045678	50.34	52.39	2.05	\$3,002.00	0.6829	\$1
Bridge-Replacement	Generated 5/10/2013	50.34	50.95	0.61	\$91,941.00	0.0006	\$151
Paint-General	Generated 5/10/2013	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
Bearings-Replace	04 07896-NMIV-045678	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
Deck-Resurface	04 07896-NMIV-045678	50.34	51.48	1.14	\$16,800.00	0.0697	\$15
Deck-Seal	04 07896-NMIV-045678	50.34	51.48	1.14	\$96,300.00	0.0118	\$84
Approach Railing	04 07896-NMIV-045678	50.34	51.48	1.14	\$1,693,800.00	0.0007	\$1,486
Approach Slab-Repair	Generated 5/10/2013	50.34	51.48	1.14	\$139,500.00	0.0082	\$122

Ready http://localhost:9000/default.aspx Port: 3000





Menu **Bridges** Reports Admin Inspection Gateway Analysis Projects

- Project List
- Manage Layouts
- Manage Filters
- Create / Edit Project
 - Query
 - Summary
 - Analysis
 - Management
- Upload Project
- Combine Projects
- Split Project
- Manage Programs
- Manage Funding

Save Save & Close Cancel

Selected Project: New Project

Query Summary Analysis Management

Project Category: Paint Filter: Projects - Paint Filter

Bridge View Bridge Map View Display Needs for All Bridges in Filter

Map Satellite

Bridge Needs

Layout: Projects - Paint Layout Display Category Actions Only Display Work Candidates Only

Bridge ID	Action	Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$K)	Cost / Benefit Existing Project
<input type="checkbox"/>								
<input type="checkbox"/> 04 07878	Paint-General	04 07896-NMIV-045678	51.37	60.22	8.29	\$10,000	0.8	\$1,206.27 Yes
<input type="checkbox"/> 04 07878	Paint-Misc. Activity	04 07896-NMIV-045678	51.37	55.00	3.36	\$5,000	0.7	\$1,488.10
<input type="checkbox"/> 04 07878	Paint-Wash	System Generated	51.37	52.10	0.73	\$2,500	0.3	\$3,424

Add to Project

Selected Bridges and Work

Bridge ID	Location	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$K)	Cost (\$K) / Benefit	
04 07598	Jesse Owens N Of Baseline	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732	
Action		Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$K)	Cost (\$K) / Benefit
Misc-Paint ID		04 07896-NMIV-045678	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732 X
Joints-Rehabilitate		04 07896-NMIV-045678	50.34	52.39	2.05	\$3,002.00	0.6829	\$1 X
Bridge-Replacement		Generated 5/10/2013	50.34	50.95	0.61	\$91,941.00	0.0006	\$151 X
Paint-General		Generated 5/10/2013	50.34	51.48	1.14	\$196,200.00	0.0058	\$172 X
Bearings-Replace		04 07896-NMIV-045678	50.34	51.48	1.14	\$196,200.00	0.0058	\$172 X
Deck-Resurface		04 07896-NMIV-045678	50.34	51.48	1.14	\$16,800.00	0.0697	\$15 X
Deck-Seal		04 07896-NMIV-045678	50.34	51.48	1.14	\$96,300.00	0.0118	\$84 X
Approach Railing		04 07896-NMIV-045678	50.34	51.48	1.14	\$1,693,800.00	0.0007	\$1,486 X
Approach Slab-Repair		Generated 5/10/2013	50.34	51.48	1.14	\$139,500.00	0.0082	\$122 X



ASHTOWare Bridge Management 5 Cassini Browser

File Sites Help

Welcome: Pontis User
Database: BrM521 SQL Server Sample DB
Help? Account LogOut

Menu
Bridges Reports Admin Inspection Gateway Analysis Projects

Project List
Manage Layouts
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Create / Edit Project
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Summary
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Management
Upload Project
Combine Projects
Split Project
Delete Project
Manage Programs
Manage Funding

Save Save & Close Cancel

Selected Project: New Project

Query Summary Analysis Management

Project Details

Project ID: 2235-5234-19 Alternate ID: Project Status: Planning Project URL:

Project Name: Project Type: Paint Year Start: Year End: Created by: John Smith Date: 5/31/2014

Project Description:

Project Notes

Project Cost and Benefits

Indirect Cost	Project Cost		Performance Measure	Average Benefit	Median Benefit	Total Benefit
Calculated: 20.0%	Direct Cost: \$5,000,000	Other Costs:	Health Index	20.31	21.71	321.32
Entered: %	Indirect Cost: \$1,000,000	Total Cost: \$6,000,000	Condition	15.21	16.02	214.64
			Risk	4.56	4.5	40.42
			Mobility	14.84	15.00	63.24
			Life cycle Cost	23.54	23.50	267.43
			TOTAL BENEFIT			1,483.43

Bridge and Work Summary

Bridge View Map View

Bridge ID	Location	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit
04 07598	Jesse Owens N Of Baseline	50.34	60.44	10.04	\$12,345,000	.1245	\$2,136
>	04 07603	7TH ST S OF GREENWAY PKWY					
>	04 07878	DESERT FOOT AT FRYE RD					
>	04 07935	INT ELIOT RD & 48TH ST					
>	04 08003	0.5 mi N of Buckeye Rd					
>	04 08508	.4 MI N OF DUNLAP RD					
>	04 08511	1.5 MILE EAST OF 24TH ST					
>	04 08529	SKY HARBOR AIRPORT TERM 3					
>	04 08530	SKY HARBOR AIRPORT TERM 3					
>	04 09175	19th Av N Of Indian Sch					

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AASHTOWare Bridge Management 5 Cassini Browser

File Sites Help

Welcome: Pontis User
Database: BrM521 SQL Server Sample DB
Help? Account LogOut

Menu: Bridges Reports Admin Inspection Gateway Analysis Projects

Project List: Save Save & Close Cancel

Manage Layouts

Manage Filters

Create / Edit Project: Query Summary Analysis Management

Selected Project: New Project

Selected Bridge: 04 07603

Bridge Work Description:

Description				Conditions			
Route:	00000	Milepoint:	mi	Deck:	4 Poor	Superstr:	6 Satisfactory
District:	District 2	County:	Maricopa	Substr:	7 Good	Culvert:	N N/A (NBI)
Owner:	City/Municipal Hwy Agenc	Area:	02B - Paul Goldsmith	Structure:	8 Protected	Deck Index:	50.07
Material:	5 Prestressed Concrete	Resp:	City/Municipal Hwy Agenc	Superstr Index:	45.89	Substr Index:	
Scour:	6 Calcs not made	Design:	05 Multiple Box Beam	Culvert Index:		Structure HI:	42.16

Current Scaled Performance			
Condition:	59.32	Risk:	53.81
Lifecycle:		Mobility:	34.2

Sufficiency			
Rating:	97.5	SD/FO:	Not Deficient

Recent Completed Work						
Year	Cost (\$k)					
No recently completed work found.						

Work Candidates Existing for the Selected Bridge Selected Work All Work

Work Candidate	Utility	Utility Change	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Action Year
Do Nothing	50.34		\$45,000	.156	\$12	0
04 0759-JQX-031914-6ABA193714 - Approach Railing-Repair	52.5	2.16	\$125,000	.032	\$0	0
04 0759-NIMO-042114-E90D693A52 - Approach Railing-Repair	52.5	2.16	\$25,000	-.141	\$0	0
04 0759-NIMO-091313-E2A8C9DA58 - Approach Slab-Repair	51.48	1.14	\$150,000	.114	\$9	0
A-DOT001-057F6A47-0000006A - Bridge Rail-Repair	50.34	0	\$75,000	-.176	\$7	0
A-DOT001-057F6A47-0000006D - Deck-Rehab	50.34	0	\$100,000	-.198	\$10	0

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Effects on Each Utility Criterion		
Category name	Before WC	After WC
Total Utility	50.34	52.5
Condition	59.32	61.88
Deck	42	98
Superstructure	81	81
Substructure	91	91
Scour	58	58
Element ratings	52.44	62.89
(12) Reinforced Concrete Deck	32.04	48.46
(38) Reinforced Concrete Deck	31.98	48.42
(65) Other Slab	100	100
(116) Reinforced Concrete Closed Web/Box Girder	100	100
(320) Prestress Concrete Approach Slab	10.66	10.66
(321) Reinforced Concrete Approach Slab	10.66	10.66
(331) Reinforced Concrete Bridge Railing	28.42	100
(520) Deck/Slab Protection Systems	100	100
(521) Concrete Protective Coating	10.66	10.66
(144) Reinforced Concrete Arch	100	100
Risk	53.81	57.58
Accident	53.81	57.58
Mobility	34.2	34.2
Percent of truck detoured.	34.2	34.2

Effects on Each Element				
Element	Str Unit	Env.	Condition	Effect
(12) Re Concrete Deck	0	Low (2)	Low	Low
(12) Re Concrete Deck	0	Mod. (3)	Low	Low
(38) Re Concrete Slab	0	Low (2)	Low	Low
(65) Other Slab	0	Ben. (1)	Low	Low
(116) Re Conc Stringer	0	Ben. (1)	Low	Low
(144) Re Conc Arch	0	Ben. (1)	Low	Low
(320) Pre Conc Appr Slab	0	Low (2)	Low	Low
(321) Re Conc Approach Slab	0	Low (2)	Low	Low
(331) Re Conc Bridge Railing	0	Low (2)	Low	Low
(12) Re Concrete Deck	1	Mod. (3)	Low	Low

Deterioration	
Bridge	Element

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- Project List
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- Split Project
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- Manage Funding

Selected Project:

Project Details

Project ID:
 Alternate ID:
 Project Status:
 Project URL:

Project Name:
 Project Type:
 Year Start:
 Year End:
 Created by: John Smith
 Date: 5/31/2014

Project Description:

Project Costs

Indirect Cost	Project Cost	
Calculated: 20.0%	Direct Cost: \$5,000,000	Other Costs: <input type="text"/>
Entered: <input type="text"/> %	Indirect Cost: \$1,000,000	Total Cost: \$6,000,000

Programs

	Program Name	Program ID	Start Year	End Year	Description
✕	County Bridge Painting	1234-2234 -21	2014	2015	Project Description text
✕	Maintenance and Works	2233-5522 -76	2015	2017	Project Description text

Funding Sources

	Funding Source	Target Year	Amount	Notes
✕	Capital Plan	2015	\$1,000,000	<input type="text"/>
✕	State Paving Budget	2015	\$4,500,000	<input type="text"/>
✕	Maintenance Budget	2016	\$500,000	<input type="text"/>

Milestones

	Type	Name	Status	Original Date	Revised Date	Notes
✕	Default	Work Items Confirmed	Complete	01/01/2015	01/01/2015	<input type="text"/>
✕	Funding	Funding Secured	Closing	01/01/2015	01/01/2015	<input type="text"/>
✕	Scheduling	Equipment Planned	In Progress	01/01/2015	01/01/2015	<input type="text"/>
✕	Default	Project Initiated	Planned	01/01/2015	01/01/2015	<input type="text"/>
✕	Scheduling	Resources Scheduled	Planned	01/01/2015	01/01/2015	<input type="text"/>



Manage Programs

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- Project List
- Manage Layouts
- Manage Filters
- Create / Edit Project
- Upload Project
- Combine Projects
- Split Project
- Manage Programs
- Manage Funding

[Create](#) [Edit](#)

Program Name	Program ID	Alternate ID	Description	Start Year	End Year	Status	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
North County Bridge Painting	1234-2234 -21	DOT-2014_99837	Program Description	2015	2018	Active	X
BZH Paving and Rehab	2235-5234 -19	DOT-2014_35545	Program Description	2016	2019	Closed	X
2015 FHWA Rehab	3234-2234 -55	DOT-2015_43005	Program Description	2015	2019	Active	X
2017 State Paving	2235-5234 -19	DOT-2017_35545	Program Description	2017	2017	Planned	X
West County Bridge Painting	1234-2234 -21	DOT-2014_99837	Program Description	2015	2020	Active	X
2016 FHWA Rehab	2235-5234 -19	DOT-2016_35545	Program Description	2016	2016	Closed	X
South County Bridge Painting	3234-2234 -55	DOT-2015_43005	Program Description	2015	2018	Active	X
Program X	2235-5234 -19	DOT-2024_35545	Program Description	2016	2019	Planned	X
East County Bridge Painting	3234-2234 -55	DOT-2015_43005	Program Description	2015	2018	Active	X
Program Y	2235-5234 -19	DOT-2014_35545	Program Description	2016	2019	Active	X

⏪ ⏩ 1 2 3 ⏪ ⏩

Total Programs 27



Menu **Bridges** Reports Admin Inspection Gateway Analysis **Projects**

- Project List
- Manage Layouts
- Manage Filters
- Create / Edit Project
- Upload Project
- Combine Projects
- Split Project
- Manage Programs
- Manage Funding

Program:

Program Details

Program ID: Program Alternate ID: Program Start Year:

Program Name: Program Status: Program End Year:

Program Objective: Program URL:

Program Description:

Program Notes

Associated Projects

	Project Name	Project ID	Category	Cost (\$k)	Utility Change	Benefit / Cost (\$k)	Cost (\$k) /Benefit	Funding Source	Year	Project Status
<input checked="" type="checkbox"/>	Rehab 1-25 Bridges	1234-2234 -21	Rehabilitation	\$1,500,000	60	.025	4.23	Federal Budget	2017	Planned
<input checked="" type="checkbox"/>	County Bridge Painting	2235-5234 -19	Paint	\$500,000	55	.08	2.65		2017	Programmed
<input checked="" type="checkbox"/>	Clark St. Bridge Replace	3234-2234 -55	Replacement	\$2,000,000	100	.10	5.22		2017	Programmed

Cost of Associated Projects (Total): \$4,000,000
 Cost of Associated Projects (Unfunded): \$2,500,000

Funding Sources

	Key	Funding Source	Amount	Year	Notes
<input checked="" type="checkbox"/>	0	Federal Highway Funds	\$2,000,000	2017	<input type="text"/>
<input checked="" type="checkbox"/>	1	State Paving Budget	\$50,000	2017	<input type="text"/>

Manage Funding

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Menu **Bridges** Reports Admin Inspection Gateway Analysis Projects

- Project List
- Manage Layouts
- Manage Filters
- Create / Edit Project
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- Manage Programs
- Manage Funding**

Funding Source Name	Funding Source ID	Status	Type	Description	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Federal Highway Paving	1234-2234 -21	Active	User Defined	Funding Source Description	X
BZH Paving and Rehab	2235-5234 -19	Planned	User Defined	Funding Source Description	X
State Infrastructure Budget	3234-2234 -55	Active	User Defined	Funding Source Description	X
Capital Plan	2235-5234 -19	Active	User Defined	Funding Source Description	X
State Sales Tax Funds	1234-2234 -21	Closed	User Defined	Funding Source Description	X
Pavement Annual Budget	2235-5234 -19	Active	User Defined	Funding Source Description	X
County Wide Funds	3234-2234 -55	Closed	User Defined	Funding Source Description	X
Source X	2235-5234 -19	Planned	User Defined	Funding Source Description	X
Bridge Painting Fund	3234-2234 -55	Active	User Defined	Funding Source Description	X
Source Y	2235-5234 -19	Planned	User Defined	Funding Source Description	X

Total Funding Sources 12

AASHTOWare Bridge Management 5 Cassini Browser

File Sites Help

Welcome: Pontis User
Database: BRM521 SQL Server Sample DB
Help? Account LogOut

Menu
Bridges Reports Admin Inspection Gateway Analysis Projects

Project List
Manage Layouts
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Create /Edit Project
Upload Project
Combine Projects
Split Project
Manage Programs
Manage Funding

Funding Source: State Paving Budget Save Cancel

Funding Source Details

Funding Source ID: 2235-5234 -19 Funding Source Status: Active Funding Source URL: http://state.dot.us/funding

Funding Source Name: 2017 State Paving Funding Source Type: Active

Funding Source Description:

Funding Source Notes:

Funding Source Targets

Key	Target Year	Target Amount	Current Plan	Remaining	Notes
X 0	2015	\$10,000,000	\$8,500,000	\$1,500,000	
X 1	2016	\$12,000,000	\$13,340,000	(\$3,340,000)	
X 2	2017	\$15,000,000	\$10,500,000	\$4,500,000	
X 3	2018	\$7,000,000	\$5,300,000	\$1,700,000	

Add New

Associated Programs and Projects

Target Year: 2017

Target Year Programs:

	Program Name	Program ID	Alternate ID	Description	Start Year	End Year	Status	Funding Amount
X	North County Bridge Paving	1234-2234 -21	DOT-2014_99837	Program Description	2015	2018	Active	\$1,000,000
X	BZH Paving and Rehab	2235-5234 -19	DOT-2014_35545	Program Description	2015	2019	Active	\$2,500,000
X	2015 Maintenance Paving	3234-2234 -55	DOT-2015_43005	Program Description	2012	2019	Active	\$750,000
X	State Paving Program	2235-5234 -19	DOT-2017_35545	Program Description	2014	2020	Active	\$4,500,000

Total Program Costs (All Requests): \$8,750,000
Total Program Costs (Approved): \$6,250,000

Target Year Projects:

	Project Name	Project ID	Category	Cost (\$k)	Utility Change	Benefit / Cost (\$k)	Cost (\$k) /Benefit	Year	Project Status
X	1-25 Bridges Paving	1234-2234 -21	Paving	\$1,500,000	60	.025	4.23	2015	Planned
X	County X Bridge Paving	2235-5234 -19	Paving	\$250,000	55	.08	2.65	2015	Programmed

Total Project Costs (All Requests): \$1,750,000

Total Costs (All Requests): \$10,500,000
Total Costs (Approved): \$8,000,000

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Other Use Cases

AASHTOWare Bridge Management

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Upload Project

The screenshot displays the AASHTOWare Bridge Management 5 Cassini Browser interface. The window title is "AASHTOWare Bridge Management 5 Cassini Browser". The top navigation bar includes "File", "Sites", and "Help". The main header features the "BrM Bridge Management" logo and a user status area showing "Welcome: Pontis User", "Database: BrM521 SQL Server", and "Sample DB". Below the header is a menu bar with "Bridges", "Reports", "Admin", "Inspection", "Gateway", "Analysis", and "Projects". A left sidebar menu lists various actions: "Project List", "Manage Layouts", "Manage Filters", "Create / Edit Project", "Upload Project", "Combine Projects", "Split Project", "Manage Programs", and "Manage Funding". The "Upload Project" form is the central focus, containing the following elements:

- Import File Type:** A dropdown menu set to "BrM External Project File (XML)".
- Input File:** A text input field with a "Select" button to the right.
- Options:** A section with two radio buttons:
 - Update Existing Project: Includes a "Select Project" dropdown menu.
 - Add as New Project: Includes a "Project Name:" text input field.
- Buttons:** "Import" and "Cancel" buttons at the bottom of the form.

The status bar at the bottom of the window reads: "Ready http://localhost:9000/default.aspx Port: 9000".

Combine Projects

The screenshot displays the AASHTOWare Bridge Management 5 Cassini Browser interface. The main window title is "AASHTOWare Bridge Management 5 Cassini Browser". The top navigation bar includes "File", "Sites", and "Help". The user is logged in as "Pontis User" and the database is "BrMS21 SQL Server Sample DB". The "Projects" menu item is selected, and the "Combine Projects" dialog box is open.

Combine Projects

Selected Projects

Project Name	Project ID	Category	Status
Rehab 1-25 Bridges	1234-2234 -21	Rehabilitation	Approved
County Bridge Painting	2235-5234 -19	Paint	Under Review
Clark St. Bridge Replace	3234-2234 -55	Replacement	Proposed

Combined Project Name:

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Split Project

AASHTOWare Bridge Management 5 Cassini Browser

File Sites Help

Welcome: Pontis User
Database: BrM521 SQL Server Sample DB
[Help ?](#) [Account](#) [LogOut](#)

Menu
Bridges Reports Admin Inspection Gateway Analysis **Projects**

Project List
Manage Layouts
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Create / Edit Project
Upload Project
Combine Projects
Split Project
Manage Programs
Manage Funding

Project to Split: 179 N Bridge Rehabilitation

Select Work Items

Bridge ID	Location	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$)	Cost (\$) / Benefit	
04 07598	Jesse Owens N Of Baseline	50.34	60.44	10.04	\$12,345,000	.1245	\$2,136	
Action Work Candidate Base Utility Utility Utility Change Estimated Cost Benefit / Cost (\$)								
<input checked="" type="checkbox"/>	Misc-Paint ID	04 07896-NMV-045678	50.34	52.42	2.08	\$9,842,148.00	0.0002	\$4,732
<input checked="" type="checkbox"/>	Joints-Rehabilitate	04 07896-NMV-045678	50.34	52.39	2.05	\$3,002.00	0.6829	\$1
<input checked="" type="checkbox"/>	Bridge-Replacement	System Generated	50.34	50.95	0.61	\$91,914.00	0.0066	\$151
<input checked="" type="checkbox"/>	Paint-General	04 07896-NMV-045678	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
<input checked="" type="checkbox"/>	Bearings-Replace	04 07896-NMV-045678	50.34	51.48	1.14	\$196,200.00	0.0058	\$172
<input type="checkbox"/>	Deck-Resurface	System Generated	50.34	51.48	1.14	\$16,800.00	0.0679	\$15
<input type="checkbox"/>	Deck-Seal	04 07896-NMV-045678	50.34	51.48	1.14	\$96,300.00	0.0118	\$84
<input type="checkbox"/>	Approach Railing	System Generated	50.34	51.48	1.14	\$1,693,800.00	0.0007	\$1,486
<input type="checkbox"/>	Approach Slab-Repair	04 07896-NMV-045678	50.34	51.48	1.14	\$139,500.00	0.0082	\$122
<input type="checkbox"/>	Channel-Repair Washouts/Erosion	04 07896-NMV-045678	50.34	51.48	1.14	\$169,200.00	0.0067	\$148
04 07603 7TH ST S OF GREENWAY PKWY								
>	04 07878	DESERT FOOT AT FRYE RD	50.34	60.44	10.04	\$12,345,000	.1245	\$2,136
>	04 07935	INT ELIOT RD & 48TH ST	62.34	75.44	13.04	\$3,874,000	.2134	\$1,428
>	04 08003	0.5 mi N of Buckeye Rd	50.34	60.44	10.04	\$12,345,000	.1245	\$2,136
>	04 08508	.4 MI N OF DUNLAP RD	62.34	75.44	13.04	\$3,874,000	.2134	\$1,428
>	04 08511	1.5 MILE EAST OF 24TH ST	50.34	60.44	10.04	\$12,345,000	.1245	\$2,136
>	04 08529	SKY HARBOR AIRPORT TERM 3	62.34	75.44	13.04	\$3,874,000	.2134	\$1,428
>	04 08530	SKY HARBOR AIRPORT TERM 3	50.34	60.44	10.04	\$12,345,000	.1245	\$2,136
>	04 09175	19th Av N Of Indian Sch	62.34	75.44	13.04	\$3,874,000	.2134	\$1,428

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Split Project Name:

Ready http://localhost:9000/default.aspx Port: 9000

Questions?

AASHTOWare Bridge Management

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Deterioration Modeling

AASHTOWare Bridge Management

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Historical Background

- Pontis 4.x Deterioration Modeling:
 - Markovian models
 - Interaction of elements not modeled
 - Probability transition matrices



Markovian Model

- Condition-based model.
- No age is considered.
- **Unrealistic results**: faster deterioration rates.

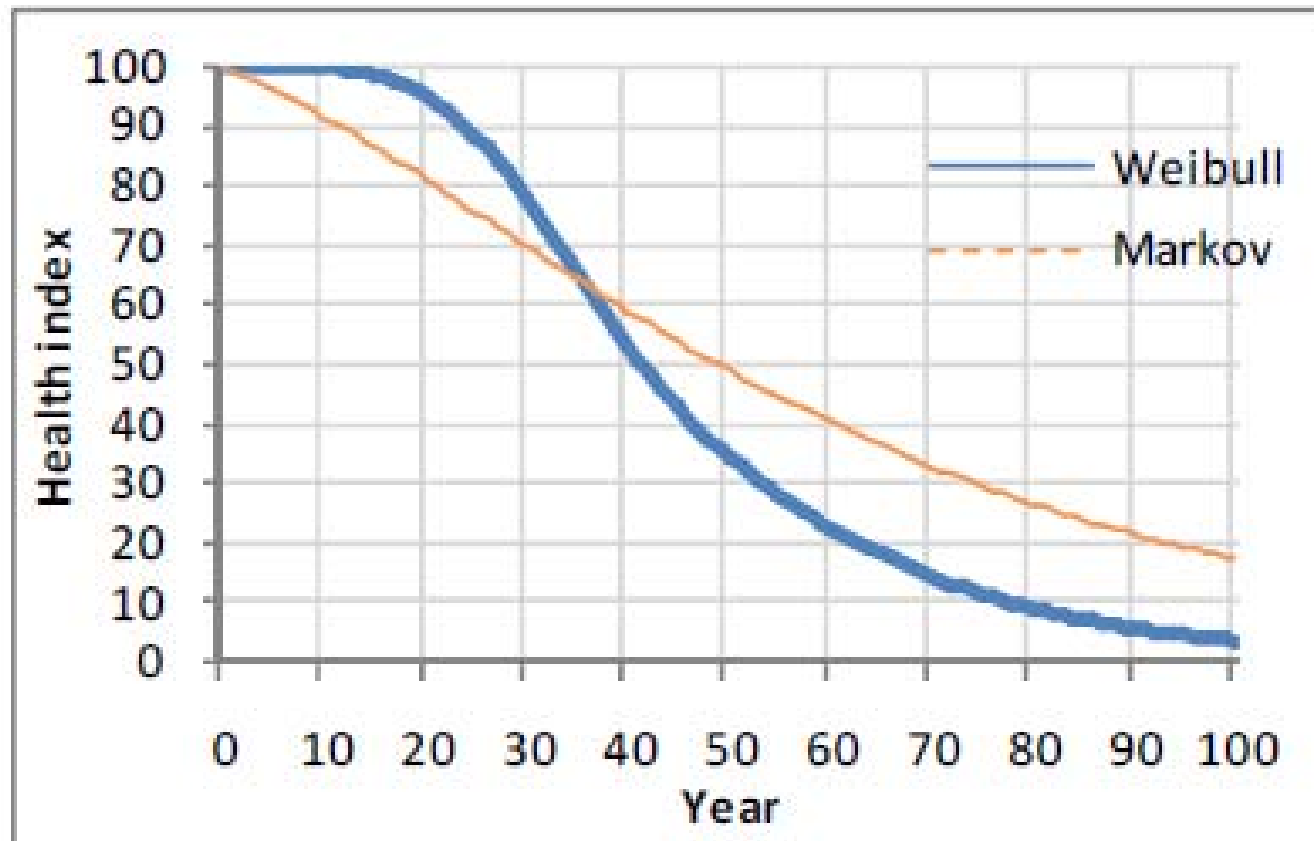


Weibull Model

- Age-based model.
- Estimates element age from its conditions
- Used to model the **onset of deterioration**: CS1 to CS2
- Realistic results.



Markovian vs. Weibull



BrM Deterioration Model

- Combination of Weibull with Markovian
- Considers the effect of other factors:
 - Protecting systems (paint, cathodic protection).
 - Environment.
 - Agency(e.g. traffic volume).



Protection systems

- Designed to slow element deterioration.
- An element may contain several protection systems:
 - 510 - Wearing Surfaces
 - 515 - Steel Protective Coating
 - 520 - Deck/Slab Prot Sys
 - 521 - Conc Prot Coating



Factors

- $f = f^E f^F \prod_e f_e^M$
- f^E - Environment factor
- f^F - Formula factor
- f_e^M - Protection factor of element e

- $T_i = f * T_i$



Transition times

- Transition times: T_1 T_2 T_3 (expert elicitation)
- T_i – Median number of years it takes a unit of element to transit to the next condition state.
- Estimated for typical elements:
 - Moderate environment.
 - No protection



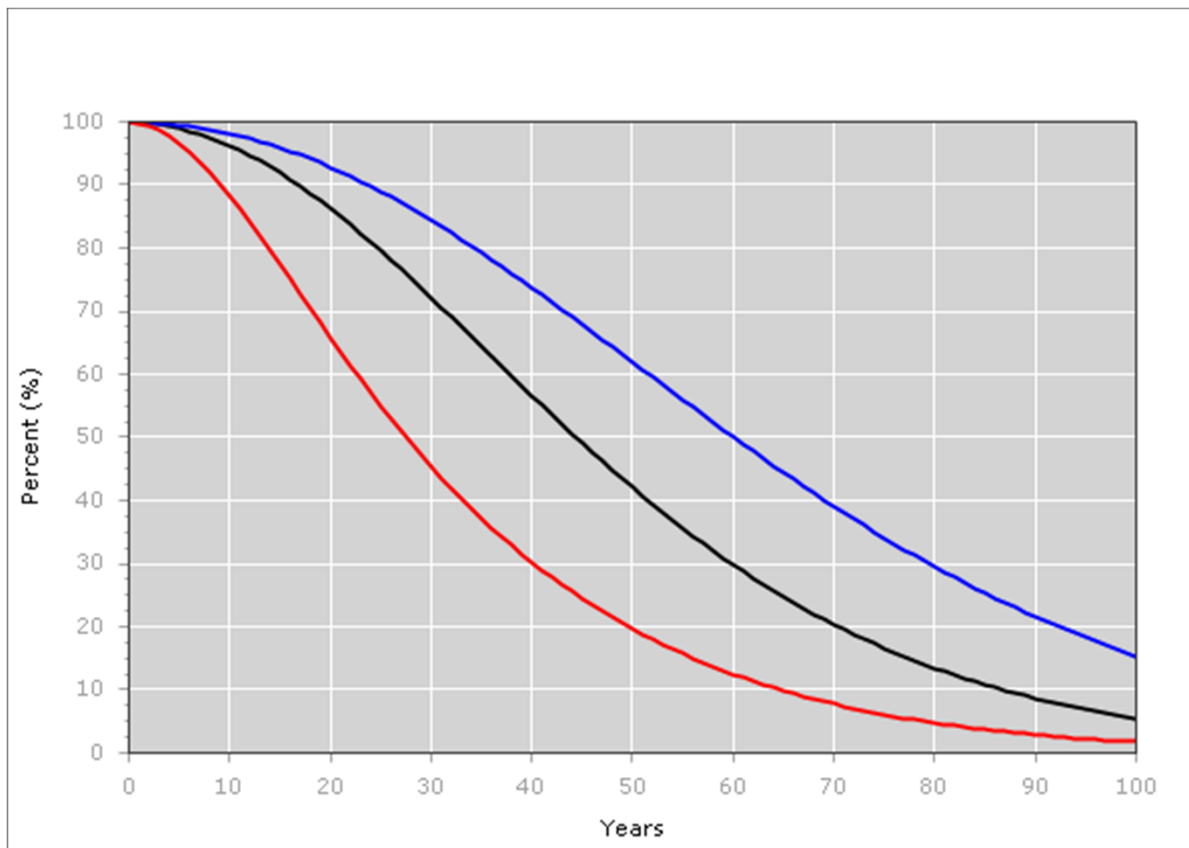
Examples

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Tweaking Median Years in CS1



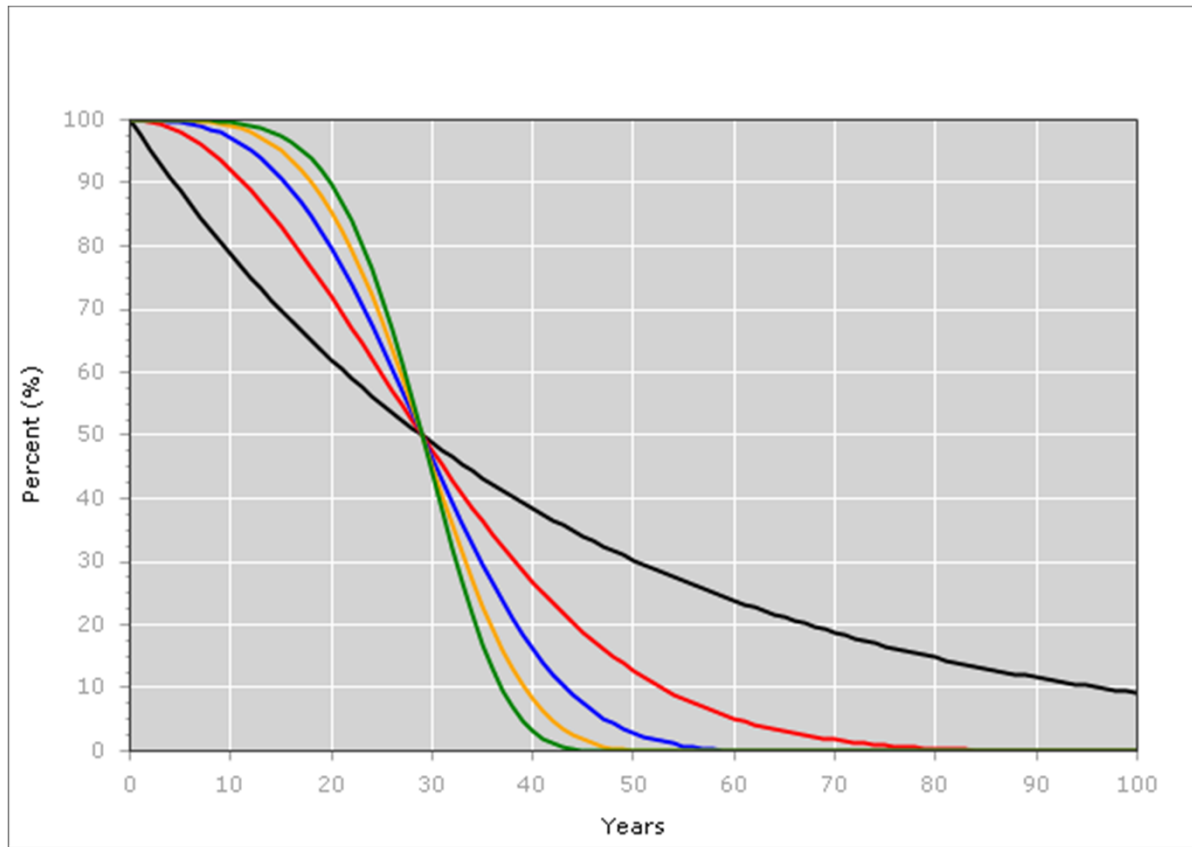
330 – Metal Bridge Rail

T1: 29 years (default)

T1: 15 years (-50%)

T1: 44 years (+50%)

Tweaking Weibull Shaping Parameter



330 – Metal Bridge Rail

$\beta: 1$

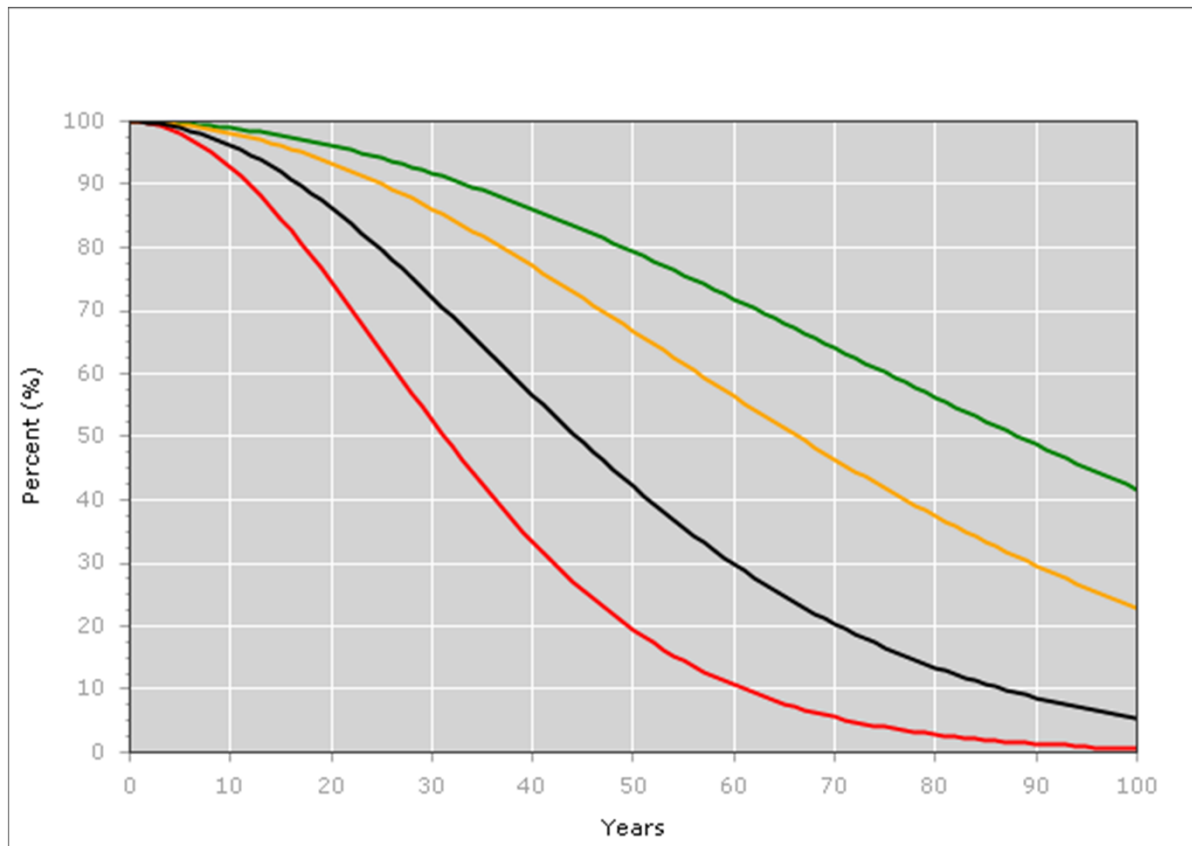
$\beta: 2$ (default 1.8)

$\beta: 3$

$\beta: 4$

$\beta: 5$

Environment Factors



330 – Metal Bridge Rail

Ben(1): 2.0

Low(2): 1.5

Mod(3): 1.0

Sev(4): 0.7

Demo

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Questions?

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New Inspection Scheduling Module

- Overview
 - Worked with TRT to determine ultimate needs of the user community
 - Targeted a simple result that would still meet all requirements
 - Maintain as much existing process and logic as possible
 - Largest change: **Most recent inspection report is always an agency's reference point**



New Inspection Schedule Module

- Existing entry screen
- New entry screen

Previous inspections for Bridge 04 07598

Key	Date	Type	Inspector	Control Group
<input checked="" type="radio"/> OYTI	9/4/2014	Regular NBI	Pontis (1)	T001057F6A470000005B
<input type="radio"/> NNRG	12/15/2004	Regular NBI	Pontis (1)	T001057F6A470000005B
<input type="radio"/> OSFV	2/11/2004	Regular NBI	Pontis (1)	T001057F6A470000005B
<input type="radio"/> UEVW	12/3/2002	Regular NBI	Pontis (1)	T001057F6A470000005B
<input type="radio"/> WIPL	12/5/2000	Regular NBI	Pontis (1)	-1
<input type="radio"/> JHGK	11/16/1998	Regular NBI	Pontis (1)	-1
<input type="radio"/> ADOT	10/30/1996	Regular NBI	Pontis (1)	-1
<input type="radio"/> JQSX	11/15/1994	Regular NBI	Pontis (1)	-1

Create New Inspection

Inspection Date:

Primary Type:

Inspector:

Entered By:

Engineer of Record:

Types of Inspection Performed

Routine:

Element:

Fracture Critical:

Underwater:

Other Special:

Create New Inspection

Primary Type:

Duplicate Previous:

National Bridge Inventory:

Element Inspection:

Fracture Critical:

Underwater:

Other Special:



New Inspection Schedule Module

- Existing schedule screen

Bridge: 04 07598 Facility Carried (007): JESSE OWENS PKWY Inspection: 2014-09-04 (OYTI) Type: Regular NBI

Summary

Inspection Date(090): 9/4/2014
 Inspector: P.User(1)
 Primary Type: Regular NBI
 Inspection Group: T001057F6A470000005B (FI)

Types of Inspections Performed:
 National Bridge Inventory:
 Element Condition:
 Fracture Critical:
 Underwater:
 Other Special:

Schedule

Required (Y/N)	Previous Date	Frequency (months)	Next Date
NBI (090):	12/15/2004	(091): 24	9/4/2016
Element Condition:	12/15/2004	24	9/4/2016
Fracture Critical (092AA): <input type="checkbox"/>	(093A): 10/30/1996	(092AB):	1/1/1901
Underwater (092BA): <input type="checkbox"/>	(093B): 10/30/1996	(092BB):	1/1/1901
Other Special (092CA): <input type="checkbox"/>	(093C): 10/30/1996	(092CB):	1/1/1901

Inspection Resources

Next Inspector: P.User(1)
 Bridge Group: (FIX PARAM VALUES)

Crew Hours: 8.00 Snooper Hours: 0.00
 Flagger Hours: 0.00 Special Crew Hours: 8.00
 Helper Hours: 0.00 Special Equip. Hours: 4.00

Status: **New** Review Needed Approved By: TJP-PP



New Inspection Schedule Module

- New schedule screen

Bridge: 04 07598 Facility Carried (007): JESSE OWENS PKWY Inspection: 2014-04-04 (REF)

Summary

Date Entered:

Inspector: P.User(1)

Primary Type: Regular NBI

Inspection Group: T001057F6A47000005B (FD)

Entered By:

Engineer of Record:

Types of Inspection Performed

Routine:

Element:

Fracture Critical:

Underwater:

Other Special:

Schedule

	Required (Y/N)	Current Date	Frequency (months)	Next Date
Routine:	(090):	<input type="text"/> 7/16/2014	(091): 48	<input type="text"/> 7/16/2018
Element:		<input type="text"/> 7/16/2014	48	<input type="text"/> 7/16/2018
Fracture Critical (092AA):	<input type="checkbox"/>	(093A): <input type="text"/> 1/1/1901	(092AB):	<input type="text"/> 1/1/1901
Underwater (092BA):	<input type="checkbox"/>	(093B): <input type="text"/> 1/1/1901	(092BB):	<input type="text"/> 1/1/1901
Other Special (092CA):	<input type="checkbox"/>	(093C): <input type="text"/> 1/1/1901	(092CB):	<input type="text"/> 1/1/1901

Inspection Resources

Next Inspector: P.User(1)

Bridge Group: 4 (FIX PARAM VALUES)

Crew Hours: 8.00 Snooper Hours: 0.00

Flagger Hours: 0.00 Special Crew Hours: 0.00

Helper Hours: 0.00 Special Equip. Hours: 0.00

Schedule Notes

Save Save & Close Cancel

Specific Changes

- Most recent inspection report is always used when creating a new inspection report
- Most recent inspection report data is always sent on the NBI tape
- Remove concept of 'previous date'. All NBI inspection dates are what will be submitted on NBI tape
- Removal of INSPKEY (reference GUID change)
- Additional tracking information related to the inspection (Engineer of Record, Entered By, Date Entered)
- Added 'schedule notes'. Individual notes related to this specific inspection, not carried forward.



Questions?

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