• Mission

• Technical Criteria and Procedures

• Development Process

• Summary
Engineering Task Force
(Initial) Mission

• Produce a set of technical evaluation criteria and procedures for passenger rail equipment built to alternative designs

• Provide a means of establishing whether an alternative design would result in performance at least equal to the structural design standards set forth in the Tier I standards

• Form a technical basis for making determinations concerning equivalent safety

• Provide a technical framework for presenting evidence to FRA in support of any request for waiver of the compressive (buff) strength requirement
Development Process

• Meeting 1 – Cambridge, November 2009
  – Review of Technical Information

• Meeting 2 – Philadelphia, December 2009
  – Discussion of Strawman

• Meeting 3 – Atlanta, January 2010
  – Consensus on Criteria Scope

• Meeting 4 – Orlando, March 2010
  – Consensus on Criteria Values

• Report Development
  – Report Components, Initial and Second Draft Reviewed via E-mail and Conference Calls
  – Final Draft Accepted by ETF on August 27th
  – APTA Comment Incorporated into Final Draft
Scope

- 238.203 Static end strength.
- 238.205 Anti-climbing mechanism.
- 238.207 Link between coupling mechanism and car body.
- 238.209 Forward-facing end structure of locomotives.
- 238.211 Collision posts.
- 238.213 Corner posts.
- 238.215 Rollover strength.
- 238.217 Side structure.
- 238.219 Truck-to-car-body attachment.
- 238.233 Interior fittings and surfaces.
Overview of Criteria

• Collision Scenarios
  – Train-to-train Collision Performance
    • Ideal Case
    • Colliding Car Override
    • Coupled Car Override
    • Truck Attachment
  – Grade-crossing Performance (Appendix F)
    • ‘Collision Post’ Impact
    • Corner Impact

• Occupant Volume
  – End Strength (Occupied Volume Integrity)
  – End Structure Integrity
  – Side Strength
  – Roof Strength
  – Prevention of Commodity Entry

• Occupant Protection
  – Occupant Environment
  – Interior Fixture Attachment
  – Occupant Protection Features
Collision Scenario

Moving Train: Train Reflects
Configuration and Vehicle Weights
Proposed for Operation

Standing Train: Locomotive and 5 Coach Cars
Conventional Locomotive = 260,000 lb
Conventional Coach Cars = 95,000 lb

For MU-led or Cab car-led
Consists:

For Locomotive-led
Consists:

20 mph

25 mph
Schematic illustration to highlight crashworthiness features. See Criteria and Procedures report for details.
• Maintaining occupied volume is the primary goal of structural crashworthiness

• Technique other than 800 kips on the line of draft can be used for assuring occupied volume integrity

• Three Criteria Options developed to allow flexibility in vehicle design
  – Option A: 800,000 pounds applied along collision load path without permanent deformation
  – Option B: 1,000,000 pounds applied along collision load path with a limited amount of permanent deformation
  – Option C: 1,200,000 pounds applied along collision load path without crippling the occupied volume
  – All Options allow properly-validated analysis as demonstration of a vehicle meeting the Option

• The collision scenario provides further assurance on the crashworthiness
• Occupant Environment
  – Scenario Criteria Requires Safe Occupant Environment
  – Compare the secondary impact velocity (SIV) curve, to the SIV curve associated with the 8g crash pulse.

• Interior fixture attachment
  – No Criteria Option Specified

• Occupant Protection Features
  – APTA SS-C&S-011-99 Standard for Cab Crew Seating Design and Performance
• Provides an Engineering-based Methodology for Comparing the Crashworthiness of Alternative-design and Tier I Compliant Equipment

• Includes Clear Criteria for Assessing Analysis and Test Results

• Contains Examples of Practicable Analysis and Test Procedures that may be used to Demonstrate Conformity to Criteria

• Is Design Independent
  – i.e., Minimizes References to Buff Stops, Collision Posts, and Other Design-Specific Features
  – Allows for a Wide Range of Structural and Interior Design Approaches
• Engineering Task Force has Developed Criteria and Procedures for Evaluating the Crashworthiness of Alternatively-designed Passenger Equipment for Tier I Service
  – Framework for Presenting Technical Information in Support of a Waiver Request
  – Design-neutral
  – Facilitates the Application of the Latest in Rail Equipment Crashworthiness Technology to the U.S.

• Status
  – ETF Voted to Accept the Criteria and Procedures Report
  – PSWG Votes Today
  – If PSWG Accepts, then RSAC Votes Next Week
  – If PSWG Rejects, Report is Returned to ETF