SCRRRA
PEER REVIEW
TEAM REPORT

FINAL
08.06.10
August 6, 2010

Mr. Darrell J. Maxey, P.E.
Director, Engineering and Construction
Southern California Regional Rail Authority
700 S. Flower St., Suite 2600
Los Angeles, CA 90017

Dear Mr. Maxey:

On behalf of the SCRRA PTC Peer Review Panel, I am pleased to submit our Final Report to SCRRA Senior Management and Board of Directors.

The SCRRA PTC Peer Review Committee was selected based on the criteria established in the April 23, 2010 Board Motion as well as for their industry knowledge and experience, and their familiarity of the regulations and requirements regarding Positive Train Control (PTC). Three of the SCRRA PTC Peer Review members are directly responsible for the implementation of PTC on their respective railroads.

The Panel focused on the three questions:
1. Is the PTC scope of work reasonable and cost effective?
2. Will the PTC Scope of Work meet the Federal requirements of the Rail Safety Improvement Act and the FRA PTC Regulations and Requirements?, and
3. Will the proposed PTC system be completely interoperable and functionally equivalent with the BNSF Railway and Union Pacific Railroad PTC system proposed for the Metrolink territory?

The SCCRA PTC Peer Review Team findings are presented in detail in the attached report. In summary, the Team believes, that at the present time, SCRRA's PTC program incorporates all of the elements of a comprehensive plan for implementation of a Positive Train Control System, is consistent with the rules and regulations published by the Federal Railroad Administration in support of the Positive Train Control mandate, and, if implemented as defined, will result in a system that will be fully interoperable and functionally equivalent to the BNSF Railway and
Union Pacific Railroad PTC system proposed for the Metrolink Territory. It is important that SCRRA continue to coordinate its program efforts with those of its rail partners in the LA Basin. In order to ensure that SCRRA continues to remain in compliance with BNSF, UP, and Amtrak’s PTC efforts, the Peer Review Team strongly suggests that SCRRA become a member and active participant on the industry’s Interoperable Train Control (ITC) Working Group.

On behalf of all of the members of the SCRRA PTC Peer Review Team, thank you for your support and the support of all of your staff and consultants.

Sincerely,

Peter A. Cannito Sr.
Chairman, SCRRA PTC Peer Review Team

Attachment

CC:   Robert E. Burkhardt, P.E.   ISIS, LLC
      E. Keith Holt         Amtrak
      Gregory M. Richardson Union Pacific Railroad
      Charles Edward Tilley  BNSF Railway
      Ronald Wong, P.E.      FTA PMOC/PGH Wong Engineering, Inc.
Introduction

At its April 23, 2010 Board Meeting, the Southern California Regional Rail Authority (SCRRA) Board of Directors approved a motion authorizing SCRRA Staff along with assistance from staff members from the five (5) member agencies to arrange to conduct a peer review of the PTC project scope of work prior to the award of the PTC Vendor/Integrator contract.

The scope of work of the Peer Review Panel, as defined by the Board motion, is to identify the most reasonable and cost effective requirements necessary to meet federal PTC regulations and implement a system that is completely interoperable and functionally equivalent with the systems being installed by the BNSF Railway and Union Pacific Railroad in Southern California on routes over which Metrolink trains operate. Per the Board motion, the review committee is to be made up of staff members from the BNSF, Amtrak, Union Pacific and two independent consultants not presently contracted to provide service to SCRRA.

Copy of SCRRA April 23, 2010 Board Motion attached as Attachment 1

PTC PEER REVIEW PANEL MEMBERS:

In accordance with the SCRRA Board Motion of April 23, 2010, the SCRRA Staff organized a PTC Peer Review Panel in accordance with the direction provided in the motion. In addition, SCRRA Staff invited a sixth member to participate on the PTC Peer Review to represent the Federal Transit Administration (FTA). The PTC Peer Review Members are:

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<tr>
<th>Name</th>
<th>Position/Role</th>
<th>Institution/Consulting Company</th>
<th>Role</th>
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<tbody>
<tr>
<td>Peter A. Cannito Sr.</td>
<td>Independent Consultant</td>
<td>LPC and Associates, Inc.</td>
<td>Chairman</td>
</tr>
<tr>
<td>Robert E. Burkhardt,</td>
<td>Independent Consultant</td>
<td>ISIS Consultants</td>
<td>Vice Chairman</td>
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<tr>
<td>E. Keith Holt</td>
<td>Deputy Chief Engineer C&amp;S</td>
<td>Amtrak</td>
<td>Member</td>
</tr>
<tr>
<td>Gregory M. Richardson</td>
<td>General Director – Transportation Systems</td>
<td>Union Pacific Railroad</td>
<td>Member</td>
</tr>
<tr>
<td>C. Edward Tilley Jr.</td>
<td>Director – Network Control Systems</td>
<td>BNSF Railway</td>
<td>Member</td>
</tr>
<tr>
<td>Ronald S.W. Wong P.E.</td>
<td>FTA Project Management Oversight Consultant</td>
<td>PGH Wong Engineering, Inc.</td>
<td>Member/Observer</td>
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Resumes for the PTC Peer Review Member are attached as Attachment 2
PTC PANEL FOCUS:

The Panel review and report focus on three questions:

1. Is the PTC scope of work reasonable and cost effective?
2. Will the PTC scope of work meet the Federal requirements of the Rail Safety Improvement Act and the FRA PTC Regulations and Requirements?
3. Will the proposed PTC system be completely interoperable and functionally equivalent with the BNSF Railway and Union Pacific Railroad PTC system proposed for the Metrolink service territory?

PTC PEER REVIEW TEAM PROCESS:

Observations and findings of the PTC Peer Review Team are based on the review of selected data and interviews with SCRRRA PTC Project staff and members of the Technical Advisory Committee of the five (5) county member agencies. The meetings were conducted over a two day period; July 20, 2010 through July 21, 2010 in the offices of the SCRRRA PTC project team located at 700 S. Flower St., Los Angeles, CA and at the Pomona MOC. The PTC Peer Review members were provided documentation by the SCRRRA staff for review prior to the meetings in Los Angeles. The Peer Review Panel received the following documentation prior to the July 20th and 21st meetings:

- Positive Train Control Project Scope/Schedule/Risk/Costs/Funding Book
- May and June 2010 PTC Monthly Project Status Reports
- Copy of the April 23, 2010 Board Motion
- Copy of May 19, 2010 letter from FRA provisional approval of the SCRRRA Positive Train Control Implementation Plan

In addition, in the July 20th meetings at the SCRRRA PTC project offices, the PTC Peer Review Panel also received a briefing on SCRRRA’s project approach including project elements and tasks to be performed by the SCRRRA Project Team and the Vendor/Integrator (V/I), a high level briefing on the V/I’s response to SCRRRA’s Request for Proposal No. H1636-10 for the system design, integration, manufacture and installation of the SCRRRA PTC system including a new Computer Aided Dispatching System.

The PTC Peer Review Team did not review Parsons Transportation’s Vendor/Integrator Proposal, nor did it review SCRRRA’s RFP Specifications for the PTC Vendor/Integrator.

The briefings were conducted by members of the SCRRRA PTC Project Management Team led by Darrell Maxey, SCRRRA’s PTC Program Manager. Aside from the PTC Peer Review Team the following key personnel also participated in the briefings:
On Wednesday, July 21, 2010, the PTC Peer Review Team met with the following members of SCRRAs’s Technical Advisory Committee (TAC):

Alex Clifford, Los Angeles County MTA, Executive Officer, High Speed Rail
Jay Fuhrman, Los Angeles County MTA, Transportation Planning Manager
Jennifer Bergener, Orange County Transportation Authority, Acting Director Rail Program
Michael Litschi, Orange County Transportation Authority, Section Manager, Metrolink Operations
Sheldon Peterson, Riverside County Transportation Commission, Rail Manager
Mitch Alderman, San Bernardino Associated Governments, Director Transit and Rail Programs
Carl Shiermeyer, Schiermeyer Consulting Services representing RCTC and SANBAG

The PTC Peer Review Team had a private meeting with the members of the SCRRRA TAC to listen to their concerns and answer their questions. Most of the TAC member concerns involved the cost of the PTC program and the inclusion of projects within the PTC program that are not directly related to the requirement to have PTC implemented by December 31, 2012. There was general agreement on the part of the TAC members that the respective SCRRRA Board Members they represent are committed to meeting the deadline. Many of the concerns expressed by the TAC members are addressed in this report.
PTC Peer Review Findings

I. Is the PTC Scope of Work Reasonable and Cost Effective?

The Scope of Work as defined by SCRRRA is reasonable and comprehensive, based on the Peer Review Team’s experience with similar efforts. However, not all of the scope elements, defined in the SCRRRA PTC Program, are necessary to directly support the implementation of PTC to meet the December 2012 timetable. PTC consists of five (5) core elements. They are:

- Dispatch System
- Back Office Server (BOS)
- On Board Equipment
- Communication System: two components 220 MHZ Radio (Wayside to On-Board Communications) and Backhaul (Land or field based path back to office systems)
- Wayside Interface Units

The SCRRRA Program includes all of these core elements, and the responsibility for the integration of these elements has been assigned to the Vendor/Integrator for implementation. The PTC Peer Review Team agrees with this approach.

There are scope of work elements and future cost drivers included in the project that are not core PTC elements and necessarily essential in order to deliver a fully compliant and interoperable PTC system by December 2012. These non-core work elements can be categorized into two areas:

- Non-Core Elements of PTC that support the program and may be opportune to implement concurrent with the PTC program but should be justified independently of the PTC Program. Examples of these non-core elements are the new hardened Pomona PTC/Train Control Facility, portions of the mapping/survey elements that were performed as part of the project, relocations of signals to improve operations that are not necessary to correct safety issues, lease of locomotives to support the testing, the installation of 1/10 mile milepost indicators, and the installation of a fiber optics system. These work elements will support the PTC system and enhance the reliability, security,
and operations of the system but are not core elements necessary to make the system work. The inclusion of these work elements is a management decision and should be based on justification that is separate from the requirement to install PTC to meet the Federal mandate.

- Non-Core elements of PTC that have an impact on future operating costs as a result of their inclusion in the program or as a result of scope beyond the requirements to support the PTC effort. The two examples of work elements that impact future operating costs are the level or extent of mapping and surveying performed in support of the project and the decision to install the 1/10 mile milepost indicators along the right-of-way. Both of these scope elements will require future maintenance and oversight.

The PTC Peer Review Team recommends that SCRRA Management review the need and timeline for proceeding with these work elements. They do not necessarily need to be completed by December 31, 2012 to ensure a fully compliant and interoperable PTC System and their inclusion in the Program should be justified on the basis of their own merits.

A work element that was described in the SCRRA PTC Implementation Plan, V/I RFP, and V/I proposal is the inclusion of a Vital Safety Server (VSS) in the design of the PTC System. The Vital Safety Server (VSS) will add diversity processing to the PTC back office function which provides safety validation of the information generated by the dispatching system, such as the authorities conveyed to trains or Roadway Workers. Class 1 Railroads plan to achieve the requisite level of safety for the PTC back office function through other means and are not currently planning on including the Vital Safety Server as part of their core PTC system. As such, its specification is not part of the work being conducted by the Interoperable Train Control Working Committee. Development of a VSS would be a project specific to the SCRRA and it is the opinion of the PTC Peer Review Committee that the development be reviewed after SCRRA has become an active participant in the ITC and considers alternatives. One such alternative is to defer the development of the VSS beyond the December 31, 2012 deadline. Deferring implementation of the VSS may reduce schedule risk to the initial rollout.

The PTC Peer Review Committee recommends that SCRRA join the Interoperable Train Control (ITC) Working Group, as soon as possible. The ITC Working Group is member organization of railroads that are working on the development of interoperable specifications to support PTC. SCRRA has been coordinating its efforts with the Union Pacific, BNSF, and Amtrak in the development of their specifications for the RFP but it has not joined the ITC because of concerns within the organization of executing the required Non-Disclosure Agreement to gain entry. Membership will provide SCRRA the ability to participate in the development of interoperable specifications, ensure that SCRRA’s needs are coordinated and included in the
specifications that are developed and do not conflict with the specifications of the member railroads which include Amtrak, Union Pacific and BNSF. Acceptance of the common specifications developed by the ITC will allow SCRAA to reduce the need to develop their own specifications as part of the Vendor/Integrator contract, maximize the probability of success at achieving interoperability, and will allow SCRAA to share the risk associated with the development of such specifications with the entire ITC community.

The TAC expressed concern about the cost per mile for implementing PTC within the SCRAA service territory and asked the PTC Peer Review Team if cost per mile was a valid industry metric. It is the general consensus of the PTC Peer Review Team that a cost per mile metric that can account for the differences in project scope and operational structures between SCRAA and other properties and be used to validate the reasonableness of the budget would require significant time and effort to develop. The PTC System development has core elements, such as the dispatch system and the BOS that are common regardless of the size of the system. On large systems, the cost per mile would be lower than on small or mid size systems. SCRAA also has a need to replace its current DigiCon Dispatch System as part of the PTC project. This is not a requirement that is common throughout the railroad industry. In addition, there are core elements that are variable in nature, such as the Wayside Interface Units (WIU) and the On-Board Equipment. On large systems the cost per mile is less because of the volume pricing for larger quantities of units purchased.

II. Will the PTC scope of work meet the Federal requirements of the Rail Safety Improvement Act and the FRA PTC Regulations and Requirements?

It is the PTC Peer Review Team’s opinion that SCRAA’s PTC scope of work will result in a PTC system that will meet the functional requirements of the Rail Safety Improvement Act and FRA’s PTC Regulations and Requirements. The most important factor is that SCRAA received provisional approval with conditions from FRA for their PTC Implementation Plan on May 19, 2012. (Attachment 3) Two of the three provisional conditions cited in FRA’s approval were satisfied by SCRAA within 30 days of the receipt of provisional approval and the third (3rd) condition can only be satisfied once SCRAA determines the actual technology to be used. Based on the Vendor/Integrator Proposal received and currently under review, SCRAA will be adopting the Vital Electronic Train Management System (V-ETMS®) as its technology for PTC. V-ETMS® is the current solution being developed and adopted by Union Pacific Railroad and Amtrak (for its operations over freight host carriers), and will be interoperable with the PTC solution Electronic Train Management System (ETMS®), being deployed by the BNSF Railway. The proposed Vendor/Integrator Team includes two of the primary developers of the V-ETMS® system, Wabtec Railway Electronics and ARINC. V-ETMS® is described in a set of specifications developed through the efforts of the ITC participants, AAR, and AREMA, and as such, meets ITC
requirements for interoperability. Although, V-ETMS® has not yet received Type Approval (Type Approval is granted to a product to indicate that it could meet the statutory requirements for PTC systems specified by RSIA08 and the regulatory requirements under subpart I) from FRA, FRA did approve both Union Pacific’s and Amtrak’s respective PTC Implementation Plans, each of which includes V-ETMS® as a PTC system solution. FRA recently completed preliminary review of V-ETMS® PTCDP and the plan is currently being updated in response to their findings. Lastly, V-ETMS® has been accepted by both host and tenant railroads operating over the SCRRA rail system.

III. Will the proposed PTC system be completely interoperable and functionally equivalent with the BNSF Railway and Union Pacific Railroad PTC system proposed for the Metrolink service territory?

The V/I proposal received by SCRRA includes the suppliers who are most experienced in the interoperable PTC technologies that UP and BNSF plan to deploy. Should SCRRA award a V/I contract and proceed with a plan to deploy V-ETMS®, SCRRA would assure itself that it is deploying a solution that provides interoperability amongst all parties. Furthermore, SCRRA would share with UP and BNSF any and all risks to successful development and interoperability of V-ETMS® and its supporting communications standards.

UP, BNSF, and other ITC participants utilize common specifications from which to develop the interoperable portions of V-ETMS®. This approach obviates the need for each participant to develop its own specification and the need to coordinate those specifications amongst all permutations of parties to ensure that interoperability is established and maintained. The Peer Review Team would have significant concern with any SCRRA and/or V/I plan that required development of SCRRA-specific specifications that attempt in any way to “shadow” or supersede the interoperability specifications developed by ITC.

**Amtrak, BNSF Railway and UP Railroads Commitment to SCRRA’s Timeline**

All of SCRRA partners in the LA Basin are committed to meeting the PTC Implementation target date of December 31, 2010.

Amtrak has made a commitment to have its locomotive fleet operating in the LA Basin equipped with V-ETMS® on-board by December 31, 2012.

BNSF Railway’s PTC Implementation Plan, approved by FRA, shows that the San Bernardino Subdivision, over which SCRRA operates, is the first and highest priority as shown in the risk analysis. As a result of this number one priority, PTC wayside equipment installation has already begun in Southern California. BNSF Railway is committed to a PTC implementation date of December 31, 2012 on the San Bernardino Subdivision.
Union Pacific’s PTC Implementation Plan, approved by FRA, specifically states its position that the implementation of PTC on the lines over which SCRRA operates as its first and highest priority. This priority is borne out in the schedule data published in the plan, which identifies wayside equipment installation beginning in 2011, submission of the FRA-required PTC Safety Plan in 4th quarter 2011, planned acquisition of PTC System Certification in 3rd quarter 2012, and commissioning of PTC in 2012 on the affected portions of its Los Angeles and Santa Barbara subdivisions. Union Pacific utilizes this December 2012 planned implementation date from which to determine the target dates for all prerequisite PTC development milestones.
Attachment 1

Board Motion
April 23, 2010 Metrolink Board Meeting
Item 13 - SCRRA Positive Train Control Program Update on Scope & Peer Review

ALTERNATIVE MOTION BY VICE CHAIRMAN KATZ TO CONSIDER REGARDING PTC PEER REVIEW (INCLUDING LANGUAGE ADDED BY DIRECTOR MORRIS)

The revised motion, as detailed below, was introduced by Vice-Chairman Katz, seconded by Director Morris and passed unanimously by the Board.

Prior to award of the PTC Vendor/Integrator contract, SCRRA staff along with assistance from staff members from the five member agencies shall arrange to conduct a peer review of the PTC project scope of work to identify the most reasonable and cost effective requirements necessary to meet federal PTC regulations and implement a system that is completely interoperable, functionally equivalent, with the systems being installed by the BNSF Railway and the Union Pacific Railroad in Southern California on routes over which Metrolink trains operate. The review committee should at least include staff members from the BNSF, Amtrak, UP and two independent consultants not presently contracted to provide services to SCRRA.
Attachment 2

PTC Peer Review Panel Member Resumes
Qualifications Profile

A professionally-licensed engineer with an extensive railroad background; Fifteen years in freight, commuter, and light rail signal systems design preceded by a seventeen year history in the signal, communications and electrical departments of CSX. Holds a BS in Electrical Engineering Technology and professional licensure in ten states. A leader in the rail community as an AREMA Committee member, a credited author / editor of the IRSE’s manual on ‘North American Railway Signaling’, and founder and president of six-year old signal design company, ISIS Consultants, LLC.

Expert Skills

- Estimating Cost, Material, and Construction
- Relay / Solid-state Interlocking Design
- Applications Software Design / Verification
- Field Test Validation
- Configuration Management Plans
- Safe Braking Calculations
- Track and Line Drawings
- Specification Writing
- QA/QA Support
- Quiet Zone Support
- Route / Aspect Charts
- Design Verification
- Factory Test Support
- Peer Review
- Incident Investigation

Professional Development

- Bachelor of Science, Electrical Engineering Technology, Outstanding Baccalaureate with Honors, Purdue/IUPUI
- Professional Engineer Licenses: CA, CO, FL, MD, NY, OH, OR, TX, UT, WA
- Member of AREMA Committees 37 and 39
- Member Institution of Railway Signal Engineers, Charter Member N.A. Chapter, Member IRSE Local Council
- Credited author and editor of the IRSE’s text ‘Introduction to North American Railway Signaling’.
- General Radio Telephone Operators License w/Radar Endorsement

Professional Experience

- **Union Pacific Railroad.** Approved highway grade crossing and wayside signal designer.
- **Tucker Interlocking, Metro, St. Louis.** Acting owner’s engineer, provided signal specification, cost and construction estimates, signal design, safe braking calculations, design verification, applications logic, factory test support and field validation support for a new interlocking and turnback signals. Support included revisions to existing communications system to integrate new interlocking including specification of RTU and interface with the signal system, specification and design of fiber optic system for integrating the interlocking into the existing SONET backbone. Project involved solid-state interlockings, AF track circuits, cab signals and wayside signals on 750 VDC electrified alignment.
- International Signal Systems
  - **United Kingdom.** Design, applications logic, factory test support and field validation on multiple U.K. projects. Led team that achieved U.K. safety acceptance for U.S. signal products, including a solid-state interlocking and constant warning time level crossing system. Provided control tables, cabling plans, electrical drawings, engineering schematics and applications software. Participated in factory validation of applications software including responding to testing logs and in commissioning validation. Provided training, including required maintenance and repair protocols for products. Authored training materials for solid-state interlockings and constant warning time systems.
  - **Republic of Egypt.** Provided incident investigation.
  - **San Juan, Puerto Rico.** Peer review of CBTC system.
  - **Mainland China.** Applications software verification for CBTC system.
Peter A. Cannito Sr. has over 40 years of experience in the rail and transit industry. His knowledge and expertise is based on his experience successfully managing large, diverse organizations and operating divisions. He has experience in all business activities including operations, finance, strategic planning, legal, human resources, capital projects, marketing, customer service, safety and security, and engineering. Furthermore he has successfully implemented new rail initiatives and managed major rail infrastructure, facilities, and systems projects. He is an effective leader with strong organizational, problem solving and crisis management skills.

EXPERIENCE AND ACHIEVEMENTS

PRESIDENT – LPC AND ASSOCIATES  
2008 to Present  
Mr. Cannito formed LPC & Associates upon his retirement from MTA Metro North Railroad in July, 2008. He has supported a number of clients as a strategic and technical advisor on matters of operations and maintenance, high speed rail, rail safety and security, project development and project management. His clients and projects have included:

- SCRRa Metrolink Safety Peer Review,
- FRA on the High Speed Rail and Intercity Passenger Rail Program.
- MTA MARC on various Operations and Maintenance projects
- Winning Denver Transit Partner/Alternate Concepts, Inc. Team for the Denver RTD Eagle P3 project,
- Good Harbor Consulting as a member of Abu Dhabi DOT International Advisory Board advising on transportation safety and security strategic and organizational issues for their planned transportation systems.
- Parsons Transportation Group, Rail & Transit Division

PRESIDENT – MTA METRO NORTH RAILROAD  
1999 - 2008  
In 2008, Mr. Cannito retired as president of MNR, where he was responsible for the management of one of the largest commuter rail systems in the United States. He managed an annual operating budget of approximately $1.2 Billion and an annual Capital Program of $320 Million. Metro North employs over 6000 employees, operates over 700 trains per day, and carries 82 million passengers per year. He was responsible for all areas of the business including: general management, financial management, strategic planning, marketing, customer service, operations, engineering, and maintenance. During his tenure, Metro North set records for on-time performance, ridership, customer service, and safety performance. He developed and oversaw programs to modernize maintenance facilities, purchase new rail cars and locomotives, rebuilt and overhaul current rail fleet, and introduced new technology to modernize financial, operations and other business functions of the corporation – all with the intent and effect of improving customer service, operating efficiencies, ridership, and revenue.

VICE PRESIDENT RAIL & TRANSIT PROGRAMS - RAYTHEON INFRASTRUCTURE INC.  
1997 - 1999  
Responsibly included the development and management of rail and transit business opportunities worldwide for Raytheon Infrastructure; a wholly owned subsidiary of Raytheon Engineers and Constructors. Responsibilities include business development, proposal management, and project management for major design/build, EPC, and engineering and design services programs.

TRANSPORTATION CONSULTANT  
1996 - 1997  
He worked as an independent consultant performing studies and project management services for ADTRANZ and Arthur Andersen, LLP.

- Managed the proposal development and acted as Team Leader for the ADTRANZ/Raytheon consortium in pursuit of the Florida High Speed Rail Project.
- Technical Advisor to Arthur Andersen on various studies for the Panama Canal Commission (PCC). Studies included development of a new locomotive procurement plan and performance of an organizational study in support of the PCC transition to the Republic of Panama in December 1999.

EXECUTIVE VICE PRESIDENT - ABB TRACTION, INC.  
1995 - 1996  
He was responsible for the management of Heavy Rail product line for ABB in the US Market. Responsibilities included the development and adaptation of the High-Speed Trains product and other inter-city and heavy rail commuter products for application to the United States market. He led the ABB proposal team for the Northeast Corridor High-Speed Rail procurement and the Florida High-Speed rail project.
Mr. Cannito’s 21 year career at AMTRAK encompassed a range of operational responsibilities including the following:

He was a member of AMTRAK’s Management Committee and Executive Staff with responsibility for management of AMTRAK’s engineering and mechanical organization; including maintenance and overhaul of all locomotives and passenger cars; maintenance of right-of-way and infrastructure, equipment acquisition, and design and construction of new rail systems and facilities.

- Managed the construction, maintenance and modernized of Amtrak’s 360 diesel and electric locomotives, 1,853 passenger cars, and national infrastructure (track, bridges, rail signal and traction systems, stations, and maintenance facilities).
- Directed the planning and implementation of AMTRAK’s High Speed Rail Program. A $1.4 billion infrastructure, signaling, and new equipment program.
- Directed development and acquisition of new passenger locomotives and passenger cars including Genesis series I and Genesis series Dual-Mode locomotives and Viewliner and Superliner II cars.

He was responsible for management of Amtrak’s Six (6) Operating Divisions, including Northeast Corridor.

- Managed takeover of 2,500 train and engine service employees from 12 operating railroads. Saved over $30M annually.
- Managed, developed and implemented first phase of Amtrak’s Centralized Electrification and Traffic Control System resulting in closing 10 block stations between Washington, DC and Wilmington, DE.
- Reorganized operation and maintenance functions consolidating Northeast Corridor Region with Off-Corridor Region. Restructuring de-layered organization and reduced management overhead.

**ASSISTANT GENERAL MANAGER - OPERATIONS NORTHEAST CORRIDOR (1984 - 1985)**
He was responsible for management of three (3) Operating Divisions and operations of all trains on Amtrak’s Northeast Corridor.

- Managed startup of contract commuter services for MBTA and Maryland DOT heavy rail commuter operations.
- Managed consolidation of Baltimore and Philadelphia Divisions resulting in cost savings and operational efficiencies.
- Negotiated labor agreements to support implementation of new Centralized Electrification and Traffic Control system

**ADDITIONAL AMTRAK Positions (1974-1984)**
General Superintendent, Baltimore and Philadelphia Divisions
Senior Director - Finance & Administration, Northeast Corridor (including NECIP)
Managing Director Financial and Program Control, Northeast Corridor Improvement Project (NECIP)
Director - Administration, Engineering Department, Washington, DC
Director - Operations Planning, Washington, DC
Engineer - Staff and Administration, Washington, DC

**NEW YORK CENTRAL / PENN CENTRAL TRANSPORTATION COMPANY**
**1967 – 1974**
Trainmaster - Seneca and Niagara Yard – Buffalo Division - Buffalo, NY

**EDUCATION**
Canisius College, Buffalo, NY, BS, Business Administration (Management)
Harvard Business School, Advanced Management Program (AMP 106)

**MILITARY SERVICE**
United States Marine Corps, Vietnam Veteran

**PROFESSIONAL MEMBERSHIPS/AFFILIATIONS**
Member – Canisius College Board of Regents
Member – Transit Cooperative Research Program, Transportation Research Board
Chairman – APTA Standards Development and Oversight Council
Chairman - APTA Security Affairs Steering Committee
Co-Chairman – APTA Procurement Steering Committee
Member – Federal Railroad Administration Rail Safety Advisory Committee
Ecton Keith Holt
1302 Christopher Court • 610-873-9858 • holt87@verizon.net

Experience

Deputy Chief Engineer C&S Amtrak, Philadelphia, PA From 2/03 to Present

- Responsible for all C&S design, standards, and oversight of maintenance. Responsible for three computerized dispatching centers, including software development, expansion and maintenance. Responsible for PTC implementation on Amtrak. Responsible for signal repair and wiring shop in Lancaster, PA. Responsible for development of 5-Year Capital Plan and overall management of C&S Capital Program. Budget: Operating (direct $10M per year; Capital - $20-$30M)

President Gannett Fleming, Valley Forge, PA From 2/02 to 2/03

- Responsible for the overall management of systems engineering, including track, traction power, catenary, communications and signals.
- As Vice President – Director Signals and Communication – Responsible for all Signal and Communications Projects.

Deputy Chief Engineer C&S Amtrak, Philadelphia, PA From 9/92 to 2/02

- Responsible for all C&S design, standards, construction and oversight of maintenance. Responsible for three computerized dispatching centers including software development, expansion and maintenance. Responsible for signal repair and wiring shop in Lancaster, PA. Budget: Operating (direct $10M per year, Capital - $20-$30M)

Sr. Director CETC & Construction From 3/90 to 9/92

- Responsible for all signal construction projects and three computerized dispatching centers.

Union Switch & Signal Inc. Pittsburgh, PA From 2/83 to 3/90

- Held positions of Engineering Supervisor, MARTA Project; Project Engineer for Port Authority Transit Project in Pittsburgh; Manager Applications Engineering, and Technical Manager Wayside Signal Projects.

Safetran Systems Corporation Louisville, KY From 6/75 to 2/83

- Held positions of Project Engineer and Chief Engineer.

Projects Completed at Amtrak

- North End Electrification Project – Installation of a new signal system for high-speed operation between New Haven and Boston, involving the introduction of a new nine-aspect cab signal system, a new civil speed/positive stop enforcement system (PTC System), installation of high-speed interlockings and expansion of the Boston Dispatching Center including SCADA control.
- Penn Station Central Control Project – Complete rehabilitation of the signal system in New York Penn Station terminal area and the design, software development and implementation of a modern computerized control center in New York.
CETC Expansion – Conversion of all interlockings between Wilmington, DE and New York to allow for remote control from CETC dispatching centers.

Empire Connection Project – A two-track connection between Metro North Railroad and Amtrak New York Penn Station, allowing all Amtrak trains to operate between Albany and New York to access Penn Station.

Education
B.S. Electrical Engineering Western Kentucky University

Professional Memberships
- Member of American Railway Engineering and Maintenance of Way Association (AREMA)
- Served on AREMA Board of Directors 1997 – 1999 and 2005 to 2008
- Served on AAR Research Committee 1997 – 2000
- Served on AAR C&S Committee F 1990-1997
- Served on AAR C&S Committee E 1985 – 1990 (Now AREMA Committee 37 – still a member)
- Subcommittee Chairman – AREMA Committee 37-3

References
References available on request
Experience

Union Pacific Railroad, Omaha, Nebraska

General Director – Transportation Systems, 2009-Present
Responsible for multiple aspects of Union Pacific’s positive train control system development:
- Technical specification, development, and testing;
- Integration with Dispatching System and other Transportation applications;
- Interoperability technology and strategy;
- Safety engineering;
- Regulatory compliance;
- Track and train control data coordination and configuration management.

ARINC, Inc., Richmond, Virginia

Senior Principal Analyst, 1998-2009
Provided principal engineering support for heavy-rail consulting projects with particular emphasis in positive train control, radio communications, safety, and operations. Provided extensive support to Association of American Railroads’ committees on standards development and documentation. Experience in compliance and developing regulatory filings in accordance with Federal Railroad Administration (FRA) regulations. Key project experience includes:
- Engineering support for various positive train control projects, including Vital Train Management System (UP), Optimized Train Control (NS), Communications-Based Train Management (CSX), Illinois DOT Positive Train Control System (UP/Amtrak/IDOT), Advanced Civil Speed Enforcement System (Amtrak), Advanced Speed Enforcement System (NJT);
- Communications loading and protocol studies (including radio/RF)
- Engineering support for development and support of ARINC’s dispatching system products;
- Development of specifications for AAR standards and studies, including Common Air Interface (CAI-12) for remote control locomotive operations, Dynamic Brake Monitor (DBM), Technology-Driven Operations (TDO), Advanced Train Control Systems (ATCS) Specification 200.

Capital One Financial Corporation, Richmond, Virginia

Senior Project Manager, 1997-1998
Managed company-wide projects related to corporate data networks, telephone, and computing environments. Gathered requirements from business operations, planned budget and execution, managed staff in a “matrix” configuration, and reported progress to management. Key project experience includes:
- Year 2000-compliance project for IT network and desktop infrastructure;
- Implementation of computer and telephony technology supporting large call centers.
Gregory M. Richardson

Heilig-Meyers Furniture Company, Richmond, Virginia
Telecommunications Manager, 1992-1997
Managed enterprise telecommunications and technical services functions, which included data and voice networks, desktop computer environment, end-user support for 800+ retail locations, and staff. Key project experience includes:
- Designed and managed procurement, installation and support of 800+ site satellite-based data network;
- Implementation of PC desktop infrastructure, network, and support team;
- Startup of 7 day-per-week point-of-sale help desk.

CSX Corporation, Richmond, Virginia
Systems Manager, 1985-1992
Responsible for planning, operation, support, and administration of corporate office IT infrastructure including telecommunications, mini-computer, and PC environments. Worked with IT staff of CSX subsidiaries to effect enterprise-wide networking, application development, and deployment. Managed budget and staff. Key project experience includes:
- Implementation of two complete change-outs of corporate office IT infrastructure;
- Planning and installation of IT infrastructure in new corporate office building;
- Support for transition of IT infrastructure during acquisitions of new subsidiary companies.

University of Virginia, Department of Academic Computing, Charlottesville, Virginia
Systems Analyst, 1983-1985
Responsible for support and operation of university academic computing infrastructure, consisting of mainframe and mini-computers, network, and terminal equipment. Developed and maintained operating system and utility software, and assisted staff and students on research projects.

Alleghany Central Railroad, Covington, Virginia/Cumberland, Maryland
Engineer/Fireman/Brakeman/Maintainer, 1978-1986 (Part-Time)
Maintained and operated steam and diesel locomotives, passenger cars, and other on-track equipment. Planned operations and performed track and signal maintenance. Assisted in planning for relocation of operations from Virginia to Maryland.

Education
Charles Edward (Ed) Tilley Jr.  
BNSF Railway  
Network Control Systems  
Director Network Control Systems

2600 Lou Menk Dr  
Fort Worth, TX 76131  
817-352-1389 Office  
817-296-9708 Cellular  
charles.tilley@bnsf.com Email

Experience:
05-01-2008 to Present  
Network Control Systems  
Fort Worth, TX  
Director Network Control Systems  
Direct, organize, plan, authorize and assist a multi-department team in the research, design, construction and implementation of the Electronic Train Management System (ETMS).

8-16-2003 to 05-01-2008  
Network Control Systems  
Fort Worth, TX  
Senior Manager NCS Train Safety Systems  
-Managing ETMS support, operation, and field testing.  
-Coordinated ETMS cross-departmental working groups.  
-Interfacing with FRA to advance ETMS pilot.  
-Assisting in the development of PSP documentation.  
-Represent BNSF on the RSAC PTC working group.  
-Procured funding from the FRA through cooperative agreements.

3-1-1996 to 8-15-2003  
Network Control Systems  
Fort Worth, TX  
Supervisor NOC Signal  
-Developed and tested NetSim databases for use in Locomotive engineer training.  
-Assisted in the GPS survey of the BNSF as well as the processing of that data.  
-Assisted in the development and testing of the Hy-Rail Limits Compliance System.  
-Supported field cutovers by making and implementing database changes.

9-1-1995 to 3-1-1996  
Signal Operations  
Fort Worth, TX  
Senior Controller  
-Supervised operations at the Signal Call Center.  
-Developed procedures and policies for Signal problem resolution.

8-1-94 to 9-1-95  
Signal Operations  
Fort Worth, TX
Network Controller
-Managed signal problem resolution.
-Created crossing database for call center use.

3-1-94 to 8-4-94
Signal
Springfield, MO
Signal Electronic Technician
-Maintained signal equipment in the Springfield Dispatch Center.
-Resolved CTC outages.

3-1-83 to 3-1-94
Signal
Springfield, MO
Signal Maintenance
-Maintained signal equipment.
-Installed and repaired signal equipment.

5-21-76 to 3-1-83
Mechanical
Springfield, MO
Electrician
-Worked as a diesel electrician in the diesel shop.

Education
2000
University of Texas at Arlington, Arlington, TX
-B.S., Electrical Engineering.
-Eta Kappa Nu Electrical Engineering Honor Society.

1995
Johnson County Community College, Overland Park, KS
-Certificate of Basic Railroad Electronics.

1989
Burlington Northern Railroad, Springfield, MO
-Journeyman Signalman Training

1981
Frisco Railroad and Railway Education Bureau, Springfield, MO
-Journeyman Electrician Training
-Electrician Certificate.

1974
Kickapoo High School, Springfield, MO
-High School Diploma.
**Key Qualifications**

Ronald Wong has 16 years of experience in the design, construction management, analysis, procurement, inspection and testing of all aspects of rail transit projects. Ronald has served a variety of roles including design engineer, testing and startup manager, deputy project manager, and resident engineer. His responsibilities have contributed to the successful completion of both new and retrofit transportation projects such as the San Francisco International Airport AirTrain System, San Francisco Muni Metro, Santa Clara Valley Transportation Authority, St. Clair County MetroLink (St. Louis), San Francisco Bay Area Rapid Transit District (BART), Central Phoenix/East Valley Light Rail Transit System, Miami International Airport, and New York City Transit.

**Relevant Experience**

**East Contra Costa County Transit Project (eBART).** Ronald is currently serving as Systems Manager responsible for overseeing the development of the systems portion of eBART final engineering design. This project is a $1.2 billion (estimated) transit extension located in the State Highway 4 Corridor, which runs east-west in Contra Costa County. Systems elements include train control, radio communications, emergency and passenger service telephones, fire and security alarms, CCTV, and a public address system. Ronald is also responsible for the preparation of vehicle procurement specifications for this new extension.

**San Francisco International Airport (SFO) AirTrain Rail Transit System.** Testing and Startup Manager of the design, construction, operations, and maintenance of the $130 million Airport Rail Transit System, at the San Francisco International Airport. The operating system portion of the project consists of various elements including vehicles, traction power system, train control, communications, and associated facilities supporting the systems elements. Integration and interface coordination are crucial in the successful implementation of the project. Having intimate involvement in the integration and interface process, Ronald gained invaluable lessons-learned in addition to his contribution to the project. The train control for the Airport Rail Transit System is a state-of-the-art Advanced Automatic Train Control System (AATC) using Communications Based Train Control (CBTC) technology - the first full communications-based train control system implemented on a passenger-carrying system. As Testing and Startup Manager, Ronald was responsible for the construction management of traction power and communications systems including traction power substations, wayside breakers, uninterruptible power supply systems, power disconnect switches, emergency trip devices, fiber optic cable network, CCTV, visual message boards, and public address subsystems. Ronald has gained the respect of the Contractor and the Client by being practical and fair, and yet ensuring conformance to the Contractual Documents. The technology for the communications-based train control system is one of the most advanced in the world requiring intense factory, field, and verification & validation testing.

**Valley Metro Rail – Central Phoenix/East Valley Light Rail Transit System.** Ronald served as the Resident Engineer on the $56 million Design-Build Traction Electrification System (TES) Contract for the 20.3-mile Central Phoenix/East Valley Light Rail Transit (LRT) System. Ronald was responsible for the constructability analysis, design review, and construction management of 15 site-built mainline traction power substations, one shop traction power substation, and
Ronald Wong, P.E., LEED® AP (cont.)

Systems Engineer

ever 20 miles of double-track low-profile overhead catenary system. The site built substations were constructed of integrally colored concrete block on landscaped sites. The overhead catenary system was installed on over 1,400 structural steel poles. Responsibilities also included the management of overall systems integration during construction for traction power, communications, signaling, and trackwork systems.

**Silicon Valley Rapid Transit Authority (SVRT) - San Jose Extension Project.** Communications Engineer responsible for the development of contract drawings and specifications for the fiber-optic carrier transmission system for the 16.3-mile, $3.7 million BART extension from Warm Springs to San Jose. Elements of the communications system include CCTV, trunked radio, SCADA, automatic fare collection, destination signs, public address, telephones, and train information monitors. This work required extensive interface with the civil and facilities design team and current BART operations practices to assure that the communications system can be seamlessly implemented into the planned structures. A key consideration was providing seamless interfaces to the existing communications equipment at BART central control. To keep BART up to date with current technologies, the communications design included the use of a TCP/IP based CCTV system as well as a voice over IP based PBX system.

**San Francisco Municipal Transportation Agency – Third Street Light Rail Extension Project.** Communications/Signals Engineer for the 5.4-mile light rail extension of Muni Metro along Third Street. Involved in the preparation of logic control drawings for PLCs, which are vital to the interlocking of two Muni/Railroad crossing intersections. Additional responsibilities included preparation of cable and raceway drawings for both fiber optic and power cables, and integration and coordination with other agencies.

**Santa Clara Valley Transportation Authority (VTA) - General Engineering Services.** Ronald served as a Systems Engineer and Deputy Project Manager responsible for multiple projects under the $750 million Rail Design Consultant (RDC) contract. Projects included the Guadalupe Corridor Communications Retrofit Project, Traction Power Substation Procurement Project, Traction Power System Sectionalization Project, and major updates to the VTA Standard Details and Design Criteria.

**Miami International Airport, Airport Rail Transit System.** Systems Engineer for the $112 million project to construct an automated people mover system for the North Terminal of the Miami International Airport. The system consists of 8,500 linear feet of elevated guideway in a dual lane, punched loop configuration with four passenger stations. Assisted with the design of the power distribution system including the conduit and feeder arrangement for dc and ac systems, and wireways for communication and train control systems. Responsibilities also included the interface of an advanced SCADA system to all traction power control systems.

**New York City Transit Authority (NYCTA).** Project Engineer performing traction power studies on the Canarsie Line Communications Based Train Control (CBTC) System to determine required traction power system upgrades to accommodate the increased train performance. The project includes detailed computer modeling of the CBTC train operations followed by preparation of a final report providing recommendations for system upgrades to support the CBTC System. Previous experience on NYCT projects include performing a traction power analysis for Myrtle Avenue, Lexington Avenue, Brighton Line, 7th Avenue Line, and Culver Line utilizing state-of-the-art software.

**SANDAG – San Diego Light Rail Transit System.** Systems Engineer responsible for constructability reviews of communications installation contract documents for the furnishing, installation, and testing of fiber-optic cables throughout the Metropolitan Transit Rail Transit System for a total of 46.9 miles. Ronald also reviewed and evaluated prospective bidder’s qualifications and follow-on bid documents.
ATTACHMENT 3

MATERIAL PROVIDED
The background and informational documents included in the list below were provided to the Peer Review Committee for the July 13th and 14th, 2010 Peer Review meetings. The same materials were also provided to the SCRRRA Member Agency Technical Advisory Committee (the “TAC”).

1. PTC Scope/Schedule/Risk/Cost/Funding Book. 193 pages
2. PTC Scope/Schedule/Risk/Cost/Funding Book 1 CD
3. PTCIP Provisional Approval Letter 4 pages
4. PTCIP Document 200 pages
5. June 2010 PTC Monthly Project Status Report 18 pages
6. Two PTC PowerPoint Presentations 56 slides
7. Sample PTC Maps Track Charts