



AGGREGATES BUSINESS INDIA 2023

Ramesh Bhatwdekar Ph.D

Institute for Smart Infrastructure and Innovative Construction

Universiti Teknologi Malaysia, Johor Baharu, Malaysia

Content – Aggregate and Sand Mining in India

- ***Overview of Aggregate and Sand Mining in India***
- ***Infrastructure Vision of India***
- ***Development Plan of highways, ports, airports***
- ***Indian railways and Mountain Railways***
- ***Development of Mumbai – Financial Capital of India***
- ***A case study of Telgana State- Sand Mining Governance***
- ***Way Forward – Aggregate and Sand Mining in India***

INFRASTRUCTURE VISION OF INDIA

- **Indian Prime Minister Narendra Modi has renewed a pledge to spend more than \$1 trillion on infrastructure to create jobs for hundreds of thousands of young Indians and boost the economy. The (\$1.35 trillion) plan — called “Gati Shakti,” which means momentum — was announced on India’s 75th Independence Day.**

Map of India



Current Population of India in 20231.4 Billion

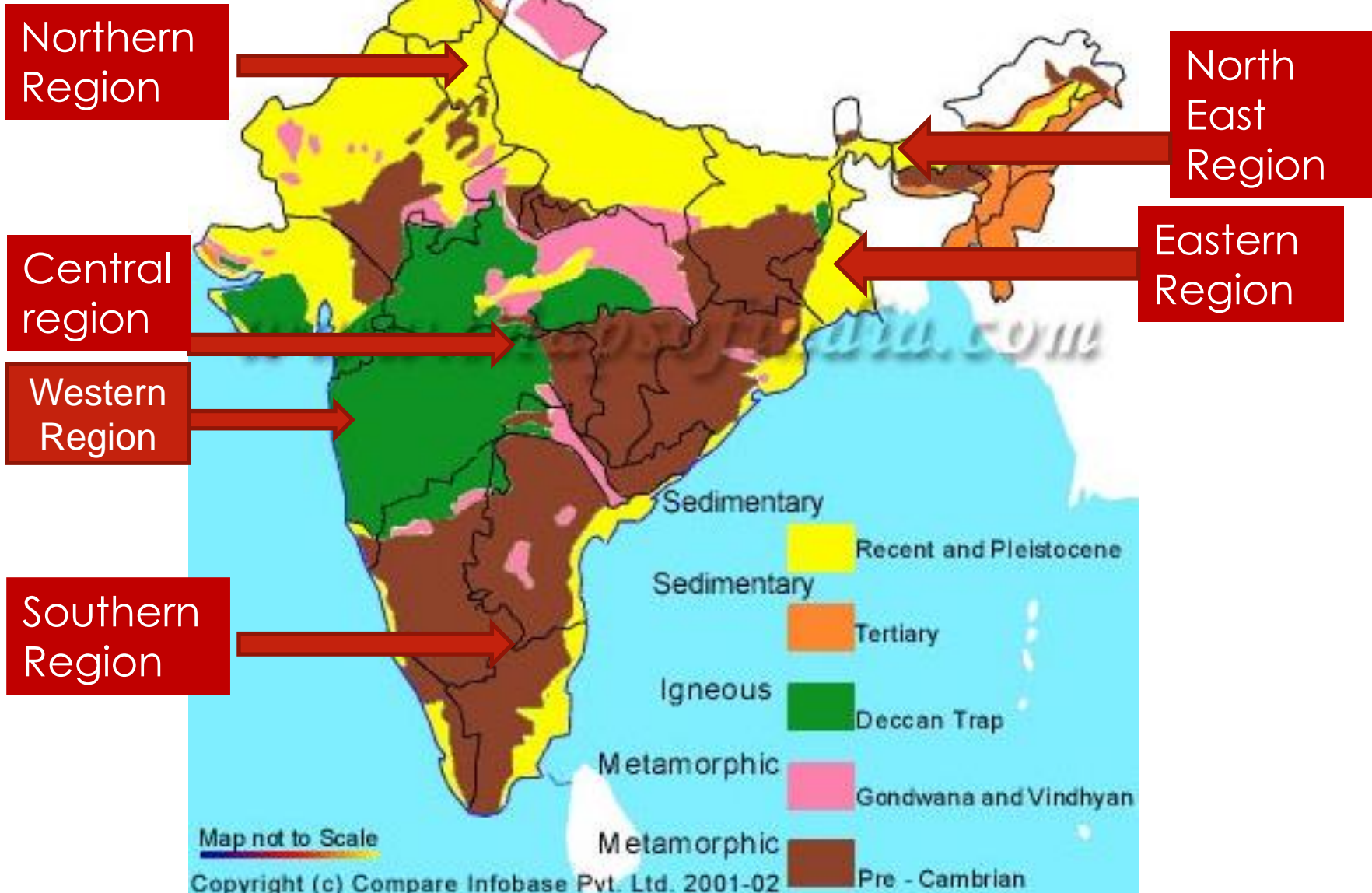
REGIONS Major Cities

- North...Delhi
- South.. Chennai, Bengaluru
- West ..Mumbai, Pune
- East ...Kolkata
- Central ..Nagpur, Raipur
- North East ...Gauhati

The ***Climate of India*** a wide range making generalizations difficult.

- Arid desert in the west,
- Alpine tundra & glaciers in the north,
- Humid tropical regions supporting rainforests in the southwest

GEOLOGICAL MAP OF INDIA



12 Under Construction Super Expressways in India (4,577 km in progress)

- Ganga Expressway -1047 km
- Mumbai Nagpur Expressway -766 km
- Chandili Rourkela Expressway -650 km
- Mumbai Vadodara Expressway -380 km
- Purvanchal Expressway -343 km
- Amaravati Anantapur Expressway -371 km
- Bangalore Chennai Expressway -240 km
- Amaravathi Outer Ring Road -210 km
- Upper Ganga Canal Expressway -150 km
- Delhi Meerut Expressway -150 km
- Eastern Peripheral Expressway -135 km
- Delhi Western Peripheral Expressway -135 km



Infrastructure projects in India under construction

- Some of the investment in infrastructure projects in India are:
- **Bharatmala Pariyojana:** A highway project that aims to connect the country's western and eastern regions.
- **Mumbai Ahmedabad Bullet Train:** A high-speed rail line that will reduce travel time between the two cities.
- **Navi Mumbai International Airport:** A new airport that will ease the congestion at the existing Mumbai airport.
- **Mumbai Trans Harbour Link:** A sea bridge that will connect Mumbai with Navi Mumbai.
- **Delhi-Mumbai Industrial Corridor:** A mega industrial zone that will boost manufacturing and trade.
- **Sagarmala Project:** A coastal development initiative that will enhance port connectivity and logistics.
- **Chenab Rail Bridge:** A railway bridge that will be the world's highest and longest arch bridge.
- **Thane Borivali Tunnel:** A road tunnel that will reduce traffic and pollution in Mumbai.

Airports development in India

- The Airports Authority of India (AAI) and private airport operators are investing \$11 billion through 2025 in the development of Indian airports¹. Some of the key airport projects in India include^{2,3}:
- Construction of a new airport on a greenfield site in Hollongi (Arunachal Pradesh) by November 2022
- New integrated passenger terminal building expansion of Tiruchirappalli & Pune Airport (March 2022), Guwahati International Airport (June 2022), Maharaja Bir Bikram Airport (Early 2021) and major expansion of Surat Airport (December 2021)
- Navi Mumbai Greenfield International Airport, Maharashtra
- Bhiwadi Greenfield International Airport, Alwar
- Rajiv Gandhi International Airport Expansion, Hyderabad
- Seabird Phase IIA Naval Air Station, Karwar, Karnataka
- Multi-Modal International Passenger and Cargo Hub Airport, Nagpur, Maharashtra
- Modernization of Chennai International Airport, Phase-II, Chennai



Capacity Expansion of existing Major Ports in India

- For all the 12 major ports, master plans have been finalized. From the port master plans, 92 port capacity expansion projects (cost: USD 7.5 Billion) have been identified for implementation over next 20 years and are expected to add 712 MTPA to the capacities at major ports.
- New Port Development
- To fill the demand gap, 2 new major ports are planned which will bring in significant capacity expansion. The locations of these new ports are deliberated after detailed origin-destination study of cargo commodities and there are mainly three levers that propel the need for building new ports: New port locations have been identified based on the cargo flow for key commodities and the projected traffic:
 - Greenfield ports are proposed to be developed at
 - Vadhavan (Maharashtra)
 - Paradip Outer Harbour (Odisha)

Top 10 Best Engineering Marvels of Railways in India

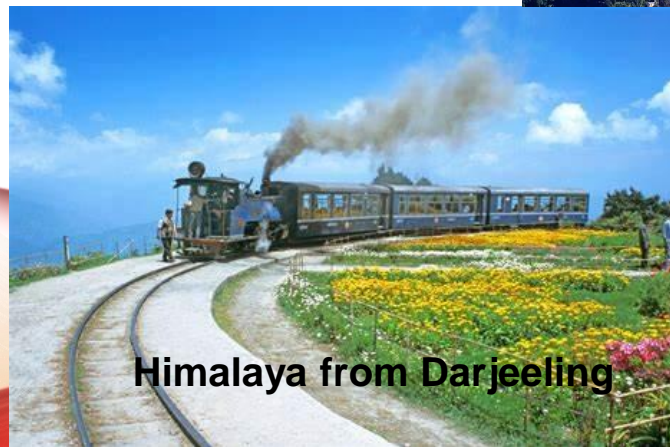
- **Chenab Bridge – World’s Tallest Railway Bridge (359 m)**
- **Pir Panjal Railway Tunnel – India’s Longest Railway Tunnel 11.215 km**
- **Pamban Bridge – India’s First Sea Bridge**
- **Panval Viaduct – Highest Viaduct in India ...**
- **Konkan Railway ...**
- **Jammu Baramulla Line ...**
- **Hauz Khas Underground Station – Delhi Metro ...**
- **Majestic Metro Station – Namma Metro**
- **Underwater River Tunnel – Kolkata Metro**
- **Mountain Railways of India**



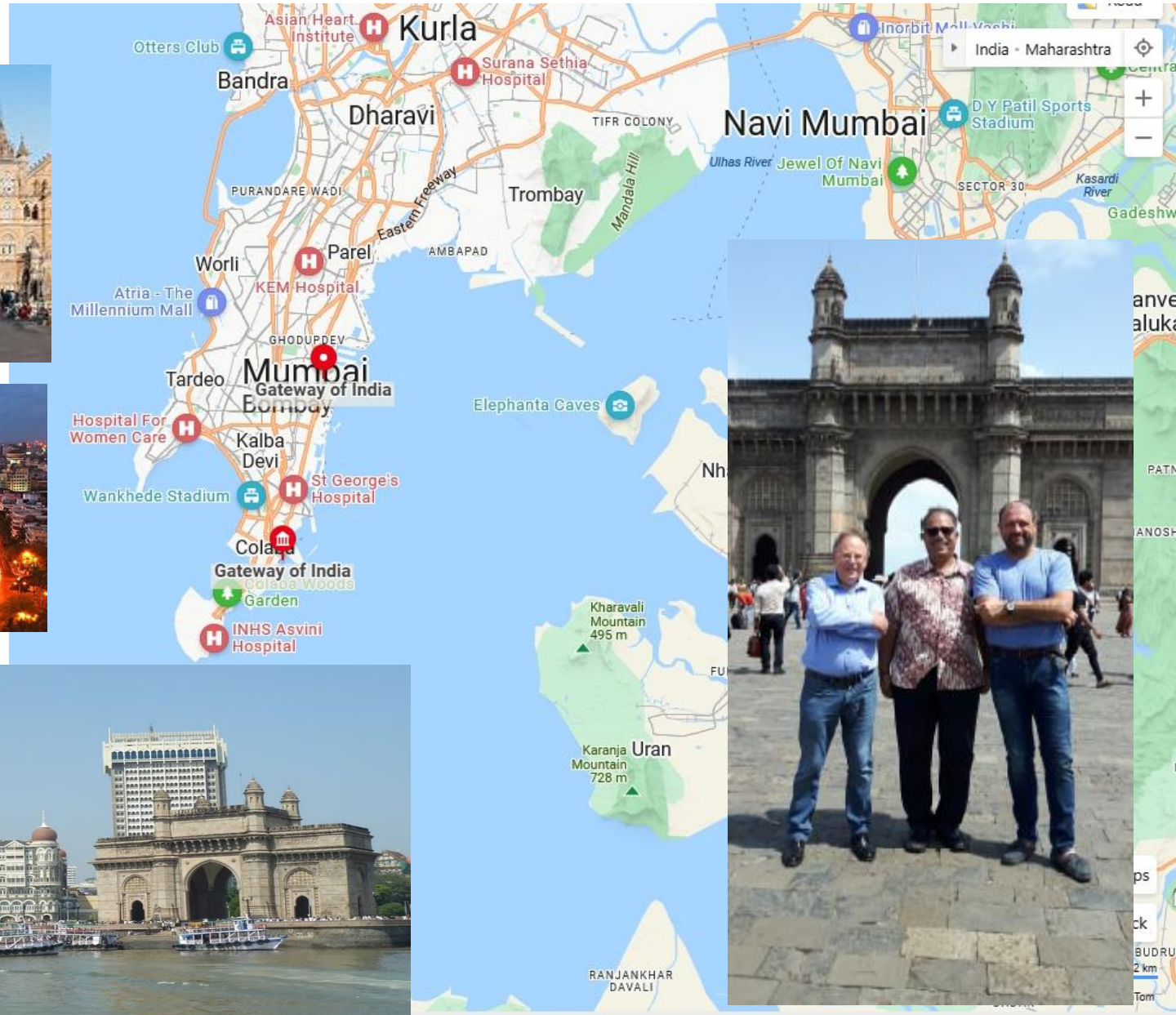
• Mountain Railways of India

- Mountain Railways of India are narrow and long metre gauge lines, contains 410 curves, 120 tunnels, 1100 bridges and travels through the high elevation of Himalayas and the Nilgiri Hills.
- Three of these railways are listed under the UNESCO World Heritage Site.

- Darjeeling Himalayan Railway
- Nilgiri Mountain Railway
- Kalka Shimla Railway
- Matheran Hill Railway
- Kangra Valley Railway



Mumbai – Financial Capital of India



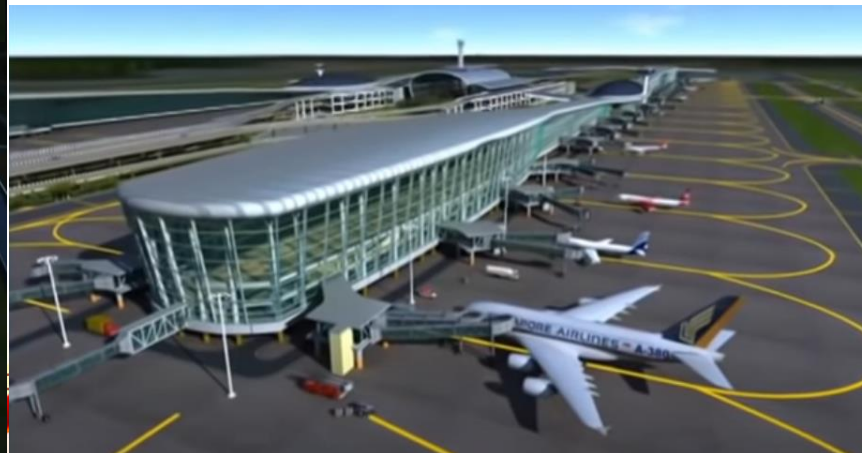
Mumbai Trans Harbour Link – Longest sea bridge in India and third largest sea bridge in the world (21.8 km) Connecting South Mumbai Navi Mumbai (USD 2.2 Billion)



but in future you will reach South Mumbai in just 15-20 minutes

Navi Mumbai International Airport

- To be developed in three phases
- Phase 1 Cost USD 2.1 Billion to handle 25 million passengers per annum by 2025
- Ultimate capacity 90 million passengers per annum
- Existing airport to be connected with Metro.



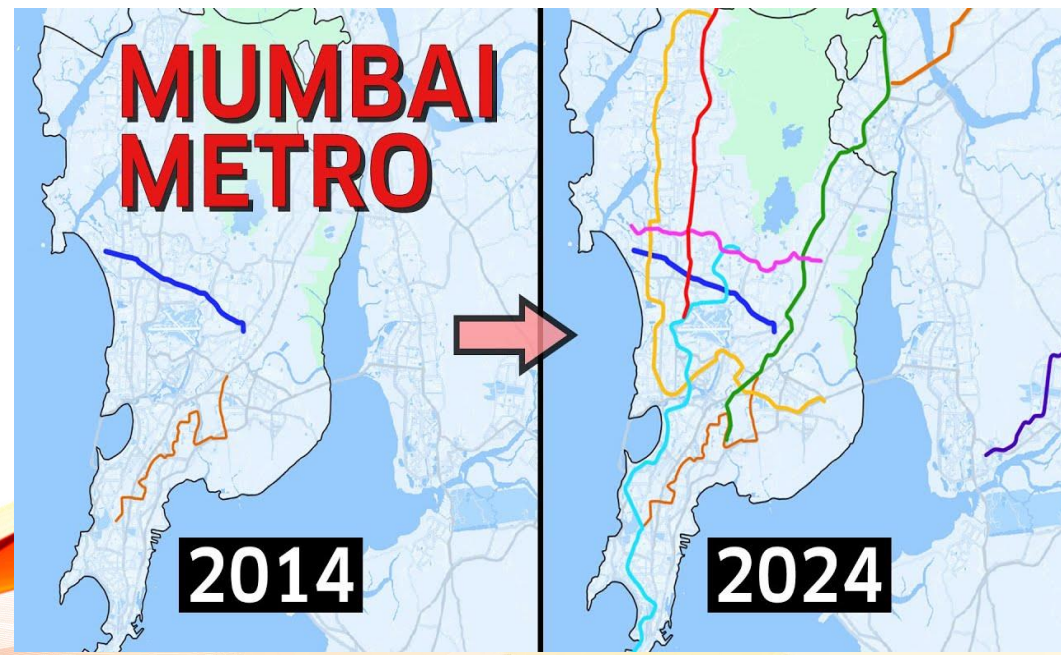
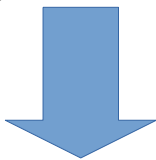
Mumbai Coast Road Project

Cost of Project USD 1.9 Billion



The Need of Mumbai Metro Project

- **Mumbai Population..... 27 Million (2023)**
- **Daily passengers in existing local trains...7 million/ day**
- **Daily passengers in existing buses2 million / day**
- **Daily passengers in taxies/ cars0.4 million/day**



Mumbai Metro Project

- Annual spending
- 0.5 to 1 Billion USD per year
- 28% underground routes with TBM

Future Lines [edit]

- UC → Under construction
- APR → Approved
- PLA → planned

Color Line No.	Terminal	Length	Total Stations	Layout
Yellow Line 2B	DN Nagar–Mandala (Mankhurd)	23.843 km (14.691 mi)	20	Elevated
Aqua Line 3	Aarey Colony–Cuffe Parade	33.5 km (20.8 mi)	27	Underground and At-Grade
Green Line 4	Kasarvadavali–Wadala	32.32 km (20.08 mi)	32	Elevated
Green Line 4A	Gaimukh–Kasarvadavali	2.7 km (1.7 mi)	2	
Orange Line 5	Kapurbawdi–Kalyan APMC	24.9 km (15.5 mi)	17	
Pink Line 6	Swami Samarth Nagar (Lokhandwala)–Vikhroli EEH	14.47 km (8.99 mi)	13	
Red Line 7A	Andheri (East)–CSMIA International	3.17 km (1.97 mi)	2	Elevated and Underground
Gold Line 8	CSMIA International–NMIA	40 km (25 mi)	12	
Red Line 9	Dahisar (East)–Mira-Bhayandar	11.38 km (7.07 mi)	10	Elevated
Green Line 10	Gaimukh–Shivaji Chowk (Mira Road)	9 km (5.6 mi)	5	Elevated
Green Line 11	Wadala–CSMT	14 km (8.7 mi)	10	Elevated and Underground
Orange Line 12	Kalyan APMC–Taloja	20.75 km (12.89 mi)	17	Elevated
Purple Line 13	Shivaji Chowk (Mira Road)–Virar	23 km (14 mi)	20	TBD
Magenta Line 14	Vikhroli EEH–Badlapur	45 km (28 mi)	40	
14	Total	297.833 km (185.065 mi)	227	



• Aggregates Production Estimates

mt = millions tonnes (metric)	2019 Actual	2020 Actual	2021 Actual	2022 Actual	2023 Est'd
Crushed Stone mt	2,500	2,000	2,100	2,200	2,300
Sand & Gravel mt	3,510	2,900	3,000	3,100	3,250
Recycled Aggs mt	5	5	5	7	10
Imports mt	40	30	20	5	5
Total Production mt	6,035	4,920	5,125	5,330	5,580
Change		-18.5%	+4.2%	+4.0%	+4.7%
Population m	1,367	1,370	1,373	1,380	1,400
Consumption t/capita	4.4	3.6	3.7	3.9	4.0
Quarries & Pits	45,000	45,000	45,000	45,000	45,000
Employed –Direct	500,000	500,000	500,000	500,000	500,000
Employed - Contract	500,000	500,000	500,000	500,000	500,000
Economic Growth %	6.5	7	7.5	7.5	8

NO AGGREGATES ASSOCIATION!

- **No national aggregates association yet in India**
- Aggregate industry in infant stage
- Large number of small quarries < 1 MTPA (0.01 to 0.4 MTPA)
- Aggregates and m-sand awareness around metro cities
- **Challenges:**
 - Diversified location of quarries
 - Many small unorganized players
 - Different languages spoken in different states
 - ‘Aggregates and Sand’ are classified as ***minor minerals***

KEY INDUSTRY CHALLENGES

- Smaller mining leases for aggregates and sand mining from 1 Ha and life of quarries varying from 5 to 10 years
- Due to smaller production capacity, cost of production per tonne is high.
- A little attention is given to environmental aspects
- Aggregates and sand are minor minerals as per Indian Regulation and not given importance
- Aggregates resources near most of metro cities are exhausted and need to be transported more than 100km
- Policy makers to be aware of world wide best practices

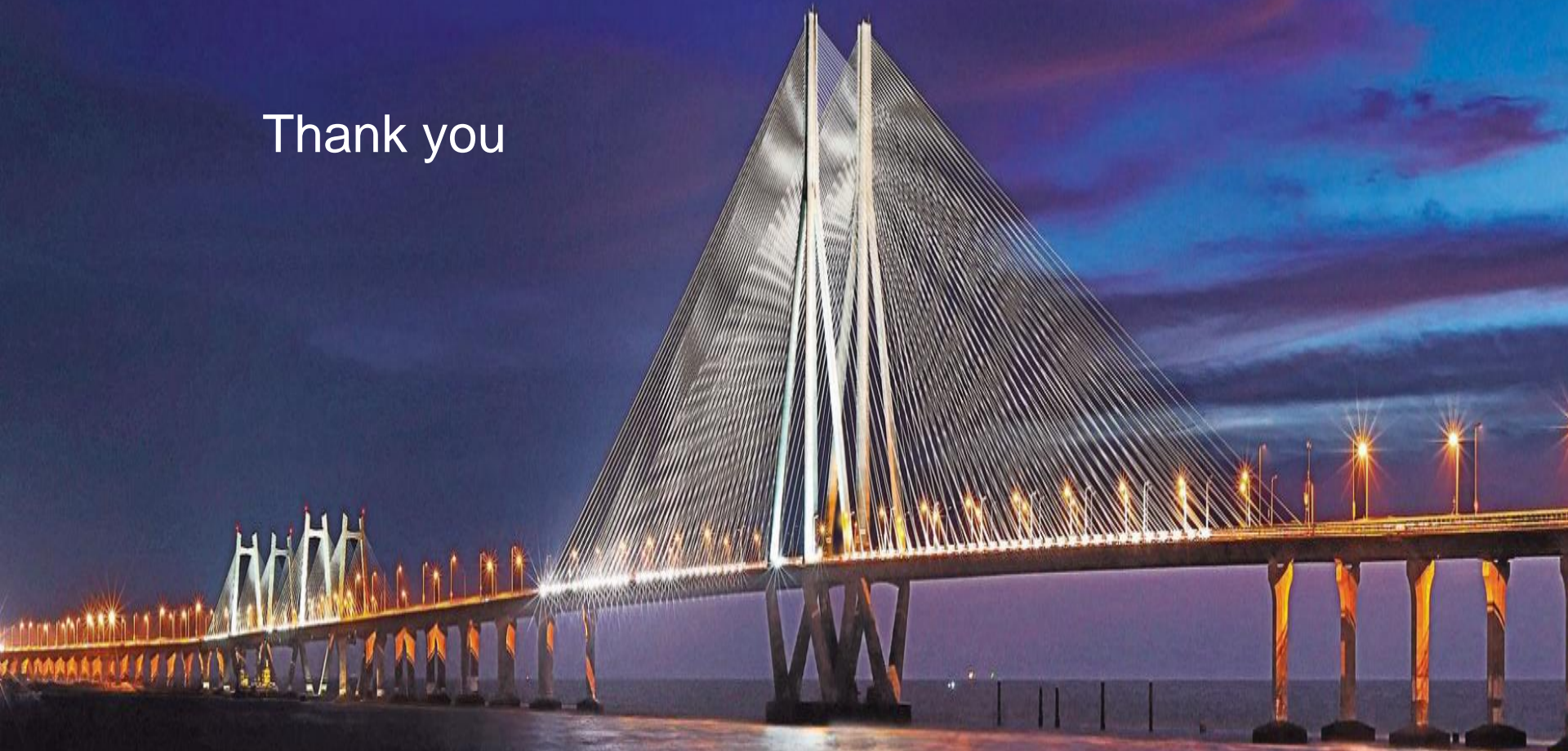
LOBBYING, PR & COMMUNICATIONS, MEMBER SUPPORT

- Some of aggregate quarry owners from Mumbai are trying to form aggregate association.
- Rajasthan state has crusher owners association.
- Each cluster near metro cities with aggregate quarries can have their own association
- **Still awareness is to be developed across India for formation of aggregate association**

WAY FORWARD – AGGREGATE and SAND MINING in India

- **Need for Aggregate Association across country**
- **Growth of Aggregates will continue as projected**
- **Metro cities have higher demand such as Delhi, Mumbai, Bangaluru which mainly consume 100% manufactured sand.**
- **River sand mining permitted by certain states where flooding is likely to take place**
- **Ageing Metro cities like Mumbai, Delhi, Kolkata, Hyderabad and certain old 2 tier cities need to develop recycled aggregates and sand production.**
- **Experience of GAIN members will benefit Aggregate & sand mining industry in India through periodic interaction.**
 - **GAIN members can visit Telgana State, Hyderabad to understand sand mining governance through application of Information Technology**

Thank you



Bandra Worli Sea Link, Mumbai (2009)