Integrating DEMU/MEMU Services

A step to decongest Bangalore

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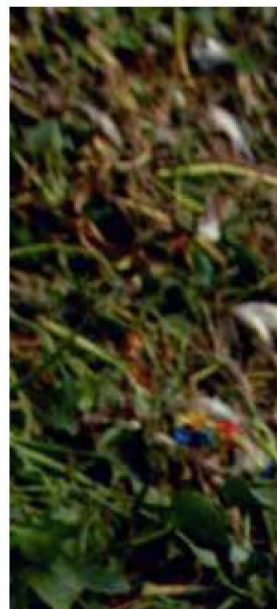National Academy of Indian Railways

Presentation Overview

- Bangalore Metropolitan Region – Relevant stats
- Importance & need of Suburban Rail system for Bangalore
- Present situation of PT & Suburban Rail in Bangalore
- DEMU services & infrastructure
- MEMU services & infrastructure
- New Developments & integration drivers
- Integration plan for DEMU & MEMU services
- Advantages of Integration
- Way Forward

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Outlook

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Rail Against The Traffic

Bangalore will soon be unliveable for many reasons, but the worst are its choked roads

AJAY SUKUMARAN

⏱ **2-MIN READ**

Bengaluru

D P Satish | News18.cor

Updated: May 2, 2016, 2:19 I

Study

CRAWL

A Bangalore traffic jam

Literature Review

- Implementation of Commuter Rail System for Bangalore Table of Contents - RITES 2012

- Comprehensive Traffic And Transportation Plan For Bengaluru – RITES June 2011

- National Transport Development Policy Committee Report – 2014

- RMP (Revised Master Plan) 2015, BDA

Bangalore – Key statistics

- Bangalore Metropolitan Region

No	District	Area (Sq. Km)	Population		Decadal Growth Rate (%)		Density (per SqKm)	
			2001	2011[?]	(91-01)	(01-11)	2001	2011
1	Bangalore	2174	6537124	9588910	35.09	46.68	2985	4378
2	Bangalore Rural	2295	850968	987257	18.60	16.02	380	441
3	Ramanagara	3556	1030546	1082739	7.84	5.06	288	303
	Total →	8025	8418638	11658906		38.49		

Source: http://www.censusindia.gov.in/2011-prov-results/prov_data_products_karnatka.html
[@] *Projected Population by 2031 : 180 Lakhs*

- Third most populous city & fifth most populous urban agglomeration in India

Population growth - Projections

YEAR		2001	2011	2016	2021	2031
CAGR (%)		1991-2001	2001-11	2011-16	2016-21	2021-31
BMR (8005 sq.km.)						
Population		8.42	11.00	12.50	14.20	18.00
CAGR (%)		2.61	2.71	2.59	2.58	2.40
BBMP (800 sq.km.)						
Population		6.17	8.03	8.99	10.06	12.60
CAGR (%)		3.68	2.67	2.28	2.28	2.28
Density		7713	10038	11234	12573	15750
% of total BMR Pop		73%	73%	72%	71%	70%
BMP (Erstwhile - 226 sq.km.) : As per RMP-2015						
Population		4.30	5.14	5.35	5.35	5.35
CAGR (%)		2.69	1.80	0.78	0.00	0.00
Density		19023	22737	23637	23637	23637
BBMP Added area (574 sq.km.)						
Population		1.87	2.89	3.64	4.71	7.25
CAGR (%)		6.44	4.46	4.75	5.29	4.41
Density		3254	5031	6345	8212	12641
Rest of BMR (Outside BBMP- 7205 sq.km.)						
Population		2.25	2.97	3.51	4.14	5.40
CAGR (%)		2.25	2.82	3.41	3.35	2.69
Density		312	412	488	575	749
% of total BMR Pop		27%	27%	28%	29%	30%

Bangalore Metropolitan Region

Urban Sprawl
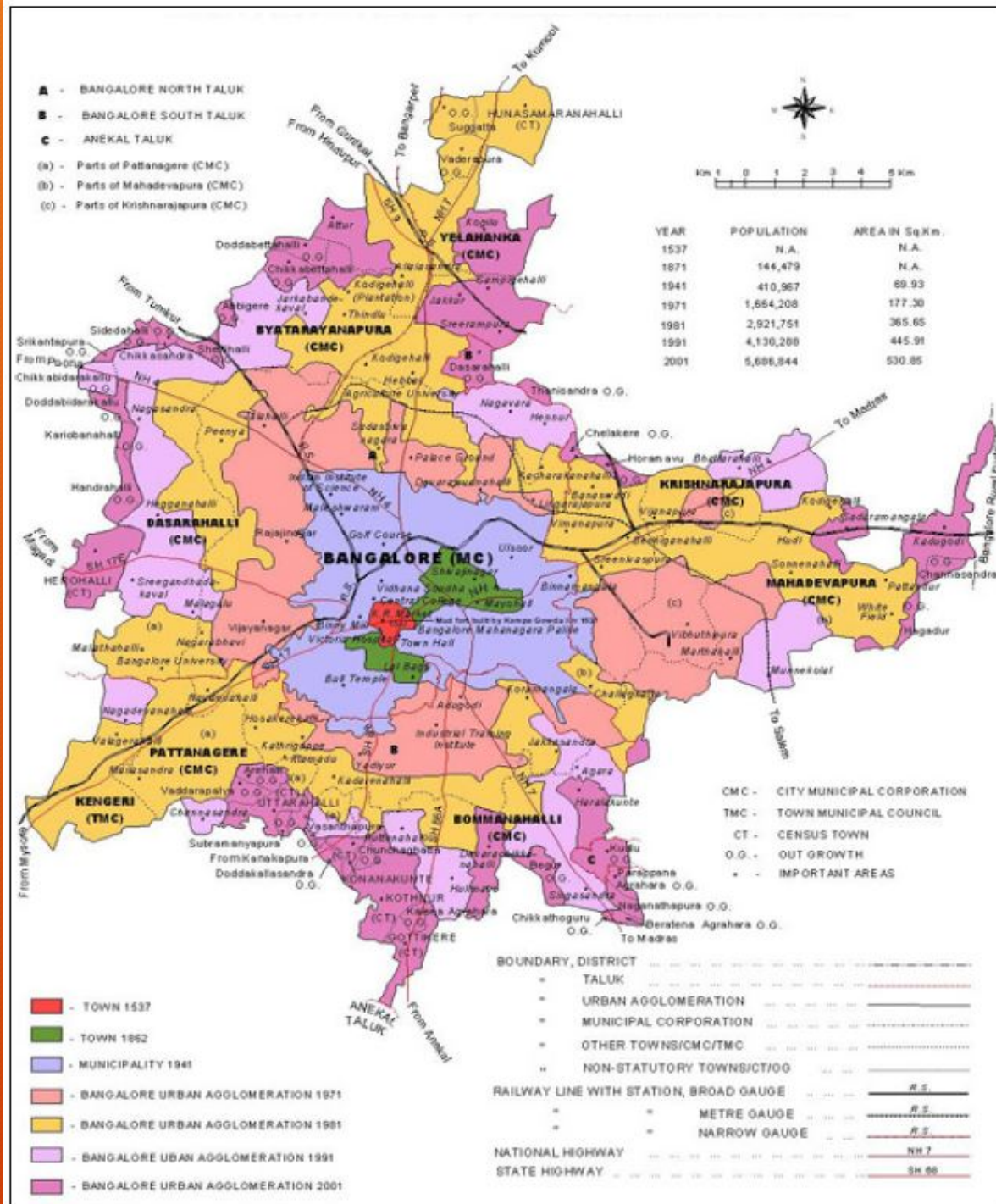
Traffic Situation

- 6 million vehicles in a city of 10 million people
- Modal Split

S.No	Travel Mode	Share
1	Walk	34.0%
2	Bicycle	4.5%
3	Taxi	0.5%
4	Auto	4.6%
5	Maxi Cab	0.5%
6	Two Wheeler	21.4%
7	Car/Van	4.5%
8	Public Transport	30.0%
	Total	100%

Source: WilburSmith Associates, Final Draft Report, CTTS for Bangalore Metropolitan Region

- In comparison in NYC, 55% people use Public Transport
  - NYC is comparable in population and size

Present situation of PT

- Predominantly Busses
- Suburban Rail to some extent
- Metro Phase 1 recently completed
  - Is already running over crowded
  - Fear of flooding
- LRT/Monorail also proposed
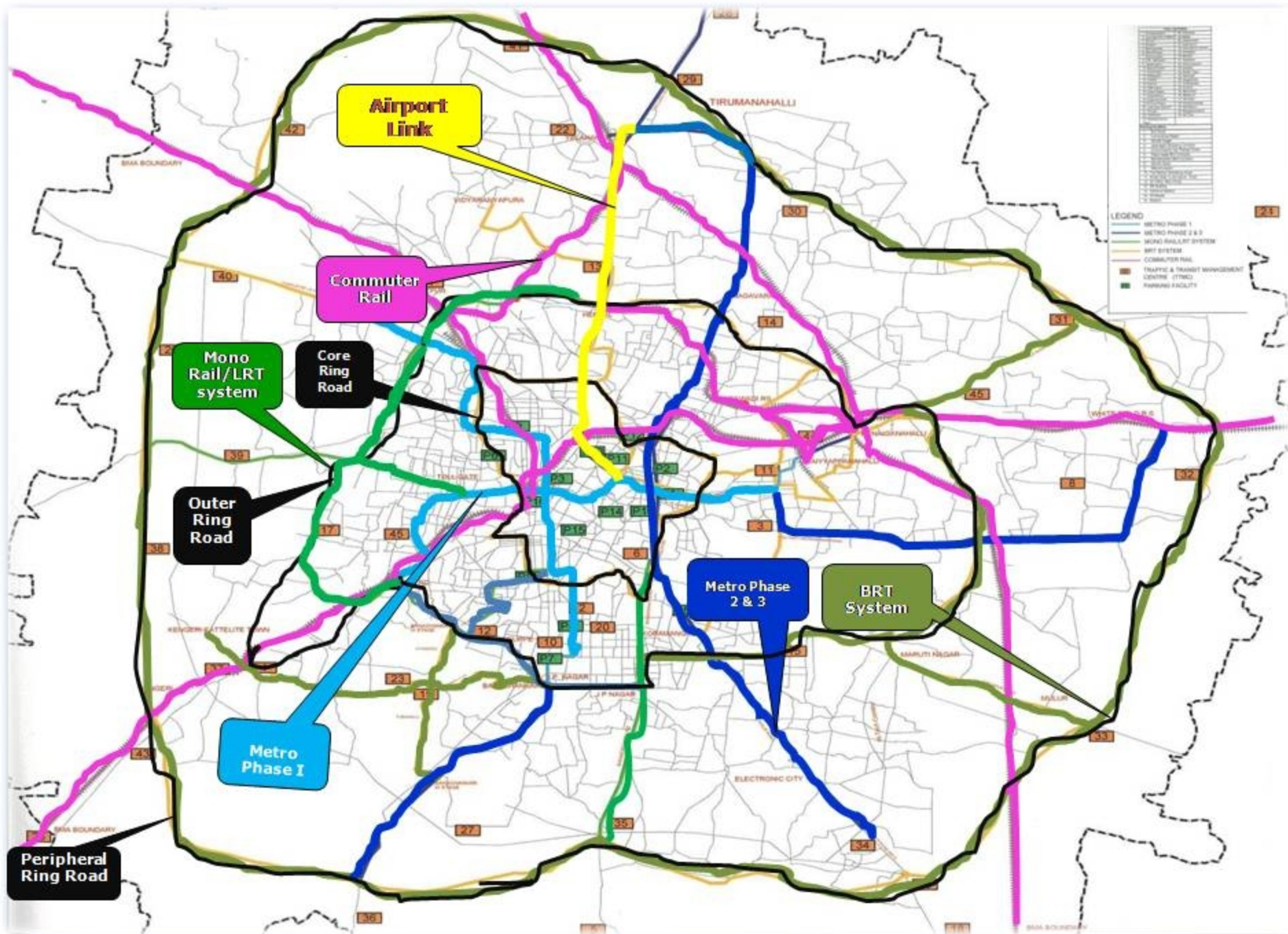
Transport Demand

- Somewhat distant suburbs
  - Nelamangala, Anekal, Yelahanka, Hosur, Sarjapura, Bidadi etc
- Cars and buses coming in from its outskirts
- People come into the city for work
- People traveling to/ from transit hubs like Majestic and KR Puram
- Low-rise and single-plot dwellings in older areas
- High-rises in newer "IT" areas,
- Suburbs mix of individual houses and apartment buildings

Need

76% decline in vegetation cover & 79% decline in water bodies

Housing has already become unaffordable in Bengaluru for the lower and middle classes which is going to form a major portion of the workforce of the future.

A trip of 5.7 km from Mahadeva-pura to KR Puram station in East Bangalore would take 44 minutes by car

One key solution

- Frequent, low cost connectivity between Bangalore and suburban growth centers

- With 6 Routes connecting 6 growth centers at a frequency of 24 trains per day per route, 375 kilometers and 50 lakh people can be covered*

Suburban Rail System

*RITES 2012 report

Advantages of Suburban Rail System

- Decongest the city
- Increase commute time efficiency & reliability
- Reduce dependency on & number of cars/ buses
- Help long-distance travelers to reach train terminals
- Lower real estate rates and hence cost of living
- Optimum utilization of railway real estate
- Lower capital expenditure on transport infrastructure
- Help develop a public transit culture
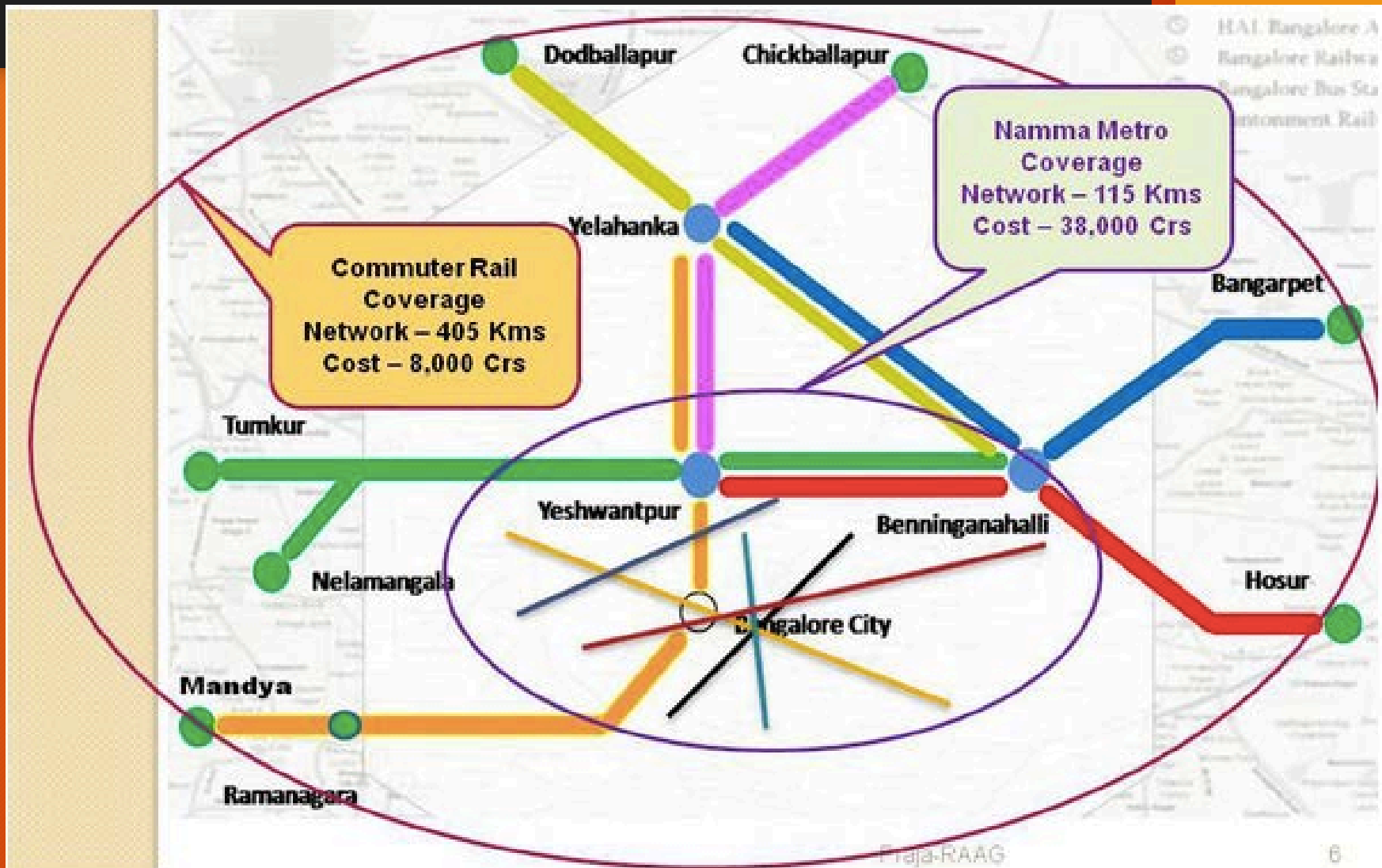
Suburban Demand & Present Situation

- Total projected Commuter Rail Trips by 2031(@ 30 % of public transport trips): 2.97 million*

- Current (2011) daily trips on Bangalore commuter rail network is estimated as 0.15 million*

- Current percentage trips by rail is about 5 % of 2031 demand

* RITES 2012 Report

Railway Network in Bangalore

- Extensive network of Indian Railways cutting right through the city
  - B.G. line from Chennai on east
  - B.G. line from Mumbai-Pune on north-west
  - B.G. line from Guntakal on the north
  - B.G. line from Salem / Trivandrum from east
  - B.G. line from Mysore from south-west

- Connects all important extended suburbs
  - Hosur, Bangarapet, Kolar, Chintamani, Chikballapur, Doddaballapur, Tumkur, Nelamangala, Mysore Road

Rail Map of Bangalore Division of IR
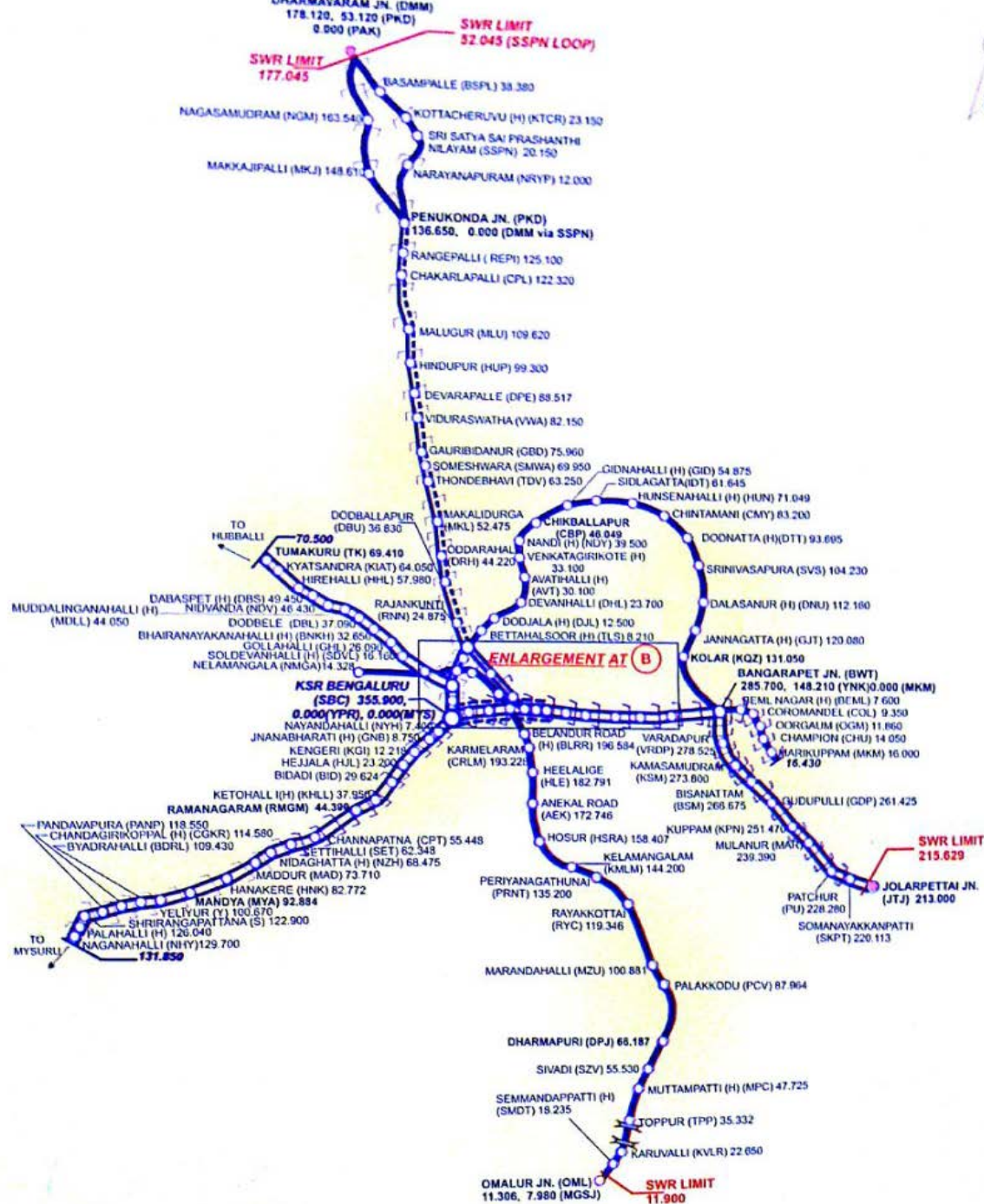
Rail Map of Bangalore Area
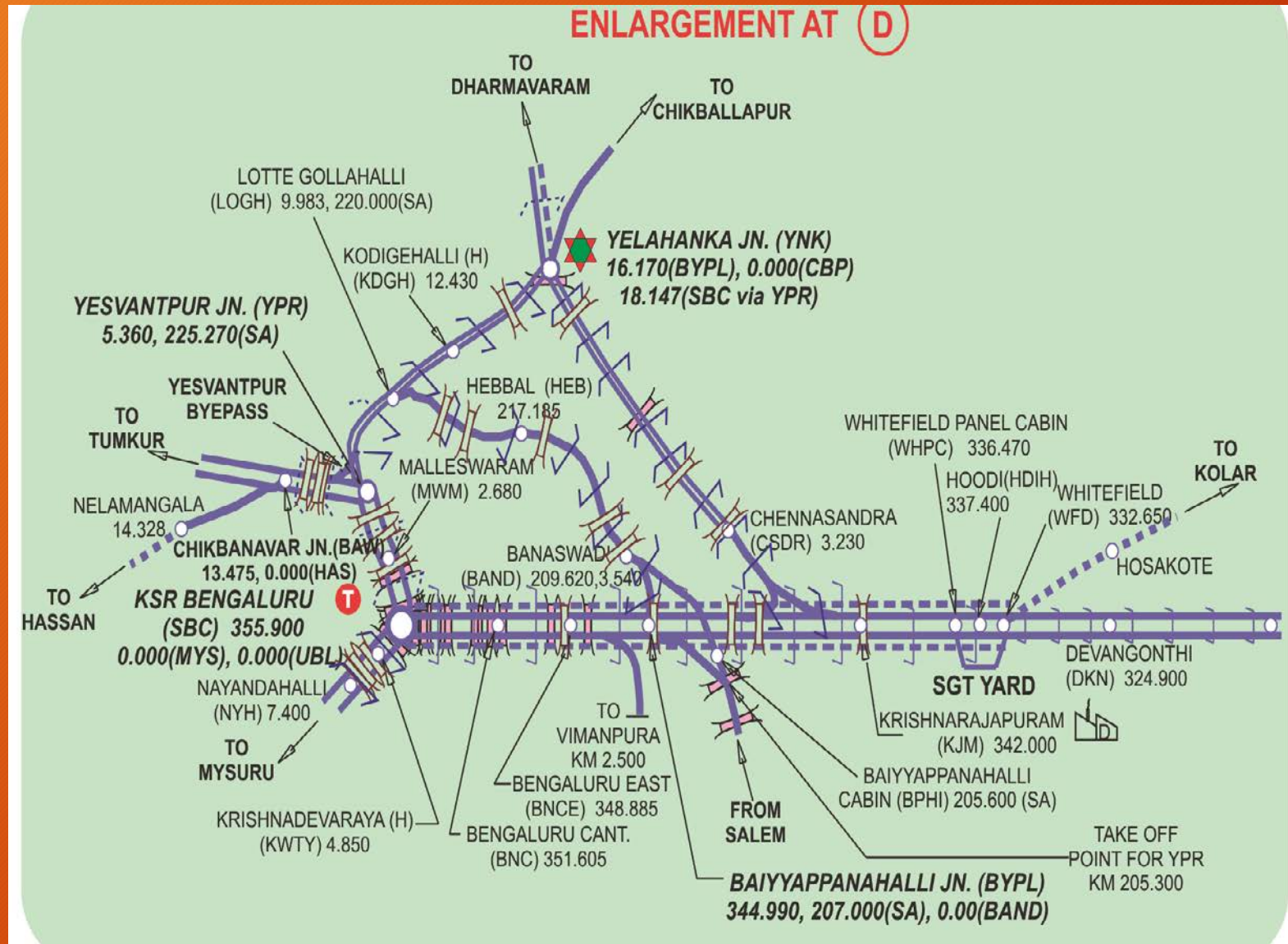
Present Bangalore Suburban Rail

- Being serviced by DEMU & MEMU rakes
- Suburban Rail Corridors
  - YPR-TK (Yeshvantpur - Tumkur)
  - SBC-MYA (Bangalore City - Mandya and beyond)
  - YNK-DBU (Yelahanka - Dodballapur)
  - YNK-CBP (Yelahanka - Chikballapur)
  - BYPL-HSRA (Baiyyappanahalli - Hosur)
  - BYPL-BWT (Baiyyappanahalli - Bangarapet)
  - SDVL – Kunigal (Soldevanahalli – Kunigal)
- About 440 kms of network

Constraints for Suburban Rail System

- Lack of line capacity
    - Path for running commuter trains not available
- Lack of commuter train stations (eg. Tannisandra)
- Less no. of platforms per station
- Inadequate rake maintenance infrastructure and stabling lines
- Unavailability of rakes (train sets) for commuter trains

DEMU

- DEMU stands for Diesel Electric Multiple Units
- Diesel engine driven self propelled train sets
- 1 DEMU set consists
  - 1 Diesel Power Car (DPC) and 3 Trailer Cars (TCs)
- One DEMU rake is made of two such units
- Bangalore has 50 TCs and 17 DPCs running in 6 rakes
- Designed for commuter services
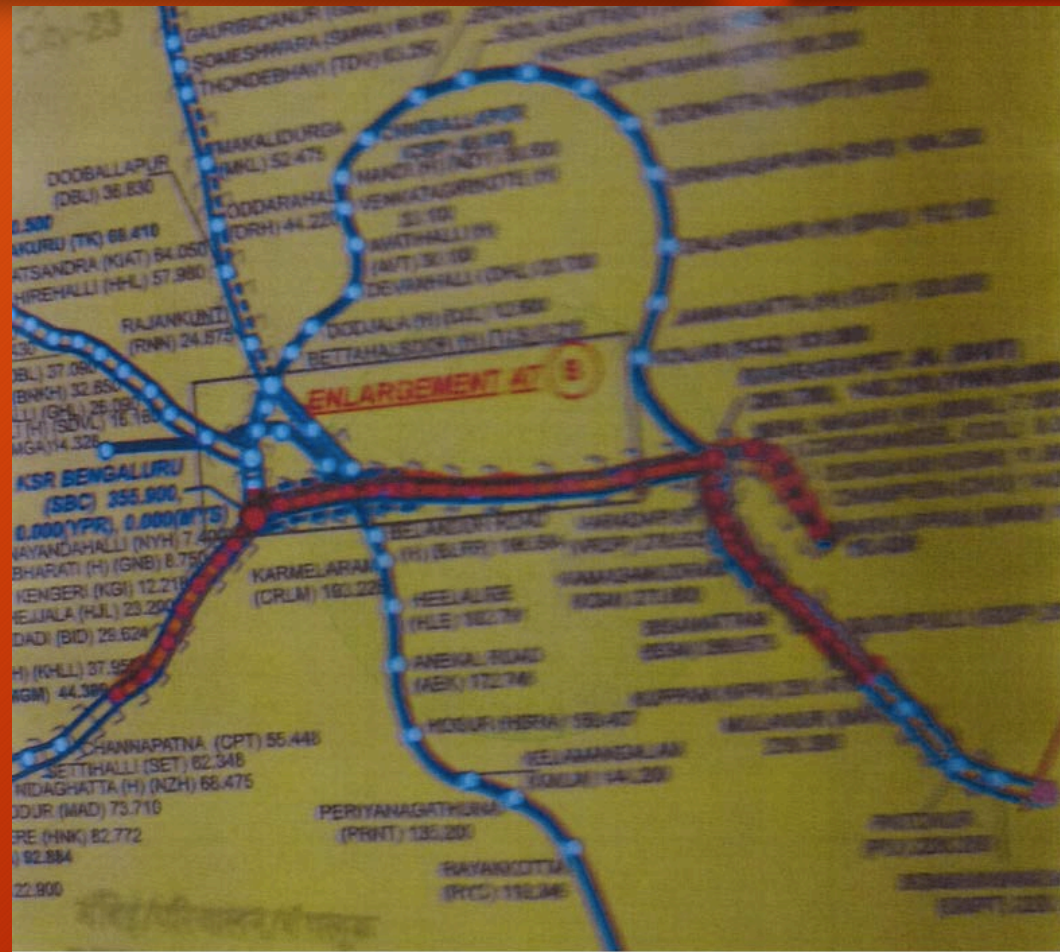
DEMU Services

- **14 sets of train services**
  - 9 sets of train services are operated using 3 DEMU rakes in SBC-BNC-BWT-MKM-KQZ-DPJ-RMGM sections.

  - 3 sets of train services are operated using 1 DEMU rakes in YPR-HSRA-DHL section.

  - 2 sets of train services are operated using 1 DEMU rake in SBC-KQZ-CPT section

DEMU Infrastructure

- Maintenance shed in Bangalore Cantt. (BNC)
- Maintenance schedule
  - 7 days trip/monthly A/Quarterly B/ 9 monthly Overhauling
- Limitations
  - Was designed for loco maintenance
  - Stabling line is short (6.5 coach length instead of 8)

MEMU

- MEMU stands for Mainline Electric Multiple Unit

- Self propelled train sets

- Get tractive power from overhead electric cables

- MEMU services were introduced in 2006

MEMU Services

| Tr. No.	Section		Dep	Arr
	From	To		
66528	BWT	KPN	05.50	06.35
66529	KPN	SBC	06.45	09.30
66513	BWT	MKM	07.10	07.45
66512	MKM	SBC	08.00	10.30
66530	SBC	BWT	09.45	11.10
66511	SBC	MKM	12.20	15.05
66514*	MKM	BWT	15.45	16.20
66515*	BWT	MKM	18.00	18.30
66516	MKM	BWT	18.40	19.15
66531	BWT	SBC	12.40	14.20
66532	SBC	MKM	14.45	17.10
66533*	MKM	KJM	17..20	19.10
66534*	KJM	KPN	19.30	21.25
66527	KPN	BWT	21.35	22.20
66514	BWT	BYPL	15.55	17.10
66515	BYPL	BWT	17.20	18.35
66533	KJM	BYPL	19.10	19.15
66534	BYPL	KJM	19.30	19.35

MEMU Infrastructure

- Maintenance was earlier being done at Bangalore city station (non- electrified facility)

- Banaswadi shed commissioned in Nov 2016 for maintenance (electrified facility)
  - Can maintain 15 rakes of 12 cars
  - Present holding 7 Rakes of 8 cars

- 14 Motor Cars + 42 Trailer Cars

Developments

- Yelehanka YNK – Dharmavaram DMM electrified
- Bangalore City SBC- Mysore MYS completing electrification
- MEMU services extended with 12 car rakes in SBC- BWT (Bangarpet) section
- Conventional passenger trains being replaced with MEMU trains
  - Higher capacity
  - Designed for commuter traffic

Electrified Railway Map of BMR
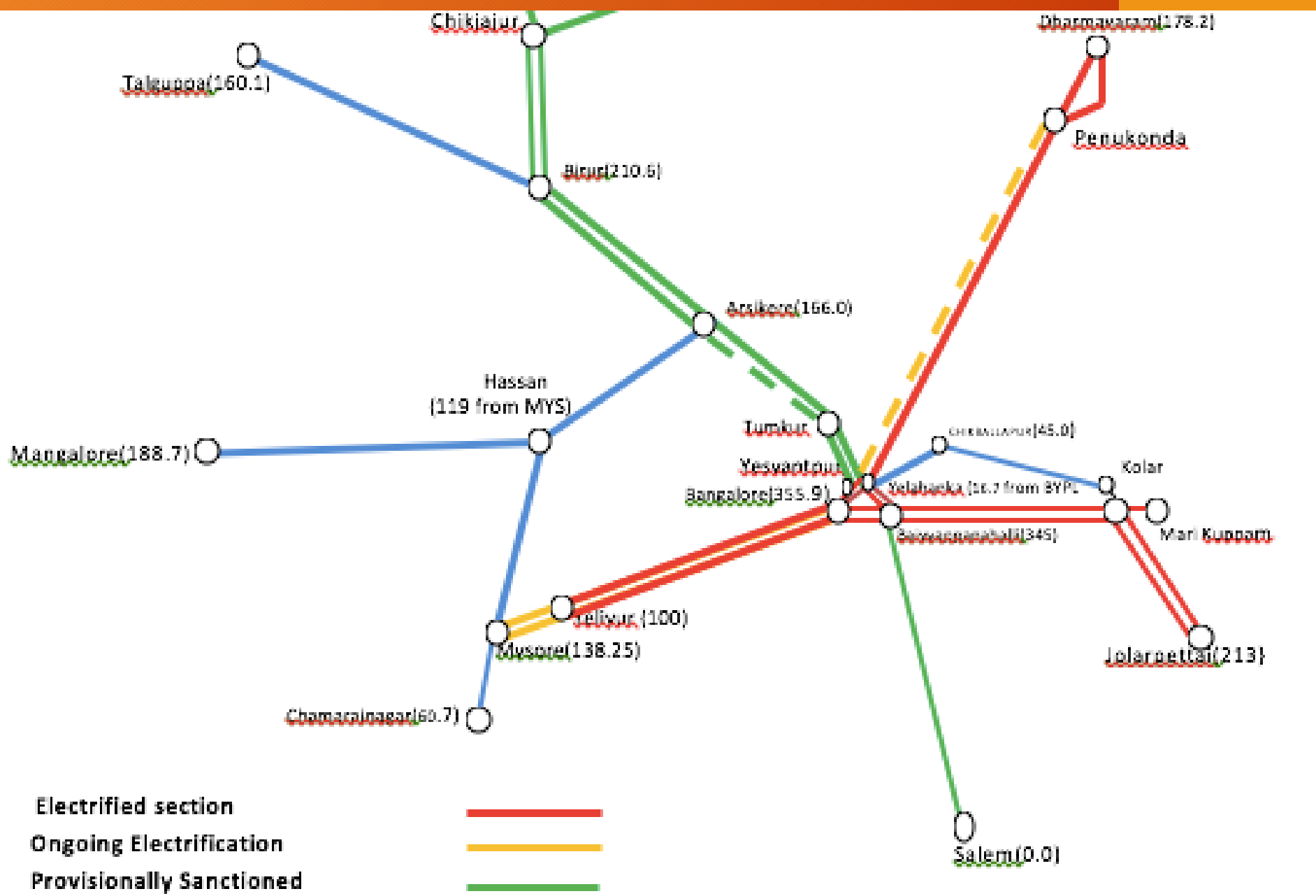
MEMU - DEMU

- Commonalities
  - Both are self propelled train sets
  - Designed for rapid transit commuter services
  - Hardware for propulsion, rolling, braking, superstructure, passenger amenities etc. are similar
  - Similar driving controls
- Differences
  - Internal Motive power system and fuel used
  - Requirement of Overhead Cables

Key Drivers of Integration of MEMU- DEMU

- Electrification of rail network in Bangalore and its suburbs

- Requirement of additional commuter trains

- Lead time in development of infrastructure

- Lead time in acquisition of new rakes

- Spare maintenance capacity at Banaswadi Maintenance Shed

- Complimentary facilities at DEMU/ MEMU Sheds

Integration Plan

- Repairs & Maintenance of both rolling stocks under one roof, with common command control structure to manage materials, machinery, tools, human resources, etc.

- Integrated maintenance plans

- Integrated rake links

- Integrated operational competency of crews who run these self propelled units

Advantages of Integration

- Net efficiency of integrated Repair & Maintenance facilities for MEMUs and DEMUs will be **much more** compared to an exclusive facilities

- Operations & Administration Cost savings

- More commuter train services

Way Forward

- Development of Integrated Management Structure
- Development of Maintenance plan & Manpower redistribution
- Training Plan
  - Familiarization course for the crew
  - Short – term cross-training to Maintainers of each stock
- Roll-out
- Stations – co-located with Metro

Thank you