

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

The purpose of this document is to provide a quick reference to definitions and acronyms established in Federal requirements, industry standards, or Department of Energy directives and related to the requirements of DOE O 437.1, Bridge and Tunnel Management.

1. Active Real Property Assets. A building, structure, or real property trailer with a FIMS status code of Operating, Standby, or Outgranted. A land parcel with a FIMS status code of Active Land. [DOE O 430.1C, Real Property Asset Management]
2. Anticipated Service Life (ASL). An estimate of the remaining life of a bridge based on current age, structural condition, specification used for design, and capacity to handle current and future traffic. The ASL may be taken as the expected life of a new bridge less the age of the bridge under consideration. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006] Selection of the Anticipated Service Life is the responsibility of the Responsible Engineer in consultation with site management.
3. Assurance Systems. Encompass all aspects of the processes and activities designed to identify deficiencies and opportunities for improvement, report deficiencies to the responsible managers, complete corrective actions, and share in lessons learned effectively across all aspects of operation. [DOE O 226.1B, Implementation of Department of Energy Oversight Policy]
4. Average Daily Traffic (ADT). Identifies the average volume of traffic for the average one day (24-hour period) during a data reporting year at a specific location or specific segment of road. [DOT/FHWA Traffic Monitoring Guide, October 2016] Annual Average Daily Traffic (AADT) estimates, with as little bias as possible, the mean traffic volume across all days for a year for a given location along a roadway. AADT is different from ADT because it represents data for the entire year.
5. Average Daily Truck Traffic (ADTT). Identifies the volume of truck traffic for a one day (24-hour period) during a data-reporting year.
6. Bankfull Discharge. For perennial streams (streams that always carry water), when the stream spreads onto the floodplain. Bankfull discharge is a relatively frequent watershed runoff event, usually more frequent than the two-year return interval. [FHWA-HIF-16-018, HEC No. 17, Highways in the River Environment: Extreme Events, Risk and Resilience, June 2016]
7. Base Flow. The long-term average discharge of a stream when the watershed is not immediately responding to rainfall event. Base flow comes from sources other than surface runoff. [FHWA-HIF-16-018, HEC No. 17, Highways in the River Environment: Extreme Events, Risk and Resilience, June 2016]
8. Best Practice. A method, procedure, process, or rule used to maintain quality as an alternative to mandatory legislated standards and can be based on self-assessment or benchmarking. The method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things, e.g., a standard way of

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

- complying with legal or ethical requirements. [DOE O 430.1C, Real Property Asset Management]
9. Bridge Evaluation. An assessment of the performance of an existing bridge. [AASHTO, Manual for Bridge Evaluation, 2nd Edition]
 10. Bridge or Tunnel File. A full history of the structure, including all design, construction, maintenance, repair, rehabilitation, use, and damage records. The Bridge File or Tunnel File contains inventory data, inspection, testing, and evaluation records, load rating and evaluation data and reports. [DOE O 437.1, Bridge and Tunnel Management]
 11. Bridge Importance. See Essential Bridge.
 12. Bridge Inspection Experience. Active participation in bridge inspections completed in accordance with the NBIS, in either a field inspection, supervisory, or management role. A combination of bridge design, bridge maintenance, bridge construction and bridge inspection experience, with the predominant amount in bridge inspection, is acceptable. [Code of Federal Regulations 23 CFR 650.305, Subpart C]
 13. Bridge Inspection Report. An inspection-specific summary including information pertinent to bridge inventory management. The report serves as a summary of the inspection, inspection findings, and recommendations; as a historical record for future reference; and, as a legal record that documents inspection activity. [DOE O 437.1, Bridge and Tunnel Management]
 14. Bridge and Tunnel Inspection Organization. Personnel assigned responsibility for implementing the Department of Energy bridge management requirements or who conduct inspections or evaluations. [DOE O 437.1, Bridge and Tunnel Management]
 15. Bridge or Tunnel Inspection. Determination of the physical and functional condition of a bridge, tunnel, or culvert by identifying, quantifying, and documenting existing defects. Performed by qualified technical personnel familiar with relevant methods and procedures, tools and equipment, safety requirements, and documentation practices. [DOE O 437.1, Bridge and Tunnel Management]
 16. Bridge or Tunnel Inspection Findings. Observations or measurements describing the overall condition of the bridge or tunnel and defects collected during an inspection. Specific defects typically include conditions that result in a condition rating of 5 or less or condition states of 3 or 4. [DOE O 437.1, Bridge and Tunnel Management]
 17. Bridge or Tunnel Inspection Report Recommendations. Corrective actions intended to ensure the safety and integrity of the bridge, culvert, or tunnel; to maintain it in good condition; and, to extend its service life. Actions may include additional inspection or evaluation, maintenance and repair, modernization, or operational activities. [DOE O 437.1, Bridge and Tunnel Management]
 18. Complex Bridge. A movable, suspension, cable stayed, segmental, bridge or any bridge with unusual characteristics. Unusual characteristics include the behaviors and details

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

not inherent in other bridge types and include: movable bridge operating components and machinery, suspension cables and components, pins and hangers, segmental box post-tensioning details, cable-stayed components, or high-strength (70,000 pounds/square inch or greater) steel. [DOE O 437.1, Bridge and Tunnel Management]

19. Condition Assessment. The process of periodic physical inspection, assessment, measurement and interpretation of the resultant data to indicate the condition of a specific asset so as to determine the need for some preventative or remedial action. It is a crucial part of asset management to determine its current condition, remaining useful life and estimated cost to correct any deficiencies. [DOE O 430.1C, Real Property Asset Management]
20. Contracting Officer. A person with authority to enter into, administer, and terminate contracts and make related determinations and findings; includes certain authorized representatives of the contracting officer acting within the limits of authority as delegated by the contracting officer. [DOE O 541.1, Appointment of Contracting Officers and Contracting Officer Representatives].
21. Contractor Requirements Document (CRD). A document that defines the specific requirements associated with the functions, services or products provided by a contractor that will apply to contracts that include the CRD. Contractors are bound by applicable laws and regulations and the terms and conditions of their contracts and CRDs that are incorporated into contracts through the use of the clause at 48 CFR 970.5204-2, laws, regulations and DOE directives. [DOE O 251.1, Department Directives Program]
22. Controlled Access Vehicle Bridge. A structure including supports erected over a depression or an obstruction, such as water, a highway, or a railway, having a passageway for carrying traffic or other moving loads, and a Structure Length of more than 20 feet (6.1 meters). A traveler must pass through a staffed entry point and present identification to traverse this structure. These structures are not included in the National Bridge Inventory. [DOE O 437.1, Bridge and Tunnel Management]
23. Countermeasures. Materials or systems intended to prevent, delay or reduce the severity scour and stream instability. [DOE O 437.1, Bridge and Tunnel Management]
24. Critical Findings. A structural or safety related deficiency that requires immediate follow-up inspection or action. [Code of Federal Regulations 23 CFR 650.305] Levels of Critical Findings and corresponding response times follow:
 - a. **Emergency**: used to report the failure or imminent failure of a critical primary structural component. An Emergency Critical Finding means that a failure is likely within a short time period. A re-inspection or repair should be scheduled, and the structure may require a Prompt Interim Action (PIA), load posting, or closure. Immediate action required.
 - b. **Urgent**: used to report a potentially hazardous condition, which, if left unattended beyond the next anticipated inspection, would likely become dangerous to persons or property. Also used to report the actual or imminent failure of a non-critical

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

structural component. Such failures may reduce the reserve capacity or redundancy of the structure but would not result in a structural collapse. A re-inspection or repair should be scheduled, and the structure may require load posting. Action required prior to next routine inspection.

- c. Rapid: used to report a potentially hazardous condition that is non-structural in nature but if left unattended beyond the next anticipated inspection would likely become dangerous to persons or property. Such failures would not affect the structure's load carrying capacity. Schedule required actions. [DOE O 437.1, Bridge and Tunnel Management]

25. Critical Findings Protocols. A site-specific plan minimally identifying:

- a. members of the Critical Findings team and alternates,
- b. team member contact information and responsibilities,
- c. procedures for notifying team members upon discovery of a Critical Finding,
- d. procedures for notifying:
 - (1) local agencies,
 - (2) local law enforcement agencies, and the Public Affairs Officer where local roads and traffic are affected,
 - (3) Site/Program leadership and the DOE BTM,
- e. procedures for implementing temporary measures and,
- f. guidelines on timeliness of actions, reporting requirements, and documentation procedures. [DOE O 437.1, Bridge and Tunnel Management]

26. Culvert. A transverse structure, pipe or series of multiple pipes, box(es), or arch(s) constructed to convey water or utilities under a road or railway. [DOE O 437.1, Bridge and Tunnel Management]

- Culvert assets under a road with a Structure Length equal to or greater than 20 linear feet meet the FHWA definition of a bridge. These assets are inventoried in FIMS with Usage Code 1768 or 1769.
- Culvert assets under railway with a Structure Length equal to or greater than 10 feet and located at such a depth that it is affected by live loads meet the Federal Railroad Administration (FRA) definition of a bridge. These assets are inventoried in FIMS with Usage Code 1468 or 1469.
- Culvert assets with a Structure Length less than FHWA or FRA bridge length and an Opening Area of more than 20 square feet are inventoried in FIMS with Usage

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

Code 2629. The FIMS Users Guide provides addition guidance for selecting real property asset Usage Codes.

- a. Opening Area is the total cross-sectional area, measured in square feet. Consider a series of multiple pipes as a single unit when the clear distance between openings is less than half of the smaller contiguous opening.
 - b. Culvert Length is measured longitudinally along the structure, pipe, or series of multiple pipes, box, or arch. The Culvert Length is generally perpendicular to the Structure Length.
27. Design Strength. The capacity of the structure or structural member being designed or analyzed (i.e. the Nominal strength) multiplied by the appropriate resistance factor. [DOE O 437.1, Bridge and Tunnel Management]
 28. DOE Bridge and Tunnel Manager (DOE BTM). The individual assigned or delegated the duties and responsibilities for bridge and tunnel inspection, reporting, and inventory. [Code of Federal Regulations 23 CFR 650.305, and 23 CFR 650.507]
 29. DOE Elements. Headquarters elements or first-tier organizations as listed in the Correspondence Style Guide, Office of the Executive Secretariat. [DOE O 251.1, Department Directives Program]
 30. Elevated Walkway. See Pedestrian Bridge.
 31. Essential Bridge. A bridge that is needed to continue functioning immediately after an earthquake or that crosses a route that is expected to remain open immediately following an earthquake. Any bridge not classified as essential is classified as a standard bridge. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, Jan 2006] An essential bridge satisfies one or more of the conditions identified in the reference or is designated as “Mission Critical” in the Department of Energy Facilities Information Management System. [DOE O 437.1, Bridge and Tunnel Management]
 32. Exempt Bridge. A bridge may be exempt from retrofitting if it is located in the lowest seismic zone or has limited remaining useful life. Temporary bridges and those closed to traffic are also exempt. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
 33. Facility/Facilities. The land, buildings, trailers, their installed equipment, and other fixed systems and equipment installed therein, other structures and facilities, and other improvements. [DOE O 430.1C, Real Property Asset Management]
 34. Flood. An event exceeding base flow where flows in a stream inundate normally dry land. [FHWA-HIF-16-018, HEC No. 17, Highways in the River Environment: Extreme Events, Risk and Resilience, June 2016]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

35. Follow-up to Critical Findings Report. Documents Critical Finding discovery and resolution. [DOE O 437.1, Bridge and Tunnel Management]
- a. Initial Report. The initial report includes the date and time of the Critical Finding discovery and notification, circumstances of the finding, severity and extent of finding, completed notifications, and closures or other limits imposed on the use of the bridge. The report includes supporting photos, sketches, and measurements.
 - b. Report of Recovery Strategy. This report updates the Initial Report and describes any temporary repairs and their inspection, other interim actions, and the intended recovery strategy with planned actions and milestone dates.
36. Fracture Critical Member (FCM). Steel tension members or steel tension components of members whose failure would be expected to result in a partial or full collapse of the bridge. [AASHTO, Manual for Bridge Evaluation, 2nd Edition] Fracture Critical Members require more thorough and detailed inspections.
37. Graded Approach. The process of ensuring that the levels of analyses, documentation, and actions used to comply with requirements are commensurate with: the relative importance to safety, safeguards, and security; the magnitude of any hazard involved; the life-cycle stage of a facility or item; the programmatic mission of a facility; the particular characteristics of a facility or item; the relative importance to radiological and non-radiological hazards; and, any other relevant factors. [Code of Federal Regulations 10 CFR Part 830.3] The process is not used to obtain exemptions from requirements.
38. Industry Standard. A set of criteria within an industry relating to the standard functioning and carrying out of operations in their respective fields of production. In other words, it is the generally accepted requirements followed by the members of an industry. It provides an orderly and systematic formulation, adoption, or application of standards used in a particular industry or sector of the economy. Industry standards vary from one industry to another. Industry standards facilitate global as well as domestic competitiveness. It is a crucial tool for developing and meeting industry goals. For example, in the automotive industry, tire sizes and durability must fall within a standardized range. Standardization serves as a quality check for any industry. [DOE O 430.1C, Real Property Asset Management]
39. Inspection – Damage. An unscheduled inspection to assess structural damage resulting from environmental factors or human actions. [Code of Federal Regulations 23 CFR 650.305]. Damage may result from floods, fire, earthquake, explosion, or impact by barge or vehicles. A Damage Inspection will determine need for additional actions including additional inspection (e.g., In-Depth), emergency load restrictions, or closure of part or all of the bridge or tunnel to traffic. Analogous to a Special or Emergency Inspection for railroad bridges. [American Railway Engineering and Maintenance-of-Way Association, Manual for Railway Engineering]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

40. Inspection – Fracture Critical Member. A type of In-Depth Inspection conducted at regularly scheduled intervals specifically to inspect Fracture Critical Member(s) or member components. It requires close-up access, hands-on inspection, and may require non-destructive testing (NDT) by qualified personnel to determine location and extent of cracking or other defects. [DOE O 437.1, Bridge and Tunnel Management]
41. Inspection – In-Depth. A hands-on, close-up inspection of one or more structure elements above or below the water level to identify any deficiencies not readily detectible using Routine Inspection procedures. An In-Depth Inspection is also used to identify developing problems that impact present service requirements or to obtain detailed information needed to facilitate the preparation of structure rehabilitation plans. This inspection may result in a full investigation including structural analysis to determine member capacity that will be used in a revised load rating. It may be performed independently from a Routine Inspection at intervals other than 24 months. It can be at a longer interval or one time only. Analogous to a Special Inspection for railroad bridges. [DOE O 437.1, Bridge and Tunnel Management]
42. Inspection – Hands-on. A visual or manual inspection technique made at a distance no greater than arm's length from the entire member or member component surface. Includes examination of all surfaces of the members and member components. May require use of specialized equipment to access members or member components. [DOE O 437.1, Bridge and Tunnel Management]
43. Inspection – Initial. Inspection conducted after construction or rehabilitation of a bridge or when the configuration or geometry of the structure changes (examples include, widening, lengthening, and change in vertical clearance). It is the baseline inspection with which all future inspections will be compared. Performance may be coincident with the final construction inspection but must be done by a qualified inspection team. [DOE O 437.1, Bridge and Tunnel Management]
44. Inspection – Routine. Regularly scheduled inspection consisting of observations and/or measurements needed to determine the physical and functional condition of the bridge, to identify any changes from initial or previously recorded conditions, and to ensure that the structure continues to satisfy present service requirements. [Code of Federal Regulations 23 CFR 650.305] Analogous to a Periodic Inspection for railroad bridges. [American Railway Engineering and Maintenance-of-Way Association, Manual for Railway Engineering]
45. Inspection – Special. An inspection scheduled at the discretion of the bridge owner, used to monitor a particular known or suspected deficiency. [Code of Federal Regulations 23 CFR 650.305] Performed when a structure requires more frequent inspection than is given by the Routine Inspection cycle, typically to monitor a known defect or condition severe enough to warrant the extra scrutiny. These conditions could include load posted bridges, foundation settlement or scour, and members with low condition ratings. Analogous to an Interim Inspection for railroad bridges. [American Railway Engineering and Maintenance-of-Way Association, Manual for Railway Engineering]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

46. Inspection – Underwater. Inspection of the underwater portion of a bridge substructure and the surrounding channel, which cannot be inspected visually at low water by wading or probing, generally requiring diving or other appropriate techniques. [Code of Federal Regulations 23 CFR 650.305] There are three (3) levels of diving inspection, Levels I, II, and III, with increasing complexity from low to high:
- a. Level I – Generally used to detect major damage, confirm drawings, or gain more information to plan a more in-depth inspection. This level is essentially a “swim-by” overview of 100% of underwater elements, which does not involve any structural elements cleaning.
 - b. Level II – Generally used to detect and identify damaged/deteriorated areas that may be hidden by biofouling or surface deterioration. The level requires detailed inspection of 10% of underwater elements and requires some cleaning. Elements are cleaned in 1-foot-high bands at near low waterline, at the mudline, and midway between.
 - c. Level III – Typically completed to investigate a deficiency detected under Level I or Level II inspections. This level often requires the use of non-destructive testing techniques and may also require the use of partially destructive techniques such as sample coring, material sampling or in-situ surface hardness testing.
47. Inspection Team Leader. Individual in charge of an inspection team responsible for planning, preparing, and performing field inspection of the bridge. [Code of Federal Regulations 23 CFR 650.305, Subpart C] The on-site individual in charge of an inspection team responsible for planning, preparing, performing, and reporting on tunnel inspections. [Code of Federal Regulations 23 CFR 650.505, Subpart E]
48. Lateral Ground Movement. A permanent offset in the ground induced by seismic movement and usually due to one or more of the collateral hazards. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
49. Line Management. The unbroken chain of responsibility that extends from the Secretary of Energy to the Deputy Secretary, to the Secretarial Officers who set program policy and plans and develop assigned programs, and to the program and Field Element Managers who are responsible for execution of these programs. [Department of Energy Order 226.1B, Implementation of Department of Energy Oversight Policy, April 25, 2011]
50. Load and Resistance Factor (LRFD) Design. A design method used by AASHTO, based on limit states of material with increased loads and reduced member capacity based on statistical probabilities. [FHWA NHI 12-049, Bridge Inspector’s Reference Manual, February 2012]
51. Load Rating. The measure of a vehicle bridge’s load carrying capacity based on the individual components and existing structural conditions, material properties, loads, and traffic conditions at the bridge site. Bridge load rating calculations are typically based on information available in the Bridge File, including as-built construction and shop drawings as well as the results of the most recent inspection results, when that

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

information is current and accurate. [AASHTO, Manual for Bridge Evaluation, 2012].
The capacity is commonly evaluated for the following load assumptions:

- a. **Inventory Rating.** Represents the safe loading for application on a vehicle bridge on a day-to-day basis. It is the largest sustained live load that an existing structure can safely carry for an indefinite period of time without undergoing damage from repeated maximum loads. The rating is based on AASHTO design specifications and takes into account the current condition or deterioration of the bridge elements due to age and service. Applicable to vehicle bridges.
 - b. **Legal Load Rating.** Represents the maximum size or weight limits permissible on a specified portion of road by law for the State in which the bridge is located. The legal dimensions and weights vary between states. Applicable to vehicle bridges.
 - c. **Maximum Rating.** Represents the load level that can be supported on a railroad bridge at infrequent intervals with applicable speed restrictions. Applicable to railroad bridges.
 - d. **Normal Rating.** Represents that load which can be operated on a railroad bridge indefinitely without inducing damage. Normal ratings will be determined in accordance with the American Railway Engineering and Maintenance-of-Way Association with and without fatigue considerations. Applicable to railroad bridges.
 - e. **Operating Rating.** Represents the maximum permissible live load that can be placed on the vehicle bridge. Unlimited use by vehicles that subject the bridge to operating levels may shorten the useful life of the bridge. This rating also includes the same load in multiple lanes. Applicable to vehicle bridges.
52. **Low Volume Road.** A road that is functionally classified as a local or minor collector road and has a design average daily traffic volume of 2,000 vehicles per day or less. [AASHTO Guidelines for Geometric Design of Low-Volume Roads, 2019] A very low-volume local road has a functional classification of local road, and features a design average daily traffic volume of 400 vehicles per day, at most. Functionally classified collectors may also follow these guidelines so long as the design average daily traffic volume does not exceed 400 vehicles per day. [AASHTO, Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT \leq 400), 2001]
53. **Lower Level Earthquake Ground Motion.** A small earthquake that has a reasonable probability of occurrence within the life of the bridge (assume 75 years). This ground motion may also be called the frequent earthquake, the expected earthquake (NCHRP 12-49-ATC/MCEER 2003), or the functional evaluation earthquake (Caltrans Seismic Design Methodology (Caltrans 1999). [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
54. **Management.** The safeguarding of the Government's interest in property, in an efficient and economical manner consistent with the best business practices. [41 CFR 102-71.20]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

55. National Bridge Inventory (NBI). A database of Structure Inventory and Appraisal data collected by each state or Federal bridge-owning agency to fulfill the requirements of the National Bridge Inspection Standards. [DOE O 437.1, Bridge and Tunnel Management]
56. National Bridge Inventory Bridge or Reportable Bridge. A vehicular bridge located on a public road and having a Structure Length of more than 20 feet. [adapted from Code of Federal Regulations 23 CFR Part 650.305, Subpart C]
57. National Bridge Inspection Standards (NBIS). The national standard for the proper safety inspection and evaluation of all highway bridges in accordance with 23 U.S.C. 151. [Code of Federal Regulations 23 CFR 650.305]
58. National Tunnel Inventory (NTI). A database maintained by the Federal Highway Administration containing inventory and inspection data for all highway tunnels located on public roads, on and off Federal-aid highways. [DOE O 437.1, Bridge and Tunnel Management]
59. Non-Destructive Testing (NDT). Any of a variety of methods used to assess the strength and condition of materials or structural components of a real property asset that does not result in any damage or change to the material or part under examination. [DOE O 437.1, Bridge and Tunnel Management]
60. Pedestrian Bridge. A structure that carries primarily pedestrian, bicycle, and equestrian traffic but may include light maintenance vehicles over a chasm, waterway, ditch, or other obstacle or convey pedestrian traffic from one building or structure to another including enclosed walkways. It does not include work or machinery platforms, stairways, platforms, boardwalks, or docks or similar type structures. [DOE O 437.1, Bridge and Tunnel Management]
 - a. Low Risk Pedestrian Bridge – A low use, low height pedestrian bridge where vehicular access is prevented, and consequences of failure are not significant.
 - b. High Risk Pedestrian Bridge – A high use pedestrian bridge with a potential loss of life given collapse or one routinely by maintenance vehicles.
61. Performance-Based Design. A design philosophy that explicitly provides for different levels of bridge performance for earthquakes of different sizes, according to the importance of the asset and its anticipated service life. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
62. Performance Level (PL) or Performance Criteria. A level of performance, expressed in terms of post-earthquake service and damage, expected to be achieved during and immediately following an earthquake of a specified size. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
63. Permit Load. A vehicle or load that exceeds the legal size or weight limits established by each state for operation on state roads. Each state has established procedures for

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

- reviewing the safety and serviceability of bridges along the planned route and for providing permission for transit. [DOE O 437.1, Bridge and Tunnel Management]
64. Plan of Corrective Action (PCA). A written plan identifying individual deficiencies or areas where bridge and tunnel management does not comply with Federal or Departmental policy. It describes actions required to correct each deficiency and the schedule for completing each action. [adapted from FHWA memorandum HIBS-30, National Bridge Inspection Standards Plan of Corrective Action(s) Guidelines, January 3, 2017]
65. Program Office. A Headquarters organization responsible for executing program management functions, and for assisting and supporting Field Office and Sites in environment, safety and health, administrative, management, and technical areas. [DOE O 430.1C, Real Property Asset Management]
66. Program Secretarial Officer (PSO). The head of a Program office which has responsibility for specific facilities, e.g., Environmental Management, Nuclear Energy, Science, Energy Efficiency and Renewable Energy, or Fossil Energy. [DOE O 430.1C, Real Property Asset Management]
67. Prompt Interim Action (PIA). Any action, including repairs, load limits, or partial or full bridge closure that is enacted to alleviate a significant safety problem on the bridge. Prompt means as soon as possible or practical given the conditions and consequences of inaction. Interim means that the action may be temporary but is to the extent necessary to ensure safe use of the bridge. [DOE O 437.1, Bridge and Tunnel Management]
68. Public Access Vehicle Bridge. A structure including supports erected over a depression or an obstruction, such as water, a highway, or a railway, and having a passageway for carrying traffic or other moving loads. A traveler could traverse the structure without ever passing through a staffed entry point or presenting identification. Public access vehicle bridges with a Structure Length of more than 20 feet (6.1 meters) will be included in the National Bridge Inventory unless permanently closed. [DOE O 437.1, Bridge and Tunnel Management]
69. Public Road. Any road or street under the jurisdiction of and maintained by a public authority and open to public travel. [23 U.S.C. 101(a)(27), Federal agencies are included among public authorities]
70. Quality. The condition achieved when an item, service, or process meets or exceeds the user's requirements and expectation. [Code of Federal Regulations 10 CFR Part 830.3]
71. Quality Assurance (QA). All those actions that provide confidence that quality is achieved. [Code of Federal Regulations 10 CFR 830.3] The use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program. [Code of Federal Regulations 23 CFR 650.305, Subpart C]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

72. Quality Assurance Program. The overall program or management system established to assign responsibilities and authorities, define policies and requirements, and provide for the performance and assessment of work. [Code of Federal Regulations 10 CFR Part 830.3]
73. Quality Control (QC). Procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level. [Code of Federal Regulations 23 CFR 650.305]
74. Quality Management. The coordination of activities by which an organization identifies its objectives, determines processes and resources to achieve desired results in a timely and cost-effective manner while meeting all technical requirements and addressing both intended and unintended consequences. It includes both Quality Control and Quality Assurance activities. [adapted from International Organization for Standardization (ISO) 9000, Quality Management Systems]
75. Railroad Bridge. Any structure with a deck, regardless of length, which supports one or more railroad tracks, or any other undergrade structure with an individual span length of 10 feet or more located at such a depth that it is affected by live loads. [Code of Federal Regulations 49 CFR 237.5]
76. Real Property Asset. Distinct parcel, building, real property trailer, other structure or facility, or interest acquired by or operated for the benefit of the Department of Energy. [DOE O 430.1C, Real Property Asset Management]
77. Required Strength. Structural capacity needed to meet or exceed the demands put on the structure by the loads. [DOE O 437.1, Bridge and Tunnel Management]
78. Responsible Engineer. An engineer charged with the overall responsibility for conducting bridge evaluations other than load ratings. This may include scour evaluations, fatigue and fracture evaluations, or seismic evaluations. [DOE O 437.1, Bridge and Tunnel Management]
79. Scour. Erosion of streambed or bank material or erosion of soil surrounding a bridge foundation due to flowing water. Often the erosion is localized around the bridge piers or abutments. [Code of Federal Regulations 23 CFR 650.305] Bridge scour occurs when fast-moving water around a bridge removes sediment from around the bridge foundation, leaving behind scour holes. These holes, in turn, can seriously compromise the bridge's integrity.
80. Scour Critical Bridge. See Scour Evaluation.
81. Scour Critical Plan of Action (Scour Critical POA). A written plan describing the appropriate measures necessary to make a bridge less vulnerable to damage or failure due to scour. The Scour Critical POA should explain why the preferred actions were selected, include a monitoring plan, possibly a plan for design and construction of countermeasures with a schedule, and a commitment to annual progress reporting until corrective actions are satisfied. [DOE O 437.1, Bridge and Tunnel Management]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

82. Scour Evaluation. Identifies the susceptibility of a bridge to scour and accurately records the present condition of bridge foundations and stream stability. The evaluation includes review of as-built foundation details; hydraulic studies, soundings, and other underwater investigations; knowledge of streambed and foundation soils; current condition of the foundation; streambed cross section profile measurement; stream flowrate measurements; and, similar historical and current data. [DOE O 437.1, Bridge and Tunnel Management] A Level 1 Scour Evaluation results in the classification of each bridge as:
- a. Scour Low Risk Bridge. Bridge with no history of scour problems and a low likelihood for scour problems in the future, or
 - b. Scour Critical Bridge. Bridge with an unstable foundation element, abutment, or pier foundation due to observed or to assessed or calculated scour as determined from a Level I Field Assessment or a Level 2 or 3 Scour Evaluation, or
 - c. Scour Susceptible Bridge. A bridge that based on a Level 1 Field Assessment is neither clearly scour critical or low risk. Further investigation is required to determine the status of the structure.
83. Seismic Hazard Level (SHL). Used to describe the severity of the seismic and geotechnical hazard at a bridge site for the purpose of detailed evaluation and retrofitting. There are four Seismic Hazard Levels based on the short- and long-period spectral accelerations (S_s and S₁) for the upper level earthquake and corresponding site factors. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
84. Seismic Hazard Rating (E). Used to describe the severity of the seismic and geotechnical hazard at a bridge site for the purpose of screening and prioritization. The rating is based on the long-period spectral acceleration (S₁) for the Upper level Earthquake and the corresponding site factor. Rating range from low (0) to high (10). [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
85. Seismic Retrofitting Category (SRC). Used to recommend minimum screening requirements, evaluation methods and retrofitting measures for deficient bridges. Four categories, A through D, are determined by the anticipated service life, bridge importance, and the seismic and geotechnical hazards at the site. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
86. Service Life. The period for which a component, element, or bridge provides the desired function and remains in service with appropriate preservation activities. [FHWA-HIF-11042, Bridge Preservation Guide, Spring 2018]
87. Short Span Bridge. A vehicular bridge with a structure length less than 20 feet. [DOE O 437.1, Bridge and Tunnel Management]
88. Site. A geographic area owned or leased by or for the Federal Government for the performance of DOE program activities. The term includes any buildings, trailers,

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

- infrastructure, land, or other improvements. [DOE O 430.1C, Real Property Asset Management]
89. Site Class. Used to classify the location of a bridge according to the properties of the soil as measured by shear wave velocities, blow counts, layer depths and thicknesses. [adapted from FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, January 2006]
90. Site Factors. Two site factors, F_a and F_v , are used to account for soil amplification of bedrock ground motions when determining the design response spectrum at the surface. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, Jan 2006]
- a. F_a is determined by the site class and the short-period spectral acceleration (S_s) for the upper level earthquake.
 - b. F_v is determined by the site class and the long-period spectral acceleration (S_1) for the upper level earthquake.
91. Site and/or Field Office Manager. Individual responsible for planning, programming, budgeting, and evaluation of activities in support of Secretarial office programs located on sites under his/her cognizance.
92. Standard. A document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose. [International Organization for Standardization (ISO)] A Standard or Technical Standard includes all of the following:
- a. common and repeated use of rules, conditions, guidelines or characteristics for products or related processes and production methods, and related management systems practices;
 - b. the definition of terms; classification of components; delineation of procedures; specification of dimensions, materials, performance, designs, or operations; measurement of quality and quantity in describing materials, processes, products, systems, services, or practices; test methods and sampling procedures; formats for information and communication exchange; or descriptions of fit and measurements of size or strength; and
 - c. terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process, or production method. [Public Law 104-113, National Technology Transfer and Advancement Act of 1995]
93. Strategic Highway Network (STRAHNET). The network of highways, including the Interstate System that provides connecting routes to military installations, industries and resources. It is a subset of the National Highway System and important to the United States' strategic defense policy by providing defense access, continuity and emergency capabilities for defense purposes.

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

[<https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/Pages/HighwaysNationalDefense.aspx>;
<https://www.fhwa.dot.gov/policy/2004cpr/chap18.cfm>]

94. Structure Inventory and Appraisal (SI&A) Data. Data recorded and stored for each bridge as standardized by the Federal Highway Administration to effectively monitor and manage a bridge inventory. Data submissions follow the current version of U. S. Department of Transportation, Federal Highway Administration, Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges and associated guidance. [DOE O 437.1, Bridge and Tunnel Management]
95. Structure Length. The length of roadway, railway, or walkway supported on the structure between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening. [adapted from Code of Federal Regulations 23 CFR 650.305, Subpart C]
96. Structurally Deficient. A classification given to a bridge with any component, NBI Data Item 58, 59, 60, or 62 (Deck, Superstructure, Substructure, and Culverts, respectively), is in Poor or worse condition (a rating of 4 or less). [Code of Federal Regulations 23 CFR 490.405]
97. Sufficiency Rating. The numerical rating of a bridge based on its structural condition and indicative of its sufficiency to remain in service. [Code of Federal Regulations 23 CFR 650.403]
98. Surface Runoff Event. Occurs on a stream whenever the watershed responds to a precipitation event, rain, hail, sleet, or snow, that causes a stream discharge above base flow. [FHWA-HIF-16-018, HEC No. 17, Highways in the River Environment: Extreme Events, Risk and Resilience, June 2016]
99. Tunnel – Pedestrian. An underground passageway, dug through the surrounding soil/earth/rock and enclosed except for entrance and exit, commonly at each end, and used exclusively for pedestrian or bicycle traffic. It does not include vehicular tunnels that have sidewalks. A tunnel used by both vehicles and pedestrians should be counted in one of the vehicular tunnel categories. A similar tunnel between two buildings may be inventoried with one of the buildings. [DOE O 437.1, Bridge and Tunnel Management]
100. Tunnel – Public Access Vehicular. Enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction, and located on a public road. May include lighting, ventilation, fire protection systems, and emergency egress capacity. [DOE O 437.1, Bridge and Tunnel Management]
101. Tunnel – Train. Tunnel used exclusively by trains. [DOE O 437.1, Bridge and Tunnel Management]

GLOSSARY OF BRIDGE AND TUNNEL MANAGEMENT TERMS

102. Tunnel – Controlled Access Vehicular. Enclosed roadway for motor vehicle and pedestrian traffic with vehicle access limited to portals, regardless of type of structure or method of construction. May include lighting, ventilation, fire protection systems, and emergency egress capacity. [DOE O 437.1, Bridge and Tunnel Management]
103. Upper Level Earthquake Ground Motion. A large earthquake that has a finite, but remote, probability of occurrence within the life of the bridge. This ground motion may also be called the rare earthquake, maximum considered earthquake (MCE) (NCHRP 12-49-ATC/MCEER 2003), or the safety evaluation earthquake (Caltrans Seismic Design Methodology (Caltrans 1999). The upper level motion has a 7 percent probability of exceedance in 75 years, which corresponds to a return period of about 1,000 years. [FHWA-HRT-06-032, Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges, Jan 2006]
104. Validation. The process of establishing evidence that provides a high degree of assurance that a product, service, or system accomplishes its intended requirements. [DOE O 430.1C, Real Property Asset Management]
105. Voluntary Consensus Standard. A type of standard developed or adopted by voluntary consensus standards bodies, through the use of a voluntary consensus standards development. [OMB Circular A-119, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, January 27, 2016]

NOTE: Definitions found in current DOE Directives are listed at:
<https://www.directives.doe.gov/definitions>

ACRONYMS RELATED TO BRIDGE AND TUNNEL MANAGEMENT

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADCI	Association of Diving Contractors International
ADT	Average Daily Traffic
ADTT	Average Daily Truck Traffic
ANSI/EIA	American National Standards Institute/Electronic Industries Alliance
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASL	Anticipated Service Life
CO	Contracting Officer
CFR	Code of Federal Regulations
CRD	Contractor Requirements Document
DED	Data Element Dictionary
DOE	Department of Energy
DOE BTM	Department of Energy Bridge and Tunnel Manager
E	Seismic Hazard Rating
EO	Executive Order
EV	Emergency Vehicles
FCM	Fracture Critical Member
FHWA	Federal Highway Administration
FIMS	Facilities Information Management System
FRA	Federal Railway Administration
HEC	Hydraulic Engineering Circular
LL	Lower Level
LRFD	Load and Resistance Factor Design
MA-50	Department of Energy, Office of Asset Management
MBE	AASHTO Manual for Bridge Evaluation
MCEER	Multidisciplinary Center for Earthquake Engineering Research
M&O	Management and Operating
NBI	National Bridge Inventory
NBIS	National Bridge Inspection Standards
NDT	Non-Destructive Testing
NHI	National Highway Institute
NHS	National Highway System
NNSA	National Nuclear Security Administration
NTI	National Tunnel Inventory
OMB	Office of Management and Budget

ACRONYMS RELATED TO BRIDGE AND TUNNEL MANAGEMENT

OSF	Other Structures and Facilities
PCA	Plan of Corrective Action
PL	Performance Level
POA	Plan of Action
PSO	Program Secretarial Officer
QA	Quality Assurance
QC	Quality Control
SHL	Seismic Hazard Level
SHV	Specialized Hauling Vehicles
SI&A	Structure Inventory and Appraisal
SNBIBE	Specification for the National Bridge Inventory Bridge Elements
SRC	Seismic Retrofit Category
TOMIE	Tunnel Operations, Maintenance, Inspection, and Evaluation
UL	Upper Level