

PRIIA 305  
Single-level Passenger Railcar  
Specification  
Independent Review

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February 15, 2011

Washington, D.C.



# Introduction

- Technical Subcommittee developed and completed a technical specification for a Single-level Standalone type passenger railcar on December 15, 2010 for approval by the Executive Board
- Executive Board created a Review Panel consisting of FRA, Amtrak, and States (stakeholders) to determine:
  - Did the Specification as produced meet the technical design, performance, and operational objectives?
  - Did the Specification development process undertaken by the Technical Subcommittee meet the inclusive process requirements of PRIIA?
- Review Panel retained a support consultant, Mr. Larry Salci, to assist the Review Panel in its responsibilities
- Mr. Salci's report concluded PRIIA Single-level Design Objectives and Performance Requirements were substantially met, and conditional approval of specification is recommended
- Conditional approval based on need for Executive Board to consider recommendations from Standardization Working Group's report prior to approval



# Scope of Report

- The Executive Board of the NGEC established a Technical Subcommittee to perform the following three tasks:
  - Task 1. Develop Specification that addresses specific design objectives and requirements and conforms to PRIIA mandates;
  - Task 2. Summarize the Single-level Specification in a manner that provides the Executive Board the information necessary to determine that the Specification complies with all PRIIA requirements and is ready for approval;
  - Task 3. Document the methodology by which the Specification was developed, reviewed, edited and approved by the Technical Subcommittee to verify inclusive industry participation

# Task 1

## **DEVELOP SPECIFICATION THAT ADDRESSES SPECIFIC DESIGN OBJECTIVES AND REQUIREMENTS AND CONFIRMS COMPLIANCE WITH ALL PRIIA MANDATES**

- 85 foot, stainless steel carbody of four car types (*Requirements Document is neutral on car dimensions and carbody material*):
  - Coach car
  - Cab/baggage car
  - Café/lounge car
  - Business Class car
- Designed for all FRA Tier I Requirements, performance spec up to 125mph
- Design allows for new fleet requirements and full operation and functional integration with existing Single-level fleets (Amfleet I, Amfleet II, Horizon, and Viewliners)
- Design will provide for proven reliable technology, maintainable, cost effective, durable stainless steel carbody and trucks with minimum design life of 40 years

# Task 1 (Cont'd)

- Design is operationally and functionally compatible with wide spectrum of environmental and physical conditions in US
- Design meets crashworthiness and incorporates Collision Energy Management (CEM) features
- Design permits any car type defined in specification to be converted to any other car type without requiring modifications to carbody, except possibly Cab car
- Design complies with all Federal (FRA, EPA, ADA, etc.) regulations and industry standards and best practices

# Task 2

## **SUMMARIZE SINGLE-LEVEL SPECIFICATION AND METHODOLOGY TO VERIFY COMPLIANCE WITH SPECIFICATION**

- A list of the areas summarized by the tables in the report:
  - Operational/Performance Requirements
  - Interoperability Requirements
  - Safety Requirements
  - Reliability and Maintainability Requirements
  - Passenger and Amenity Requirements
  - Communication and Electrical Controls
  - Vehicle Standardization
  - Environmental Initiatives
  - Regulatory and Industry Standards
  - Test and Vehicle Acceptance Requirements

# Operations/Performance Requirements

- Single-level cars can operate without restriction in US
- Speed and operations issues will be governed by FRA, track, and host railroads
- Cars capable of negotiating 250 ft. radius horizontal curve, 1,000 ft. vertical curve, 5 in. cant deficiency, and no more than 50% wheel unloading stopped on 7 in. super elevation
- HVAC maintains interior temp range for operation at ambient temps -30 F to 110 F
- Design and test for up to 125mph operation, on Class 1-7 track
- Operating range in corridor service up to 600 miles, up to 20 hrs.
- Specification silent on tilting capability (Requirements-tilting optional)
- Conventional pneumatic system for service and emergency brake, wheel slide control, and provision for electrically controlled pneumatic system
- Operates at both high-level and low-level boarding passenger station platforms
- Cars are fully ADA compliant, wheelchair accessible (two carborne powered wheelchair lifts), accessible toilet room, wheelchair parking station, OTIS ADA compliant



# Interoperability Requirements

- Spec requires complete functionality and operation, either as new standalone fleet or intermingled with other Single-level cars
- Design allows for easy passenger walkthrough from an existing car to a new car (aligned end door location, diaphragm, walkway)
- Design allows States/Amtrak to tailor or customize interior layout for special purpose cars (food service, business class) without altering the cars' operational and safety characteristics
- Customer variables provide for exterior graphics, paint and styling, decals, and interior décor options
- All ADA requirements are included in spec for interoperability



# Safety Requirements

- Design meets all Federal safety regulations, industry standards and industry recommended practices
- Design is advancement in safety compared to current FRA Tier I 49 CFR Part 238 requirements for crashworthiness, incorporates Collision Energy Management (CEM)
- CEM requirements for protected operator cab space will provide design challenge for Contractor
- Design requires safety standards be incorporated for all major components and subcomponents
- Design specifies each Cab car control architecture provides for Positive Train Control (PTC ) implementation



# Reliability and Maintainability Requirements

- The car reliability requirement is based on a mean distance between train delays (MDBTD) of at least 150,000 miles
- There are component reliability requirements of mean distance between failures (MDBF) for major subsystems of between 300,000 and 1,000,000 miles
- Maintainability shall be the primary criterion for the design of the under floor equipment, equipment rooms and access doors
- Design requires ease of access for inspection, maintenance and repairs
- Specification defines preventative maintenance requirements that mirror all Amtrak maintenance intervals and procedures, FRA safety requirements and OEM maintenance manuals

# Passenger and Amenity Requirements

- Four sets of side passenger entry doors (two per side) at far ends of cars, except Cab/baggage may have only one side entry
- HVAC system to maintain the car's interior temperature at specified values (68 F to 76 F)
- Four modes of interior lighting: normal, quiet car, standby, and emergency
- Interior and exterior lighting shall be provided by Light Emitting Diodes (LEDs) or a combination of LEDs and fluorescent lights
- Communication systems: Public Address (PA), Intercommunications (IC) system, Onboard Train Information System (OTIS), and Passenger Information System (PIS), includes wireless capacity
- Pressurized fresh water system 112 gal, Café car 224 gal, capacity potable water for drinking, hand washing, toilet flushing, and Café galley requirements
- Waste system shall be vacuum system with minimum capacity for 225 gal of passenger waste
- Interior space provides balance between need for revenue seats and for other uses such as luggage racks, bicycle storage



# Communications and Electrical Controls

- Single-level cars to be functionally compatible with the existing Single-level fleet of Amfleet I and II, Horizon and Viewliner fleets
- Electrical power distribution and control system for each car and car to car power and signal trainline circuits from HEP 480 VAC, three phase, 60 Hz
- Car to car communications for MU and COMM provided by 27 pin jumper cables and receptacles
- System architecture for control, operations, and communications utilizes up to date technologies, open architecture for expansion, and still interface with systems that may already be installed
- Cab/baggage car equipped with Positive Train Control (PTC) and be fully functional with PTC systems in use or planned for use by host railroads ROW in which Amtrak operates
- Passenger convenience outlets (120VAC) are distributed throughout the car in the wall panel at each seat pair and two outlets at each Café table for customer electronic equipment



# Vehicle Standardizations

- Technical Subcommittee Working Group developed Report on Proposed Approach to Standardization of Specifications for new equipment and proposed recommendations to the Executive Board that maximize benefits:
  - Standardization of the specification layout and language
  - Standardization of key component interfaces-interchangeable with common performance requirements
  - Standardization of the design of particular component or system resulting in interchangeable components/systems

# Environmental Initiatives

- Specification identifies areas that promote sustainability in the manufacturing process to reduce manufacturing waste and energy consumption:
  - Create reusable packaging for transport of materials
  - Use of recycled materials for packaging
  - Use of recycled materials in the production process
  - Recycling of excess materials used in the manufacturing process
  - Capture of office supplies, paper, cardboard, copier toner
  - Develop or promote employee awareness campaigns
- Specification requires use of R-400 series refrigerants that lessen the impact on the depletion of the ozone layer



# Regulatory Standards

- Contractor must comply with all Federal regulations including ADA, DOE, EPA, FRA, FTA, APTA, AAR
- Specification must meet all industry standards and recommended or best practices, some of which are:
  - American National Standards Institute (ANSI)
  - American Public Transportation Association (APTA)
  - American Society of Mechanical Engineers (ASME)
  - American Society of Testing and Materials (ASTAM)
  - American Welding Society (AWS)
  - Institute of Electrical and Electronics Engineers (IEEE)
  - International Organization of Standards (ISO)
  - National Fire Protection Association (NFPA)
- Burden is on Contractor to be aware of and comply with all Federal regulations and industry standards and practices

# Testing and Acceptance

- Contractor is responsible for developing a Project Management Plan for prosecution of all work
- Contractor is responsible for submitting an Engineering Plan for accomplishing design functions - four major reviews: 1) Preliminary Design Review; 2) Intermediate Design Review; 3) Mock Up Review; and Final Design Review
- Contractor is responsible for CPM (Critical Path Method) Plan to schedule all activities related to a contract
- Specification requires four major categories of tests:
  - Material certification tests
  - Proof of design tests - validate design
  - Production tests - functional, operational and workmanship
  - Acceptance tests - demonstrate conformance with technical specification
- Contractor shall develop and implement a Quality Assurance (QA) program to ensure control of engineering changes, configuration management, production control and independent audits



# Task 3

## **DOCUMENT THE METHODOLOGY BY WHICH THE SPECIFICATION WAS DEVELOPED, INCLUSIVE INDUSTRY INPUT, EVALUATION PROCESS**

- The Executive Board created a Technical Subcommittee to develop the specification
- March 2010 - Technical Subcommittee issued industry-wide letter of invitation to participate in Specification development process
- Amtrak, FRA, the States, and over 100 industry professionals including carbuilders, suppliers and consultants participated in the Specification development
- Technical Subcommittee formed subgroups to develop major sections of the Specification:
  - Mechanical
  - Electrical
  - Vehicle/track Interface
  - Structural
  - Interiors

# Task 3 (Cont'd)

- Subgroups provide technical input, data and recommended written changes to Amtrak baseline spec
- December 15, 2010 - Technical Subcommittee met to receive final inputs; voted to approve the Single-level Specification and forward to the Review Panel and Executive Board for approval
- The Review Panel retained Larry Salci to assist in its assessment of the Specification and provide a report with recommendations