

American Railway Engineering and Maintenance of Way Association

Letter Ballot

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This part was last updated in 2018. The part was reviewed and content updated to match current inspection procedures and technologies.

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Part 15

Inspection of Railway Buildings¹

— 2022 —

FOREWORD

- a. Railway buildings represent a significant capital investment and should be properly maintained in order to protect that investment while providing an acceptable level of safety to its users. Effective building maintenance involves both reactive and programmed maintenance activities. A maintenance program for a building is generally based upon an inspection program performed once a year but not less than once every five years, the actual interval should be established by the importance of the building to the ongoing business operations of the railroad as well as the age and condition of the structure as determined in previous inspections. Inspections should be performed by qualified professionals.
- b. Reactive maintenance involves repairs and/or replacement of consumables components. Programmed maintenance involves addressing assets which may not add Capital value when replaced and can be replaced in-kind when the useful life has been reached. Programmed asset replacement may include systems that when updated in their replacement can be a Capital investment and add value.
- c. The inspection program can also be used to confirm compliance with regulatory code and compliance issues as they relate to the International Building Code (IBC), Americans with Disabilities Act of 1990 (ADA), National Building Code of Canada and other federal, state, provincial and local regulatory bodies.
- d. The inspection program may include but is not limited to assets such as administrative and maintenance buildings for their shell and interiors, HVAC and plumbing systems, overhead cranes, doors, windows, elevators, escalators, Fire and Life Safety items, electrical service, and site facilities.
- e. A building inspection program can be used to identify short term and long-term costs associated with the items appearing in the inspection report. These costs can be utilized to establish capital budget(s) for repairs or modifications within a specified time period. This section will provide guidance on defining, gathering data during an inspection, and reporting the condition for use in Maintenance and Capital programs.

¹References Vol. 85, 1984, p 29

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SECTION 15.1 ORGANIZATION AND INSPECTION PREPARATION

- a. The preparation for new inspection will provide time for the review of the relevant codes, safety protocols, system shut down procedures and communication, existing plans, previous inspection reports, maintenance records, outstanding work items, and pertinent background information and new updates. The previous inspection shall be reviewed for special equipment used to access locations outside and

inside the buildings. The site may include confined space inspection requirements, track time or blue light protection. All tools, equipment and training should be known before inspection tasks begin.

Pertinent information may include recent rehabilitation plans for the facility building. The inspection report should note the status of compliance with the applicable codes.

- b. A reasonable guide for defining types of facilities can be found in the FTA Guidelines. The more relevant types for freight and passenger railroads are as follows:

Administrative Facilities

Administrative facilities are typically offices which house management and supporting activities for overall transit operations such as accounting, finance, engineering, legal, safety, security, customer services, scheduling and planning. They also include facilities for customer information or ticket sales, but that are not part of any passenger station.

General Purpose Maintenance Facilities

General maintenance includes areas such as shops for the major crafts that are needed to support the other yard facilities for all other departments. Crafts include but are not limited to welding, iron work, carpentry and masonry. The other railroad departments in a yard may include Maintenance of Equipment, Transportation, Transmission Power, Communications and Signals, Materials storage, and Procurement. The same facility can be used for both general purpose and heavy maintenance.

Depending on the organization of the programs for a railroad, the support buildings along the right of way can be inspected as a facility asset. The user department, such as Communications and Signals and Transmission Power, can be informed of the findings and program funding for the maintenance and Capital improvements.

Heavy Maintenance Facilities: A garage or building where the railroad may perform engine and other major unit rebuilds. Facilities devoted exclusively to major rebuilds and maintenance on revenue cars and equipment.

Passenger and Parking Facilities

Passenger stations are significant structures with a separate right-of-way (ROW). For rail modes, passenger facilities typically mean a platform area and any associated access structures or accessory spaces accessible to passengers or by staff who are in support of passenger service. This definition of passenger facilities includes:

- All rail passenger facilities
- All motorbus, rapid bus, commuter bus, and trolley bus passenger facilities in a separate ROW that have an enclosed structure (building) for passengers for items such as ticketing, information, restrooms, and concessions
- All transportation, transit or transfer centers, park-and-ride facilities, and transit malls if they have an enclosed structure (building) for passengers for items such as ticketing, information, restrooms, concessions, and telephones

*FTA Condition Assessment Guidebook

- c. The person in charge of the overall building inspection should, if at all possible, arrange to have the area Supervisor and/or his representative accompany the inspection team. The inspection forms can be revised as agreed upon by the end user department and the inspectors to accommodate any specific items particular to a location, or changes to a facility. The forms may be hardcopy or available on mobile devices. Inspection findings may be used to update inventories, asset management systems, or used to address audit requests. An inspection may also be an opportunity to create inventories for the purpose of creating programs for replacements when useful life is exceeded. For any inspection, abbreviations should be avoided unless universally applied. The importance of proper documentation of a condition needs to be clearly understood by the inspection group. Descriptions should be clear, accurate and concise.

SECTION 15.2 INSPECTORS

- a. Generally, there are two types of inspections that may be considered basic needs for a railroad facility. There is an in-depth inspection that will include all systems, the facility building and the site location. The frequency of the in-depth inspection may be between 3 to 5 years or more depending on the complexity of the systems housed and the function for railroad operations. The inspectors should consist of a team of civil engineers, electrical engineers, mechanical engineers, structural engineers, architects, construction manager, and supervisors. These disciplines might be in-house personnel or a hired consultant or a combination.
- b. The second type of inspection include descriptive titles such as 'Cyclical Maintenance Inspection' and 'Condition Assessment Inspection'. A team comprised of railroad personnel can perform these inspections at a frequency between monthly to yearly depending on the facility and the systems being maintained by the railroad. Railroad personnel directly involved with the maintenance of the systems can be the inspectors or a designated inspector position that the trades personnel can be hired into given years of service, certifications, and other qualifications deemed required by the railroad.
- c. When hiring a consultant for inspection services, the positions required for a contract may include project manager, inspection team leader with professional license, OSHA confined Space certification, and destructive or non-destructive testing abilities. Roles, qualifications, and responsibilities should be strictly defined.

SECTION 15.3 INSPECTIONS

- a. Different categories for inspections may be used depending on the nature of the facility and business demands. The categories may include Cyclical Maintenance inspections, Condition inspections, In-Depth inspections, and Emergency inspections with follow up Interim inspections. The process and timeframe for these inspection types should be well defined by the railroad, planned on schedule and funded appropriately.

- b. These inspections are a valuable tool for identifying potential, developing problems that may affect the integrity of the building or facility. Inspections may also serve to identify potential environmental problems, as well as energy inefficiencies that may exist. Through the inspection process, buildings and facilities can be maintained in a manner which will foster operational efficiencies, assure their design life and possibly prolong that life. Inspections serve as a planning tool for budgeting programmed maintenance and major expenditures to help avoid failures or catastrophic loss. There are numerous commercial software programs that incorporate an asset database, asset condition reporting, a work order initiation and follow-up process, and an asset history. They provide an integrated platform for conducting building inspections and scheduling building maintenance, identifying "state-of-good-repair" backlog, and anticipating asset upgrading or replacement. These programs provide inspection forms in both hard copy and electronic form and can generate budgets for capital planning purposes.

Public funding of rail projects may impose as a condition of a grant the requirement to develop and follow a formal Asset Management Plan that periodically reviews the condition of infrastructure and critical facilities. Building inspections are an element of asset management which may support the owner with its compliance of contractual or regulatory requirements. A rating scale with definitions should be used consistently to compare conditions from one inspection to the next. (Example 1: Suggested by FTA to include here or perhaps just direct the reader to the FTA website)

FTA TERM Condition Assessment Scale

Rating	Condition	Description
5	Excellent	No visible defects, new or near new condition, may still be underwarranty if applicable
4	Good	Good condition, but no longer new, may be slightly defective or deteriorated, but is overall functional
3	Adequate	Moderately deteriorated or defective; but has not exceeded useful life
2	Marginal	Defective or deteriorated in need of replacement; exceeded useful life
1	Poor	Critically damaged or in need of immediate repair; well past useful life

Section 15.4 CONDUCTING AN INSPECTION

The following paragraphs of this manual are not included to serve as a comprehensive guide on what to check when inspecting a building and/or facility. The information provided is intended only to serve as a guide and a reminder to those charged with the inspection duties to be mindful of these potential conditions.

- a. Structural inspections of a building and/or facility should begin at the foundation level. The visible portions of the exterior foundation should be checked for cracks and/or other forms of damage. Concrete stairs, stoops and/or ramps attached to the building should be checked for settlement and/or separation and assessed as to whether or not remedial measures are necessary. If steel framing is involved bolted connections should be inspected for corrosion, or if welded joints are used, inspect for cracking and/or separations. Steel framing should also be checked for corrosion and stress due to possible overloading or damage due to impacts, heavy winds, foundation movements, etc.

Inside basements or crawl spaces, walls and floor surfaces should be checked for cracks and water infiltration. If concrete ceilings are present, check for cracking and/or spalling along bearing points. Columns and piers should be inspected for cracking, spalling and/or other damage. Concrete pits should be inspected for cracking in the floor and walls. Note if any water infiltration is present.

Accessible timber framing elements, including wood sills, plates, joists, rafters, studs, headers, header joists, struts, collar beams, door bucks, stair runners, columns and corner posts should be checked for splitting and stress due to overloading or fatigue. Also, ensure that no decay is visible due to water damage and/or insects such as termites. Similar checks should also be made on all floors of the building if applicable, as well as the attic. In the attic, also check for water stains on framing or damp insulation that may indicate damage to the roof sheathing.

- b. Architectural inspections should focus on the interior and exterior condition of the building. On the exterior, the inspection should examine the condition of the masonry, metal panels, concrete, wood or composite surfaces, whichever is applicable. Exterior surfaces should be checked to ensure applied protectants are in a condition that will protect the underlying material from degradation. Positive drainage around the building or facility should be also be verified. For masonry work, mortar joints should be checked for possible deterioration. Metal buildings should be checked for loose, missing or damaged trim and/or panels, rusting elements or missing fasteners. Concrete walls should be checked for cracking and spalling, which could potentially allow water to penetrate into the building interior. Wood surfaces should be checked for decay and/or other types of damage. Regardless of the type of construction, inspection should carefully evaluate the condition of sealants and caulking at joints and junctions of dissimilar materials.

Walk-through and overhead doors should be checked to ensure serviceability and proper functionality, including the proper operation of limit switches and safety devices. Overhead door apparatuses such as tracks/guides, reels, springs, motors, cables, chains, etc. should be checked for damage or fatigue. Track frame and/or guide mounts should be checked to ensure that connections to the building or facility are solid. Overhead door panels or slats should be checked for damage or fatigue. Walk-through doors and accessories, such as panels, hinges, closers, thresholds, kick plates, hold-opens, stops, pulls, push bars, latches/locks, etc. should be checked.

Window exteriors should be checked to ensure caulking is intact or hasn't dried out and/or pulled free of its contact surfaces. Also note any broken glass or seals which may be leaking on double glazed windows. For wooden sash, check for possible decay. For operable sash, test the operation of hardware, especially if the window is considered an alternate emergency exit.

Eaves and fascia boards should be checked for decay and mold, failure of hardware, and proper functioning of eave vents to reduce condensation in attic spaces. On metal trim, check for separations and/or loose pieces. Inspect gutters and downspouts for proper functionality. Check for damage or restrictions including debris, dents, rust and/or attachment hardware failure that may result in improper pitch to the downspouts or drains. Inspect scuppers, window jambs and door jambs for looseness, decay and/or other types of damage.

On the interior, inspect floors, walls, and ceilings for possible damage and/or adverse wear. Check for water spots, indicating possible rainwater or plumbing leaks. Ensure that door and window hardware are properly functioning, especially panic hardware on prescribed exits. In areas where ceramic tile, glazed tile and/or masonry products are used, check grout and sealants for damage or degradation. Stairs and stairwells should be checked for safe tread condition, secure handrails, adequate lighting, signage and/or any unsafe condition. Verify that elevators have been inspected as required by code enforcement officials by reviewing certificates at the start of the inspection. Elevator cabs and individual elevator floor call stations should be inspected to ensure proper operations. Portable fire extinguishers and standpipe hose cabinets should be inspected for condition, suitability of fire class hazard and current inspection tagging by a qualified fire protection specialist.

On the roof, inspect flashings and sealants for separation and/or other types of damage. Check the condition of the roof surface itself for ponding, membrane fatigue, bubbles, tears, rust, missing or damaged fasteners, sealants or other potential trouble spots. Inspect curbs, scuppers, flashings and counter-flashings around mechanical equipment and other roof penetrations such as plumbing vents.

- c. The mechanical inspection should include the heating, air conditioning, exhaust and ventilation systems, as well as plumbing and Fire and life safety systems. When service contractors are utilized for mechanical systems maintenance, review all recent service reports prior to starting an inspection.

The heating, ventilation and air conditioning (HVAC) systems checks will vary according to the types of systems used and only those persons familiar with the operation of these types of systems should be used for the inspection. In general, HVAC systems should be checked for clean filters, proper belt tension on fans, clean fan wheels, clean coils, clean strainer baskets, if applicable, and that traps, valves, pressure reducing stations, condensate pumps, drains and air vents are all operating properly. Natural gas or Liquefied Petroleum Gas burners, supply lines, line connections, pilot systems, thermocouples, force air fans, ventilation, etc. should be checked. Boilers and hot water generator burners, fuel filters and relief valves should be inspected. Work reports should be checked to ensure that maintenance requirements are being met. Storage tanks when visible, should be inspected for adequate containment, pipe connections, markings, and alarms. Air compressors and air receivers, relief valves, condensate drains, and coolers/dryers should be checked for proper operation and current compliance with pressure vessel codes.

The sequence of operation for each HVAC system should be reviewed, followed by verification of proper operation of thermostats and other controls. Motorized dampers, fire dampers, diffusers, grilles, and

fans should be checked for proper settings and operation. Inspection and/or service reports should be checked, if available, for re-occurring problems.

Plumbing inspections should begin at the main water and sewer/ storm drain service points where they enter or leave the building. Water meters and backflow preventers should be inspected for correct installation and operation, including secure attachment of the electrical service ground to the incoming water service. Piping for sewer and water should be checked for damage and/or leaks. Cleanouts should be accessible. Toilet areas should be checked to determine if faucets are working properly, water closets flush correctly, and hot water tanks are installed properly with functioning relief valves and required safety devices.

Fire suppression systems including water sprinkler systems should be inspected for damage. Sprinkler heads, leaks in the piping (on wet systems) and that the fire pump, if applicable, is being exercised according to the manufacturer's directions. Dry fire suppression systems should be checked to ensure proper charge and activation valves and alarms have been inspected and tested. Service records for gaseous fire suppression systems should be reviewed and the fire protection specialist consulted for any anomalies noted. All control valves should be adequately marked, clear of obstructions, and padlocked in the open position if required by code. Hazardous materials storage areas should be inspected for required signage, containment, fire suppression and rated construction isolation as required by code enforcement officials. Inspections should keep alert for improper storage of hazardous or flammable materials in areas not so designated.

Building drainage systems should be checked for deterioration and clogging. Oil/water separators, grease traps, triple basins and other waste type holding tanks should also be checked to ensure they are operating properly and being serviced on a regular basis.

Electrical inspections should determine if adequate power exists in the building. If possible, occupant interview may help in determining if there is any history of dimming lights or repeated circuit breaker trips. Panels should be clear of obstructions and panel board directories are up to date. Fuse and/or breakers should be checked on each circuit in order to verify that they are properly sized and functional. Ground fault and arc fault circuit interrupters should be tested. Outlets and switches should be checked for fatigue, damage to covers and/or proper functionality. Emergency lighting and other life safety systems should be checked to ensure that the systems are operating properly. If emergency or standby power systems are installed, review maintenance records and simulate a power failure to verify the systems operate as intended. Where electrical grounding jumpers are installed on equipment or lightning protection, inspections should verify that connections are tight and electrical continuity to a grounding electrode is present.

Lighting should be checked to determine that reasonable lumens or foot-candles exist in workspaces for the tasks being performed. Note if the fixtures lenses and safety guards, if used, are clean and/or in need of replacement. Note if improper or unauthorized extension cords are in use, and if any wiring appears to have been added to the facility which does not meet local electrical code requirements.

- d. Environmental inspections are also a necessity on many buildings and facilities where asbestos, lead paint, and/or hazardous chemical/substance may have been used and/or are expected to be found.

If an environmental inspection is deemed appropriate for the building and/or facility a qualified environmental engineer and/or consultant should be employed. This individual and/or firm should then conduct a thorough investigation of the building and/or facility to determine if any hazardous materials, chemicals and/or substances are present. A full report should be provided outlining the findings of the inspection.

If hazardous materials, chemicals and/or substances are found, proper documentation of the findings should be prepared. Documentation should consist of what specifically was found, extent of the material, identification of the substance and/or chemical, photographs, and the approximate cost for abatement.

As noted earlier in this section, the above is not intended to serve as the criteria for an inspection, but merely to alert the reader as to the many items which need to be considered when conducting a thorough building and facility inspection. While many of the above referenced items will be common to almost any building and/or facility, each building and/or facility will have their own unique needs and inspection requirements.

SECTION 15.5 INSPECTION REPORTS

- a. Once the inspection has been completed and notes compiled, a report should be prepared which identifies any substandard or unacceptable condition(s) identified during the inspection. Any condition identified during the inspection that would represent a hazard to personnel or to the safety of the structure, should be brought to the immediate attention of the responsible person in charge of the inspection and official in charge of the building or facility at the time of the inspection. Final reporting may be developed by grouping items according to location in or around the building/facility, or by separate discipline lists arranged by priority rating.
- b. Each discipline should categorize the results of their individual inspections in order to assist those receiving the information to identify immediate and long-term needs. When requested, estimates of costs may be prepared for the work on an individual line-item basis to support future maintenance planning.
- c. Urgent items needing correction may be assigned to specific parties and monthly reporting as to status of repairs or corrections made to the designated railroad official(s).
- d. A suggested rating system is proposed which can serve as a guide for determining the importance of the repairs needed and response type that may be advisable. This rating system is as follows:
 1. Potentially hazardous to personnel and/or personnel safety. Urgent action required
 2. Compromises structural integrity of the building and/or facility. Immediate action warranted.

3. Requires major maintenance and if not attended to promptly will cost substantially more at a later date. Schedule additional study and establish future actions.
4. If corrected will reduce building and/or facility operating cost. Evaluate and budget if necessary
5. Corrective action will improve image, appearance and/or personal comfort. Evaluate and budget if necessary
6. Regular maintenance has been neglected and/or performed improperly. Revised operating practices or maintenance methods should be established.
7. No work required. Revised operating practices or maintenance methods may be needed.

SECTION 15.6 AMERICANS WITH DISABILITIES ACT

- a. The scope of work for a rehabilitation for an existing facility should include review of ADA items and what if any need for additional items to meet code compliance for that type of facility and location.
- b. After a rehabilitation of an existing building, the plans should note general compliance with the ADA. The plans can be reviewed by either the consultant for the rehabilitation or a code compliance officer for the railroad.
- c. The US Department of Transportation enforces regulations governing transit, which includes ensuring that recipients of federal aid and state and local entities responsible for roadways and pedestrian facilities do not discriminate on the basis of disability in highway transportation or activities. The department also issues guidance to transit agencies on how to comply with the ADA to ensure public transit vehicles and facilities are accessible. (* U.S. Department of Labor)
- d. The Office of Civil Rights is responsible for ensuring public transit providers comply with all nondiscrimination requirements. The office oversees the implementation of laws and regulations that prohibit discrimination on the basis of race, color, national origin, religion, sex, disability, and age in the provision of services to the public. The office provides technical assistance and training and conducts compliant investigation and onsite compliance reviews to ensure public transit providers fulfill civil rights requirements. Please visit the FTA website for programs offered by the office. (*Federal Transit Administration)

SECTION 15.7 RESILIENCE PLANNING

Resilience is “the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.” The railroad should understand the critical points in their transportation system: right of way, track, equipment, power sources, communications, and human capital. Although the inspection program cannot address Resiliency directly, the inspection report can offer suggestions for improvement with respect to resiliency items for planning and Capital improvement purposes.

The railroads risk management plans can include the following as applicable to their system: extreme weather impacts, climate change impacts, sea level rise, carbon reduction initiatives, pandemics, natural disasters, terrorist incidents, and catastrophic incidents.

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Sample Administrative/Maintenance Facility Condition Assessment Form

Inspection Date:
Inspector Name:
Facility Name:
Address/Location:

ID #		Asset Quantity	Unit of Measure	Percent of Asset Quantity by Condition				
				5 Excellent	4 Good	3 Adequate	2 Marginal	1 Poor
A.	Substructure							
B.	Shell							
C.	Interiors							
D.	Conveyance							
E.	Plumbing							
F.	HVAC							
G.	Fire and Life Safety							
H.	Electrical							
I.	Equipment							
J.	Site							