Suppression Rule (Formerly 'Look Ahead Rule')

BrM User Group Meeting September 15, 2021

H-3 Freeway, Hawaii

CONTACT

Kevin Murata
kevin.murata@mayvue.com
Text | Voicemail | (808) 382-1293

BrM@mayvue.com
Support | 1-888-44-SUPPORT
1-888-447-8776
General | 1-877-462-9883

MAYVUE

Jira Service Desk
http://support.mayvue.com

BACKGROUND

Back in 2019…

2019 Vote Rank	Total Votes	State Rank	Count States	Priority Enhancement	JIRA Ticket
5	198	3	19	Optimizer look ahead rule (Suppression Rule)	BRMSD-1392

Ranked No. 5 on the User Group Priority list

The Application Formerly know as

PONTIS™ BRIDGE MANAGEMENT

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

Brad Pitt

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

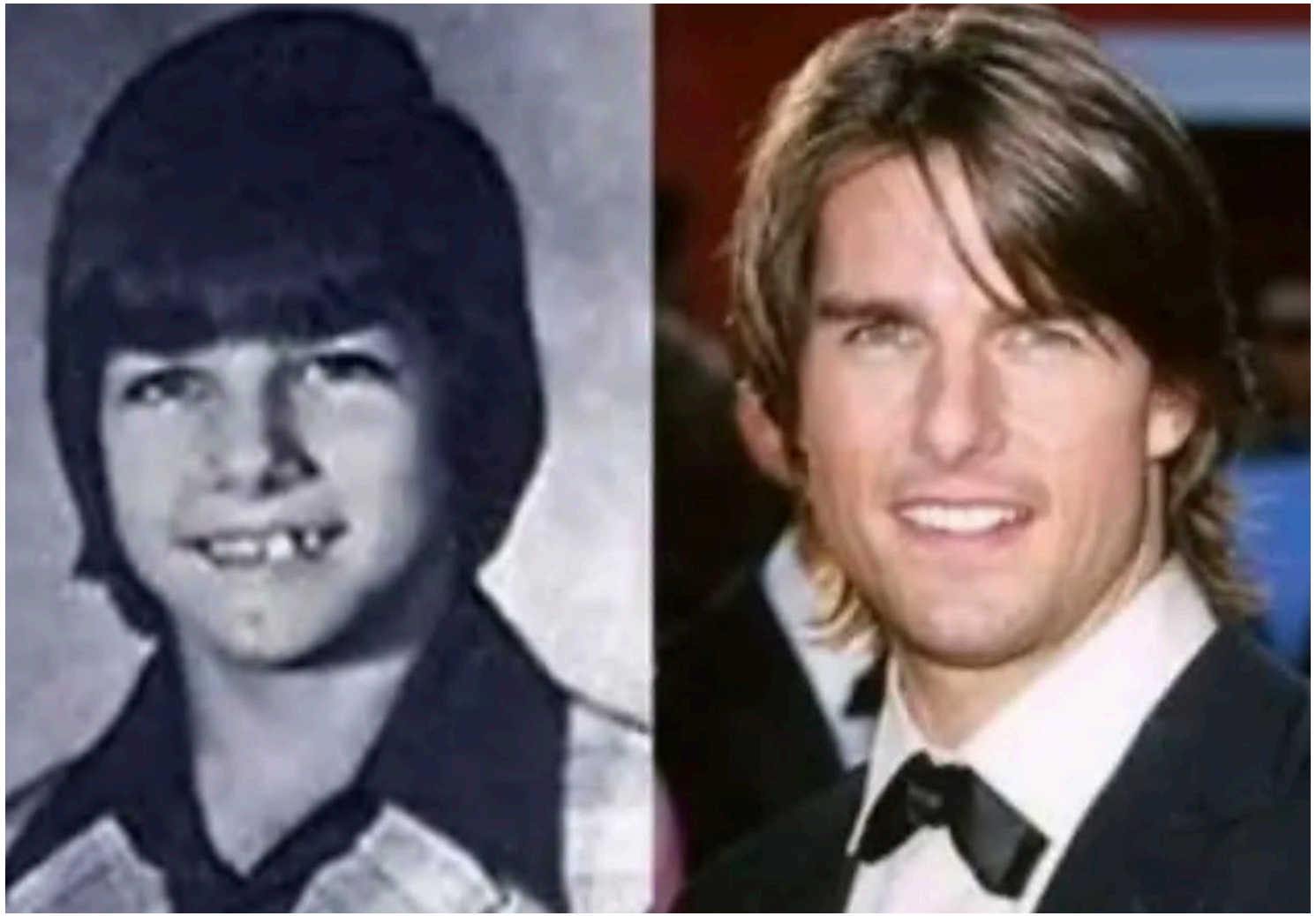
WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

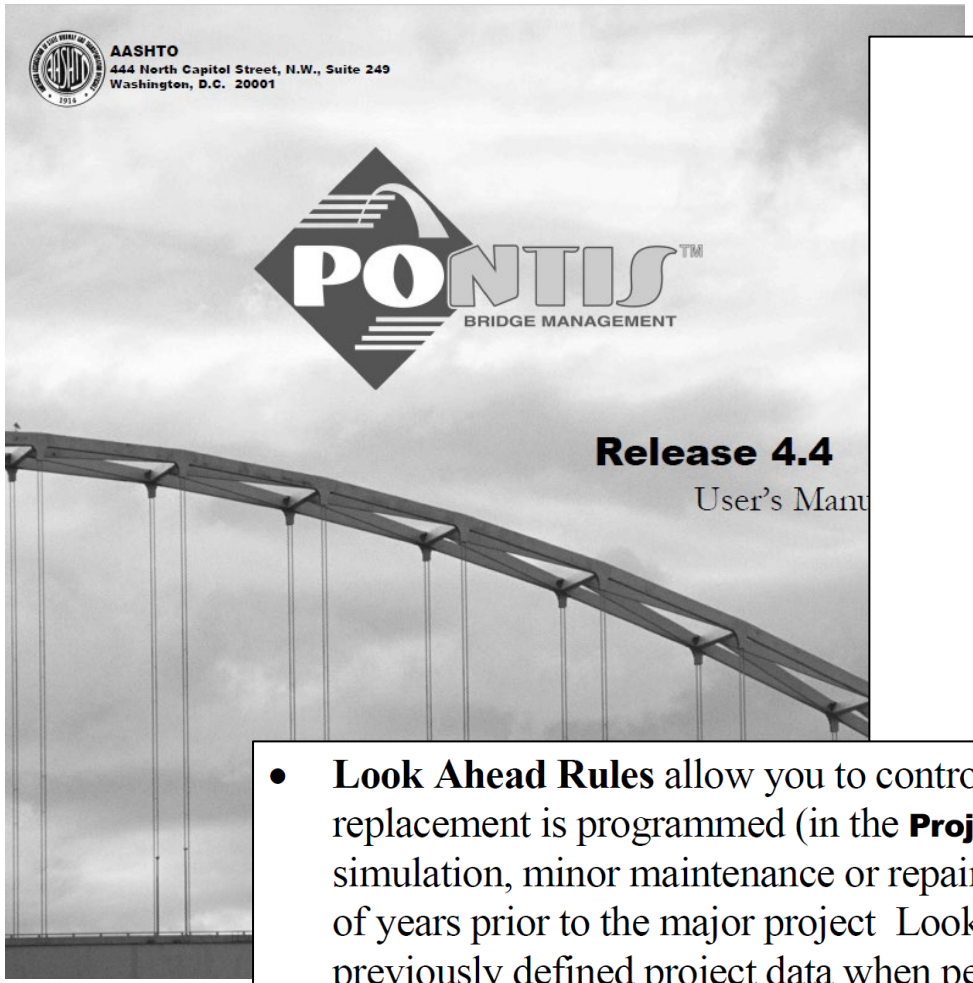
Tom Cruise



Not all change is Bad

LOOK AHEAD RULES

LOOK AHEAD RULES



BRIDGE PROGRAM SIMULATION

5.5 Entering Simulation Rules

Overview of Simulation Rules

A variety of simulation rules have been established in Pontis to tune the simulation's behavior to match with agency practice for structure project development, and to improve the quality of the system's recommendations for bridge-level work (also called Pontis work candidates). The ability to define these rules addresses the fact that while the system's approach to determining preservation and improvement needs preservation optimization models is sufficient for addressing network-level needs, more careful consideration of a range of detailed factors is needed for making realistic bridge-level recommendations. In addition, agencies may have preservation policies for specific elements that they wish to see reflected in Pontis, but that consider factors or conditions outside of the scope of the Pontis preservation model (e.g. smart flag conditions triggering work on deck elements).

Five different sets of simulation rules may be defined in Pontis to control the behavior of the program simulation These include:

- **Scoping Rules** allow you to ensure that when the preservation optimization model recommends a particular type of work (e.g. replace deck), that related work (e.g. replace joints) is scheduled at the same time. Scoping rules help address issues created by the fact that the preservation optimization model considers each element independently of the others.
- **Look Ahead Rules** allow you to control the timing of work so that if a major rehab or replacement is programmed (in the **Project Planning** module) within the timeframe of the simulation, minor maintenance or repair work won't be scheduled for a specified number of years prior to the major project Look ahead rules help Pontis make the best use of previously defined project data when performing a program simulation.
- **Major Rehab Rules** allow you to force the simulation to schedule a major rehabilitation

5-12 AASHTO Pontis User's Manual

- **Look Ahead Rules** allow you to control the timing of work so that if a major rehab or replacement is programmed (in the **Project Planning** module) within the timeframe of the simulation, minor maintenance or repair work won't be scheduled for a specified number of years prior to the major project Look ahead rules help Pontis make the best use of previously defined project data when performing a program simulation.

What it is NOT

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

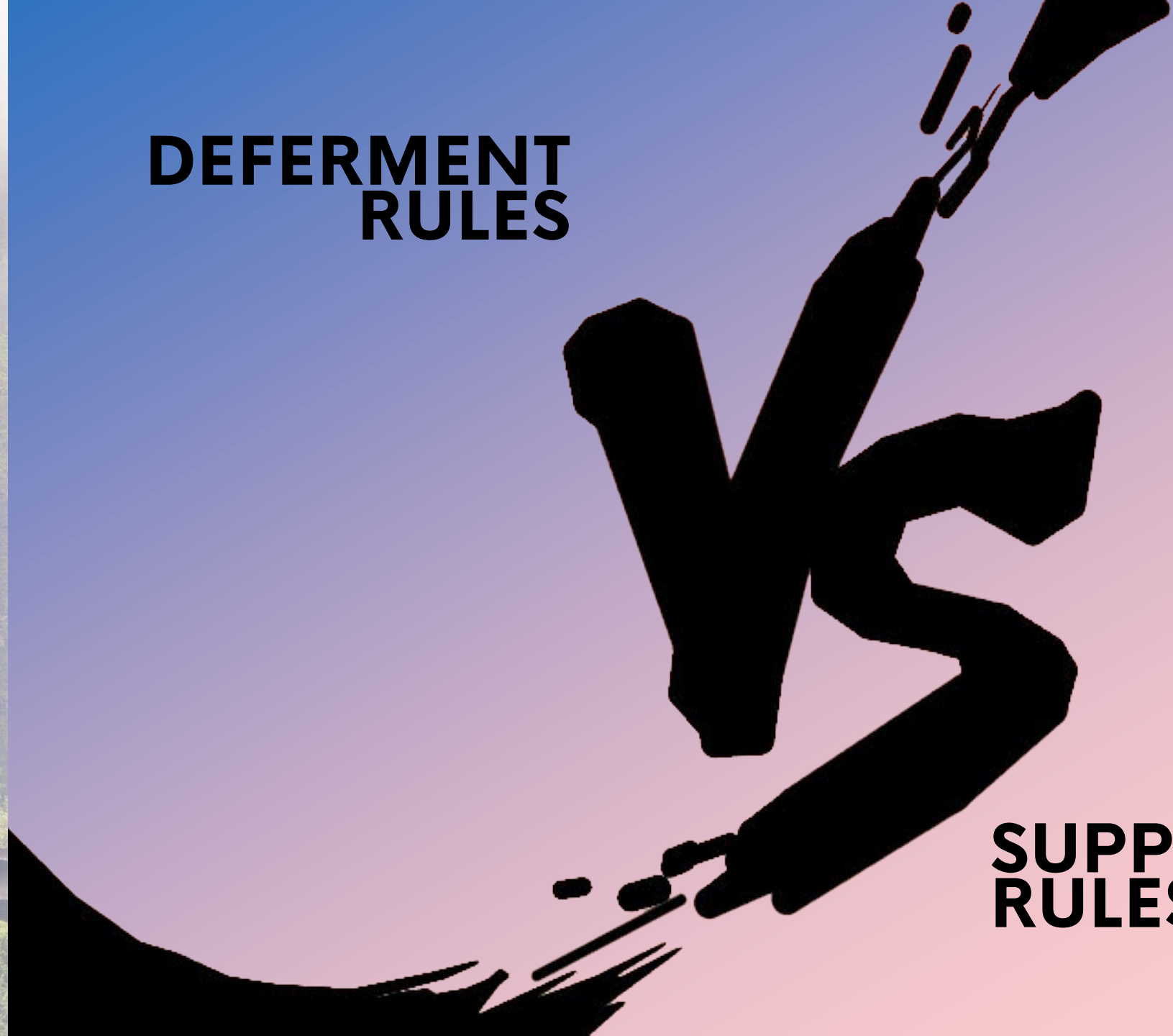
WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

DEFERMENT RULES



SUPPRESSION RULES

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

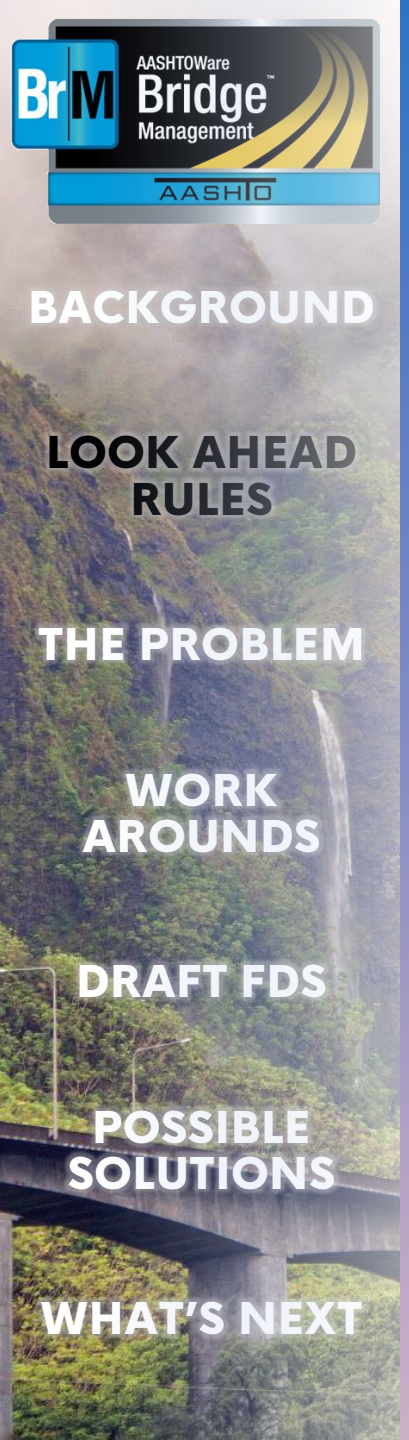
THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT



DEFERMENT RULES

DEFER specific actions for a certain number of years AFTER an action is applied

SUPPRESSION RULES

SUPPRESS an action from being applied a certain number of years BEFORE a bridge replacement action

THE PROBLEM

THE PROBLEM

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
BRIDGE PROGRAMMING LIST

NHS - FY22 Bridge Program - $50M per year **Program Years: 2022 - 2031**

Rank	Bridge No.	Feature Inersected	Facility Carried	District
117	003000800300071	NF KAUKONAHUA(K THOT)	KAM HWY	Oahu

Recommended Action	Action Cost	Total Cost	Prog Year	CON Year
Substructure Repair	$642,273	$642,273	2022	2026
Bridge Replacement	$38,838,583	$38,838,583	2024	2029

Condition: POOR

THE PROBLEM

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
BRIDGE PROGRAMMING LIST

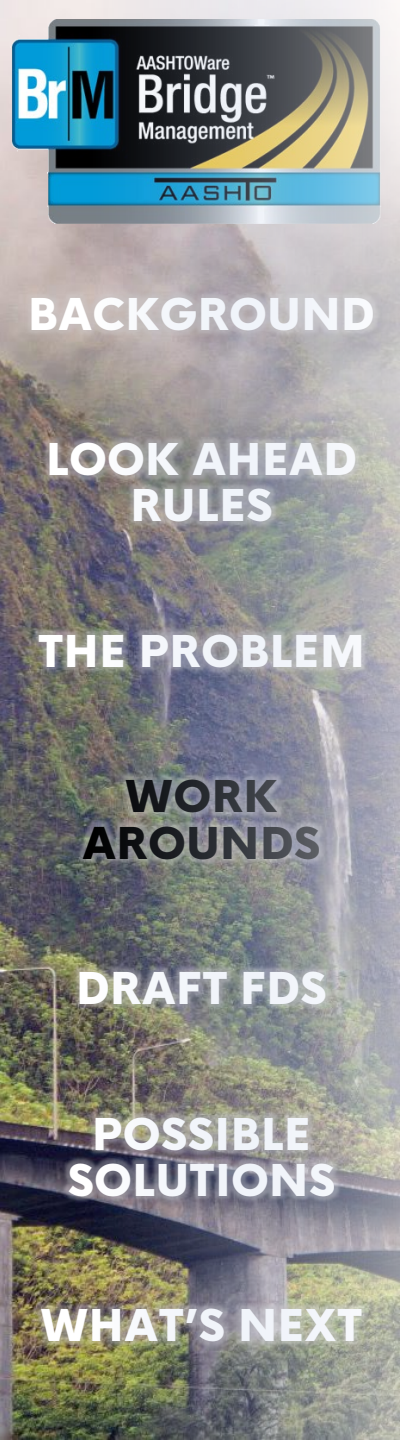
NHS - FY22 Bridge Program - $50M per year **Program Years: 2022 - 2031**

Rank	Bridge No.	Feature Inersected	Facility Carried	District
117	003000800300071	NF KAUKONAHUA(K THOT)	KAM HWY	Oahu

Recommended Action	Action Cost	Total Cost	Prog Year	CON Year
Substructure Repair	$642,273	$642,273	2022	2026
Bridge Replacement	$38,838,583	$38,838,583	2024	2029

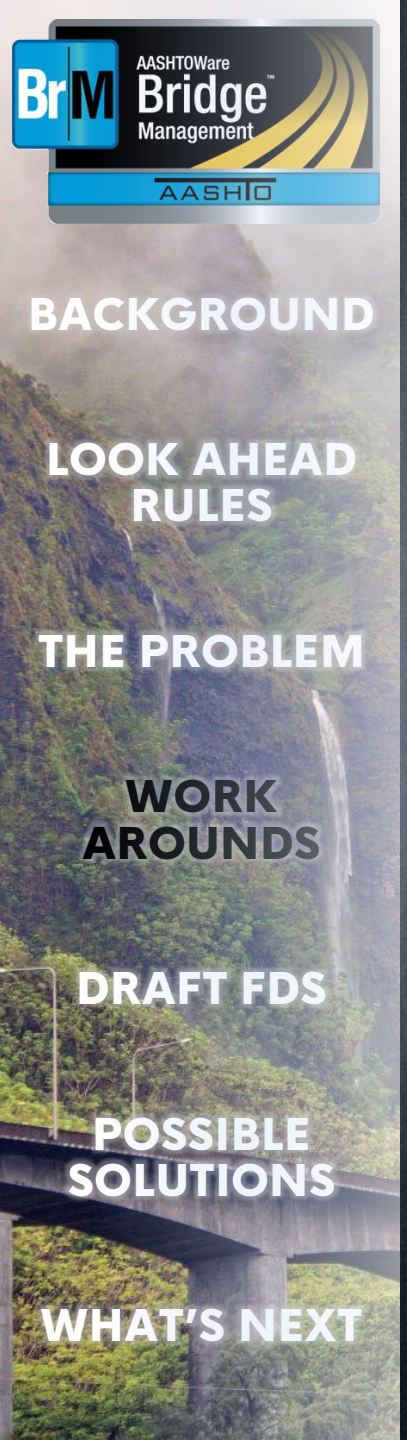
Condition: POOR

- The Optimizer selected a Substructure Repair 3 years before selecting a Bridge Replacement.
- Network Policy conditions can reduce the frequency this happens, but there may still be cases where it occurs.



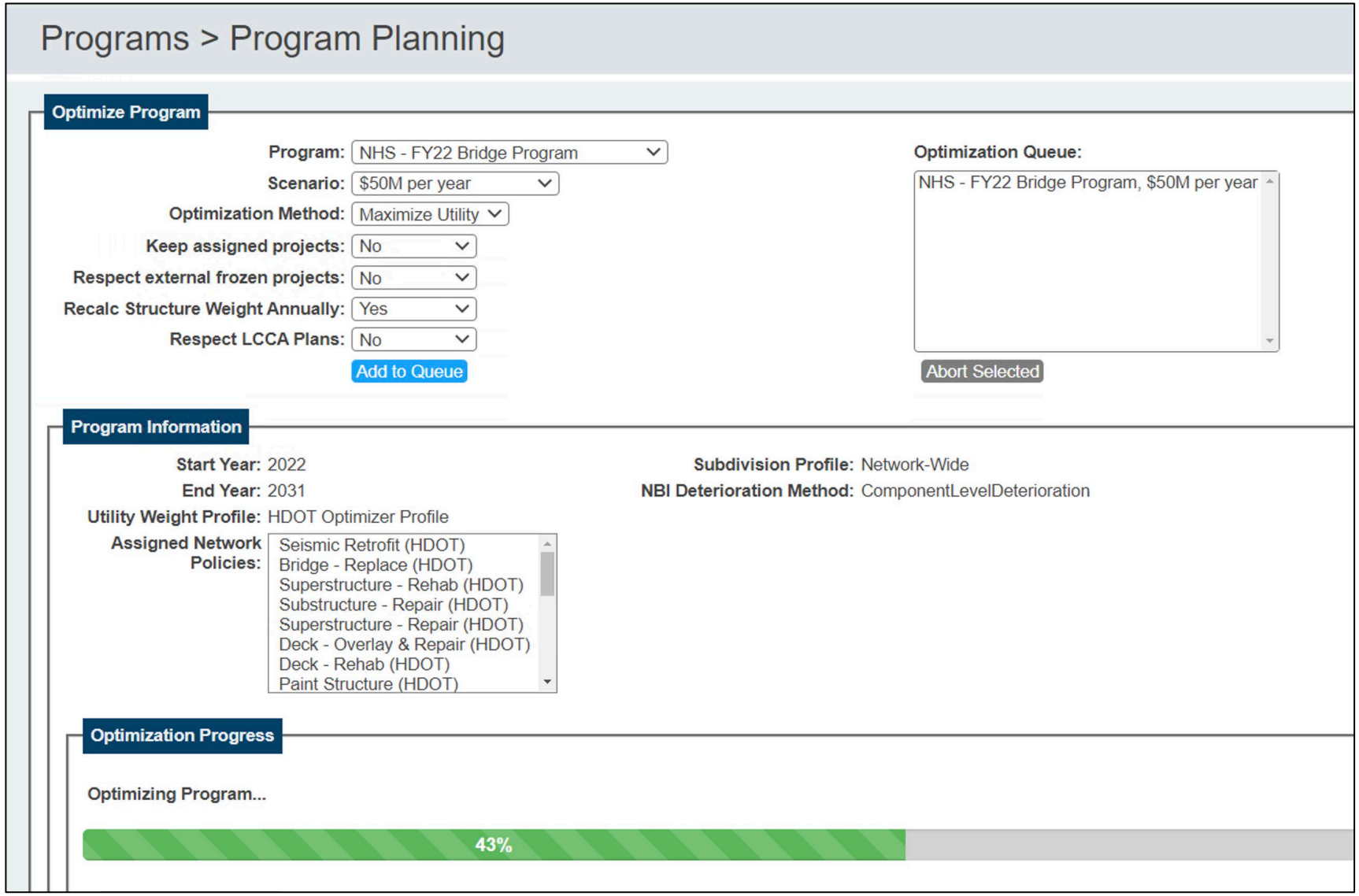
WORKAROUNDS

The first Workaround which I Call…



Workaround One

Step 1. Run an Optimization



Step 2. Manually delete projects in Excel

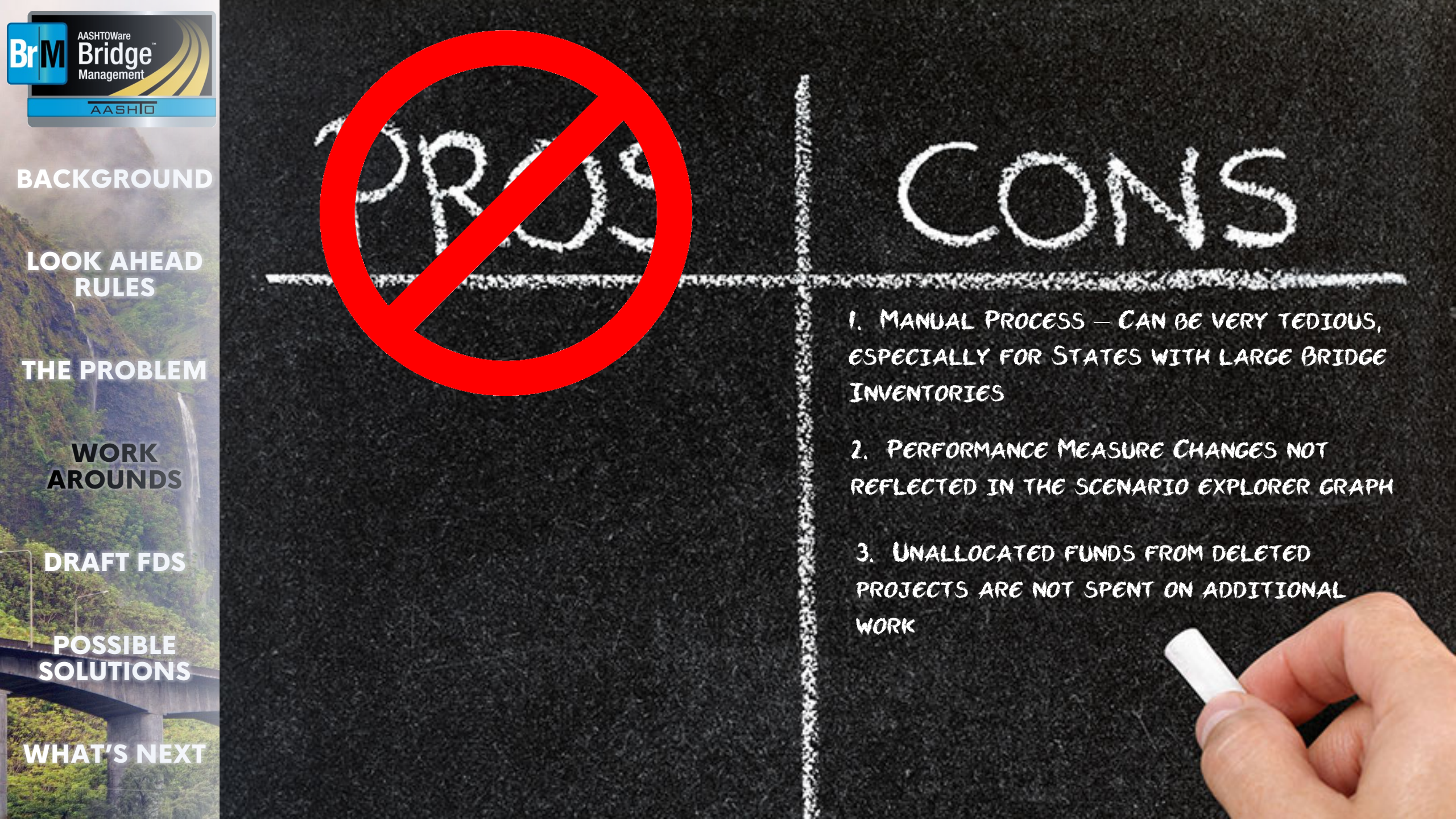
Bridge No.	Feature Intersect	Facility Carried	District	Source	Action	Action Cost	Project Cost	Prog Year	CON Year	Condition	Deck Area	Scour Critical	Deck Geometry
003000830302412	N PUNALUU STRM	KAM HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Bridge Replacement	$1,759,716	$1,759,716	2021	2026	POOR	969	3 SC - Unstable	2 Intolerable - Re
003000800300071	NF KAUKONAHUA(K THOT)	KAM HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Substructure Repair	$642,273	$642,273	2022	2026	FAIR	8,557	8 Stable Above Footing	2 Intolerable - Re
003000800300071	NF KAUKONAHUA(K THOT)	KAM HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Bridge Replacement	$38,838,583	$38,838,583	2024	2029	FAIR	8,557	8 Stable Above Footing	2 Intolerable - Re
003000830301785	KAHAWAINUI STRM-LAIEWAI	KAM HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Substructure Repair	$54,888	$54,888	2022	2026	POOR	2,476	8 Stable Above Footing	2 Intolerable - Re
003000H10201344	HIC STRUCT #3A	RAMP H1EB 13AA	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Deck Repair	$161,521	$210,101	2022	2026	FAIR	11,367	N Not Over Waterway	5 Above Tolerabl
003000H10201344	HIC STRUCT #3A	RAMP H1EB 13AA	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Joint Replacement	$48,579	$210,101	2022	2026	FAIR	11,367	N Not Over Waterway	5 Above Tolerabl
003000H10100537	KUNIA SEP IB	FAI-H1	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Joint Replacement	$104,931	$104,931	2022	2026	FAIR	8,934	N Not Over Waterway	4 Tolerable
003000H10202706	WAIALAE VIA IB-HWY OP	FAI-H1	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Deck Repair	$1,186,144	$1,197,783	2022	2026	FAIR	108,479	N Not Over Waterway	4 Tolerable
003000H10202706	WAIALAE VIA IB-HWY OP	FAI-H1	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Substructure Repair	$11,638	$1,197,783	2022	2026	FAIR	108,479	N Not Over Waterway	4 Tolerable
003000830302637	S KAHANA STRM	KAM HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Substructure Repair	$86,747	$86,747	2022	2026	FAIR	2,357	8 Stable Above Footing	2 Intolerable - Re
003000610300638	PALI BR #8A OB	PALI HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Substructure Repair	$25,465	$64,711	2022	2026	FAIR	5,716	8 Stable Above Footing	2 Intolerable - Re
003000610300638	PALI BR #8A OB	PALI HWY	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Deck Repair	$39,245	$64,711	2022	2026	FAIR	5,716	8 Stable Above Footing	2 Intolerable - Re
003000780400393	MOANALUA STRM	MOANALUA RD OB	Oahu	BrM NHS - FY22 Bridge Program - $50M per year	Joint Replacement	$87,443	$87,443	2022	2026	FAIR	7,632	8 Stable Above Footing	5 Above Tolerabl

Figure – Custom Excel Report Designed for Hawaii DOT

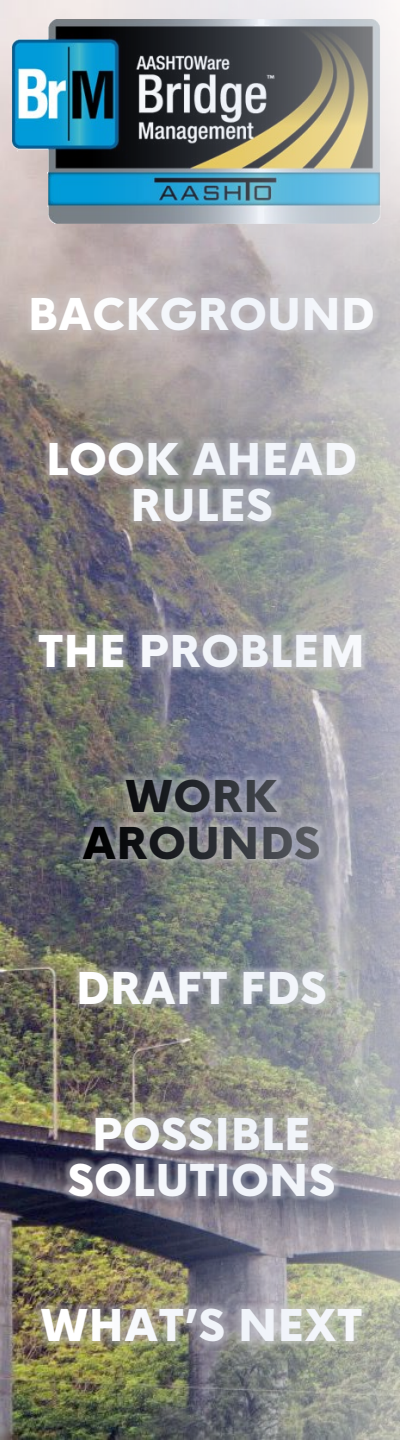
AASHTOWare Bridge Management

AASHTO

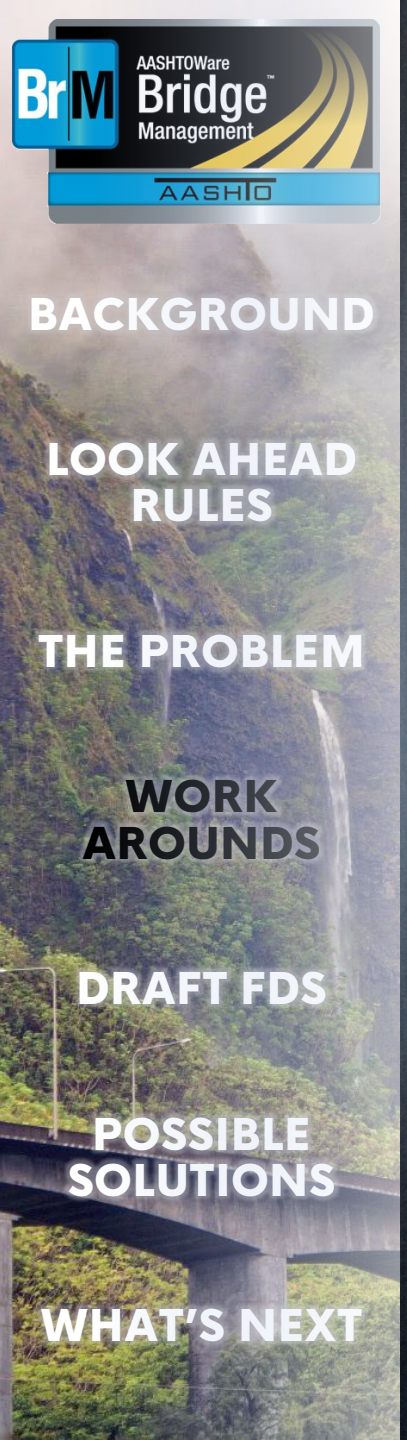
- BACKGROUND
- LOOK AHEAD RULES
- THE PROBLEM
- WORK AROUNDS
- DRAFT FDS
- POSSIBLE SOLUTIONS
- WHAT'S NEXT



Workaround One

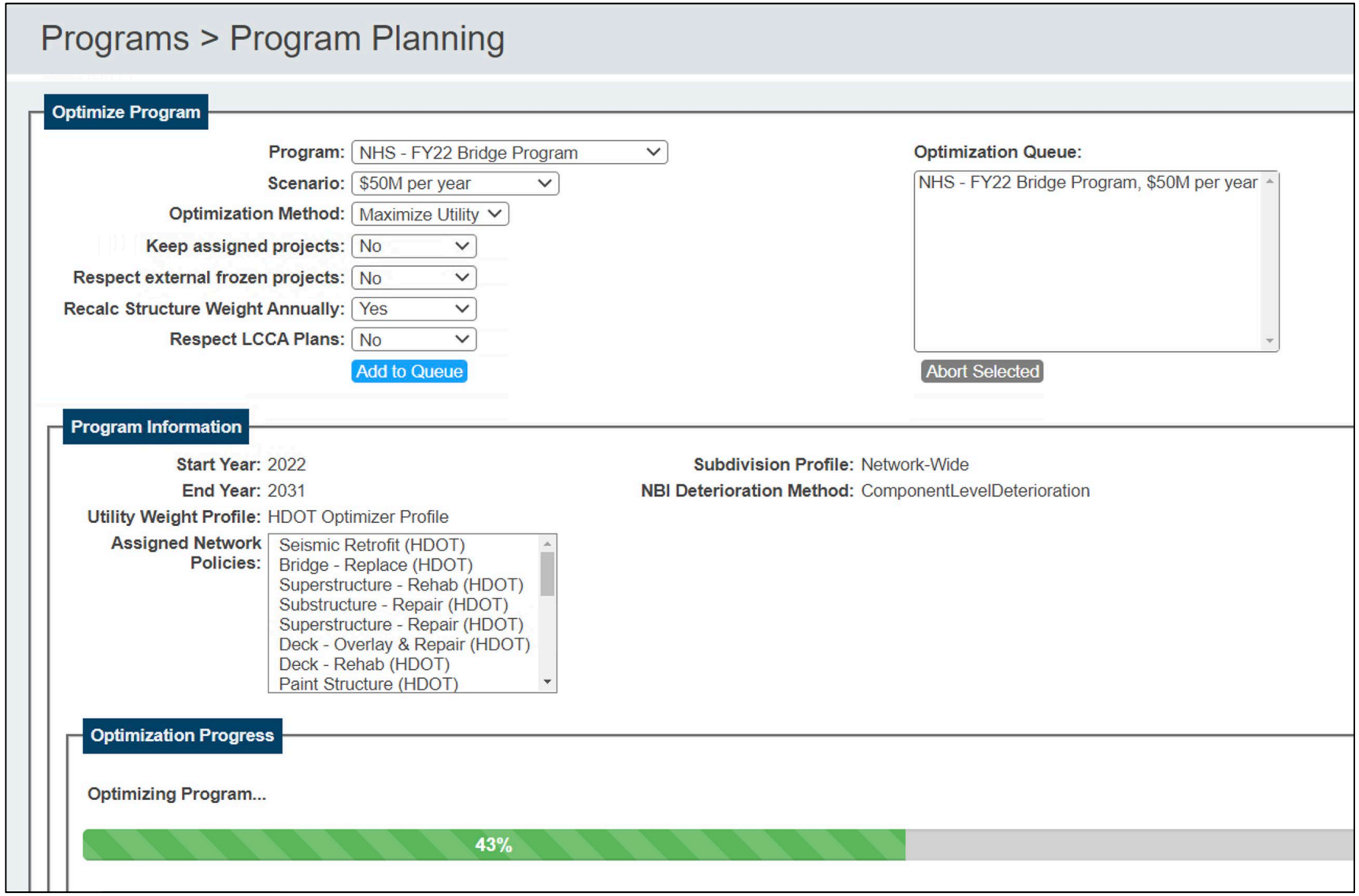


NOT THE ONLY OPTION

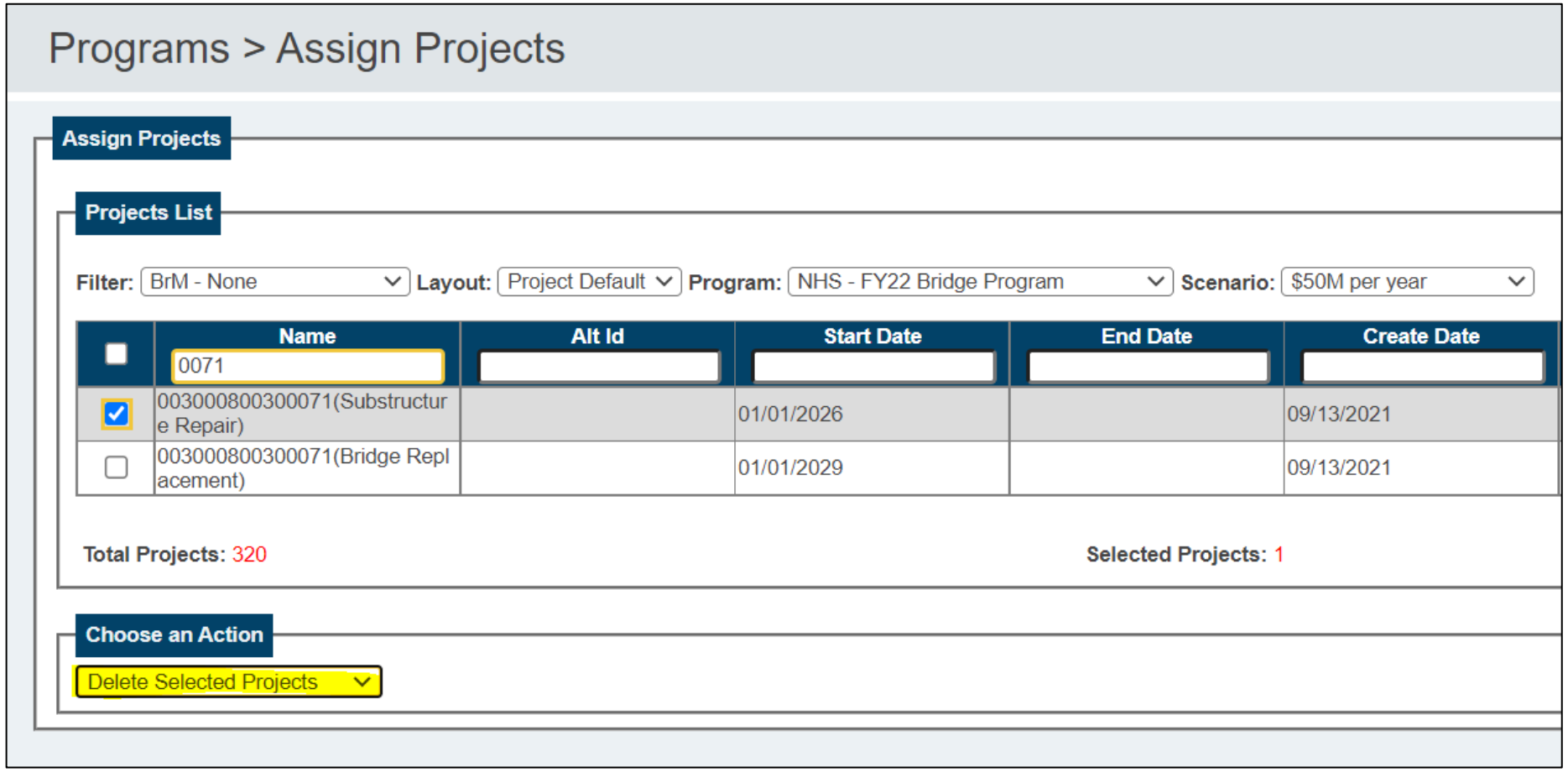


Workaround Two

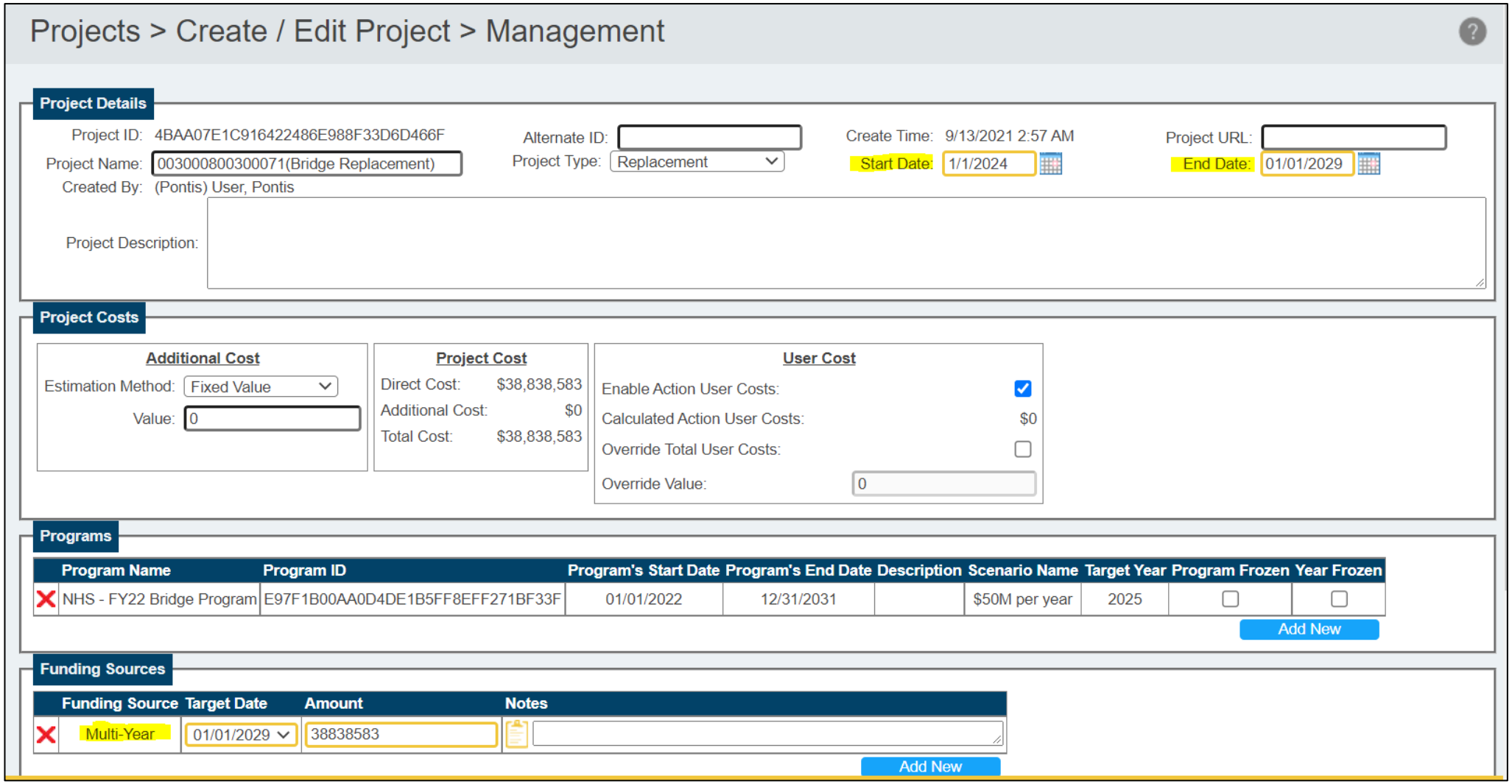
Step 1. Run an Optimization



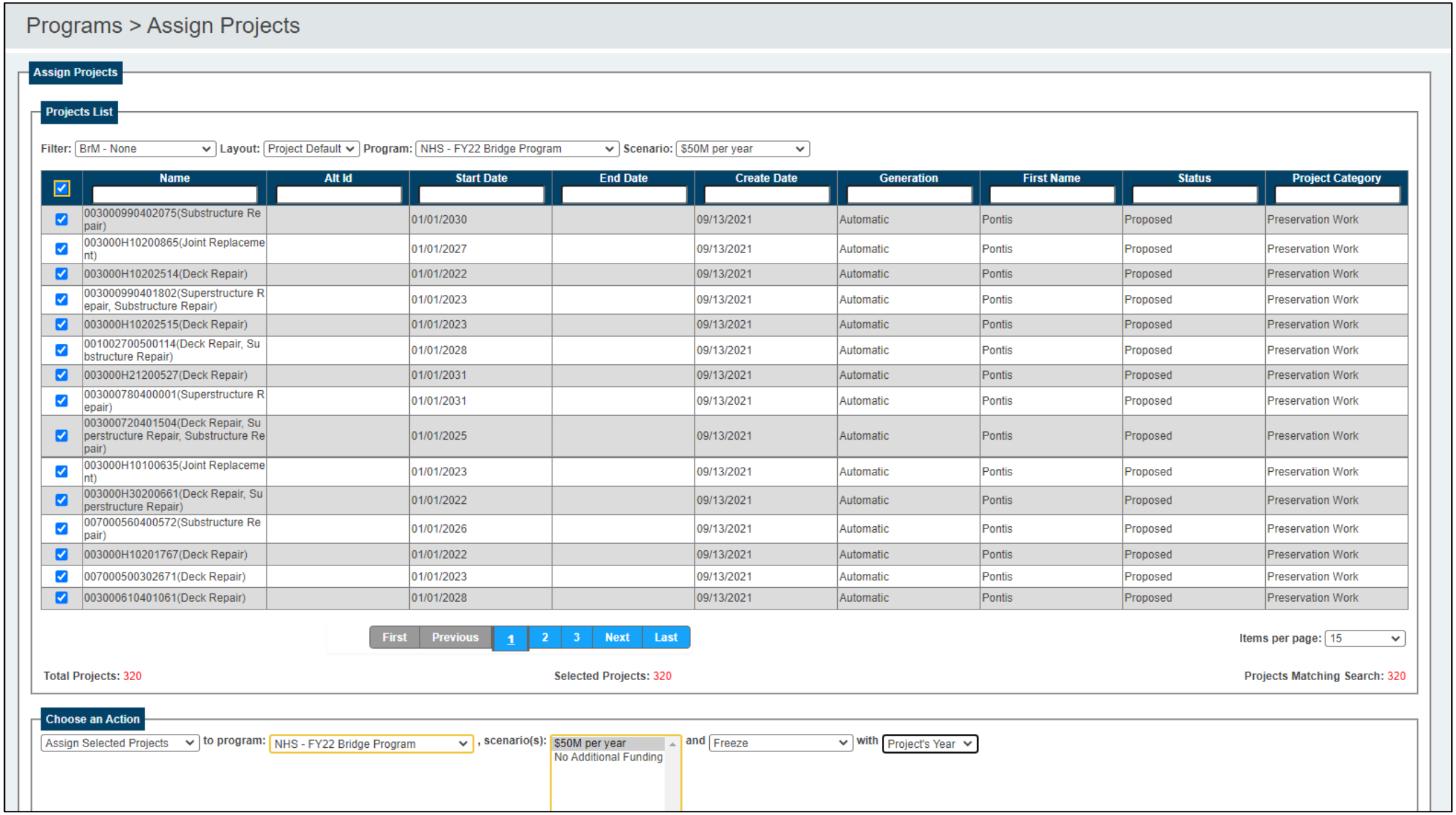
Step 2. Manually delete projects in BrM



Step 3. Add Multi-year funding allocation to replacement projects



Step 4. Freeze ALL remaining assigned projects to the Program



Programs > Assign Projects

Assign Projects

Projects List

Filter: BrM - None | Layout: Project Default | Program: NHS - FY22 Bridge Program | Scenario: $50M per year

	Name	Alt Id	Start Date	End Date	Create Date	Generation	First Name	Status	Project Category
☑	003000990402075(Substructure Repair)		01/01/2030		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H10200865(Joint Replacement)		01/01/2027		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H10202514(Deck Repair)		01/01/2022		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000990401802(Superstructure Repair, Substructure Repair)		01/01/2023		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H10202515(Deck Repair)		01/01/2023		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	001002700500114(Deck Repair, Substructure Repair)		01/01/2028		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H21200527(Deck Repair)		01/01/2031		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000780400001(Superstructure Repair)		01/01/2031		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000720401504(Deck Repair, Superstructure Repair, Substructure Repair)		01/01/2025		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H10100635(Joint Replacement)		01/01/2023		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H30200661(Deck Repair, Superstructure Repair)		01/01/2022		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	007000560400572(Substructure Repair)		01/01/2026		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000H10201767(Deck Repair)		01/01/2022		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	007000500302671(Deck Repair)		01/01/2023		09/13/2021	Automatic	Pontis	Proposed	Preservation Work
☑	003000610401061(Deck Repair)		01/01/2028		09/13/2021	Automatic	Pontis	Proposed	Preservation Work

First | Previous | 1 | 2 | 3 | Next | Last

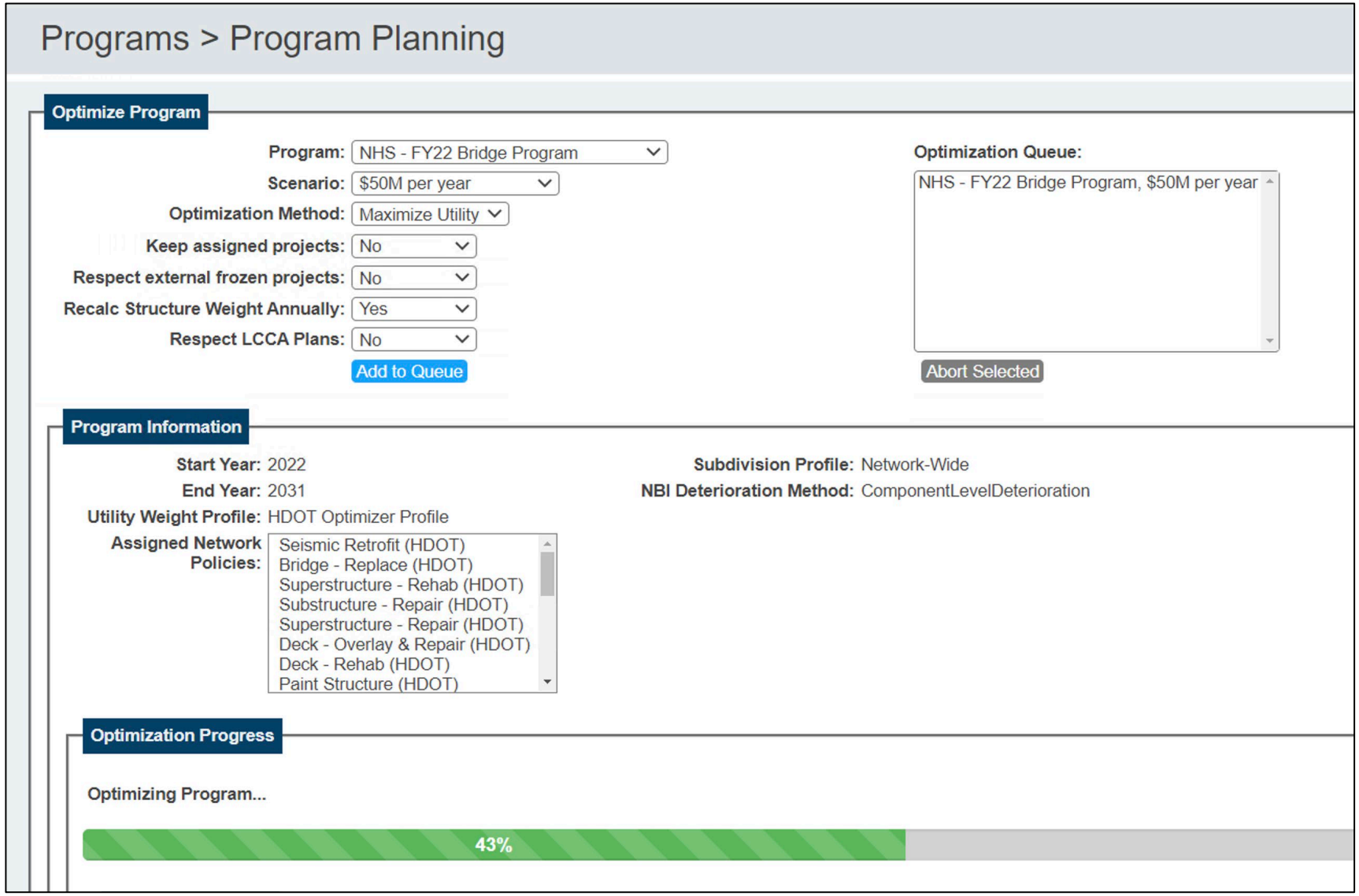
Items per page: 15

Total Projects: 320 Selected Projects: 320 Projects Matching Search: 320

Choose an Action

Assign Selected Projects to program: NHS - FY22 Bridge Program, scenario(s): $50M per year, No Additional Funding and Freeze with Project's Year

Step 5. Re-run the Optimization



PROS

1. Performance Measure Changes will be reflected in the Scenario Explorer graph

2. Unallocated funds from deleted projects will be spent on additional work if applicable

CONS

1. Still a VERY Manual Process – even more tedious than workaround one, especially for States with large Bridge Inventories

DRAFT FDS

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

A Functional Design Specification (FDS) was drafted out of interest from previous BrM User Group Meetings

Suppression Rule Functional Design Specification (FDS)

Prepared for:

The AASHTOWare Bridge Management (BrM) Task Force

by

MAYVUE

Dated: January 4, 2021
Version 3

Draft FDS

1.1 OVERALL PAGE UI (SUBJECT TO CHANGE)

- Mayvue will enhance the existing Programs > Create/Edit Programs page in BrM to support the ability to assign a Suppression Rule for bridge replacement projects.
- The overall page UI is as shown in Figure 1, with default state of 'Enable Suppression Rule', unchecked. All sections on the page will remain unchanged except 'Network Policies'. Detailed requirements for enhancements to 'Network Policies' section are described in the following section.

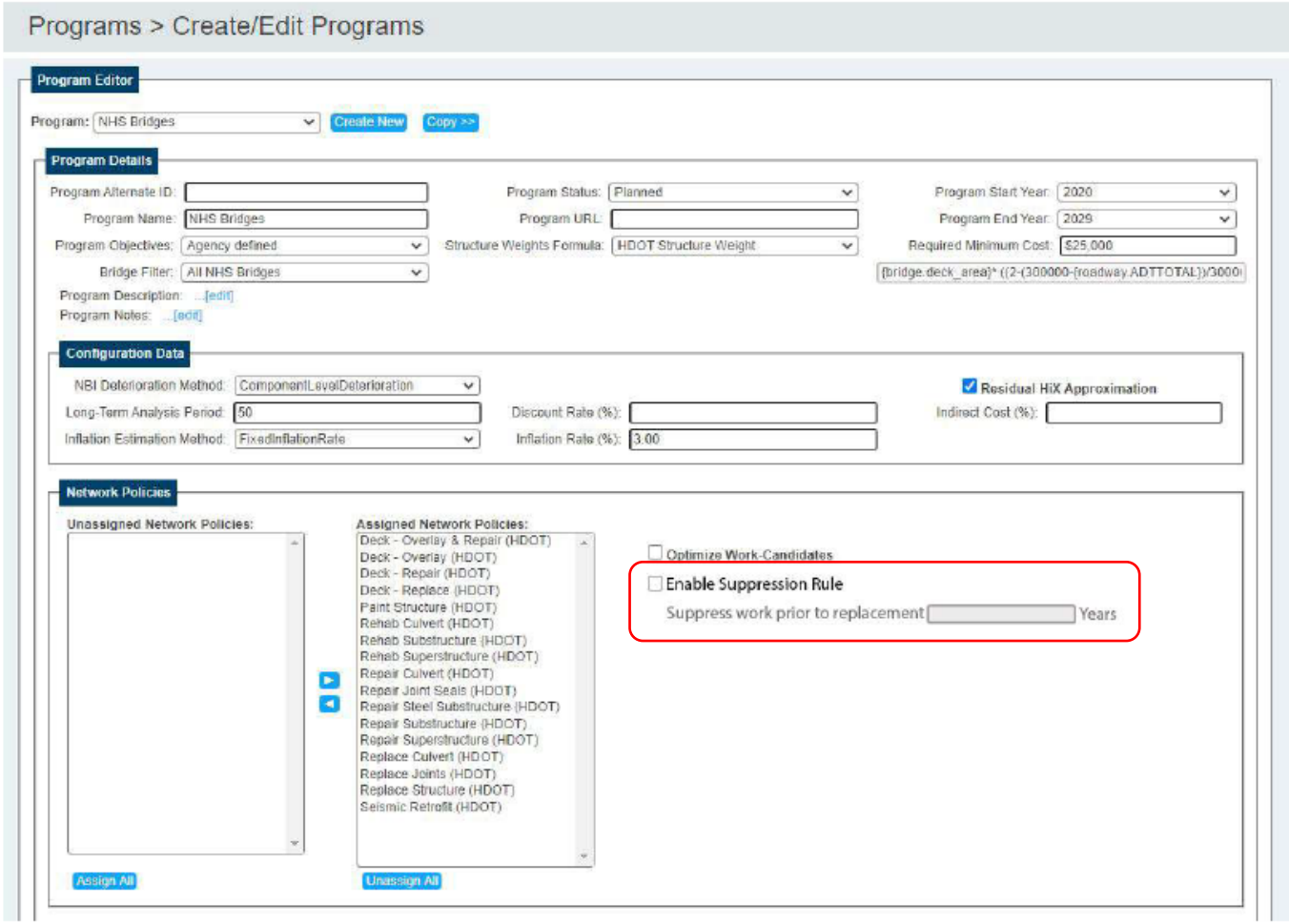


Figure 1: mockup of proposed 'Programs > Create/Edit Programs' page with 'Suppression Rule'

Draft FDS

- The Suppression Rule will only apply to the following:
  - Replacement actions selected by the optimizer for a selected scenario, with 'Bridge Replace' checkbox checked, on Admin > Modeling Config > Action Defs page, as shown in Figure 3.

Admin > Modeling Config > Action Defs

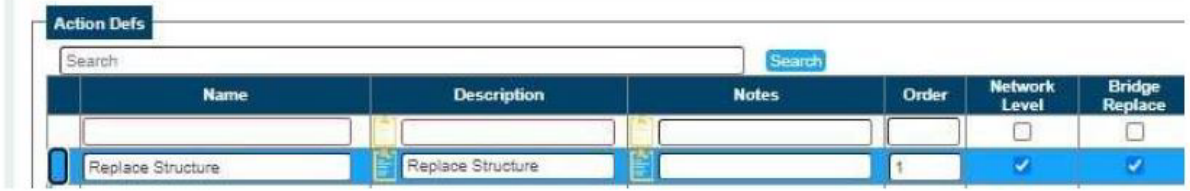
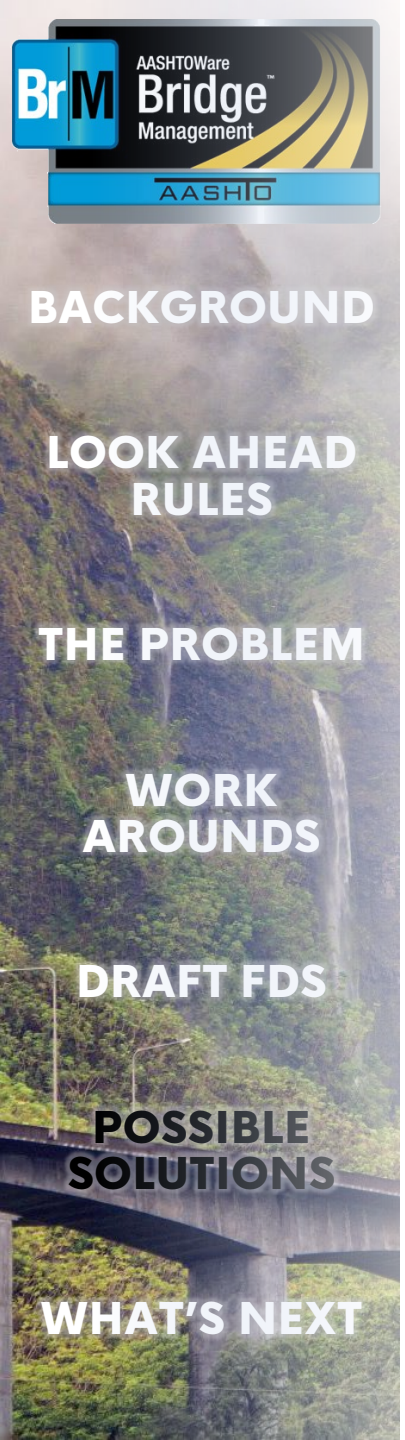


Figure 3: Admin > Modeling Config > Action Defs page with 'Bridge Replace' checkbox checked

  - Replacement projects assigned to a program with 'Keep assigned projects' set to 'YES'.
  - Replacement projects frozen to a program with 'Keep assigned projects' set to 'YES' or 'NO'.
  - Replacement projects frozen to an external program with 'Respect external frozen projects' set to 'Yes', on the Programs > Program Planning page, when an optimization is run on another program.



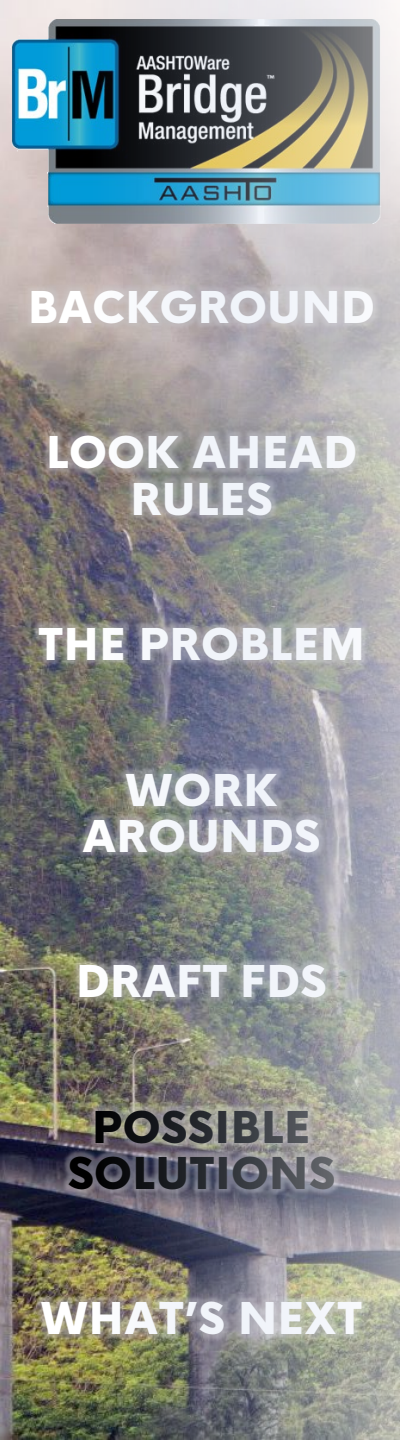
POSSIBLE SOLUTIONS

Option 1 – The Optimizer Second Pass

Option 1 – The Optimizer Second Pass

- The Optimizer does an initial run and selects projects for each year starting from the first to last program year.
- The Optimizer starts from the last program year and unassigns selected projects on a bridge that fall within the specified number of years before a Bridge Replacement.
- The Optimizer freezes all bridges that have projects and does a second pass to see if it can find projects on remaining bridges with unallocated funds from the projects that were unassigned.

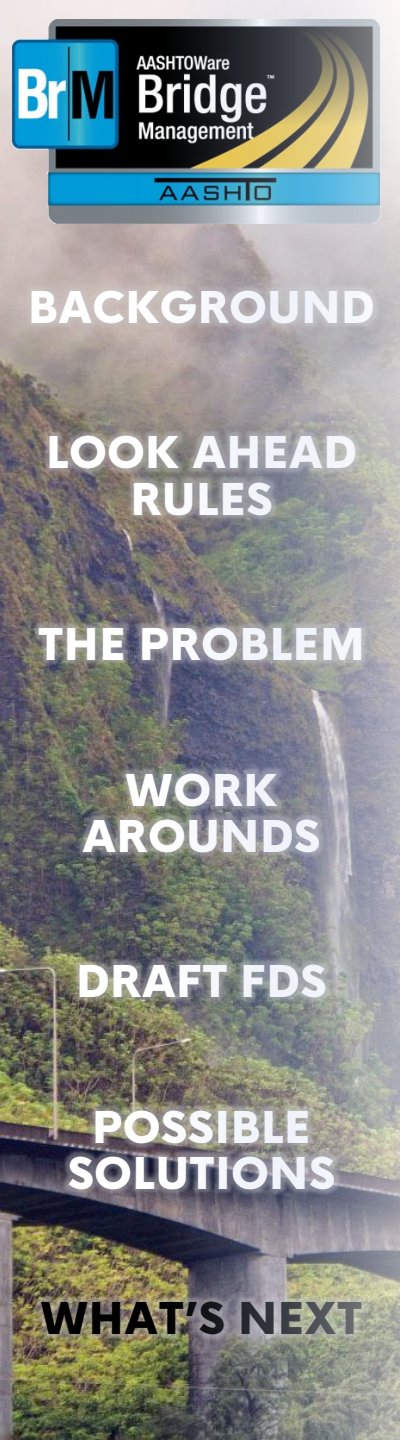
WHAT IS A "FROZEN" BRIDGE?



Option 2 – Post Optimization Process

Option 2 – Post Optimization Process

- The Optimizer does an initial run and selects projects for each year starting from the first to last program year.
- In a separate Task, a "post optimization process" is run that removes selected projects on a bridge that fall within a specified number of years before a Bridge Replacement.
- An optional second optimization can be run on the program to look for additional projects on remaining bridges with unallocated funds from the projects that were removed.


BrM
AASHTOWare
Bridge
Management
AASHTO
BACKGROUND
LOOK AHEAD RULES
THE PROBLEM
WORK AROUNDS
DRAFT FDS
POSSIBLE SOLUTIONS
WHAT'S NEXT

WHAT'S NEXT?

- **Currently highest unfunded enhancement on the User Group priority list**

2019 Vote Rank	Total Votes	State Rank	Count States	Priority Enhancement	JIRA Ticket	FDS Status (Not started, In Progress, Needs Finalized, or Complete)	Funding Status for FDS and Development	Estimated Level of Effort (T-shirt Size)	August 2021 Update
5	198	3	19	Optimizer look ahead rule (Suppression Rule)	BRMSD-1392	Needs Finalized	None	L	Also known as the Suppression Rule. A draft FDS is available (recently developed at the Task Force's direction). The next step is for the champion and interested agencies to confirm the requirements in the FDS draft or document additional needs or revise requirements. Funding will be needed to move the enhancement forward to development after requirements are finalized. At this time, there are no funding commitments from the user community. This enhancement will be considered by the Task Force for inclusion in a future work plan.

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

AASHTOWare Bridge Management

AASHTO

BACKGROUND

LOOK AHEAD RULES

THE PROBLEM

WORK AROUNDS

DRAFT FDS

POSSIBLE SOLUTIONS

WHAT'S NEXT

THE CHOICE IS YOURS

CONTACT

Kevin Murata
kevin.murata@mayvue.com
Text | Voicemail | (808) 382-1293

BrM@mayvue.com
Support | 1-888-44-SUPPORT
1-888-447-8776
General | 1-877-462-9883

MAYVUE

Jira Service Desk
http://support.mayvue.com


MAYVUE