Conserving Natural Resources through Sustainable Design

By: Major Jim Servi
Engineering Plans Officer, US Indo-Pacific Command

What is Sustainable Design?

Sustainable design seeks to reduce negative impacts on the environment, while improving health and comfort of building occupants, thereby improving building performance.

"Basically, when the workspace is designed for occupant comfort, people are much more productive. That hits the bottom line more than energy efficiency because companies spend 75 to 80 percent of their operating budgets on their employees."

Scott Ceasar

Principal at Cosentini Associates

Projects include 4 Times Square

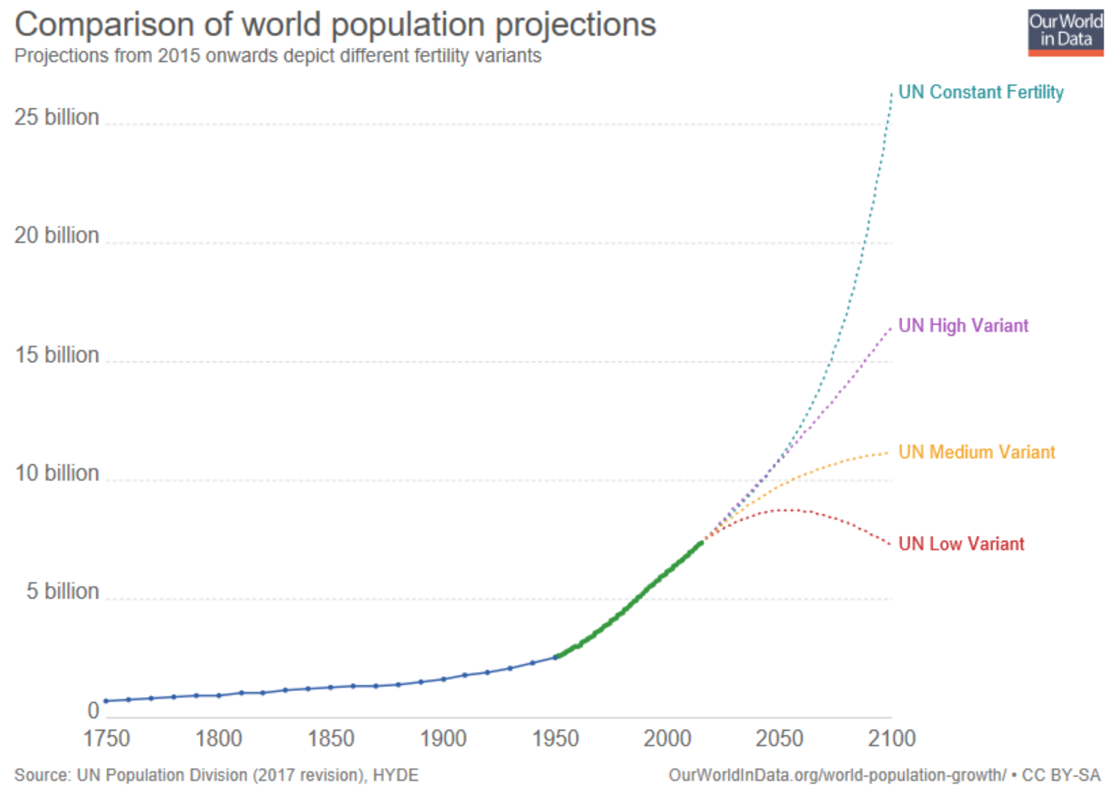
The World is Growing

UN Estimates

- 2030 – 8.6 Billion
- 2050 – 9.8 Billion
- 2100 – 11.2 Billion

- Lower Fertility Rates, but
- Higher Life Expectancy

- Greater demands on our natural resources



Why is Sustainable Design Important?

- Reduces consumption of non-renewable resources
- Minimizes waste
- Creates healthier work environments
- Optimize site potential
- Uses environmentally preferable products
- Protects and conserve water
- Optimizes operational and maintenance practices
- *Makes the best use of our natural resources to support the world's growing population*

"More than ever, sustainability is at stake…We live in a world of constant and profound transformation, so architects have to radically rethink the way we build. New expressions need to reflect new paradigms and the rise of technology. We have to project our ideas far into the future, they need to stand the test of time."

Jean Nouvel

Pritzker Architecture Prize Winner

Projects include Louvre Abu Dhabi and Philharmonie de Paris

How is Sustainable Design Implemented?

- Decision making centers around reducing negative impacts on the environment (without compromising the bottom line)
- Considers the entire lifecycle of the building:
  - Design
  - Construction
  - Operation
  - Decommission

"It's about: where did that material come from? What damage has been done to the land in the excavation of that material? How will it be returned to the Earth eventually, or can it be reused, can it be recycled, can it be put together in a way that can be pulled apart and changed and reused?"

Glenn Murcutt

Pritzker Architecture Prize Winner

Projects include Australian Islamic Centre

United States Government

- Energy Policy Act of 2005
  - “design federal buildings to achieve energy efficiency at least 30 percent better than ASHRAE 90.1 standards, where life-cycle cost effective.”
- Energy Independence and Security Act (EISA) of 2007
  - Reduce fossil fuel generated energy consumption by 65% by 2015
    - By 100% by 2030
  - Manage water from 95th percentile rain events onsite
  - Apply sustainable design principles to siting, design, and construction

United States Government

- Executive Order 13693 in 2015
  - Planning for Federal Sustainability in the Next Decade
    - Reduce building energy intensity by 2.5% annually
    - Reduce potable water consumption intensity by 2.0% annually
    - Identify at least 15% of the federal agency's existing buildings that comply with the Guiding Principles for Sustainable Federal Buildings (issued by the Council on Environmental Quality in 2016)

"Understand the limitations of design. No human creation lasts forever and design does not solve all problems. Those who create and plan should practice humility in the face of nature. Treat nature as a model and mentor, not as an inconvenience to be evaded or controlled."

William McDonough

First EPA Presidential Green Chemistry Challenge Award Winner

Created Hannover Principles for Sustainability

Projects include Ford Rouge plant with it's 454,000 square foot living roof

Guiding Principles for Sustainable Buildings

1) Integrated Design
2) Commissioning
3) Site Selection
4) Transportation
5) Safeguarding Assets
6) Energy Star
7) Energy Efficiency
8) Renewable and Clean Energy
9) Metering – Energy and Water
10) Benchmarking
11) Indoor Water Use
12) Outdoor Water Use
13) Alternative Water
14) Outdoor Water/Manage Rain
15) Ventilation/Thermal Comfort
16) Daylighting/Lighting Controls
17) Indoor Air Quality
18) Occupant Health and Wellness
19) Material Content and Performance
20) Waste Diversion
21) Materials Management

"Now, it's all about energy. Soon, finding ways to participate in the water cycle more intelligently will become even more important than demand-side conservation of energy. Water is the new energy."

Rob Harrison

Harrison Architects and Passive House consultant

Achieving Sustainable Design

- Leadership in Energy and Environmental Design (LEED)
  - Credential for green building certification used to evaluate and measure sustainable design
  - Buildings become LEED certified
- College courses and curriculum
- World Green Building Council

"The perfect building is really acting as if nature would" and that "has to be a building that really deeply connects people to nature."

Amanda Sturgeon

CEO of International Living Future Institute

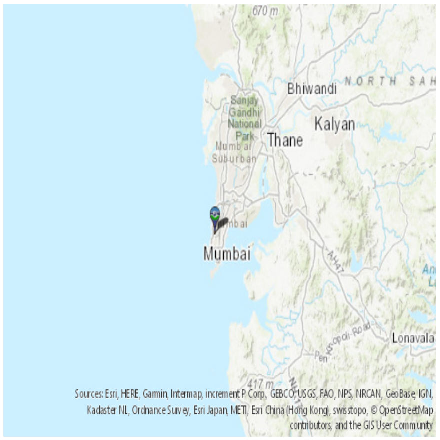
Projects include portions of Google's Quad Campus

UNCLASSIFIED

Proposed Project

India: 2020

39455: Sustainable Design Workshop



PROJECT #: ***IN-HA-2020-00039455***
TIME FRAME: **1/1/2020 to 12/31/2020**

EST. COST: **$215,159.00**
SECTOR (LEAD SUBSECTOR): **Disaster Mitigation and Preparation (Disaster Mitigation and Preparation)**
STATUS: **Submitted**
POC: **James Servi (Engineering Plans Officer) james.servi@pacom.mil**

EXECUTIVE SUMMARY

This FY20 project will take place in Mumbai, India and will develop India’s resiliency and ability to adapt to climate change, through a hands-on workshop with world and regional experts recruited by Redhorse Corp. in sustainable urban design to identify green infrastructure solutions that can be implemented in India. The focus of the workshop will be on better managing urban flooding events, with the aim to protect India’s local population in Mumbai and other vulnerable cities. SMEs from the South Asia region will share case studies on the use of water-sensitive urban designs, such as rainwater harvesting systems, permeable pavement that allows stormwater to filter through the ground and replenish groundwater resources, bioswales that remove debris and pollution from surfacewater runoff, and artificial wetlands that protect against floods.

Specific Objectives

Demonstrate the links between flooding in urban areas and climate change, deforestation (particularly the loss of wetlands), waste management and infrastructure development and planning. Educate key stakeholders in India on innovative solutions to managing urban design challenges, namely flooding, waste, and water management Identify technologies and best practices to prevent flooding and improve water quality through green infrastructure, improved waste management and ecosystem conservation. Enhance environmental security planning in India.

Projects Around the World

Vancouver Convention Centre West

Credit: Vancouver Convention Centre

Projects Around the World

The Bullitt Center, Seattle

Credit: Nic Lehoux

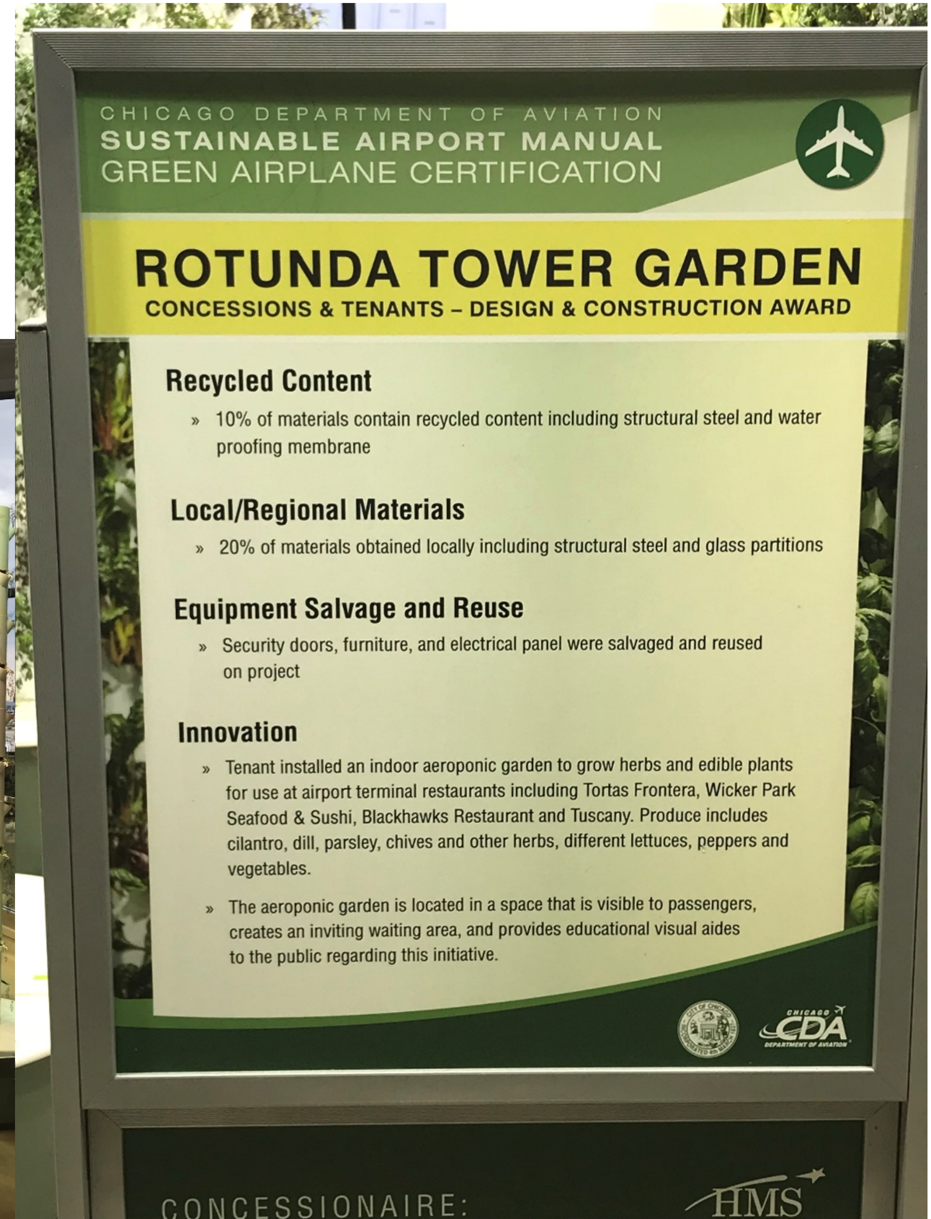
Projects Around the World

One Central Park, Sydney

Credit: Boral

Projects Around the World

O'Hare International Airport, Chicago



Let’s put our architect/engineer hat on…

- Think of the building you live in, or work in, or one that stands out in your mind
- You’ve just been asked to reconstruct that building using the principles of sustainable design
- What does that look like for you?

Thank-you

Any questions?

References

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- https://ecowarriorprincess.net/2016/06/5-outstanding-examples-of-sustainable-design-around-the-world/
- https://www.forbes.com/sites/rahimkanani/2014/03/07/the-future-of-sustainable-design/#5a06407535e5
- https://www.terramai.com/blog/6-famous-architects-share-their-top-sustainable-design-tips/