Transportation Asset Management

667 Repeatedly Damaged Facilities List Procedure

Delaware Department of Transportation

Submitted by:
Pennoni / The Kercher Group, Inc.

January 27, 2021
Table of Contents

667 Repeatedly Damaged Facilities List ........................................................................................................ 2
  1. Purpose .................................................................................................................................................. 2
  2. References .......................................................................................................................................... 3
  3. Abbreviations and Definitions ............................................................................................................. 4
  4. Scope .................................................................................................................................................. 5
  5. Prerequisites ....................................................................................................................................... 5
  7. Gantt Chart ......................................................................................................................................... 7
  8. Responsibilities .................................................................................................................................. 8
  9. Business Process Steps ....................................................................................................................... 8
      Step 1.1 Designate potential declared event ....................................................................................... 8
      Step 1.2 Initiate new project in P6 .................................................................................................... 8
      Step 1.3 Record project locations in P6 for event related projects ............................................... 9
      Step 2.1 Identify new damage related projects ............................................................................... 9
      Step 2.2 Update 'Repeatedly Damaged Facilities List' with new locations .................................. 10
      Step 2.3 Hold Evaluations Workshop .............................................................................................. 11
      Step 2.4 Record results in updated List ........................................................................................... 15
      Step 2.5 Make List available for Asset Leads ................................................................................ 15
  10. Business Process Steps .................................................................................................................... 15
      Step 3.1 Use List and evaluations in analysis .................................................................................. 15
      Step 3.2 Update status of options in List ......................................................................................... 15
      Step 4.1 Update TAMP with latest List ............................................................................................ 16
1. **Purpose**

The purpose of this Standard Operating Procedure (SOP) is to provide structured guidance:

a) for the maintenance of a list of repeatedly damaged facilities in accordance with the code of federal regulations 23 CFR 667,

b) for the conduct of a regular workshop to ensure the list is as accurate as possible and for performing initial evaluations of possible mitigation actions on each facility,

c) to make evaluations available to DelDOT stakeholders, and

d) to use the current list and evaluations in updates of the DelDOT Transportation Asset Management Plan in accordance with the code of federal regulations 23 CFR 515.

The basic requirement of the 23 CFR 667 legislation is that the State DOT must complete a statewide evaluation for all roads, highways, and bridges. The State DOT shall update the evaluation after every emergency event to the extent needed to add roads, highways, and/or bridges subject to this paragraph that were affected by the event. The State DOT shall review and update the entire evaluation at least every four (4) years. In establishing its evaluation cycle, the State DOT should consider how the evaluation can best inform the State DOT's preparation of its asset management plan and STIP¹.

After June 30, 2019, FHWA will periodically review State DOT compliance. The review may include actions such as requesting the evaluations and reviewing the level of consideration in planning, programming, and project level decision-making. Compliance reviews at that time would be for requirements applicable to NHS routes. On and after November 23, 2020, compliance reviews would include requirements applicable to non-NHS routes as well. After this date, the State DOT must complete an evaluation for the affected portion of the repeatedly damaged facility before a project for that facility on a non-NHS route can be included in the STIP (23 CFR 667.7(b)), and the State DOT must consider the evaluation when developing the project (23 CFR 667.9(a)). When reviewing a State DOT's authorization requests for projects not on the NHS, Division Offices should check whether the facility is subject to the evaluation requirement before the project can be included on the STIP².

¹ From 23 CFR §667.7 Timing of evaluations, https://www.ecfr.gov/cgi-bin/text-idx?SID=d7f45846301f4958099b876bae58aca0&mc=true&node=pt23.1.667&rgn=div5#se23.1.667_17

For a fully compliant Transportation Asset Management Plan (TAMP), the Part 667 evaluations must be included in the TAMP and considered in accordance with 23 CFR 515.7(c)(1), 515.7(c)(6), 515.9(d)(3), and 515.9(d)(6) (as well as 23 CFR 515.9(l) if assets other than NHS pavements and bridges are included in the TAMP). Such consideration includes the identification of risks that can affect condition of NHS pavements and bridges and the performance of the NHS, including risks related to recurring damage and costs as identified through the Part 667 evaluations. Similarly, States should consider the results of evaluations that could affect whole life costs of assets in life cycle planning processes, particularly those related to extreme weather events and current and future environmental conditions as discussed in 23 CFR 515.7(b)\(^3\).

In summary, the risk evaluations are not required for receiving emergency repair funding under 23 CFR 668\(^4\), but they are required as a part of the TAMP. FHWA may also request a risk evaluation for any project contained in a State’s STIP (in this case the DelDOT CTP). Per 23 CFR 667.9(b)\(^5\), the FHWA can use the risk evaluation or lack thereof as a factor when determining funding allocations for STIP projects.

This standard operating procedure (SOP) details the process described above.

### 2. References

- DelDOT Transportation Asset Management Plan (TAMP)  
- Transportation Asset Management Plan Annual Consistency Determination Final Guidance  
  https://www.ecfr.gov/cgi-bin/text-idx?SID=d7f458463013f95809bb876bae58aca0&mc=true&node=pt23.1.667&rgn=div5
  https://www.fhwa.dot.gov/programadmin/23cfrr667_qa.cfm

---

\(^3\) From Guidance posted by FHWA 11/26/2018. See 2. References.

\(^4\) From 23 CFR §668 Emergency Relief Program.  
https://www.ecfr.gov/cgi-bin/text-idx?SID=066bb411f546222cddf3186c7b4d0b&mc=true&node=pt23.1.668&rgn=div5

\(^5\) From 23 CFR §667.9 Consideration of Evaluations.  
https://www.ecfr.gov/cgi-bin/text-idx?SID=fb39d1b0d30b9c2d39e7ad33b1645d2b&mc=true&node=pt23.1.667&rgn=div5
3. Abbreviations and Definitions

BMS: Bridge Management System
BMG: Bridge Management Group
CTP: Capital Transportation Program
DFL: Damaged Facilities List. This list in Excel includes all facilities with damage associated. Repeatedly damaged facilities are determined from this list.

Evaluation: “An analysis that includes identification and consideration of any alternative that will mitigate, or partially or fully resolve, the root cause of the recurring damage, the costs of achieving the solution, and the likely duration of the solution. The evaluations shall consider the risk of recurring damage and cost of future repair under current and future environmental conditions. These considerations typically are a part of the planning and project development process.”⁶

M&O: Maintenance and Operations
P6: Primavera P6 is a DelDOT software application for prioritizing, planning, and managing projects, programs, and portfolios.
PMS: Pavement Management System
PMG: Pavement Management Group
Repeatedly Damaged Facility: Bridges, culverts, or sections of a road or highway that have required repair and reconstruction activities on two or more occasions due to natural events resulting in relatively sudden or catastrophic failure. A catastrophic failure is a sudden failure of a major element or segment of a road, highway, or bridge due to an external cause. The failure must not be primarily attributable to gradual and progressive deterioration or lack of proper maintenance.⁷

---


⁷ Note that this definition is more general that the definition specifically regarding the 667 legislation where the FHWA guidance notes that “repeatedly damaged facilities” are roads, highways, and bridges that have required repair and reconstruction activities on two or more occasions due to natural disasters or catastrophic failures resulting in emergencies declared by the Governor of the State or the President (23 CFR 667.1). For purposes of 23 CFR part 667 evaluations, a catastrophic failure is a sudden failure of a major element or segment of a road, highway, or bridge due to an external cause (23 CFR 667.3). The failure must not be primarily attributable to gradual and progressive deterioration or lack of proper maintenance (23 CFR 667.3).
RDFL: Repeatedly Damaged Facilities List. Currently a list held in Excel that includes evaluations of potential mitigation projects. This may also be referred to in other documents as the ‘asset level risk register’.

SOP: Standard Operating Procedure

STIP: State Transportation Improvement Program

4. **Scope**

States are required by 23 CFR 667 to “conduct statewide evaluations to determine if there are reasonable alternatives to roads, highways, and bridges that have required repair and reconstruction activities on two or more occasions due to emergency events”\(^8\). This SOP defines the process for determining repeatedly damaged facilities as well as the process for determining whether repair or reconstruction is a cost-effective option for risk reduction.

From: [https://www.fhwa.dot.gov/programadmin/23cfr667_qa.cfm](https://www.fhwa.dot.gov/programadmin/23cfr667_qa.cfm)

Note: For the purposes of this Questions and Answers Document, “repeatedly damaged facilities” are roads, highways, and bridges that have

- required repair and reconstruction activities.
- on two or more occasions due to natural disasters or catastrophic failures resulting in emergencies declared by the Governor of the State or the President (23 CFR 667.1).

5. **Prerequisites**

Data needed:

1. The current list of facilities repeatedly damaged and repaired after emergency events (i.e., the current RDFL)

2. P6 report from Finance giving the Actual Expenditures during the past calendar year and including relevant columns from P6 indicating that the project is related to repairs to a structure or road location that was damaged in an event – this is a prerequisite to being able to identify facilities (locations) where repairs have been made using emergency funding since the last update of the Repeatedly Damaged Facilities List (RDFL).

\(^8\) From 23 CFR §667.1  Statewide Evaluation. [https://www.ecfr.gov/cgi-bin/text-idx?SID=fb3d1b0ddab9c2d09b7ad33b1645dd2b&mc=true&node=p23.1.667&rgn=div5](https://www.ecfr.gov/cgi-bin/text-idx?SID=fb3d1b0ddab9c2d09b7ad33b1645dd2b&mc=true&node=p23.1.667&rgn=div5)

[Diagram showing the business process for managing repeatedly damaged facilities, with steps such as identifying new damage-related projects, updating the facilities list, and making the list available for asset leads.]

AMS-667-01 667 Repeatedly Damaged Facilities List
7. **Gantt Chart**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Days</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Designate Potential Declared Event (Finance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2 Initiate New Project in P6 (Project Initiator)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 Record Locations in P6 for event related Projects (Field)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Identify new repeatedly damaged facilities (AMT)</td>
<td>7</td>
<td>1-Mar</td>
<td>7-Mar</td>
</tr>
<tr>
<td>2.2 Update 'Repeatedly Damaged Facilities List' with new locations (AMT)</td>
<td>7</td>
<td>8-Mar</td>
<td>14-Mar</td>
</tr>
<tr>
<td>2.3 Hold Evaluations Workshop (AMT)</td>
<td>2</td>
<td>15-Mar</td>
<td>16-Mar</td>
</tr>
<tr>
<td>2.4 Record results in updated List (AMT)</td>
<td>2</td>
<td>17-Mar</td>
<td>18-Mar</td>
</tr>
<tr>
<td>2.5 Make List available for Asset Leads (AMT)</td>
<td>1</td>
<td>19-Mar</td>
<td>19-Mar</td>
</tr>
<tr>
<td>3.1 Use List and evaluations in analysis (PMG/BMG)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2 Update status of options in List (PMG/BMG)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Update TAMP with latest list (AMT)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| March *Note that exact dates may vary depending on AMT decisions etc.* | 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  |
|-----------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| For each event                                                       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| For each event                                                       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| For each event                                                       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 7-Mar                                                                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 14-Mar                                                               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 16-Mar                                                               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 18-Mar                                                               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 19-Mar                                                               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

- 1.1 Designate Potential Declared Event (Finance) is repeated annually as part of the programming process.
- 1.2 Initiate New Project in P6 (Project Initiator) is repeated annually as part of the programming process.
- 1.3 Record Locations in P6 for event related Projects (Field) is repeated as needed.
- 2.1 Identify new repeatedly damaged facilities (AMT) is done every 2 years starting from 2019.
- 2.2 Update 'Repeatedly Damaged Facilities List' with new locations (AMT) is done every 2 years starting from 2019.
- 2.3 Hold Evaluations Workshop (AMT) is done every 2 years starting from 2019.
- 2.4 Record results in updated List (AMT) is done every 2 years starting from 2019.
- 2.5 Make List available for Asset Leads (AMT) is done every 2 years starting from 2019.
- 3.1 Use List and evaluations in analysis (PMG/BMG) is done every 4 years when TAMP is updated.
- 3.2 Update status of options in List (PMG/BMG) is done every 4 years when TAMP is updated.
8. **Responsibilities**

This SOP will be coordinated by the Asset Management Team (coordinated by Engineering Support) and conducted jointly by the Finance Section, Bridge Management Group (BMG), and Pavement Management Group (PMG). Field, construction and maintenance personnel will also have roles in identifying current and potential projects that are required for repair and reconstruction activities due to natural disasters or catastrophic failures on roads, highways and bridges.

9. **Business Process Steps**

**Step 1.1 Designate potential declared event**

Role: Finance (Finance Division or M&O Business Management)

For events that are or may in the future be Governor declared emergency events, a storm number is identified and sent out to DelDOT personnel for use in capturing labor, equipment, and materials costs for possible later reimbursement.

Note: Projects on the damaged facilities list (DFL) are not required to have a storm number associated with them, however, this is very much encouraged if a storm number is available.

**Step 1.2 Initiate new project in P6**

Role: Project Initiator

The following will be designated at the project level in Primavera P6:

- If the project is being initiated primarily for required repair or reconstruction activities due to natural events resulting in relatively sudden or catastrophic failure of a portion of road, highway or bridge, the following fields should be filled:
  - The ‘Damage Related’ checkbox should be checked if the repairs or reconstruction are related to an uncommon natural event (e.g., hurricane, flood, storm surge, earthquake, wildfire, landslide)
  - The ‘Storm Number’ and ‘Storm Description’ fields should be filled in, if applicable, by checking the statewide storm number and event description from the M&O email (e.g., ‘38-XXX-51 for the wind/rain even that occurred 7/24/17 through 7/25/17’). Sometimes there are multiple storm numbers associated with a project. When this is the case, enter the main storm number and storm description associated with the majority of the project costs.
As a secondary step to this, request a list from M&O of work where the ‘Damage Related’ field is selected in Maximo. Some of the Work Orders may be associated with storm numbers. Because some Work Orders may not have storm numbers associated with them, it is important that a ‘Description’ field is filled out explaining the cause of the damage.

- The ‘Anticipated Vulnerability Reduction’ field should be filled in by estimating a percent reduction in likelihood that the facility will be damaged in a similar event in the future after the project is completed. Select from the dropdown list to indicate one of the following:
  - 0% = the risk has not been mitigated at all for a similar event in the future (returned to previous condition)
  - 50% = the risk has been addressed to some extent for a similar event in the future
  - 100% = the risk is completely mitigated for a similar event in the future (e.g., the bridge was raised).

☐ As part of the routine process, the location or locations will also be updated in the location management system. These may provide a good source of additional information when updating the DFL in Step 2.2 since in the context of the Part 667 legislation, the facility is essentially a location.

**Step 1.3 Record project locations in P6 for event related projects**

Role: Project Initiator

As part of the project initiation, one or more locations are recorded in the ‘Project Name’ field in P6. These locations should be accurate or descriptive enough to enable personnel in the future to identify if the same section of road, highway or bridge is damaged in the same way for the same reason requiring another repair or reconstruction project.

**Step 2.1 Identify new damage related projects**

Role: Asset Management Team

As new projects are initiated in P6, some projects will not yet be on the Repeatedly Damaged Facilities List (RDFL). In this step the Asset Management Team will:

- Run a report from P6 to identify all new projects that are required to repair damage from an event since the last time the RDFL was updated. This is accomplished by running a report in P6 filtered for the following:
Step 2.2 Update 'Repeatedly Damaged Facilities List' with new locations

Role: Asset Management Team

Once the P6 report is available, the RDFL should be updated as follows:

- Copy results from P6 report and append them to the end of the current Damaged Facilities List (DFL) in Excel. This list should contain all damaged facilities since January 1, 1997. It is important to keep track of the damaged facilities so that if a facility is damaged again, it can be updated as a repeatedly damaged facility.

- Update the 'ER/FEMA Funds Used' column. Determine all applicable projects and mark them with a 'Y' where emergency funds were used and a 'N' where emergency funds were not used.

- Update the 'Number of Times Damaged' column for any new DFL entries.
  - Use filtering and the locations described in the 'Project Name' column to determine whether the locations from the new projects are the same as any for any previous damage related projects and manually update the 'Number of Times Damaged' column.
  - If the location description in the 'Project Name' field is not specific enough, other location data associated with the project may also be useful.

- Filter the DFL, which is a list of projects, by the 'Number of Times Damaged' column to include projects where 'Number of Times Damaged' > 1. Sort by the location described in the 'Project Name' column to identify locations with multiple projects. Copy any new facilities based on location description to the RDFL. If any facility locations have multiple projects, only copy the latest project.

- 'Date Initiated' > date of last RDFL update
- 'Damage Related' checkbox = checked
- 'Anticipated Vulnerability Reduction' field < 100%
  - If this field is set to 100%, this indicates that the project is anticipated to remove the root cause of the problem and thus remove vulnerability to future similar events. It would therefore not be necessary to evaluate mitigation options.

- Note: the output should include information including photographs, if available, about location for use in comparing with previous projects to enable identification of facilities with more than one event related project

- Export results of P6 report to Excel
Specifically, to obtain the Part 667 list of facilities, filter the RDFL for projects for which ER/FEMA funds were used (ER/FEMA Funds Used = Y).

**Step 2.3 Hold Evaluations Workshop**

Role: Asset Management Team

After the RDFL has been updated with new facilities, it is necessary to conduct evaluations of mitigation options for new facilities. This is done by scheduling and holding a workshop in which field and maintenance personnel that are familiar with the new facilities and the associated problems and reasons for repair.

- Workshop Frequency and Attendees - At least every other year, the Asset Management Team will arrange for a Risk Assessment Workshop to be conducted to update the Risk Register of Facilities Repeatedly Damaged by Emergency Events (a.k.a. the RDFL) as well as the Agency and Program Level Risk Register. The Agency and Program Level Risk Register update process can be conducted in a separate workshop if so desired; its process is outlined in the TAMP.

  The workshop will be attended by a diverse group of representatives from the Districts, the Pavement and Bridge Management Groups, the Asset Management Team, Project Planning, and Agency Leadership. Because participants will likely differ somewhat from year to year, a refresher on the fundamentals of risk will typically be covered as part of the agenda.

- Workshop Scope - The workshop will begin with an introduction and will cover risk background including:
  - Definitions and Terminology
  - Risk Register (specifically RDFL) Components
  - Previous lessons learned
  - Open Discussion / Q&A

- States are required to regularly evaluate facilities repeatedly requiring repair and reconstruction due to emergency events (23 CFR Part 667). As part of this requirement, DelDOT will conduct a statewide evaluation to:
  - Determine any emergency event as declared by the Governor or President since January 1, 1997
  - Determine if any roads, highways, or bridges have required repair and reconstruction activities (permanent repairs) on 2 or more occasions due to emergency events.
Review and update the entire evaluation every 4 years.

- By November 23, 2018, complete the statewide evaluation for all NHS roads, highways and bridges – **COMPLETED**
- By November 23, 2020, evaluate all roads, highways, and bridges – **COMPLETED**

The evaluation described above is repeated periodically, typically at the same time as the main risk register workshop for agency and program level risks, to continuously update the 667 facility list and risk evaluation. The evaluations for potential 667 facilities, based on the most recent risk workshop. The process for evaluating asset level risks is to evaluate possible mitigation actions, including the Do Nothing alternative. Each possible mitigation action is evaluated as follows:

- **Action** – First evaluate Do Nothing action. Then define at least one other possible mitigation action to alleviate the consequence of a similar event to the latest event which damaged the asset.
- **Cost of Action** – Estimate the agency cost of the mitigation action. (In-house vs. contract, materials, manhours, equipment, traffic control, user delay costs, detours, etc.)
- **Duration of Fix** – Estimate the duration before the asset will need to be repaired or replaced in years.
- **Annualized Cost of Action** – The cost of the action is divided by the duration of the fix to obtain an annualized cost.
- **Event Frequency (Likelihood)** – Estimate the frequency of the event. (Ex: if an event occurs approximately once every 10 years, likelihood is 10%.)
- **Cost Exposure after Action (Consequence)** – Estimate the User Costs, Repair Costs, Safety Costs and Other costs and sum these as the consequence of the event assuming the mitigation action had been implemented. The consequence is then annualized based on the event frequency to give the annualized expected consequence.
- **Risk reduction** – Calculate the risk reduction as a percentage of the expected consequence under the Do Nothing alternative minus the remaining expected consequence if the mitigation action was implemented.
- **Benefit Cost Ratio** – Calculate the benefit to cost ratio (B/C Ratio) by dividing the expected annualized consequence reduction (see Risk Reduction) by the annualized cost of the action (described above). If this B/C ratio is greater
than one (> 1), the mitigation action could be considered. If the ratio is less than one (< 1), the risk could be tolerated.

The workshop will produce an evaluations spreadsheet with the columns filled out as follows:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Most recent damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Location:</td>
</tr>
<tr>
<td>NHS (Y/N):</td>
<td>Repeated Damage:</td>
</tr>
<tr>
<td>Damage Type / Fix:</td>
<td>Damage Cost:</td>
</tr>
<tr>
<td>Event Name:</td>
<td>Year Month:</td>
</tr>
</tbody>
</table>

**Mitigation Actions**

<table>
<thead>
<tr>
<th>Action:</th>
<th>Cost of Action:</th>
<th>Duration of Fix (Yrs):</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Do Nothing</td>
<td>Always = $0</td>
<td>Always = 0</td>
</tr>
<tr>
<td>1 - Alternative Mitigation Action</td>
<td>= Estimate of the Cost of the Action</td>
<td>= Estimated Number of Years the Action Will Remain Effective</td>
</tr>
</tbody>
</table>
### Benefit Cost Ratio Calculation (1)

<table>
<thead>
<tr>
<th>Annualized Cost of Action:</th>
<th>Consequence:</th>
<th>Risk Reduction:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always = 0</td>
<td>= Event Frequency * Total Cost</td>
<td>Always = 0</td>
</tr>
<tr>
<td>= Cost of Action / Duration of Fix</td>
<td>= Event Frequency * Total Cost</td>
<td>= 1 - (Consequence of Alternative Mitigation Action / Consequence of Do Nothing)</td>
</tr>
</tbody>
</table>

### Cost Exposure after Action (1)

<table>
<thead>
<tr>
<th>Event Freq.</th>
<th>User Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 1 / Frequency in Years</td>
<td>= (Total Delay Costs Per Day * Days of Delay) + AADT * (Passenger % * (VOC for Passenger Cars Per Mile<em>Detour Length) + Truck % * (VOC for Trucks Per Mile</em>Detour Length))</td>
</tr>
<tr>
<td>= 1 / Frequency in Years</td>
<td>= (Total Delay Costs Per Day * Days of Delay) + AADT * (Passenger % * (VOC for Passenger Cars Per Mile<em>Detour Length) + Truck % * (VOC for Trucks Per Mile</em>Detour Length))</td>
</tr>
</tbody>
</table>

### Cost Exposure after Action (2)

<table>
<thead>
<tr>
<th>Repair</th>
<th>Safety</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>= Damage Cost</td>
<td>= Total Cost of Fatalities and/or Injuries</td>
<td>= Any Other Costs Associated with Damage</td>
<td>= User Costs + Repair + Safety + Other</td>
</tr>
<tr>
<td>= Damage Cost</td>
<td>= Total Cost of Fatalities and/or Injuries</td>
<td>= Any Other Costs Associated with Damage</td>
<td>= User Costs + Repair + Safety + Other</td>
</tr>
</tbody>
</table>
Step 2.4 Record results in updated List

Role: Asset Management Team

- Update the relevant TAMP Table sheet within Risk Register spreadsheet with the results from the workshop for inclusion in the next TAMP. The RDFL and TAMP Table sheets contain most of the same information, just in different formats for presentation in the TAMP document. In the spreadsheet, it is possible to ‘look up’ the values for the TAMP Table sheet from the RDFL.

- Export the table to be reviewed by the PMG and BMG. After comments are received, this can then be used in updated TAMP.

Step 2.5 Make List available for Asset Leads

Role: Asset Management Team

- The Asset Management Team should provide the updated RDFL to the Asset Leads

- The Asset Leads should review list for anything out of place or that they do not agree with and provide initial comments back to the Asset Management Team (see Gantt Chart in section 7 on page 7 for timeline expectations).

Step 3.1 Use List and evaluations in analysis

Role: Asset Management Groups (PMG/BMG)

Per 23 C.F.R. 667.9, FHWA is able to consider the results of risk evaluations when relevant to funding decisions being made. The State must provide FHWA with the evaluations for projects in the CTP upon request, thus they need to be thorough and up to date with an appropriate connection to project planning and project development.

The most influential portion of the risk evaluation is the benefit cost ratio (B/C). This is what should be considered when determining if a project is a viable option. When a project is being determined, the B/C ratio should be considered and used in part to justify the project.

Step 3.2 Update status of options in List

Role: Asset Management Groups (PMG/BMG)

To ensure facilities can be removed from the RDFL, once programming for the year is complete, the status of each facility in the RDFL should be updated based on mitigation actions that are either programmed or already completed. Once a mitigation action is
completed, the facility is permanently removed from the list. If at a later date the facility is again damaged, a new separate entry for the facility will be added to the RDFL.\(^\text{9}\)

- To make this update, the Asset Management Team should send out the current RDFL to the Management Groups for updates at the end of annual programming. The ‘Comment’ column of the RDFL should be used to describe the status. The following status descriptions should be used:

  **Full Mitigation Project Programmed** – If a project is programmed that is reasonably expected to address the root cause of the damage and is anticipated to fully mitigate the vulnerability of the facility with respect to similar events, then the status of the facility should be marked “Full Mitigation Project Programmed”. The anticipated timeframe for the project should be given.

  **Partial Mitigation Project Programmed** – If a project is programmed that will partially address the root cause of the damage and is expected to significantly reduce the vulnerability of the facility with respect to similar events, then the status of the facility should be marked “Partial Mitigation Project Programmed”. The anticipated timeframe for the project should be given.

  **Full Mitigation Project Complete** – If the full mitigation project is complete, then the status of the facility should be marked “Full Mitigation Project Complete” and give the approximate date of completion.

  **Partial Mitigation Project Complete** – If the full mitigation project is completed, then the status of the facility should be marked “Partial Mitigation Project Complete” and give the approximate date of completion.

- When a full mitigation project is completed, the “Number of Times Damaged” column should be set to Zero. If a completed project only partially mitigates the risk, the “Number of Times Damaged” column should not be adjusted.

- Once the review of the RDFL has been conducted by the PMG/BMG, it should be returned to the Asset Management Team for final compilation.

### Step 4.1 Update TAMP with latest List

**Role:** Asset Management Team

When the TAMP is updated per the document *DelDOT Asset Management: A Guide to Implementing and Updating Plans*, add the updated RDFL with evaluations as an appendix. This process is outlined further in Chapter 3, Section 4 of the aforementioned guide. Ideally,

---

\(^{9}\) Based on guidance published by FHWA Posted 11/26/2018: [https://www.fhwa.dot.gov/programadmin/23cfr667_qa.cfm](https://www.fhwa.dot.gov/programadmin/23cfr667_qa.cfm)
even if the TAMP is not immediately due to be re-certified, the latest current draft of the TAMP should be updated.

--------------------------------