


International Climate Risk Knowledge Development and Capacity Building: Costa Rica and Honduras Examples

David Lapp, FEC, P. Eng.
Secretariat, WFEO Committee on Engineering and the Environment
Manager, Professional Practice, Engineers Canada

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Canada

PIEVC CVIIP

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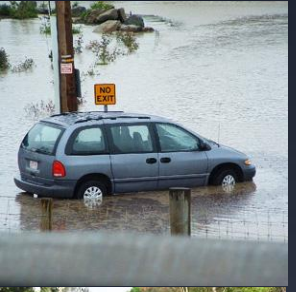
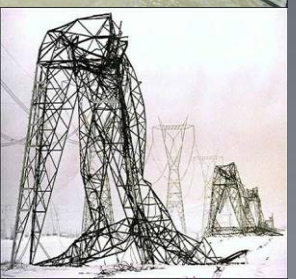




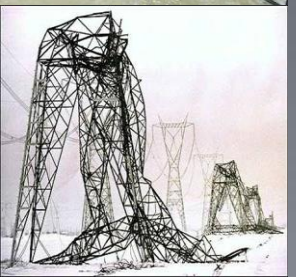


Knowledge Development and Capacity Building

- **Knowledge Development (The First Step)**
  - Develop the knowledge
  - Impart knowledge through training
- **Capacity-Building (The Subsequent Steps)**
  - Human resources
  - Organizational development
  - Institutional development
  - Legal and regulatory framework

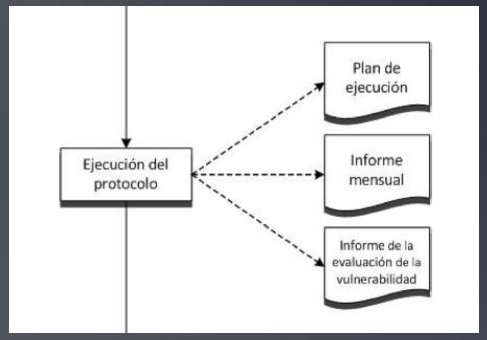


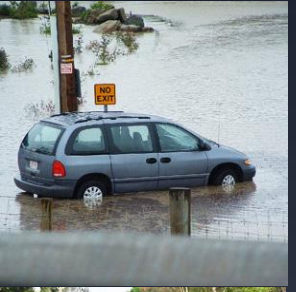




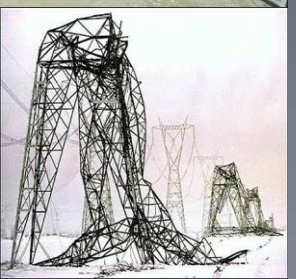
Methods Used for Knowledge Development and Capacity Building

- On-site workshops
- Protocol documentation
- Review relevant case studies of completed projects
- Establish project management roles
- Establish working roles for technical and climate data
- Establish project schedule, meetings, reporting, deliverables
- Review level of effort required to complete study
- Advice, coaching by teleconference , in-person meetings
- Periodic review of documentation produced



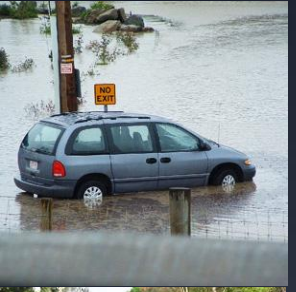




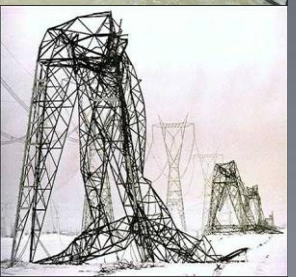


Regional Context

- Costa Rica and Honduras, similar to many other Central American nations, have experienced significant infrastructure damage from extreme weather events
- Future climate will force infrastructure managers to face severe challenges from increasing frequency and intensity of extreme weather events:
  - Hydrologic cycle changes –impacting quality and availability of water supply
  - Accelerating ecosystem changes
  - Landslides
  - Coastal Sea Rise
  - Hurricane destruction , extreme rainfall and damage from high winds

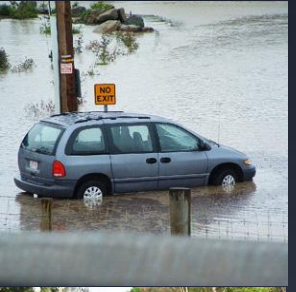


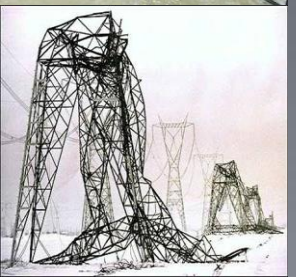
Regional Context..

- Need to develop the capacities of local institutions to assess vulnerabilities to changing climate for its infrastructure:
  - Improve understanding of the weather and changing climate
  - Better monitoring networks to obtain needed data to improve understanding of basin runoff dynamics.
  - Coordinate engineering staff and other professionals to establish capabilities for a reproducible approach to vulnerability assessment of critical public infrastructure to extreme events

Regional Context..



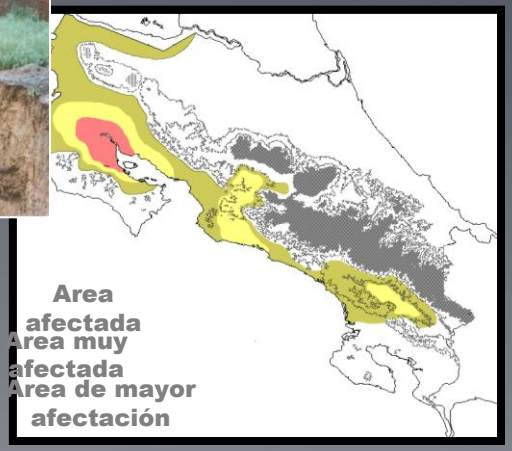


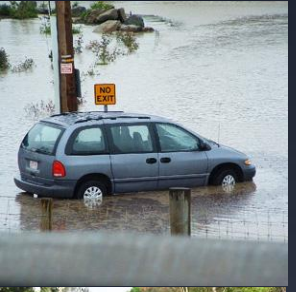


- Recent severe weather-related disaster events in Costa Rica and Honduras provide insight on how damaging future effects of extreme weather events can be:
  - Agricultural production impacts
  - Damage to infrastructure
  - Loss of life
  - Economic impacts
  - Public health impacts
- Costa Rica - Massive infrastructure damage associated with unusually severe *indirect* rains and high winds in November 2010 (Hurricane Tomás) in Limon region

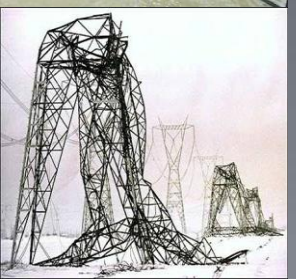








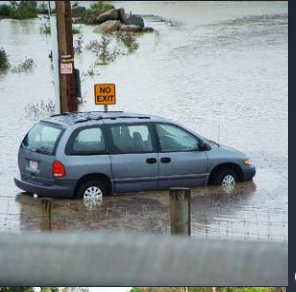


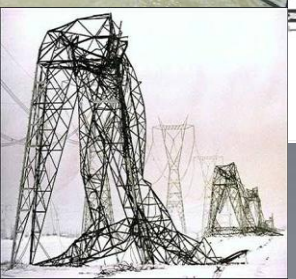



Costa Rica Limon Infrastructure Case Study

- The City of Limon sewage system was selected by Costa Rica as the representative and priority infrastructure for a climate change engineering vulnerability assessment

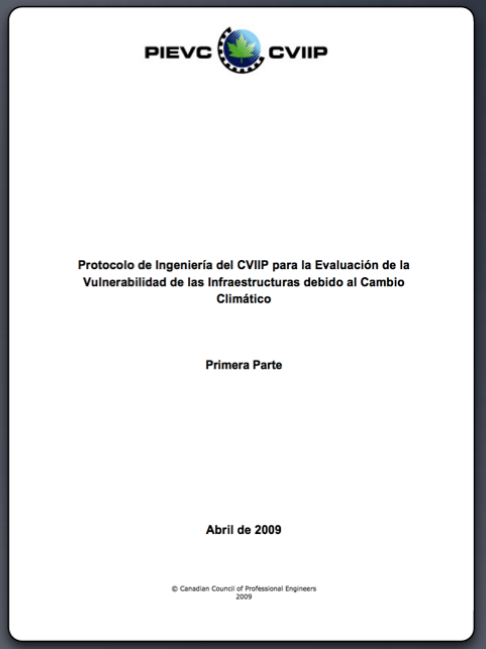
- Limon is located on the Caribbean Sea side of Costa Rica
  - Capital city and main hub of the Limon province
  - Total Metro population =105,000

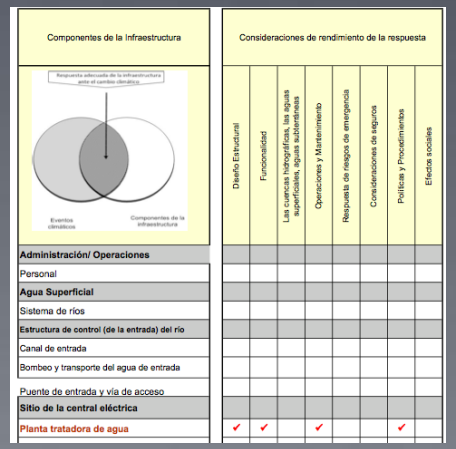




Project Objective

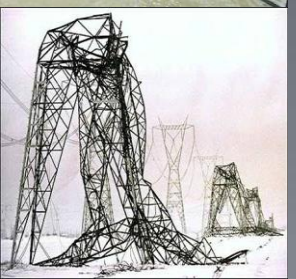
- Conduct a vulnerability assessment on the City of Limon's Wastewater Treatment System to determine risks to infrastructure due to severe weather events associated with climate change.











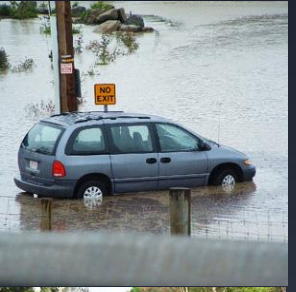
Project Team Organization and Roles..

- CFIA/UPADI:
  - Local Overall Study Coordination

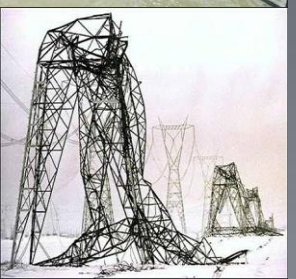
COLEGIO FEDERADO DE INGENIEROS Y DE ARQUITECTOS DE COSTA RICA

UPADI UNION PANAMERICANA DE ASOCIACIONES DE INGENIEROS

Core team: UPADI provided one Project Engineer/Coordinator and CFIA provided an Executive Director/Project Administrator



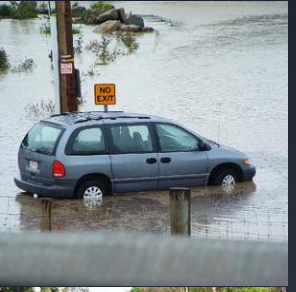




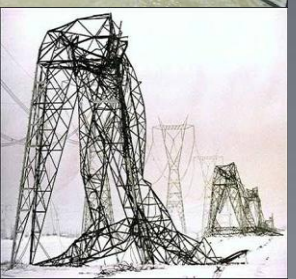
Project Team Organization and Roles

- **AyA (Instituto Costarricense de Acueductos y Alcantarillados):**
  - Infrastructure Owner
  - Risk Analysis and Engineering
  - Research and Development
  - Scheduling and Monitoring
  - Collection and Treatment
  - Peripheral Systems

Core team: 5 professional engineers +4 operations and maintenance staff





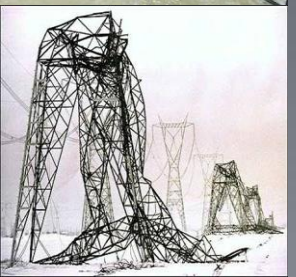
Project Team Organization and Roles

- **Costa Rica Instituto Meteorologico Nacional (IMN):**
  - Climate Analysis
  - Research
  - Forecasting
  - General meterological data advisory services
  - Key interface for engineering team

Core team: 2 climate scientists



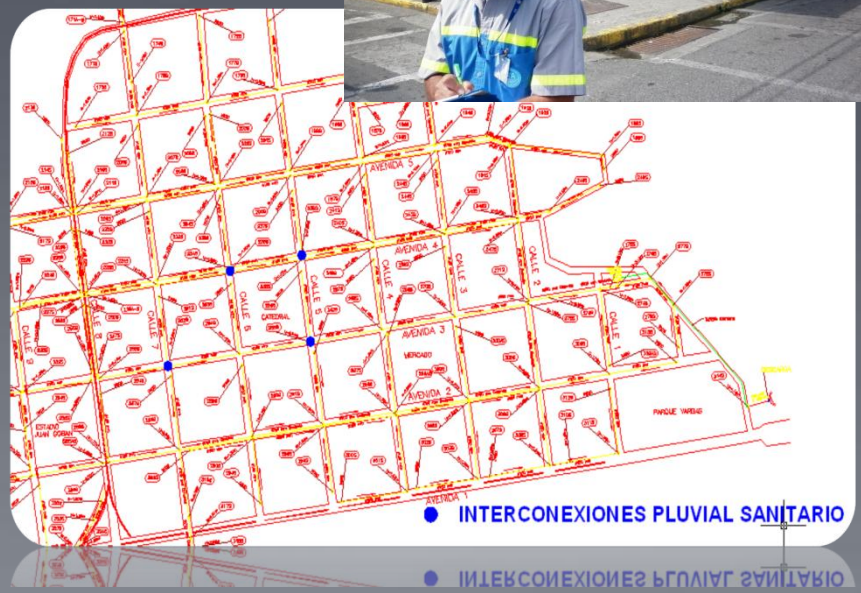


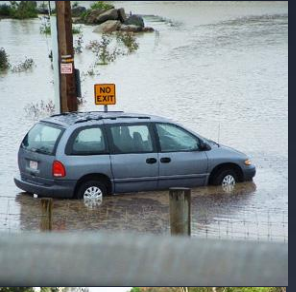


Sample Finding: Rain Overload-Capacity Implications

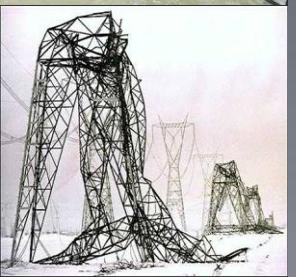
- High level of interconnections between storm and sanitary sewers
- System capacity limitations before higher burden due to projected climate
- Recommendation:
  - Initiate program for identification and reduction of interconnections of services. Reclaim capacity for now and future
  - Eliminating interconnections offers chance to reclaim inherent adaptive capacity of the sewer system for Limon









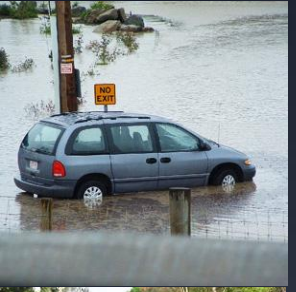


General Conclusions
Costa Rica Limon Case Study

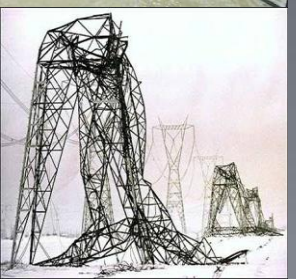
- Identified adaptation measures requiring immediate action
- Identified potential vulnerabilities predicted to occur with extreme conditions attributable to future climate
- Expanded on traditional criticality assessments, allowing identification of potential vulnerabilities caused by other process upsets, cumulative or cascading failure scenarios
- Encouraged the organization and recording of key infrastructure asset components
- Identified areas where more detailed studies are required, where equipment improvements are prudent, good record keeping and tracking of data sources and assumptions
- Facilitates ongoing review and revision of the infrastructure's risk profile in the future

Escala	Calificación de la gravedad de las consecuencias y efectos
	Método E (modificado)
0	Poco significativa o no se aplica
1	Cambio medible muy bajo/ escaso
2	Cambio en la capacidad de servicio Baja / poca / mínima
3	Pérdida parcial de ciertas capacidades
4	Pérdida moderada de cierta capacidad
5	pérdida de capacidad y pérdida parcial de función
6	pérdida de función considerable/crítica
7	pérdida de activos extrema/continua

Assessment of Climate Risk and Construction Practices for Highway Bridge Infrastructure in Honduras

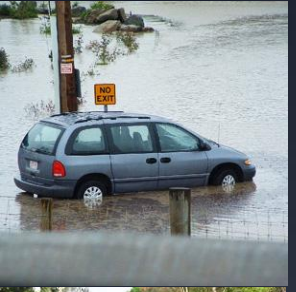




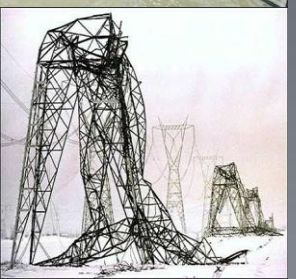


Objectives of the Project

- Develop the knowledge on the risks imposed by present and future climate on selected highway bridges in Honduras.
- Build the capacity for Honduran authorities to understand and define, at a screening level, the risks and vulnerabilities
- Review bridge infrastructure maintenance and operations policies and procedures for present and future climate
- Review the procurement of competent design and construction services for highway bridges to account for future climate

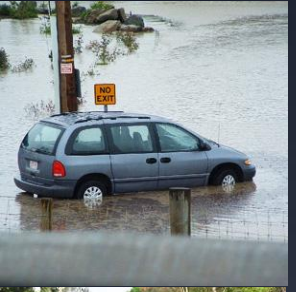




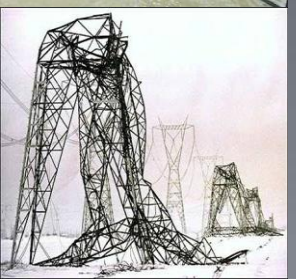


Project Partners

- **Government of Canada** – Department of the Environment – International Affairs Branch
- Engineers Canada
- **Honduras**
  - College of Engineers – CICH
  - Ministry of Transport (SOPTRAVI) – owner and operator of infrastructure
  - Meteorology Institute – weather and climate data
  - Ministry of the Environment (SERNA) – climate change responsibility
  - Risk Management Commission (COPECO)







Other External Stakeholders

- Construction and Engineering Chambers of Commerce – representing the private sector
- Professional Societies: Planners, Architects
- National Electricity Utility (ENEE) - owner of weather stations network
- Other Government Ministries: Finance, Planning
- United Nations Development Program

Project Organization

Government of Canada (Project funding)

Project Advisory Group

Honduras External Stakeholders (e.g., CHICO, CHEC, Universities, etc.)

Honduras Government Stakeholders (e.g., SOPTRAVI, SERNA, COPECO, Meteorología)

Honduras Stakeholders Liaison

WFEO Liaison (D. Danyluk)

PIEVC Canada Network of experts

Engineers Canada (D. Lapp)

Colegio de Ingenieros Civiles de Honduras (CICH)

Project Administration

Project Manager (G. Félio)

Project Manager – Honduras (J. Paz)

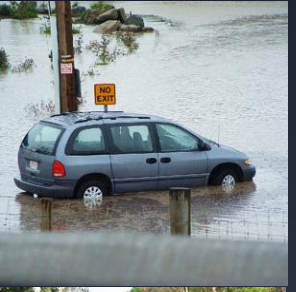
Project Administration (Honduras)

Technical Team (Canada)

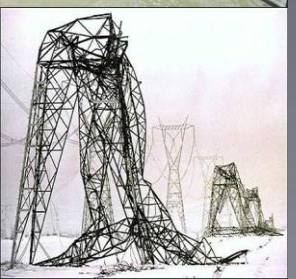
Technical Team (Honduras) Experts contracted and from government agencies

Codes, standards & procurement

Vulnerability Assessment of bridges





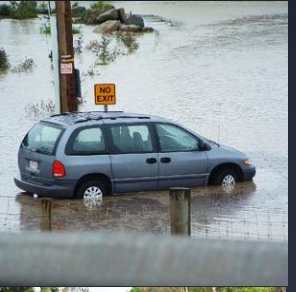


Progress to Date (March 2012)

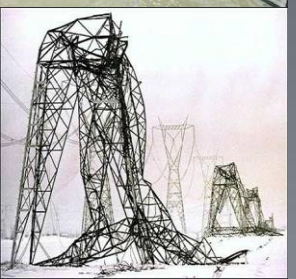
- Signing of Collaborative and Protocol License agreements between Engineers Canada and the *Colegio de Ingenieros Civiles de Honduras* (CICH)

Training Workshops

- End of March 2012 – in Tegucigalpa and San Pedro Sula: Close to 100 participants

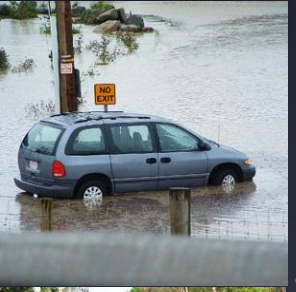




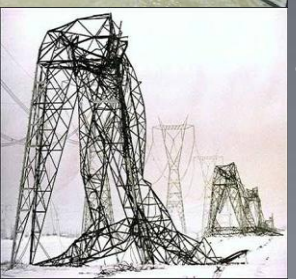


Work in Progress

- Setting-up the Honduras Project Team (June 2012)
  - Engineers specialised in various bridge related domains: structures, hydraulics, hydrology, geotechnical, operations
  - Meteorology and climate specialists
- Selection of the candidate bridges – criteria
  - Located on major transportation routes
  - Representative of existing and future construction
  - Various climate zones
  - Safety and security of team
  - 82 bridges reviewed, 11 on short list, 4 to be selected for assessment

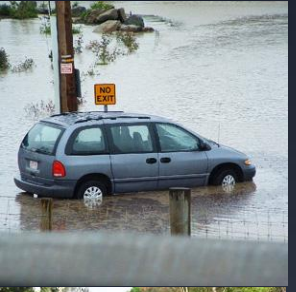




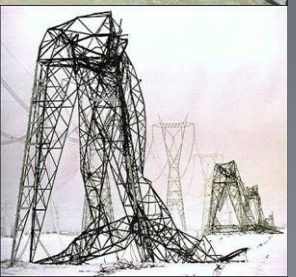



Results and Observations To Date

- Multiple disciplines and teamwork
- Understanding risk assessment and climate change impacts
- Meteorological and climatological capacity challenges
- Application of the protocol
- Role of workshops
- Role of Canadian Advisory Team
- Project management
- Presentations to the Costa Rica government

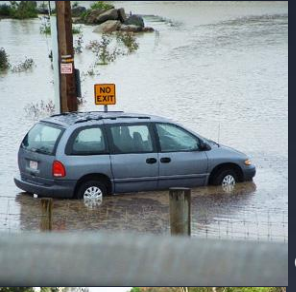




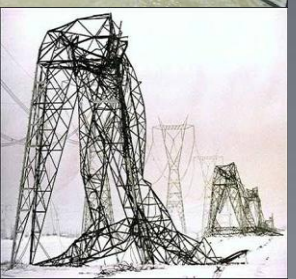


Capacity Building Model

Adapted from Brown et. al. in Australian Runoff Quality, Engineers A





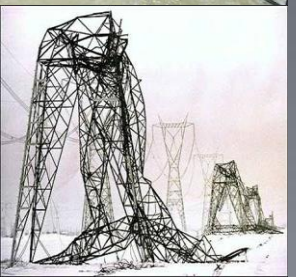


Capacity Building Assessment Levels

- Level 1 – Exposure to the issues, principles, results of projects
- Level 2 – Awareness and demonstrated learning
- Level 3 – Demonstrated application or engagement in a project
- Level 4 – Application beyond the initial project
- Level 5 – Independent application without external advice or intervention

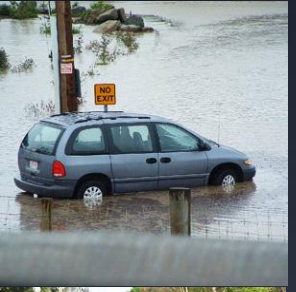




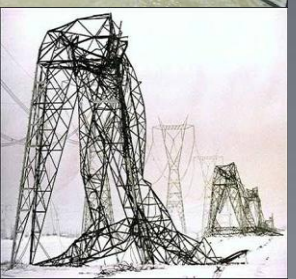


Next Steps

- Long-term users license with Colegio signed September 2011
- Further briefings and workshops with government departments to raise awareness and buy-in
- Secure additional case studies for other infrastructures as well as continue water studies with AyA
- Work with Colegio in workshops to neighbouring countries in the region to solicit new interest
- Colegio staff are providing advice and support to the Honduras project







Questions

For more information on the Costa Rica and Honduras Infrastructure Climate Risk Assessments and International applications contact:

David Lapp, P.Eng.

Manager, Professional Practice

Engineers Canada

david.lapp@engineerscanada.ca