PennDOT LTAP
technical
INFORMATION
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DISASTER DAMAGE ASSESSMENTS

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Accurate damage assessments are essential to operations management and receiving funding for recovery efforts from a disaster. The checklists below provide some general guidance for performing a damage assessment for debris management, damaged roads, and bridges. This information collected will help determine whether cleanup efforts and repairs are eligible for funding and what percentage of the repairs may be eligible for reimbursement or requested funds.

Debris Management Assessment

Debris clearance is often a major activity in any disaster recovery plan and will entail the removal of damaged objects like trees, building parts, parts of roads, and bridges, on both public and private property. An accurate calculation method will be needed to help estimate debris totals. FEMA (Federal Emergency Management Agency) has developed a Debris Estimating Field Guide to assist in determining the best way to estimate debris at https://www.fema.gov/sites/default/files/2020-07/fema_329_debris-estimating_field-guide_9-1-2010.pdf. Note the section on Ground Measurements.

A flood event caused the municipal culvert to fill with debris. Include the cost estimates to remove debris in culverts.

Debris Management Checklist

- ✓ Take photos of the debris before any work begins.
- ✓ Identify the number of sites impacted.
- ✓ Document the type of material that will need disposed.
- ✓ Calculate the tonnage of debris by site (be sure to consider what debris is not visible yet but could be brought to the site).
- ✓ Estimate the costs that will be involved in the removal effort utilizing both in-house resources and contracted services.

> ***Tip*** Ensure all employees working with debris removal have appropriate personal protective equipment (PPE) including hard hat, high-visibility vest, eye protection, cell phone, gloves, long pants, and safety-toed boots.

Roads and Bridges Damage Assessment

When a disaster damages a road or bridge structure municipal staff will need to perform the initial assessment of the damage and evaluate the structure for public safety. A complete detailed inspection and cost estimate may be necessary following the initial assessment. Below are sample checklists of the information that is needed to assist in the recovery planning.

Road and Bridge Assessment Checklist

- ✓ Identify the location of damage by road/structure (detailed location information with GPS coordinates is best).
- ✓ Photos from multiple angles and locations that illustrate the extent and cause of the damage will help to illustrate the impact. Before and after repair pictures are recommended.

> ***Tip*** The most current inspection report for the road or bridge will be an important document to reference in the assessment as it will detail pre-disaster facility condition.

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For Roads:

- The damage assessment of a road is focused on the general condition of the road to determine if an emergency repair or permanent repair will be needed.

Examples of an Emergency Repair include regrading of a roadway, debris or slide removal, rip rap replacement to protect the structure or roadway, replacement of short sections of asphalt paving on routes with heavy traffic, traffic control during an emergency, and detour implementation.

Permanent Repairs examples may include increasing the elevation of a road, increasing the size of a culvert, or significantly improving a paving section.

When performing an assessment, data gathering will be used to both formulate your plan of action and how you may consider outside assistance. Below are a few items that should be considered for this assessment:

- ✓ Identify and document any immediate concerns observed that may require a closure or immediate hazard to be isolated or addressed.
- ✓ Plan to gather measurements of the damaged areas to assist with estimates for the overall assessment.
- ✓ Prior to making any repairs in-house or contracting the work out, estimate the material, equipment, and labor costs that will be associated with cleanup and repairs.
- ✓ Identify any permits that may be required by other agencies.
- ✓ For Emergency Repairs, immediate work is permitted. For repairs that may be deemed "Permanent Work" it will be important to receive approval by working with your Municipal Services Representative prior to any work authorization by completing the PennDOT Form D-4232 https://www.dot.state.pa.us/public/PubsForms/Publications/PUB%202/D-4232.pdf.
- ✓ Utilize a standard road grade for damage rating as follows:

This is Line Road in North Hopewell Township. This was a localized event that did several million dollars of damage to township infrastructure. Take photos before any work is done to show the true damage.

1: Basic Damage	Pedestrian and motor traffic are unaffected despite debris. No visual damage to the structure or drainage system.
2: Minor Damage	Pavement is partially buried by mud and debris. Operations staff will be needed to remove debris and clean roadway for safe passage. Minor drainage clearing is needed.
3: Moderate Damage	Localized moderate cracking is observed and there is a clear reduction in the structural integrity of the road. Barricades may be needed to prevent continued damage by traffic, repairs are needed to bring the road back to a usable condition.
4: Major Damage	Pavement has failed or is completely missing. There is no safe passage available for pedestrians or motorists. Excessive repair or complete replacement is necessary.

For Bridges:

An initial bridge damage assessment should take approximately 30 minutes and is meant to gather preliminary information, as well as initiate any emergency unsafe designations that may need to be elevated. Since bridge design and construction vary, your assessment should include the basic components that may have sustained damage. Examples of components that should be observed and noted may include the deck, expansion joint, foundation, column, abutments and the approach to name a few.

- ✓ Upon arrival for initial assessment, ensure that any hazards encountered like downed wires, faulty traffic devices, or roadway obstructions are reported to the proper authorities.
- ✓ Be sure not to walk or drive over or under any structure until the safety has been assessed.
- ✓ Pay special attention to any irregularities or disturbances. Shifts in guiderails, or striping may be visible evidence.
- ✓ Damage reports should include an estimated percentage of damage for each element that is observed which could be broken down as follows:

The steel beam bridge with a steel grate deck survived the flood, but debris needed to be removed and the bridge was inspected for safety.

Light (1-10%)	Structure needs minor repairs showing minor deck cracking, spalling overhead signage damage, etc.
Moderate (10-30%)	Structure is likely repairable with some structural damage showing a few inches of joint separation and/or movement of the deck, minor cracking around bolts is observed.
Heavy (30-60%)	Structure is partially intact, but several elements are showing structural damage such as columnar cracking, cracking of overhead sign post.
Major (60-100%)	Structure is in danger of collapse, several elements are showing severe damage and repairs are not likely with possible bridge deck sagging, extensive cracking of culvert wingwall, displacement of girder off bearing support.
Destroyed (100%)	Structure has failed completely and is unusable for traffic.

Tip Consider the use of an Unmanned Aircraft System (UAS) or drone to take photos of a disaster. For more information go to the PennDOT USA/Drone page: https://www.penndot.pa.gov/Doing-Business/Aviation/Licensing%20and%20Safety/Pages/Unmanned-AircraftSystems-(Drone)-Information.aspx.