### Scope of Civil Engineering Projects

- The scope is truly vast:
  - Housing and Buildings - Commercial, residential, public, religious, sports, resorts etc.
  - Transportation - Traffic engineering, roads, bridges, airports, railways, ports
  - Power - Thermal, Hydro, Nuclear & Non-conventional
  - Plants & Factories - General industrial structures;
    - Water & effluent treatment plants;
    - Core sector industries - steel, paper, ...
  - Hydraulics & hydrology, water
  - Ocean engineering
  - Soil mechanics, foundation engineering, underground structures
  - Environmental engineering.

### Key Players in Civil Engineering Field

- Government - policy maker, developer, owner, regulator, tax collector,....
- Public Sector Owner Clients
- Private Sector Owner Clients
- Project Developers - IL&FS, GMR, Tata Power, L&T.....
- Constructors / Contractors
- Consultants, Architects, Designers
- Project Management Agencies
- Contract Management Agencies
- Financial institutions - World Bank, ADB, IDFC, ICICI,....
- Academia, Research & Development and Training agencies
- Manufacturers - Equipment, Materials, Systems
- Service providers - Waterproofing, Prestressing,....
- Organisations and Professional Bodies - Indian Roads Congress, Builders Association, IIBE, BIS, CI,....

### Possible Work areas

- Design
- Construction
- Planning
- Project Development
- Project Management
- Contract Management
- Building services
- Facilities management
- Development of software for Structural analysis & design, CFD, geomechanics, project management, EIP,....
- Project Financing - BOT type projects
- Risk Management
- Supply Chain Management
- Plant & Machinery
- Bank's Engineer, Lenders' Engineer
- Arbitrator
- Training of staff & workmen, construction skills development
- Safety Management - Safety, Environment & Health
- Quality Management
- Technical Writer
- .........................!!!
Some Key Success Factors for Site Management:
- From Client: Clear & equitable Contract, Clear Specs, readily available & clear drawings, agreed flow of funds, Quick decisions, realistic cost & time expectations
- From own Top Mgmt: Funds, Management Bandwidth, Support for Resources, Overall Planning, good Team, etc
- Site: Good Leader (Project manager), Cohesive & Skilled Team
- Enablers: Good Planning, Appropriate Technology (methods), Good Project Management
### Construction Methods
- Abundant opportunities for Creativity & Innovation
- Vasai Creek railway Bridges – 78 girders (650t) launched by using only Tidal Effects!

### Supply Chain Management
- Captive Power Plant in Vizag –
- Scope: Supply & Erection of all Balance of Plant (except Turbine, generator, main equipment) – as EPC work
- Itemizing, speccing, sourcing, tracking, delivering, erecting, testing & commissioning
- Successfully completed

### Project Development
- Gangavaram Port – Modern port in East Coast, developed by APIDC
- Assignment included: Feasibility study, Detailed project Report, Financing & Project Structuring studies, Road shows, bidding out Development, assistance for Contract finalising.
- Successfully completed.
- Today Gangavaram is a successful Private sector Port in operation

### Project Financing
- Coimbatore Bypass; One of the earliest projects to go in for private sector financing, as a BOT project. Continuing operations now also
- Project viability ensured by clubbing a bridge project with the road, for collecting toll

### Project Management
- Earliest Proj Mgmt concepts with Bar Charts
- Then CPM
- PERT
- MS Projects/ Prima verA
- Earned value Management
- Now….LEAN Construction concepts….high degree of Sustainability
- Concepts are evolving all the time!

### Risk Management
- Tunnel Project:
  - Underground / hydel projects fraught with many risks: climatic, floods, rock collapses, geological strata variations, accidents,…
  - Risk Assessment
  - Risk analysis – risk log
  - Risk Mitigation
  - Risk management – Contingency action plans, Preventive measures
Safety Management
- cavern
  - Huge underground job
  - Not a single fatality underground!
  - Nurtured safety culture & Safety Practices
  - Today it is Safety, Health & Environment!

Quality Management
- Atomic Power Project
  - Very high degree of Quality
  - Air leak tightness tests for proving the Containment!

Contract Management
- Captive Power Project:
  - American legal terminology for the first time in India
  - The '90s boom in power sector in India brought in many IPPs (Independent Power Producers). The US system has a high degree of legalese!
  - Indian forced to update their Contract management
  - Today we have many standard contract documents: CPWD, FIDIC, NEC, ...
  - Being on top of Contracts Management is very essential in large, multi-disciplinary, multi-party contracts!

Plant & Machinery
- Head Race Tunnel
  - TBM, Precast lining segments casting machine
  - Other sophisticated drills, grouting machines, surveying eqpt, ...

Repairs & Rehabilitation
- Ahmedabad Bridge:
  - Challenge was for rehabilitating the bridge without stopping the Traffic & yet do it quickly
  - Innovative method adopted

The Joys of Site life
- Learning to like New Places
- Learning co-operation, synergy, camaraderie
- Learning to be tough
- Learning Client management
- Learning Human Relations
- Learning Production management
- Learning Self-sufficiency
CONCLUSION

- Civil Engineering is the backbone of Infrastructure
- It is multi-dimensional, multi-faceted
- Offers many possibilities for engagement
- It has many high-tech features
- It is pretty much Dynamic and evolving all the time
- Now is the time in India with a Boom in Infrastructure with many Opportunities
- It has many Challenges & many Rewards; exploiting them is in your hands!

All the Best!!
Thank you