

CLIMATE-RESILIENT INFRASTRUCTURES

Innovative design approach for Sustainable Infrastructure

Case study: Infrastructure upgrade in Belize



Speaker: Stefano Ripari, Civil Engineer and Partner

Blue Economy Forum 2024, Izola (Slovenia), 4th December 2024

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POLITECNICA
building for humans

COMPANY

We are one of Italy's leading integrated design companies, providing its expertise in the field of Architecture, Engineering and Urban Planning. Our professionals have signed prestigious projects in over 50 countries around the world, guided by a common cultural and social vision: Building for Humans. This approach is the essence of the human and professional development of Politecnica's people and projects.

1972

Year of foundation:
over 50 years of history and
experience in the field of
integrated design

+300

Staff:
engineers, architects, technicians
and administrative staff, of whom
40 percent are under 40 years old
and 47 percent are women

38

Projects acquired in 2023:
in Italy and abroad,
of which 11% for
private clients

7

Fields of activity:
architecture and building technologies,
structures, infrastructure, systems,
fire prevention, health and
safety, sustainability

4

Multidisciplinary fields:
Project Management -
Construction Management -
BIM - Healthcare

+29MIn€

Turnover 2023:
with major acquisitions in
healthcare, luxury,
infrastructure and restoration



SUSTAINABILITY

We follow the main international sustainability standards for a project approach that respects the environment, limits the use of resources and uses renewable energy sources.

Associations



GBC Italy
Green Building
Council
Italy



International
Federation of
Consulting
Engineers



Dun &
Bradstreet
D-U-N-S
Number@:
443 829 189



European
Federation of
Engineering
Associations



Assortis
International
Cooperation
Platform

Company Certifications



Bureau Veritas
certified service
quality
ISO 9001, ISO
14001, ISO 45001



Certification
Bureau Veritas
UNI PDR 125



IDEM Gender
Equality
Certification



Legality Rating
AGCM with
the maximum
rating: 3 stars



Gold rating in the
EcoVadis System
among the 5%
evaluated by the
platform

Professional certificates



LEED® AP
certified
professionals



Envision®
SP certified
professionals



Bureau Veritas
UNI 11648:2016
certified project
managers



Certified Project
Managers Project
Management
Institute



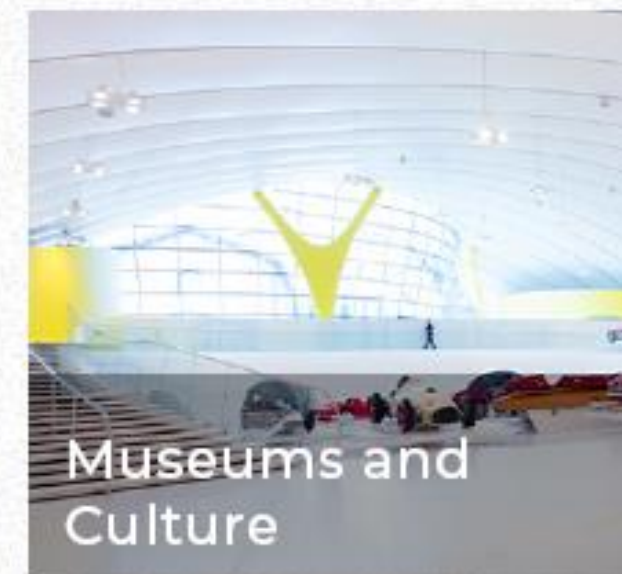
ICMQ-certified
BIM staff
(Manager, Coord.
and Specialist)

SECTORS

We develop projects in Italy and abroad, in the public and private sector, in education, health, industry, services and infrastructure.

We have in-house architects, engineers, planners, plant engineers and structural engineers organised in **seven areas of activity**, each with its own in-house manager: architecture and building technologies, structures, infrastructure, systems and energy, and fire and safety.

All sectors operate in a coordinated manner, supported by the work of **four multidisciplinary, cross-disciplinary areas** for each project.



PEOPLE

Today we are a professional community of over 300 members, consisting of engineers, architects, technicians and experts with an average age of 36 years.

Members, collaborators, employees are central for us. We devote attention to them through **welfare policies** that reconcile work and family commitments, promoting vocational training and inclusion initiatives in favour of gender equality and women's employment, respect for diversity.

We believe in **vocational training**: in 2023 we organised more than 2600 hours of vocational courses - BIM technicians, safety coordinators, fire prevention experts - together with moments of sharing, useful to reflect together on internal project experiences, and to promote our project culture, bringing know-how together.

45%

is the percentage of women in Politecnica

36

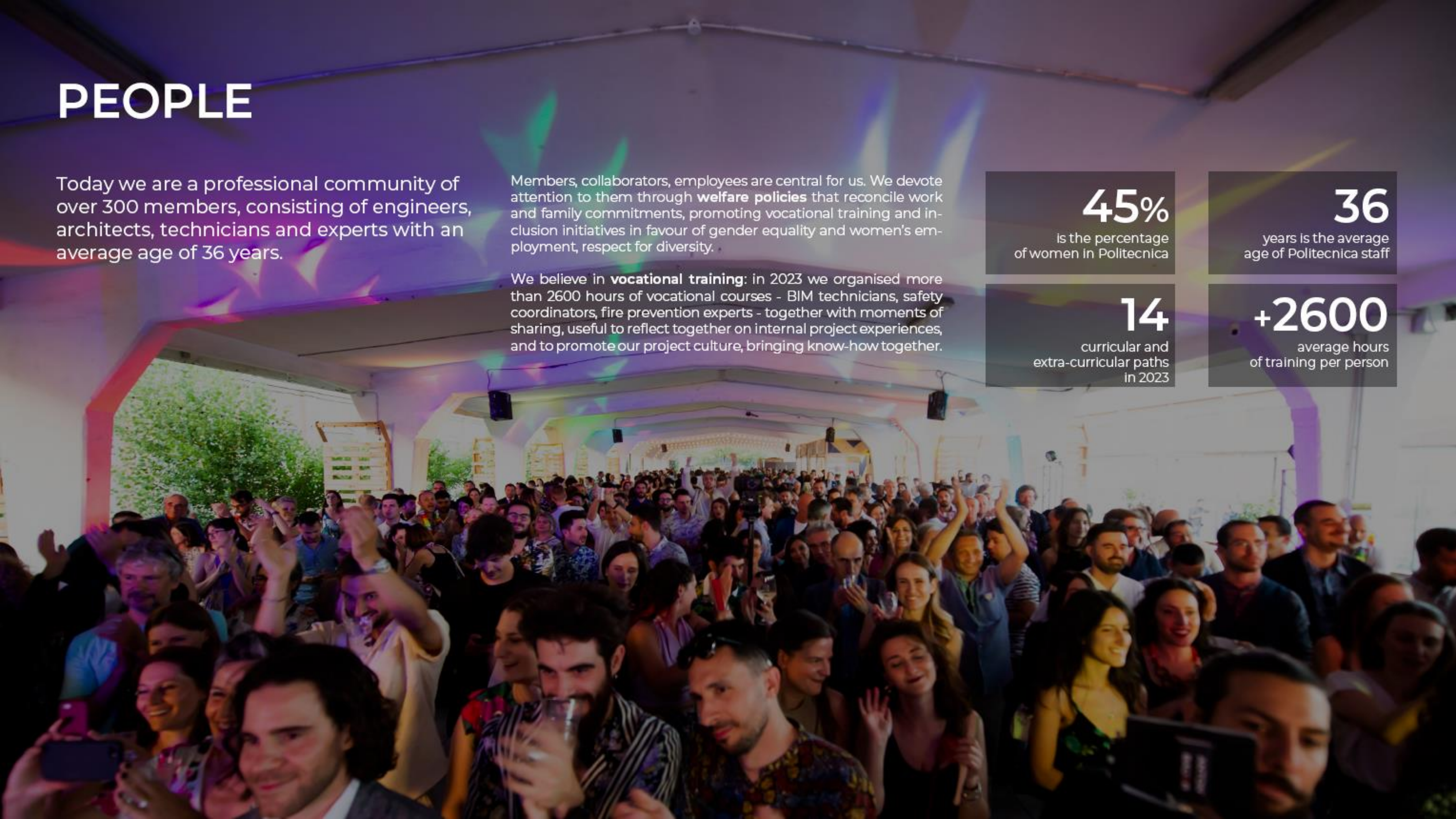
years is the average age of Politecnica staff

14

curricular and extra-curricular paths in 2023

+2600

average hours of training per person



ABROAD

Sharing Italian best practices and knowledge transfer initiatives to contribute to innovation and growth in the developing countries where we operate.

We have extensive experience in terms of **international projects**, thanks to our renowned ability to integrate different competences and our skill in managing complex projects. With a proven track record in the construction of civil works and infrastructure in many developing countries, we develop numerous projects financed by **International Financing Institutions**.

We are present in **10 countries** (Angola, Belize, Jamaica, Grenadines, Guyana, Equatorial Guinea, Kenya, Romania, Sierra Leone), promoting local development and growth, connecting people from 3 continents.

Our latest international projects:

- New Demerara Bridge - Guyana
- Fort Charlotte - St. Vincent & the Grenadines
- 27 Strategic Bridges - Albania
- Essex Valley Agricultural Project - Jamaica
- Philip Goldson Highway - Belize
- Wismar-Mackenzie Bridge - Guyana
- Coastal Highway - Belize
- Zealand University Hospital - Denmark
- East African Kidney Institute - Kenya
- Arseni Hospital - Romania



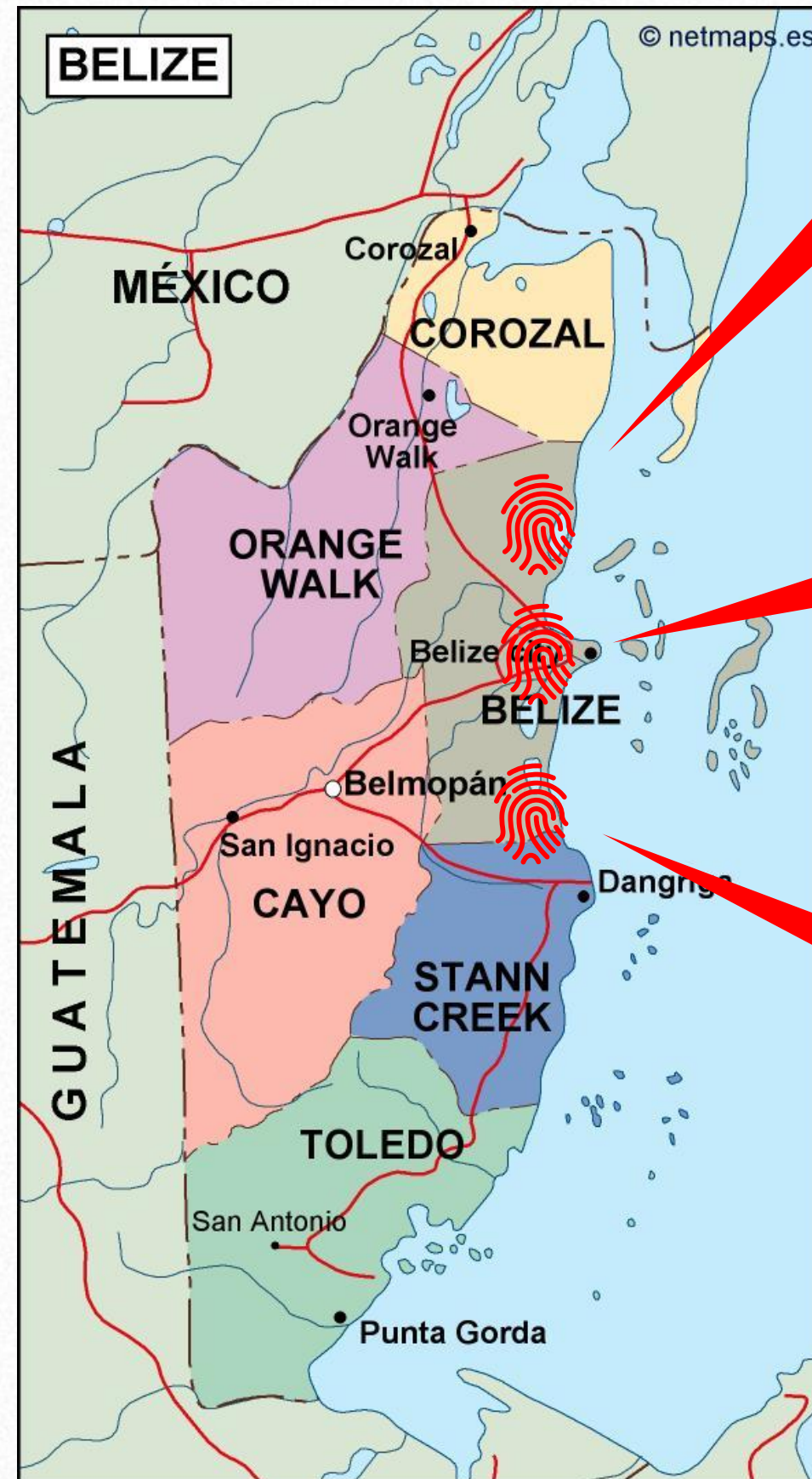
CLIMATE CHANGE IN BELIZE: THREE STRATEGIC INFRASTRUCTURES



Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

Belize is vulnerable to **hurricanes, storms** and associated **floods**, wind damage, and **storm surge** mainly due to low-lying terrain that exacerbates the effects of flooding and sea level rise.


World Bank Natural Disaster Hotspot study ranks Belize as the **8th country in the world for climate risk**.




Philip Goldson Highway


 From Mile 24.5 north of Belize City to Mile 92 at the Belize-Mexico Border


 125 km

 45,8 millions

Haulover Bridge

 PG International Airport and Belize City road link


 960 m

 15,5 millions

Coastal Highway

 From Hope Creek to La Democracia

 59 km

 66 millions

COASTAL HIGHWAY | PROJECT BACKGROUND

The road, previously vulnerable to extreme weather events, has long been in need of a comprehensive upgrade to facilitate the safe movement of people and goods.

By addressing the critical needs for improved connectivity, safety and socio-economic growth, this project:

- ✓ modernizes transportation in the region
- ✓ embodies forward-thinking sustainable design principles
- ✓ aims to address socio-economic challenges
- ✓ supports regional economic growth
- ✓ showcases an advanced project management for handling complex, large-scale projects, by focusing on sustainability goals with detailed planning for timelines, budget and quality



COASTAL HIGHWAY | INNOVATIVE DESIGN APPROACH

CLIMATE CHANGE APPROACH – 2050 SCENARIO

Increase in air temperature (from 2°C to 4°C) compared to the present. This implicates:

- ✓ Temporal and spatial variations in seasonal rainfall
- ✓ A general decrease in annual rainfall of about 10%
- ✓ Increasing frequency and intensity of tropical storms

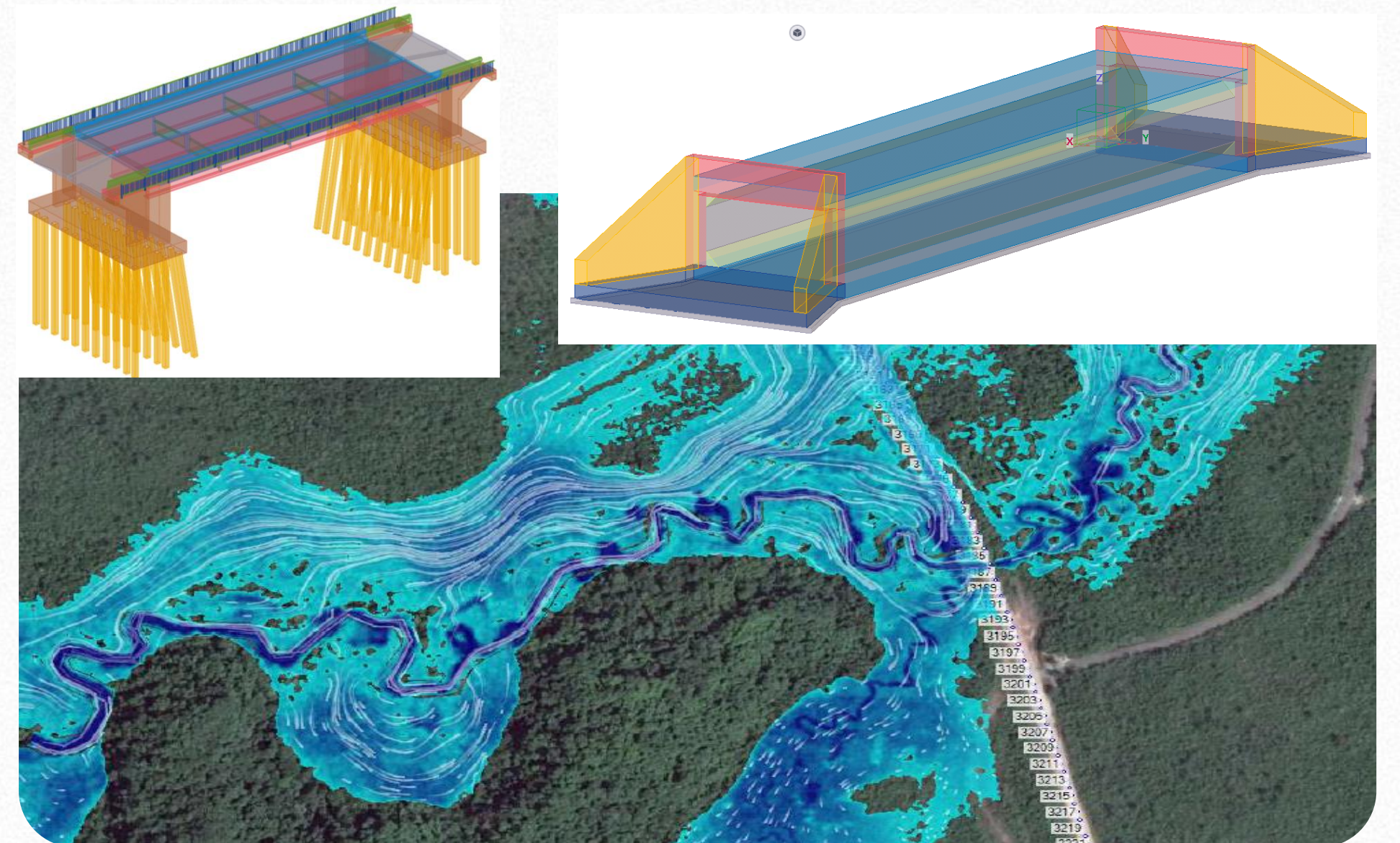
The Weather Generator (WG) developed by Caribbean Community Climate Change Centre (CCCC) provides for possible future weather conditions. The statistical analysis of extreme events was compared with the output of the WG system for the 2050 Scenario (Precis RCM driven by MPI GCM (ECHAM5)).

Analysis	-	Rainfall depth (mm/24hours)	Change Factor (-)
Statistical analysis of extreme events	TR300	413.28	1.51
Statistical analysis of extreme events	TR200	392.50	1.43
Statistical analysis of extreme events	TR125	368.38	1.35
Statistical analysis of extreme events	TR100	356.92	1.30
Climate change projections	95 th percentile	326.30	1.19
Statistical analysis of extreme events	TR50	321.20	1.17
Climate change projections	90 th percentile	288.40	1.05
Statistical analysis of extreme events	TR25	285.22	1.04
Statistical analysis of extreme events	TR20	273.54	1.00
Climate change projections	85 th percentile	245.90	0.90
Statistical analysis of extreme events	TR10	236.72	0.87
Statistical analysis of extreme events	TR5	198.34	0.73
Statistical analysis of extreme events	TR2	140.36	0.51

2050 Scenario similar to 50-year ARI (Statistical analysis of extreme events)

«WORTH FOR MONEY» APPROACH

Evaluation of intervention scenarios with respect to benefits and related costs. The analysis showed that it was not economically viable to build a year-round road.



COASTAL HIGHWAY | ANTE-OPERAM / POST-OPERAM

ANTE-OPERAM
POST-OPERAM
COMPARISON



HAULOVER BRIDGE| STORM SURGE

HURRICANES AND STORM SURGES

Belize lies on a well-established Wester Caribbean hurricane track and is affected by hurricanes on average once every 5 years with extensive damages to infrastructure and ecosystems..

In 1999, the United States Agency for International Development (USAID) conducted a storm hazard assessment for Belize under Caribbean Disaster Mitigation Project. The study allowed an estimate of the maximum water level along the coast for any storm of similar strength.

The results showed that the coast of Belize City (where Haulover Bridge is located) would be severely impacted by storm surge in the event of a major hurricane.



Storm Category	Predicted Maximum Storm Surge Belize City area
1	1m
2	2.5m
3	3.5m
4	4.5m
5	8m

Historical records identify 5 hurricanes passing within 10 km of the Haulover Bridge including the recent Hurricane Earl which struck on August 4th 2016. The related storm surge was estimate to be approx. 2 meters.

Haulover Bridge freeboard is 4,5 meters – equal to Category 4 Hurricane storm surge.

Future projections: Climate models are still not developed well enough to predict future changes in hurricane frequency and intensity.

The PRECIS regional climate model simulations predict reduced hurricane probability for the Caribbean and increased hurricane intensity (Emanuel et al, 2008)

ACHIEVEMENTS AND RECOGNITIONS

The Coastal Highway project has been recognized for its commitment to sustainable development:

UN Global Compact Network Italy SDG Pioneer Award for SMEs (2024)



A model of resilient infrastructure, emphasizing the project's positive environmental and social impact

(<https://www.globalcompactnetwork.org/it/notizie/notizie-ungcn-italia/2450-un-global-compact-network-italia-a-veronica-rossi-di-lavazza-group-e-alessio-gori-di-politecnica-il-premio-sdg-pioneer-italy-2024.html>)

ENR Global Best Project Award of Merit (2023) and (2024 for Philip Goldson Hwy)



Balancing infrastructure with environmental preservation by the use of unconventional construction techniques

(<https://www.enr.com/articles/57765-road-highway-award-of-merit-sixth-road-coastal-highway-upgrading-project>)

Client and Donor satisfaction for project completion **on time** and **within budget (...the best award...)**

Nicole Davison (British High Commissioner to Belize) on Coastal Highway

“Residents of several areas are no longer isolated when there is heavy rainfall. Those most vulnerable can access health, education and social services even in bad weather”.



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Rome

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00198 Roma
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BRANCHES WORLDWIDE

Bucharest

Strada Subcetate 24
Camera 3, Etaj 1, Ap 4

Copenhagen

H. C. Andersens Boulevard 37,
5th c/o The Italian Chamber of
Commerce, 1553

Kingstown

Bonadie Street 298, Saint Vincent
and the Grenadines

PROJECT OFFICES

Belmopan, Belize

Freetown, Sierra Leone

Georgetown, Guyana

Nairobi, Kenya

Kingston, Jamaica

POLITECNICA
building for humans

THANK YOU
FOR YOUR ATTENTION

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