Implementation of the Nation’s First Standardized Intercity Rail Car Specification

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ABSTRACT

The nation has entered a new age of passenger rail equipment procurement, design and manufacture utilizing nationally standardized technical specifications. These specifications were created through a complex and open process that included participation from all constituents of the passenger rail community and are now being utilized for the first time in a joint procurement of 130 bi-level passenger railcars.

This paper will describe the development of these specifications and update the reader on the current status of the first project to use them, highlighting the amazing collaborative effort undertaken to bring to reality the goal of a national standard passenger railcar and growth of jobs in America in this sector.

Section 305 of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) mandated the creation of a Next Generation Equipment Pool Committee (NGEC) to oversee the development of standardized specifications for new passenger railcars and locomotives. Federal funding programs such as American Recovery and Reinvestment Act (ARRA) and the High-Speed Intercity Passenger Rail (HSIPR) require that new rail rolling stock acquisitions conform to these standard specifications.

The NGEC was established in January 2010 and the voting members of the Executive Board include representatives of 11 State DOTs, the Federal Railroad Administration (FRA) and Amtrak. The draft specification was evaluated by a multidisciplinary team of over 150 representatives from states, Amtrak, American Public Transportation Association (APTA), the rail car supply industry, consultants and the FRA.

On August 31, 2010, the NGEC Executive Board unanimously approved the first standard specifications for a bi-level passenger rail car requiring 100% Buy America participation and Crash Energy Management (CEM).

On November 27, 2012, yet another milestone was reached when the California Department of Transportation (Caltrans) Division of Rail, lead state for
the joint states procurement, issued a Notice to Proceed to Sumitomo Corporation of America. This is a tremendous accomplishment and brings the states and the NGEC so much closer to the ultimate goal of putting next generation “steel wheels on tracks”.

THE ORIGIN OF THE NGEC STANDARDIZATION PROCESS

Development of the first nationwide standardized bi-level specification starts with the passage of PRIIA. Enacted on October 16, 2008, by Federal Law 110-432 Division B, PRIIA was a large and comprehensive package of legislation covering a wide spectrum of rail safety, capital funding, standardization of cost accounting principles, and rolling stock. Section 305 of the PRIIA legislation created the NGEC to “design, develop specifications for, and procure standardized next-generation corridor equipment.” Consisting of a scant 332 words, this provision of PRIIA initiated an aggressive program of rolling stock specification development that will guide the design and manufacture of intercity passenger rail equipment for years to come.

In April 2009, President Barack Obama, announced a new vision for developing high-speed passenger rail in America. He called for a collaborative effort by the federal government, states, railroads, and other key stakeholders to help transform America’s transportation system through the creation of a national network of high-speed rail corridors. To achieve this vision, the FRA launched the HSIPR program in June 2009. This program details the requirements and procedures needed to acquire funding available under ARRA. The HSIPR program supports a series of strategic transportation goals: building a foundation for economic competitiveness; ensuring safe and efficient transportation choices; promoting energy efficiency and environmental quality; and supporting interconnected livable communities. Near-term, the program was intended to aid in economic recovery efforts and lay the foundation for a national high-speed intercity passenger rail network through planning studies and targeted investments in existing intercity passenger rail infrastructure, equipment, and intermodal connections. Long-term HSIPR program funding is envisioned to build an efficient, high-speed intercity passenger rail network, connecting major population centers 100 to 600 miles apart.

It was ARRA and HSIPR that took the PRIIA Section 305 NGEC program from the academic to the immediately practical. These programs both require that intercity rail passenger equipment acquired with HSIPR and ARRA grant funds must be consistent with the NGEC specifications. The specification development process was now backed by a funding mechanism to take the specifications and advance them into actual rolling stock. The timing of the funding programs reinforced to the NGEC the urgency of completing specifications for applicants for Federal funds to use for much-needed rolling stock.

The work of the NGEC was considered critical to rebuilding the rail manufacturing industry in the U.S. As FRA Administrator Joe Szabo stated so aptly at the first annual meeting of the NGEC, “What we seek is the development of a domestic rail car manufacturing industry as multiple
companies competing to build what is essentially the same equipment. We want commonality of design and standardization of components and parts that will permit multiple firms to build essentially the same, interoperable equipment and its components."

**FORMATION OF THE NEXT-GENERATION EQUIPMENT COMMITTEE**

To accomplish the requirements of Section 305 of PRIIA, Amtrak was mandated to establish the NGEC, comprised of representatives of Amtrak, the FRA, host freight railroad companies, passenger railroad equipment manufacturers, interested states, and, as appropriate, other passenger railroad operators. The purpose of the Committee was to design, develop specifications for, and procure standardized next-generation corridor equipment."

On January 14, 2010, the By-Laws and Operating Procedures for the NGEC were approved. During the course of the initial meeting, the Committee was constituted, formed an Executive Board, elected officers, appointed members, and developed and approved a work plan with a very aggressive schedule and timeline.

Voting members of the Executive Board, including the officers, represented eleven state Departments of Transportation (California, Georgia, Iowa, Louisiana, Maryland, Missouri, New York, North Carolina, Oklahoma, Washington and Wisconsin), the FRA, and Amtrak.

At the initial meeting the Executive Board established two subcommittees: the Technical Subcommittee (TSC) and the Finance Subcommittee (FSC). The TSC was created to develop and evaluate passenger rail car and subsystem designs and technologies, and establish performance and safety criteria standards. The TSC also determined the types of equipment required, including bi-level, single-level and trainset car specifications, and diesel-electric locomotive specifications to support operations up to 125 MPH.

The task of creating and approving the specifications for the types of equipment identified in a short timeframe was essential to the success of the NGEC. The TSC was to generate for Board approval a bi-level specification by July 2010. This gave the NGEC a sense of immediacy, and as a result the NGEC looked to specifications that were at a high degree of completion and refinement, and that were intended for use by states or Amtrak to fill equipment needs in the near future based on available funding, ridership growth and fleet planning. Caltrans and Amtrak had both identified bi-level cars as high-priority acquisitions for fleet expansion over the next several years to meet capacity demands and fleet management requirements, and the third-generation bi-level car specification under joint development by Caltrans and Amtrak at the time was close to completion.

**HISTORY OF THE BI-LEVEL INTERCITY CORRIDOR CAR**

The bi-level corridor car is a well-established equipment type – Amtrak and Caltrans have been successfully operating a fleet of intercity bi-level cars in corridor service throughout California since 1995. The bi-level California Car
and Surfliner fleets were an evolutionary design derived from Amtrak’s long-distance Superliner cars, with numerous design changes that made the California Cars and Surliners more suitable to the demands found in a corridor service environment.

The concept for the bi-level intercity corridor car originated with the passage of Propositions 108 and 116 in California in 1992. These propositions provided close to $3 billion for the development of urban, commuter and intercity rail and transit projects in California. Proposition 116 directed Caltrans to develop specifications for standard, state-of-the-art passenger cars and locomotives to be used throughout California. The legislation requirements included a mandate for standardization and interchangeability of cars, systems, and components to reduce maintenance and spare parts costs, similar to the goals of PRIIA. Emphasis was placed on compatibility with Amtrak equipment standards, operations, maintenance and material control. Adherence to existing Amtrak standards for Superliner equipment, including clearances, track geometry, trainline connections and all required functional compatibility allowed the California Cars to operate in mixed train consists with Superliners and ex-Santa Fe high-level cars, as well as a variety of Amtrak-owned locomotives. This enabled the cars to be deployed on routes where Superliners are approved to operate. Both of these type cars can not operate on the Northeast Corridor, due to clearance restrictions under the high-voltage catenary. Cab control cars were designed for locomotive control to enable push-pull operation for operational efficiency and enhanced equipment utilization.

Though built for use in California the design philosophy was specifically focused on creating a new car type for use on other corridors as well.

The first Caltrans fleet acquisition consisted of nine F59PHI locomotives built by Electro-Motive Division of General Motors (EMD) and 66 bi-level “California Cars” built by Morrison Knudsen in four configurations: coach, cab control coach, coach-baggage, and food service.

In 1998 the bi-level corridor car design was advanced to a second generation by Amtrak through its Surfliner car procurement. Built by Alstom Transportation in Hornell, NY, between 1998 and 2002, the Surliners used the California Car as a design base with numerous incremental improvements for passenger amenities, maintainability and operations, while adhering to the same design considerations and objectives used to build the California Cars.

Major improvements included reconfiguration of the interior to add a toilet room on the upper level, different...
system technologies for toilets and side door operators, refinements to the trucks and suspension, and addition of passenger amenities such as convenient electrical outlets at every seat.

Combining the *California Car* fleet with Amtrak’s purchase of 40 *Surfliners* and California’s acquisition of an additional 22 *Surfliner* cars, the total bi-level corridor fleet is now at 128 cars, deployed on the *Pacific Surfliner*, *San Joaquin* and *Capitol Corridor* routes. The ease by which the *Surfliner* cars were functionally and operationally integrated into existing fleets of *California Cars* and *Superliners* is an example of the benefits of recognizing the importance of standardization when specifying and designing new rail equipment. This integration created the basis of a number of the design prerequisites that were incorporated into the third-generation of the bi-level corridor car.

**STARTING WITH THE C21 SPECIFICATION**

Demand for revenue space on the three California intercity corridors has increased dramatically over the last few years, with 49% ridership growth overall in the period of 2001-2010. The *Capitol Corridor* has experienced an astounding 88% ridership growth during those years and is the third most used intercity corridor in the country with 1.8M passengers per year. The last major bi-level fleet expansion occurred in 2002 when Amtrak and Caltrans acquired the *Surfliner* cars. The *Surfliner* service is the second most used intercity corridor in the country with 2.7M passengers per year.

Ridership on Amtrak’s four Illinois routes has grown 75% over the past six years and is now over 2.1M passengers per year. The service from Chicago to St. Louis has double in ridership during this period and is scheduled to start service at 110 mph in 2015. This is the fastest passenger train in North America outside of the *North East Corridor*.

Recognizing the strong demand in passenger growth in California, the Midwest and other corridors nationwide, Amtrak’s Rolling Stock Engineering and Caltrans’ Office of Rail Equipment joined forces starting in 2006 and began a joint initiative to take the bi-level car design to a third generation through detailed analysis of the existing car designs.

Amtrak employees in the Mechanical, Transportation and On-Board Services departments were surveyed for their input on the designs seeking comments on the maintainability, functionality and ease of operation of the various car types. The resulting specification was nicknamed the “Corridor Car for the 21st Century” or “C21 Car”.

The C21 specification utilized many well-established industry standards for design and performance of subsystems, materials and components, such as those developed by APTA, AAR, and industry trade groups. The philosophy was to use as many existing standards as possible.

By December 2009, the C21 specification was 95% complete, and subsequently was identified as a candidate for use by the NGEC as the basis for the bi-level specification development and approval due to its advanced level of completion and the need for the NGEC to bring a
specification to approval in a highly compressed timeframe.

THE TSC GOES TO WORK

Starting on March 4, 2010, the TSC began a series of weekly conference calls that laid out the framework for the specification development, the aggressive timeline that was necessary for specification approval, and the composition of the TSC. The TSC determined that the only way to meet the aggressive deadline for the bi-level specification was to break the work into subgroups that could work in parallel. Seven subgroups were formed and team leaders were appointed for each.

The TSC held its first face-to-face meeting in Chicago in April 2010. Attendance was well over 150 representatives from all stakeholder groups in the NGEC community. The participants were invited to join the subgroup of their choice. Representatives from states, Amtrak, the FRA, car builders, consultants, and major sub-system suppliers provided feedback to the subgroups about what was technologically achievable and commercially viable.

As built, the California Cars and Surfliners did not include crash energy management (CEM) in their design, as that system of structural design had not yet been developed when those car types were designed and built. The California Cars and Surfliners were designed and built in full compliance with FRA requirements for structural strength in effect at the time the cars were delivered. The first production vehicles to feature the innovative CEM technology were the new commuter cars being built for Metrolink in Los Angeles by Hyundai Rotem USA.

Early in the review process, the structures subgroup identified the need to incorporate CEM as an essential safety improvement over the existing carshell design. The structures subgroup, working in conjunction with Caltrans and Amtrak, developed a CEM system that was based on specifying the energy absorption of an individual car in a train, as opposed to the energy absorption of a train consist as a group of coupled cars.

The CEM system as specified in the bi-level specification is specifically intended to allow an individual car with CEM to be operated in a consist of cars that may or may not have CEM, so that each car performs individually but the overall crash performance of the train consist is improved. The inclusion of CEM on an NGEC car will not reduce the structural integrity of the non-CEM cars.

This skillful refinement of the Metrolink-based CEM design for application to a different car type, fleet and operational environment allowed the TSC to adopt CEM as a base carshell structural design for the new NGEC bi-level cars without requiring an expensive and potentially unfeasible redesign and retrofit of the existing bi-level equipment, allowing the owners of the existing equipment to accept the new design with minimal impact on operations.

The completed NGEC bi-level specification, assigned the number 305-001 by the TSC, was unanimously approved at the July meeting of the TSC, a remarkably short three months and seven days after the first face-to-
face meeting in Chicago on April 22 and less than five months from the TSC’s first conference call on March 4, 2010. The process was remarkably short and efficient.

EXECUTIVE BOARD APPROVES THE SPECIFICATION

The specification now moved from the TSC to the full NGEC Executive Board for review and approval. The process, by which the bi-level specification was developed, reviewed and approved in preparation for submittal to the Executive Board is almost as important a component of the NGEC’s mandate and mission as is the specification. The adequacy of the specification is determined by its technical merit as well as by the soundness of the process by which it was created.

A review panel was established to evaluate the bi-level specification, focusing on the specification’s compliance with the Executive Committee’s requirements document and stated objectives as well as additional requirements such as compliance with regulations regarding safety, accessibility and operations.

The final review of the completed specification was performed by Larry Salci, a professional rail equipment consultant under contract to the FRA specifically for performing an objective review of the specifications for completeness, buildability and compliance with the approved requirements document. Mr. Salci has 40 years of experience in the rail equipment manufacturing industry, and brings a very high degree of technical, contractual and practical expertise to the specification review and approval process.

Mr. Salci’s review of the bi-level specification was summarized as follows:

“It is Mr. Salci’s professional opinion that the PRIIA Section 305 Bi-Level Specification meets all major design objectives and requirements of PRIIA, and approval of the Bi-Level Specification is recommended.”

He goes on to add “It is estimated that, during Mr. Salci’s professional career, as the CEO of several passenger railcar manufacturers, he reviewed over 100 rail passenger car specifications. After careful review of the PRIIA Bi-Level car specification, Mr. Salci concluded that this is one of the most thorough, complete, and technically sound specifications he has reviewed.

Upon completion of his review, Mr. Salci prepared a report with a recommendation for approval.

On August 31, 2010, the NGEC Executive Board met in Washington, DC and voted unanimously to approve the NGEC Bi-Level Specification developed and approved by the TSC, just seven and a half months after creation of the NGEC. This approval was a landmark event and represented the first standardized specification developed and approved by the NGEC in accordance with the requirements of PRIIA.

Subsequent to the approval of the bi-level specification, on September 9, 2010 the following announcement was made:
U.S. Transportation Secretary Ray LaHood today announced the first-ever uniform technical standards for the manufacture of high-speed intercity passenger rail cars, a development that will enhance the ability of U.S. manufacturers to compete in what is set to become a burgeoning industry.

Additional comments were provided by Federal Railroad Administrator Joseph C. Szabo. “This is a milestone in the history of rail transportation. These standardized bi-level passenger rail cars will be able to operate nationwide and are compatible with existing equipment. A common design also makes it easier to train maintenance personnel, stock parts and perform repairs, which reduces costs.”

ACTIVITIES OF THE NGEC SINCE APPROVING THE BI-LEVEL SPECIFICATION

The NGEC has recognized the importance of its work and understands that progressing that work in a timely, comprehensive, thorough and open manner is vital to its success and will lead to a rebuilding of the rail equipment manufacturing industry in the United States.

Since adoption of the bi-level specification in August 2010, the NGEC has used the specification development and approval process to complete four additional specifications. The status of the five specifications is listed below:

Specification (1) Bi-Level Intercity – Approved August 2010
Revision C issued – Apr. 2012
Revision C.1 Issued – Sept. 2012

Specification (2) Diesel Electric Locomotive - Approved March 2011
Revision A issued – July 2012

Specification (3) Single Level Car - Approved February 2011
Revisions based on Bi-Level Revs. A, B and C.
Approved – Nov. 2012

Specification (4) Trainset- Approved August 2011
“DCR Effort” in progress to brings trainset standard language up the Bi-Level Rev. C.
Anticipated Approval – 2Q 2013

Specification (5) Diesel Multiple Unit- Approved September 2012

These specifications will retain the standardized format, organization and style of the specifications approved previously, and will be built on the framework of existing specifications, such as the bi-level specification, to promote standardization and consistency.

Once approved, the rail equipment specifications are not static, unchanging documents. The specifications will evolve to meet changing technology, operational needs and environmental conditions, and to allow clarifications and refinements that may be applied during the procurement and manufacture of the vehicles. To address this issue the NGEC, through the TSC, has taken on the development of document management procedures that control the changes made to the approved specifications to preserve the integrity and intent of the specifications. The document management process is part of a systems engineering subgroup that is developing a comprehensive
system for evaluating the specifications throughout the procurement, production and deployment phases of vehicle acquisition. This will ensure that multiple acquisitions and successive generations of vehicles maintain consistency with, and provide feedback into, the documents, processes and visions that were used to establish the specifications in the first place.

These are all landmark achievements and can be considered an extraordinary start to a long term effort. With the recent award of HSIPR grants to a number of states for equipment acquisition, the NGEC, while continuing to develop new specifications will be implementing standardization and their Document Control Process as part of an overall Systems Engineering process.

The NGEC Executive Board established the Joint Procurement Task Force (JPTF) at its June 23, 2011 meeting. Their ultimate goal is getting “wheels on the track” and creating jobs and a reinvigorated the domestic rail manufacturing industry in this country.

The JPTF met weekly for several months advancing towards a multi-state procurement of next generation bi-level cars; and on April 18, 2012 an historic milestone was achieved with the release of the first ever multi-state RFP for the bi-level car. This achievement moved the states involved in the joint procurement (California, Michigan, Missouri and Illinois) closer to the NGEC goals and is a major step toward rebuilding the American rail manufacturing and supply industry.

The process of a multi-state procurement of Diesel-Electric Locomotives is also underway at this time. The Executive Board agreed to have the JPTF issue an RFI to the industry on behalf of the NGEC on July 6, 2012. This is another landmark step in the PRIIA process, as it will be the second NGEC specification for next generation equipment to be put forward for procurement, and, as an NGEC released RFI (rather than an RFI from an individual state) it moves the NGEC in the direction envisioned by Congress and the Administration when it called for the establishment of the NGEC. In February, 2013, Illinois DOT was named as the lead state for this procurement, and James Lindsay was named as the project manager.

The overall NGEC effort, to date, has included a tremendous amount of involvement from experts in the field found among the states, Amtrak, FRA and the industry. The industry participation membership on the TSC continues to grow – there are now 215 members involved on behalf of the manufacturing and supply industry.

**CALTRANS/IDOT PROCUREMENT**

This procurement required a Joint Procurement Agreement between Caltrans and IDOT that specified the purpose, roles, responsibilities, bid evaluation participation responsibilities and financial participation terms for each agency. This Joint Procurement Agreement took several months to negotiate as it required both agencies to resolve specific agency procurement requirements such as which type of procurement could be managed by Caltrans, what DBE/SBE requirements could be included and other issues such as intellectual property, bonding and warranties. The Joint Procurement
Agreement was finalized in September 2011. Caltrans issued RFP 75A0362 on April 20, 2012 and posted on the State’s BidSync site. This joint procurement with IDOT representing the Midwest Coalition of States of Illinois, Michigan and Missouri indicated that Caltrans would purchase 42 railcars and the Midwest Coalition represented by IDOT would purchase 88 railcars. This contract also contains options for up to 300 additional railcars. This contract is funded by FRA and State of CA funds from Proposition 1B bonds. This RFP included the NGEC Technical Specifications and a modified version of the APTA railcar procurement Terms and Conditions. The APTA document was used as a baseline for this procurement as all of the carbuilders had recently participated in developing the format and content in an effort to standardize railcar procurement language by APTA so the industry was familiar with much of the language used. The bids were due on May 30, 2012 and a pre-proposal conference was held May 10, 2012.

The State of California Procurement Department required Caltrans to use a two step process as defined in their procurement regulations as “Draft” and “Final” submittals from the carbuilders. This was not the Negotiated Procurement process that is normally used and prevalent with many FTA railcar procurements. Because this was a new process to the industry the State procurement agency took extraordinary efforts to help the suppliers understand the process. The procurement required a two envelope procedure. One envelope would contain the Qualifications and Technical Packages and the second envelope would contain the Price Package.

The first envelope was evaluated for responsiveness. The Caltrans/IDOT RFP resulted in (7) potential bidders expressing interest in this project. This is an indication of the industry attention that this procurement attracted and a testament to the fairness and transparency of the process. Hyundai Rotem decided to drop out without submitting a Draft Proposal. The other (6) bidders were asked to submit a Draft Proposal and all (6) were considered responsive and were invited to attend confidential discussions.

Per the California State requirements these confidential discussions were intended to assist each bidder in determining if there were any compliance issues found in their Draft proposals and what they could do to resolve them and provide a compliant Final proposal. When asked to submit Final Proposals, Bombardier elected to not continue with the procurement process. The other five bidders were: Alstom, CAF, Kawasaki, Siemens and Sumitomo. Before the Final Proposals were received, Caltrans had issued (37) addenda and had answered 487 questions. This is an indication of how diligent the bidders were being as they had also participated in the NGEC specification development process for the previous two years.

The five remaining bidders submitted Final Proposal by the required due date. Even though Caltrans had clearly indicated issues with their Draft proposals during the confidential discussions, two of the bidders, Alstom and Siemens submitted non-compliant
Final Proposals and therefore did not have their Final Technical and Price Proposals evaluated. Based upon predetermined and published criteria the following were the final technical and price score totals out of a possible 100 points:

CAF – 86.463 points
Kawasaki – 85.242 points
Sumitomo – 90.369 points

Based upon these scores on November 27, 2012, yet another milestone was reached when Caltrans issued a Notice to Proceed to Sumitomo Corporation of America. This is a tremendous accomplishment and brings the joint procurement states and the NGEC closer to their goals. Shown in Figure 2 below is the rendering supplied with the Sumitomo proposal for the next generation of intercity bi-level passenger railcars.

Figure 2. Artist Conception of Sumitomo/Nippon Sharyo New Intercity Passenger Railcar

Part of the submittal package required each bidder to identify the components that they are proposing for NGEC/FRA mandated standardization. Caltrans/IDOT and FRA are monitoring the Standardization Plan submitted by Sumitomo with the intention of establishing standardized components and interfaces for the passenger rail industry.

The FRA grant funding requirements also mandated 100% Buy America compliance for these railcars. This was the first procurement to include these requirements which required Caltrans and IDOT to work with the FRA to clarify what the carbuilders would be required to provide to demonstrate 100% Buy America compliance. To accomplish this the agencies and the FRA developed a 115 item list of components that must be manufactured in the United States in order to have their railcars be considered 100% Buy America compliant. The most critical component on this list was the requirement to build the car body structure in the United States. Most carbuilders continue to build their car body structures outside of the United States and then perform final assembly in their U.S. factories.

Once Sumitomo was chosen as the preferred supplier, Caltrans, IDOT, their consultants and the FRA conducted a series of pre-award Buy America compliance audits. To prepare for this Caltrans and their consultants prepared a Buy America compliance audit procedure that included roles and responsibilities, the audit inspection process and forms and the draft audit report format. These audits were performed in numerous locations simultaneously during the first part of October 2012 in order to expedite the NTP for Sumitomo. The final Buy America pre-award audit report indicated that Sumitomo and their sub-suppliers would be compliant.
During the latest NGEC Annual Meeting, held in Washington D.C. on February 21, 2013 the NGEC Chairman, Bill Bronte (Caltrans Division of Rail Chief), stated “we have accomplished one massive amount of work in about 37 months, it is amazing. In that amount of time we have adopted 5 NGEC specifications and are working on a 6th. He further elaborated on the fact that in a very short period of time (from July 2011) California, working with the states of Illinois, Michigan, Missouri as well as other NGEC members, FRA and Amtrak, took “the very concept of 305” and working with the standardized NGEC Bi-Level specification, were able to “put into practice and actually do what has never been done before”. With California as the lead state and Illinois representing the mid-west states, an RFI was developed, followed by an RFP, followed by a notice to award a contract, and ultimately a notice to proceed with a multi-state procurement of next generation bi-level passenger rail cars. Managing the procurement was a phenomenal accomplishment and a tremendous collaboration among “the FRA, Amtrak and all of the individual states involved, and was remarkable in that it all was accomplished in about 18 months.” From the release of the RFP to the signed contract in November of 2012 this group “accomplished in 9-12 months what normally would take 18-20 months for one state.”

Stan Hunter (Caltrans Division of Rail Chief of the Office of Rail Equipment) elaborated “there are hundreds of requests for specification changes that have come through this process and always with tight time controls to support the procurement. This was a superhuman effort. There is no way the bi-level procurement could have been awarded in a timely manner if not for the NGEC TSC”

At this point in the meeting, Chairman Bronte introduced FRA Administrator Joe Szabo. The Administrator noted that there have been three overriding factors for PRIIA Section 305: “Standardization; the future of the NGEC; and bundling of orders to get efficiency of scale to allow us to build domestic supply and achieve Buy America objectives”.

Administrator Szabo addressed the meeting attendees stating “In 3 years it is amazing to see what you have accomplished. I wanted to come here today to say thank you…you are a very unique group that has come together to develop these specifications; and I am glad to see the fruits of the efforts with the first procurement out the door with the bi-level coming in at 35% below budget.” He further elaborated that “this shows the power of bundling” and commented that “100% Buy America is creating 250 jobs directly in Illinois” and additional jobs “will tumble down”.

The next step is the Diesel-electric locomotive procurement at sustainable speeds up to 125 mph. “I want to thank California and Illinois for the work that lies ahead with the locomotive procurement.”

TEAMWORK WITH THE FIRST NGEC CARBUILDER

Sumitomo Corporation of America (SCOA) is responsible for the commercial and contractual aspects of this contract. Their partner in this project is Nippon Sharyo who will be
responsible for the technical and production aspects of this project.

SCOA, established in 1952 and headquartered in New York, NY, is the largest subsidiary of Sumitomo Corporation. They have 10 offices and over 80 subsidiaries and affiliates in the U.S. and Canada. Their Transportation System Group has over 30 years' experience in the North American Rail Industry and has provided over 900 cars delivered on time and on budget.

Their partner in this project, Nippon Sharyo U.S.A.(NS) is headquartered in Arlington Heights, IL, and was established in May 1982. They have an existing manufacturing plant located in Rochelle, IL about 80 miles West of Chicago. This plant started operation in June 2012 and is currently building railcars for Metra and SMART. They employ over 300 people, have a capacity for up to 120 railcar per year and currently have about 463,000 square feet of manufacturing facility on a 35 acre site.

Because of the PRIIA/FTA requirements to build the car body in the United States with steel made here Nippon Sharyo has elected to expand this facility by adding Shop Number 3 as shown in Figure 3 below:

This new facility will add over 300,000 additional square feet of manufacturing capability to their plant. This facility will be used to do metal fabrication and machine production to manufacture major parts and components for the car body using U.S. made raw materials. It is under construction now and is expected to open in 2014. This new facility required Nippon Sharyo to invest over $50 million and will employ around 80 new staff.

Caltrans and IDOT along with their staff and consultants are currently conducting Preliminary Design Reviews (PDR) as specified in the NGEC specifications and contract documents. This activity is estimated to be completed later this year to be followed by Intermediate and Final Design reviews which should be concluded in 2014. The Pilot Cars are expected to be delivered in August of 2015 with railcar production starting in 2016.

At a ground breaking ceremony for the new Shop Number 3 in April 2013, the SCOA/NS team emphasized their focus on building quality railcars on time and on budget. They also reinforced their
commitment to the NGEC/FTA goals for this project as summarized below:

**Standardization:**

- Use standard existing systems and components wherever possible
- Identify and control key interfaces to provide for “form”, “fit” and interchangeability
- Standardize interface and performance requirements

**Buy America:**

- 100% compliant with FRA Buy America Requirements
- Multiple potential suppliers for competitiveness
- Do not compromise on quality
- Encourage participation by Small Businesses
- Job creation and capital investment in the U.S.A.

During this ceremony, Kevin Koyasu of Nippon Sharyo stated “we are honored to be doing this project; we are honored by those present in the room. The 305 Committee made the specification, USDOT, Amtrak, Caltrans and IDOT, the mid-west states, and all of the members of the industry who have participated in these activities – we thank you for all of your efforts.”

He continued “we have the baton to build the cars and in two and a half years you will see the results of your work.”

The PRIIA 305 standardization process, the NGEC developed specifications and the Caltrans/IDOT contract are all intended to create the best passenger rail rolling stock for many diverse operational environments and circumstances. This project and all of the participants are well on the way of accomplishing these goals.

**ACKNOWLEDGEMENTS**

The authors would like to acknowledge the hundreds of contributors to the NGEC bi-level specifications, including members of state agencies, the FRA, APTA, Amtrak, consultants, car manufacturers, industry representatives and other organizations. Without their skill, dedication and tireless effort, the specifications would not be as complete, comprehensive and refined as they are. Their participation in the NGEC process was on a voluntary, time-available basis. This is an example of true teamwork.

**REFERENCES**

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LIST OF FIGURES AND CAPTIONS

Figure 1. Surfliner Cab-Baggage Car for use in Amtrak California Service

Figure 2. Artist Conception of Sumitomo/Nippon Sharyo New Intercity Passenger Railcar

Figure 3. Artist Conception of Addition of Shop #3 at Nippon Sharyo Facility, Rochelle, IL
IMPLEMENTING STANDARDIZED INTERCITY PASSENGER RAILCAR SPECIFICATIONS

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Next Generation Equipment Committee

- Section 305 of “Passenger Rail Improvement and Investment Act” (PRIIA) in 2008
- Mandated to: “design, develop standardized next-generation corridor equipment”
- Consists of States, Amtrak, the FRA, rail equipment suppliers, consultants and others
- Voting Executive Board is Amtrak, FRA and 11 State representatives

Program Goals and Funding

- Bring to reality a national standard passenger railcar and growth of jobs in America
- Help transform America’s transportation system creating a network of high-speed rail corridors
- 100% Buy America participation and Crash Energy Management (CEM)
- ARRA and HSIPR took the NGEC program from academic to immediately practical

Bi-Level Design Considerations

- Use of existing fleet layouts
- Flexible configuration
- Modularity:
  - Seat pitch is adjustable
  - Business Class is modular
  - Meets many service scenarios
- Reliable, comfortable, maintainable
- Standardization vs. Innovation

Bi-Level Operational Considerations

- All operational and environmental conditions in North America except Northeast Corridor
- Operable as standing fleet or intermingled with existing bi-level fleets
- Standardized with existing bi-levels:
  - Upper and lower floor height
  - Train line pin assignments
  - Amtrak clearances and track geometry

Benefits of Standardization

- Interoperability between fleets (legacy/new)
- Flexible deployment allowing mixed train sets
- Promotes evolution of design
- Commonality of parts

Surfliner (2001)
Superliner (1978)
California Car (1994)
**History of Existing CA Fleet**

- Bi-level corridor car well established — in service since 1995
- *California Car* and *Surfliner* evolutionary from *Superliner*
- Large vestibules, low floor boarding — 18 in. TOR and pass through at 104.5 in. above TOR
- First passenger railcar with ADA compliant wheelchair lift on board
- Current Fleet - 66 *California Cars*, 40 Amtrak *Surfliners*, 22 Caltrans *Surfliners* — 128 cars total.

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**First Gen. CA Car Innovations**

- Enclosed Luggage Bins
- Large Windows with Curtains
- Wide Aisles
- Work Tables

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**Second Gen. Surfliner Innovations**

- Rest room Upper Level
- Improved Ride Quality
- Open Luggage Bins
- Electrical Outlets Each Seat
- Wider Seats

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**Shared Features on Both Cars**

- Water Fountain
- ADA Restroom
- On-Board W.C. Lift

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**Successful Growth in CA Corridors**

- Caltrans and Amtrak operating a fleet in corridor service throughout California since 1995
- The three California intercity corridors increased ridership by 49% in the period of 2001-2010
- *Capitol Corridor* experienced 88% ridership growth third most used intercity corridor at 1.8M pass./yr.
- *Surfliner* service is the second most used intercity corridor in the country with 2.7M pass./yr.

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**Successful Growth in IL Corridors**

- Ridership on Amtrak’s four Illinois routes, grown 75% in the past six years now over 2.1M pass./yr.
- In 2013, the Chicago-St. Louis corridor has averaged an 88% on time performance.
- Chicago-St. Louis trains will run at 110 mph and will be the second fastest in North America
- More 110 mph runs will be added 2015, reducing one-way time by as much as 40 minutes
- When corridor improvements are completed 2017 one-way trip time, one hour faster than at present
NGEC Bi-Level Specification Basis

Create industry standard technical specifications through complex and open process
Caltrans and Amtrak had identified bi-level cars as high-priority acquisitions for fleet expansion
Bi-level car specification under joint development by Caltrans and Amtrak and close to completion
NGEC chose the C-21 (Gen. 3) baseline specification from Caltrans/Amtrak as starting point

NGEC Bi-Level Specification Process

Evaluated by over 150 representatives from Amtrak, FRA, suppliers, consultants, etc.
Process started March 2010, approved by Technical Subcommittee — July 29, 2010
Executive Board Adopts Bi-level August 31, 2010
Additional NGEC Specifications:
  - Single Level – Feb. 2011
  - Locomotive – March 2011
  - Trainset – August 2011
  - Diesel Multiple Unit (DMU) – September 2012

NGEC Bi-Level Specification Key Features

- Crash Energy Management (CEM)
- Improved ADA criteria – 49CFR Part 38
  - Lift capacity from 600 lbs. to 800 lbs.
  - Platform from (30” X 48”) to (30” X 54”)
  - Parking Area from (30” X 48”) to (32” X 59”)
  - Minimum vestibule from 42” to 44”
- 100% Buy America
- Tier 4 locomotives and 125 mph operation

NGEC Bi-Level Specification Features

Stainless steel construction (U.S. made)
Designed and built per 49CFR Part 238 Tier 1 and APTA-SS-C&S-034-99
Car types and seating configurations
  - Coach – 89 seats, 1 W.C. space
  - Cab – 75 seats, 1 W.C. space
  - Café/Lounge – 35 seats, 1 W.C. space,
    21 lounge (non-revenue) seats, 4 crew station seats
- Wi Fi, worktables, convenience outlets, passenger information LCD screens, real-time train wellness data, designed for use with PTC

NGEC Bi-Level Specification Dimensions

- 85 ft. long, 16 ft. 2 in. high, 10 ft. 6 in. wide
- Operates at 5 in. cant deficiency per 49CFR213
- Lower floor height 18 in.
- Upper floor height 104.5 in.
- Side door openings 52 in
- Operate at 125 mph to FRA/AREMA standards
- Maximum weights:
  - Coach – 150,000 lbs.
  - Cab/Baggage – 154,000 lbs.
  - Café/Lounge – 153,000 lbs.

CEM - Crash Energy Management

Innovative technology from FRA, Volpe Center.
First application on revenue cars is Metrolink’s new Rotem cars.
Adapted for application to the new bi-level fleet
CEM – Design Features

- Energy absorption car-based, not train-based.
- CEM-equipped cars in mixed consists with non-CEM cars.
- Interior “crush spaced” used for utilities:
  - Trash receptacles
  - HVAC ducting
- Cab/Baggage car has flat front end with car-to-car pass-through is an engineering challenge

PRIIA Required 100% Buy America

- Most agencies and builders used to FTA requirement of 60% domestic content
- FRA worked with NGEC/Caltrans/IDOT to develop list of 115 items to be manufactured in the U.S.
- The largest critical item was the car body
- Most carbuilders continue to build their car body structures outside of the United States
- Caltrans and IDOT performed pre-award Buy America audits October 2012

Managing the Procurement

- Caltrans appointed lead agency for the first procurement using the NGEC specifications
- California DOT (Caltrans) and Illinois DOT (IDOT) signed a Joint Procurement Agreement Aug. 2011
- IDOT also represents the Mid-West states of Michigan, Iowa and Missouri
- RFP 75A0362 issued on April 20, 2012 for (42) Caltrans cars and (88) IDOT cars
- RFP included the NGEC technical specifications and a modified version of APTA Terms/Conditions
- APTA terms recently developed by the industry

Caltrans Procurement Process

- State of California not allowed to use rail car industry standard negotiated procurement process
- Caltrans process was a two step Draft/Final
  - One envelope “Qualifications” the other “Price”
  - (7) potential bidders, Rotem dropped out
  - (6) bidders submitted Draft Proposals and were considered responsive
- Caltrans issued 37 addenda and answered 487 questions before Final Proposals were due

Caltrans Procurement Process (cont.)

- (5) submitted Final Proposals, Bombardier dropped out
- Caltrans/IDOT conducted confidential discussions to help all bidders be compliant for “Final”
- In spite of these efforts Alstom and Siemens submitted non-compliant Final Proposals
- Based upon pre-determined and published criteria the remain (3) proposals scored out of 100 were:
  - CAF – 86.463 points
  - Kawasaki – 85.242 points
  - Sumitomo – 90.369 points

Sumitomo Corporation of America

- Based upon scores NTP is issued Nov. 27, 2012
Caltrans/IDOT Partners

Sumitomo Corp. of America (SCOA) is the largest subsidiary of Sumitomo Corporation
Established in 1952; HQ in NY, NY; 10 offices and 80 subsidiaries in North America
Transportation Systems Group over 30 years experience in North America
Provided over 900 railcars delivered on time and on budget

Nippon Sharyo U.S. A. (NS) HQ Arlington Heights, IL, established on 1982 will build for SCOA
Existing plant in Rochelle, IL about 80 miles NW of Chicago
In operation June 2012 building railcars for METRA and SMART
Currently 300 employees, 463,000 sq.ft. of manufacturing facility on 35 acres
Due to requirements for 100% Buy America, plan to add 300,000 sq.ft. metal fabrication shop
Investing $50M building now, expect open 2014

Nippon Sharyo Mfg. Facilities

At recent NGEC meeting Chairman Bill Bronte congratulated the NGEC members and Board for
Put into practice what had never been done before
Accomplished in 12 months with multiple states what was not normally done by one state in 20 months
FRA Administrator, Joe Szabo added: standardization and bundling orders for efficiency resulted in the first order coming in 35% below budget
Caltrans and IDOT are currently finalizing Preliminary Design Review
Pilot cars are expected August 2015 with production starting in 2016

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