



**KARNATAKA INFORMATION
COMMUNICATION TECHNOLOGY
GROUP**

KIG 2020

Infrastructure

COMPREHENSIVE RECOMMENDATIONS TOWARDS SUSTAINABLE CITY



ADDITIONAL INFRASTRUCTURE REQUIRED

Categories	In & around Bengaluru	Other Emerging Cities
Office/ Commercial Space	18 Crore Sft	2 Crore Sft
Manufacturing Spaces	1.7 Crore Sft	1.3 Crore Sft
Residential Spaces	102 Crore Sft	28.4 Crore Sft
Low Cost Dwelling Units	7.5 Lac Units	2 Lac Units
Total Additional Land Required	14,500 Acres	6,300 Acres
Additional Power (Peak demand)	1,200 MW	460 MW
Additional Potable Water Required (Nett)	375 MLD	150 MLD
Additional Solid Waste Generated	1,800 MT/Day	800 MT/Day
Additional Sewage Generated	300 MT/Day	125 MT/Day
Infrastructure Expenditure required	255,992 Crores	

Number of Satellite Clusters Proposed		
In Bengaluru	North-South-East	4
Other Emerging Cities across Karnataka		4



GOALS FOR SUSTAINABLE CITY

MOBILITY AND TRANSPORT

1. **Mass Public Transport System :** *“Walk and Hop to Work” and encourage at least 60% of the commuters to use Public Transport*
2. **Non Motorized Transport Initiatives:** *“Walk for better Health”*
3. **High Speed Travel Corridor:** *Commuting from one end of PRR to other in less than 60 minutes during peak traffic*

SUSTAINABILITY & ENVIRONMENT

1. **Water Resources:** *Optimization of Wastage & Conservation of Natural Resource*
2. **Green Initiatives:** *Reduce “Carbon Footprint” & conserve on resources*
3. **Low Cost Housing:** *“Affordable Housing for All”*
4. **Smart Cities & Emerging Cities:** *“Live and Walk to work”*
5. **Public Sanitation Initiatives:** *“Hygienic toilets for All”*
6. **Solid Waste Management:** *“Garbage free City”*
7. **Air Quality & Dust Mitigation:** *Attain & excel the National Ambient Air Quality Standards 2011*
8. **Social Welfare Initiatives:** *Creating a Respectful and Altruistic Society*
9. **Parks and Afforestation Measures:** *Creating a “Greener and Cleaner Bengaluru”*

SERVICES & UTILITIES

1. **Homeland Security, Traffic Management & Surveillance:** *“Safe & livable city” and increase commuting speed*
2. **Fire and Life Safety:** *“Emergency response time” within 3 minutes*
3. **Power:** *“Reliable and Uninterrupted” power*
4. **Development Control Rules amendment:** *Enhance Structured, Sustainable and Organic Development*
5. **Networking and Wi-fi:** *“Networking the Common Man”*



A. MASS PUBLIC TRANSPORT SYSTEM

Goal: “ Walk and Hop to work” and encourage at least 60% of the commuters to use public transport

1. Metro connectivity (Phase 1, 2 and 3) to cover over 250 kms by 2020 in Bengaluru
2. Capacity building of BMTCL services- addition of 3000 more buses by 2020
3. Sub-urban commuter rail system to link up surrounding towns
4. Capacity building of City Taxies within CBD & SBD
5. Create multi modal transport centers with MLCP's near them
6. BRTS along the ORR, PRR and Radials from ORR to PRR
7. Implementation of Intelligent Transport System
8. Incentivize car pooling
9. Ban on-street and footpath parking and mandate organized paid parking compulsory within CBD to improve lane driveway



B. WATER RESOURCES

Goal: Optimization of water usage & Conservation of Natural Resource

1. Reduction of Unaccounted for Water from 56% to at least 25%- potential recovery of over 200 MLD
2. Commercial losses of over 12 to 15% to be plugged immediately by incentivizing local zonal offices
3. Recycling and reuse of waste water- recovery of at least 50% of domestic consumption
4. Mandate reuse of grey water for all consumers of over 30KLD
5. All newer developments/layouts to have dual piping
6. Industries to be mandated for the use of tertiary treated water for non-portable applications
7. Up-gradation of existing secondary treatment plants to tertiary treatment standards- potential recovery of 500 MLD for Indirect Portable Usage
8. Segregation of sewage from storm-water drains & treatment
9. Zero discharge concept for larger developments



B. WATER RESOURCES- CONTD

9. Rejuvenation and rehabilitation of over 400 lakes & water bodies - potential of over 200 MLD
10. Channelizing of all primary and secondary Storm Water Drains and formation of service corridor along side for sewer lines - 850 Kms plus reduction of flooding in city
11. Land to be identified for water-treatment plants, sewage treatment plant and reservoirs for spatial expansion
12. Collection of excess storm-water runoffs in 2 or 3 balancing reservoirs in the 3 valleys around Bengaluru and treating & supplying to existing BWSSB storage reservoirs - potential of over 500 MLD
13. Use of ICT in BWSSB distribution monitoring system
14. Creation of 10 or more water testing facilities across the city under IISc for water quality monitoring
15. BWSSB to engage in green power for long term sustainability
16. Service level benchmarking for utilities to be implemented as per Ministry of Urban Development guidelines



C. NON-MOTORIZED TRANSPORT INITIATIVES

Goal: Make the city walkable for healthier living

1. Roads to be remodeled as per Tender SURE specifications
2. Pedestrianisation of all roads
3. Skywalks at major locations with travelators
4. Public bike sharing system
5. Pedestrian cross-overs with lifts and escalators
6. Automated bicycle sharing system
7. Covering of the Primary & Secondary Storm Water Drains to facilitate cycling tracks & boulevard development – 850 Kms



D. HIGH SPEED TRAVEL CORRIDORS

Goal: Commuting between city extremes in less than 60 minutes

1. Complete the Peripheral Ring Road in two phases – 118 Kms
2. Create elevated/underground Core Inner Ring Road around CBD - 28 Kms
3. 6 Radial link roads connecting Core Inner Ring Road- ORR and PRR
4. Extension of 11 Link Roads beyond PRR - 165 Kms
5. Development and up-gradation of Arterial and Sub-arterial roads as per Tender SURE guidelines - 1,940 Kms
6. Development of other city internal roads in lines of Tender SURE guidelines - 8,000 Kms
7. Implement Satellite Town Ring Road linking up the BMRDA satellite townships - 204 Kms
8. High Speed Rail Link to Mysore and BIAL
9. Construction of additional Grade Separators & Roads over bridges/ RUB's
10. Use of single toll card across all toll roads



E. GREEN INITIATIVES

Goal: Reduce Carbon Footprint & Conserve Resources

1. Mandate GRIHAA/LEED Gold certification for all future developments over 50,000 sft
2. Existing developments over 100,000 sft to be certified by 2020
3. All IT/ITES developments to utilize at least 15% green power
4. Telecom towers to use green power over the next three years
5. Clean technologies in vehicles – Electric Vehicles, Hybrids, plug-in hybrid engines, Bio-fuels, Ethanol blends, Hydrogen, Fuel cells
6. Introduction of public charging Electric Vehicles & subsidies by Government for Electric Vehicles



F. AFFORDABLE HOUSING

Goal: Affordable Housing for All.

1. 750,000 dwelling units in the EWS/LIG category to be provisioned for the city
2. Land of about 4500 acres need to earmarked in & around Bangalore. This land can be then sold to Low Income Developers
3. Subsidies and grants as admissible by the GOI/National Housing Bank/ State Government to be made available
4. All newer developments to be mandated for low cost housing either within certain developments or as separate developments
5. Corpus for such development in other emerging cities to be earmarked by the Government
6. Integrate Slum Rehabilitation program
7. Relaxation of FSI norms to reduce per flat land cost



G. SMART CITIES AND EMERGING CITIES

Goal: “Live and Walk to work”

1. Develop Satellite Smart Cities which are self-sustainable and integrated
2. Smart cities within CBD with high densification to be part of the zonal planning and are to be self-sustainable
3. Government to set up data center in emerging and rural cities
4. Improve connectivity between urban and rural areas
5. Incentivize social infrastructure development in emerging cities



H. PUBLIC SANITATION INITIATIVES

Goal: “Hygienic toilets for All”

1. Ratio of 1 public toilet seat per 150 of the population as per International standards
2. Implementation of National Urban Sanitation Policy
3. Construction of Community Toilet Complexes at all strategic locations



I. SOLID WASTE MANAGEMENT

Goal: Ensure a Garbage free City

1. Long term sustainable plan for waste to energy plants to be implemented thereby reducing dependence on landfills
2. 80% of solid waste generated to be reused/recycled
3. Solid waste Management to be decentralized within zones & not centralized
4. Source segregation from major producers of waste viz commercial establishments, hotels, apartment complexes, offices
5. Incentivize waste to energy schemes



J. FIRE AND LIFE SAFETY

Goal: Ensuring emergency response time within 3 minutes

1. Fire stations and services to be augmented as per B-SAFE-2031
2. Zoning of the city based on risk factors and planning accordingly
3. Scientific way of locating fire stations equipment based on zoning with the principle of response time for emergencies within 3 minutes
4. Acquiring personal protective equipment and infrastructure development
5. NOC fee for fire approval to be enhanced from Rs 20/sqm
6. Self-assessment and periodical reporting of the health and conditions of fire protection system in buildings
7. Mandate renewal of fire license every 2 years from KSFES for all developments
8. Adequate funding for operations and maintenance of personnel and infrastructure to be ensured



Goal: Ensure Reliable & Uninterrupted power

1. Implementation of Distribution Automation System (DAS) project
2. Implementation of Restructured Accelerated Power Development and Reforms Program (R-APDRP)
3. Long term sustainable plans by bundling of power through National Grids and PTC to be ensured
4. Smart Grid Concepts to be implemented
5. Implementation of roof top solar renewable energy for all newer developments



L. HOMELAND SECURITY, TRAFFIC MANAGEMENT & SURVEILLANCE

Goal: Ensure Safe & livable city and increase commuting speed

1. Over 900 city junctions to be improved for smoother flow of traffic
2. 360 junctions have been signalized. 180 have been fitted with surveillance cameras. The balance amount to be executed
3. Surveillance cameras along all arterial & sub-arterial roads
4. Synchronization of traffic signals with appropriate fiber connectivity
5. Education on road usage & discipline
6. Imposition of congestion tax within CBD during peak hours
7. Adequate funding for operations and maintenance of personnel and infrastructure to be ensured
8. Aerial Monitoring System through Unmanned Aerial Vehicle for Emergency Responses



M. AIR QUALITY & DUST MITIGATION

Goal: Attain and Excel the National Ambient Air Quality Standards of 2011

1. Mandate use of CNG for all public vehicles within city limits (for buses, autos, city taxies & company cabs)
2. Ambient air quality monitoring stations at more locations
3. Soft and hardscaping of all open stretches to avoid dust collection
4. Implement precast construction techniques to reduce pollution due to construction
5. Implement Dust free construction techniques



N. SOCIAL WELFARE INITIATIVES

Goal: Creating a Respectful and Altruistic Society

1. Create animal welfare measures and shelters for stray animals
2. Create civic awareness campaign initiatives
3. Identify and maintain playgrounds in each of the layouts
4. Identify and the creation of crematoriums and burial grounds in each of the layouts



O. PARKS AND AFFORESTATION

Goal: Creating a Greener and Cleaner Bengaluru

1. Parks to be developed and maintained
2. Lung spaces (Lalbaugh's) to be earmarked at all new layouts
3. Rapid tree plantation in scientific manner to be under taken to replenish the green house effect due to urbanization



P. AMENDMENT TO DEVELOPMENT CONTROL RULES

Goal: Enhance Structured, Sustainable and Organic development

1. Car parking requirements to be rationalized depending upon the development zone
2. Parking to be a shared resource within the city
3. 15% of the car parks in all developments to be mandated towards public parking
4. FSI regulations to be rationalized and linked to impact fee as in Hyderabad
5. Aviation height regulation to be rationalized for high-rise development and HAL Airport/AAI to upgrade its infrastructure
6. Setback rules need to be amended to keep maximum 8 mts setback all around as done internationally
7. Distance between two building blocks within a development not to exceed more than 8 mtrs



P. AMENDMENT TO DEVELOPMENT CONTROL RULES - CONTD

Goal: Enhance Structured, Sustainable and Organic Development

9. Fire regulations to be rationalized for building over 7 stories as fire needs to be combated from within the building and not from the outside, as practiced internationally
10. Development approval process to be expedited within 45 days to encourage construction industry with a Single window concept
11. Redevelopment norms and amalgamation of plot sizes for CBD redevelopment to be rationalized and formulated as user friendly
12. Automated Verticular Car parking systems



Q. NETWORKING & Wi-Fi

Goal: Networking the Common Man

1. All Villages to be wired & networked
2. Last mile fiber optic connectivity to all newer developments
3. All information on governance to be available on the internet
4. Coverage of entire Bengaluru metropolitan area with Wi-Fi



R. OTHER GENERAL RECOMMENDATIONS

1. Planning & Implementation of City's Urbanization programmes to be on a Metropolitan basis and not compartmentalized
2. Provision of 6 nos of Integrated Freight Complexes around the periphery of Bengaluru
3. KSRTC to augment fleet & services for other emerging cities
4. Comprehensive Urbanization plans similar to Bengaluru to be worked out for other Emerging Cities viz Mysore, Mangalore, Hubli-Dharwar, Belgaum, Gulbarga with Vision 2050
5. Governance structure for Urban administration as per Mc Kinsey's report to be formulated immediately



INFRASTRUCTURE RESOURCE GENERATION OPTIONS

- - Option 1: State Government Funding
 - Option 2: Central & State Government Funding
 - Option 3: By City Taxes
 - Option 4: By Connectivity Fund and project implemented through SPV
-
- ➔ Option 1 & 2 are long drawn processes
 - ➔ Option 3: Requires Legislative reforms



INFRASTRUCTURE RESOURCE GENERATION

Proposed Method of Fund Mobilisation for Bengaluru Integrated Connectivity Plan (BICP)

Propose following Infrastructure Fund (base):

- Residential : Rs 100* psf for all zones
- Office & Commercial: Rs 150* psf for all zones
- Premium FSI (beyond the eligible base FSI):

	Commercial	Residential
Zone A:	Rs 2,500* psf	Rs 2,000* psf
Zone B:	Rs 1,000* psf	Rs 800* psf
Zone C:	Rs 640* psf	Rs 512* psf

**Every 3 years increase to factor inflation*

Tolls collected to be utilised for Maintenance Annuity

Development Zone	Residential (Crores Sft)	Office/ Commercial (Crores Sft)	Total Development (Crores Sft)
Zone A: Within Core Inner Ring Road	10.23	1.80	12.03
Zone B: Between Core Inner Ring Road & ORR	28.63	5.05	33.68
Zone C: Between ORR and PRR	38.85	6.86	45.71
Zone D: Beyond PRR	24.54	4.33	28.87
Total Development	102.25	18.04	120.29



INFRASTRUCTURE EXPENDITURE

(IF START IS DELAYED TO 2020, COST WOULD BE RS. 318,000 Crs)

	Expenditure	Units	Total (Rs. Crs)
A	MOBILITY AND TRANSPORT		
	<u>Road Infrastructure</u>		
	High Speed Connectivity (PRR, UG, Elevated, Radial)	461 Kms	33,049
	City Road Improvement - Arterial & Sub-Arterial) - Tender SURE	1,940 Kms	13,406
	Other City Roads - Tender SURE (Pavement, Road, Side Drains)	8,000 Kms	8,290
	Land Acquisition for Roads		3,450
	Satellite Town Ring Road	204 Kms	7,030
	<u>Mass Transport Corridors</u>		
	Metro Phase - II	72 Kms	26,667
	Metro Phase - III	80 Kms	33,333
	High Speed Rail Link to BIA	34 Kms	4,333
	High Speed Rail to Mysore	130 Kms	25,000
	Commuter Rail System	450 Kms	8,760
	<u>Improvement in City Bus System</u>		
	City Bus System		5,312
	<u>Grade Separators</u>		
	Grade Separators - Roads	12 Nos	540
	Road Over Bridges / RUB's - Rail	32 Nos	1,217
	Skyways / Subways	66 Nos	520
	Parking Facilities		592
	Integrated Freight Complexes	6 Nos	211
	Transport System Management Measures		831
			172,541



INFRASTRUCTURE EXPENDITURE – Contd/-

	Expenditure	Units	Total (Rs. Crs)
	<u>SUSTAINABILITY AND ENVIRONMENT</u>		
B	WATER		
	Reduction of unaccounted for water	From 56% to 25%	2,551
	Arresting Reservoir leakages		3,077
	Upgradation of existing secondary treatment plants to tertiary treatment standards and laying dual pipeline		2,551
	Segregation of sewage from storm water drain and treatment		957
	Storm water drains - Primary & Secondary Drains	850 Kms	10,593
	Water Testing Labs	10 Labs	54
	Storage Reservoirs for excess stormwater runoff	5000 Acres	6,378
	Water bodies & harvesting - Lake Rejuvenation	469 Lakes	6,378
			32,540
C	Solid Waste Management (80% re-use)	5832 MT / Day	1,310
D	<u>Social Welfare Initiatives</u>		
	Public Sanitation Improvement Initiatives (<i>1 per 150 population</i>)	100,000 Toilet Seats / Urinals	1,788
	Slum Re-development		2,473
	Animal Welfare and Shelters		95
			4,356
E	Parks and Afforestation		1,854
F	Low Cost Housing Development - Land for 7,50,000 Dwelling Units	4500 Acres	4,272



INFRASTRUCTURE EXPENDITURE – Contd/-

	Expenditure	Units	Total (Rs. Crs)
	<u>UTILITIES</u>		
G	Electrical Infrastructure Upgradation Fund - Redundancy & Stability	3000 MW	2,775
H	Homeland Security - Police - 900 Junction Improvements	1000 Junctions	555
	Surveillance / Security - Arterial / Sub-Arterial Roads	1940 Kms	134
			689
I	Fire Department - Up-gradation	K-SAFE 2031 Program	499
J	Wi-Fi Connectivity	1300 Sq. Kms	829
K	Administration, Communication and DPR		2,681
	<u>INTEREST</u>		
L	Interest on borrowings @ 9% p.a.		31,643
	Total		255,992



INFRASTRUCTURE FINANCIALS

Projected Cash Flow for the period Year 2013 to Year 2024

Summary	Rs. Crs
Total Expenditure without Interest (A)	224,348
<u>Contributions / Collections</u>	
GOK Funding spread Over 12 years	81,000
Government of India	14,900
Collection from Road Tolls	9,272
Railways	2,920
ULB's	5,992
Other Funding	54,163
Metro and Transportation Cess	20,817
Infrastructure Fund Generation	58,549
Total Funds Available (B)	247,613
Gap - Surplus / (Deficit) (C = B - A)	23,264
Interest on Debt (ROI - 9%)	31,643
Loan Outstanding at end of the 12 year period - Rs. Crs	(6,933)
Maximum Loan at any point of time - Rs. Crs	(56,116)

THANK YOU