RE: NCHRP Synthesis 20-05/Topic 47-15, State of the practice for traffic signal preemption at intersections near highway-railway grade crossings

At signalized highway intersections that are in close proximity to a railroad crossing, the railroad signal control and the traffic signal control equipment should be interconnected to allow for preemption of the traffic signal operations upon approaching trains. While standards and guidelines have existed for a long time on when and how to accomplish this, while rare, there continues to be vehicle-train crashes where inadequate preemption was a causative factor. This was recognized in the 2010 Texas DOT Highway-Rail Grade Crossing Safety Action Plan where it is stated: “Forty-six percent (105) of this group of 229 collisions (with ‘active signal devices’ which were ‘interconnected with a traffic signal at a nearby intersection’) occurred at the multiple-collision locations. This indicates that there may be an issue related to the adequacy of the preemption at these crossings.” Furthermore, in Illinois DOT’s Action Plan, it is stated that “… Highly complex highway-rail intersections that have highway and railroad warning devices interconnected comprise only 3.8% of the public highway-rail crossings …, yet account for 30.9% of the risk of a collision occurring.” This synthesis seeks to identify state-of-the-art practices in implementing (design, coordination, maintenance) traffic signal preemption to address this safety issue.

This letter expresses my interest in being the consultant for preparing the subject synthesis. I feel especially qualified to be the consultant for this synthesis because I have:

- Demonstrated the ability to successfully complete the scope of work for four NCHRP synthesis projects, namely:

- Relevant experience in this specific topic and railroad-highway grade crossing safety, in general, as evidenced by:
  - Principal investigator and co-author of *Recording Devices for Interconnected Grade Crossing and Intersection Signal Systems: An Informational Report (FHWA Report 12-020)*.
  - Currently participating as a senior technical advisor for NCHRP Project 03-118 “Decision-Making Guide for Traffic Signal Phasing,” which will include signal preemption for grade crossings.
  - PI for NCHRP Project 3-95 that was reported in Report 731 *Guidelines for Timing of Yellow and Red Intervals for Traffic Signals*.
Interconnection of the highway and railroad signalization and developing adequate preemption is a complicated issue requiring expertise in railroad and highway traffic signal equipment and operations. Supporting me in these areas will be Terry Byrne and Joe Herr. **Mr. Byrne**, a Senior Project Manager at VHB, has 42 years’ experience in the railroad industry all of them involved at-grade railroad crossings including the installation, testing and commissioning and design of signaling and control. Mr. Byrne understands both sides of the technical issues involving the railroad and the traffic side. His membership on three national committees-- APTA, AREMA and TRB-- will be an asset in identifying current practices and issues. **Mr. Herr**, P.E., PTOE., a Senior Engineering Manager at VHB, has more than 40 years of experience in all aspects of traffic signal control including a deep knowledge of the technical and operational aspects of rail grade crossings. He is an accredited IMSA Level Three Traffic Signal certified for both bench and field applications. He was recently part of the project review team for the 2010 ITE/IMSA “Traffic Signal Maintenance Manual”. Herr and Byrne frequently interact in developing preemption plans for grade crossings. McGee, Byrne and Herr collaborated in the conduct of a related project for FHWA entitled *Recording Devices for Interconnected Grade Crossing and Intersection Signal Systems* (see http://safety.fhwa.dot.gov/xings/recording_device/).

**Brief Discussion of Synthesis Approach**
Based on my experiences with past synthesis projects, the keys to a successful synthesis include:

- Identifying the critical issues so that the synthesis is focused correctly. The consultant needs to assist the Panel in identifying the key issues and questions. The 11 bulleted lists of topics provides the starting basis for these issues.
- Querying the most appropriate agencies and the office (person) within the agency—in this case, there are multiple agencies/offices involved considering both the highway and railroad sides.
- Asking the right questions on surveys to the agencies. The survey should only be as long as needed to address the issues. Agencies will not respond if the survey is long and if the questions require significant effort by the responder(s).
- Selecting the best agencies for providing the requested case examples. In the Practical Design synthesis I interviewed several DOT officials from six states to document their practices.
- Compiling the information in a succinct and useful way—answering the questions that other states may have. If the synthesis document is too lengthy, potential users will not read it.

In conducting this synthesis, I will be mindful of the proposed changes to Chapter 8 in the MUTCD on this topic as well as an impending update to the current ITE RP “Preemption of Traffic Signals Near Railroad Crossings.” Also, AREMA updates their chapter on at-grade crossings every year. Depending upon the schedule of these activities, the information obtained from this synthesis may be useful to these efforts.

I can assure NCHRP and the panel of my availability and dedication to completing the assignment within the designated time frame. I am an independent consultant and will have no significant project commitments when this project starts. Also, as a former principal at VHB, I continue to have access to its facilities and resources including Joe Herr and Terry Byrne as needed.

I am excited about the possibility of being the consultant for this project. I can comply with the terms of the NCHRP contract. Thank you for considering me for this synthesis.

Respectfully submitted,
Hugh W. McGee, Ph.D., P.E
RESUME

HUGH W. McGEE, Ph.D., P.E.

EDUCATION

B.S.  Civil Engineering, Pennsylvania State University  (1965)
M.S.  Civil Engineering, Pennsylvania State University  (1969)
Ph.D.  Civil Engineering, Pennsylvania State University  (1972)

EMPLOYMENT HISTORY

Vanasse Hangen Brustlin, Inc. (VHB)  2005- 2013  Principal
Bellomo-McGee Inc.  1982-2005  President
Wagner-McGee Associates, Inc.  1979-1982  Vice President
BioTechnology, Inc.  1976-1979  Program Manager
Alan M. Voorhees & Associates, Inc.  1972-1976  Senior Associate
Pennsylvania Transportation Institute  1967-1972  Research Assistant
U.S. Army (Corps of Engineers)  1965-1967  Officer
Hardesty and Hanover  1965  Highway Engineer

EXPERIENCE

Highway Design, Traffic Engineering, and Traffic Safety Research

Principal investigator for numerous research studies sponsored by the Federal Highway Administration, the National Cooperative Highway Research Program, and other agencies. Specific topics within the general area of highway design, traffic engineering and traffic safety have included:

- Effectiveness of Geometric Design Elements
- Intersection Control
- Railroad-Highway Grade Crossings
- Highway Information Systems
- Sign Retroreflectivity
- Traffic Control Device Effectiveness
- Traffic Signal Operations
- Pavement Markings
- Work Zone Traffic Control
- Truck Safety
- Pedestrian Accommodations

These projects have involved the collection and analysis of various types of data including crash reports, traffic volume and flow characteristics, roadway data and driver behavior.
Traffic Control Device Design and Use

Traffic Signal Design – Principal-In-Charge and project designer for several traffic signal installations throughout the Washington, DC region.

Traffic Sign Design – PIC and project designer for traffic signs for several facilities including sections of the Fairfax County Parkway and Manassas Bypass.

Automatic Truck Rollover Warning System – PIC for initial feasibility and then eventual design of an innovative system for warning drivers of the potential for rollover of trucks on curved exit ramps. Three prototype systems were designed and installed on the Capital Beltway.

Highway Planning and Preliminary Design

Rt. 29 Phase II Preliminary Design, Fairfax County -- PIC for a study for Fairfax County, VA that developed a preliminary design plan for the widening of a 7-mile section of Rt. 29. Was responsible for traffic forecasting to develop design hour volumes, capacity analyses to determine functional design requirements and then the preliminary design of key roadway elements, i.e. cross-section, access points, etc.

I-95 HOV Facility Extension and I-95 Access Study – Principal-in-charge for a VDOT study which is examined the feasibility of extending the HOV facility from its current terminus in Dumfries, VA to Fredericksburg, VA. It is also examined the need and feasibility of adding new interchanges, to include a collector-distributor design, in the Fredericksburg area.

Numerous intersection designs for safety and operational improvements.

Traffic Operations and Safety Improvement Studies

14th Street Bridge Corridor Improvement Study – PIC for a VDOT study which developed alternative improvements to solve traffic congestion and safety problems on the I-395 corridor from the Pentagon into the District of Columbia. The study included extensive data collection, traffic simulation, preliminary engineering of improvements, and public participation.

George Washington Memorial Parkway Safety Improvement Study – Participated in a study of the GWMP, which had the objective of identifying safety problem locations and recommending improvements. Preliminary design for recommended improvements were prepared.

Montgomery County High Accident and Congestion Improvements – Senior traffic engineer for a project that identified the 25 highest accident and congestion locations and developed improvements.

Traffic Impact Studies -- PIC and project engineer for numerous studies of the traffic impact associated with various developments. Many studies included development of traffic control and street/roadway geometric improvements.
LICENSES

- Registered professional engineer in VA, PA, MD

AFFILIATIONS

- American Society of Civil Engineers, Fellow
- Institute of Transportation Engineers, Fellow (Past President, Washington, DC Section and Mid-Colonial District, and Mid-Colonial District representative to International ITE Board of Direction)

AWARDS

- Outstanding College of Engineering Alumnus, Pennsylvania State University, 2010.
- D. Grant Mickle Award, Transportation Research Board, 2004 (with 3 others persons)

SELECTED RELATED PUBLICATIONS (Abbreviated List)


Relevant Capabilities and Skills

1973-1980 - Traffic Engineer – City of Boston Transportation Department

1980 – 1990 - Field Service Engineer / Engineering Manager – Traffic Signal System Supplier responsible for the design, QA/QC, field troubleshooting and operations tasks for more than 3000 traffic signal control assemblies and systems across seven states.

1990 – Present - Senior Engineering Manger – Corporate technical lead on ATMS systems involving projects in 11 states. Work includes signal inspections, field operations support, design, development of technical specifications, technology assessments and technical training.

Relevant Project Work

Forest Avenue, Portland, Maine
Rail grade crossing design for three interconnected traffic signal locations.

Main Street, Ashland, Massachusetts
Rail grade crossing field evaluation and design involving two interconnected traffic signal locations with emergency vehicle preemption.

Eastern Avenue, Chelsea, Massachusetts
Rail grade crossing design involving proposed traffic signal installation with geometric changes and inclusion of a pre-track traffic signal control.

Essex, Connecticut
Design of traffic signal control assembly for rail grade crossing utilizing internal traffic signal controller rail preemption.

Education
Bachelor of Science, Electrical Engineering, Northeastern University, 1977

Professional Certifications and Affiliations
Registered Professional Engineer, Commonwealth of Massachusetts
ITE Accredited Professional Traffic Operations Engineer
IMSA Certified Traffic Signal Inspector (Regional Instructor)
IMSA Certified Level Three Traffic Signal Field Electrician (National Instructor)
IMSA Certified Level Three Traffic Signal Bench Technician
OSHA Certified Safety and Health

Relevant Publications
NTCIP - “Understanding the NTCIP Class Profiles from an End User’s Perspective”
ITE – “Communications Options for ATMS Systems”
APTA - “The Successful Deployment of a Transit Signal Priority System”
Relevant Capabilities and Skills

39 Years’ experience in the Railroad Signal and Train Control Industry

- Experience includes field installation, testing and commissioning railroad grade crossing systems.
- Twenty-five years of experience in designing Railroad grade crossing systems.
- Fifteen years in performing studies, diagnostic team reviews and working on industry committees
- Serves on three national organizations with regards to Highway - Rail Grade Crossings

Relevant Project Work

_Vermont Agency of Transportation – Burlington – Charlotte (Commuter Rail)_

Designer of the first FRA approved “Quiet-Zone” (Vermont Railways) Burlington, VT. Project included the design of four-quadrant gated crossings, full barrier gates, microprocessor control system, and data recording with remote diagnostics to the VRS Control Office.

_MBTA/FTA Four-Quadrant Gate Demonstration Project_

Designer of the first four-quadrant gated crossing for MBTA (Abington, MA) – This FTA/FRA demonstration project was to assess the need and application of four-quadrant gates on the recently commissioned Old Colony Railroad lines.

_New Commuter Rail Start-up Project, Kissimmee to Deland, FL_

Involves the review and preliminary design of the CSX “A” Line between Kissimmee and Deland, FL. This included the review and development of new conceptual layouts for 126 “at-grade” railroad crossings, 18 existing interlockings, and 50 miles of mainline wayside signaling.

_FHWA- Pedestrian Safety Guide for Transit Agencies_

Developed guidelines to provide transit agency staff with a resource for improving pedestrian safety. The project developed several recommended approaches to address pedestrian safety issues near transit stations, bus stops, and other places where transit (bus or rail) is operated.

Affiliations

- Member of AREMA Committee 37 (Grade Crossing Systems)
- Member of TRB AHB60 – Railroad Grade Crossings
- Member of APTA – Grade Crossing Committee

Relevant Publications

- TRB – Webinar “Highway-Rail Grade Crossing Safety 101: A Primer on Grade Crossing Safety” scheduled for September 2010
- FTA – Four-Quadrant Gate Demonstration Project on the MBTA Old Colony Railroad – FTA-MA-03-X001.01.1