

CARL SHAFLIK, PEng 夏辉林

SPECIALTIES: Intelligent Transportation Systems
Traffic Management Systems, Roadway Safety
Highway Electrical and Mechanical (E&M) Systems
Construction Supervision and Project Management
Traffic, Electrical, Illuminating, and Civil Engineering

PROFESSIONAL SUMMARY

Carl Shaflik, PEng, has over 30 years experience in the civil and electrical engineering fields for transportation and highways projects.

During the past 25 years, he has specialized in the implementation and deployment designs, as well as construction supervision and inspection, of: Intelligent Transportation Systems (ITS), freeway and expressway traffic management systems, roadway safety systems, traffic signal systems, roadway and area lighting, highway electrical facilities, and highway signing systems. Furthermore, fully knowledgeable of highway traffic control and electrical systems design standards and construction specifications, he has also undertaken major research and standards development for several government departments most notably, the Transportation Association of Canada, Alberta Transportation, and the British Columbia Ministry of Transportation. To this end, he has participated as a major team member, and well as team leader, in the development of various design and construction manuals for a multitude of government departments and ministries, including: the Electrical and Traffic Engineering Design Manual, the Highway Guide Signing Design Manual, the Electrical and Signing Materials Standards, and the

Electrical and Signing Construction Standards for the British Columbia Ministry of Transportation.

Carl Shaflik has over 20 years experience in construction engineering and project management of transportation projects including, cost analyses, construction estimates, and financial accountability. He is also fully conversant with FIDIC conditions and contract documents.

Earlier in his career Carl Shaflik has worked as a designer and drafter in the production of traffic and electrical related engineering designs; worked as a legal and engineering surveyor; and has undertaken construction layout.

Carl Shaflik's commitment to excellence is demonstrated by his decision to return to university as a part-time graduate student and pursue a Master of Engineering Degree in Transportation Engineering and Construction Management, specializing in ITS. This choice of specialties directly coincides with his unique combination of traffic and electrical engineering experience to provide superior service to advanced highway and transportation infrastructure construction projects.

RESPONSIBILITIES

- Oversee – as well as directly develop – the implementation and deployment designs, construction engineering, and project management of traffic engineering, roadway safety engineering, and ITS disciplines for transportation infrastructure construction projects.
- Act as Engineer of Record and Construction Engineer for traffic and electrical engineering disciplines of transportation infrastructure construction projects.
- Liaise with consultants, contractors, product suppliers, manufacturers, project owners and clients, government agencies, third party stakeholders, and in-house personnel.
- Coordinate design and construction work under FIDIC conditions.
- Review and provide comprehensive reporting of all Traffic Engineering Systems.
- Conduct research, studies, surveys, technical analyses, and report writing.

CAREER EXPERIENCE

EMPLOYER:	Shaflik International Inc	2004 - on
	Whistler, BC, Canada	
Position:	President	
	Shaflik Engineering Ltd	1975 - 2004
	Burnaby, BC, Canada	
Position:	Vice-President, Engineering	1980 - 2004
	Senior Project Engineer	1994 - 2003
	Senior Project Manager	1987 - 1994
	Project / Construction Manager	1984 - 1987
	Senior Designer / Technician	1979 - 1984
	Engineering Designer / Drafter	1975 - 1979

SECONDMENTS FOR INTERNATIONAL PROJECTS:

	LEA International	Ontario, Canada
	Louis Berger Group	New Jersey, USA
	Kampsax A/S (COWI A/S)	Copenhagen, Denmark
	Wilbur Smith Associates	South Carolina, USA
	Japan Overseas Consultants	Tokyo, Japan
	Danish Road Directorate	Copenhagen, Denmark
	Trow International	Ontario, Canada
	SNC – Lavalin	Quebec, Canada
	Snowy Mountains Engineering (SMEC)	Cooma, Australia
Position:	Senior Foreign Traffic Engineer (E&M and Roadway Safety Systems)	

EARLIER CAREER EXPERIENCE

EMPLOYERS:	Aplin & Martin Engineering Ltd	1974 - 1975
	McElhanney Surveying and Engineering Ltd	1972 - 1973
Position:	Surveyor / Instrument Person	

EDUCATION

BASc	Civil Engineering, University of British Columbia, Vancouver, BC	1995
Course	National ITS Architecture Course, Virginia Tech, Washington DC	2000
Courses	MASc, Transportation Engineering and Construction Management (ITS Specialty), University of British Columbia, Vancouver, BC	in progress
Courses	Computer Programming, Douglas College, New Westminster, BC	1987
Courses	Computer Programming, Douglas College, New Westminster, BC	1984
Course	Traffic Signal Systems, Northwestern University, Chicago, Illinois	1980

PROFESSIONAL AFFILIATIONS

Member	APEGBC , Assoc of Professional Engineers and Geoscientists of British Columbia
Member	APEGGA , Assoc of Professional Engineers, Geologists, and Geophysicists of Alberta
Member	IESNA , Illuminating Engineering Society of North America - IESNA Roadway Lighting Committee / Tunnel Lighting Sub-committee
Member	ITS Canada , Intelligent Transportation Systems Society of Canada
Member	IDA , International Dark-Sky Association
Member	IMSA , International Municipal Signal Association
Member	CEBC , Consulting Engineers of British Columbia
Member	ACEC , Association of Consulting Engineers of Canada (FIDIC representative)
Resisted with:	Asian Development Bank (ADB) – Consultant Code 018156 Caribbean Development Bank (CDB) African Development Bank (AfDB) – Registration No. 00077259

CITIZENSHIP

Canadian Irish European Union

LANGUAGES

	Speaking	Reading	Writing
English:	Excellent	Excellent	Excellent
Mandarin:	Poor	Fair	Fair

PUBLICATIONS AND TECHNICAL PAPERS

British Columbia Driver Information Display System - A History of Development	1999
Integration of the Field Components of Traffic Engineering Systems & ITS - Design Considerations for a Freeway Traffic Management System	1997
Traffic Signal Detector Locations - Proper Positioning Increases Efficiency & Safety	1996
Light Pollution - Environmental Effects of Roadway Lighting Systems	1996
Design / Build Projects - Legal Implications for the Engineer	1995

(If you are having trouble downloading these documents they are also available at www.shaflik.com.)

AREAS OF EXPERTISE

Carl Shaflik has particular experience in the following technical areas:

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

Carl Shaflik has been an active member of ITS Canada for the past 15 years and keeps current with the latest in research and development of ITS. In particular, he is active in ITS Canada's foreign development section and has participated in several ITS trade missions to the Peoples Republic of China including the Hong Kong SAR.

Carl Shaflik specializes in the research of ITS technologies and the design and supervision for the implementation and deployment of ITS systems. In particular he has been a major designer of the various Driver Information Display Systems throughout British Columbia, and a key team member, Engineer of Record, and Owner's Engineer for the Trans Canada Highway (Vancouver Section) Traffic Management System. He is also a key development member for the British Columbia ITS Strategic Plan specializing in Advanced Traveller Information Systems (ATIS) and Road Weather Information Systems (RWIS) and in the Shanghai ITS Strategic Plan specializing in field systems.

Carl Shaflik has most recently worked as the Foreign Traffic / E&M Engineer for the ITS and other related Traffic Engineering Systems on several expressway projects in the PR China.

Carl Shaflik specializes in the field integration of ITS user systems such as CCTV surveillance systems, automated incident detection systems, dynamic message sign systems, and vehicle-to-roadside communication systems; and ITS support systems including mounting structure design, power distribution systems, and communication systems.

Carl Shaflik has produced a technical paper which analyses the problems of field integration of ITS and other related highway

systems and provides recommendations on efficient planning and design. This technical paper is available on the Shaflik International website at www.shaflik.com.

ROADWAY SAFETY

Carl Shaflik has undertaken the design and construction supervision of freeway and expressway safety systems. These systems include the safety aspects of roadway and area lighting, safety aspects of tunnels, the proper placement of signing, traffic signals systems, guardrails and barriers, and anti-dazzling devices. He has produced a technical paper regarding the efficient placement of detectors at traffic signals and how they affect the roadway safety of the installation. This technical paper is available on the Shaflik International website at www.shaflik.com.

TRAFFIC SIGNAL SYSTEMS

Carl Shaflik has been designing traffic signals for the past 25 years and has experience ranging from old style fixed time electro-mechanical systems to state-of-the-art traffic responsive computerized systems. He has designed and construction managed over 500 traffic signal installations throughout BC and internationally.

Carl Shaflik has researched, designed, and construction supervised several interconnected and coordinated traffic signal systems including closed-loop systems. He has designed over 100 traffic signals with some form of emergency vehicle or railway preemption and is experienced with all the major suppliers and manufacturers in the field. He has also undertaken signal preemption and detector technology studies for several clients.

Recently Carl Shaflik has undertaken theoretical research and produced a technical paper regarding the proper location and placement of detector loops at intersections. This technical paper determines that the proper physical placement of vehicle detectors can significantly increase the throughput and capacity of signalized intersections. This technical paper is available on the Shaflik International website at www.shaflik.com.

ROADWAY, BRIDGE, AND TUNNEL LIGHTING SYSTEMS

Carl Shaflik has been designing roadway lighting for highways, freeways, bridges, tunnels, and municipal roads for over 30 years and has undertaken designs along major corridors such as the Trans Canada Highway, the Coquihalla Highway, and the Vancouver Island Highway. He is experienced in all forms of roadway lighting design, from major arterials and freeways to minor local and residential roads, including large interchanges and downtown urban centers. He has designed and construction managed over 3000 roadway lighting projects throughout British Columbia as well as out of province and internationally, and has specifically undertaken the lighting design on several major bridges and tunnels.

Carl Shaflik is an active sitting member of the Illuminating Engineering Society of North America (IESNA) Roadway Lighting Committee. This society is the main engineering standards body in North America for the research and development of lighting engineering standard practices. He sits on the sub-committees for Tunnel Lighting, Environmental Affects (Light Pollution), and Toll Plaza Lighting.

Carl Shaflik has produced a technical paper which analyses the effects of light pollution as produced by roadway lighting systems and provides recommendations on efficient design and mitigation methods. This technical paper is available on the International Dark-Sky Association website at www.darksky.org or on the Shaflik International website at www.shaflik.com.

HIGHWAY SIGNING DESIGNS

Carl Shaflik has undertaken the planning, design, and construction supervision of highway guide signing systems and regulatory and warning signing systems for the past 20 years. Signing designs have covered all types of highway systems from major and minor urban centers to rural and urban freeways and expressways. He has undertaken the recent development of the British Columbia Ministry of Transportation and Highways signing materials and construction standards.

COMMUNICATIONS SYSTEMS

Carl Shaflik has had direct involvement with design and installation of communications systems for various projects and was part of the team designing the SONET (synchronous optical network) system for the Trans Canada Highway Traffic Management Program. He has also construction managed the field infrastructure of several fiber-optic communication systems for transportation projects, including 360 networks and Worldwide Fiber installation across southern British Columbia and northwest Washington State and the recent Jingzhu, Hurong, Hangjinqi, and Taigan Expressway Projects in China. This infrastructure typically forms the backbone of freeway traffic management and tolling systems.

GENERAL ELECTRICAL SYSTEMS

Carl Shaflik has undertaken the planning, design, and construction supervision for all of the standards electrical systems that support transportation engineering projects for the past 25 years. These electrical designs include, but are not limited to, primary power distribution, secondary power distribution, and back-up UPS and stand-by power generation.

MAJOR PROJECTS

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

- **Second Jiangxi Highway Project (Taihe to Ganzhou Expressway), Jiangxi Province, PR China, 2004: Senior Foreign Traffic / E&M Engineer (Traffic Engineering and Roadway Safety)**

Provide the functional design review, review of tender documents (design/build), construction supervision, and systems implementation management for the Traffic Engineering Systems, Traffic Safety Systems, Intelligent Transportation Systems (ITS), and Electrical & Mechanical Systems (E&M) for the Taihe to Ganzhou (Taigan) Expressway. This project consists of approximately 128 km of new expressway from the city of Taihe south to Ganzhou, and is the centerpiece of the Ganyue Expressway. The Traffic



Engineering Systems consist of a full traffic management system with incident detection, CCTV surveillance, emergency telephones, advanced road/weather detection, and dynamic message signing; a semi-automated (smart card) tolling system comprised of 7 toll plazas; full length fiber-optic communications; and the necessary power distribution systems. The project also encompasses two traffic management centers

- the main center serving as the Ganyue Expressway Traffic Management Center, and a special tunnel management center. The expressway also has 5 major twin-tube high-speed tunnels with the full complement of specialty tunnel lighting, ventilation, emergency safety systems such as fire protection, a local CCTV traffic surveillance system, and other related E&M support systems. Extensive coordination was also undertaken with other related traffic engineering systems such as highway signing and markings, area and roadway lighting, and highway safety systems.

Special Features: Implementation of state-of-the-art advanced Intelligent Transportation Systems and large tunnel E&M systems. This project was designed and inspected under FIDIC conditions.

Client: Wilbur Smith Associates (USA) / Danish Road Directorate (Denmark) Joint Venture for the World Bank Financed Project Office of the Jiangxi Provincial Communications Department

- **Hubei National Highway 4 Project (Jingzhu Expressway), Hubei Province, PR China, 2003: Senior Traffic / E&M Engineer (Traffic Engineering and Roadway Safety)**

Provided the functional design review, review of tender documents (design/build), construction supervision, and systems implementation management for the Traffic Engineering Systems, the Intelligent Transportation Systems (ITS), the Road Safety Systems, and the Electrical & Mechanical Systems (E&M) for the Hubei National Highway 4 Project. This project consists of approximately 125 km of new expressway from the city of Wuhan, capital of Hubei Province, and south to the Hunan Provincial Border.



This project forms the southern portion of the Hubei Provincial section of the Jingzhu (Beijing to Zhuhai) Expressway. The Traffic Engineering Systems consist of a full traffic management system with incident detection, CCTV surveillance, emergency telephones, advanced road/weather detection, and dynamic message signing; a semi-automated (smart card) tolling system comprised of 7 toll plazas; a commercial vehicle Weigh-In-Motion system; full length fiber-optic communications; and the necessary power distribution systems. The project interfaces with the traffic management and tolling systems at the Hubei Provincial Traffic Management Center, in the form of a virtual systems sub-center within the same building. There are also several maintenance and administration centers along the project. Extensive co-ordination was also undertaken with other related traffic engineering systems such as highway signing and markings, area and roadway lighting, and highway safety systems.

Special Features: Implementation of state-of-the-art advanced Intelligent Transportation Systems and integration with major systems from adjacent projects. This project was designed and inspected under FIDIC conditions.

Client: Kampsax A/S (part of COWI A/S) (Denmark) for the World Bank Financed Project Office of the Hubei Provincial Communications Department

- **Hangjinq Expressway Project, Zhejiang Province, PR China, 2003: Senior Foreign Traffic / E&M Engineer (Traffic Engineering and Roadway Safety)**

Provided the functional design review, review of tender documents (design/build), construction supervision, and systems implementation management for the Traffic Engineering Systems, Traffic Safety Systems, Intelligent Transportation Systems (ITS), and Electrical & Mechanical Systems (E&M) for the Hangjinq (Hangzhou to Jinhua to Quzhou) Expressway Project. This project consists of approximately 235 km of new expressway from the city of Hangzhou, capital of Zhejiang Province, southwest toward the Jiangxi provincial border. The Traffic Engineering Systems consist of a full traffic management system with incident detection, CCTV surveillance, emergency telephones,



advanced road/weather detection, and dynamic message signing; a semi-automated (smart card) tolling system comprised of 18 toll plazas; a full length fiber-optic communications system; and the necessary power distribution systems. The project encompasses 4 traffic management centers and several maintenance and administration centers. The

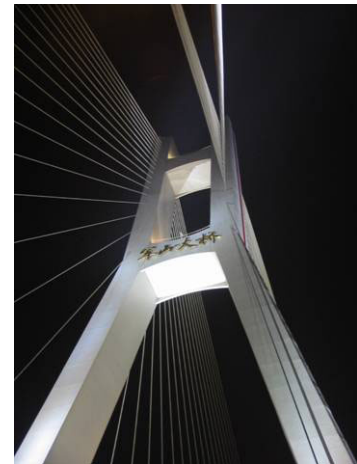
expressway also has 2 major twin-tube high-speed tunnels with the full complement of specialty tunnel lighting, ventilation, emergency safety systems such as fire protection, a local CCTV traffic surveillance system, and other related E&M support systems. Extensive co-ordination and supervision was also undertaken with other related traffic engineering systems such as highway signing and markings, area and roadway lighting, and highway safety systems.

Special Features: Implementation of state-of-the-art advanced Intelligent Transportation Systems and large-tunnel E&M systems. This project was designed and inspected under FIDIC conditions.

Client: Wilbur Smith Associates (USA) / Japan Overseas Consultants (Japan) Joint Venture for the Japan Bank for International Cooperation (JBIC) Loan Project Office of the Zhejiang Provincial Communications Department

- **Hubei National Highway 3 Project (Jingzhu and Hulong Expressways), Hubei Province, PR China, 2002: Senior Foreign Traffic / E&M Engineer (Traffic Engineering and Roadway Safety)**

Provided the functional design review, review of tender documents (design/build), participation in the 'Joint Design Process', construction supervision, and systems implementation management for the Traffic Engineering Systems, Traffic Safety Systems, Intelligent Transportation Systems (ITS), and Electrical & Mechanical Systems (E&M) for the Hubei National Highway 3 Project. This project consists of approximately 225 km of new expressway from the city of Wuhan, capital of Hubei Province, north to the Henan Province Border. The project forms the Hubei provincial sections of the Jingzhu (Beijing to Zhuhai) and Hulong (Shanghai to Chengdu) Expressways. The Traffic Engineering Systems consist of a full traffic management system with incident detection, CCTV surveillance, emergency telephones, advanced road/weather detection, and dynamic message signing; a semi-automated (smart card) tolling system comprised of 18 toll plazas; a commercial vehicle Weigh-In-Motion system; full length fiber-optic communications; and the necessary power distribution systems. The project also encompasses three traffic management centers - the main center serving as the Hubei Provincial Traffic Management Center, and several maintenance and administration centers. The Hubei Provincial TMC will be the largest traffic management center in China. Extensive co-ordination was also undertaken with other related traffic engineering systems such as highway signing and markings, area and roadway lighting, and highway safety systems.



Special Features: Implementation of state-of-the-art advanced Intelligent Transportation Systems. This project was designed and inspected under FIDIC conditions.

Client: LEA International (Canada) / Louis Berger International (USA) Joint Venture for the World Bank Financed Project Office of the Hubei Provincial Communications Department

- **City of Shanghai Intelligent Transportation Systems Strategic Plan, Shanghai, PR China, 2000 - 2001: Field Systems Specialist**
Development of a high level ITS strategic plan based on the new Chinese, Canadian, and US ITS Architectures. This strategic plan will form the basis for the development of ITS projects in Shanghai over the next 10 years. A functional design of a selected pilot project directed toward ATIS was also prepared. Shaflik's role concentrated on the field systems integration. Special Features: Advanced ITS system research and development.
Client: IBI Group (Canada) for the Shanghai Municipal Government
- **Province of British Columbia Intelligent Transportation Systems Strategic Plan, British Columbia, Canada, 2000 - 2001: Rural ITS Applications Specialist**
Development of a high level ITS strategic plan based on the new Canadian, and US ITS Architectures. This strategic plan will form the basis for the development of ITS projects throughout BC over the next 10 years. Shaflik's role concentrated on rural ITS applications. Special Features: Advanced ITS system research and development, for rural applications including Advanced Traveller Information Systems (ATIS) and Road Weather Information Systems (RWIS).
Client: IBI Group for Translink (Greater Vancouver Transportation Authority)
- **British Columbia, Canada, and Washington State, USA, Cross Border Advanced Traveller Information System, 2001 - ongoing: Signing Design Specialist**
Development of an Advanced Traveller Information System to enhance the efficiency of cross border commercial and tourist traffic between Canada and the US. Shaflik's role concentrated on integration of the principles of positive guidance to this ITS Project. Special Features: Advanced ITS system research and development.
Client: IBI Group for the BC Ministry of Transportation
- **Trans Canada Highway Traffic Management Pilot Project, Burnaby/Coquitlam, 2000: Owner's Engineer**
Owner's Engineer services for the electrical and traffic systems field integration of the traffic management system which will include CCTV, incident detection, and dynamic message sign systems, and other related Traffic Management Systems. Special Features: Advanced ITS system research and development. Preparation of performance specifications for specialized ITS components.
Client: Delcan Corporation and the BC Ministry of Transportation and Highways
- **Trans Canada Highway Traffic Management Program Infrastructure Detailed Design, Burnaby/Coquitlam, 1997 - 1998: Chief Designer / Engineer of Record**
Carried out the detailed design construction supervision for the infrastructure installation of the various TMP components along the freeway. Capital Value: Project \$102M; Traffic and Electrical \$3.7M. Special Features: Integration and coordination of the advanced ITS designs with other highway design features. Early procurement of many of the ITS systems. Contract preparation for fast-track construction.
Client: BC Ministry of Transportation and Highways

- **Trans Canada Highway Traffic Management Program Preliminary Design, Burnaby/Coquitlam, 1996: Chief Designer / Engineer of Record**
Research and development of the preliminary design for the CCTV, incident detection, and changeable message sign systems, and other related Traffic Management Systems. Included preliminary design of the fiber-optic communications system network. Special Features: Advanced ITS system research and development. Development of a synchronous optical network system (SONET).
Client: ND Lea Consultants Ltd and the BC Ministry of Transportation and Highways
- **Vancouver/Richmond Rapid Bus Project, Vancouver and Richmond, BC, 1999 - 2000: Chief Designer / Engineer of Record**
Designers and construction supervisors of 13 traffic signals and bus shelter electrical systems along No. 3 Road and Sea Island Way in Richmond and Granville Street in Vancouver. This route will be operated as a transit priority corridor with dynamically controlled traffic signals providing priority to buses. Capital value: \$3M. Special Features: These signals will incorporate state-of-the-art ITS AVL (Automated Vehicle Location) bus priority systems and will be interconnected with the City of Richmond's and the City of Vancouver's Traffic Signal Control Centers.
Client: IBI Group and Delcan Corporation for BC Transit (Translink)
- **British Columbia Red Light Camera Project (Photo Enforcement), 1999: Engineer of Record**
Preparation of the functional, preliminary, and detailed designs; the design guidelines; the material and construction standards; and construction supervision for the Red Light Camera photo enforcement program in British Columbia. Special Features: Field testing and selection of various component parts. Development of deployment and construction standards.
Client: Insurance Corporation of British Columbia
- **Sumas Prairie Driver Information Display System, Chilliwack, BC, 1991: Project Manager / Chief Designer**
Designed and construction supervised several changeable message signs in the Fraser Valley area of Greater Vancouver. Capital Value: \$2M. Special Features: Coordinated the supply and installation of large sign bridge structures; and, utilized new fiber-optically enhanced retro-reflective flip disk changeable message sign technology. Required advance procurement of new ITS technology.
Client: BC Ministry of Transportation
- **Drivers Information Display System, Coquihalla Highway Project, Phases 1, 2, and 3, Hope to Kamloops and Merritt to Peachland, BC, 1987 - 1990: Project Manager / Chief Designer / Construction Supervisor**
Prepared the design and supervised the installation of a computerized, remotely controlled advanced traveler information system (ATIS). Capital Value: \$5M. Special Features: Utilized state-of-the-art technology for real time message signing displays and involved mountainous terrain with extreme adverse climate. The DIDS consisted of full message dynamic message signs, limited message variable message signs, specific message open/closed signs, and auxiliary extreme weather condition signs. Sign communications was provided in remote areas by cellular telephone systems.
Client: BC Ministry of Transportation and Highways

- **Toll Plaza Area Infrastructure, Coquihalla Highway Project, Phase 1, Hope to Merritt, BC, 1986 - 1987: Project Manager / Chief Designer**
Designed and construction managed high mast lighting and the infrastructure for vehicle classifications systems and other tolling related ITS facilities. Capital Value: \$300,000. Special Features: Required advanced light control; and, involved extreme climatic conditions and adverse terrain.
Client: BC Ministry of Transportation and Highways
- **Road Weather Information System Installation, Coquihalla Highway Project, Phase 3, Merritt to Peachland, BC, 1995: Designer and Field Supervisor**
Designed and construction supervised the installation and field infrastructure for the Road Weather Information System equipment. Capital Value: \$200,000. Special Features: Involved extreme climatic conditions and adverse terrain on a mountain highway with significant winter snowfall.
Client: BC Ministry of Transportation
- **Kamloops Weigh Scale Weigh-in-Motion System. Trans Canada Highway, Kamloops, BC, 1987: Project Manager / Chief Designer / Construction Supervisor**
Designed and supervised the installation of a Weigh-In-Motion (WIM) advanced vehicle scale system. Capital Value: \$150,000. Special Features: Utilized state-of-the-art technology for efficiency of trucks and other commercial vehicles.
Client: BC Ministry of Transportation and Highways
- **Squamish Dynamic Message Sign, Squamish, BC, 1999: Project Manager / Engineer of Record**
Detailed design, construction supervision, and project management for the implementation of a rural dynamic message sign for highway safety. Project specific warrants were developed due to the lack of formal warrant systems for isolated DMSs. This project also involved putting together a team of component manufacturers and producing the DMS in-house. Capital Value: \$300,000.
Client: BC Ministry of Transportation

HIGHWAYS AND EXPRESSWAYS

- **Trans Canada Highway HOV Project Detailed Design, Burnaby/Coquitlam, 1997 - 1999: Chief Designer / Engineer of Record**
Prepared the detailed design and undertook the construction supervision for roadway lighting, highway signing, and other related highway electrical systems for the widening of the freeway through Burnaby and Coquitlam. Capital Value: Project \$102M; Traffic and Electrical \$4.0M. Special Features: Development of completely new project specific design and construction standards. New lighting level criteria was developed to suit future CCTV surveillance.
Client: Reid Crowther & Partners (now EarthTech) and the BC Ministry of Transportation and Highways
- **Coquihalla Highway Lighting, Signals, and Signing; Coquihalla Highway Project, Phases 1, 2, and 3; Hope to Kamloops and Merritt to Peachland, BC, 1984 - 1990: Project Manager / Chief Designer / Construction Supervisor**
Carried out all stages of design, full project management, construction supervision, and contract administration of all electrical and signing work. Capital Value: Project \$900M; Traffic and Electrical \$15M. Special Features: Involved a freeway with adverse mountainous terrain; extreme climatic conditions with heavy snowfalls; scheduling of construction through the winter months; and, politically sensitive fast-track construction.
Client: BC Ministry of Transportation and Highways
- **Cache Creek to the Rockies Program, Province of British Columbia, 1997 to 2000: Consulting Electrical Engineer**
Preparation of the functional and preliminary electrical designs for the major upgrading of the Trans Canada Highway from Kamloops to the Alberta Border, including future tunnel and bridge electrical systems and ITS applications. Special Features: Application of the newly developed lighting and electrical standards and practices.
Client: BC Ministry of Transportation and Highways
- **Churchill-Roosevelt Freeway Project, Trinidad and Tobago, 1980: Project Manager / Senior Designer**
Designed traffic signals and highway lighting including a signal interconnection and coordination system for a priority bus route system. Capital Value: Traffic and Electrical \$3M. Special Features: Included coordination with bridges and the elevated highway; a computerized traffic coordination system; and, a design in an area with no standards or regulations.
Client: ND Lea International for the Government of Trinidad and Tobago
- **Hamilton / Westminster Interchange Project, Richmond / New Westminster / Delta, BC, 1993: Chief Designer / Construction Supervisor**
Designed and construction supervised the lighting, traffic signal, and signing designs. Capital Value: Project, \$80M; Traffic and Electrical, \$4.5M. Special Features: Included high mast lighting, 40 metres tall; and, a program to analyze lighting levels on the freeway. Required advance procurement of all specialized equipment.
Client: Delcan Corporation for the BC Ministry of Transportation and Highways

- **Cassiar Connector Project, Trans Canada Highway, Vancouver, BC, 1992: Chief Designer**
Carried out design, construction supervision, and inspection of all roadway lighting, traffic signals, signing, and advanced systems. Capital Value: Project, \$120M; Traffic and Electrical, \$5M. Special Features: Included safe maintenance of traffic through construction in the busiest intersection in Western Canada with little and/or no inconvenience to the motoring public; and, liaison and co-ordination with two major government agencies; the City of Vancouver and the BC Ministry of Transportation and Highways.
Client: SNC-Lavalin for the BC Ministry of Transportation and Highways

- **Trans Canada Highway Guide Signing Rehabilitation Program Detailed Design, Port Mann to Hope, 1992 to 1995: Chief Designer / Engineer of Record**
Preparation of the functional, preliminary, and detailed designs, and the construction supervision for the guide signing upgrade along the Trans Canada Highway from Surrey to Hope. Capital Value: \$1.1M. Special Features: Application of the newly developed guide signing standards.
Client: BC Ministry of Transportation and Highways

- **Barnet Hastings People Moving Project, Port Moody / Burnaby, BC, 1993 - 1996: Chief Designer / Engineer of Record**
Conducted design and construction supervision of street lighting, traffic signals, HOV signing and advanced traffic signal coordination system. Assisted the Ministry in development of the communications system along the corridor. Capital Value: Project \$18M; Traffic and Electrical \$1.4M. Special Features: Involved co-ordination with the Ministry, the City of Port Moody and BC Hydro.
Client: SNC-Lavalin and McElhanney Consultants for the BC Ministry of Transportation and Highways

- **Mary Hill Bypass Project, Port Coquitlam, BC, 1994: Chief Designer**
Designed and construction supervised the high mast lighting, roadway lighting, traffic signals, and infrastructure for an advanced reversible lane control system. Capital Value: Project \$40M; Traffic and Electrical \$2M. Special Features: Included high mast lighting; and, required future provisions for an advanced changeable lane control system and traffic management system.
Client: ND Lea Consultants for the BC Ministry of Transportation and Highways

- **Nanaimo Parkway Project, Vancouver Island Highway Project, BC, Nanaimo, 1993: Senior Designer**
Designed and construction supervised the roadway lighting, traffic signalization, and highway guide signing to full expressway standards. Capital Value: Project \$100M; Traffic and Electrical \$3M. Special Features: Involved a fast-track project; and, was the first project to incorporate new Ministry standards for the electrical and signing works. Also required early procurement of several sign bridge structures.
Client: ND Lea Consultants and Koors-Intercad for the BC Ministry of Transportation and Highways

- **McKenzie Interchange Project, Vancouver Island Highway Project, BC, 1992: Chief Designer**
Provided design of roadway lighting and traffic signalization. Capital Value: Project \$55M; Traffic and Electrical \$3.2M. Special Features: Involved a fast-track project; required accommodations for an observatory due to ambient light and for special lighting fixtures to make the lighting less obtrusive; necessitated extensive design to accommodate the heavy ferry traffic through the detours; and, resulted in the design of four different signals for four stages to accommodate the construction.
Client: Crippen Consultants for the BC Ministry of Transportation and Highways
- **Duke Point Highway, Nanaimo, BC, 1996: Chief Designer / Construction Supervisor / Engineer of Record**
Designed and construction supervised the roadway lighting and traffic signalization for both urban expressway and rural highway standards. Capital Value: Project \$50M; Traffic and Electrical \$1.2M. Special Features: Involved a fast-track project and coordination with the new BC Ferries terminal. Also required early procurement of signing materials and sign bridge structures.
Client: Reid Crowther and Partners (now EarthTech) for the BC Ministry of Transportation and Highways
- **Okanagan Connector Freeway Regulatory, Warning, and Directional Signing; BC, 1990: Project Manager / Chief Designer / Construction Supervisor**
Undertook the detailed design, construction supervision, contract administration, and project management of all aspects of the regulatory, warning, and guide signing system for the 120 km long freeway. Capital Value: \$4M. Special Features: Involved construction supervision and co-ordination through 20 different construction projects; adverse terrain and climatic conditions; and, a fast-track project. Also required early procurement of sign bridge structures.
Client: BC Ministry of Transportation and Highways

BRIDGES AND TUNNELS

- **Yanggongshan, Zhuhu, Xiawan, Foziling, and Xiaoyuan Tunnels; Taihe to Ganzhou Expressway, Jiangxi Province, PR China, 2004: Senior Foreign Traffic / E&M Engineer**
Provide functional design review, review of tender documents (design/build), construction supervision, and systems implementation management for the Traffic Engineering Systems, Intelligent Transportation Systems (ITS), and Electrical & Mechanical Systems (E&M) for the 5 tunnels on the Taigan Expressway Project. These tunnels consisted of twin-tube structures with the full complement of specialty tunnel lighting, ventilation, emergency systems such as fire protection, a local CCTV traffic surveillance system, a tunnel control and maintenance center, and related other E&M support systems. The longest tunnel, Foziling, was 1.8km in length. Special Features: Implementation of advanced Intelligent Transportation Systems and large-tunnel E&M systems. This project was designed and inspected under FIDIC conditions.
Client: Wilbur Smith Associates (USA) / Danish Road Directorate (Denmark) Joint Venture for the Jiangxi Provincial Communications Department
- **Xinling and Wangshiling Tunnels, Hangjinqi Expressway, Zhejiang Province, PR China, 2003: Senior Foreign Traffic / E&M Engineer**
Provide functional design review, review of tender documents (design/build), construction supervision, and systems implementation management for the Traffic Engineering Systems, Intelligent Transportation Systems (ITS), and Electrical & Mechanical Systems (E&M) for the Xinling and Wangshiling Tunnels on the Hangjinqi Expressway. These tunnels consisted of twin-tube structures with the full complement of specialty tunnel lighting, ventilation, emergency systems such as fire protection, a local CCTV traffic surveillance system, a small control and maintenance center, and related other E&M support systems. The longest tunnel, Xinling, was 1.5km in length. Special Features: Implementation of state-of-the-art advanced ITS and large-tunnel E&M systems. This project was designed and inspected under FIDIC conditions.
Client: Wilbur Smith Associates (USA) / Japan Overseas Consultants (Japan) Joint Venture for the Zhejiang Provincial Communications Department
- **Rogers Pass Snowsheds, Trans Canada Highway, BC, 2000 - 2002: Chief Designer / Engineer of Record**
Designed and construction supervised the electrical systems for three snowshed tunnels including tunnel lighting, power distribution, and communications systems. Capital Value: Electrical, \$2M. Special Features: Developed new project specific illumination level standards due to lack of available power and fiscal restraints.
Client: BC Ministry of Transportation and Highways
- **Cambie Bridge Project, Vancouver, BC, 1984 - 1986: Project Manager / Chief Designer**
Undertook design and construction supervision for specialty roadway lighting, decorative lighting and power distribution for a major 6 lane 2km long bridge in Vancouver's city center. Capital Value: Project \$80M; Traffic and Electrical \$2M. Special Features: Involved architect's specialty flood lighting; aesthetics; and, accommodation for traffic congestion during construction and trolley pole system for power supply conductors.
Client: ND Lea & Associates for the City of Vancouver

- **Glacier National Park Snowsheds, Trans Canada Highway, BC, 2000 and ongoing: Chief Designer / Engineer of Record**
Designed and construction supervised the electrical systems for the five snowshed tunnels including tunnel lighting, power distribution, and communications systems. Capital Value: Electrical, \$4.5M. Special Features: Developed new project specific illumination level standards due to lack of available power and fiscal restraints. Designed and constructed a rural underground primary electrical service with parallel fiber-optic communications system for advanced controls and monitoring.
Client: Public Works Canada and Parks Canada
- **Third Avenue Overpass Project, New Westminster, BC, 1988: Project Manager / Chief Designer**
Designed and construction supervised bridge deck heating for roadway de-icing. Capital Value: Electrical \$400,000. Special Features: Involved specialized control system; implementation of full heated deck bridge; and, recognized internationally as leaders in this field.
Client: Land Developer for the City of New Westminster
- **Fraser Canyon Tunnels Lighting Survey, Trans Canada Highway, BC, 2001: Special Lighting Consultant**
Undertook a field survey and detailed analysis of the existing lighting systems in seven tunnels through the Fraser Canyon section of the Trans Canada Highway in BC. Special Features: Performed testing and measurements using specialized luminance meter equipment and made recommendations for re-lighting based on maximum pavement luminance requirements. Special design criteria were developed to suit the rural nature of the highway and to minimize the energy consumption and the yearly operational costs.
Client: BC Ministry of Transportation
- **Alex Fraser Bridge, Delta, British Columbia, 1984 - 1986: Chief Designer**
Provided full design and construction supervision for specialty roadway lighting, communications system, tower floodlighting, navigational aid lighting, and power distribution for a major 3.5 km long cable stayed bridge. Capital Value: Project \$107M; Traffic and Electrical, \$2.5M. Special Features: Involved specialty flood lighting; weather monitoring during construction; aesthetics; and, accommodation for future ITS systems.
Client: Buckland and Taylor Ltd and CBA Engineering for the BC Ministry of Transportation and Highways
- **Dry Gulch Bridge, Coquihalla Highway Project, Phase I, Hope to Merritt, BC, 1986: Project Manager / Chief Designer**
Designed and construction supervised the electrical systems for major arch type bridge, including internal lighting and electrical systems in the steel arches for maintenance. Also included major power transmission systems and communications systems ducting across the bridge. Capital Value: Electrical \$50,000. Special Features: Adverse terrain; extreme climatic conditions; and, the need to build a power line to the area.
Client: BC Ministry of Transportation and Highways

- **Second Narrows Bridge, Vancouver, British Columbia, 1997: Engineer of Record**
Conceptual designer and Engineer of Record for the design and construction supervision for the major retrofit of roadway lighting, communications system, CCTV surveillance, tower and pier floodlighting, navigational aid lighting, power distribution, and highway signing for an existing major 3 km long bridge on the Trans Canada Highway. Capital Value: Traffic and Electrical, \$1.8M. Special Features: Included provisions for future ITS systems, special anti-vibration pole designs, and specialty base designs for future sign bridges.
Client: Buckland and Taylor Ltd for the BC Ministry of Transportation
- **No. 2 Road Bridge Project, Richmond, BC, 1993: Chief Designer**
Designed and construction supervised bridge lighting, roadway lighting, pier and navigation lighting, and traffic signals. Capital Value: Project \$35M; Traffic and Electrical \$2M. Special Features: Coordinated with the civil designer to locate conduits and concrete bases in the bridge structure; installed receptacles inside the bridge box girder; provided decorative lighting design; and, maintained the required lighting levels with pole height constraints.
Client: PBK Engineering Ltd. (now Cochrane Engineering) for the City of Richmond.
- **Great Bear Snowshed, Coquihalla Highway Project, BC, 1986: Project Manager / Chief Designer**
Designed and construction supervised the electrical systems for the snowshed including tunnel lighting, pavement heating, power distribution, and communications systems. Capital Value: Electrical, \$1.3M. Special Features: Utilized state-of-the-art programmable logic lighting controllers for efficiency.
Client: BC Ministry of Transportation and Highways
- **Ladner Creek Bridge, Ottomite Bridge, and Kingsvale Overhead, Coquihalla Highway Project, Phase I, Hope to Merritt, BC, 1986: Project Manager / Chief Designer**
Designed and construction supervised bridge deck heating for all three bridges for winter de-icing. Capital Value: Electrical \$700,000. Special Features: Involved de-icing control systems; adverse terrain; extreme climatic conditions; and, the need to build a power line to the area. *Client:* BC Ministry of Transportation and Highways
- **Standard Corrugated Steel Pipe Underpass Tunnels, Coquihalla Highway Project, Phases 1, 2, and 3, BC, 1986 - 1990: Project Manager / Chief Designer**
Designed a standard tunnel lighting and power distribution system for corrugated steel pipe (multiplate) underpasses to be used in freeway construction in rural applications. Design used on approximately 30 short tunnels along the 300 km project. Special Features: Involved standardizing the design for efficient procurement of materials, ease of construction, and most importantly efficient on-going maintenance.
Client: BC Ministry of Transportation and Highways

DESIGN / BUILD PROJECTS

- **Westview Interchange Design/Build Project, Trans Canada Highway, Lighting, Signals, and Signing, North Vancouver, BC, 1995: Engineer of Record**
Carried out design and full project management of all electrical and signing work for this freeway construction through North Vancouver. Capital Value: Project \$40M; Traffic and Electrical \$2.1M. Special Features: Involved an urban freeway and the first BC highways design-build project.
Client: Walter and SCI Construction for the BC Ministry of Transportation and Highways
- **Airport Connector Design/Build Project, Vancouver International Airport, Lighting, Signals, and Signing, Richmond, BC, 2001: Engineer of Record**
Provided full functional and detailed design, construction supervision, and full project management of all electrical and signing work for this new major connecting highway to the Vancouver International Airport. Capital Value: Project \$25M; Traffic and Electrical \$1.1M. Special Features: Involves a new bridge over the Fraser River, inclusion of an existing swing span bridge, and an interconnected traffic signal system coordinated with a priority bus route.
Client: Water Construction and SNC-Lavalin for the Vancouver International Airport Authority
- **Johnson/Mariner Overpass Design/Build Project, Lighting, Signals, and Signing, Coquitlam, BC, 1995: Engineer of Record**
Carried out design and full project management of all electrical and signing work for this railway overhead structure adjacent to the Lougheed Highway. Capital Value: \$600,000. Special Features: Involved the second MoTH design-build project.
Client: Peter Kiewit and Sons for the BC Ministry of Transportation and Highways
- **South Surrey Interchange Design/Build Project, Highway 99, Lighting, Signals, and Signing, Surrey, BC, 1999: Engineer of Record**
Provided design, construction supervision, and full project management of all electrical and signing work for this freeway construction through south Surrey. Capital Value: Project \$35M; Traffic and Electrical \$2.0M. Special Features: Involves a sub-urban freeway and single point interchange.
Client: BA Blacktop for the BC Ministry of Highways

TECHNICAL RESEARCH, REPORTS, and STANDARDS DEVELOPMENT

- **BC Highway Roadway and Area Lighting Design Manual, Province of BC, 2001: Special Consultant to the Ministry**
Researched and developed a new production of the BC Roadway and Area Lighting Design Manual. Special Features: Required extensive research of new methodologies applied to roadway and area lighting, including the latest design practices using pavement luminance and Small Target Visibility. Also developed a new set of design criteria for lighting levels based on maximum requirement standards in order to minimize energy consumption and reduce ongoing operational costs.
Client: BC Ministry of Transportation
- **Full Spectrum White Light vs High Pressure Sodium Lighting Pilot Project , City of Calgary, under development: Illuminating Engineering Specialist**
Theoretical research has been undertaken by the IES indicating that the use of full spectrum white light is more optically effective for visibility than monochromatic high pressure sodium light. To demonstrate the effects of this theory in the field a pilot project is being undertaken in the City of Calgary.
Client: Illuminating Engineering Society of North America, Roadway Lighting Committee Spectral Effects Subcommittee and the City of Calgary
- **Illumination of Isolated Rural Intersections Design Manual, Transportation Association of Canada, 2000: Illuminating Engineering Specialist**
Researched and developed a new design standards manual for the Transportation Association of Canada (TAC) regarding the roadway illumination at isolated rural intersections. This manual will be used as the engineering standard practice across Canada. Special Features: Required extensive research of new methodologies applied to roadway and area lighting, including the latest design practices using pavement luminance and Small Target Visibility. Also developed a new set of design criteria for lighting levels based on maximum requirement standards in order to minimize energy consumption and reduce ongoing operational costs.
Client: Hamilton Associates for the Transportation Association of Canada
- **BC Highways Traffic Engineering and Electrical Design Guidelines, Material Standards, and Construction Standards, 1993-1997: Team Member and Consulting Engineer**
Research and development of the Ministry of Transportation and Highways new design guidelines, material standards, and construction standards for electrical and traffic engineering systems. Shaflik Engineering produced and published the documents. Special Features: As part of the material standards Shaflik Engineering prepared and administered the pre-purchase and standing offer contracts for the Ministry's electrical maintenance department.
Client: BC Ministry of Transportation and Highways

- **City of Calgary Roadway and Area Lighting Design Manual, Calgary Alberta, 2001: Special Lighting Consultant**
Researched and developed a new production of the City of Calgary Roadway and Area Lighting Design Manual. Special Features: Required extensive research of new methodologies applied to roadway and area lighting, including the latest design practices using pavement luminance and Small Target Visibility. Also developed new design criteria for lighting levels based on maximum requirements in order to minimize energy consumption and reduce operational costs.
Client: City of Calgary Roads Department
- **BC Master Municipal Specifications, 1993-1997: Team Member and Consulting Engineer**
Research, development, and production of the BC Master Municipal Specifications design guidelines, material standards, and construction standards for roadway lighting and traffic signals. Special Features: Required incorporation and streamlining of the various independent municipal standards.
Client: Joint Venture of BC Cities and Municipalities
- **BC Highway Guide Signing Design Manual, Province of BC, 1995: Special Consultant to the Ministry**
Researched and developed a new production of the BC Guide Signing Design Manual. Special Features: Required extensive research of signing systems in Canada, USA, Australia, and Europe; involved extensive liaison with the Ministry; and, will set the standard for the Province.
Client: BC Ministry of Transportation and Highways
- **Town of Smithers Roadway Lighting Study, Smithers BC, 2000: Lighting Engineering Specialist**
Undertook a complete survey, provided analysis, and prepared a comprehensive report on the entire Town of Smithers roadway lighting system. Provided commentary on existing systems, prepared a master plan for all future lighting systems including upgrading of existing systems, and prepared new design, material, and construction standards.
Client: Town of Smithers
- **Banff National Park Roadway Lighting Study, Banff Alberta, 2002: Lighting Engineering Specialist**
Undertook a complete field survey, provided analysis, and prepared a comprehensive report on the entire existing roadway lighting system along the Trans Canada Highway through Banff National Park.
Client: Parks Canada

MUNICIPAL PROJECTS

- **Numerous Municipal Roadway Lighting Projects, 1975 - 2002: Designer / Senior Designer / Project Manager / Engineer of Record**
Carried out the functional planning, detailed design, construction supervision and inspection, project management and contract administration of roadway lighting systems for approximately 3000 projects. Capital Values: Traffic and Electrical, \$5000 - \$100,000 per project.
Clients: Various British Columbia Cities and Municipalities
- **Numerous Municipal Traffic Signal Projects throughout BC, 1975 - 2002: Designer / Senior Designer / Project Manager / Engineer of Record**
Carried out the functional planning, detailed design, construction supervision and inspection, project management and contract administration of traffic signals and traffic signal systems for over 500 projects. Capital Values: Electrical, \$5000 - \$100,000 per project.
- **City of Coquitlam Road Intersections Project, Coquitlam, BC, 1988: Chief Designer**
Carried out traffic signal design and advanced interconnection of signals for 50 different intersections; and, prepared, coordinated and supervised the construction of traffic signal and communications designs. Capital Value: \$2M. Special Features: Included preparation of construction contracts, project supervision, and inspection.
Client: City of Coquitlam
- **Matsqui Traffic Co-ordination System Project, South Fraser Way, BC, 1988: Chief Designer**
Prepared the co-ordination of the traffic signal system along South Fraser Way. Capital Value: \$100,000.00 Special Features: Used PC-based Closed Loop Traffic Signal Monitoring System; provided significant savings through the utilization of overhead wiring on BC Hydro/telephone poles; and, co-coordinated location of system detection loops.
Client: District Municipality of Matsqui (now City of Abbotsford)
- **Dundarave and Ambleside Downtown Revitalization Project, West Vancouver, BC, 1988: Project Manager / Senior Designer**
Conducted design and construction supervision of decorative lighting and signals. Capital Value: \$500,000. Special Features: Included elaborate decorative lights; required an aesthetically pleasing design to enhance the existing environment; and, necessitated extensive co-ordination with the client, merchants and architect.
Client: Municipality of West Vancouver
- **Penticton Downtown Revitalization Program, Penticton, BC, 1979: Senior Designer/Project Manager**
Carried out design and construction supervision of lighting and signals for decorative downtown area. Capital Value: \$2.5M. Special Features: Involved a coordinated traffic signal system for a one-way road couplet; required an aesthetically pleasing design; and, included extensive co-ordination with the client, merchants and the architect.
Client: McElhanney Consultants for the City of Penticton

SPECIAL PROJECTS

- **360networks Fiber Optic Transmission System Construction Supervision, Southern British Columbia and Northern Washington State, 1998 -2001: Project Manager and Engineer of Record**
Independent construction supervision and engineering certification of a major fiber optic transmission system underground infrastructure in southern British Columbia and northern Washington State. The infrastructure is part of a major world wide system. Capital Value: \$10 million.
Client: 360networks / Worldwide Fiber / Ledcor Industries
- **Lighting Design Legal Opinion, Kamloops Civic Center, BC, 2001: Lighting Specialist and Certifying Engineer**
Researched and provided a professional legal opinion for a civil court case involving a personal injury accident attributed to the existing lighting design. Special Features: Due to the minimal amount of engineering standard practices covering the situation in question, extensive research was undertaken and professional opinions developed from first principles and with comparison and extrapolation of standards in other areas.
Client: Fulton and Company Lawyers
- **Earl's Cove Ferry Terminal Project, Sunshine Coast, BC, 1979: Senior Designer**
Provided design for power distribution and controls for a major salt water ferry terminal. Capital Value: Electrical, \$400,000. Special Features: Included liaison with the Ministry of Transportation and Highways and BC Ferry Corporation; and, involved an environmentally sensitive project.
Client: British Columbia Ferry Corporation
- **BC Driver Information Display Systems Fall Arrest Survey and Retrofit, 1999: Project Manager**
The aging infrastructure of the BC changeable message signs system, in particular the supporting sign bridges, required a detailed site survey and recommended upgrading of the safety fall arrest system on the maintenance catwalks of approximately 40 structures. Special Features: The new fall arrest systems design had to conform to newly released Workers Compensation Board guidelines and requirements.
Client: BC Ministry of Transportation
- **Kicking Horse Mountain Ski Resort Electrical Design, 2000 – 2005, Chief Designer and Engineer of Record**
Carried out the entire electrical design and construction management of all aspects of the project including primary power distribution, secondary power distribution, communications, and building electrical systems. Capital Value: \$4M. Involved planning, design, and construction supervision and co-ordination of the entire electrical systems in a mountainous municipal with adverse terrain and climatic conditions; and, a fast-track project.
Client: Ballast Nedam Canada and McElhanney Consultants Ltd

- **Newton Athletic Park Project, Surrey, BC, 1979: Senior Designer**
Designed sports field lighting for a soccer, field, football field and tennis court. Capital Value: Electrical, \$200,000. Special Features: Involved control of spillway lighting since the project was in the center of a subdivision area.
Client: City of Surrey
- **Burnaby Sports Fields, Burnaby, BC, 1977: Senior Designer**
Designed the sports field lighting for four separate municipal parks. Capital Value: Electrical \$750,000. Special Features: Included spillway light control in populated areas; and, used, for the first time, concrete poles, which were 80 feet high, for the lighting system.
Client: Municipality of Burnaby
- **Spruce Grove Sports Fields, Whistler Resort, BC, 1998: Project Engineer**
Designed and construction supervised the sports field lighting for three separate baseball fields, tennis courts, and auxiliary area lighting. Capital Value: Electrical \$300,000. Special Features: Included advanced light control to reduce light pollution in the rural resort area.
Client: Resort Municipality of Whistler