

1. Rail Transit Standards Background and Process Description

Abstract: This volume explains the history, background, and process behind APTA's Manual of Standards and Recommended Practices for Rail Transit Systems and provides instructions for using the manual, a glossary of terms, and a description of all policies pertaining to the manual.

Keywords: APTA, bylaws, glossary, instructions, policies, rail transit standards task force, rail transit, rail transit standards, standards development, standards development process, standards implementation

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Rail Transit Standards Background and Process Description

1. About APTA

APTA is a nonprofit international association of over 1,500 public and private member organizations including transit systems and commuter rail operators; planning, design, construction and finance firms; product and service providers; academic institutions, transit associations and state departments of transportation. APTA members serve the public interest by providing safe, efficient and economical transit services and products. Over ninety percent of persons using public transportation in the United States and Canada are served by APTA members.

1.1 APTA mission

APTA's mission is to serve and represent its members in making public transportation an effective path to economic opportunity, personal mobility, and improving the quality of life through partnerships, communication, technology, and advocacy.

1.2 APTA policy on diversity

APTA recognizes the importance of diversity for conference topics and speakers and is committed to increasing the awareness of its membership on diversity issues. APTA welcomes ideas and suggestions on how to strengthen our efforts to meet these important diversity objectives.

1.3 Anti-trust policy

Federal antitrust laws prohibit contracts, combinations, and conspiracies in restraint of trade. Sanctions for violating the antitrust laws include civil damages (including treble damages) and criminal fines and imprisonment. The Policy of the American Public Transportation Association and the Rail Transit Standards Task Force is to strictly adhere to the antitrust laws.

In accordance with the above, the rail transit standards and recommended practices were developed objectively for the legitimate non-competitive purpose of promoting safe and efficient passenger rail transit service.

2. Scope of Manual of Standards and Recommended Practices

The standards and recommended practices contained in this manual apply to rail transit systems that do not operate on the general railroad system in the United States. This includes light rail and heavy rail (subway) transit systems. The manual does not apply to commuter railroads or other passenger railroads that operate on the general railroad system and are regulated extensively by the Federal Railroad Administration.

A notable exception is Port Authority Trans-Hudson Corporation (PATH). PATH does not operate on the general railroad system, but PATH is regulated extensively to the by the Federal Railroad Administration. PATH contributed heavily to the development of this manual. PATH has much more in common with the rail transit systems covered by this manual than with commuter railroads. To the extent these standards and recommended practices do not conflict with FRA regulations, they apply to PATH.

Several of the standards and recommended practices contained in this manual have potential for much broader application. Some of the more promising are:

- The Standard for Rail Transit Accident/Incident Investigation could be easily tailored to applied in any transit mode
- The Standard for Rail Transit Emergency Management could be easily tailored to apply in any transit mode
- The Design Guidelines for Heavy Duty Transportation Elevators and Escalators can be applied in any transit mode
- Many of the operating practice standards and recommended practices could be adapted to apply to bus or commuter rail systems
- The grade crossing standards and recommended practices could be applied by commuter railroads

The standards and recommended practices contained in this manual will be phased in by rail transit systems over a two-year time period ending September 30, 2006. By that time, all rail transit systems should be in compliance with the standards or their own equivalent alternate practices (see Volume I, Section 3.2)

3. Disclaimer

The American Public Transportation Association (APTA) developed this manual in consultation with a diverse group of experts, arriving at consensus positions, using the procedures defined in the APTA Rail Transit Standards bylaws. APTA strives to provide accurate, complete, and useful information. The information contained in this detailed manual is based upon technical information that is believed to be reliable, but for which no responsibility is assumed.

Neither APTA nor any person or organization contributing to the preparation of this document makes any warranty, expressed or implied, with respect to the usefulness or effectiveness of any information, method or process disclosed in this material. Nor does APTA assume any liability for the use of, or for damages arising from the use of, any information, methods, or process disclosed in this document.

No information or suggestions shall be deemed to be a recommendation to use any specific manufacturer's product(s) or any system in conflict with an existing patent right, code, or regulations. This manual should not serve as a substitute for sound engineering judgment.

3.1 Liability issues

To address a concern the Policy Committee had over how standards and even recommended practices could be used against rail transit systems in court to determine liability, the documents clearly grant rail transit systems flexibility in how or if they implement these practices. San Diego Trolley, Inc. had their legal staff review how to minimize liability risks through flexible language. This language is reflected in the Overview section of each individual standard under a subheading entitled “Alternate Practices.”

3.2 Alternate practices

Individual rail transit systems may modify the practices in these standards to accommodate their specific equipment and mode of operation. APTA recognizes that some rail transit systems may have unique operating environments that make strict compliance with every provision of these standards impossible. As a result, certain rail transit systems may need to implement the standards and practices in this manual in ways that are more or less restrictive than these documents prescribe. A rail transit system (RTS) may develop alternates to the APTA standards so long as the alternates are based on a safe operating history and are described and documented in the system's safety program plan (or another document that is referenced in the system safety program plan).

Documentation of alternate practices shall:

- a) Identify the specific APTA rail transit safety standard requirements that cannot be met
- b) State why each of these requirements cannot be met
- c) Describe the alternate methods used
- d) Describe and substantiate how the alternate methods do not compromise safety and provide a level of safety equivalent to the practices in the APTA safety standard (operating histories or hazard analysis findings may be used to substantiate this claim)

4. Motivation for developing rail transit standards

Due to the increasing popularity and demand for rail transit service, many existing rail transit systems plan service expansions and an ever-growing number of cities plan new rail transit starts. The leaders of the rail transit industry believe the time is right to develop guidance for this growth in the industry and to create the basis for more uniform safety oversight of rail transit operations by the states.

As a result, the rail transit industry united under the umbrella of the American Public Transportation Association (APTA), to develop standards and recommended practices to improve safety and increase operating efficiency. The effort is spearheaded and funded by the leaders of 25 rail transit systems along with Federal Transit Administration (FTA) and Wabtech.

These industry leaders believe this project will help rail transit systems meet their responsibility to the public to continue to improve on an already excellent safety and reliability record.

The main benefits anticipated are:

- a basis for more uniform state safety oversight programs
- sharing of best practices throughout the industry
- a highly visible, proactive industry led safety program
- guidance and help for new starts
- improved communications among rail transit systems and government agencies

5. APTA's standards development process

To be successful, any consensus process involving organizations with diverse interests must have rules defining the procedures to be used. APTA developed a set of bylaws to govern the process which can be found in Annex A of this volume. These bylaws contain the following basic principles:

- membership open and broadly representative of industry
- open process and meetings
- consensus based (defined as 75% super-majority)
- mandatory minimum public comment period
- response required to all reasonable comments received
- final approval voting based on one vote per organization
- maximum use of electronic communication
- the policy committee retains implementation authority

The bylaws and resulting process APTA used to develop these standards followed the process required by the American National Standards Institute (ANSI) to obtain ANSI Standards Development Organization (SDO) certification.

More than 241 individuals volunteered to participate on one or more of the committees—including representatives from the California Public Utilities Commission, Federal Transit Administration, the Federal Railroad Administration and the National Transportation Safety Board.

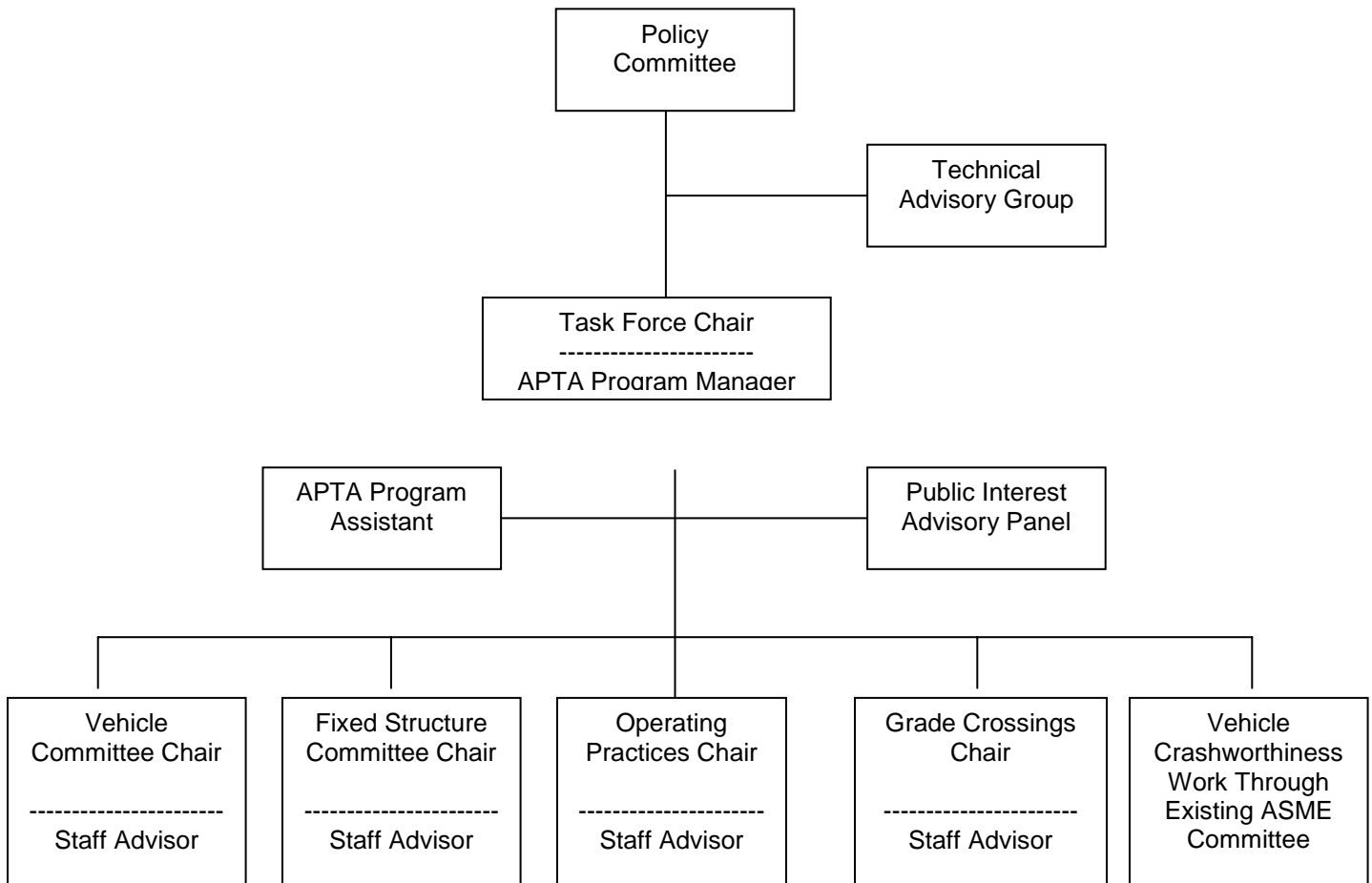
Although APTA and the consultants assisted each of these working groups or sub-committees, each member of a sub-committee contributed his/her expertise and knowledge to the sub-committee’s product.

To help keep travel costs and mail costs down, APTA used the internet to communicate with committee members and to post work products for review. An important part of the first meeting of each committee was a tutorial on how to use Webworks as customized for this project by Booz Allen Hamilton. Each of the sub-committees have a web site where reference documents were posted in electronic form and where sub-committee members posted their work for comment or use by other sub-committee members.

6. Rail Transit Standards Program organization

Figure 1 illustrates the organizational structure of APTA’s Rail Transit Standards program.

Rail Transit Standards Organizational Chart



6.1 Policy Committee

Policy Committee membership consists of the general managers (or designee) of each operating or planned rail transit system that has paid the special APTA assessment, commercial organizations that provide financial support equal to that of an operational rail transit system and a representative of the Federal Transit Administration.

The Policy Committee is responsible for the following functions:

- Setting the broad policy to be followed by the Task Force
- Approving the bylaws
- Approving the Task Force annual budget
- Approving major changes to the budget (if required)
- Approving Task Force priorities
- Appointing the Task Force Chair and Vice-Chair
- Appointing a Policy Committee representative to the Task Force
- Authorizing implementation of documents approved by the Task Force

Each rail transit system—either operational or in the planning stage--that has paid the current annual APTA rail transit standards assessment has one vote on the Policy Committee. The Federal Transit Administration also has one vote on the Policy Committee. Commercial organizations that provide financial support to the effort at the same level as operational rail transit systems have one vote on the Policy Committee. Membership of commercial organizations do not comprise more than 40% of the total membership of the Policy Committee.

6.2 Technical Advisory Group

Membership of the Technical Advisory Group consists of senior experts from rail transit systems and other industry stakeholders. The Technical Advisory Group responds to requests from the Policy Committee for recommendations on task force policy and priorities.

The specific tasks to be completed by the technical working group include:

- a) Recommend a small number (no more than 4) of focus areas for the standards development effort. The focus areas should have high potential to produce meaningful safety improvements. By way of example, possible focus areas include: vehicle inspection and maintenance, vehicle crashworthiness, grade crossings, operating practices, track, emergency preparedness and station design.
- b) Identify related industry standards development efforts so that duplication is avoided.

- c) Recommend a policy or guiding philosophy to determine when a subject should be addressed with a mandatory standard or a voluntary recommended practice.
- d) Review and make recommendations on the budget estimates made by the APTA staff.
- e) Review and make recommendations on the schedule developed by the APTA staff.
- f) Draft a set of bylaws that defines the process to be used to develop the standards.
- g) Make recommendations for key personnel to recruit—both from transit systems and suppliers to lead development efforts in each of the recommended focus areas.

6.3 Task Force Executive Committee

The Task Force Executive Committee shall consist of the Task Force officers, the APTA program manager and the staff advisor to each committee. The executive committee will meet, usually via conference call, as needed to resolve issues raised as the Task Force conducts its business or to discuss proposed changes to Task Force bylaws or work plans.

6.4 Task Force

The Task Force shall organize itself into individual committees—one committee to address each priority category approved by the Policy Committee.

The goal of the task force is to be an effective force, broadly representative of the rail transit industry, that will pursue safety, reliability, and efficiency improvements through standards and best practices developed through a consensus process.

Task Force initial objectives:

- Recruit and maintain membership broadly representative of the rail transit industry
- Develop industry standards and recommended practices through a consensus process
- Identify areas of rail transit system design and/or operation where standards or recommended practice have a high potential to lead to safety improvements
- Identify existing standards and standards development activities applicable to the mission of the Task Force
- Develop and maintain industry standards and recommended practices that have a high potential to lead to safety improvements
- Provide guidance to the federal government on rail transit industry safety research needs
- Provide a forum for rail transit industry professionals to share safety experience and best practices
- Over time, have state oversight programs reflect the work done by the task force

The Task Force membership is broadly representative of all the major interests and stake holders in the rail transit industry. APTA specifically sought members from:

- rail transit operators
- rail transit labor organizations
- rail transit vehicle builders
- rail transit major component suppliers
- government organizations with an interest in rail transit
- public interest groups with a stake in the rail transit industry

APTA does not intend to limit Task Force membership. However each, Task Force member is expected to bear the cost of Task Force participation.

The task force is organized into committees based on the priorities set by the technical advisory group and was approved by the Policy Committee.

6.5 Committees

The Rail Transit Standards were divided into four separate committees: Vehicle Inspection and Maintenance, Rail Grade Crossings, Operating Practices, and Fixed Structure Inspection and Maintenance. Each of these committees' documents were placed in their own separate volume of this manual. Due to the volume of documents produced by the Signals & Communications Subcommittee of the Fixed Structure Inspection and Maintenance Committee, a fifth volume of Signals & Communications documents was created.

Task Force Committees developed individual work plans and schedules. Task Force committees divided into sub-committees of subject matter experts to develop the initial drafts of individual standards or recommended practices.

The Committee Chairs, with the assistance of committee staff advisors, were responsible for:

- ensuring that the committee develops a work plan and schedule
- organizing, set the agenda and schedule committee meetings
- appointing sub-committees to address individual work plan items
- chairing and ensuring productive committee meetings
- ensuring accurate minutes of committee meetings are recorded
- identifying resources or research needed to execute the work plan

- ensuring that the committee follows the document development and approval procedures given in the bylaws
- seeking and maintaining broad based industry representation on the committee

APTA provided staff support to assist the chair of each committee with administrative functions such as arranging committee meetings, taking and distributing committee meeting minutes, keeping an accurate committee membership and communication list, and distributing committee work products for review. The staff support also provided technical expertise to help the committee develop and implement its work plan.

Staff support was provided by APTA staff members or by contract support. If staff support was provided by contractors, the contractors were recognized consultants to the rail transit industry. APTA assisted the committee chairs in developing a statement of work for the contract for a committee staff advisor.

Committee members, not the committee staff advisor, were expected to draft the initial versions of each document developed by the committee. Once a workable draft was developed by committee members, the staff advisor provided quality and change control for refinements and revisions to the document.

6.6 Subcommittees

Each committee organized into sub-committees to execute logical portions of the work plan. Sub-committees developed the initial drafts of proposed standards and/or recommended practice for full committee review and approval.

6.7 Rail Transit System document review Point of Contact

The Policy Committee agreed that the key to the correct content and level of detail is a thorough review of each document by each rail transit system. Since not every rail transit system was able to participate on each of the four rail transit standard committees, the Policy Committee agreed APTA should take steps to ensure each rail transit agency has an opportunity to do a thorough review.

APTA formally requested that each rail transit system furnish a single point-of-contact responsible to get timely review of proposed APTA rail transit standards and recommended practices.

7. Policies

During the debates conducted by the technical committees, several controversial issues arose. These issues were not isolated to a single technical committee, they were common to all the committees. As a result, through the APTA Program Manager, the technical committees requested guidance from the Policy Committee on the following issues:

- a) Standard vs. recommended practice

- b) Combined standards and recommended practices
- c) Safety vs. service reliability and/or efficiency
- d) Document level of detail
- e) Compliance with standards and recommended practices
- f) Implementation of standards and recommended practices

The Policy Committee developed a policy for handling each of these issues. These policies are discussed in Sections 7.1-7.6.

7.1 Standards vs. recommended practices

Unnecessary standards can increase costs and severely limit a rail transit system's operating flexibility. However, making truly safety critical actions voluntary leads to lack of credibility and confidence in the rail transit industry.

One of the most significant and persistent challenges to APTA's Rail Transit Standards Program was reaching consensus on the basis for the making the decision on whether a document should become a standard or a recommended practice. APTA's initial guidance given to the many small working groups charged with making this decision was contained in a decision tree (attached) developed for APTA's commuter rail standards program. The decision tree leads to a standard if the document addresses a safety critical subject and to a recommended practice in all other cases.

While this decision tree worked well for the commuter rail program, it has proven to be only partially successful for the rail transit program. For the rail transit program, the decision tree is a valuable tool to make an initial decision. If the decision tree leads to a recommended practice, no problems have resulted. However, if the decision tree leads to a standard, more guidance is required for the small working groups that must justify this decision.

For the purposes of the RTS program, a standard sets mandatory requirements that must be met (however, more than one acceptable way to meet these mandatory requirements often exists). On the other hand, a recommended practice describes an approach that is generally accepted as desirable and successful. A recommended practice could describe one of the acceptable ways to meet a standard.

7.1.1 Characteristics of a standard

Standard: A generally accepted practice, method, or prescribed manner by which something is achieved by authority as a rule, measure of quality, or value.

A standard should be developed when the document:

- Covers a system, component, process or task that is safety critical, or
- Ensures interoperability between parts or equipment, or

- Standardizes a design or process, or
- Addresses an FRA or NISB concern, or
- May become part of a regulation.

7.1.2 Characteristics of a recommended practice

Practice: An established or usual way of doing something and usually based on repeated actions or widely established processes.

A recommended practice should be developed when:

- The document describes only one of several acceptable approaches, or
- The document is tutorial in nature, or
- The document does not meet one of the characteristics for a standard, or
- Consensus could not be reached that the document should be a standard.

7.1.3 Process to select a standard vs. a recommended practice

The RTS program includes documents that contain both requirements and recommendations. To provide consistency and to reduce controversy, APTA developed the following guidance to help make the decision as to whether a document should be developed as a standard or as a recommended practice:

- a) If a document does not address a safety critical subject, that document should be developed as a recommended practice.
- b) If a document is to be developed as a standard, a history of safety problems to support the need for the standard should exist, otherwise document should be a recommended practice.
- c) If the document is to be developed as a standard, a likelihood that the safety benefits resulting from implementation will outweigh the cost of implementation should exist, otherwise the document should be a recommended practice.
- d) If the document contains both requirements and recommendations, but the recommendations predominate, that document should be a recommended practice.
- e) If the document contains both requirements and recommendations, but the requirements predominate, that document should be a standard.
- f) All standards should contain an opt different clause that allows rail transit systems the flexibility to provide equivalent safety through an alternate approach to the standard.

Using this approach, APTA judged (*pick one*)

- a) That the document does not address a safety critical subject, therefore it is a recommended practice.
- b) That the document addresses a safety critical subject, but a history of safety problems supporting the need for a standard does not exist, therefore it is a recommended practice.
- c) That the document addresses a safety critical subject, but the cost of implementation will outweigh the resulting safety benefits, therefore it is a recommended practice.
- d) That the document addresses a safety critical subject, that a safety need exists and the resulting safety benefits could outweigh the cost of implementation therefore it contains mandatory requirements. However, recommendations predominate therefore it is a recommended practice.
- e) That the document addresses a safety critical subject, that a safety need exists and the resulting safety benefits could outweigh the cost of implementation therefore it contains mandatory requirements. The mandatory requirements predominate recommendations, therefore it is a standard.

The word *shall* is used in these documents to indicate mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted unless the rail transit system can demonstrate equivalent safety is achieved through an alternate approach.

The word *should* is used in these documents to indicate that among several options one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not required.

7.2 Combined standards and recommended practices documents

Several documents under development as part of the program contain both standards and recommended practices. The following three ways to handle this situation have been tried:

- a) Titling the document “*Standards and Recommended Practices for*” and clearly indicating in the text of the document which provisions are standards and which are recommended practices.
- b) Splitting the document into two documents. The first titled “*Standards for*” that contains only the provisions that are standards. This document refers to the second document. The second document titled “*Guidelines for Implementing Standards for*” contains the recommended practices.
- c) Titling the document “*Standards for*” but including only the provisions that are standards in the body of the document. The body of the document refers to informative annex(es) that contain the recommended practices.

Examples of each of these three ways to handle this situation were distributed to all the Rail Transit Systems for comments. Method 1 caused considerable confusion. Method 2 led to fears that the need to have documents would be detrimental. Method 3 caused the least reaction. Method 3 is a tradition means that other Standards Development Organization use. In addition, legal precedents clearly treat an informative annex to the standard as not part of the requirements imposed by the standard.

As a result, Method 3 was used to handle documents that contain both standards and recommended practices.

7.3 Safety vs. service reliability and/or efficiency

Safety is the foundation and first priority of the program. However, improvements in service reliability and/or efficiency are important secondary goals. Only documents that clearly address safety improvements were drafted as standards. Documents that strayed from a safety focus into service reliability and/or efficiency improvements are not be standards. They were developed as recommended practices or guidelines.

Definitions of Safety Critical

Safety-critical component or system means a component or system that, if not available, increases the risk of damage to equipment or injury to a passenger, crewmember or other person (*From FRA Notice of Proposed Rulemaking on Passenger Equipment Safety Standards*).

Safety-critical task means a task that, if not performed correctly, increases the risk of damage to equipment or injury to a passenger, crewmember or other person (*From FRA Notice of Proposed Rulemaking on Passenger Equipment Safety Standards*).

Safety Critical – A designation placed on a system, subsystem, element, component, device, or function denoting that satisfactory operation of such is mandatory to assurance of patrons, personnel, equipment or facility safety. Such a designation dictates incorporation of special safety design features (*from APTA 1979 Guidelines for Design of Rapid Transit Facilities*).

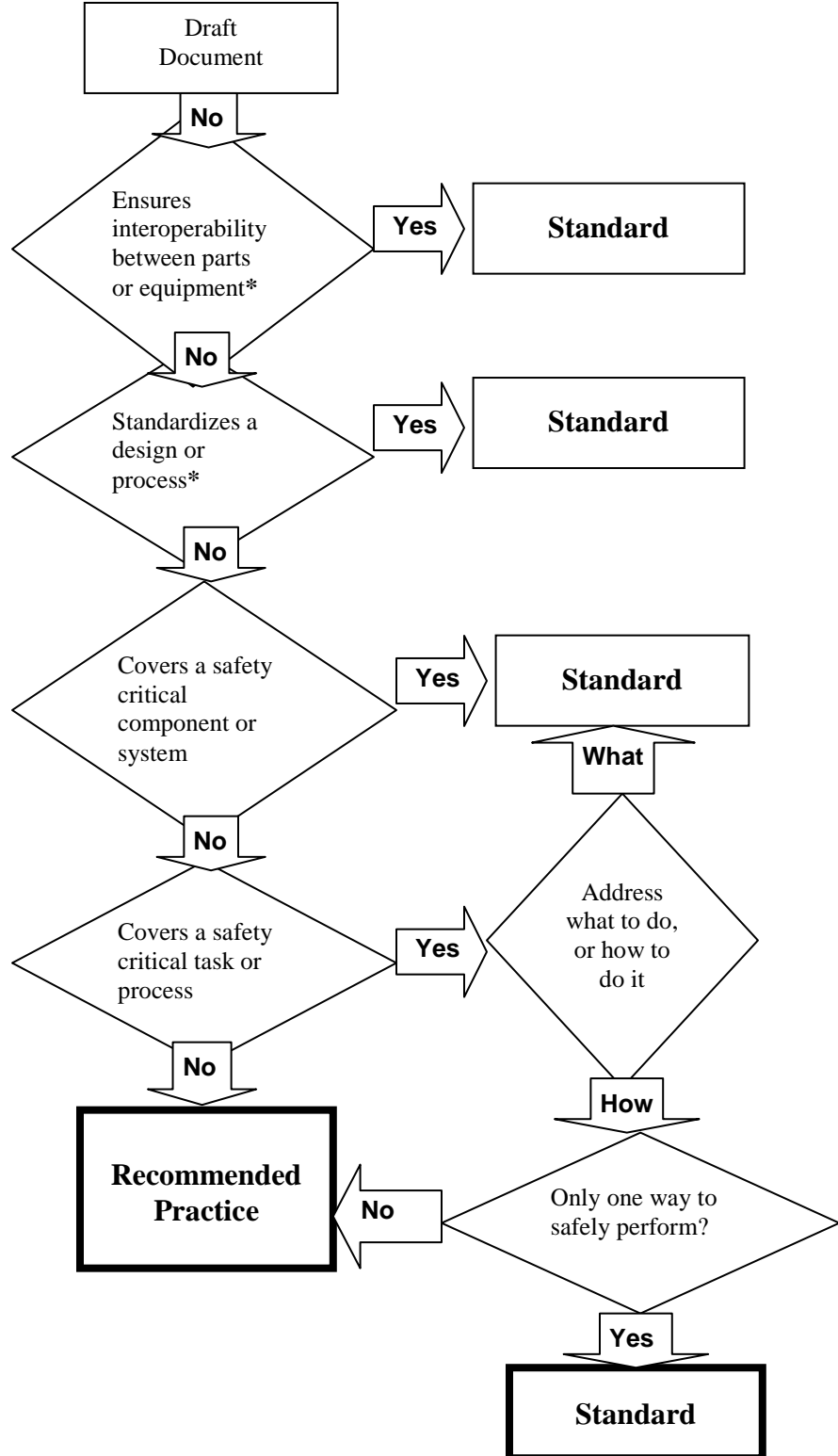
Document classification decision tree

**Rail transit standards decision tree
standard or recommended practice**

Safety critical component or system means a component or system, if not available, increases the risk of damage to equipment or injury to a passenger, crew member or other person.

Safety critical task means a task, if not performed correctly, increases the risk of damage to equipment or injury to a passenger, crewmember or other person.

- Examples of what APTA may consider safety critical:**
- Brakes
 - Brake tests & inspections
 - Suspension systems
 - Emergency communications
 - Emergency exits
 - Wheels
 - Cab signals
 - Emergency lighting
 - Back-up power
 - Daily mechanical inspection (Many, but not all items)
 - Periodic maintenance (Many, but not all items)
 - Safety appliances



7.4 Document level of detail

The text in the documents developed as part of this project provide procedures and tasks for rail transit systems to do, while allowing flexibility as to the precise detail on how these functions should be performed or how frequently. Where it was possible and consensus could be reached, the documents list frequencies for performing the tasks proscribed in a given document. Frequencies are specified in general or broad terms while providing a universally accepted range of time, mileage, or other operating parameters.

This manual contains language that allows rail transit systems the flexibility to adjust frequencies based on original equipment manufacturers requirements, similar intervals implemented for like equipment elsewhere, or operating experience and performance data. The bodies of these documents do not specify *how* prescribed tasks must be done. However, *examples* of how to perform tasks may be included in informative annexes.

7.5 Compliance with standards and recommended practices

APTA does not have, nor does it intend to develop, an enforcement staff. Enforcement of these standards is the responsibility of the individual rail transit systems. APTA's rail safety audit program will include a detailed review of a rail transit system's compliance with the standards. The rail safety audit report will go to the rail transit system's top management.

Recommended Practices are voluntary but strongly advised. If an RTS chooses not to follow a recommended practice, the RTS should ensure that the practice it uses is at least equivalent to the recommended practice.

7.6 Implementation of standards and recommended practices

The Policy Committee approved a two-year phase-in period for the rail transit standards and recommended practices. The phase-in period starts when this manual is first distributed to rail transit systems on October 1, 2004. The phase-in period ends September 30, 2006. At that time, rail transit systems should be in compliance with the standards or their own equivalent alternate practices (see Section 3.2).

8. How to use this manual

8.1 Organization

This manual is organized into six volumes:

Volume 1-Rail Transit Standards Background and Process Description

Volume 2-Vehicle Inspection and Maintenance

Volume 3-Grade Crossings

Volume 4-Operating Practices

Volume 5-Fixed Structure Inspection and Maintenance

Volume 6-Signals and Communications Inspection and Maintenance

8.2 Document numbering nomenclature

The documents in this manual use the following document numbering nomenclature:

Examples:

APTA RT-S-SC-004-02
APTA RT-RP-VIM-002-01

“APTA” stands for the American Public Transportation Association and indicates that the document was developed through APTA.

APTA RT-S-SC-004-02

“RT” stands for “rail transit” and designates the rail transit standards and recommended practices from the Passenger Rail Equipment Safety Standards (PRESS) which are numbered as APTA SS-__-____-__

APTA RT-S-SC-004-02

After the “RT” is either an “S” for “standard” or an “RP” for “recommended practice.”

APTA RT-S-SC-004-02
APTA RT-RP-VIM-002-01

The document number then designates the volume of the document using the following acronyms:

VIM = Vehicle (Inspection and Maintenance)
RGC = (Rail) Grade Crossings
OP = Operating Practices
FS = Fixed Structures
SC = Signals and Communications

APTA RT-S-SC-004-02
APTA RT-RP-VIM-002-01

Within each volume, each document is assigned a three-digit number that follows the volume designation in the document number.

APTA RT-S-SC-004-02
APTA RT-RP-VIM-002-01

Following the three digit document number is a two-digit number indicating the year that the Task Force approved the document.

APTA RT-S-SC-004-02
APTA RT-RP-VIM-002-01

8.3 Document format

The Manual of Standards and Recommended Practices for Rail Transit Systems uses a format closely based on the Institute of Electrical and Electronics Engineers (IEEE) Standards Style Guide. APTA received permission from the Institute of Electrical and Electronic Engineers (IEEE) to use the IEEE format for its standards and recommended practices.

8.4 Use of informative annexes

The IEEE developed the Informative Annex to allow discussion of details about how to meet a standard without creating additional liability if those details are not followed. APTA standards and recommended practices also utilize informative annexes in order to include useful examples of how to meet standards or recommended practices. Courts do not recognize the informative annex as part of the standard making the informative annex an ideal tool to provide “how to” examples without creating the potential for increased liability that could occur if these examples appeared in the body of the text.

8.5 Requests for revisions

Requests for revisions of APTA standards and recommended practices are welcomed from any interested party. Suggestions for changes to documents should be submitted in the form of a proposed change to the text along with the appropriate supporting documentation/rationale for the change.

Occasionally, questions may arise concerning the meaning of portions of these standards as they are specifically applied. APTA will resolve such issues through the PRESS Task Force Executive Committee.

Comments on standards, questions on interpretation or requests for changes should be addressed to:

Director-Operations & Technical Services
American Public Transportation Association
PRESS Staff Advisor
1666 K Street, NW
Washington, D.C. 20006
202-496-4805

8.6 Changes to a standard or recommended practice

One of the attractive features of an industry consensus standards process over Federal rulemaking is that making changes in the standards to accommodate the constantly changing railroad environment can be made much more quickly and easily. Thus industry standards are much easier to keep current than federal regulations.

The rail transit systems want the rail transit standards process to take advantage of this flexibility. Any concerned party may propose a change to an approved standard or recommended practice. The concerned party proposes specific changes by marking up the approved version of the text of the standard or recommended practice with strike-outs to indicate text to be eliminated and redlines or italics to indicate text to be added. A copy of the proposed changes and supporting rationale are submitted to the APTA RTS Task Force staff advisor.

Once the proposed changes have been submitted to the staff advisor, an identical process to the process used to approve a new standard or recommended practice is followed.

Once the proposed changes have been submitted to the staff advisor, an identical process to the process used to approve a new standard or recommended practice is followed.

Any Task Force member or user of previously approved documents may request a change or correction to a previously approved document. The exact wording of the proposed change or correction and a clear statement of the reasons for proposed change or correction should be sent to:

American Public Transportation Association
Program Manager, Rail Transit Standards
1666 K Street, N.W.
Washington, DC, 20006-1215

The program manager will convene a meeting of the Task Force Executive committee to consider the request for change or correction. If the Executive Committee determines that the change corrects an obvious error, the executive committee may simply instruct the program manager to make the correction and reissue a corrected document.

If the Executive Committee determines that the proposed change has merit, but could change the intent or application of the document, the Executive Committee shall refer the proposed change to the Task Force Committee that developed the document for consideration. The Committee may act on the change in any manner from denying the proposed change to proposing a revised document to the full Task Force for a re-vote.

If the Executive Committee determines that the proposed change has no merit, the Executive Committee may deny the change and instruct the program manager to inform the party that submitted the change that the proposed change has been rejected.

Annex A

(Informative)

Rail Transit Standards bylaws

The Press Task Force first adopted a set of bylaws to govern the conduct of Task Force business in December, 1996. The bylaws can be amended with the approval of 75% of the voting members of the Task Force. On several occasions, the Task Force did approve amendments to the bylaws.

Appendix A of this manual contains the bylaws governing the operation of the PRESS Task Force. Amendments to the bylaws are documented through the use of strike-outs to text that has been eliminated and bold italics to indicate text that has been added. The date the Task Force approved each amendment is included in parentheses after the revised text.

A.1 Preamble

APTA intends to facilitate the process for the rail transit industry to develop standards and recommended practices through a broad-based consensus process. Membership in APTA will not be required for an organization to participate in the development process for rail transit standards and recommended practices. APTA intends that the initial focus of the effort will be on safety. However, safety will not be the sole factor used to determine the need for a standard or recommended practice.

Where possible, APTA intends to use Professional Engineering Societies with American Nation Standards Institute (ANSI) certification such as the Institute of Electrical and Electronic Engineers (IEEE) and American Society of Mechanical Engineers (ASME). If using a professional engineering society to develop a standard is not possible, APTA will use a process that encourages broad industry participation. That process is described in these bylaws.

When APTA must develop a standard or recommended practice outside the ANSI process, APTA will make the process as open as possible. APTA will post draft documents on the FTA and APTA websites for a 30-day period for public comment. The committees drafting the documents will attempt to respond to and to resolve all reasonable public comments prior to bringing the documents to a final approval vote.

A.2 Task force name

The Task Force shall be known as the Rail Transit Standards Task Force. In carrying out its mission, the Task Force shall promote its activities as those of the American Public Transportation Association Rail Transit Standards Task Force.

A.3 Vision

To be an effective force, broadly representative of the rail transit industry, which will pursue safety, reliability and efficiency improvements through standards and best practices developed through a consensus process.

A.4 Mission

To develop and maintain standards and recommended practices for rail transit system design and operation. To accomplish this mission, the Task Force membership shall be broadly representative of the rail transit industry specifically including rail transit system operators, the Federal Transit Administration, the Federal Railroad Administration, the National transportation Safety Board, state oversight agencies, manufacturers, engineering and consulting firms, rail transit labor organizations and others with an interest in the rail transit industry.

A.5 Objectives

The Task Force shall have the following initial objectives

- Recruit and maintain membership broadly representative of the rail transit industry
- Develop industry standards and recommended practices through a consensus process
- Identify areas of rail transit system design and/or operation where standards or recommended practice have a high potential to lead to safety improvements
- Identify existing standards and standards development activities applicable to the mission of the Task Force
- Develop and maintain industry standards and recommended practices that have a high potential to lead to safety improvements
- Provide guidance to the federal government on rail transit industry safety research needs
- Provide a forum for rail transit industry professionals to share safety experience and best practices;
- Over time, have state oversight programs reflect the work done by the task force

A.6 Funding

The development and maintenance of rail transit system standards and recommended practices will be funded through a combination of special annual assessments to rail transit systems approved by the APTA Executive Committee, possible federal grants and other sources as may be approved by the APTA Executive Committee.

APTA shall develop an annual budget for the Rail Transit Standards Task Force. The Policy Committee shall approve the budget.

A.7 Approach

Rail transit system standards and recommended practices shall be developed through an industry consensus process by a task force that is broadly representative of all the major rail transit industry interest groups and stake holders. Figure 6.1 is an organizational diagram depicting the relationships to be established to develop, to approve and to implement rail transit standards and recommended practices

The broad policies to be followed by the task force shall be set by the Policy Committee. APTA shall ensure that the policies set by the Policy Committee are followed. The task force shall organize itself into committees based on the priorities set by the technical guidance group and approved by the Policy Committee. Task Force committees shall develop individual work plans and schedules. Task Force committees shall divide into sub-committees of subject matter experts to develop initial drafts of individual standards or recommended practices. The procedures set out in these bylaws shall be followed to develop, approve and implement individual documents.

A.8 Policy Committee

Policy Committee membership consists of the general managers (or designee) of each operating or planned rail transit system that has paid the special APTA assessment, commercial organizations that provide financial support equal to that of an operational rail transit system and a representative of the Federal Transit Administration.

The Policy Committee shall perform the following functions: set the broad Policy to be followed by the Task Force:

- approve the bylaws
- approve the Task Force annual budget
- approve major changes to the budget (if required)
- approve Task Force priorities
- appoint the Task Force Chair and Vice-Chair
- appoint a Policy Committee representative to the Task Force
- authorize implementation of documents approved by the Task Force

Policy Committee Voting

Each rail transit system (either operational or in the planning stage) that has paid the current annual APTA rail transit standards assessment shall have one vote on the Policy Committee. The Federal Transit Administration shall have one vote on the Policy Committee. Commercial organizations that provide financial support to the effort at the same level as operational rail transit systems shall have one vote on the Policy Committee. Membership of commercial organizations shall not comprise more than 40% of the total membership of the Policy Committee.

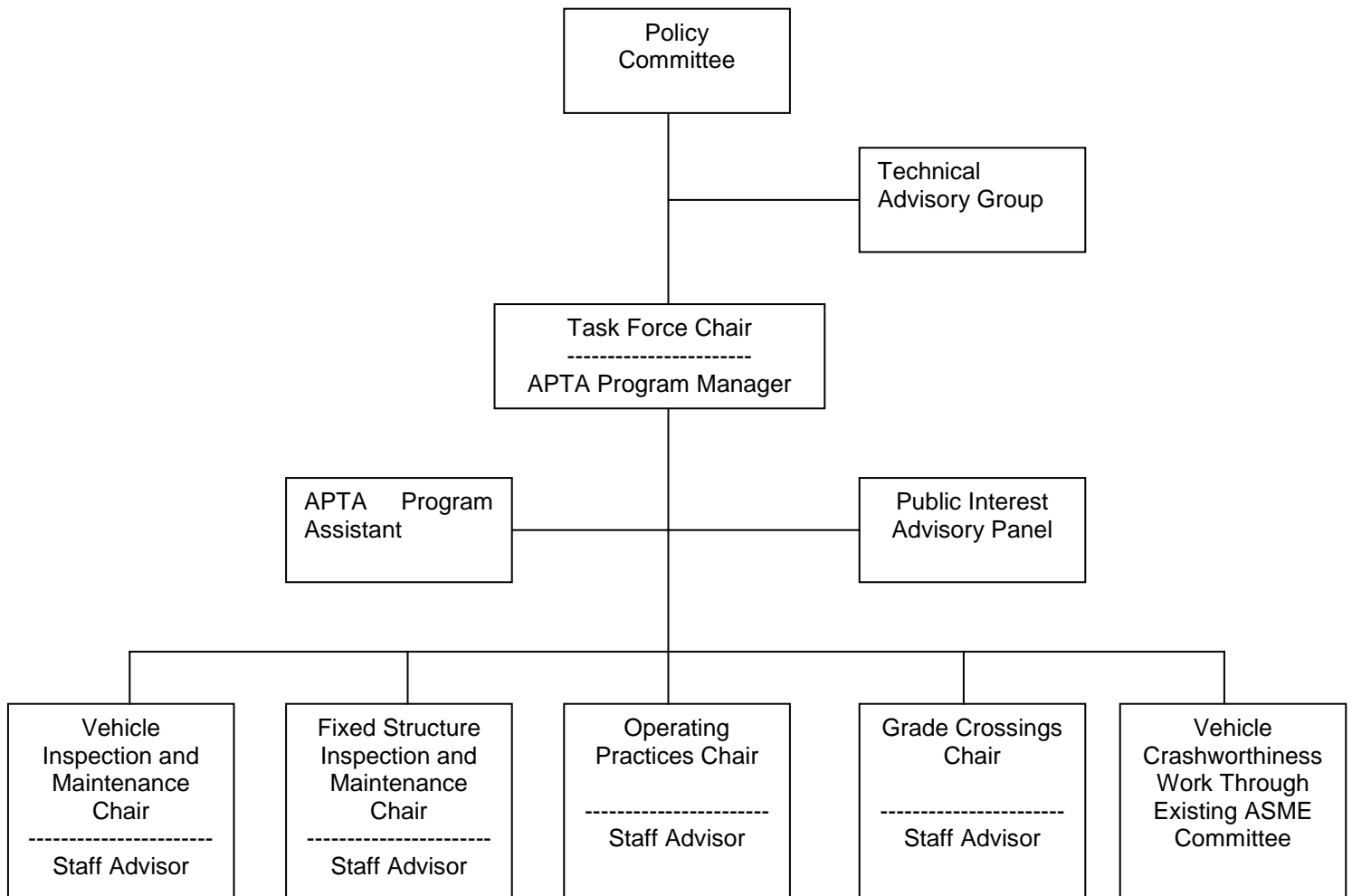
Formal Policy committee votes may take place via face-to-face meeting, conference call, mailed ballot or a combination of these methods. For a vote to be valid, APTA must receive ballots from at least 75% of the voting members of the Policy Committee. An abstaining ballot received by APTA counts towards this 75% quorum requirement.

For the Policy Committee to approve an issue or document brought up for a vote, 2/3 of the non-abstaining ballots received by APTA must be in the affirmative.

A.9 Technical Guidance Group

Membership of the Technical Advisory Group shall consist of senior experts from rail transit systems and other industry stakeholders. The Technical Advisory Group shall respond to requests from the Policy Committee for recommendations on task force policy and priorities.

Rail Transit Standards Organization



A.10 Task Force officers

The Task Force Officers shall consist of a Task Force Chair and Vice-Chair and the Chairs of each of the Task Force Committees formed to address the established Task Force priorities.

The Task Force Chair and Vice-Chair shall be appointed by the Policy committee. The Chairs of the Task Force committees shall be appointed by the Task Force Chair. Task Force Officers serve for a term of two years and may be reappointed to additional terms.

The Task Force Chair shall, with the assistance of the APTA staff:

- appoint Task Force Committee Chairs
- organize, set the agenda and schedule Task Force meetings
- chair and ensure productive Task Force meetings
- ensure that accurate minutes of Task Force meetings are recorded
- provide guidance to the APTA program manager
- resolve issues raised during the Task Force work process
- work with the Policy committee representative to report progress

The Task Force Vice-Chair shall, with the assistance of the APTA staff:

- ensure the Task Force follows Policy committee policy
- ensure the Task Force adheres to the bylaws
- ensure that each committee has a viable work plan and schedule
- in the Chair's absence, assume the responsibilities of the chair

The Task Force Committee Chairs shall, with the assistance of committee staff advisors:

- ensure that the committee develops a work plan and schedule
- organize, set the agenda and schedule committee meetings
- appoint sub-committees to address individual work plan items
- chair and ensure productive committee meetings
- ensure accurate minutes of committee meetings are recorded
- identify resources or research needed to execute the work plan

- ensure that the committee follows the document development and approval procedures given in the bylaws
- seek and maintain broad based industry representation on the committee

A.11 APTA Program Manager

APTA shall appoint a program manager to provide leadership for APTA staff and contractor support to the Task Force. The program manager shall:

- work closely with Task Force officers to determine resource needs
- develop statements of work for Task Force contract support
- coordinate APTA staff support for the Task Force
- present research needs identified by the Task Force to the federal government
- develop annual Task Force budgets and business plans
- exercise quality control over Task Force work products
- assist the Task Force Chair conduct Task Force meetings
- schedule and organize Task Force Executive Committee to address issues that arise
- ensure adequate communication with Task Force members on Task Force business
- coordinate the efforts of the Task Force with other, related, standards development efforts
- ensure broad representation of the industry on the Task Force
- ensure that the Task Force follows the procedures set forth in the bylaws
- ensure accurate and timely publication and distribution of documents approved by the Task Force and authorized by the Policy Committee

A.12 Task Force organization

The Task Force shall organize itself into individual committees—one committee to address each priority category approved by the Policy Committee. Some committees may organize themselves to produce standards and recommended practices independently. Other committees may organize themselves to provide greater emphasis, industry representation and resources to existing standards development being conducted by other standards development organizations. (For example, the American Society of Mechanical Engineers (ASME) effort to develop structural standards for light rail vehicles.)

Each committee shall develop a work plan and schedule. Each committee may organize into sub-committees to execute logical portions of the work plan. Sub-committees shall develop initial drafts of proposed standards and/or recommended practice for full committee review and approval.

A.13 Committee staff support

APTA shall provide staff support to assist the Chair of each committee with administrative functions such as arranging committee meetings, taking and distributing committee meeting minutes, keeping an accurate committee membership and communication list, and distributing committee work products for review. The staff support shall also provide technical expertise to help the committee develop and implement its work plan.

Staff support may be provided by APTA staff members or by contract support. If staff support is provided by contractors, the contractors shall be recognized consultants to the rail transit industry. APTA will assist the Committee Chair develop a statement of work for the contract for a committee staff advisor.

Committee members, not the committee staff advisor, will be expected to draft the initial versions of each document developed by the committee. Once a workable draft has been developed by committee members, the staff advisor will provide quality and change control for refinements and revisions to the document.

A.14 Task Force Executive Committee

The Task Force Executive Committee shall consist of the Task Force officers, the APTA program manager and the staff advisor to each committee. The executive committee will meet, usually via conference call, as needed to resolve issues raised as the Task Force conducts its business or to discuss proposed changes to Task Force bylaws or work plans.

A.15 Task Force membership

The Task Force shall seek membership that is broadly representative of all the major interests and stake holders in the rail transit industry. APTA will specifically seek members from:

- rail transit operators
- rail transit labor organizations
- rail transit vehicle builders
- rail transit major component suppliers
- government organizations with an interest in rail transit
- public interest groups with a stake in the rail transit industry

APTA does not intend to limit Task Force membership. However each, Task Force member is expected to bear the cost of Task Force participation.

A.16 Meetings

The Task Force shall schedule Task Force meetings as necessary to conduct Task Force business. Initially APTA expects Task Force meetings to be held quarterly. APTA will attempt to hold the meetings at various locations throughout the country in an attempt to spread the travel burden as fairly as possible. APTA will also attempt to get Task Force members with adequate meeting facilities to host meetings. This will help reduce meeting costs and give the host an opportunity to expose Task Force members to the host's operations or products.

The committee chairs shall schedule committee meetings as necessary to execute the committees work plans. Again, every attempt will be made to fairly spread the travel burden. To minimize travel costs, APTA expects to schedule two-day quarterly Task Force meetings with the first day being individual committee meetings and the second day being a full Task Force meeting. APTA expects that committees will also meet at least once between each quarterly meeting.

A.17 Communication on Task Force business

To minimize cost and maximize productivity, APTA will attempt to take advantage of electronic forms of communication of Task Force business with Task Force members. Task Force members will be strongly encouraged to have an e-mail service capable of receiving large documents as an attachment to an e-mail message. APTA will also encourage Task Force members to develop Task Force work products using Microsoft Office 97 and to have the ability to down load and print lengthy Microsoft Word documents.

A.18 Policy on standards vs. recommended practices

The decision to develop a document as a standard or a recommended practice can be quite controversial. Unnecessary standards can increase costs and severely limit a rail transit system's operating flexibility. However, making truly safety critical actions voluntary leads to lack of credibility and confidence in the rail transit industry. Due to importance and potential impact of these decisions, the Task Force shall make a recommendation to the Policy committee as to whether each document will be implemented as a standard or as a recommended practice. The Policy committee shall use the voting procedures defined in bylaws section 7.0

A clear set of guidelines is required to help Task Force committees make this important recommendation and to help the Policy Committee make the final decision on how to implement each document developed by the Task Force. APTA proposes that each committee use the decision tree included as Figure 17.1 to make this recommendation.

When a committee decides to recommend that a document as a standard, the committee needs to take care to write the document so what needs to be done is clearly specified. To the maximum extent possible, flexibility on how to do it is to be left with the individual rail transit systems.

A.19 Document development and approval process

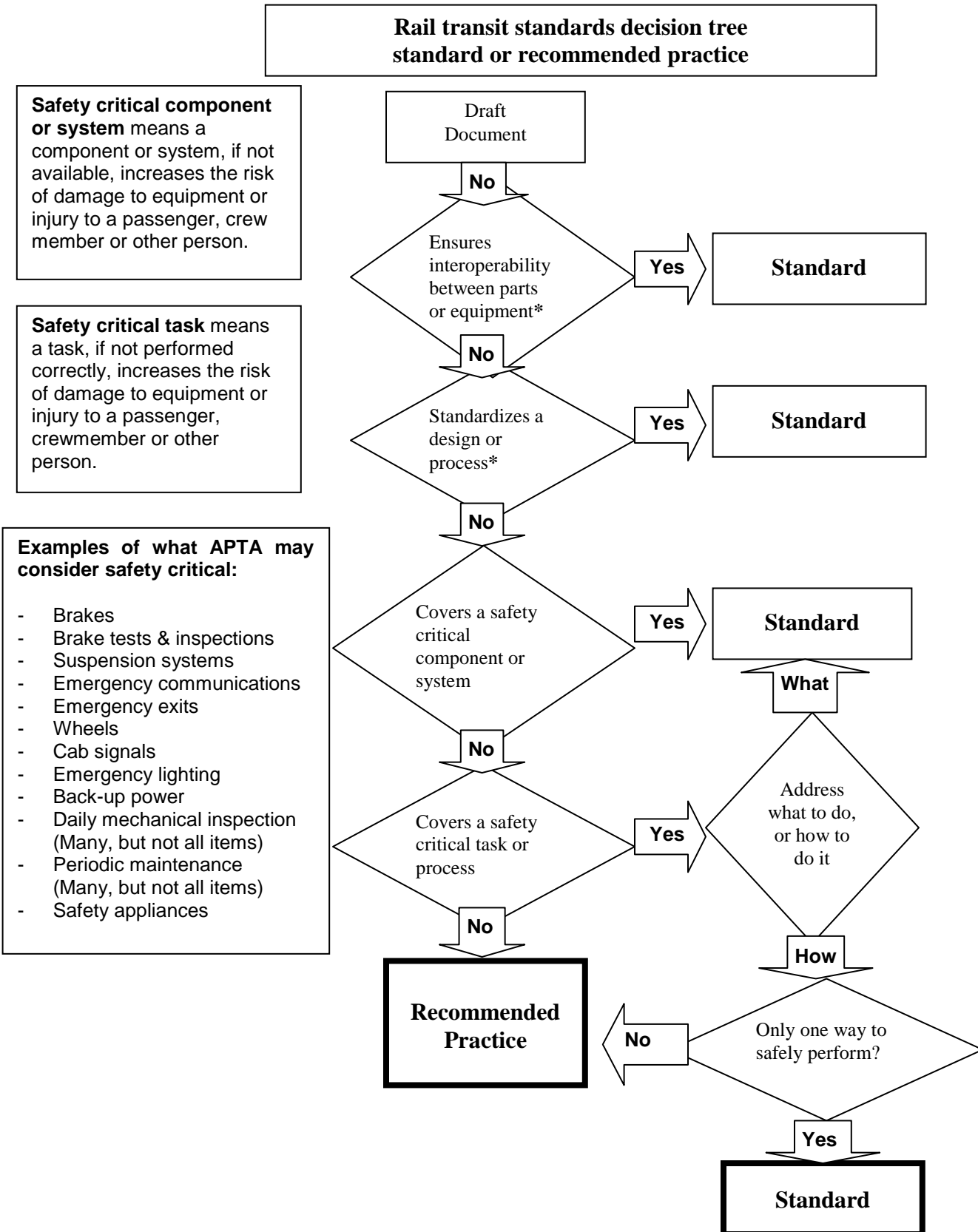
The initial working draft of a document shall be developed by the committee or a sub-committee appointed by a Task Force Committee Chair. After the sub-committee agrees that the document is ready for committee review, the committee staff advisor shall distribute (electronic distribution is strongly preferred) the working draft to all Committee members and allow them a reasonable time to respond with written comments.

After responding to the comments made by committee members, the committee will vote to submit the document to the Task Force membership for comments. A simple majority of the committee is required to approve the document for comments by the entire Task Force.

After the committee approves the document, the committee staff advisor will transmit an electronic version of the document to the APTA program manager for distribution to the Task Force membership. The APTA program manager shall transmit the document to the entire Task Force membership (electronic transmission is strongly preferred) allowing 30 working days for Task Force members to comment on the document.

Task Force members should submit their comments in writing. Exact wording desired should be supplied as well as the reasons for the requested change.

Document classification decision tree



Within 5 working days of the close of the comment period, the APTA program manager shall transmit all the written comments to the committee staff advisor. The committee staff advisor shall schedule a committee meeting to resolve all the written comments received. The committee shall make decisions on how to change the document. The committee must respond to every comment and shall keep a written summary of how each comment is resolved.

The committee staff advisor shall transmit the revised document and the comment response summary to the APTA program manager. The APTA program manager shall transmit the revised document and the response summary to all Task Force members a minimum of 20 working days prior to a vote on the document.

A spokesman for the committee will present the document to the Task Force voting members for approval. Dissenting presentations are allowed, but only by Task Force members who previously submitted written comments.

Debate prior to the vote will be limited to issues raised in written comments received by the committee. New issues will not be allowed to enter the debate. Every attempt will be made to limit on-the-spot revisions to the document during the debate process. The voting members should have the document that they are being asked to approve in front of them.

A.20 Document format

All documents developed by the Task Force shall follow the formatting guidance given in the 1996 version of the IEEE style guide.

A.21 Task Force voting

Public interest groups with stake in the rail transit industry are invited and strongly encouraged to participate in the document development and review process at the technical level, but they will not be voting members of the Task Force.

If they so desire, each government agency with an interest in the rail transit industry may vote at the Task Force level.

Each operating or planned rail transit system that paid the special assessment is entitled to one vote at the Task Force level.

Each national rail transit labor organization participating on the Task Force is entitled to one vote.

Each corporate entity that is either a member of the Policy Committee or contributes \$1000 to help defray the cost of developing the standards shall be entitled to one vote at the Task Force level. Corporate entities shall not comprise more than 40% of the voting members of the Task Force. Corporate entities need not be a member of APTA to vote or to participate. Corporate entities that elect not to contribute to defray cost are invited and strongly encouraged to participate in the document development and review process, but they will not be voting members of the Task Force. Separate companies under the same corporate umbrella shall be considered single corporate entities for the purpose of Task Force voting.

If an organization is not represented at two consecutive Task Force meetings, that organization shall lose its vote until that organization participates in two consecutive meetings. APTA will compile and keep current an accurate list of voting member organizations. Each voting organization will designate a single individual to vote for the organization.

A quorum of sixty (60%) of the total Task Force voting members must be present for a valid vote to take place.

While the Task Force will strive for unanimity (meaning documents that all voting members can support), as a practical matter unanimity is extremely difficult to achieve among a large group of industry stake holders with diverse and at times even conflicting interests. As a result, the Task Force bylaws require a super majority of 75% of the voting members that cast ballots (do not abstain) to vote in the affirmative for the Task Force to approve a standard or recommended practice.

A.22 Document implementation

The Task Force Committee that develops a document shall make a recommendation for how that document should be implemented. Many standards and recommended practices require a phase-in period for implementation. The Policy Committee shall have the final approval regarding how and when all documents approved by the Task Force are implemented.

A.23 Changes or corrections to previously approved documents

Any Task Force member or user of previously approved documents may request a change or correction to a previously approved document. The exact wording of the proposed change or correction and a clear statement of the reasons for proposed change or correction should be sent to:

American Public Transportation Association
Program Manager, Rail Transit Standards
1666 K Street, N.W.
Washington, DC, 20006-1215

The program manager will convene a meeting of the Task Force Executive committee to consider the request for change or correction. If the Executive Committee determines that the change corrects an obvious error, the executive committee may simply instruct the program manager to make the correction and reissue a corrected document.

If the Executive Committee determines that the proposed change has merit, but could change the intent or application of the document, the Executive Committee shall refer the proposed change to the Task Force Committee that developed the document for consideration. The Committee may act on the change in any manner from denying the proposed change to proposing a revised document to the full Task Force for a re-vote.

If the Executive Committee determines that the proposed change has no merit, the Executive Committee may deny the change and instruct the Program Manager to inform the party that submitted the change that the proposed change has been rejected.

A.24 Changes to the Task Force bylaws

Any Task Force member may propose changes to the Task Force bylaws. The exact wording of the proposed change and a clear statement of the reasons for proposed change should be sent to:

American Public Transportation Association
Program Manager, Rail Transit Standards
1666 K Street, N.W.
Washington, DC, 20006-1215

If the proposed change is received sixty days prior to the next scheduled Task Force meeting, APTA will distribute the proposed change and justification to all Task Force members for their review in preparation for debate and vote at the next Task Force meeting. If the change is received less than 60 days prior to the next scheduled Task Force meeting, APTA will delay action on the proposed change until the meeting after the next scheduled meeting.

A proposed change shall be adopted by an affirmative vote of 75% of the voting members present and casting ballots (not abstaining).

A.25 Anti-trust policy

Federal antitrust laws prohibit contracts, combinations and conspiracies in restraint of trade. Sanctions for violating the antitrust laws include civil damages (including treble damages) and criminal fines and imprisonment. The Policy of the American Public Transportation Association and the Rail Transit Standards Task Force is to strictly adhere to the antitrust laws.

In accordance with the above, the Task Force will develop objective rail transit standards and recommended practices for the legitimate non-competitive purpose of promoting and supporting safe and efficient passenger rail service.

A.26 Conflicts with APTA bylaws or federal or D.C. law

In the case of a conflict between these bylaws and the APTA bylaws or between these bylaws and the Federal or District of Columbia law, the APTA bylaws or the Federal or District of Columbia law shall prevail.

Annex B

(Informative)

B.1 Document development, review, and approval process

Each APTA rail transit standards document went through four levels of development, review, and approval prior to publishing:

1. Subcommittee level
2. Committee level
3. POC/Task Force level
4. Policy Committee level

On the subcommittee level, the development, review, and approval process was flexible and varied greatly between individual subcommittees. No formal comment-response forms or ballots were used on the subcommittee level. Once a document moved to the committee level, the process became more formalized, using comment-response forms and voting ballots.

Although the bylaws require only a majority vote¹ to approve a document from one level to the next, APTA made every effort, and in most cases succeeded, to come to a full group consensus before passing a document on to the next level. On the Policy Committee level, the last stage before full approval, a 100% unanimous vote was used rather than the 75% majority vote required by the bylaws.

For a quick sheet of the individual steps within the document development, review and approval process, see Figure 1. Detailed descriptions of the steps within each level are provided in Sections B.1.1 to B.1.4.

¹ Simple majority for Levels 1-3 and 75% majority for Level 4.

Figure 1 – Rail Transit Standards document development process quick sheet

STEP	ACTION	RESPONSIBILITY
SUBCOMMITTEE LEVEL		
1	First draft submitted	Author(s)
2	Document development & review	Subcommittee members including author(s)
3	Document revision	Author(s), subcommittee chair, APTA staff advisor, or APTA standards editor
4	Subcommittee approval	Subcommittee members
COMMITTEE LEVEL		
5	Subcommittee-approved draft submitted	APTA staff advisor
6	Committee review & comment period	Committee members
7	Committee comments forwarded to subcommittee	APTA program assistant or APTA staff advisor
8	Comment response & document revision	Subcommittee members and/or author(s)
9	Revised document & completed comment-response form submitted	Author(s), subcommittee chair, APTA staff advisor, APTA program assistant, and/or APTA standards editor
10	Committee approval	Committee members
POC/TASK FORCE LEVEL		
11	Committee-approved draft submitted via APTA website posting	APTA staff advisor
12	Committee-approved draft submitted via email	APTA program assistant
13	POC review & comment period	Task Force members, RTS point-of-contact representative, and the general public
14	POC comments forwarded to subcommittee	APTA program assistant or APTA staff advisor
15	Comment response & document revision	Subcommittee members and/or author(s)
16	Revised document & completed comment-response form submitted	Author(s), subcommittee chair, APTA staff advisor, APTA program assistant, and/or APTA standards editor
17	Task Force approval	Task Force members
POLICY COMMITTEE LEVEL		
18	Task Force-approved draft presented	APTA manager and program assistant
19	Policy Committee approval	Policy Committee members

B.1.1 Subcommittee level

- a) **First draft submitted** - One or a small group of subcommittee members write and present a first draft of a document to the rest of the subcommittee at a meeting or via email or fax.
- b) **Development & review** - The full subcommittee (including the author/s) reviews, develops, and comments on the draft at a committee/subcommittee meeting, by teleconference, or via email.
- c) **Revision** - The author(s), subcommittee chair, staff advisor, or APTA standards editor incorporates subcommittee feedback into a new, revised draft of the document.
- d) Repeat steps b) and c) as necessary.

- e) **Approval** - With the vote of a simple majority (at a committee/subcommittee meeting or via email), the subcommittee members agree to pass the document on to the committee.

B.1.2 Committee level

- a) **Draft submitted** - The APTA staff advisor submits the subcommittee-approved document to full committee for review via email and by posting the document on the Internet (WebWorks).
- b) **Review & comment period** - Committee members have 30 days from when the document is posted/transmitted to comment on the document. Comments are submitted in a standard comment-response form via WebWorks posting, email, fax, or mail (as the committee prefers). For a sample of a comment-response form, see Figure 2.
- c) **Revision** - The author(s) and/or subcommittee members resolve all committee member comments and complete the comment-response matrix at a committee/subcommittee meeting, by teleconference, or via email. Decisions to accept or decline comments are recorded in the comment-response matrix. Accepted comments are incorporated into a new draft of the document.
- d) **Revision submitted** - The author(s), subcommittee chair, staff advisor, or APTA standards editor submits the new, revised draft of the document and the completed comment-response matrix to the committee.
- e) **Approval** - The full committee votes on the document via WebWorks, e-mail, or at a committee meeting. With the vote of a simple majority, the document is approved to move on to the POC/Task Force level.
- f) If the document receives any “accept with minor revision” votes (see Figure 3), repeat steps c) and d) before submitting to the POC/Task Force.
- g) If the document receives any rejections due to a major concern (see Figure 3), repeat steps c) through e) (including a re-vote) before submitting to the POC/Task Force.
- h) If the document receives any rejections in concept or principle (see Figure 3), ATPA staff advisors negotiate directly with the voting member (with subcommittee involvement as necessary). If major changes are made as a result of this negotiation, repeat steps c) through e) (including a re-vote) before submitting to the POC/Task Force.

Figure 2 – Comment-response form

APTA RT-X-XX-XXX-XX (Document Title) Comment-Response form Name: _____					
Rec'd	Reviewer	Page #	Section #	Comment	Resolution (for Subcommittee use only)
Rec'd Codes: CM-R: Comment received during committee review period CM-V: Comment received during committee voting period TF-R: Comment received during task force review period TF-V: Comment received during task force voting period					

Figure 3 – Committee ballot

	<h3>Rail Transit Standards Development Committee Voting Ballot</h3>
<p>This ballot is to be used only by Rail Transit Standards _____ Committee voting members for a formal vote on all standards or recommended practices brought before the _____ Committee.</p>	
<p>Please return your completed ballot to: American Public Transportation Association Rail Transit Standards –Fixed Structures and Maintenance Committee 1666 K Street, N.W. Washington, D.C. 20006-1215</p>	
<p>Or by posting on the Rail Transit Standards _____ Committee Website: https://webworks.bah.com</p>	
<p>APTA recommends that the referenced document be voted on as:</p>	
<p><input type="checkbox"/> A Mandatory Standard (the document contains safety critical provisions)</p> <p><input type="checkbox"/> A Recommended Practice (the document provides guidance on good practice for non-safety critical tasks or design criteria)</p>	
<p>Title of Document: _____</p>	
_____ Approval of Author	_____ Committee Chair
_____ Approval of Committee APTA Staff Advisor	_____ APTA Staff
<p>Name and Organization of Voting Member: _____</p>	
<p>Please indicate how you vote on this document.</p>	
<p><input type="checkbox"/> I accept the document as written.</p> <p><input type="checkbox"/> I can accept the document with attached revisions of a minor or editorial nature. <i>(Attach recommended revisions)</i></p> <p><input type="checkbox"/> I reject document due to a major concern, but I could accept it if my concern is addressed. <i>(Attach description of concern and how you recommend that it be addressed.)</i></p> <p><input type="checkbox"/> I reject the document in concept or on principle.</p> <p><input type="checkbox"/> I abstain. I chose not to review this document. <i>(Attach description of why you abstained)</i></p>	
_____ Signature of <i>(if submitting hard copy)</i>	_____ Date
<p><i>Additional comments (if needed):</i></p>	

B.1.3 POC/Task Force level

- a) **Draft submitted** - The APTA staff advisor posts the committee-approved document for POC² to review on APTA website. APTA program assistant emails the committee-approved document to Task Force members for POC review.
- b) **Review & comment period** - POC members have 30 days from when the document is posted on the APTA website to comment on the document. Comments are submitted in a standard comment form (“comment-response matrix”) to APTA³ via email, fax, or mail.
- c) **Comments forwarded** - APTA forwards the POC comments to the committee/subcommittee/author via WebWorks posting or to the committee’s staff advisor via email (depending on the committee’s preference).
- d) **Revision** – The author(s) and/or subcommittee members have ten days to resolve all POC comments and complete the comment-response matrix at a committee/subcommittee meeting, by teleconference, or via email. Decisions to accept or decline comments are recorded in the comment-response matrix. Accepted comments are incorporated into a new draft of the document.
- e) **Revision submitted** - The author(s), subcommittee chair, or staff advisor posts the new, revised draft of the document and the completed comment-response matrix on WebWorks for the POC review. APTA posts the revised draft and completed comment-response matrix on the APTA website for POC review.
- f) **Ballots submitted** - APTA sends a Task Force ballot along with the revised draft and completed comment-response matrix to Task Force members via email, mail, or fax at least 20 days before the ballots are due.
- g) **Approval** - Task Force members vote on the document at a Task Force meeting or by transmitting an absentee ballot to APTA via fax, email or mail at least 10 days before the Task Force meeting. 60% of the Task Force must vote to make a quorum. With a 75% majority vote, the POC-reviewed document is approved to move on to the policy committee level.
- h) If the document receives any “accept with minor revision” votes (see Figure 4), repeat steps c) through e) before presenting the document to the policy committee.
- i) If the document receives any rejections due to a major concern (see Figure 4), repeat steps c) through g) (including a re-vote) before presenting the document to the policy committee.


² POC or “point-of-contact” includes Task Force members, the RTS point-of-contact representative, and the general public.

³ Dave Phelps and Tonie Hankins at <railstandards@apta.com>.

j) If the document receives any rejections in concept or principle (see Figure 4), ATPA staff advisors negotiate directly with the voting entity (with subcommittee involvement as necessary). If major changes are made to the document as a result of this negotiation, repeat steps c) through g) (including a re-vote) before presenting the document to the policy committee.

k) For a sample of a Task Force ballot, see Figure 4.

Figure 4 – Task Force ballot



Rail Transit Standards Development Task Force Voting Ballot

by Rail Transit Standards Task Force voting members for a formal vote on all standards or recommended practices brought before the Rail Transit Standards Task Force. Please return your completed ballot (one per document) to:

American Public Transportation Association
 Rail Transit Standards –Fixed Structures and Maintenance Committee
 1666 K Street, N.W.
 Washington, D.C. 20006-1215

APTA recommends that the referenced document be voted on as:

A Mandatory Standard (the document contains safety critical provisions)

A Recommended Practice (the document provides guidance on good practice for non-safety critical tasks or design criteria)

Title of Document: _____

Approval of Author	Committee Chair
Approval of Committee APTA Staff Advisor	APTA Staff

Name and Organization of Voting Member: _____

Please indicate how you vote on this document.

I accept the document as written.

I can accept the document with attached revisions of a minor or editorial nature. (*Attach recommended revisions*)

I reject document due to a major concern, but I could accept it if my concern is addressed. (*Attach description of concern and how you recommend that it be addressed.*) Note: APTA hopes that concerns will be limited to those topics previously identified by POC review of the document by the Voting Member organization.

I reject the document in concept or on principle.

I abstain. I chose not to review this document. (*Attach description of why you abstained*)

 Signature of (if submitting hard copy) Date

Additional comments (if needed):

B.1.4 Policy committee level

- a) **Draft submitted** – APTA mails the Task Force-approved document to the policy committee. APTA Director of Operations and Technical Services (Thomas Peacock) also presents the Task Force-approved document to the policy committee at a policy committee meeting.⁴
- b) **Approval** – Policy Committee members vote on the document at the policy committee meeting or by transmitting an absentee ballot to APTA by mail. 60% of the Policy Committee must vote to make a quorum. With a 75% majority vote (as required by the bylaws), the Task Force-approved document is approved for implementation. (In reality, a 100% unanimous vote was attained before a document was considered “fully approved.” Figure 5 is a sample of the Policy Committee ballot.

Figure 5 – Policy Committee ballot



Rail Transit Standards Development Policy Committee Voting Ballot

when absentee voting is authorized by Rail Transit Standards Policy Committee voting members for a formal vote on all standards or recommended practices brought before the Rail Transit Standards Policy Committee. Please return your completed ballot (one per document) to:

American Public Transportation Association
 Rail Transit Standards –Fixed Structures and Maintenance Committee
 1666 K Street, N.W.
 Washington, D.C. 20006-1215

APTA recommends that the referenced document be voted on as:

A Mandatory Standard (the document contains safety critical provisions)

A Recommended Practice (the document provides guidance on good practice for non-safety critical tasks or design criteria)

Title of Document: _____

Approval of Author	Committee Chair
Approval of Committee APTA Staff Advisor	APTA Staff

Name and Organization of Voting Member: _____

Please indicate how you vote on this document.

- I accept the document as written.
- I can accept the document with attached revisions of a minor or editorial nature. (*Attach recommended revisions*)
- I reject document due to a major concern, but I could accept it if my concern is addressed. (*Attach description of concern and how you recommend that it be addressed.*) Note: APTA hopes that concerns will be limited to those topics previously identified by POC review of the document by the Voting Member organization.
- I reject the document in concept or on principle.
- I abstain. I chose not to review this document. (*Attach description of why you abstained*)

Signature of (if submitting hard copy) _____ Date _____

Additional comments (if needed):

⁴ Policy committee meetings generally take place during APTA’s Annual Meeting or at a major APTA conference.

All Policy Committee members must vote to “accept the document as written.” If a Policy Committee member votes any other way (“accept with revisions” or “reject”) APTA alerts the Subcommittee who authored the document, forwarding them suggested revisions, comments, and concerns submitted by the Policy Committee member.

If possible, the Subcommittee accommodates the Policy Committee member’s suggestions. However, in instances where a suggestion conflicts with any item the Committee or Task Force had previously reached consensus on, APTA’s Manager of Operations & Technical Services negotiates directly with the voting entity (with subcommittee involvement as necessary) until consensus is reached.

If major changes are made to the document as a result of this negotiation, the document must go back to the Committee level and be re-approved by the Committee, the Task Force, and the Policy Committee. The document is considered “fully approved” once it is approved on all four levels.

Comments and Comment Tracking Form

APTA RT-X-XX-XXX-XX <p align="center">(Document Title) Comment-Response form Name: _____</p>					
Rec'd	Reviewer	Page #	Section #	Comment	Resolution (for Subcommittee use only)
Rec'd Codes: CM-R: Comment received during committee review period CM-V: Comment received during committee voting period TF-R: Comment received during task force review period TF-V: Comment received during task force voting period					

Annex C

(Informative)

Glossary of terms

C.1 Abbreviations and acronyms

AAR	Association of American Railroads
AAS	Association in Applied Science
AASHTO	American Association of Highway Transportation Officials
ABS	automatic block system
ac	alternating current
ADA	Americans with Disabilities Act
ADU	aspect display unit
AFLS	automatic flashing light signals
AHJ	authority having jurisdiction
ANSI	American National Standards Institute
APM	automatic people mover
APP	accident prevention program
APTA	American Public Transportation Association
APU	auxiliary power unit
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASR	approach stick relay
ASTM	American Society of Testing Equipment
ATC	automatic train control
ATCS	automated train control system
ATO	automatic train operation
ATP	automatic train protection
ATS	automatic train supervision
AWS	American Welding Society
BCU	brake control unit
BOCA	Building Officials Codes of America
CAD	computer aided design
CBTC	communications-based train control
CCTV	closed circuit television
CEM	comprehensive emergency management
CEO	Chief Executive Officer
CFR	Code of Federal Regulations
CP	control pneumatic
CRT	cathode ray tube
CSR	contractor safety representative
DAQ	delivered audio quality
dB	decibels

dc	direct current
DMM	digital multi-meter
DMUs	diesel multiple units
DOT	United States Department of Transportation
DVQ	delivered visual quality
EIA	Electronic Industries Association
EM	emergency management
EMF	electromotive force
ENS	emergency notification system
EOCC	emergency operations control center
EPA	Environmental Protection Agency
ESD	electrostatic discharge
FAA	Federal Aviation Administration
FACP	fire alarm control panel
FCM	fracture critical members
FEMA	Federal Emergency Management Agency
FFD	Fitness for Duty
FHWA	Federal Highway Administration
FM	frequency modulation
FOM	fiber optic multiplexer
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GCP	grade crossing predictor
GFCI	ground fault circuit interrupter
GPS	global positioning satellite
HOS	hours of service
HPPL	high performance photo-luminescent
HRRT	heavy rail rapid transit
HVAC	heating, ventilation and air conditioning
IC	incident commander
ICS	incident command system
IEEE	Institute of Electrical and Electronic Engineers
IIC	investigator in charge
ISO	International Standards Organization
ITE	Institute of Transportation Engineers
kHz	kilohertz
LED	light emitting diode
LRT	light rail transit
LRV	light rail vehicle
MA	motor alternator
ME	medical examiner
MHz	megahertz
mph	miles per hour
MSDS	material safety data sheet
MUTCD	Manual of Uniform Traffic Control Devices
NBC	nuclear/biological/chemical

NCR	no calibration required
NFPA	National Fire Protection Agency
NIST	National Institute of Science and Technology
NTD	National Transit Database
NTSB	National Transportation Safety Board
NX	entrance/exit
OCC	operations control center
OCS	overhead contact system
OEM	original equipment manufacturer
OJT	on the job training
OL	Operation Lifesaver ⁵
OLI	Operation Lifesaver, Inc. ⁶
OSHA	Occupational Safety and Health Administration
OSHA	Occupational Safety and Health Administration
OSHA	Occupational safety & Health Administration
OSHA	Occupational Safety and Health Administration
OSHA	Occupational Safety and Health Administration
OSHA	Occupational Safety and Health Administration
PA	public address system
PBX	private branch exchange
PC	physical characteristics
PCB	printed circuit board
PCM	pulse code modulation
PM	preventive maintenance
POA	participating outside agency
PPE	personal protective equipment
PSA	public service announcement
PSTN	public switched telephone network
PTU	Portable Test Unit
PVC	poly-vinyl chloride
RF	radio frequency
RFG	rail fixed guideway
ROW	right-of-way
RTS	rail transit system
RTU	remote terminal unit
RTV	rail transit vehicles
SBD	safe braking distance
SCADA	supervisory control and data acquisition
SOCC	Satellite Operations Control Center (or back-up OCC)
SOP	standard operating procedure
SRP	standard & recommended practice

⁵ Operation Lifesaver (OL) is a nationwide, nonprofit public awareness program dedicated to ending collisions, fatalities and injuries at highway rail grade crossings and on railroad property.

⁶ Operation Lifesaver, Inc. (OLI) is the headquarters office for OL in the United States, located at 1420 King Street, Suite 401, Alexandria, VA, 22314; Phone: 800-537-6224.

SWP	safety work program
TDD	telephone for the deaf and disabled
TIR	total indicated run-out
TM	traction motor
TOD	train operator display
TWC	train-to-wayside communications
UMTA	Urban Mass Transit Administration
UPS	un-interruptible power supply
US&S	Union Switch and Signal Corporation
USC	United States Code
USDOT	United States Department of Transportation
v	volts
VCVRS	vehicle cab voice recording system
VDRS	vehicle data recording system
VOM	volt ohm meter
VPI	vacuum pressure impregnated
VVRS	vehicle video recording system
XR	crossing relay

C.2 Definitions

absolute block: A block that no train is permitted to enter while it is occupied by another train without authorization and the appropriate procedure.

ac track circuit: An ac electrical circuit that makes use of both rails to detect train occupancy of the track and, in response, to actuate signals, train control devices and grade crossing protective equipment. *Syn:* **power frequency track circuit.**

access equipment: Any vehicle entryway accessory that deploys to aid the boarding of passengers including steps that deploy when doors are operated.

accident/incident: An unexpected loss-causing event that results in a fatality, bodily injury, or property damage.

acoustical listening device: A rudimentary low frequency vibration monitor that transforms the minute impacts from mismatched or distressed rolling and sliding elements into audible pressure waves that can be heard through an air tube stethoscope or seen by observing the plot of electrical signals generated by a transducer monitoring the same energy.

active grade crossing warning system: The system used to inform road users of the approach or presence of trains at highway-rail grade crossings which includes flashing light signals and necessary control equipment and may or may not include warning gates.

actual point: The end of the switch rail farther from the frog, where the spread between the gauge lines of the switch rail and the stock rail is sufficient for a practicable switch point.

aerial inspection: An inspection done on an overhead electrical distribution system where the inspector is at the same level as the overhead equipment being inspected.

alarm circuit: An electrical path utilized to transmit a signal that indicates an alarm condition from a remote location to a local or central reporting location.

alignment: The horizontal location of track as described by curves and tangents.

alternating current (ac) ground detector: A device used to monitor ac power supplies for grounded conditions and to display an alarm when ground conditions are detected. *Syn:* **ac ground fault detector.**

ambient temperature: The temperature of liquid or air surrounding any electrical part or device.

amplifier: Electronic equipment that increases the voltage, current, or power of signals passing through it.

annunciator panel: A device designed to monitor and indicate the status of detection circuits.

antenna: A device that picks up or sends out radio frequency energy.

application software: Software that defines the site-specific functions of a system, e.g., route locking.

approach locking: An electric locking that is effective when a train is on the approach within a specified distance to a signal displaying an aspect to proceed that is set to stop and that which prevents the operation of any interlocked or electrically locked switch in the route governed by the signal and prevents an aspect to proceed from being displayed for a conflicting route, until after a predetermined time interval has expired or occupied or if the signal is at stop with the approach unoccupied.

approach stick relay (ASR): A vital interlocking relay used in an approach locking circuit.

arc: An electrical spark that occurs when current jumps across an air gap as a result of a number of present conditions. Arcing is a common electrical hazard.

armature: The part of a machine, whether rotating or stationary, that carries the winding connected to the external circuit in which the principal EMF is induced. **NOTE:** This term is usually limited to the rotating part of a dc machine and refers to the complete assembly of the winding with core and commutator.

aspect: **(A)** The appearance of a fixed signal conveying an indication as viewed from the direction of an approaching train. **(B)** The appearance of a cab signal conveying an indication as viewed by an observer in the cab.

audible signals - A signal, the indication of which is conveyed by a horn, bell or whistle.

audio frequency impedance bond: A device of low resistance and low impedance to all frequencies to which it is not tuned, used with jointless audio frequency track circuits to couple inductively and confine the signaling energy to its own track circuit and equalize the return propulsion current between rails without impeding its flow. *Syn:* **signal impedance bond.**

authority having jurisdiction: **(A)** The entity that defines the contractual (including specification) requirements for the procurement of the highway-rail grade crossing equipment. **(B)** The entity responsible for the maintenance and upkeep of the equipment. **(C)** The entity with the legal responsibility for overseeing investigations.

authorized personnel: Personnel who need to be aware of operating rules and procedures, particularly operators, controllers, and their supervisors, and others (employed or contracted) working on or near the right-of-way.

automatic block system (ABS): A system of controlling train separation in which the signal aspects are activated by movement of trains into and out of blocks. The presence or absence of a train in a block is determined by a track circuit. If the circuitry fails, the signal shall display its most restrictive aspect.

automatic train control (ATC): A system for automatically controlling train movement, enforcing train safety and directing train operations. **(B)** A system which enforces speed restrictions and prevents exceeding speed restrictions by automatic brake applications; may additionally encompass automatic train operation, automatic train protection, and automatic train supervision. **(C)** The method and, by extension the specific system for automatically controlling train movement, enforcing train safety, and directing train operations. Automatic train control includes three major functions: automatic train operation, automatic train protection, and automatic train supervision.

automatic train operation (ATO): That subsystem within the automatic train control system that performs any or all of the functions of speed regulation, programmed stopping, door control, performance level regulation, or other functions otherwise assigned to the train operator.

automatic train protection (ATP): That subsystem within the automatic train control system which maintains failsafe protection against collisions, excessive speed, and other hazardous conditions through combination of train detection, train separation, and interlocking.

automatic transfer switch: An electrical switching device that automatically switches over to the alternate source of power without interruption of ac power if the normal source of power drops off or drops under prescribed voltage levels. The transfer switch will automatically switch to its normal source of power after a pre-determined amount of time and a prescribed voltage level is restored to the normal side of the transfer switch.

auto-tension system: A system tensioned by weight or spring to maintain an overhead contact system wire height and a constant wire tension within a defined temperature range.

ballast: Granular material placed in the track bed to support and restrain the track in line and surface.

bar signal: A lighted signal configured in the shape of a bar, normally positioned to appear in a vertical, angled, or horizontal orientation. These are used as aspects to convey a signal indication. Bar signals are often used on light rail transit systems.

battery cell: A unit contained in a battery that produces a direct voltage by converting chemical energy to electrical.

battery string voltage: The total output voltage measured across a group of interconnected batteries.

battery terminal voltage: The total voltage measured between the positive and negative battery terminals.

battery terminal: A piece of conductive material used as a point of connection on a battery for attaching the positive or negative leads of a device.

battery: A device that converts chemical energy to electrical energy.

beneficial use: When the elevator is placed into service, may be prior to the site being ready for public use.

blinker door: Door panel pairs that rotate into the entryway or stepwell when opened.

block occupancy: The presence of a train in a track circuit or block or the resultant state achieved by shunting the rails of the track circuit.

block signal: A fixed signal installed at the entrance to a block to govern trains entering and using that block.

block: A continuous section of track of defined limits, the use of which by rolling stock is governed by an ATC or wayside signals or both. A block may contain one or more track circuits.

brake control unit: A device that controls and transmits pressure to brake units in response to control commands.

brake cylinder: A cylinder in which compressed air acts on a piston that transmits the force of the compressed air to the associated brake rigging.

brake disc: A circular solid or finned plate that is rotating with respect to the disc brake pads that are brought into contact with it to provide the retarding force. Usually mounted to the wheel, hub, or axle. Also known as a Friction Ring.

brake head: A holder which carries the detachable brake shoe or brake pad.

brake shoe key: A key by which a brake shoe is fastened to a brake head.

brush: A conductor serving to provide, at a rotating surface, electrical contact with a part moving relative to the brush.

brushholder: A structure designed to carry a brush or brushes that enables it to be maintained in contact with a sliding surface.

buffer spring: A spring used to cushion or absorb shock in order to prevent damage to the gear train when the stop trip arm is driven to the clear position.

buss voltage: The voltage measured at an interconnect point for a power source.

bypass mode: A specific system operating condition wherein the standard system outputs and operations are disabled.

cab signal: A signal in the train operator's cab which conveys either automatic block aspects or indicates the prevailing speed command, or both.

caliper: The assembly on disc brakes which hold the disc pads and straddles the disc.

call-on: Signal aspect that requires the train operator to bring a train to a complete stop before proceeding into an occupied block at restricted speed.

cam: A machine part with an irregular form such that its motion, usually rotary, imparts by contact to another part, specific reciprocating motion.

car carried relay: A relay installed on transit cars.

carbon strip: The current collector strip mounted to the top of the pantograph, which slides along the contact wire.

cartridge fuse: A device used to protect an electric circuit from the effect of excessive current draw enclosed in an insulating cartridge. *See also:* **fuse**.

cell terminal: An external connection point on a battery cell of specific polarity.

cell: The smallest, indivisible unit of a battery; the fundamental electrochemical unit.

charger output current: The total amount of current measured at the output of a battery charger unit when connected to one or more batteries.

charger output voltage: The voltage measured at the output of a battery charger unit.

charging equipment meter: A device used for monitoring and measuring the voltage and current outputs of a battery charging unit.

check sheets: Forms with provision for acknowledging completion of outlined inspection and maintenance tasks.

check sum: A number derived from a cyclic redundancy check used to verify accuracy of data.

chief executive officer (CEO): Overall head of organization.

chief mechanical officer (CMO): Overall head of maintenance for either a particular mode of transportation or for multiple modes of transportation within the rail transit system.

chief of rail transportation: Head of the rail transportation office who manages the safe, efficient movement of passengers through stations and on trains. Staff may include train operators, station managers, operations control personnel, transportation supervisors, and support personnel. It should be noted that certain employees, such as station personnel, might report to departments other than transportation.

chief operating officer (COO): Overall head of a particular mode of transportation, either bus or rail. Will oversee and direct the maintenance and operations activities of the mode. The COO may preside over more than one mode.

chief safety officer: Head of Office of Safety responsible for the safe operation of all modes of transportation, maintenance, and construction for passengers, employees, contractors, and the general public, property, and the environment.

circuit controller: A device for opening and closing electric circuits operated by a rod connected to a switch, derail, or moveable point frog.

city tie: The physical and/or software interconnection between the RTS and public agency or municipal emergency systems. *Syn:* **interface.**

clear signal: A signal displaying a permissive aspect.

cleat: A device used to secure motor cables in place. A cleat typically consists of an assembly of two pieces of insulating material provided with grooves for holding one or more conductors at a definite spacing from the surface, wired over and from each other, and with screw holes for fastening in position.

closed circuit television (CCTV): A non-broadcasting system for processing video and text information.

closed loop design: A system design that adheres to the closed-loop principle and requires that requires verification of requisite conditions before the permissive state or action can be initiated and requires that the requisite conditions remain continuously present for the permissive state or action to be maintained. In a closed loop design, a permissive state or action can not be initiated or maintained in the presence of detected failures. In addition, closed-loop design requires that failures to perform a logical operation, or absence of a logical input, output or decision do not cause an unsafe conditions, i.e. system safety does not depend upon the occurrence of an action or logical decision.

command post: A location at the site of an emergency designated as the place from which the incident will be managed and through which all communication and activities will be coordinated. Also referred to as the “Incident Command Post” and the “Field Command Post.”

communication circuit: A transmission path that conveys information from one location to another.

commutator brush: A piece of conductive material, usually carbon or graphite, that rides on the commutator of a motor and forms the electrical connections between the commutator and the power source.

commutator: An assembly of bars of segmental section, insulated from each other and connected to the coils of an armature winding. The assembly comprises a hollow cylinder on which brushes bear, generally on the cylindrical surface but sometimes on the radial surface. The arrangement serves to connect each of the sections of the armature winding in turn with an external circuit connected to the brushes.

compliance check: Term used to describe observations of individual performance by a trained observer.

comprehensive emergency management (CEM): A practice of emergency management that breaks emergency planning into four phases: mitigation, preparedness, response, and recovery. CEM presents an “all hazards” approach to emergency management, focusing on procedures that can be used for multiple emergencies.

conductive personal article: A personal item that can conduct electricity. Examples of conductive personal articles are metal watch bands, metal-framed safety glasses, finger rings, jewelry, metal belt buckles, hearing aids with external wiring, etc.

configuration control: A process to assure that all documentation that describes a system and its various components is current and reflects the actual functional and physical characteristics of the system throughout its life cycle.

conflicting route: Two or more routes, opposing, converging, or intersecting, over which train movements can not be made simultaneously without possibility of collision.

connecting rod: A rod that transmits linear mechanical motion within the switch machine, or that transmits such motion outside the machine to some part of the track switch assembly. *See also:* **lock rod, switch rod, switch throw rod.**

consequence management: Measures to alleviate the damage, loss, hardship, or suffering caused by emergencies. These include measures to restore essential services, protect public health and safety, and provide emergency relief to affected state and local governments.

construction inspector: The person designated by the RTS to be in charge of all or any part of the project site.

contact: A conducting part which co-acts with another conducting part to open or close an electric circuit.

contractor: Any individual(s) or entity under contract with the rail transit system (including RTS and subcontractor personnel) to install, inspect, maintain, and/or test RTS vehicles, systems, and components. *Syn:* **consultant.**

control pneumatic (CP) valve: A set of valves that routes compressed air to the switch machine to control switch movement and provides switch position indication.

conventional interlocking: An interlocking that uses a manual system of controls to align switches and clear signals to establish routes.

corrosion inhibitor: A substance used on metal surfaces to prevent the chemical action of corrosion.

cotter pin: A short strip of soft, folded metal that is inserted through a bolt head or nut to prevent rotation and/or disengagement of that bolt or nut from its connection.

coupling transformer: An electrical device used for impedance matching.

crossbond: An electrical connection between adjacent tracks used to balance negative propulsion return current between tracks.

current overload protection: A feature in an electrical circuit that automatically disconnects the circuit whenever the current exceeds a specified level.

customer relations: The practices and methods that an RTS employs to interact with external customers on a singular/personal and social/public basis. This includes passive and active interaction. These interactions primarily involve, but are not limited to: communicating with customers (e.g., conversations with RTS personnel, signage, brochures, public address announcements and media relations), the treatment of customers (e.g. scheduling for special events, upkeep of stations), and the consideration customers receive in the rail transit system's planning and operations (e.g., equipment and station design, revenue practices).

cut out contact: A set of contacts that when opened disables an electrical device. *See also:* **latch block.**

cutout circuit: Any circuit that overrides the operation of automatic warning systems including switch cutout circuits and devices that enable personnel to manually override the normal operation of automatic warning systems

cyclic redundancy check (CRC): An algorithmic inspection of the data content of firmware.

data logging equipment: A device used to capture and store defined analog or digital data. *Syn:* **data logger, event recorder.**

dc converter: Converts high voltage direct current (dc) to low voltage dc.

dc-ac inverter: A propulsion system that uses a variable voltage/variable frequency inverter to supply power to alternating current (ac) traction motors and thereby to accelerate the car and provide dynamic braking, if so equipped.

dc-dc chopper: A propulsion system that uses power semiconductors to regulate current to dc traction motors and thereby to accelerate the car and provide dynamic braking, if so equipped

deadman control: a pressure or activity actuated device that detects inattention or disability of a train operator.

de-energized: Automatic door equipment that is disconnected from its power source and will not operate automatically.

delivered audio quality (DAQ): The quality of an audio message as heard by the human ear when delivered to a speaker or other audio device. *See also:* **delivered visual quality.**

delivered visual quality (DVQ): The quality of a video message, text or image seen by the human eye when delivered and displayed on a monitor. *See also:* **delivered audio quality.**

departure test: The process used to test rail transit vehicle systems controlled by train to wayside communication equipment.

derail: A track safety device designed to guide a rail car off of the rails at a selected spot to prevent collisions or other accidents.

detector: A device used to measure or sense a physical property and produce an electrical output or contact closure.

diagnostic review team: A group of knowledgeable representatives, interdisciplinary in nature that represents all groups having responsibility for safety at highway-rail grade crossings.

direct current (dc) ground detector: A device used to monitor dc power supplies for grounded conditions and to display an alarm when ground conditions are detected. Syn: dc ground fault detector.

disc brake pad: A replaceable friction element secured to a brake head for the purpose of producing a retarding force onto the face of a disc.

disc brake unit: A friction brake in which the brake pads create retarding force by rubbing on a separate disc or discs mounted on the wheel hub or the axle.

distilled water: Water that has been purified through an evaporation or condensation process.

distortion: An undesired change in the waveform of a signal.

door guide: Tracks or other restraints that constrain the motion of door panels.

door operator: The drive mechanism that operates door panels.

door panel: The moveable barrier element of a vehicle entryway.

electric locking: The application of one or more electric locks or equivalent circuits, by which interlocked devices are secured against operation under certain conditions.

electric switch machine: An electrically controlled device for positioning of switch point, the complete operation of the switch machine performs the three functions of unlocking, operating and locking. *Syn:* **power operated switch machine.**

electrolyte: A substance that when dissolved in a suitable solvent becomes an ionic conductor.

electro-mechanical code rate transmitter relay: A device which uses electrical energy to produce an oscillating action to vary periodically an electrical circuit at a definite predetermined code frequency.

electro-mechanical timer relay: A motor driven relay with or without an electrically operated clutch, which will not close its front contacts or open its back contacts, or both, until the expiration of a definite time interval after the relay has been energized.

electromotive force: That voltage induced in a conductor when the conductor is moved across a magnetic field.

electro-pneumatic switch machine: An electrically and pneumatically controlled device for positioning of switch point, the complete operation of the switch machine performs the three functions of unlocking, operating and locking.

electro-static discharge (ESD): The release of stored electrical energy.

elevator cab control panel: The station located inside an elevator car that is used to operate and control the elevator. *See also:* **elevator home panel, elevator home position.**

elevator home panel: The station located outside an elevator at the home position that is used to operate and control elevators. *See also:* **elevator cab control panel, elevator home position.**

elevator home position: A pre-determined location that an elevator is called to during an emergency evacuation. *See also:* **elevator home panel.**

elevator: a hoisting and lowering mechanism, equipped with a car or platform, which moves in guide rails or racks and serves two or more landings and is classified by the following:

elevator, freight: an elevator used primarily for carrying freight and on which only the operator and the persons necessary for unloading and loading the freight are permitted to ride.

elevator, hydraulic: a power elevator where the energy is applied, by means of a liquid under pressure, in a hydraulic jack

elevator, passenger: an elevator used primarily to carry persons other than the operator and persons necessary for loading and unloading.

elevator, rack and pinion: a power elevator with or without a counterweight which is supported, raised, and lowered by a motor or motors which drive a pinion or pinions on a stationary rack mounted in the hoistway.

elevator, roped-hydraulic: a hydraulic elevator where the energy is applied by a roped-hydraulic driving machine

emergency call box (ECB): A component of the emergency telephone/passenger assistance device which contains the communications equipment used for calling the central monitoring facility.

emergency management (EM) plan: The written document that contains a specific rail transit system's emergency procedures and/or checklists.

emergency management (EM): All actions a rail transit system takes to reduce the impact of emergencies.

emergency operations control center (EOCC): A pre-identified location for senior officials from the RTS and, if required, emergency responders from participating outside agencies to meet and discuss strategies for coping with the emergency. *Syn:* **war room.**

emergency responder: Any individual employed by the RTS or a participating outside agency that plays an active role in emergency response or recovery.

emergency telephone: A system for communicating audio messages from specific points in the rail transit system to central locations. This system includes emergency call boxes and passenger assistance communication equipment. *Syn:* **passenger assistance device.**

emergency: An unforeseen combination of circumstances and/or incidents with the potential to negatively impact safe transit operations that calls for immediate action, assistance, or relief.

emergency-specific response procedures: Procedures and/or checklists that have aspects that apply only to a specific given emergency scenario and cannot be easily applied to any other emergency scenario. Examples include procedures for earthquakes, hurricanes, terrorism, and the release of dangerous substances.

energized: Automatic door equipment that is poised to operate when a command signal is received.

entrance gate: A highway rail crossing traffic control gate that is used on the approach lanes of traffic toward a highway rail grade crossing.

escalator support: The upper, lower, and intermediate supports needed to support the total loads of the escalator.

event recorder: A device used to capture and store defined analog or digital data. *Syn:* **data logger.**

executive software: Software that performs the basic operations of a system, e.g., memory mapping, addressing, self-diagnostics, etc. Typically of standard format that does not change from installation to installation.

exit gate: A highway rail crossing traffic control gate that is used on the exit lanes of traffic from a highway rail grade crossing.

external alarm: A visual message, light or audible tone produced by an electrical system that is either seen or heard when the system has failed or has generated an error.

eyelet: A closed loop electrical fastener that provides a terminating point for wiring. *Syn:* **ring terminal.**

fail soft: To fail in a manner which is consistent with “fail safe” principles but which continues to provide some level of functionality. Under fail soft conditions, vital functions are maintained, but at a lower or degraded level of functionality or operability, i.e., concept of graceful degradation as part of the fail safe (shut the system down through intermediate steps, all of which are fail safe) design.

fail-safe: A design philosophy applied to safety critical systems that prohibits hardware failures or software errors from causing a system to assume or maintain an unsafe state.

fail-safely: The implementation of a function in a fail-safe manner.

failure message: A visual or audible indication produced by a system to report failure.

familiarization training/training for changes: Familiarization training is utilized to imbue an employee initially to existing conditions, equipment, rules, procedures, and other transit elements as a part of an introduction qualification phase. Training for changes is considered specialized training to instruct employees on new conditions in the system including, but not limited to, changes in vehicle equipment, track, signals right of way, other types of facilities such as stations, yards and shops, or operating, safety, customer service policies and procedures.

fatality: The death of a person either at the time an accident/incident occurs or within 24 hours thereafter.

feed end: The point in an ac track circuit at which the alternating current originates and is applied to the rails.

fiber optic multiplexer (FOM): A system used in the process of combining a number of individual channels into a common bit stream for transmission over fiber optic cable.

final acceptance: The point at which the owner accepts the elevator project as being complete including all submittal requirements. This may be a different point in time than substantial completion.

fire alarm control panel (FACP): The unit that controls, monitors, and reports the status of the fire system detectors.

fire department control key: The key utilized to gain access to and control of elevator operating systems.

firmware: A device that is programmed with instruction set software and installed in a processor-based system, e.g., electronic programmable read only memory (EPROM).

fixed signal: In rail operations, a signal at a fixed location that indicates a condition that affects the movement of a train.

fixed structure: A structure used by rail transit systems for the purpose of providing transit services.

fixed termination system: An overhead contact system with a contact wire tension that is fixed at a specific temperature and varies for all other temperatures.

flagperson/watchperson: Personnel assigned to control movement of trains by the display of hand signals, flags, or lights. Personnel may also be assigned to protect workers who are engaged in work activities on the right of way.

flat steps: Number of flat steps shall be measured from edge of comb plate in horizontal direction to first exposure of a riser, at upper and lower landings.

fouling point: The location on a turnout, beyond the frog, at which insulated joints or derails are placed at or beyond the clearance point.

frequency: The number of alternating current cycles per second.

friction clutch: A device that absorbs the shock encountered in switch operation. The clutch is adjusted to slip at a specific motor current.

front line employees: RTS employees whose work routines include the provision of rapid transit service and/or activities which result in usual or potential contact with customers. Examples of these types of employees are train operators, station personnel, maintenance employees who work in or near rail stations and facilities (e.g., parking lots) security personnel and supervisory/managerial personnel who oversee these employees.

fuse: A device used to protect an electric circuit from the effect of excessive current draw. *See also:* **cartridge fuse.**

gain: (A) An increase in the effective power radiated by an antenna in a certain desired direction. (B) An increase in received signal strength from a certain direction.

gasket: A sealing device used to protect equipment and used to prevent gases or liquids from passing through.

gate down: A crossing gate is in the “down” or lowered position when it is horizontal in accordance with the pre-determined design from vertical (typically 85 to 92 degrees depending on specific gate mechanism adjustment and other factors).

gate up: A crossing gate is in the “up” or raised position when it is vertical in accordance with the pre-determined design from horizontal (typically 85 to 92 degrees depending on specific gate mechanism adjustment and other factors.)

gauge plate: A metal plate, extending from rail to rail, used to maintain gauge of track.

gauge rod: A metal rod, extending from rail to rail, used to maintain gauge of track.

general emergency response procedures: Procedures and/or checklists that are applicable to a wide array of emergency scenarios with minimal revisions for emergency-specific needs. Examples include procedures for evacuation, notification, and crowd control.

ground bus: An interconnecting point in a signal equipment room at earth ground potential.

ground: A low resistance connection to earth potential.

guardrail: In rail construction, a rail or other device that is laid parallel to the running rails of a track to prevent derailment or to hold the wheels in alignment and prevent their flanges from striking the points of turnouts, crossing frogs, or the points of switches.

guideway: The portion of a transit line and its structures that exists within right-of-way fences, outside lines of curbs or shoulders, underground tunnels, cut or fill slopes, ditches, channels, and waterways.

hand crank: (A) A tool designed for the manual operation of a switch machine. (B) The action of using a hand crank.

hand signal: A signal, the indication of which, is conveyed by the motion or position of a person's hand or arm. A flag may be used to enhance visibility of a hand signal. A lantern or other suitable hand held light is used to convey hand signals in tunnels or during hours of darkness.

hand throw lever: A lever used to position switch points. This device can be used on a dual control switch that provides for either power or hand operation and on non-interlocked hand operated switches.

hand-operated switch: A non-interlocked switch that can only be operated manually. *Syn:* **hand throw switch, switch stand.**

hazard: Any real or potential condition that can cause injury, death, or damage or loss of equipment or property.

heavy duty elevator: An elevator designed specifically for transportation system usage.

heavy rail system: An electric railway capable of a "heavy volume" of traffic characterized by exclusive rights-of-way, multi-car trains, high speed and rapid acceleration, sophisticated signaling, and high platform passenger loading. *Syn:* **elevated railway, rapid rail, rapid transit, subway.**

high performance photoluminescent material (HPPL): A material that is capable of emitting fluorescent and/or phosphorescent light at a high rate and for an extended period of time after absorption of light radiation from an external source by the process of photon excitation.

highway rail intersection: *See:* **highway-rail grade crossing.**

highway: A public way for purposes of travel, including the entire area within the right-of-way. *Syn:* **road, street.**

highway-rail grade crossing: (A) A location where a public highway, road, street, or private roadway, including associated sidewalks and pathways, crosses one or more railroad track at grade. (B) The general area where a highway and a railroad's right of way cross at the same level, within which are included the railroad tracks, highway, and traffic control devices for highway traffic traversing that area.

home signal: A controlled signal located at the entrance to one or more interlocked routes or blocks to govern trains entering or using those routes or blocks.

hydraulic pressure control unit (HPCU): A device that controls and transmits hydraulic pressure to disc brake units in response to control commands.

hydrometer: An instrument that measures the specific gravity of a liquid such as the electrolyte of a storage battery.

impedance bond: *See:* **audio frequency impedance bond.**

Incident Command System (ICS): A system used to manage emergency response activities, that consists of a hierarchy/chain of command (command function) and emergency communications protocols.

incident commander (IC): Incident commander is the individual responsible for all functions at the field response level. If the transit agency is the only responder, then they will be the IC. When emergency responders such as the fire department and police are on site, they will take on the responsibility of IC.

incident commander: The RTS staff member responsible for managing and responding to emergencies/incidents and for acting as a liaison with emergency responders.

incident: A specific event or circumstance that has a negative effect on operations.

indication contact: A conducting part that co-acts with another conducting part to open or close an electric circuit for the purpose of providing and removing voltage to an indication device.

indication of a signal: The information conveyed by the aspect of a signal.

installer: The contractor or subcontractor responsible for furnishing and installing the escalator.

insulated joint: A joint in which electrical insulation is provided between adjoining rails.

insulating block: An inert, dielectric part that prohibits the passage of electrical current between two electrically active metal components.

interconnection: The electrical connection between the railroad active warning system and the traffic signal controller assembly for the purpose of preemption.

interim maintenance: Maintenance from the point of substantial completion, but prior to revenue service.

interlocking control panel: A panel displaying a line diagram of the trackage in and near a particular interlocking or group of interlockings, and equipped with various pushbuttons, electric switches, indicator lights and audible alarms to allow control and monitoring of that section of trackage.

interlocking machine: An assemblage of manually operated devices for the control of signals, switches or other units, and including mechanical or circuit locking or both to establish proper sequence of movements.

interlocking signal: An appliance that conveys information governing train movement through an interlocking.

interlocking: An arrangement of signals and signal appliances so interconnected that functions must succeed each other in proper sequence, permitting train movements over controlled routes only if safe conditions exist.

internal logged error: An abnormal condition or communications error generated within a device, circuit or system that is displayed and stored in memory.

inverter: Device used to convert dc voltage to alternating current (ac) voltage.

investigator in charge: The RTS staff member (generally from the safety department, or alternately the risk department) responsible for the detailed investigation of an emergency/incident.

ionization: The formation of or separation into ions by heat, electrical discharge, radiation, or chemical reaction.

island: The portion of the highway rail grade crossing where the highway and/or pedestrian walkways directly cross the railroad tracks.

junction box: An enclosure that contains electrical connections and/or hardware.

latch block: The assembly that latches the crank cut out contacts in the open position when engaged by a hand crank. *See also:* **cut out contact.**

lever: A hand operated switch for rapidly opening and closing a circuit.

light rail system: An electric railway with a lighter volume of train traffic than heavy rail that may use shared or exclusive rights-of-way and may run trains intermingled with street traffic. Light rail systems frequently operate with low platform loading and single car trains. *Syn:* **street car, tram, trolley car.**

linkage: A mechanical arrangement for transferring motion in a desired manner.

local control panel: A panel displaying a line diagram of the trackage in and near a particular interlocking or group of interlockings, and equipped with various pushbuttons, electric switches, indicator lights, and audible alarms to allow control and monitoring of that section of trackage. *Syn:* **interlocking control panel.**

lock bar: A bar containing a locking dog that mechanically locks the switch in the full reverse or full normal position.

lock out/tag out: The use of warning tags and/or lockout devices on an energy source control when machinery or equipment is being repaired. The person who places the tag/lock is the only person who may remove it.

lock rod notch: The cut out portion of a switch machine lock rod designated for insertion of the locking dog to mechanically lock a switch machine.

lock rod: A rod attached to the front rod or lug, through which a locking plunger (dog) may extend when the switch points or derail are in the normal or reverse position. *See also:* **connecting rod, switch rod, switch throw rod.**

locking dog: A steel block that is automatically positioned, in the switch and lock movement, at the completion of a machine's throw to effect mechanical switch locking of the points.

locking: The electrical or mechanical establishment of a condition for a switch, interlocked route, speed limit, or automatic function that cannot be altered except by a prescribed and inviolate sequence of unlocking actions.

loop cable conduit: Conduit made of polyvinyl chloride (PVC), plastic, rubber, fiberglass or other material used to house the coils of cables from which loops are made and to mount the loop to the rail. *See also:* **wayside inductive loop.**

loop layout: The complete track assembly that includes the loop, mounting brackets, clamps, loop cable, shorting bar, running rails and other related components.

loop shorting bar: The center tapped, rail to rail, 1000 kcmil cable shunt just inside the insulated joints at an Interlocking signal, which provides rail to rail balance for the negative return current entering and exiting the Interlocking and provides an additional length of inductive coupling for loop audio frequencies.

loss-causing: Term to describe bodily injury, loss of life and/or property, to be defined specifically by RTS.

lost motion: Motion and force that is not transmitted to the door panel due to cumulative clearances in the door operator mechanical components.

mainline: Those tracks upon which scheduled service is operated and which are designated as such.

maintenance facility: The location within defined limits utilized by the Rail Transit System for the maintenance and repair of rail transit vehicles. It may or may not contain an enclosed building.

marker coil: A wayside, passive, electronic device installed at a precise location to convey grade, distance, and program station stop information to passing trains.

maximum authorized speed: The highest speed limit that is authorized.

mechanical switch locking: An arrangement of locking bars, dogs, and other apparatus within a switch machine that locks the point in place at the end of the stroke of the switch machine.

mechanical switch locking: An arrangement of locking bars, dogs, and other apparatus within a switch machine that locks the point in place at the end of the stroke of the switch machine.

median: The area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way, excluding turn lanes. The median width may be different between intersections, interchanges, and opposite approaches of the same intersection.

megger/megohmmeter: A precision device designed to test dielectric strength of both motor and cable insulation.

mitigation: The phase of emergency management that utilizes sustained actions to reduce or eliminate long-term risk to people and property from hazards and limits the effects of hazards. Mitigation for rail transit systems may include design considerations for safe vehicles and facilities, safety training, and other activities or provisions that promote a safe operating environment.

motor assembly: A machine component consisting of motor, pinion gear, contactors, and mounting bracket.

motor control contact: A contact of a relay, switch, or other devices used to provide electrical energy to a motor or a device to be power operated.

motor cutout contact spring: Tension applying device designed to ensure that motor electrical contacts, designed to remove power from the motor in the event of a jam or overload, make sufficient contact to pass electrical energy.

motor cutout contact: The contacts on a switch machine that open the motor circuit when a switch machine is operated in the manual mode.

motor: The basic assembly that converts external electrical energy into rotational torque.

multiplexer: A digital device that can select one of a number of inputs and pass the logic level of that input onto the output.

near side station stop: A station stop within the approach limits of a highway-rail grade crossing.

near side station stop: A station stop within the approach limits of a highway rail grade crossing.

negative bonding: Conductors of low resistance providing a path for the return propulsion current at non-insulated joints.

non-vital logic: The software that is used in interlocking microprocessors that replaces the entrance/exit (NX) relay logic and performs non-vital functions.

non-vital system: Any system, the function of which does not affect the safety of train operation.

notice to proceed: Within this document shall mean the date which the elevator installer is notified to proceed with the project.

NX interlocking: An Interlocking that uses a non-vital system of controls that automatically aligns switches and clears signals to establish interlocked routes by entrance and exit selection. The basic NX involves four non-vital logic circuits; route initiation, storage, completion and check.

on sight/operation on sight: A requirement that train operators shall look ahead and be constantly alert for any condition which may cause injury or damage and be ready to bring their train to a safe and smooth stop. Movement must be made so as to control the movement to permit stopping within one half of the range of vision of: (a) Other trains or rail equipment occupying or fouling the track, (b) Obstructions, (c) Switches not properly lined for movement, (d) Derails set in the derailing position, (e) Any signal requiring a stop, and (f) Broken rail and misaligned track.

operating agency: Purchaser, lessee or contractor that utilizes equipment for the carriage of people.

operating rod: The rod by means of which motion is transmitted to apparatus.

operations control center (OCC): A location or locations designed, equipped, and staffed for the purposes of monitoring and controlling RTS activities from a central location or locations. *Syn:* **rail control center, rail operations center, rail service control center.**

opposing route: Either of two routes that require opposite direction of running on the same interlocking block.

original equipment manufacturer (OEM): The enterprise that initially designs and builds a piece of equipment.

owner: The legal entity that retains the right to construct and operate a transit system.

pantograph: (pantograph current collection equipment) The current collector apparatus, typically consisting of a linked framework, mounted on top of a rail transit vehicle.

participating outside agency (POA): Any organization not directly affiliated with the RTS that may respond during a transit emergency. Examples include but are not limited to fire departments, police departments, utilities, hospitals, contractors with specialized equipment, and local, state, and federal government agencies.

passenger assistance device: *See:* **emergency telephone.**

passenger information system: A system for communicating audio and/or visual information to employees and passengers.

permissive block: A block which permits a train to enter while it is occupied by another train.

personal protective equipment (PPE): All clothing and other work accessories designed to create a barrier against workplace hazards. Examples include safety goggles, blast shields, hard hats, hearing protectors, gloves, respirators, aprons, and work boots.

pilot cell voltage: The voltage of a selected cell that is assumed to be the voltage of the entire battery.

pin bond: A rail bond where the conductor is connected to a tapered pin that is driven into a pre-drilled hole in the rail.

plug door: Rigid door panels that are rotated from outside the car shell when open, and into the entryway portal when closed.

pocket: Cavity formed by the car shell outer wall and inner liner that receives door panels when open.

point detector rod: A device used to translate mechanical position of the switch points to the switch machine.

poppet valve: A valve used in electro-pneumatic equipment to apply air pressure to a device when activated.

positive stop: The requirement that a train operator bring a train to a full and complete stop.

post maul: A large sledgehammer.

post-fault condition: Any condition caused by a system failure that causes either repetitive faults or lockout trip of any subsystem.

power frequency impedance bond: An iron core coil of low resistance and relatively high reactance, used on electrified railroad to provide a continuous path for the return propulsion current around insulating joints and to confine the alternating current signaling energy to its own track circuit.

power supply: A unit that supplies electrical energy and maintains constant voltage and/or current output within in specific limits.

precision measuring device: Any mechanical, electrical, electronic or pneumatic instrument that when utilized properly, provides a measurement that is used to demonstrate compliance with specified requirements.

pre-departure inspection: a visual and/or functional check of rail transit vehicle components or systems, performed prior to placing a vehicle or train into revenue service, conducted in accordance with local RTS procedures by a person trained to have the necessary skills and knowledge to effectively perform these tasks.

preemption: The transfer of normal operation of traffic signals to a special control mode that interrupts the normal sequence of traffic signal phases to accommodate train operation at, or adjacent to, the traffic signal controlled intersection.

preparedness: The phase of emergency management that prepares the RTS in advance for emergency response and recovery. Preparedness for rail transit systems includes but is not limited to the development of emergency procedures and/or checklists and an emergency management plan, emergency response training, and inter-agency agreements.

presence detector: A device used to detect the presence of a train in a pre-determined section of rail.

prime mover: An engine that provides mechanical power to drive the generator in diesel-electric vehicles or the hydraulic/mechanical transmission in diesel-hydraulic drive vehicles.

priority: Signal priority modifies the normal highway traffic signal operation process to better accommodate train operation at or adjacent to the traffic signal controlled intersection.

private branch exchange (PBX): A telephone system that implements four- or five- digit dialing between users.

processor-based: A system dependent upon a digital processor for proper functioning.

profiler/profilometer: A precision device designed to measure commutator surfaces.

project manager - the person, usually employed by the RTS, designated to be in overall charge of the project.

proof testing: An abbreviated calibration procedure performed by the RTS that compares a shop measuring device and tools to a known calibrated standard that is traceable to NIST, and verifies that the shop measuring device's accuracy is within specified parameters.

public address system (PA): A system for communicating audio information to employees and passengers.

pull station: A manually activated device used to initiate a fire alarm condition.

pulse code modulation (PCM) span line: A system that provides a metallic transmission medium between two PCM multiplexed terminals and provides a transmission path for PCM carrier systems.

qualification: The initial training and testing program given to employees new to a classification that upon successful completion qualifies them to carry out the full scope of duties and responsibilities of the classification. Some RTSs refer to qualification as certification.

rail brace: A device that provides lateral support on the field side of stock rails to maintain the track gauge.

rail cable clamp: A mechanical device used to secure large current carrying cables to the running rail.

rail fastener: A device designed to resist lateral and longitudinal rail movement and restrain rail rotation, while providing vertical support.

rail operations employee: Term used to describe rail transit operators and conductors and others required to routinely operate rail transit trains.

rail transit supervisor: A qualified employee who has direct control over assigned staff and equipment and is responsible for the safe and efficient performance of an assigned portion of the rail transit system.

rail transit system (RTS): The organization or portion of an organization that operates rail transit service and related activities. *Syn:* **operating agency, operating authority, transit agency, transit authority, transit system.**

rail transit system engineer: A licensed professional engineer that is authorized by the rail transit system to exercise engineering judgment, make technical decisions with regard to the fixed transit guideway structures, and to direct qualified staff, engineering consultants, or other qualified specialists to perform work. The rail transit engineer does not have to be a direct employee of the owner.

rail transit train: Any motorcar, locomotive or other self-propelled on-rail vehicle, with or without other cars coupled. A regular train is a train authorized by a schedule. An extra train is any train that is not in the schedule.

rail transit: All forms of non-highway ground transportation that operate on rail including light rail, streetcars, trolley, and rapid rail transit systems.

receive signal: Energy containing encoded information sent from transit vehicle antennas to wayside antennas.

receiver: A device that converts radio waves into audio or visual signals.

recovery: The phase of emergency management that occurs after emergency response activities are completed and any immediate danger has passed. Recovery for rail transit systems includes but is not limited to restoration of normal operations, damage repair, debriefing, assessment of emergency response, and documentation.

rectifier unit: A device that converts alternating current to direct current. *See also:* **traffic rectifier.**

refresher training: The periodic, or “for cause,” course of training and testing program given to employees in a classification that, upon successful completion, maintains this qualification to carry out the full scope of duties and responsibilities of the classification for periodic or remedial purposes. Refresher training programs may be integrated with “Training for Changes.”

relay drop-away level: The level of current at which a relay armature drops to the normally de-energized state. *Syn:* **release value.**

relay pick-up level: The minimum current required to move a relay armature from one state to another when its coil is energized.

repeater: An automatic relay station, generally in a high elevation, that is used to increase the range of an FM transmitter or receiver.

response: The phase of emergency management that occurs once an emergency situation has been confirmed or, in some cases, when warning signs indicate that an emergency is imminent.

restricted speed: The maximum allowable speed authorized, in conjunction with the operation on sight rule, to be observed by train operators. The determination of the speed is dependent upon, but not limited to, the following: automatic or manual train operation, signal visibility, weather, braking capacity of the equipment, clearances for persons on the right of way, condition of track or other applicable situations.

revenue service: The station or facility opening date.

revenue vehicle: A rail transit vehicle designed, built and used for transporting passengers in routine revenue service. **NOTE:** This standard specifically addresses diesel engine embodiments.

ribbon fuse: A cylindrical fuse consisting of a ribbon shaped fusible metal enclosed in a glass or transparent plastic cylinder with end caps.

right-of-way (ROW) work: Work performed at track level or above track level within a distance designated by the RTS of the centerline of the closest tracks.

right-of-way (ROW): The area at track level or above track level at a distance from the centerline of the track, as specified by the RTS.

ring terminal: A closed loop fastener that is used to secure wire to a terminal post. *Syn:* **eyelet.**

risk: The probability of a hazardous condition occurring in a given context.

road/roadway: That portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles. In the event a highway includes two or more separate roadways, the term roadway as used herein refers to any such roadway separately, but not to all such roadways collectively.

rotor: A rotating part of an electrical machine with a shaft. **NOTE:** Usually applied to an ac machine.

route locking: Electric locking, effective when a train passes a signal displaying a permissive aspect, that prevents the movement of any switch, movable point frog, or derail in advance of the train within the route entered.

route: The course or way traveled **from one controlled signal to another**. *See also: conflicting routes.*

rules: Rules are written mandatory directives issued by the rail transit system for its officers and employees. Rules require or prohibit specific actions, conduct, methods or procedures in connection with the employment duties and responsibilities of those officers and employees.

safe: Having acceptable risk of the occurrence of a hazard.

safety assurance: A characteristic of system implementation that assures a level of safe operation.

safety critical: A term applied to a system or function for which correct performance is critical to the safety of personnel and/or equipment or a system or function for which incorrect performance may result in an unacceptable risk of a hazard. *See: fail-safe.* NOTE- Such a designation may require the incorporation of additional special safety design features. NOTE-Vital functions are a subset of safety-critical functions.

safety inspector - the person designated by the RTS to provide safety management services to the construction site of the project.

safety stops: Safety stops are made to ensure braking capability in the approach to a must stop situation. Safety Stops are the stopping of a train's movement in the yard at prescribed distances and/or locations from a fixed obstruction (such as bumper blocks/posts) at the end of a track, or as when entering a maintenance facility. Safety Stops shall be required when approaching stationary trains already occupying a track and whenever else prescribed by the Rail Transit System.

safety: Freedom from those conditions that can cause death, injury, or occupational illness, damage to the environment, or damage to or loss of equipment or property.

Satellite Operations Control Center (SOCC): A designated backup location for carrying out essential functions if the existing OCC is incapacitated, threatened, or in harms way. *Syn: Backup OCC.*

seal (tamper evident): A device used to identify tampering and/or unauthorized access to a relay's internal components.

seal: A device used to prevent gases or liquids from passing through.

sealed battery system: A network of batteries sealed to prevent the leakage of its gas or liquid contents.

sectional release: A route locking design that allows segments of route and switch locking to be released as the appropriate track circuits become unoccupied as a train advances through a route.

seismic detection system: An accelerometer-based sensing system used to detect seismic activity and produce an electrical signal output.

selectivity: The ability of a receiver to separate two closely spaced signals.

semaphore signal: A type of railroad signal whereby the daytime aspect is given by the position of a blade on an arm.

sensitivity: The ability of a receiver to detect weak signals.

shunt: A by-path in an electrical circuit.

shunting device: A device that provides a by-path from rail to rail in a track circuit. This device typically simulates the presence of a train to the signaling system.

signal bonding: Rail connection providing a low resistance path for track circuit current.

signal equipment room drawing: A combination of drawings that includes signal schematics, plant layout, equipment location, track plans, and information for other signal equipment controlled from the signal equipment room.

signal equipment room: A train control room, relay room, bungalow, or hut located in a passenger station or yard or at some other strategic point to house signal equipment. *Syn:* **train control room.**

signal system snow melting equipment: Equipment used for the sole purpose of melting snow and ice that may interfere with signal system operation.

signal: An appliance that conveys information governing train movement.

single command: A chain of command used in the ICS in which a single, Incident Commander (IC) has overall responsibility for the management of an incident or emergency when the event overlaps one or more jurisdictions .

slide plate: A flat plate contained in the switch layout that provides a surface for the movement of the switch points from one position to the opposite position. *Syn:* **wear plate.**

slip joints: A sliding joint required to support escalators in transportation system and high-rise applications. Location can be at top or bottom support areas but are generally located at the platform level or as indicated on the contract drawings.

slip ring: a conducting ring rotating with a winding and connected thereto, and serving to make connection with an external circuit by means of a brush or brushes.

slip switch: A combination of a crossing and a single connecting track that is located within the limits of the crossing and is made up of a right hand switch from the one track and a left hand switch from the other track which unite to form the connecting track without additional frogs.

slow speed: Speed developed by individual RTS to temporarily reduce the speed of the train.

snubber: A friction or hydraulic device used to damp oscillations, also known as a shock absorber or damper (e.g. truck to bolster yaw oscillations).

social mitigation: Passenger awareness programs, education on self-protective measure for both passengers and employees, and other situational or procedural measures.

special gauging: Gauges used to verify OEM specifications. A special gauge may be considered a precision measuring device.

special tool: A customized tool fabricated, purchased or supplied for a specific purpose. A special tool may be considered a precision measuring device.

specific gravity: The ratio of the density of a solid or liquid to the density of an equal volume of distilled water.

spin test: A diagnostic procedure typically used to detect anomalies that are not apparent when inspecting stationary motors, gear drives and wheel sets. Wheel sets are jacked off the running rail and rotated under no load conditions (or “spun”) either through resistance control of traction power line voltage or by utilizing a testing device supplying low voltage or low frequency. A low voltage power supply is connected to dc traction motors usually at the motor lead plug and receptacle quick disconnect. For induction motors, a variable voltage, variable frequency or fixed low frequency power supply is required.

spot replace: Repair or replacement of the specific unserviceable parts found defective in an assembly.

squelch: A circuit within a radio that keeps the speaker silenced until the signal level exceeds a certain point.

staggered polarity: The method of alternating negative and positive ac polarities at insulated joints for the purpose of detecting defective insulated rail joints to prevent feed through of a voltage into an adjacent track circuit that could create an unsafe condition.

station operations employee: Term used to describe rail transit station operations personnel whose primary function is to provide customer service in rail stations and referred to as Station Managers, Customer Assistants, Station Clerks or the like.

station personnel: RTS employees whose primary function is to provide customer service in rail stations; they are variously referred to as cashiers, station agents, customer assistants or station managers.

stator: The fixed part of an electrical machine. **NOTE:** A base or other support or suspension elements, if provided, is not ordinarily considered to be part of the stator.

step width: The horizontal distance between skirt panels.

stock rail: The rail that the point of a switch, derail, or moveable point frog rests against.

stop trip arm hook: A device used to hold the stop trip arm in the clear position.

stop trip arm: A device used to enforce compliance of a signal displaying a restrictive aspect. If a train operator fails to comply with the signal displaying a restrictive aspect, the stop arm contacts a trip device mounted on the front end of each train, causing the emergency brake application of the train braking system.

storage tracks: Those tracks outside of the Yard upon which trains are stored. Properly identified sections of mainline tracks may also be designated and used as storage tracks.

street: *See:* highway.

substantial completion: The point at which the elevator is ready for use, whether the site is finished or not. This is where the jurisdictional inspection usually takes place.

switch block: A wedge-shaped wooden block, designed to be forced between an open switch point and a stock rail of a track switch, to hold the other switch point firmly against its stock rail to ensure safe train passage.

switch cutout: A device that opens contacts and interrupts power to the switch motor.

switch indication relay: A relay that indicates whether a switch machine is in or out of position.

switch latch: An assembly or device that latches the crank cutout contacts in the open position when engaged by a hand crank. When the switch latch is closed, the cutout contacts are restored.

switch layout: A complete track assembly that includes the switch machine, the switch points, rails, frogs, and other related components.

switch machine: A device that performs the mechanical function of controlling the movement of switch points or a derail from one position to the other.

switch obstruction gauge: A thickness gauge (1/8", 1/4", 3/8") used in switch points to test switch locking and point detector adjustments.

switch point clamp: A device that clamps the base of a closed switch point to the base of the adjacent stock rail to secure it in place.

switch point: A movable tapered track rail with a point designed to fit against the stock rail.

switch rod insulation: Non-conductive material used to electrically isolate the two sections of a switch rod.

switch rod: A rod connecting the two points of a switch or moveable point frog, by means of which the relative distance between the points is maintained. *See also:* **connecting rod, lock rod, switch throw rod.**

switch throw bar: The mechanical part in a switch machine, which is driven by the main gear and which is connected to the switch throw rod. *See also:* **switch throw rod;** *Syn:* **throw bar.**

switch throw rod: The connecting rod that transfers motive force from the switch machine throw bar to the switch points. *See also:* **switch throw bar;** *Syn:* **throw rod, switch operating rod.**

switch valve: A device used on pneumatic and electro-pneumatic switch machines that permits compressed air to flow in one direction.

switch: A track structure of movable running rails (points) with necessary fastening to provide a means for routing trains from one track to another.

switched resistance: A propulsion system that utilizes a camshaft or logic network to control the operation of a series of electrical contacts and/or contactors, which shunt out resistors to regulate current to dc traction motors and thereby to accelerate the car and provide dynamic braking, if so equipped. Control of the cam may be through analog electronics or a microprocessor.

tamp: The process of compacting ballast under ties.

temporary warning device: Signs, flags, lights, discs or targets installed when wayside workers are present to alert and direct the actions of train operators of approaching trains and removed when no longer needed.

terminal block: A molded non-conductive material containing one or more electrical wiring terminals. *See also:* **terminal board.**

terminal board: A small panel made of non-conductive materials containing one or more electrical wiring terminals. *See also:* **terminal block.**

terminal buss bar: A heavy strap or bar normally made of copper, used to carry heavy currents or to make a common connection between several points.

terminal post: A terminal designed to electrically connect two or more wires. *Syn:* binding post.

terrorism: The intentional and unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population or any segment thereof, in furtherance of political or social objectives.

third rail current collection equipment: A mechanical assembly, commonly mounted to a rail transit vehicle truck frame (usually four assemblies per car, electrically linked together). Its design provides a continuous pressure applied sliding shoe connection to the third rail for the purpose of transferring power from the third rail to the rail transit vehicle.

third rail: An electrical conductor (also called contact rail) located alongside the track designed to carry energy for the propulsion and auxiliary systems of trains.

tie plate: A plate that is used to provide a bearing area for the rail base that distributes the rail vehicle load to the tie and prevents lateral movement of the rail.

tie strap: A steel bar used to maintain tie spacing and prevent movement.

tie: The transverse member of the track structure to which the running rails are fastened, which is centered on the track and designed to cushion, distribute, and transmit the stresses of traffic from the rail to the ballast. *Syn:* **crosstie**.

time locking: Either mechanical or electrical locking that prevents an established route from being changed until expiration of a predetermined time interval. Time locking is initiated when a signal is set to stop by a means other than normal train operation. Time locking differs from approach locking, as time locking is not conditional, and is in effect regardless if the approach track circuit is occupied or not.

timing device: A timing relay or mechanical timer whose contacts become open and/or closed upon completion of a definite (usually adjustable) time interval (up to several minutes) after the timing relay has been energized or mechanical timer set.

timing signal: A signal which controls train speed by requiring that a certain time elapse in an approach block.

torque stripe: Registration marks painted across a fastener and an adjacent stationary reference surface immediately after the specified tightening torque has been applied. Marks subsequently found out of registration indicate relative motion, probable loosening and reduced clamping forces.

torque wrench: A device that sets, limits, and measures the amount of rotational force. *See also:* **torque**.

torque: A force that produces rotational twisting.

total indicated run-out: Total deviation from perfectly round condition.

track brake: A magnetic friction brake that compresses against the running rail and is activated by an electrical signal.

track car: Any vehicle which operates on rail and which does not positively shunt track circuits.

track transformer: An electrical device used to supply ac voltage for a track circuit and/or secondary signal circuits.

traction power return cable: Heavy duty cable of various sizes that are connected to the running rails, impedance bonds, and other track locations and components that provide a path for the negative traction power current to flow and be returned.

traffic locking: Traffic locking is electric locking which prevents the manipulation of levers or other devices for changing the direction of traffic on a section of track in between interlockings while that section is occupied or while a signal displays an aspect to proceed into that section.

traffic rectifier: A device that converts alternating current to direct current for traffic circuits. *See also:* **rectifier unit.**

traffic: The prescribed direction of train operation in a section of track between Interlockings or between consecutive signals. The direction of traffic for a section of track is locked and cannot be changed when a block in that section is occupied or a signal is cleared for a route into that section.

train control room: A device used in signal systems, which provides, a dc voltage for traffic circuits.

train controller/supervisor: An employee, usually stationed in a control center, authorized and responsible to direct the operation of trains on the mainline. Some systems may employ other employees, subordinate to the controller, to facilitate train movements at critical locations.

train dispatching: A automatic or supervisory process used to control and monitor the departure of rail transit vehicles from specific locations.

train operator: A qualified employee having direct control and responsibility for the movement of a train.

train stop circuit controller: Device for opening and closing electrical circuits operated by a rod connected to a component within the stop mechanism.

train stop: A device that controls the stop trip arm.

train: Any motorcar, locomotive or other self-propelled on-rail vehicle, with or without other cars coupled.

train-to-wayside communications (TWC): Non-vital transmission of data from a transit vehicle to wayside systems or from wayside systems to a transit vehicle, which may include train identification, length, door status, positioning reference information, approaching station information, speed and acceleration modification, departure testing, and dispatching instructions.

transmit signal: Energy containing encoded information sent from wayside antennas to transit vehicle antennas.

transmitter: A device that produces radio frequency signals.

tread brake shoe: A replaceable friction element secured to a brake head for the purpose of producing a retarding force onto the tread of the wheel.

tread brake unit: A friction brake in which the brake shoes create retarding force by rubbing on the wheel treads.

trunk line: A system that connects the private branch exchange (PBX) to the local carrier switch or private switch telephone network (PSTN).

tuning unit: The portion of a two piece signal impedance bond system that houses the electronic components that are wired in parallel with the bond toroid coils and used to form the resonant circuits required to provide specific ATP functions.

unified command: A chain of command that is multi-jurisdictional in which more than one agency (including the RTS) shares responsibility for the management of the emergency.

un-interruptible power supply (UPS): A system that provides continuous electrical power and acts as a backup power supply in the event of utility power loss.

vane relay: A type of alternating current relay in which a metal disc (vane) moves in response to current in the controlling circuit.

vehicle cab voice recording system: An installed system, consisting of an audio recording mechanism, recording medium, and any sensors and wires that feed audio to the recording mechanism.

vehicle data recording system: An installed system, or a capability integrated into another functional system, consisting of a data recording mechanism, recording medium, processing software and hardware, and any sensors and wires that feed vehicle performance data to the recording mechanism.

vehicle video recording system: An installed system, consisting of a video recording mechanism, recording medium, and any sensors and wires that feed video to the recording mechanism.

vented lead acid battery: A non-sealed storage battery consisting of electrodes immersed in an electrolyte of dilute sulfuric acid. The electrodes contain lead oxides that change their composition as the cell is charged or discharged.

vented standby battery: A storage battery system vented to outside or circulating air that is held in reserve to serve as a back-up power source in the event the regular power source fails.

ventilation: The act or process of circulating air for the purpose of exhausting undesired heat, fumes, and/or gases.

vital function: A safety critical function that requires fail-safe implementation. *See: fail-safe, safety critical.* NOTE-Vital functions are a subset of safety-critical functions.

vital relay: A relay, meeting certain stringent specifications, so designed that the probability of its failing to return to the prescribed state upon de-energization is so low as to be considered practically nonexistent.

vital system: Any system, the function of which affects the safety of train operations.

voice/data carrier transmission system: A multi-channel communication device used for the transmission and reception of voice and data.

warning message: A visual or audible message produced by a system to warn maintainers or monitors of the status of a device, circuit or system.

wayside inductive loop: A device constructed of one or more turns of conductors in a loop cable conduit for inductively coupling and/or transmitting track and cab signals into the running rails or to receiving devices for train reception. *See also: loop cable conduit.*

wayside signal ac power system: The system that provides ac power to rail transit signal systems typically including input transformer, inverters, converters, transfer, switches, UPS systems, fault protection equipment, breakers and fuses.

wayside signal dc power systems: The System that provides dc power to rail transit signal systems typically including dc power supplies, dc-to-dc converters and charging equipment.

wayside signal equipment: Components of the signal system located on the right-of-way.

wayside signal: A signal of fixed location along the track right-of-way.

wayside worker: Any employee or outside contractor who performs work upon the right of way within a specified distance of the tracks. At some properties, these personnel may be referred to as roadway workers. Flagpersons and watchpersons are considered wayside workers.

wheel profile gauges: Instruments for determining the deviation of the observed, actual wheel profile from the new or ideal wheel profile

wiggle wire: An antenna used for wayside-to train communication.

work zone: A section of track where train operations are temporarily restricted due to the presence of one or more wayside workers that may be designated by use of a temporary warning device.

working points: Points of intersection of step nosing line and the horizontal line of the top and bottom landing plates at finish elevation.

yard intercom system: A system for communicating audio information to employees within designated yard zones/groups. *Syn:* **yard page system, yard public address system.**

yard supervisor: The employee who supervises the movement of trains within a yard.

yard: A facility within defined limits that has a system of tracks used for making up trains, storing trains, and other purposes. A maintenance facility may be included.

yardmaster: The employee who supervises the movement of trains within a Yard.