

# ACCESSIBILITY BENCHMARKING FOR METRO SYSTEMS IN INDIA



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India Smart Cities Fellowship, 2019



# Introduction



Year	*Total	Private Cars	Two wheelers
1980-81	3.2L	99,200	1.76L
1986-87	5.1L	1.58L	2.8L
1990-91	5.8L	1.8L	3.2L
1996-97	7.6L	2.3L	4.18L
2000-01	<b>10.29L</b> <b>&gt; First Million</b>	3.65L	5.5L
2006-07	15.03L	4.64L	7.93L
2007-08	16.04L	4.92L	8.59L
2008-09	16.74L	5.03L	9.18L
2009-10	17.67L	5.14L	9.8L
2010-11	18.70L	5.5L	10.44L
2011-12	<b>20.28L</b> <b>&gt; Second Million</b>	6.21L	11.31L
2012-13	21.87L	6.72L	12.35L
2013-14	23.32L	7.23L	13.29L
2014-15	25.71L	7.97L	14.7L
2015-16	28.19L	8.5L	15.96L
2016-17	<b>30.69L</b> <b>&gt; Third Million</b>	9.2L	17.72L
Apr-Nov	32L	9.6L	8.7L



➤ In 2016-17, vehicle registration touched 685 vehicles daily. Sources said that till Oct-Nov 2017, the number of vehicles hitting city roads daily was close to 700. This includes all vehicles including private cars, two-wheelers, app-based taxis, buses, school buses and trucks

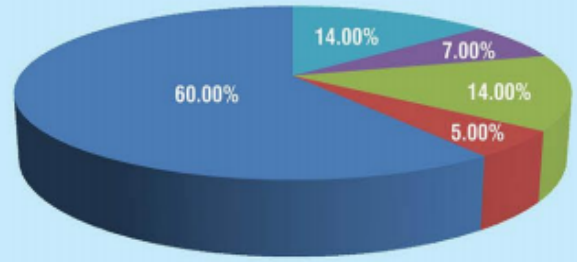
To ease the traffic situation in urban areas and make travel convenient for the people, Government of India has introduced the Mass Rapid Transit System (MRTS) in many cities.





# Cost Estimation of Delhi Metro Rail

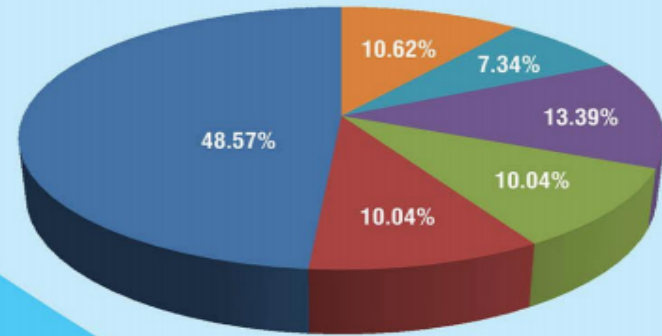
## COMPLETION COST OF PHASE – I: ₹ 10,571 Crores



### FUNDING PLAN

**60.00%** JICA LOAN  
**5.00%** Interest free Subordinate debt towards Land Cost  
**14.00%** GOI Equity  
**7.00%** Property Development  
**14.00%** GNCTD Equity

## ESTIMATED COST OF PHASE – III: ₹ 41,079 Crores

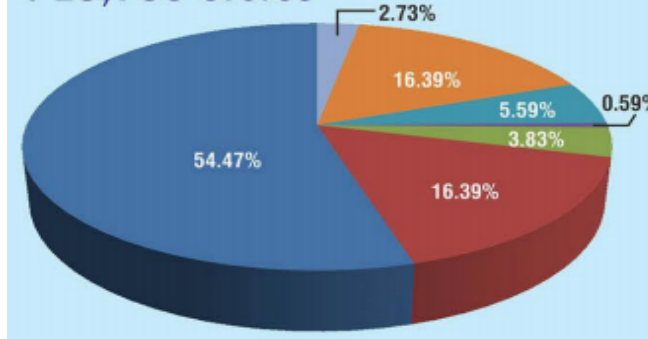


### FUNDING PLAN

**48.57%** JICA LOAN  
**10.04%** GNCTD Equity  
**10.04%** GOI Equity  
**13.39%** Land & Central Tax  
**7.34%** Property Development by DMRC  
**10.62%** Grant

Transit System	Metro Rail	BRTS	Road
Cost/Km	277cr	4 -8 cr	1.5-2cr

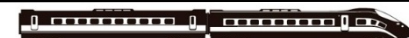
## COMPLETION COST OF PHASE – II: ₹ 18,783 Crores



### FUNDING PLAN

**54.47%** JICA Loan (PTA by GOI)  
**16.39%** GOI Equity  
**3.83%** Interest free Subordinate debt for Land  
**0.59%** Grant by HUDA  
**5.59%** DMRC Internal Accruals/Property Development  
**16.39%** GNCTD Equity  
**2.73%** Interest free Subordinate debt for Central Taxes

S.No.	Description	Amount (Rs.In Crores)		
		Corridor 1	Corridor II	Total
1.	Land	81.98	61.39	143.37
2.	Civil Engineering Works			
2.1	Alignment and formation			
2.1.1	Elevated	419.20	213.28	632.48
2.1.2	Utilities (Civil work) Environmental Protection, Rehabilitation & resettlement	20.00	40.00	60.00
2.2	Station Buildings (elevated and at-grade).	275.00	154.00	429.00
2.3	Permanent Way	124.92	69.15	194.07
	<b>Sub Total (Item 2)</b>			<b>1315.55</b>
3.	Electrical works			
3.1	Traction & Power Supply	212.48	134.55	347.03
	<b>Sub Total (Item 3)</b>			<b>347.03</b>
4.	S & T Works			
4.1	Signaling & Telecommunication including cable diversions	153.58	77.32	230.90
4.2	Telecommunication	39.45	18.81	58.06
4.3	AFC installations at stations	42.87	21.26	64.13
	<b>Sub Total (item 4)</b>			<b>353.09</b>
5.	Depots	76.70	51.69	128.39
6.	Rolling stock (in 2007)	502.83	176.67	679.50
7.	<b>GRAND TOTAL (Item 1 to 6)</b>			<b>2966.93</b>
8.	General charges @ 8% inclusive of contingency @ 3%			237.35
	<b>Grand total:</b>			<b>3204.28</b>
				<b>Rs. 3205 Crores</b>

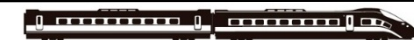


CITY	Population	Metro Name	Estimated Ridership	RIDERSHIP (Daily Average)	Percentage	Modal Share
Delhi NCR	29,399,141	Delhi		250000		
		RMG				
		NM				
Kochi	6,77,381	Kochi Metro		50,000		
Hyderabad	9,700,000	Hyderabad	3.32 Lakhs	200000		
Kolkata	4,496,694	Kolkata	8 Lakhs	700,000		
Bengaluru	8.5 million	Namma Bengaluru	4.49 Lakhs	400,000		
Mumbai	12,442,373	Mumbai	10.5 lakhs	277,000		
Jaipur	3,046,189	Jaipur	2 Lakhs	17,649		
Chennai	7,088,000	Chennai	4.4 Lakhs	50,000		
Lucknow	2,817,105	Lucknow	1.30 Lakhs	67,000		
Ahmedbad	5,633,927	Ahmedabad		35,000		
Nagpur	2,405,665	Nagpur		NA		

# Need for Study

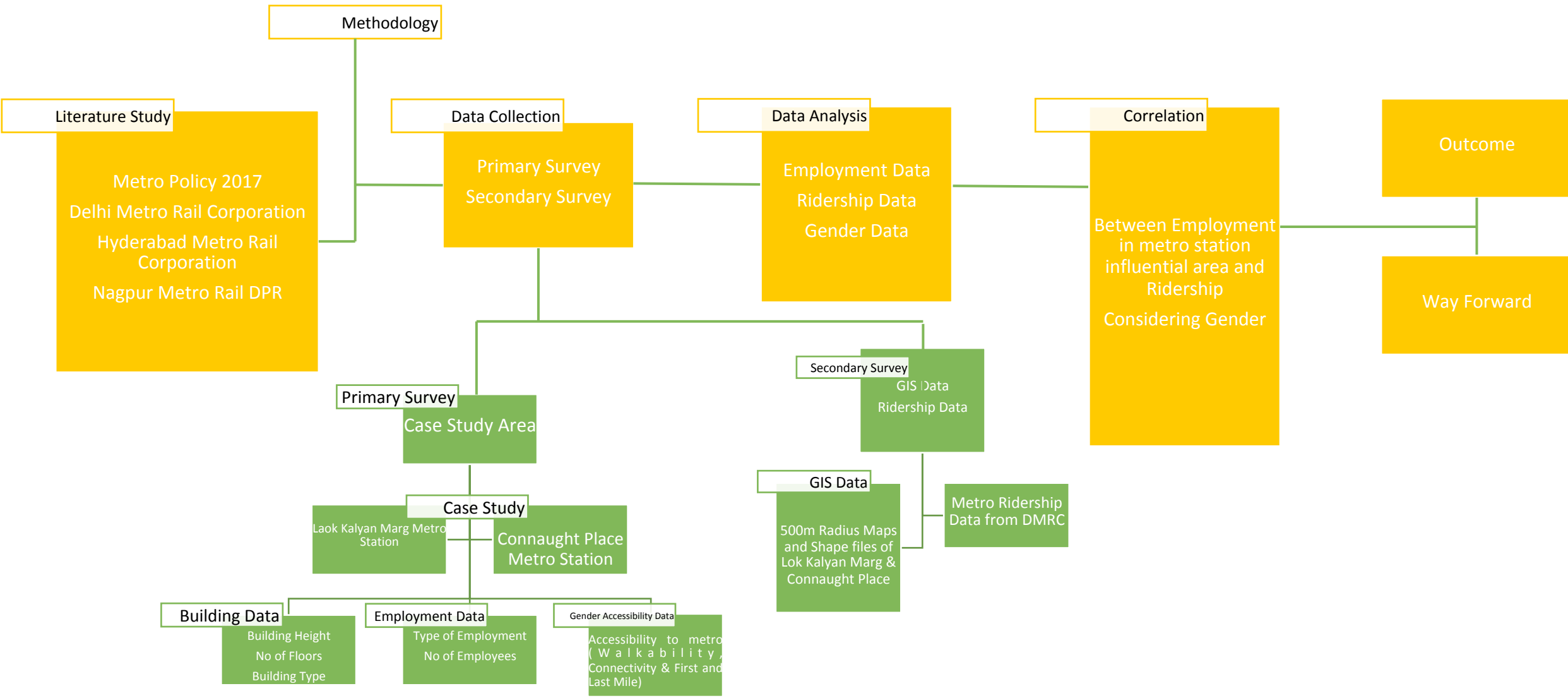
While State and Central governments tout **metro rail systems as a one-size-fits-all solution** to traffic congestion and environmental problems of Indian cities,

the **ground reality is incongruous** with the so far generated returns by metro systems in India which can be attributed to the shortfall of expected ridership capacity.





# Methodology and Approach





## 500m Radius Area – Lok Kalyan Marg Metro Station

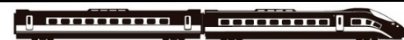
Avg. footfall: 9, 914  
Commercial Space: 4%  
Residential Space: 93%  
Public Space:





# 500m Radius Area – Rajiv Chowk Metro Station

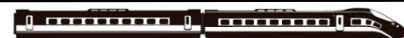
Avg. footfall: 1,14,080  
Commercial Space : 90%  
Residential Space: 2%  
Public Spaces : 5%





# Analysis

Zone	Building Type	Building Name	Number of Buildings	Job Types	Number of Jobs
1	Commercial	NDMC Tees January Market	1	Vendors	
		Claridges Hotel	1	Employees	
	Residential	Private Houses with Servant Quarters	22	Gaurds	
		Private Houses with Servant Quarters		Drivers	
		Private Houses with Servant Quarters		Servants	
Amenities	Gandhi Smriti	1	Employees		
2	Residential	Private Houses with Servant Quarters	23	Gaurds	
		Private Houses with Servant Quarters		Drivers	
		Private Houses with Servant Quarters		Servants	
		Private Houses with Servant Quarters		Drivers	
	Government Residential	Doctor's Quarters NDMC	18	Servants	
		Staff Quarters NDMC	15	Servants	
	Amenities	NDMC Homeopathic Dispensary	1	Doctors	
		NDMC Homeopathic Dispensary		Workers	
		Dhobhi Ghat	1	Workers	
		NDMC Primary School	1	Teachers	
		NDMC Primary School		Workers	
Electric Sub Station	1	Operators			
3	Commercial	Indira Gandhi National Museum	1	Workers	
	Residential	Private Houses with Servant Quarters	23	Gaurds	
				Drivers	
				Servants	
	Government Residential	Staff Quarters NDMC	33	Servants	
		CPWD Quarters NDMC	33	Servants	
		PMO Staff Quarters	20	Servants	
Amenities	Tuglaq Road Police Station	1	Police Staff		
4	Residential	Private Houses with Servant Quarters	27	Gaurds	
				Drivers	
				Servants	
	NDMC Residential	Staff Quarters NDMC	18	Servants	
	Amenities	NDMC Homeopathic Dispensary	1	Doctors	
		NDMC Homeopathic Dispensary		Workers	
		NDMC Primary School	1	Teachers	
NDMC Primary School		Workers			





# Gendered access to Metro

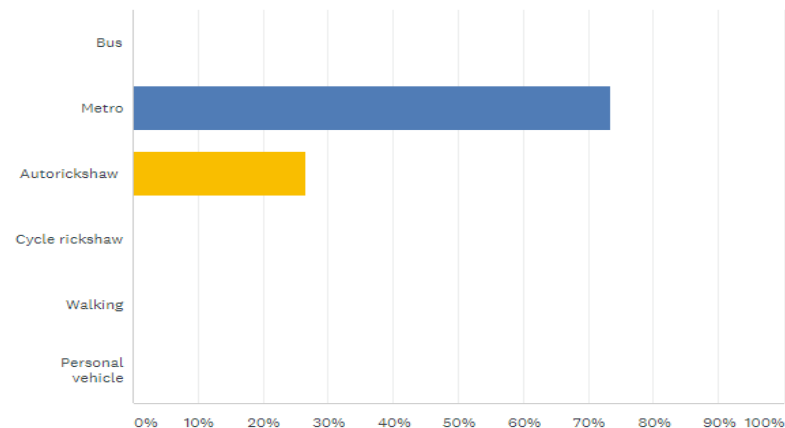
“The differences in travel behaviour by gender are mostly due to the **complexity of activities more often experienced by women** than men...although travel behaviour may be changing for both men and women, **the gender gap in public transport is still significant and requires greater understanding for more equitable policy implementations**” – Wei-Shiuen Ng and Ashley Acker, International Transport Forum (France )

They are safe and affordable but particular areas are not great to walk. Also too many modes makes you take auto or uber instead

Pretty safe

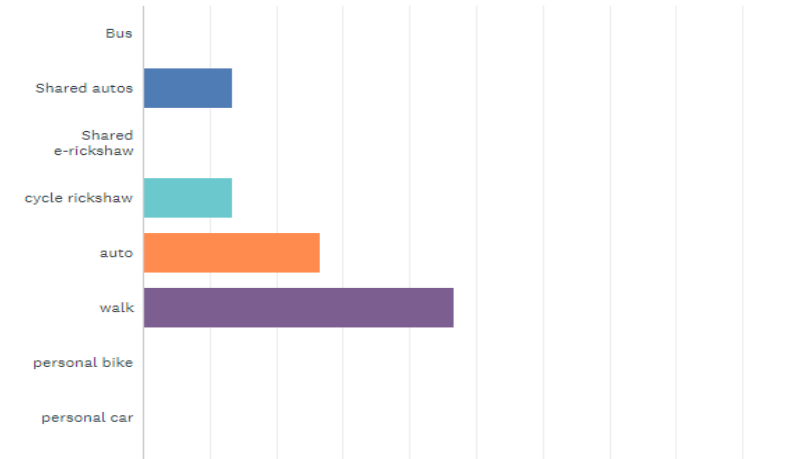
Preferred mode of transport to and from work

Answered: 15 Skipped: 1



If a user of the metro, how do you reach your workplace from the nearest metro station?

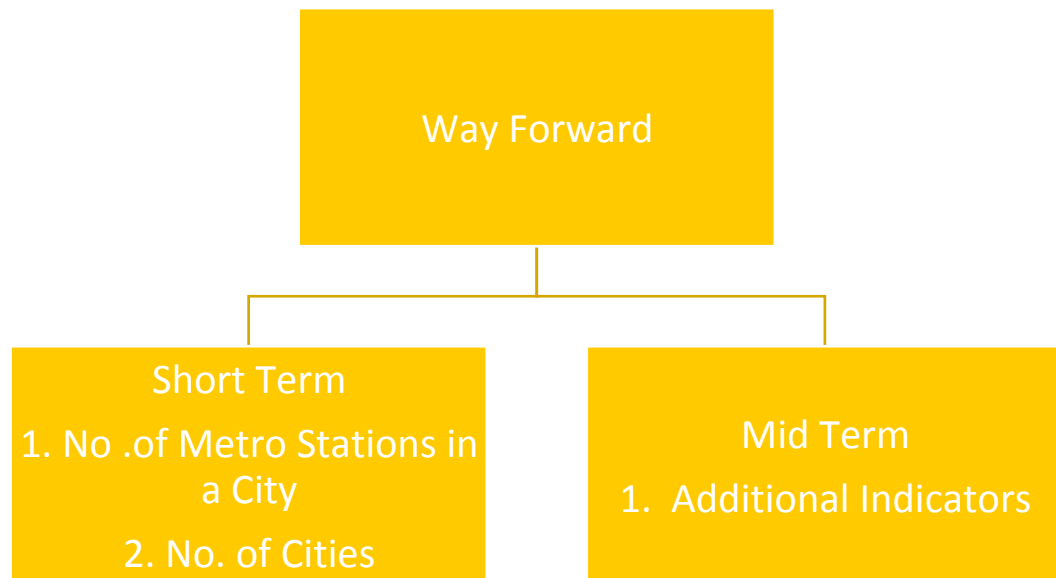
Answered: 15 Skipped: 1



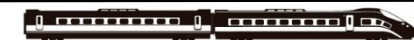
The safety depends on time. When I have taken the same metro at night around 11:30 pm, and walked home, the very familiar street during the day suddenly became terrifying. While it is walkable during the day when people are around, I don't think I'll be again walking the same street late at night, and would prefer to take a cab or auto.



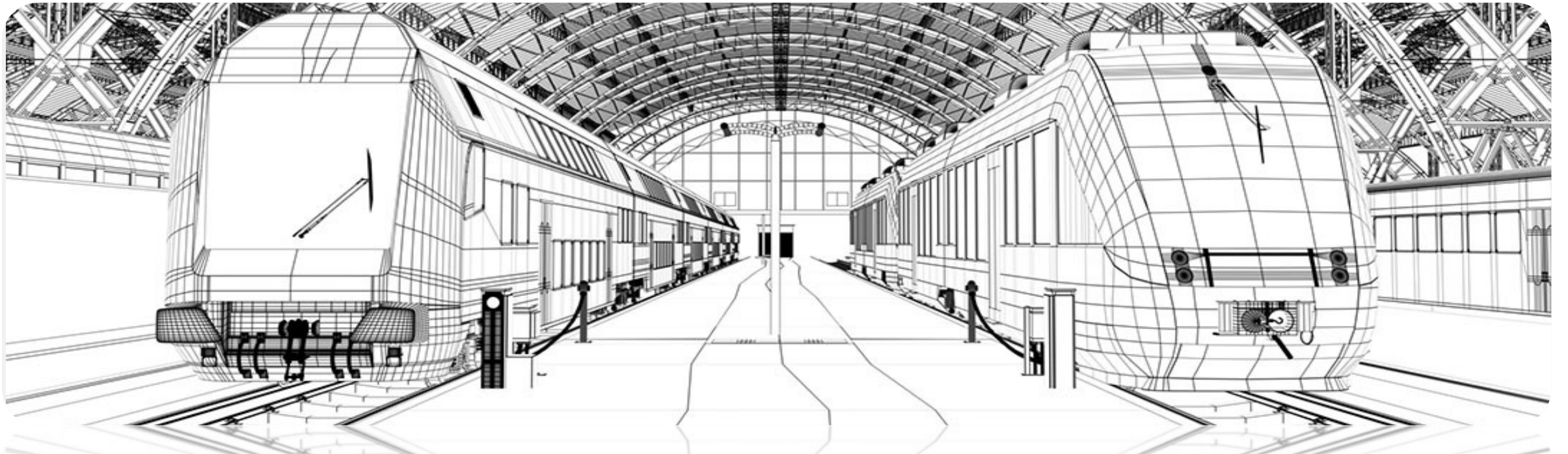
# Way Forward



<b>1.</b>	<b>Infrastructure/Transport</b>	
a.	Station's Peak Hour Boarding/ Alighting (Persons/ Hr)	
<b>2.</b>	<b>MOTORIZED ACCESSIBILITY</b>	
a.	Availability of Intermediate Para Transit/ Shared auto	Primary Survey/ Observatory analysis
b.	Availability of feeder network	Primary Survey/ Observatory analysis
c.	Cost/ Km of access modes	Primary Survey/ Observatory analysis
d.	Availability of Park & Ride facility for private vehicles (Area in Square meters)	Primary Survey/ Observatory analysis
<b>3.</b>	<b>NON-MOTORIZED ACCESSIBILITY</b>	
	Availability of walk able footpaths	Primary Survey/ Observatory analysis
	Availability of cycle tracks	Primary Survey/ Observatory analysis







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Thank You

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