

The image is a collage of three photographs. The top-left photo shows the Golden Gate Bridge in San Francisco, extending across the water. The top-right photo shows a large dam with water cascading over its spillways. The bottom-left photo shows a man in a white shirt standing and pointing at a computer monitor while a woman in an orange shirt sits at the desk. The text 'Infrastructure Planning and Management' is overlaid in the center, and 'Class 1 - Introduction to Infrastructure' is overlaid on the bottom-left photo.

# Infrastructure Planning and Management

Class 1 - Introduction to Infrastructure



# Agenda

- What is infrastructure?
- Types of infrastructure
- The role of infrastructure
- The infrastructure crisis



# What is Infrastructure?

- There is no single definition for the term “infrastructure”. It is a term used in a variety of disciplines
- The “Merriam Webster” Dictionary defines infrastructure as *“The underlying foundation or basic framework (as of a system or organization)”*



# Attributes of Infrastructure

- Rather than describing infrastructure through a single definition, it might be more helpful to describe infrastructure through a set of characteristics that are attributed to it. Some of these characteristics that are popularly associated with infrastructure are:
  - Infrastructure facilities are generally available to large groups of people
  - Infrastructure helps deliver essential services for the functioning of an organization or society
  - Infrastructure helps achieve economic and social objectives
  - Infrastructure is the base upon which society and its activities rest
  - Examples of infrastructure are waterways, roads, etc



# Types of Infrastructure

- Several systems can be characterized as infrastructure – including Computer Systems that network and serve data and applications, educational curriculum and so on.
- For the purpose of this course, we will narrow down our perception of infrastructure and restrict it to **PHYSICAL INFRASTRUCTURE** of the following types
- Transportation Infrastructure
  - E.g: Roads, Bridges, Airports, Ports, Waterways
- Water and Sanitation Infrastructure
  - E.g: Water Supply Systems, Sewage treatment systems
- Energy Infrastructure
  - E.g: Dams, power plants, power distribution and transmission facilities, pipelines
- Telecommunication Infrastructure
- Housing, Facilities and Recreation



# The Role of Infrastructure

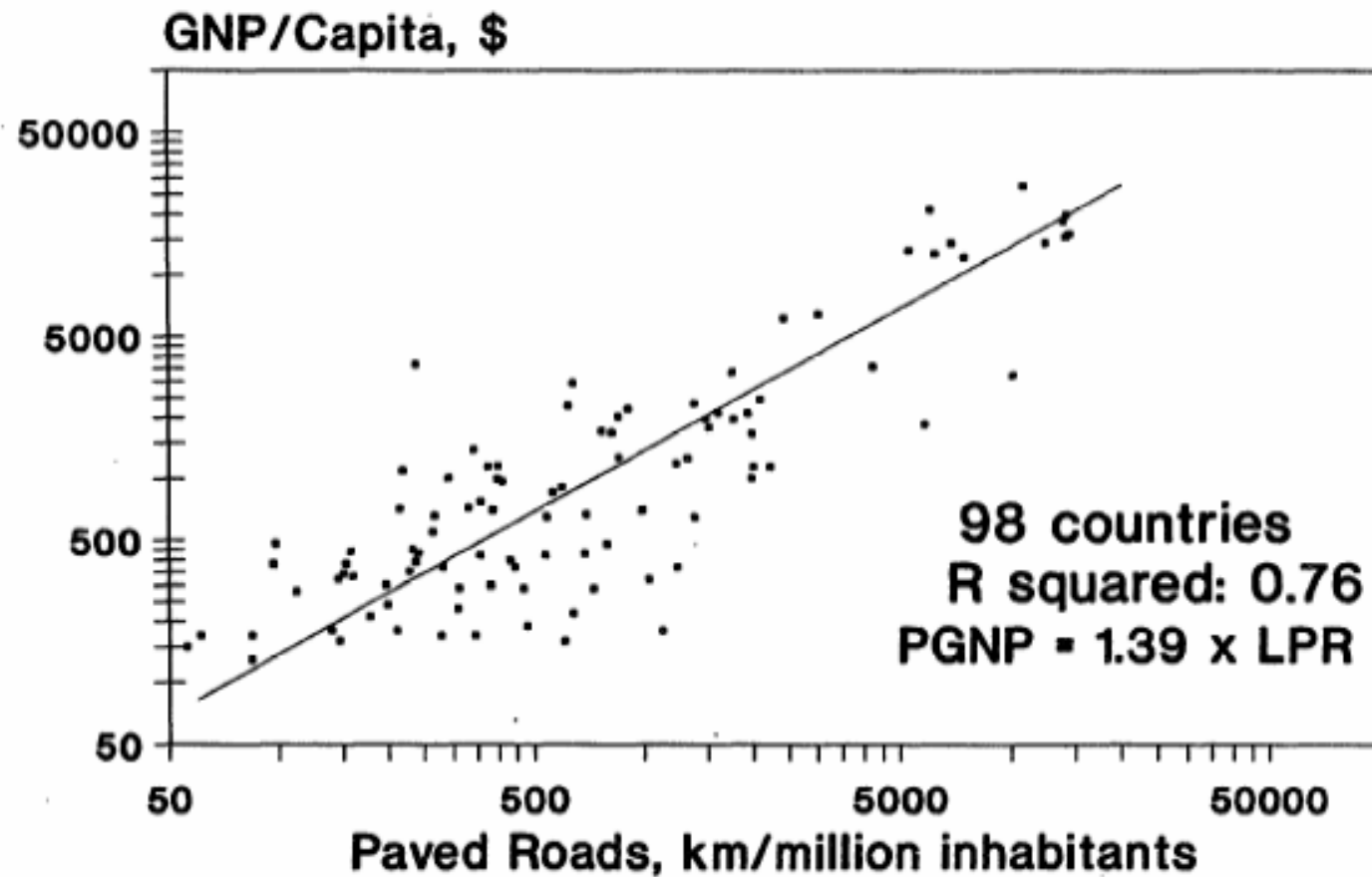
- The importance of infrastructure is two-fold
  - Infrastructure is instrumental in promoting economic growth
  - Infrastructure also plays a role in alleviating poverty



# Infrastructure and Economic Growth

- In the following slide a graph is presented that clarifies the role of infrastructure in economic development (Source: Queiroz et al, 1992 – World Bank Working Paper).
- This slide shows a plot of the length of paved roads that a country has versus its GNP
- 98 countries were surveyed to plot this graph
- A clear correlation emerged between the Length of paved roads (LPR) and the per-capita GNP (PGNP) according to the following equation
  - $PGNP = 1.39 (LPR)$
- This indicates that the more physical infrastructure a country has (in this example we consider only transportation infrastructure, but this relationship holds true for other types of infrastructure as well), the greater the economic stability and vice versa.

## Relationship between per capita GNP and Paved Road Density (circa 1988)








# Infrastructure, Economic Growth and poverty reduction

	Economic Growth	Poverty Reduction
Transportation	Faster access to destinations, increase in productivity	More reliable access to markets so that fresher goods can be sold at lower wastage levels
Water and Sanitation	Incentives for construction of facilities, infrastructure and residential infrastructure, which in turn promote economic growth	Improved health, reduction in health related spending, potential increase in income savings
Telecommunications	Improved access and transfer of data, leading to reduced travel times and increases in productivity	Increased access to information leading to improved ability to make decisions on issues like selling price of produce etc
Energy	Reliable and abundant power enables setting up of industries and residences that create jobs, manufacture products and promote economic growth	24 hour electricity increase the duration of the productive working day, thereby augmenting income, increasing agricultural yields etc.



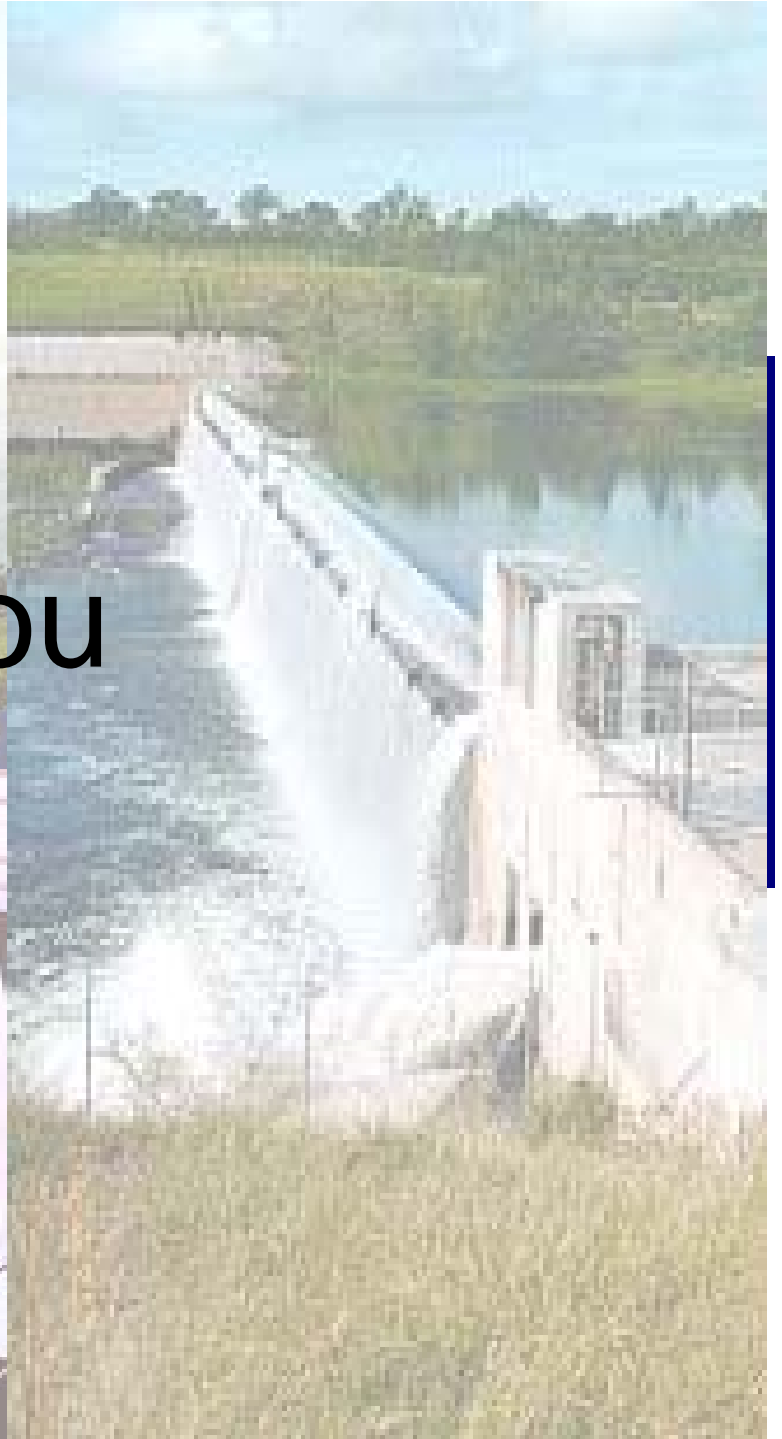
# The Infrastructure Crisis

- Despite the importance of infrastructure for economic and social well-being, we are faced with several problems
- Infrastructure in developed countries is old, unreliable, inefficient and in need of replacement.
  - The USA is embarking on a major plan relating to infrastructure spending
- In developing countries, infrastructure is often not available
  - Large portions of urban and rural populations in developing countries have inadequate access to water and sanitation
  - Power supply is non-existent or unreliable and people are faced with frequent power-cuts
  - Quality of road infrastructure is often bad, leading to long travel times and increased vehicle maintenance costs. Width of roads is also often a constraining factor leading to traffic jams and blocks.
  - Several of these problems currently hold true for many areas in India as well.
- This is therefore a golden opportunity for engineers with technical as well as managerial and policy level knowledge of these issues, since there is a huge demand for such people to enter the workforce and solve the worlds infrastructure inadequacies.



# Why do we have so many problems with infrastructure?

- This particular question and ways in which to solve it will be the focus of this entire course. It is therefore impossible to answer this question right away. Before we conclude this session, we list out a few of the causes for the failure to provide adequate infrastructure
  - Lack of funds
  - Lack of implementation and management capabilities
  - Corruption, bureaucracy and unfair competition
  - Land acquisition issues involving dealing with displaced people and special interest groups
  - etc



Thank you

