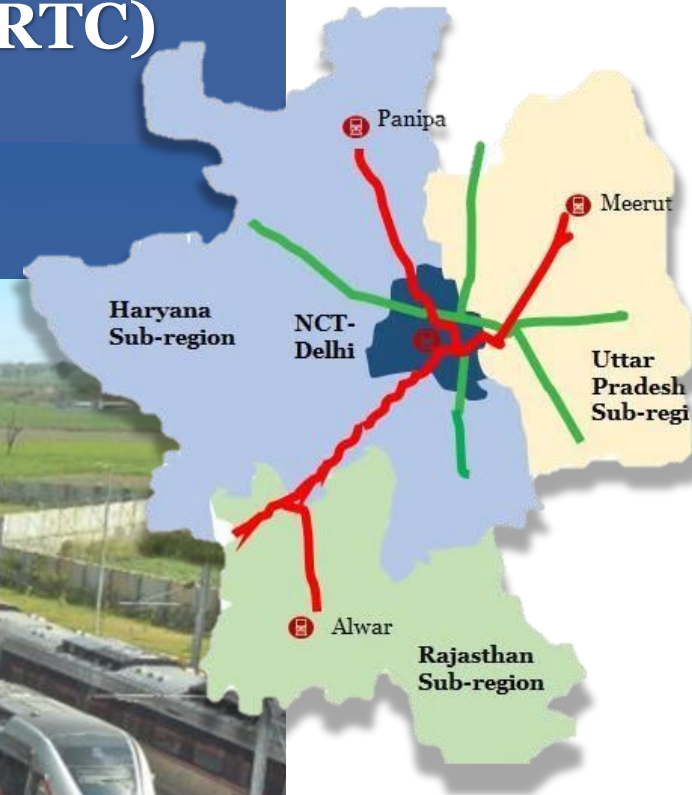


# Regional Rapid Transit System National Capital Region Transport Corporation (NCRTC)

*India's First Semi-High Speed Regional Rail*



**Srishti Gupta  
Lead (Strategy)**



***ADB Business Opportunities Seminar (BOS)***

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# Regional Rapid Transit System (RRTS)

*A strategic intervention to provide futuristic and commuter centric regional commute*



## National-level

(> 150 km)

- ✓ National Railways
- ✓ National Airlines
- ✓ High Speed Rail



## Regional-level

(20-150 km)

- ✓ Passenger Trains
- ✓ Inter-state Buses
- ✓ RRTS (Semi-high Speed rail)



## City-level

(10-25 km)

- ✓ Metro Rail Transit
- ✓ Bus Rapid Transit
- ✓ City Buses



## Last Mile

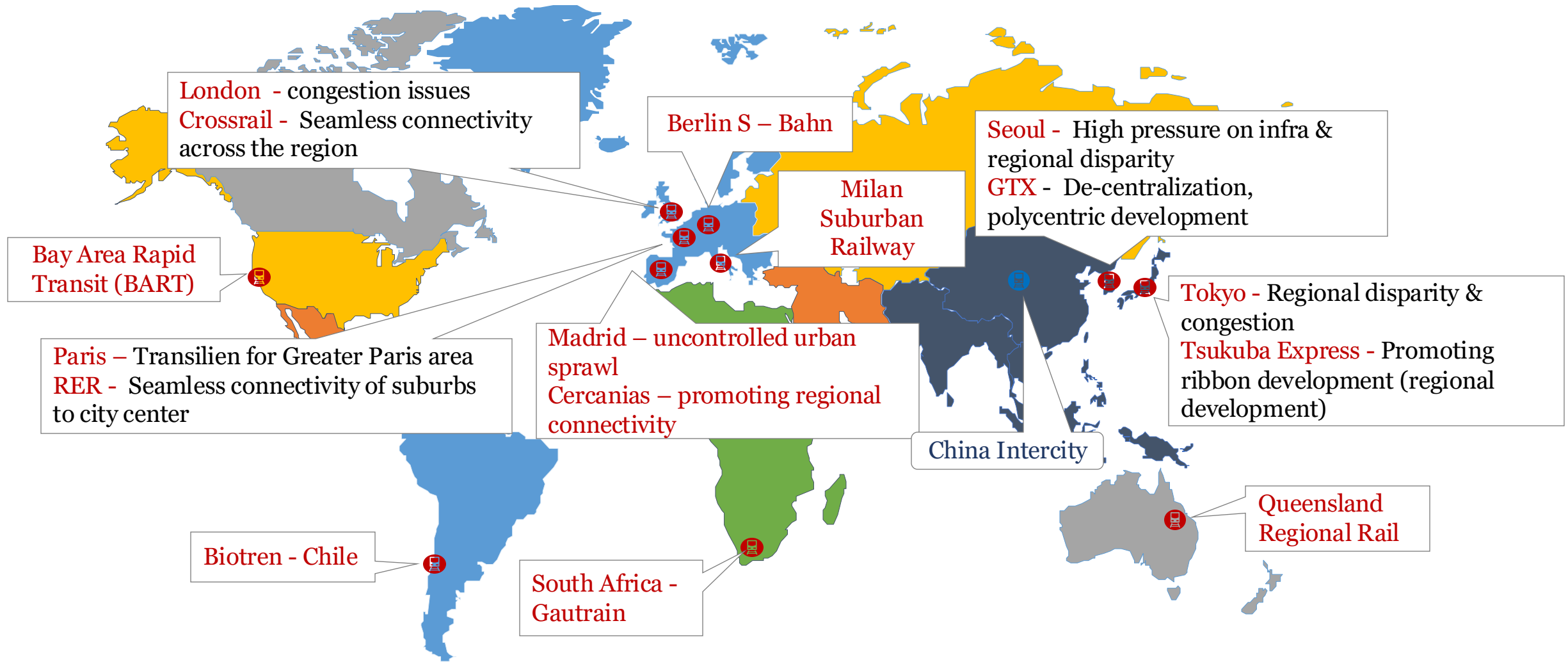
(< 10 km)

- ✓ Autos / Shared Autos
- ✓ E-Rickshaws
- ✓ Feeder Buses

*High Speed Rail & Semi-High Speed Rail are in nascent stages of implementation*

# Regional Rails

*Adopted by cities globally to control urban sprawl & promote decentralized economic development*



Regional Rail

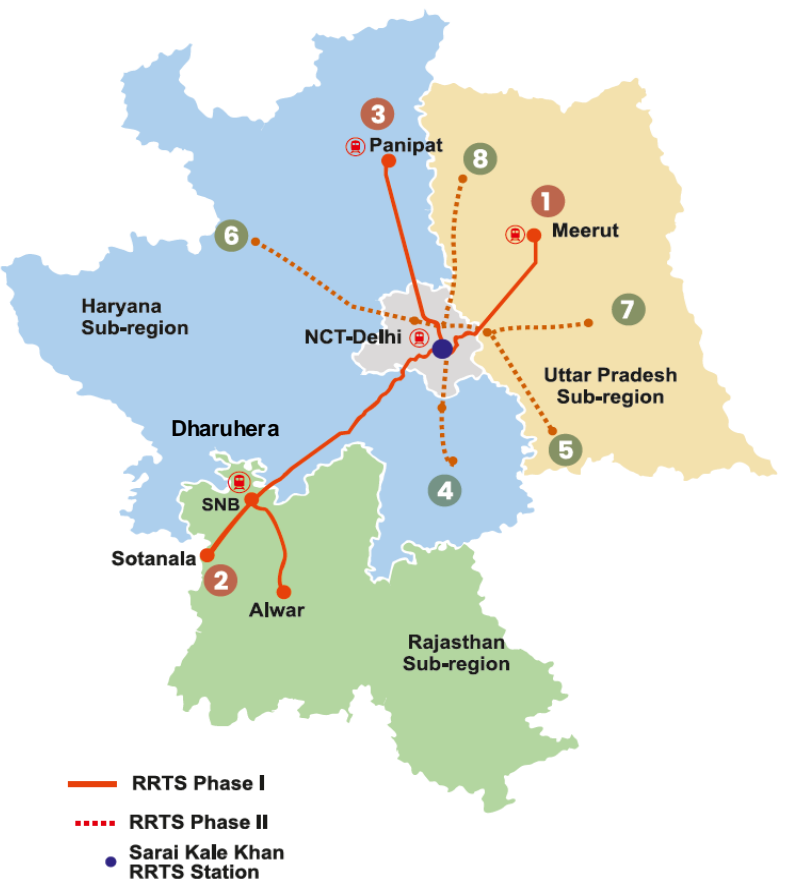
Inter-city / Commuter / High Speed Rail



# Regional Rapid Transit System (RRTS) in National Capital Region

## Eight RRTS corridors identified in Functional Plan of Transport for NCR (2032) - 3 corridors prioritised in Phase - I

National Capital Region (NCR)



Parameters	Delhi – Meerut	Delhi – Panipat	Delhi - Alwar		
			Delhi – SNB #	SNB – Sotanala	SNB – Alwar
<b>Total Length (Km)</b>	82.15	103.02	107	33.3	58
<b>Estimated travel time (min)</b>	60	72	75	23	30
<b>No. of total stations</b>	25	17	16	4	2
<b>Present status</b>	42 Km operational under commercial operations	Under GOI appraisal (approved by Govt. of Haryana & GNCTD)			

### Phase-I: 3 RRTS corridors

1. Delhi-Ghaziabad-Meerut

2. Delhi-Gurgaon-Rewari-Alwar

3. Delhi-Sonipat-Panipat

4. Delhi-Faridabad-Ballabgarh-Palwal (60 Km)

5. Ghaziabad-Khurja (83 Km)

6. Delhi-Bahadurgarh-Rohtak (70 Km)

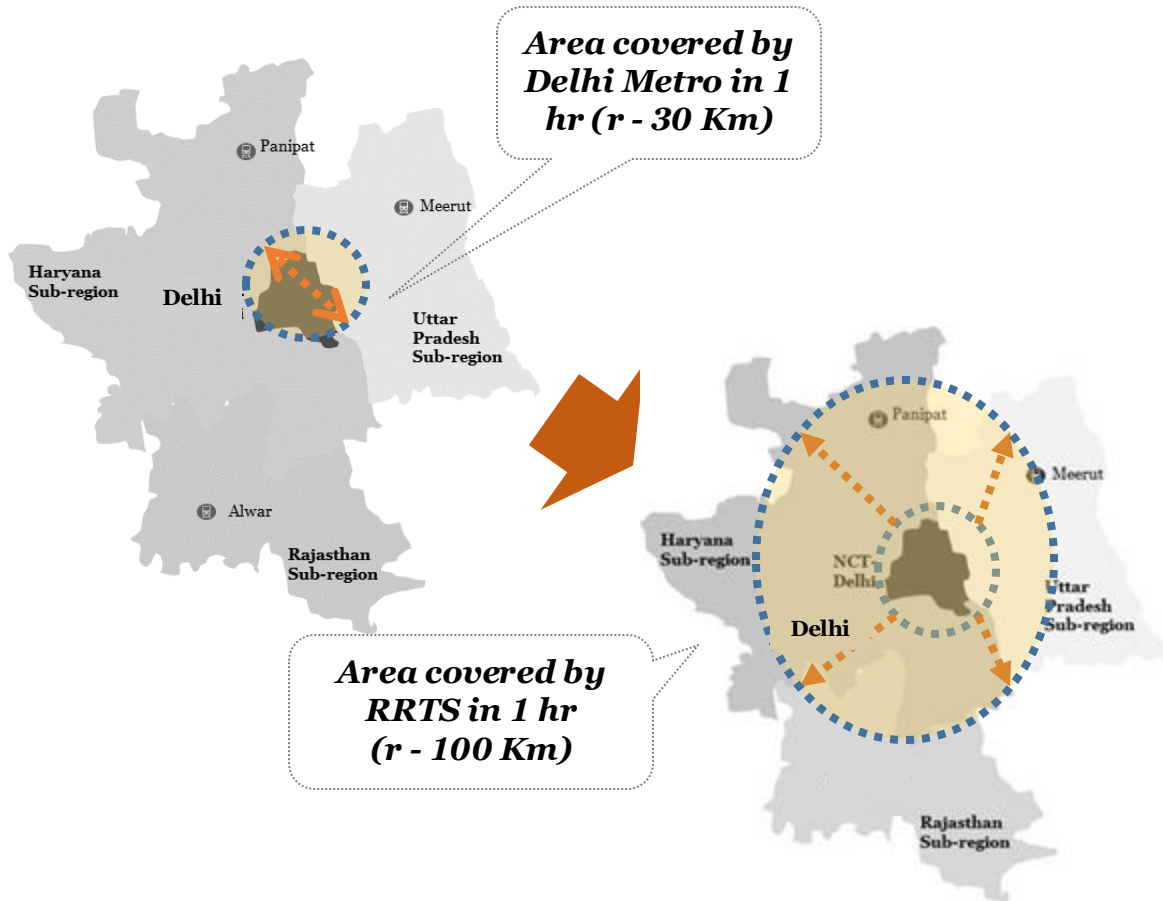
7. Ghaziabad-Hapur (57 Km)

8. Delhi-Shahdra-Baraut (56 Km)

# - To be implemented in two stages – Stage-I: Delhi – Dharuhera, Stage-2: Daruhera to SNB  4

# Bringing Regions Together For Sustainable Economic Growth

## Promoting Polycentric Growth



Connectivity Enhancement	Origin – Destination	Time by RRTS# ( Min)
Semi High-Speed Connectivity between Towns of NCR	Ghaziabad - Gurugram( Cybercity)	34
	Meerut ( <u>Begampur</u> ) – Gurugram ( Cybercity)	66
Seamless access to job centres	Kashmere Gate – Gurugram ( Cybercity)	26
	Sarai Kale Khan – Gurugram ( Cybercity)	17
Fast direct connection to Airport	Mayur Vihar – Aero city	22
	Noida City Centre – Aero city	33
	Ghaziabad - Aero city	30
	Meerut ( <u>Begampur</u> ) - Aero city	63
	<u>Kundli</u> – Aero City	40
	RG University ( KMP) – Aero City	45
	<u>Murthal</u> - Aero City	53

# Delhi-Meerut RRTS Corridor

## Project at a glance

- Project Sanctioned – **March 2019**
- Project Cost – \$ **3.6 bn**
- Corridor Length ~ **82.15 km**
- 16 RRTS Stations; 13 Local Transit Stations (Metro) on same infrastructure
- 42km Currently Operational** serving important towns like Ghaziabad, Modinagar
- Served Over 2 million Commuters** since October 2023
- Progress up to Aug 31st, 2024
  - Physical progress - **79.7%**
  - Financial progress – **73.4%**

*Commissioning of complete corridor – June 2025*

**Section under Revenue Operations:**

- Sahibabad to Meerut South
- 42 Km section
- 9 Operational Stations



# Broad system parameters

Parameter	RRTS
Design Speed	180 kmph
Operating/Average Speed	160 kmph/ ~90 kmph
Frequency	5-10 min(RRTS)
Inter-Station Distance	5 – 10 km
Services on Network	Inter-operable
Train Length	6/9 coach trains : infrastructure for 9 coach trains
Gauge	Standard Gauge
Rolling Stock	<ul style="list-style-type: none"><li>• 3.2 meters wide cars</li><li>• Transverse seating</li><li>• One business class coach in every train</li></ul>
Signalling	ETCS Level II with LTE communication backbone
PSD/PSG	At all stations
Track	Ballastless Track suitable for 180 kmph/220 kmph
Traction	1x25 KV AC Rigid OCS in tunnels
Bearings	Spherical or other suitable for the speed

# Enhancing Private Sector Participation - OpEx Optimization



1

Operations & maintenance

- Comprehensive 12-year O&M contract awarded to Deutsch Bahn India
- First of its kind contract in the country – in line with Metro Rail Policy 2017
- Predictability of long-term costs, managerial efficiencies and entrepreneurial spirit
- Now being followed by peer organisations in the country



2

Procurement and maintenance of Rolling stock

- Supply bundled with 15-year maintenance – awarded to Alstom India
- Optimised life cycle cost with efficient maintenance – predictability of long-term cost
- Leveraging OEM capability – learning best practices of maintenance
- Now being followed by peer organisations in the country



3

Implementation of AFC system

- Open loop system - National Common Mobility Card (NCMC)
- Unbundled into two contracts - system integrator and financial institution
- PPP Hybrid Annuity Model adopted
- Two level AFC gates for enabling access to premium class coach



# Commuter Centricity at Every Step



**Design speed of 180 kmph  
(Delhi to Meerut in less than an hour)**



**Train every ~5-10 min. & serving  
traffic nodes every 5-10 kms**



**Inter-operable Corridors &  
Multimodal Integration**



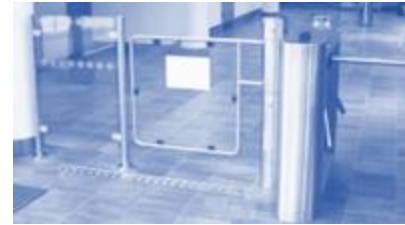
**Priority seating - women, disabled,  
elderly & children**



**High capacity, comfortable  
journey, airline seating**



**Wheelchair & stretcher lift  
space provision**



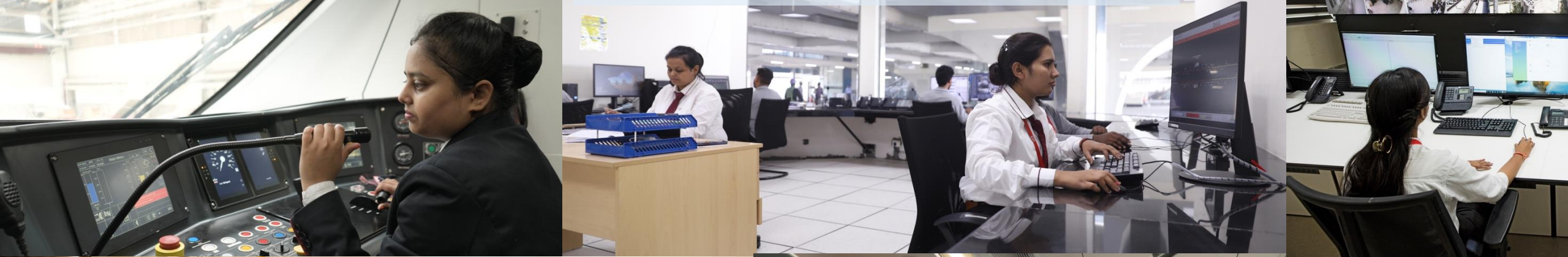
**Two stage AFC for premium  
class**



**UPI enabled Ticket  
Vending Machine**



# WOMEN – Playing an Important Role in RRTS



Station Controllers and Train Operators at RRTS stations are majorly women

# Loan Name: Delhi-Meerut Regional Rapid Transit System Project (Project Number: 51073-003)

- Loan Amount: **US\$ 2,049 million**  
(**ADB** Financing: US\$ 1,049 million; **AIIB** Joint Co-financing: US\$ 500 million; **NDB** financing: US\$ 500 million)
- Implementing Agency: National Capital Region Transport Corporation (NCRTC)
- Loan Repayment Period: 17 years for principal repayment (Feb' 2029 to Aug' 2045)
- Construction Period: from 2019 to 2025
- Categories of Procurement: (Civil Works/ Supply of Equipment/ Consultancy Services)
- Nature of Procurement: ICB/NCB/QCBS as per procurement policies of ADB
- Geographical Location: (Delhi-Ghaziabad-Meerut)
- Future Procurement Opportunities: All the major packages have been awarded and are under execution. However, last mile packages and other property development packages are in pipeline of Bidding.
- Project Director/Concerned Official's Contact Details:
  - Name & Designation: Mr. Anil Kumar Shrangarya, Director (Projects)
  - Postal Address: GatiShakti Bhawan, INA, New Delhi-110023
  - Phone Numbers: +91 011 24666700
  - Email Id: [anil.shrangarya@ncrtc.in](mailto:anil.shrangarya@ncrtc.in)

# Contracts Due for Bidding

<b>S N</b>	<b>Type of Work</b>	<b>Location</b>	<b>No of Packages</b>	<b>Estimated Cost (INR Million)</b>	<b>Likely Date for Invitation to Bid (ITB)</b>
<b>Supply Contracts</b>					
1.	Design, Manufacturing, Supply Testing and Commissioning of Catenary Maintenance Vehicle and Engineering Maintenance Vehicle with Integration of Signaling System for Delhi-Ghaziabad-Meerut Regional Rapid Transit System (RRTS) Corridor	Delhi-Ghaziabad -Meerut Regional Rapid Transit System (RRTS) Corridor	01(one)	INR 650	



# *Procurement strategy for successful commissioning of Delhi Meerut corridor*

- **Pre-construction activities taken-up before on boarding of main contractors** to have encumbrance free sites for timely execution of the works.
- Procurement of **Viaduct and Stations packages undertaken on BoQ basis** and separate DDC consultants appointed for design, as no template of such rail-based system was available.
- **Underground packages** were undertaken on **Design and Build basis**. As the tunnel diameter, Schedule of Dimensions and alignment were fixed, too much variation was not expected.
- **Standard Bidding Document (SBD) of ADB** was adopted for procurement on BOQ based contracts with percentage above/below/at-par basis to avoid case of vitiations.
- Suggestions of bidders in **pre-bid discussion** are incorporated in bid to incorporate industry requirements.
- Giving due deliberations to **Purchase Preference Policy – Make in India (2017)** and other policies of Government of India Various **Consultancies such as Detailed Design Consultants, Proof Consultants and General Consultant** on QCBS basis
- As a result approx. 400 bidders from across the globe participated in the bidding in ~50 major packages of the Corridor.

# Unprecedented Multimodal Integration



## Network Integration

- Integrated Network Planning
- Less overlap between public transport



## Physical Integration

- *Station Proximity*
- making transfers among transit systems more efficient
- *In-station facilities*



## Operational Integration

- Coordination of routes, schedules and frequencies



## Information & Ticketing

- Integrated ticketing
- Integrated Information

# Property Business at RRTS



### Key Retail Opportunities

<p><b>Retail Built-up Shops</b></p>	<p><b>F&amp;B Built-up Shops</b></p>	<p><b>Kiosks and ATMs</b></p>
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### Other Opportunities

<p><b>Pickup/ Delivery Points</b></p>
---------------------------------------

### Key Advertising Opportunities

<p><b>Outdoor Advertising</b></p>	<p><b>Indoor Advertising</b></p>	<p><b>Semi-Naming Rights</b></p>
<p><b>Smart Card/Token Ads</b></p>	<p><b>In-train Ads and Wraps</b></p>	<p><b>Co-branded Cards</b></p>

### Other Opportunities

<p><b>Experiential Marketing</b></p>
<p><b>Tunnel Advertising</b></p>



# Innovative Revenue Generation Opportunities

### Key Telecom Opportunities

**Towers, IBS and Small Cells**



**Optical Fibre Cables**



### Key Last Mile Connectivity Opportunities

**Parking**



**Cab Access**




### Other Opportunities

**EV Charging Points**




### Key Innovative Opportunities

**Virtual Stores**



**Pouring Rights**



### Other Opportunities

**Digital Products**



**In-Train Wi-Fi**





# Major land pockets for Property Development

S. No.	Site Location	Site Area (In Hectare)	Status	Approvals Awaited
1	Ghaziabad	2.4	Recreational land allotted by Govt. of UP Govt. of UP notified TOD Zone	GDA Master Plan not yet Notified.
2	Duhai Depot	31.0	Govt. of UP notified TOD Zone ZDP under Preparation by NCRTC	
3	Bhaisali	3.8	Govt. of UP notified TOD Zone ZDP under Preparation by NCRTC	
4	Modipuram Depot	31.2	Govt. of UP notified TOD Zone ZDP under Preparation by NCRTC	
	<b>Total</b>	<b>68.4</b>		

# Area at Stations for Property Development

Sl. No.	Stations	Area (in Sqm)
1	Sarai Kale Khan*	6,919
2	Anand Vihar*	7,840
3	New Ashok Nagar	2,905
4	Anand Vihar	4,299
5	Sahibabad (Bids under evaluation)	165
6	Ghaziabad (Tender under preparation)	18,495
7	Guldhar (Bids under evaluation)	134
8	Duhai (Bids under evaluation)	275
9	Meerut South	4,970
10	Begumpul	3,560
	<b>Total</b>	<b>49,562</b>

 Under Process

\* Air rights available

# Delhi – SNB RRTS Corridor

## Alignment details

**Total Length (km)** **107**

**Elevated (km)** **70**

In Delhi 0.22

In Haryana 68

In Rajasthan 2

**Underground (km)** **37**

In Delhi 22

In Haryana 15

In Rajasthan 0.0

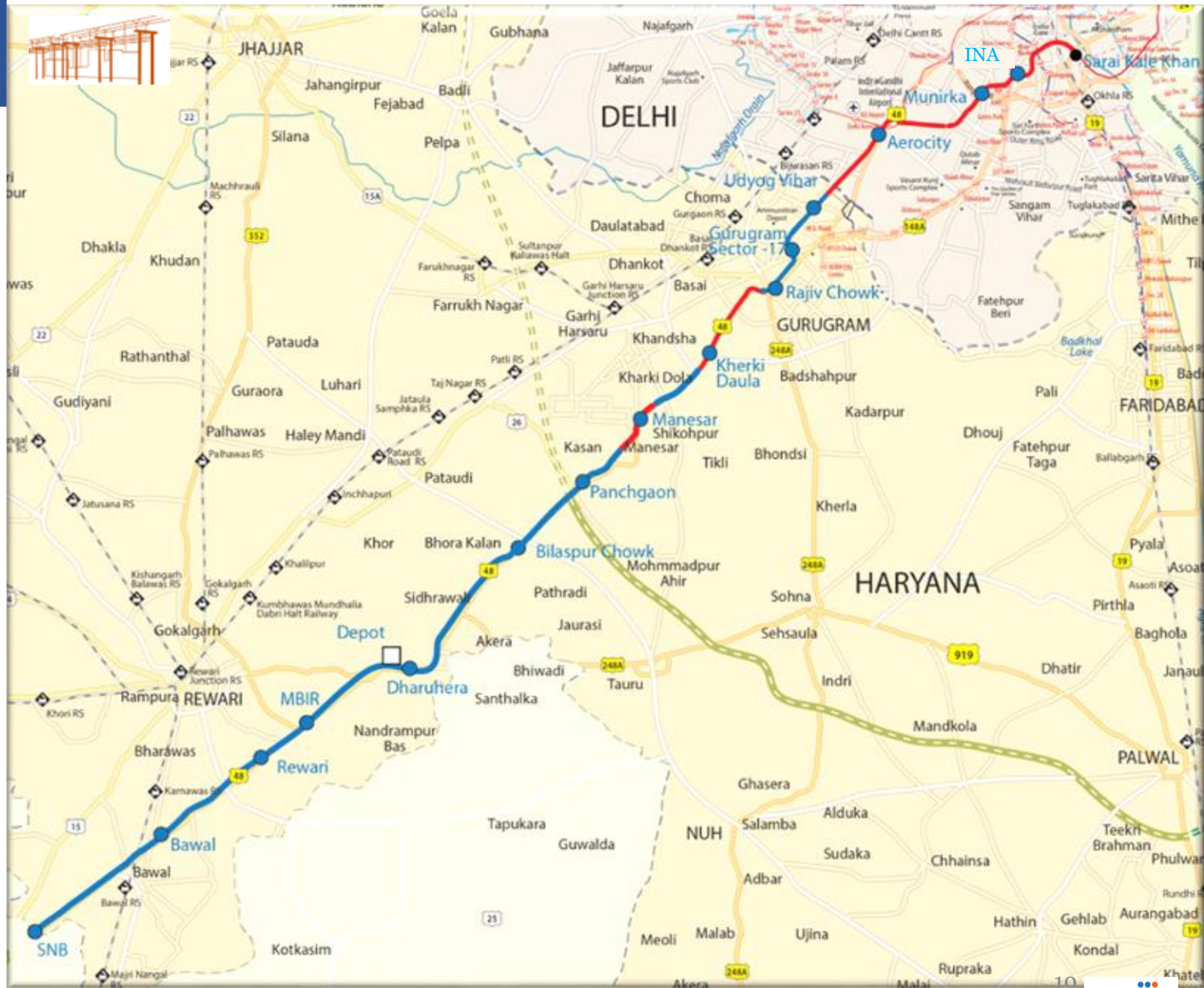
**Estimated travel time** **~ 75 min**

**No. of total stations** **16**

In Delhi (U/G: 3) 4

In Haryana (U/G: 2) 11

In Rajasthan 1



# Stations on Delhi – SNB Corridor

S.No	Station Name	State	Interstation distance (in km)	Cumulative distance (in km)
1	Sarai Kale Khan Station	Delhi	0.48	0.00
2	<b>INA</b>	<b>Delhi</b>	7.29	6.81
3	<b>Munirka Station</b>	<b>Delhi</b>	5.07	11.88
4	<b>Aerocity Station</b>	<b>Delhi</b>	5.38	17.26
5	Udyog Vihar Station	Haryana	7.78	25.04
6	Sec 16 Station	Haryana	4.83	29.87
7	<b>Rajiv Chowk Station</b>	<b>Haryana</b>	3.49	33.36
8	<b>Kherki Daula Station</b>	<b>Haryana</b>	6.28	39.64
9	<b>Manesar Station</b>	<b>Haryana</b>	7.13	46.77
10	Panchgaon Station	Haryana	6.77	53.54
11	Bilaspur Chowk	Haryana	5.50	59.04
12	Dharuhera Station	Haryana	11.66	70.70
13	MBIR Station	Haryana	9.86	80.56
14	Rewari Station	Haryana	3.51	84.07
15	Bawal Station	Haryana	10.10	94.17
16	SNB Station	Rajasthan	11.84	106.01



# Pre-construction activities underway

- **CPM Field offices are functional** at Gurugram and Delhi since May 2019 and Jan 2020 respectively



- **Enabling works:** In order to save time in project implementation once the Project is sanctioned by GOI, enabling works are substantially completed with the support of Government of Haryana.



**Project in high state of readiness for commencement of construction**

# Loan Name: Delhi-SNB Regional Rapid Transit System Investment Project (Project Number: 56015-002)

- Loan Amount: **US\$ 2358 million**  
(**ADB** Financing: US\$ 1382 million; **World Bank** Financing: US\$ 457 million; **JICA** financing: US\$ 519 million)
- Implementing Agency: National Capital Region Transport Corporation (NCRTC)
- Loan Period: Proposal is under active review.
- Construction Period: Likely construction period is about 6 years from the date of sanction of the project.
- Categories of Procurement: (Civil Works/ Supply of Equipment/ Consultancy Services)
- Nature of Procurement: Expected to be ICB/NCB/QCBS as per procurement policies of ADB
- Geographical Location: (Delhi-Gurugram-Rewari-SNB)
- Future Procurement Opportunities: Please refer next slides.
- Project Director/Concerned Official's Contact Details:
  - Name & Designation: Mr. Anil Kumar Shrangarya, Director (Projects)
  - Postal Address: GatiShakti Bhawan, INA, New Delhi-110023
  - Phone Numbers: +91 011 24666700
  - Email Id: [anil.shrangarya@ncrtc.in](mailto:anil.shrangarya@ncrtc.in)

# Expected Future Procurement Opportunities – Civil & Elect. Works (Delhi – SNB Corridor)

SN	Type of Work	Location	Scope of Work
1	Construction of Depot cum Workshop	Dharuhera	All civil, PEB and E&M work
2	Environment Control System (ECS), Tunnel Ventilation System (TVS) and Building Management System (BMS)	DLI-SNB	ECS, TVS & BMS for 37 km UG section and 6 Nos. of UG stations
3	Escalators and Travelators	DLI-SNB	For 6 Nos. of UG and 9 Nos. of elevated stations
4	Elevators (Lifts)	DLI-SNB	
5	HH Rails & Fastening System	DLI-SNB	Entire 107 Route km
6	Construction of Elevated Viaduct	Kherki Daula Toll to Manesar Sector-1, Manesar Ravine Area ramp to Bilaspur Chowk, Bilaspur Chowk to Dharuhera	26.6 Route Km & 3 Nos. Elv. Stns.
7	Construction of Elevated Viaduct	Dharuhera to SNB	35 Route km & 4 Nos. Elv. Stn.
8	Design and Construction of twin Tunnels	Ramp at Millenium Park (including Ramp Structure) to Munirka	13 Route km & 2 Nos. UG Stn.
9	Design and Construction of twin Tunnels	Ex. Munirka to Ramp at IDPL Complex (including Ramp Structure)	9 Route km & 1 No. UG Stn.
10	Construction of Elevated Viaduct	IDPL Complex to Rajiv Chowk (Incl. Elevated ramp structure)	9.0 Route Km & 2 Nos. Elv. Stns.
11	Design and Construction of twin Tunnels	Rajiv Chowk to Kherki Daula Toll and Manesar to Ravine Area	15 Route km & 3 Nos. UG Stn.
12	Other Packages	As and when required	

# Expected Future Procurement Opportunities – Other Infrastructural Works (Delhi – SNB Corridor)

SN	Type of Work	Location	Scope of Work
1	Signalling, Train Control Systems, Telecommunication system, Platform Screen Doors	DLI-SNB	Entire 107 Route km
2	Solar	DLI-SNB	RESCO Model
3	Staff quarters and others	Dharuhera	For entire corridor
4	Automatic Fare Collection	DLI-SNB	For all 15 Stns. (PPP mode)
5	Financial Institution (FI) for issuance of Open Loop National Common Mobility Card (NCCM)	DLI-SNB	RESCO
6	RRTS Trainsets (Rolling Stock Systems)	DLI-SNB	For entire corridor
7	Catenary Maintenance Vehicle and Engineering Maintenance Vehicle	DLI-SNB	
8	Electrical Work on Viaduct & Tunnel (from Sarai Kale Khan to Kherki Daula)	DLI-SNB	
9	Electrical Work on Viaduct & Tunnel (from Kherki Daula to SNB [including Depot])	DLI-SNB	
10	Other Packages	As and when required	

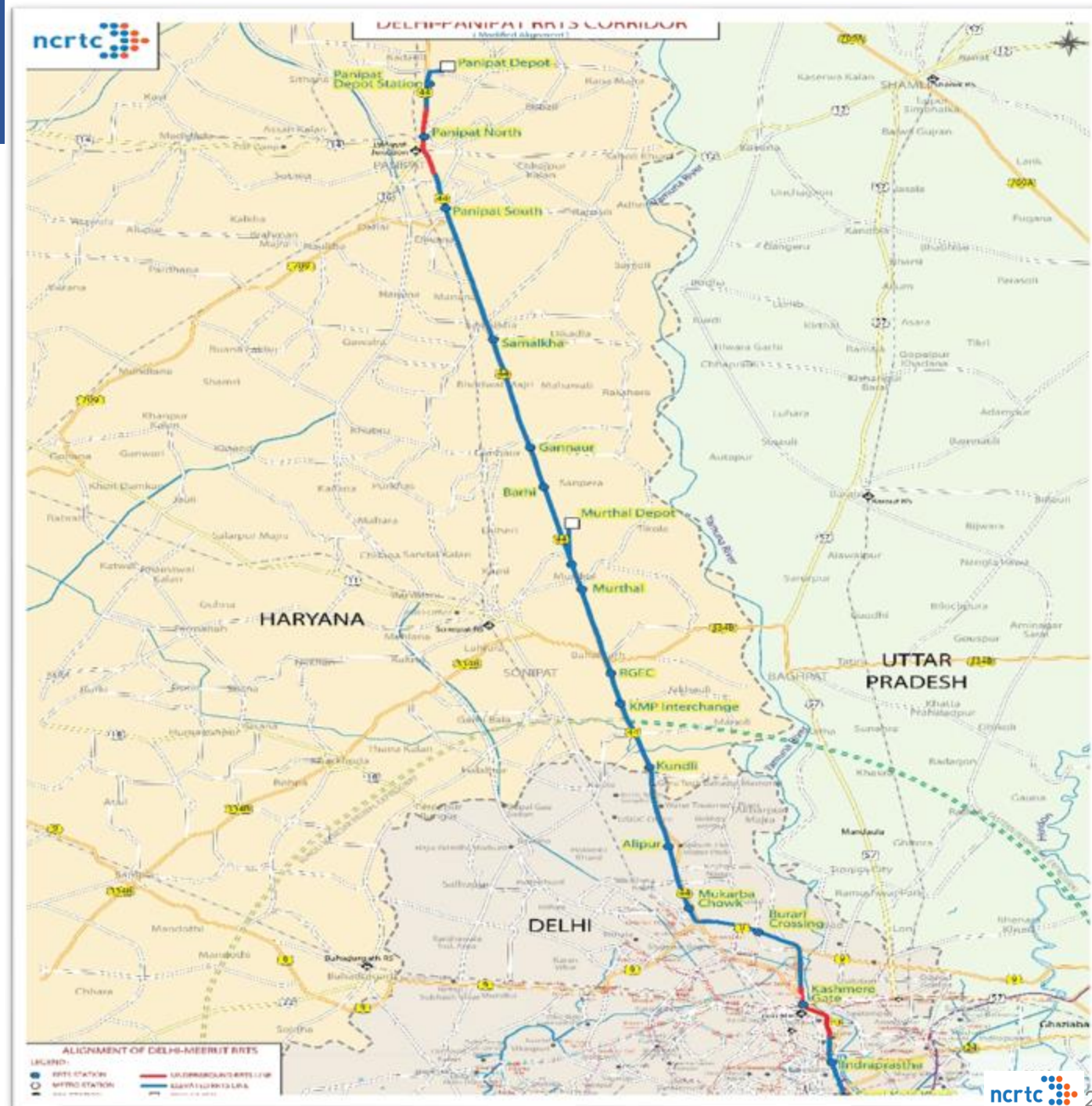


# Delhi – Panipat RRTS Corridor

## Alignment details

<b>Total Length (km)</b>	<b>103.02</b>
<b><i>Elevated (km)</i></b>	<b><i>91.54</i></b>
In Delhi	29.7
In Haryana	61.84
<b><i>Underground (km)</i></b>	<b><i>11.48</i></b>
<i>In Delhi</i>	6.5
<i>In Haryana</i>	4.98
<b>Estimated travel time</b>	<b>~ 72 min</b>
<b>No. of total stations</b>	<b>17</b>
<i>In Delhi (U/G:1)</i>	29.7
<i>In Haryana (U/G:1)</i>	61.84

\*Delhi = 36.20 km, Haryana = 66.82 km



# Stations on Delhi – Panipat Corridor

S. No.	Station Name	State	Inter Station Distance (Km)	Cumulative distance (in km)
1	Sarai kale khan	Delhi	0.48	0
2	Indraprastha	Delhi	3.82	4.3
3	Kashmiri Gate	Delhi	6.14	9.96
4	Burari Crossing	Delhi	8.51	14.65
5	Mukarba chowk	Delhi	5.36	13.87
6	Alipur	Delhi	6.64	12
7	Kundli	Haryana	7.13	13.77
8	KMP	Haryana	6.72	13.85
9	R G E C	Haryana	3.24	9.96
10	Murthal	Haryana	7.86	11.1
11	Murthal Depot	Haryana	3.23	11.09
12	Barhi	Haryana	5.87	9.1
13	Gannaur	Haryana	4.56	10.43
14	Samalkha	Haryana	10.66	15.22
15	Panipat-south	Haryana	12.37	23.03
16	Panipat-North	Haryana	6.83	19.2
17	Panipat Depot	Haryana	3.84	10.67

15 Elevated Station    2 Underground Station

# Delhi – Panipat : Current Status

- In-principal approval of DPR given by State Governments of NCT of Delhi and Government of Haryana
- Under consideration by Govt. of India

## DPR Capital Cost – INR 32,052 Cr

Description	Total Cost
Land	2,174
Civil works, Alignment and formation (excl. Stations & Depot)	9,858
Station Building	1,805
E&M Works	552
Depot-cum-Workshop	856
Permanent Way	2,082
Detailed Design and Proof check charges	-
Traction & Power Supply	2,175
Signalling and Telecom. (incl. Depot lines)	1,951
Automatic fare collection	10
Misc. Works	1,602
Rolling Stock	3,307
Miscellaneous Items	181
General Charge incl. General consultancy charges, administrative charges	1,221
Contingency Charges	833
Interest During Construction	3,443
<b>Total Project Cost (INR in Cr)</b>	<b>32,052</b>

# NCRTC supporting other organisations in the urban transport sector

1 Bid documents of O&M for private sector participation

2 Bid document for procurement of Rolling stock and its long-term comprehensive maintenance

3 SPEED (NCRTC In-House real time online monitoring tool)

4 SPEED & GATI (GPS based Attendance Information) App

In house technical, legal and financial expertise to assist in preparation of Bidding Document for the urban transport sector

Implemented at Bangalore Metro Rail Corporation (BMRC)

Implemented at Haryana Rail Infrastructure Development Corporation (HRIDC)



गति से प्रगति

Thank You



*NCR Transport Corporation, Gatishakti Bhawan, New Delhi 110023*

*Website [ncrtc.in](http://ncrtc.in)*

# Framework for implementation of DLI-SNB RRTS Corridor

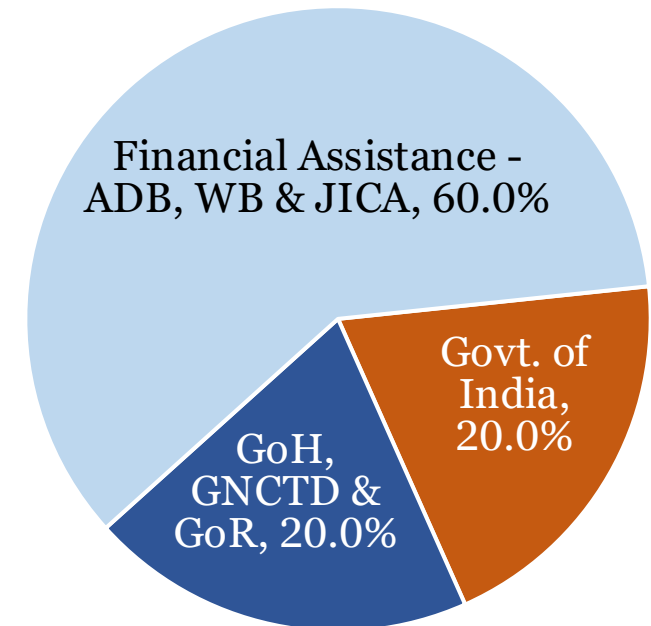
In 2018, BOD of NCRTC having representation of **four NCR states & GoI** approved the DPR of Delhi-SNB RRTS Corridor

Department of Economic Affairs, Ministry of Finance has posed the project for the external funding of **Delhi-SNB RRTS Corridor from ADB** (30th July 2021), **World Bank** (2nd July 2021) **and JICA** (24th May 2021) as funding agencies.

DPR of Delhi-SNB RRTS Corridor is under active consideration of Govt. of India for approval and sanction of the project is awaited

Pre-construction activities have commenced from **March 2018**.

## Financing plan





# Progress: Pre-construction activities/enabling works



**Geotechnical Investigation**

**Shifting of EHT Transmission Electrical Lines 400 kv at Panchgaon**



**Laying of 11 kv U/G Cable at Manesar**



**Sewer Line shifting**



**Road Widening**



# Some RRTS nodes identified for LVC – Delhi-Meerut Corridor

Location	Product mix	Approx. area to be developed
<b>Jangpura</b>	• Commercial Towers above Stabling Yard	<i>≈4 - 5 lakh sqm BUA</i>
	• Residential Development	
	• Mixed Use Development	
<b>Sarai Kale Khan</b>	• Offices / co-working, Food Court, Budget Hotel	<i>~50,000 sqm of BUA above elevated RRTS structures</i>
<b>Anand Vihar</b>	• Retail, Offices	<i>~50,000 sqm of BUA above UG RRTS Station</i>
<b>Ghaziabad</b>	• Retail, Offices, Entertainment, Food Court, Service Apartments	<i>total BUA development of ~50,000 sqm</i>
<b>Duhai Depot</b>	• Big Box Retail , Sports and Entertainment Zone (temporary), Integrated Townships (long term), warehouses, etc.	<i>~75 acres land available for integrated development</i>
<b>Bhaisali</b>	• Retail, Office / Healthcare	<i>~20,000 sqm above UG MRTS Station</i>



- Structure shall be provided either by NCRTC and leased to private developers on long term lease for furnishing, renting out ( revenue sharing) and operations or the land will be leased to developer and he shall develop it and in lieu provide upfront premium plus annual lease to NCRTC as the case may be. In both the cases Built-up area will be returned to NCRTC after the lease period.



# Masterplanning for PD – Ghaziabad RRTS Station





# Masterplanning for PD – Duhai Depot





# *Proposals for PD – Anand Vihar*





# *Proposals for PD – Bhaisali*





# Broad system parameters

Parameter	RRTS
Design Speed	180 kmph
Operating Speed	160 kmph
Frequency	5-10 min(RRTS)
Inter-Station Distance	5 – 10 km
Services on Network	Inter-operable
Train Length	6/9 coach trains : infrastructure for 9 coach trains
Gauge	Standard Gauge
Rolling Stock	<ul style="list-style-type: none"><li>• 3.2 meters wide cars</li><li>• Transverse seating</li><li>• One business class coach in every train</li></ul>
Tunnels	Twin tunnels of Dia 6.5 m
Signalling	ETCS Level II Hybrid Level III with LTE communication backbone
PSD/PSG	At all stations
Track	Ballastless Track suitable for 180 kmph/220 kmph
Traction	1x25 KV AC Rigid OCS in tunnels
Bearings	Spherical or other suitable for the speed

# First-of-its-kind initiatives

## ***Signalling***

- Globally first time in RRTS - ETCS Level 2 Hybrid Level 3 over LTE backbone, integrated with Platform Screen Doors (PSD)
- PSD, previously imported, designed, manufactured & installed in India for 1<sup>st</sup> time obviating need for import

## ***Building Information Modeling - BIM***

- Comprehensive bottom-up BIM implementation, only major project in India – helped in collaboration among designers, consultants and implementors

## ***Track***

- Introduced ballast less precast slab-track technology through Indian contractors

## ***Integration of metro on RRTS infra***

- Metro services will run on RRTS infrastructure in Meerut - 1<sup>st</sup> such initiative in India
- Saving Rs. 6300 crore of public exchequer

## ***Digital Project & Asset Management***

- SPEED - In-House tool: Project monitoring app being used by BMRCL & HRIDC, enabled NCRTC to identify & mitigate risks to achieve project timelines
- Asset Management System (AMS): BIM and AMS will help not only in expeditious project implementation but in efficient maintenance of the entire system

## ***Rolling Stock***

- 1<sup>st</sup> in India certified for design/ operating speed of 180/160 kmph; 100% designed & manufactured in India

## First of its kind in India with design speed of 180 kmph

### Track structure

- Pre-cast slab track
- Low maintenance
- Integrated Track Monitoring System
- **PORR (Austria)**

### Traction

- Flexible overhead catenary for elevated
- Rigid overhead catenary for underground (tunnel)
- **FURRER+FREY, SYSTRA**

### Signalling

- ETCS II on LTE Backbone with ATO and PSD integration
- **ALSTOM** – implementation partner; **NOKIA** - LTE
- **TRANSURB** – Consultant

### Rolling stock

- Design speed - 180 kmph
- Regenerative braking
- **ALSTOM** – supply + 15 year maintenance

# RRTS – Other innovative initiatives

## Double tap AFC – Premium Class

- Premium Lounge access using a Double-Tap functionality
- **Consortium of Datamatics (India) AEP (Italy)**

## Integration of Metro & RRTS

- Two services to be operated on same infrastructure
- Significant CapEx savings

## Open Loop Payment

- National Common Mobility Card
- Integration with RRTS + Metro + Bus + Feeder
- Similar to London's Oyster or Tokyo's Suica
- Other payment modes: Paper QR + Digital QR + EMV Contactless Cards

## Platform Screen Doors

- Installation of Platform Screen Doors on all RRTS stations
- Integration with ETCS Level 2 Signalling System
- Enhanced passenger safety at stations