Service Level Benchmarks for Urban Transport at a Glance

1. Public Transport facilities

Level of Service	1. Presence of Organized Public Transport System in Urban Area (%)	2. Extent of Supply Availability of Public Transport	3. Service Coverage of Public Transport in the city	4. Average waiting time for Public Transport users (mins)	5. Level of Comfort in Public Transport	6. % of Fleet as per Urban Bus Specification
1	>= 60	>= 0.6	>= 1	<=4	<= 1.5	75 - 100
2	40- 60	0.4 - 0.6	0.7- 1	4 – 6	1.5 – 2.0	50 - 75
3	20 - 40	0.2 - 0.4	0.3 - 0.7	6 – 10	2.0 – 2.5	25 - 50
4	< 20	< 0.2	< 0.3	> 10	>2.5	<= 25

Overall Level of Service of Public Transport facilities City wide

Calculated LoS = (LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5 + LoS_6) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**< 12**	The City has a good public transport system which is wide spread and easily available to the citizens. The system provided is comfortable.
2	**12 - 16**	The City has public transport system which may need considerable improvements in terms of supply of buses/ coaches and coverage as many parts of the city are not served by it. The frequency of the services available may need improvements. The system provided is comfortable.
3	**17 - 20**	The City has a public transport system which may need considerable improvements in terms of supply of buses / coaches and coverage as most parts of the city are not served by it. The frequency of the services available needs improvements. The system provided is not comfortable as there is considerable over loading.
4	**21-24**	The city has very poor/no organized public transport system

2. Pedestrian Infrastructure facilities

Level of Service	1) Signalized intersection delay (%)	2) Street Lighting (Lux)	3) % of City Covered
1	< 25	>= 8	>= 75
2	25 - 50	6 - 8	50 - 75
3	50 - 75	4 - 6	25 - 50
4	>= 75	< 4	< 25

Overall Level of Service of Pedestrian Infrastructure Facilities City wide

Calculated LoS = (LoS_1 + LoS_2 + LoS_3) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**3 – 5**	The City has adequate barrier free pedestrian facilities along overall road network.
2	**6 - 8**	The City has pedestrian facilities which may need some improvements in terms of improvements in intersections, footpaths, and street lighting as some parts of the city are not served by it. The footpath available needs improvements. The system provided is otherwise comfortable and sustainable
3	**9-10**	The City has pedestrian facilities which may need considerable improvements. The pedestrian facilities at intersections, availability of footpath etc needs improvements as also many parts of the city are not served by it.
4	**11 - 12**	The city lacks adequate pedestrian facilities

3. Non Motorized Transport (NMT) facilities

Level of Service	1. % of network covered	2. Encroachment on NMT roads by Vehicle Parking (%)	3. NMT Parking facilities at Interchanges (%)
1	>=50	<= 10	>=75
2	50 - 25	10 - 20	50 - 75
3	25- 15	20 - 30	25- 50
4	< 15	> 30	< 25

Overall Level of Service (LoS) of Non Motorized Transport facilities (NMT) City-wide

Calculated LoS = (LoS_1 + LoS_2 + LoS_3) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**3-5**	The City has adequate NMT facilities along overall road network.
2	**6 – 8**	The City has NMT facilities which may need some improvements in terms of encroachments, parking facilities at interchanges etc as some parts of the city are not served by it. The system provided is otherwise comfortable and sustainable
3	**9-10**	The City has NMT facilities which may need considerable improvements as many parts of the city are not served by it.
4	**11 – 12**	The city lacks adequate NMT facilities

4. Level of Usage of Intelligent Transport System (ITS) facilities

Level of Service	1. Availability of Traffic Surveillance (%)	2. Passenger Information System (PIS) (in %)	3. Global Positioning System (GPS)/ General Packet Radio Service (GPRS) (%)	4. Signal Synchronization (%)	5. Integrated Ticketing System (%)
1	>=75	> =75	> =75	> =75	>= 75
2	50 - 75	50 - 75	50 - 75	50 - 75	50 - 75
3	25 - 50	25 - 50	25 - 50	25 - 50	25 - 50
4	< 25	< 25	< 25	< 25	< 25

Overall Level of Service (LoS) of usage of Intelligent Transport System (ITS) City-wide

The calculated LoS = (LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**5 - 7**	The city has adequate ITS facilities
2	**8 - 10**	The city has ITS facilities which may need some improvements in terms of Integrated Ticketing System, Signal Synchronization, GPS/GPRS, PIS etc as some parts of the city are nor served by it.
3	**11 - 15**	The city has bare minimum ITS facilities and may need considerable improvements terms of Integrated Ticketing System, Signal Synchronization, GPS/GPRS, PIS etc as many parts of the city are nor served by it.
4	**16 - 20**	The city lacks adequate ITS facilities

5. Travel speed (Motorized and Mass transit) along major corridors

Level of Service	1. Average Travel speed of Personal vehicles (KMPH)	2. Average Travel speed of Public Transport (KMPH)
1	>= 30	>= 20
2	25 – 30	15 -20
3	15 - 25	10 – 15
4	< 15	< 10

Overall Level of Service of Travel Speed along major corridors City wide

Calculated LoS = (LoS_1 + LoS_2) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**2**	Primarily free flow- movement at average travel speeds usually about 70% of the free flow speed for the key corridors.
2	**3 -4**	Small increase in traffic causing substantial increase in approach delay and hence, decrease in arterial speed.
3	**5 -6**	Significant approach delays and average travel speed of 1/3 the free flow speed or lower. Such conditions causinga combination of one or more reasons such as high signal density, extensive queuing at critical intersections and inappropriate signal timing.
4	**7 -8**	Key corridors at extremely low speeds below 1/3 to 1/4 of the free flow speed. Intersection congestion is likely at critical signalized locations, with high approach delays.

6. Availability of Parking Spaces

Level of Service	1. Availability of on street paid public parking spaces (%)	2. Ratio of Maximum and Minimum Parking Fee in the City
1	>= 75	> 4
2	50 - 75	2 - 4
3	25 - 50	1 - 2
4	< 25	1

Overall Level of Service (LoS) for Availability of Parking Space City-wide

Calculated LoS = (LoS_1 + LoS_2) and identify overall LoS as mentioned below.

Overall LoS	Calculated LoS	Comments
1	**2**	Paid parking spaces are available in the city and the demand is well managed by incorporating differential parking rates for the CBD.
2	**3 - 4**	Paid parking spaces are available in the city and the demand is well managed by incorporating differential parking rates for the CBD. However some improvements may be required
3	**5 - 6**	Paid parking spaces provided in the city need to be improved upon and to cater to the demand some differential parking rates for the CBD have been adopted. The city authorities need to imitative considerable improvements measures.
4	**7 - 8**	The city authorities need to initiate immediate actions with respect to providing paid parking spaces and demand management for parking.

7. Road Safety

Level of Service	1. Fatality rate per lakh population	2. Fatality rate for pedestrian and NMT (%)
1	<= 2 persons	<= 20
2	2 - 4 persons	20 - 40
3	4 - 6 persons	40 - 60
4	> 6 persons	> 60

Overall Level of Service (LoS) for Road Safety City-wide

Calculated LoS = (LoS_1 + LoS_2) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**2**	Level of Fatality rate in a city is very low.
2	**3 - 4**	Need some improvements in road design and available road infrastructure, traffic management and in other such reasons which significantly contribute to road safety.
3	**5 - 6**	Need considerable improvements in road design and available road infrastructure, traffic management and in other such reasons which significantly contribute to road safety.
4	**7 - 8**	Level of Fatality rate in a city is very high.

8. Pollution levels

Level of service*	SO_2	Oxides of Nitrogen	SPM	RSPM (Size less than 10 microns)
1 (Low)	0 - 40	0 – 40	0 - 180	0 - 40
2 (Moderate)	40 - 80	40 – 80	180 - 360	40 - 80
3 (High)	80 - 120	80 – 120	360 - 540	80 - 120
4 (Critical)	> 120	> 120	> 540	> 120

*** As per CPCB guidelines**

Overall Level of Service (LoS) for Pollution level City-wide

Calculated LoS = (LoS_1 + LoS_2 + LoS_3 + LoS_4) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS	Comments
1	**< = 5**	Level of pollution in a city is very low.
2	**6 - 9**	Need some improvements in emission standards, checking pollution etc.
3	**10 - 13**	Need considerable improvements in emission standards, checking pollution etc.
4	**14 - 16**	Level of pollution in a city is very high.

9. Integrated Land Use Transport System

Level of Service	1. Population Density - Gross (Persons/Developed area in hectare)	2. Mixed Land-use on Major Transit Corridors / Network (% area under non residential use)	3. Intensity of Development - City wide (FSI)	4. Intensity of development along transit corridor (FSI transit corridor/ FSI)	5. Clear Pattern and Completeness of the network	6. % of area under Roads	7. %age network having exclusive ROW for Transit network
1	> =175	> = 30	> = 2	> = 3	Clear pattern (ring-radial or grid-iron) and complete network	> = 15	>=30
2	150-175	15-30	1.5-2.0	2-3	Some what clear pattern (ring-radial or grid-iron) but somewhat incomplete network	12 - 15	20-30
3	125-150	5-15	1.0 - 1.5	1.5-2	somewhat unclear pattern and incomplete network	10 -12	10-20
4	< 125	<5	<1	<1.5	no clear pattern incomplete / sparse network	< 10	<10

Overall Level of Service (LoS) for Integrated Land Use Transport system City-wide

For > =1 million population: Calculated LoS = (**$LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5 + LoS_6 + LoS_7$**) and identify overall LoS as mentioned below

For < 1 million population: Calculated LoS = (**$LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5 + LoS_6$**) and identify overall LoS as mentioned below

Overall LoS	Calculated LoS		Comments
	>= 1 million population	< 1 million population	
1	**<=8**	**<= 9**	City structure is appropriately planned in a manner which patronizes public transport.
2	**8 -15**	**9 - 14**	City structure is some what in coherence with the public transport system
3	**15 - 22**	**14 - 20**	Faint coherence between city structure and public transport system
4	**22- 28**	**20 - 24**	Inconsistency in the city structure and public transport system leading to lesser ridership and high dependence on personalized motor vehicles

10. Financial Sustainability of Public Transport by bus

Level of Service	1. Extent of Non fare Revenue (%)	2. Staff /bus ratio	3. Operating Ratio
1	> = 40	< = 5.5	<= 0.7
2	20 - 40	5.5 - 8.0	0.7 - 1
3	10- 20	8 - 10	1 - 1.5
4	< 10	> 10	> 1.5

The Overall LoS for Financial Sustainability of Public Transport by bus city wide		
Calculated LoS = (LoS_1 + LoS_2 + LoS_3) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	**< = 4**	The public transport of a city is financially sustainable.
2	**5 - 7**	The public transport of a city is financially sustainable but needs some improvements
3	**8- 9**	The public transport of a city is financially sustainable but needs considerable improvements
4	**10 - 12**	The public transport of a city is not financially sustainable.

Service level Benchmarks for Urban Transport

Background & Approach

1. Introduction

The challenges of the urban sector in India are growing rapidly, and government agencies at various levels are taking steps to address the gaps in service delivery. One of the important steps towards this is introduction of appropriate systems for information management, performance monitoring, and benchmarking.

Benchmarking is now well recognized as an important mechanism for introducing accountability in service delivery. It can help Urban Local Bodies (ULBs) and other agencies in identifying performance gaps and effecting improvements through the sharing of information and best practices, ultimately resulting in better services to the people. It provides

- Common minimum framework for monitoring and reporting on service level benchmarks.
- Guidelines on how to operationalize this framework in a phased manner.

Ministry of Urban Development (MoUD) wants to address institutional and operational aspects for ensuring long term sustainability of the benchmarking activity. Accordingly all JNNURM mission cities are advised to undertake the process of service level benchmarking. In addition, the initiative will facilitate development of Performance Improvement Plans using information generated by the benchmarking exercise. It will address both, performance monitoring for internal decision making and reporting to higher levels of government and external stakeholders.

2. Need

System for measuring performance of urban transport activities and taking further action on them has not been institutionalized in urban agencies. It is therefore important that the basic minimum standard set of performance benchmarks are commonly understood and used by all stakeholders. Depending on the specific needs of a city, performance parameters can be defined and used to improve the quality of urban transport.

Benchmarks	Rationale	Definition
List of service level Benchmark	Why is this benchmark important for urban transport	Objective and Mathematical Definition
Data Requirement	**Reliability of Measurement**	**Frequency of Measurement**
Data that is required to calculate the indicator	What is the reliability of data that should be targeted	How often should the each benchmark be measured
Level of detail	**Target**	**Action Plan**
What is the level of geographical detail to which the data should be available	What is the performance level that should be targeted	What is the Action plan to achieve the target

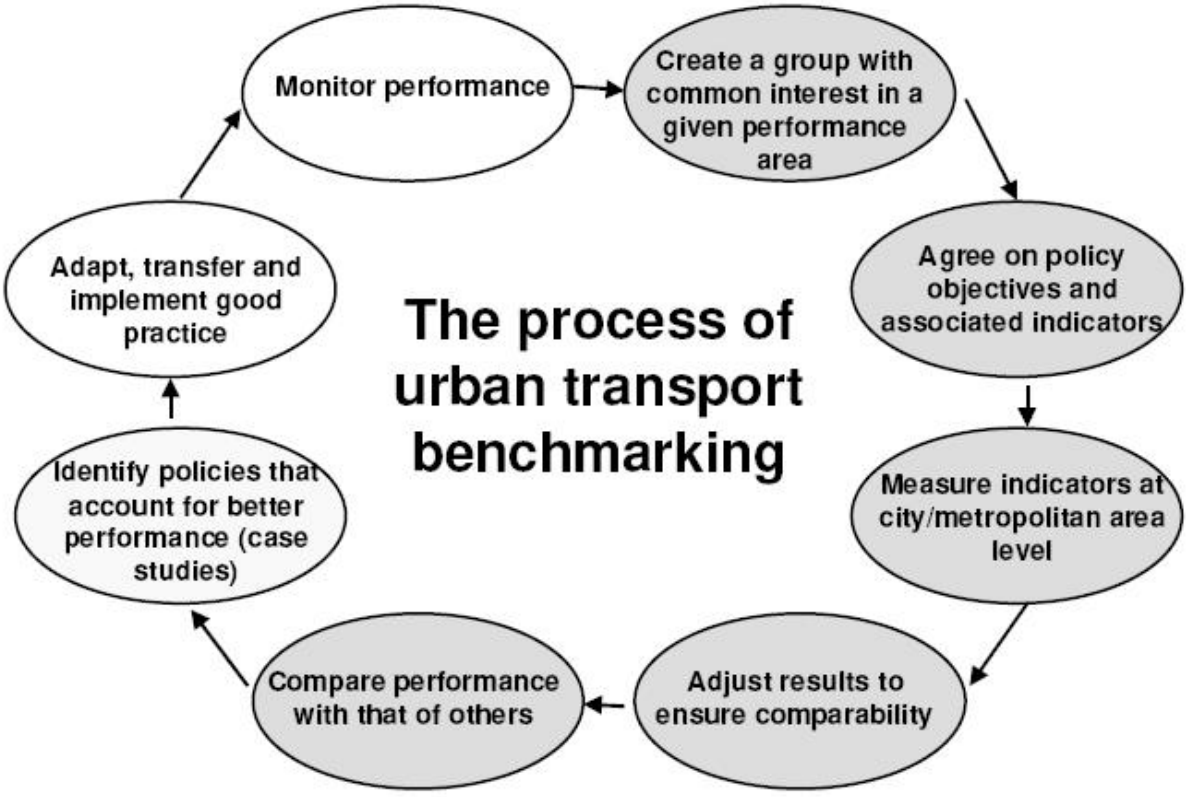
3. Objective and Approach

The following areas need to be focused for the assessment of overall level of service:

- Quality and financial sustainability of public transport
- Pedestrian / NMT safety and infrastructure facilities
- ITS facilities in a city
- Land use transport integration
- Parking system and pollution levels in a city

To facilitate comparison between cities and changes in performance over time, it is important that the performance levels are monitored against set benchmarks. It is in this context, that the MoUD has initiated an exercise to define Service Level Benchmarks (SLBs).

Benchmarking is a long term process which involves a number of successive steps as shown in the 'benchmarking wheel' below.



MoUD constituted a 'Core Group' comprising of experts from various institutions under chairmanship of Sh. S.K Lohia, the then Director (Urban Transport) and now OSD (MRTS) to arrive at the SLBs. Drawing on the experiences of various initiatives in measuring service level performance, the Core Group arrived at a set of performance benchmarks for urban transport. After much deliberation, the benchmarks, their definitions, means of measurement, frequency and reporting etc. were finalized.

The Handbook on Service Level Benchmarks is a ready reckoner of sorts to enable ULBs and other city level parastatal agencies implement systems for measuring, reporting and monitoring the SLBs.

4. Performance Benchmarks for Urban Transport

Service level performance benchmarks have been identified for the following areas of intervention:

a. Public transport facilities
b. Pedestrian infrastructure facilities
c. Non Motorized Transport (NMT)facilities
d. Level of usage of Intelligent Transport System (ITS) facilities
e. Travel speed (Motorized and Mass Transit) along major corridors
f. Availability of parking spaces
g. Road safety
h. Pollution levels
i. Integrated land use transport system
j. Financial sustainability of public transport

The parameters highlight the performance as would be monitored by the 'Urban Local Bodies' / 'Development Authority'/ Parastatal Agency. These performance measurements will need to be carried out by the service delivery agencies themselves, reported to higher levels of management and also disseminated widely. Clear definitions and methodologies are expected to eliminate bias in measurement and reporting.

Typically, four levels of service (LoS) have been specified, viz. '1', '2', '3', and '4' with '1' being highest LoS and '4' being lowest to measure each identified performance benchmark . Therefore, the goal is to attain the service level 1.

5. Role of Stakeholders

The role of different stakeholders and the next steps they will need to pursue are briefly mentioned below.

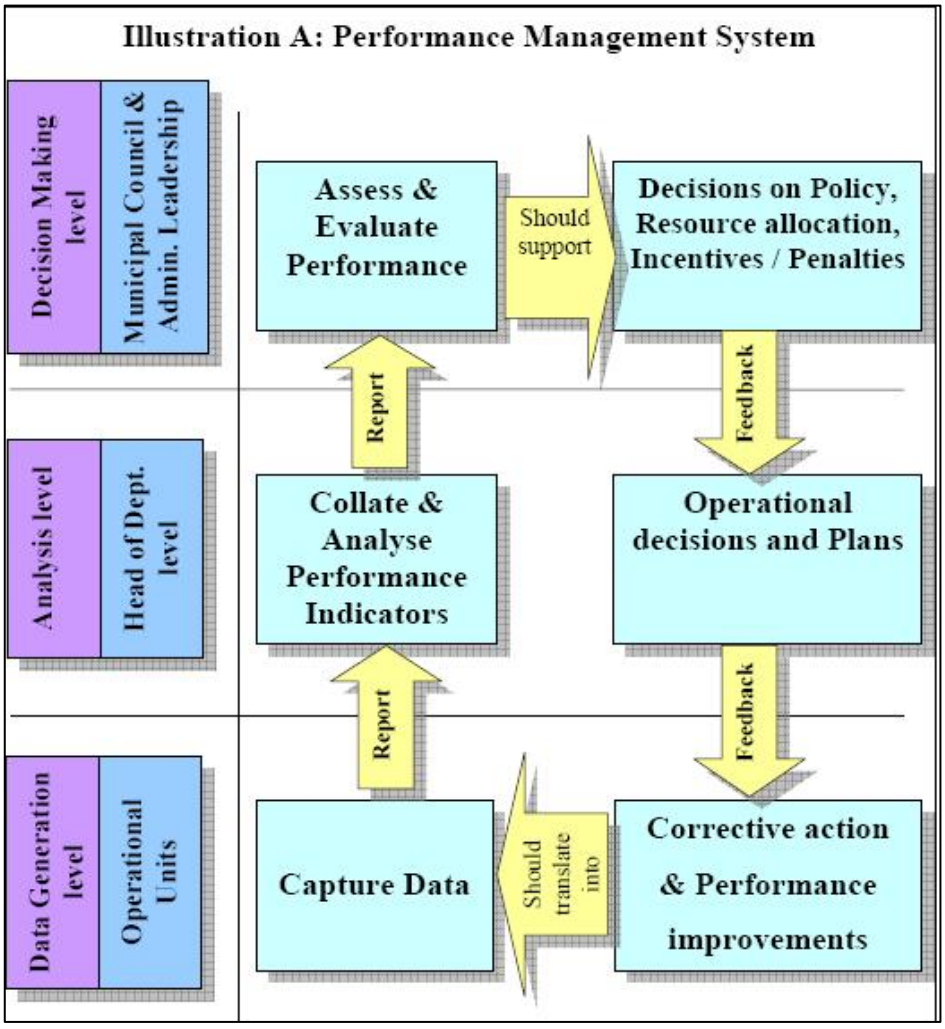
a) **Central Government:** The Ministry of Urban Development, Government of India will take the lead for disseminating these service level performance benchmarks. Further SLBs will also be institutionalized through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and other programmes of this Ministry through more ways than one, viz.
   - SLBs will be an integral part of City Development Planning processes including development of Comprehensive Mobility Plan, both for assessment of current situation, and for setting targets under their plans.
   - Where ever appropriate, SLBs will be dovetailed with the commitment on reforms, and subsequent process of appraisal of reforms
   - The relevant SLBs should be part of Detailed Project Reports for related projects in urban transport. The DPR should indicate both the current situation and what change the project will bring about to increase the level of service (LoS). Subsequent process of monitoring the implementation of the project will examine this change in LoS. .
   - Under the JNNURM or scheme for urban transport planning, support may be extended to enable ULBs to establish systems in their respective institutions for periodic measurement, reporting and analysis of SLBs.

b) **State Governments and its agencies:** State Governments and its nodal agencies in the urban sector have a critical role in driving performance of ULBs. State Government will need to periodically examine the SLBs as an input for its decisions related to policy, resource allocations, providing incentives and penalties, channelising technical and manpower support SLBs will also be an important input to State Finance Commissions in the course of their work.

c) **Urban Local Bodies / Parastatal agencies:** ULBs / parastatal agencies are the most important stakeholders for institutionalization of SLBs. As service delivery institutions, ULBs will find it useful to institutionalize systems for performance management using SLBs. Benchmarking with other cities within the State or with similar cities would facilitate a healthy competitive environment for continuous improvement. The Directorate of Local Bodies / Department of Municipal Administration will need to play a key role in this process through constant inter-city comparisons.

6. Performance Management System

The process of performance measurement has to be taken further into performance management system. Performance management data using SLBs should be included in the set of information disseminated under mandatory public disclosure, as required by the reforms mandate under JNNURM. The next key steps for ULBs are to generate performance reports on SLBs periodically beginning FY 09-10. Data can be captured either through previous studies or through specific surveys carried out at defined intervals. In parallel, the ULBs will also need to institutionalize systems for the entire cycle of performance management, as depicted in Illustration A. This would imply the following:



i. **Systems for Capturing Data:** Design and implement data collection systems for data to be captured. Such data will typically be from field level staff such as traffic engineers, planners, accounts clerks, etc. Simple data formats should be designed and provided to them to capture the data and report the same upwards within the organization for collation and determination of the service level performance.

ii. **Systems for collation and analysis of performance benchmarks:** Specific persons should be designated with the mandate to collate the data received from the field and generate the performance reports. Working directly under supervision and guidance from officers at the Head of Department level.

iii. **Systems for assessment and evaluation of performance:** In most cases, multiple indicators need to be examined to obtain a holistic picture of service levels in identified benchmarks. Performance benchmarks reported by department level should be closely examined at the management level of the ULB.

iv. **Systems for decision making:** All ULBs do have systems for decision making; however, many decisions end up being considered in the absence of quality data. To address such gaps, systems such as - periodically tabling the performance reports in the Council / to the Standing Committees should be instituted.

v. **Systems for operational decisions and plans:** Decisions and plans will need to be periodically reviewed in light of the performance achieved. Additional capital inflow and revenue expenditure may be required. A process of annual review and follow-up of decisions will need to be instituted.

7. Limitations and Challenges

It is recognized that this initiative has a number of limitations. Performance management in ULBs is being triggered from the Central Government, however, the acceptance and capacity at the state and city levels is what will sustain this initiative. While this handbook has attempted to address issues of definition and methodology for the SLBs, it is anticipated that a number of complexities will arise in the course of actual implementation. The possible challenges will include:

- Extensive surveys would be required for most of the SLBs
- Collection of secondary information from the various sources as the same may not be readily available or may not be in a usable format.
- Availability of staff with adequate technical knowledge to carry out the analysis.
- The entire loop of performance management will be sustainable only if - disclosure, reporting, monitoring and performance management feedback, incentives and disincentives are also brought into the cycle. Else the system of measurement and disclosure of SLBs may not sustain itself.

8. Standardization of Service Level Benchmark

With a view to the definition and computation methodology of the selected SLBs, the following details have been provided:

a. **Title, Units and Definition:** The specific name, the unit of measurement in which the performance is to be measured, and definition for the benchmarks is provided.

b. **Data requirements:** The specific surveys and area which need to be covered for each benchmark are given in the following table:

Service level Benchmark (SLB)	Area to be covered	Primary Survey Required
Public Transport facilities	Key public transport corridors along the city	• Boarding Alighting at major bus stops of identified routes • Passenger count inside the bus on identified routes
Pedestrian Infrastructure facilities	Arterial roads* / sub arterial roads / Key Public transport corridors along the city	• Collect phasing plan of a Signalized intersections in a city • Measurement of intensity of street light by lux meter • Footpath length having minimum width of 1.2m or more
Non Motorized Transport (NMT) facilities	Arterial roads / sub arterial roads / Key Public transport corridors along the city	• Dedicated NMV track having minimum width of 1.5m or more • Measurement of parking area on dedicated Cycle track • Signalized Intersection count
Level of Usage of Intelligent Transport System (ITS) facilities	City Municipal area / Planning boundary	• Count of Signalized intersections, bus stops, terminals, metro stations etc
Travel speed (motorized and mass transit)along major corridors	Arterial roads / sub arterial roads / Key Public transport corridors along the city	• Speed and delay • Journey time of bus at identified bus route
Availability of Parking spaces	Arterial roads / Sub arterial roads/ Key Public transport corridors along the city	• Parking survey
Road Safety	City Municipal area / Planning boundary	Nil
Pollution levels	City Municipal area / Planning boundary	Nil
Integrated Land Use Transport System	City Municipal area / Planning boundary	• Land use observation survey along transit corridors • Total length of roads having ROW 9m and above • Total length of roads having exclusive BRT/Metro/LRT
Financial Sustainability of Public Transport by bus	ULB / Parastatal agency	Nil

The survey locations and detail data analysis of each survey should be captured in report so as to maintain consistency in measurement or survey locations over time.

As per IRC: 86-1983: Geometric design standards for urban roads in Plains, the definition of arterial and sub arterial is as follows:

***Arterial roads:** This system of streets serves as the principal network of through traffic flows. Significant intra urban travel such as between central business district and outlying takes place on this system. Arterials should be coordinated with existing and proposed through bypass roads to provide for distribution and collection of through traffic to and from sub arterial and collector street systems. A properly developed and designated arterial street system would help to identify the residential neighborhoods, industrial sites and commercial areas. These streets are generally spaced at less than 1.5 km in highly developed central business area and at 8 km or more in sparsely developed urban fringes. Parking, loading and unloading activities are usually restricted and regulated.

Sub Arterial roads: These streets are of somewhat lower level of travel mobility than the arterial streets. The emphasis on access to adjoining areas is more in case of these streets than in the case of arterial streets. Their spacing may vary from 0.5 km in the central business district to 3 - 5 km in the sub urban fringe.

c. **Rationale for the benchmark:** For each performance benchmark, the overall significance and rationale for assessing and monitoring has been provided. The benchmark value has been specified in all cases.
d. **Reliability of measurement:** The performance assessment can be scaled on reliability wherein casually collected information from secondary sources would result in lowest level of reliability (D) and information collected by conducting detailed survey on the field would qualify as being the highest / preferred level of reliability (A).
e. **Frequency of measurement:** For each benchmark, the minimum frequency at which the performance should be measured is “annually”. Frequency of reporting would also be “annually”.
f. **Jurisdiction of measurement:** This refers to the geographic jurisdiction for which performance should be measured. The Jurisdiction area for measurement is as follows:
    i. Class 1 cities – Planning Boundary
    ii. Class 2 and 3 cities - Municipal area boundary

9. Structure

Section 1: Service level Benchmarks – This section provide details regarding each of selected SLBs such as Quality of available data, effort required in data collection and significance of the benchmark.

Section 2: Performance Report Card- It provides the sample of performance reports of Service level benchmarks that each ULB / parastatal agencies / municipal development authority can use to set and track their performance improvement.

Section 1:

SERVICE LEVEL BENCHMARKS

1.1 PUBLIC TRANSPORT FACILITIES

It indicates the city-wide level of services provided by public transport systems during peak hours (8 to 12 noon & 4 to 8 pm). Public Transport systems will only include rail, or organized bus based systems. Public Transport systems are characterized by - Fixed origins and destinations; Fixed routes and schedules; Fixed stoppage points; and Fixed fares. Public Transport therefore does not include Intermediate Public Transport (IPTs) such as shared RTVs, auto-rickshaws, three-wheelers, tempos, shared taxi or other such vehicles providing point-to-point services.

1. **Presence of Organized Public Transport System in Urban Area:** Within the first year, all JnNURM cities to establish Organized Public Transport System and by second year all 2 lakh plus population cities (as per 2001 census) to establish the same.
2. **Extent of Supply / Availability of Public Transport:** Within the first two years, all million plus cities but less than 4 million to increase public transit supply to service level 3 or above. All 4 million plus cities to increase supply to service level 2 or above.
3. **Service Coverage of Public Transport in the city (Bus route network density):** All million plus cities but less than 4 million to increase their public transit coverage at least supply to service level 3 or above. All 4 million plus cities to increase the service coverage to service level 2 or above.
4. **Average waiting time for Public Transport users:** All million plus cities to maintain average waiting time for public transport users to be a maximum of 12 minutes or below within 2 years.
5. **Level of Comfort in Public Transport (Crowding):** In all million plus cities, with in 2 years, the level of service should be 3 or above
6. **Percentage Fleet as per Urban Bus Specifications:** All million plus cities to have atleast 25% of their fleet as per urban bus specifications by the end of first year.

Regulatory Mechanism for Periodic Revision of Fares: There would be periodic revision of fares based on changes in the prices of indices. Such periodic revision is proposed to be carried out, every year. The formula to be used for such revision would be as follows:

FN = 0.4 [FPN – FPO] + 0.3 [CPIN – CPIO] + 0.3 [AMCN – AMCO] + FO

Where,
FN - New Fare
FO – Old Fare
FPN – New Fuel Price
FPO – Old Fuel Price
CPIN – New Consumer Price Index
CPIO – Old Consumer Price Index
AMCN – AMC Rate/km
AMCO - Old AMC Rate/km

Indicators to calculate City-wide Level of Service (LoS) of Public Transport Facilities						
Level of Service	**1. Presence of Organized Public Transport System in Urban Area (%)**	**2. Extent of Supply Availability of Public Transport**	**3. Service Coverage of Public Transport in the city**	**4. Average waiting time for Public Transport users**	**5. Level of Comfort in Public Transport**	**6. % of Fleet as per Urban Bus Specification**
1	> = 60	> = 0.6	>= 1	< = 4	< = 1.5	75 - 100
2	40 - 60	0.4 - 0.6	0.7- 1	4 - 6	1.5 - 2.0	50 - 75
3	20 - 40	0.2 - 0.4	0.3 - 0.7	6 - 10	2.0 - 2.5	25 - 50
4	< 20	< 0.2	< 0.3	> 10	> 2.5	< = 25

Data Requirement to Calculate the Level of Service of Public Transport Facilities			
S.no	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Presence of Organized Public Transport System in Urban Area			
a)	Calculate the total number of buses in the city	No.	Total number of buses operating on road
b)	Calculate the total number of buses under the ownership of STU/SPV or under concession agreement.	No.	Organized Public Transport may be identified as that which is run by a company or SPV formulated specifically for the operation of public transport within the city or under concession agreement. The intercity bus services would not be included as part of urban public transport operations
c)	**Presence of Public Transport System in Urban Area (%)**	**%**	**Calculate= [b / a]*100**. Compute LoS as mentioned in indicator 1 i.e. Presence of Public Transport System in Urban Area (%)
2. Availability of Public Transport			
a)	No of Buses/ train coaches available in a city on any day	No.	Number of public transport vehicles operating in the city, which may be lower than the number of vehicles owned by the utility or that authorized to ply. Daily average values over a time period of a month may be considered. (1 train coach is equivalent to 3 buses).
b)	Total Population of the city	No.	Current population should be considered. Past census figures should be used as base, and annual growth rate should then be used to arrive at current population.
c)	**Availability of Public transport /1000 population.**	**Ratio**	**Calculate= [a / b].** Compute LoS as mentioned in indicator 2 i.e. Availability of Public Transport

3. Service Coverage of Public Transport in the city			
a)	Total length in road kms of the corridors on which public transport systems ply in the city.	Road kms	Total length of the public transport corridor within the urban limits should be considered. Corridors along which the service frequency is one hour or less should only be considered. Public transport systems may be road or rail or water based, and include public or private transport service providers.
b)	Area of the urban limits of the city.	Area in sq. kms	Area of the urban limits should be considered. This may corresponds the urban limits demarcated by the development authority / metropolitan area, or any other such urban planning agency which need to be covered by public transport. This need not be restricted to municipal boundaries.
c)	**Service Coverage**	**road kms / sq. km**	**Calculate = [a / b].** Compute LoS as mentioned in indicator 3 i.e. Service coverage of public transport system in a city.
4. Average waiting time for Public Transport users			
a)	Identify bus stops for survey within the city	No.	With help of city map, plot all public transport routes and bus stops (both direction) using GIS and GPS.
b)	Average headway of buses/route	No.	Make the complete list of bus stops in a serial number (1,2,3….N)
			• Out of the total number of bus stops (N), a sample of (n) bus stops need to be collected for the purpose of survey, as follows: o > 4 million – 10% o 1 – 4 million – 25% o <1 million – 50% • To select the actual stops to be surveyed, stratified random sampling is recommended as follows: o Select 1st bus stop between 1 to 5 randomly from the list identified above o To select the next bus stop, skip N/nth bus stops from the list • Repeat the exercise for all the bus stops
		Min	• Collect the data of route wise headway (in min) for buses at each of the identified bus stop during morning and evening peak hour. • From the data collected, calculate the average headway for that particular route. Repeat the exercise for all selected routes • Calculate the average waiting time of passenger for each route as half of the average headway for that particular route.
			Make frequency distribution table for each of the LoS class interval (indicator 4). Find out the median of the frequency distribution which defines the average waiting time. Find out LoS corresponding to that median value for the table (indicator 4).
c)	**Average waiting time for Public Transport users**	1 / 2 / 3 / 4	Compute LoS as mentioned in indicator 4 i.e. Average waiting time for Public Transport users

5. Level of Comfort in Public Transport			
a)	Identification of key nodes / traffic origin points	No.	With help of city maps, routes of all public transport corridors should be plotted. Identify the key routes of public transport in the city (R1, R2, …. Rn) which covers the whole city.
b)	Passenger count on bus at key identified routes	No.	Passenger count survey should be carried out on bus of each identified route during morning & evening peak hour in both directions. If there is more than one type of bus then count to be done for each bus type.
c)	Seats available in the bus		Count the number of seats available in a bus of each type on each identified route.
d)	**Passenger comfort- Load factor (passengers per seat)**	1/2/3/4	**Calculate= [b / c]** for each route for each bus type and calculate the average load factor of all routes and compute LoS as mentioned in indicator 5 i.e. Level of Comfort in Public Transport
6. % of Fleet as per Urban Bus Specifications			
a)	Total number of buses in the city	No.	Calculate the total number of buses in the city
b)	Total number of buses as per urban bus specifications in the city	No.	Calculate the total number of buses as per urban bus specification (Urban bus specifications given on website :urbanindia.nic.in"
c)	**% of Fleet as per Urban Bus Specifications**	%	**Calculate [b / a * 100].** Compute LoS as mentioned in indicator 6 i.e. % of Fleet as per Urban Bus Specifications

Overall Level of Service of Public Transport facilities City wide		
The calculated level of Service (LoS) of Public Transport facilities = (LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5 + LoS_6) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	< 12	The City has a good public transport system which is wide spread and easily available to the citizens. The system provided is comfortable.
2	12 - 16	The City has public transport system which may need considerable improvements in terms of supply of buses/ coaches and coverage as many parts of the city are not served by it. The frequency of the services available may need improvements. The system provided is comfortable.
3	17 - 20	The City has a public transport system which may need considerable improvements in terms of supply of buses / coaches and coverage as most parts of the city are not served by it. The frequency of the services available needs improvements. The system provided is not comfortable as there is considerable over loading.
4	21 - 24	The city has poor or nil organized public transport system

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Based on some information collated from secondary sources.
Intermediate level(C)	Only information collected from city authorities / different agencies without any checks.
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	All the data for above mentioned performance parameters is collected/measured as mentioned above. Field observers should be properly trained, data formats provided, and observations be properly tabulated. Actual surveys are undertaken which are either carried out by or verified by the independent agencies.

1.2 PEDESTRIAN INFRASTRUCTURE FACILITIES

It indicates the percentage of road length along the arterial and major road network or Public Transport corridors and at intersection that has adequate **barrier free** pedestrian facilities. The indicators to calculate the adequate pedestrian facilities are as follows:

1. **Signalized intersection delay (%):** All million plus cities to target level of service 2
2. **Street Lighting (Lux):** All million plus cities to target level of service 2
3. **Percentage of City Covered with footpaths (wider than 1.2 mtrs):** All million plus cities to target level of service 2.

Indicators to calculate City-wide Level of Service (LoS) of Pedestrian facility			
Level of Service	**1) Signalized intersection delay (%)**	**2) Street Lighting (Lux)**	**3) % of City Covered**
1	< 25	> = 8	> =75
2	25 - 50	6 - 8	50 - 75
3	50 - 75	4 - 6	25 - 50
4	> = 75	< 4	< 25

Data Requirement to Calculate the Level of Service of Pedestrian facility			
S.No	**Data required for calculating the indicator**	**Unit**	**Remarks**
1) Signalized intersection delay			
a)	Total number of Signalized intersection	No.	Identify the total number of signalized intersections in a city (n)
b)	Average waiting time of pedestrian at intersection	Seconds	• Collect intersection phasing plan for each intersection. • Workout the amount of waiting time required for a pedestrian to cross each arm of road. • Calculate the average total waiting time of passengers of all arms of signalized intersection and divide by 2 to get average waiting time. If there is any foot over/under bridge at any arm, then waiting time for that particular arm is zero
c)	**Signalized intersections Delay (%)**	1/2/3/4	• **Desired average waiting time for a pedestrian is not more than 45 seconds.** • Calculate total number of signalized intersections having

			more than average waiting time of 45 seconds for pedestrians and calculate percentage of total. • Compute LoS as mentioned in indicator 1 i.e. Signalized intersections Delay (%)
2) Street Lighting (Lux)			
a)	Total length of roads	in kms	Total length of road network in the city i.e. arterial / sub arterial road network or Public Transport corridors on both sides.
b)	Calculate lux level	%	Take 10 samples per km along the arterial / sub arterial road network or Public Transport corridors. Create a frequency distribution of all the lux levels observed for the LoS categories mentioned in indicator 3 i.e. Street Lighting (lux) and calculate the cumulative frequency, where it crosses 50% mark, take that range as the LoS for indicator. Example: say the frequency distribution for the LUX is >=8 = 20%, 6-8 = 15%, 4-6 = 30% and <4 = 35%. in this case the cumulative frequency crosses 50% mark at 4-6 range. Therefore the LoS for the indicator is 4-6, which is 3.
c)	**Street Lighting**	1/2/3/4	Compute LoS as mentioned in indicator 2 i.e. Street Lighting (Lux)
3) % of City Covered			
a)	Total length of road network	Km	Calculate the total length of road network and multiply by 2
b)	Total length of footpath of a city	Km	Calculate the total length of footpath having minimum width of 1.2m width or more and multiply by 2 if available on both sides
c)	**Percentage of city covered**	1/2/3/4	**Availability = [b / a]*100**. Compute LoS as mentioned in indicator 3 i.e. % of city covered.

Overall Level of Service of Pedestrian Infrastructure facilities City wide

The calculated Level of service (LoS) for pedestrian infrastructure facilities = (LoS_1 + LoS_2 + LoS_3) and identify overall LoS as mentioned below:

Overall LoS	Calculated LoS	Comments
1	**3 - 5**	The City has adequate barrier free pedestrian facilities at overall road network.
2	**6 - 8**	The City has pedestrian facilities which may need some improvements in terms of improvements in intersections, footpaths, and street lighting as some parts of the city are not served by it. The footpath available need improvements. The system provided is comfortable and sustainable
3	**9-10**	The City has pedestrian facilities which may need considerable improvements. The pedestrian facilities at intersection, availability of footpath etc needs improvements as many parts of the city are not served by it.
4	**11 - 12**	The city lacks adequate pedestrian facilities

Reliability of measurement

Reliability Scale	Description of method
Lowest level of reliability (D)	Based on some information collated from secondary sources.
Intermediate level (C)	Only information collected from city authorities / different agencies without any checks.
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	All the data for above mentioned performance parameters is collected / measured as mentioned above. Field observers should be properly trained, data formats provided, and observations be properly tabulated. Population data should be from Census records. Actual surveys are undertaken which are either carried out by or verified by the independent agencies.

1.3 NON MOTORIZED TRANSPORT (NMT) FACILITIES

Indicates the percentage of dedicated cycle track / lane along the arterial & sub arterial road network or public transport corridors with a minimum of 2.5 m width. It is characterized by continuous length, encroachment on NMT lanes, and parking facilities. All JnNURM cities to have NMT tracks on all major roads with in a year. The indicators to calculate the adequate NMT facilities are as follows:

1. **NMT Coverage (% network covered):** At least 25% network with in a year. The width of pedestrian path and cycle track can be combined if the roads are too narrow
2. **Encroachment on NMT roads by Vehicle parking (%):** Target should be to have not more than 30% of NMV roads encroached i.e. LoS of 3 with in 1 year.
3. **NMT parking facilities at Interchanges (%):** Create NMT parking near all major bus stops, terminals and railway stations with in a year.



Indicators to calculate City-wide Overall Level of Service (LoS) of NMT facilities			
LoS	**1. % of network covered**	**2. Encroachment on NMV roads by Vehicle Parking (%)**	**3. NMT Parking facilities at Interchanges (%)**
1	> =50	< =10	>=75
2	50 - 25	10 - 20	50 - 75
3	25- 15	20 - 30	25- 50
4	< 15	> 30	< 25

Data Requirement to Calculate the Level of Service of NMT facilities			
S.No	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. % network covered			
a)	Total length of road network	Km	calculate the total length of road network
b)	Total Length of NMT network	Km	calculate the total length of NMV network
c)	**% of city covered**	1/2/3/4	Calculate = [b/a]*100. Compute LoS as mentioned in indicator 1 i.e. % of city covered

2. Encroachment on NMV roads by Vehicle Parking (%)			
a)	Total length of the Parking on Cycle Track	Km	Calculate Total road length where Parking on Cycle Track is present
b)	Total length of NMT network	Km	calculate the total length of NMT network
c)	**% of on street parking on cycle track**	1/2/3/4	**Calculate = [a / b]*100.** Compute LoS as mentioned in indicator 2 i.e. Encroachment on NMV roads by Vehicle Parking (%)
3. NMT Parking facilities at Interchanges (%)			
a)	Total no. of interchanges	no.	Calculate the total no. of interchanges i.e. major bus stops, terminals and railway stations.
b)	Total no. of interchanges having bicycle parking	no.	Calculate the total number of interchanges having NMT parking facilities (within 250 m radius)
c)	**NMT Parking facilities at Interchanges**	1/2/3/4	**Calculate = [b / c]*100**. Compute LoS as mentioned in indicator 3 i.e. NMT Parking facilities at Interchanges (%)

Overall Level of Service (LoS) of Non Motorized facilities (NMV) City-wide		
The calculated level of service (LoS) of Non Motorized facilities is = (LoS_1 + LoS_2 + LoS_3) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	**3 - 5**	The city has adequate NMT facilities at overall road network.
2	**6 - 8**	The city has NMT facilities which may need some improvements in terms of encroachments, parking facilities at interchanges etc as some parts of the city are not served by it. The system provided is comfortable and sustainable
3	**9 - 10**	The city has NMT facilities which may need considerable improvements as many parts of the city are not served by it.
4	**11 - 12**	The city lacks adequate NMT facilities

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Based on some information collated from secondary sources.
Intermediate level (C)	Only information collected from city authorities / different agencies without any checks.
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	All the data for above mentioned performance parameters is collected / measured as mentioned above. Field observers should be properly trained, data formats provided, and observations be properly tabulated. Population data should be from Census records. Actual surveys are undertaken which are either carried out by or verified by the independent agencies.

1.4 Level of Usage of Intelligent Transport System (ITS) facilities

ITS refers to efforts to add information and communications technology to transport infrastructure and vehicles in an effort to manage factors that typically are at odds with each other, such as vehicles, loads, and routes to improve safety and reduce vehicle wear, transportation times and fuel consumption. GPS/GPRS systems are required so as to cover all the public transport and intermediate public transport vehicles on the "National public transport helpline" besides the use for operational efficiencies. The indicators to calculate the usage of ITS facilities in the city are as follows:

1. **Availability of Traffic Surveillance System:** In all Million plus Cities, all rapid transit stations and all transit terminals will be equipped with CCTVs (Year-1) and all signalized intersections by year 2.
2. **Passenger Information System (PIS):** In all Million plus Cities, major bus stops, all rapid transit stations and all transit terminals will be equipped with PIS system (Year-1).
3. **Usage of Global Positioning System:** All new transit vehicles will be equipped with GPS systems (Year-1 for all JnNURM cities and year 2 for two lakh plus population cities). Older transit vehicles in these cities will be covered with GPS system in Year 2. Intermediate public transport systems will be covered with GPS in the years 2 to 3.
4. **Signal Synchronization:** In all million plus cities, in the first 2 years, all the junctions on major roads will be synchronized (50% in year1 and 50% in year 2).
5. **Integrated Ticketing System:** In all million plus cities, all public transit systems and sub-systems will be covered Automatic Ticketing System in the next 3 years (in a phased manner). All cities with rapid transit systems (Metro/BRT) to introduce integrated ticketing system during the next 3 years (To include integration of ticketing between sub-systems and parking).
6. **Signalized intersection:** In all million plus cities, in the first 3 years, all the junctions on major roads will be signalized (50% in year1 and 50% in year 2).

Indicators to calculate City-wide Level of Service (LoS) of Intelligent Transport System (ITS) facilities					
Level of Service	**1. Availability of Traffic Surveillance (%)**	**2. Passenger Information System (PIS) (%)**	**3. Global Positioning System / GPRS (%)**	**4. Signal Synchronization (%)**	**5. Integrated Ticketing System (%)**
1	> =75	> =75	> =75	> =75	> =75
2	50 - 75	50 - 75	50 - 75	50 - 75	50 - 75
3	25 - 50	25 - 50	25 - 50	25 - 50	25 - 50
4	< 25	< 25	< 25	< 25	< 25

Data Requirement to Calculate the Level of Service of Intelligent Transport System facilities			
S.No	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Availability of Traffic Surveillance			
Detection of movement of persons or vehicles for the purpose of security, incidence management and also to get real time information regarding pedestrian or vehicle flow.			
a)	Total no. of bus stations on BRTS, major bus stops, terminals, metro stations and signalized intersections having CCTVs	No.	Calculate total no. of bus stops, terminals, metro stations and signalized intersections having CCTVs
b)	Total no. of bus stations on major bus stops, BRTS, terminals, major bus stops, metro stations and signalized intersections	No.	Calculate total no. of bus stops, terminals, metro stations and signalized intersections
c)	Availability of Traffic Surveillance	%	**Calculate [a / b]*100.** Compute LoS as mentioned in indicator 1 : Availability of Traffic Surveillance
2. Passenger Information System (PIS)			
Passenger information systems are the key communication link between transportation operators and the traveling passengers. It provides accurate, current information on arrival and departure times and gates—information the traveler needs to keep moving efficiently. The information is provided in the form of digital displays as well as through loud speakers installed at appropriate locations.			
a)	Total no. of bus stops, terminals, metro stations having PIS	No.	Calculate total no. of bus stops, terminals, metro stations having PIS
b)	Total no. of bus stops, terminals, metro stations	No.	Calculate total no. of bus stops, terminals, metro stations
c)	Passenger Information System (PIS)	%	**Calculate [a / b]*100.** Compute LoS as mentioned in indicator 2: Passenger Information System
3. Global Positioning System / GPRS			
The Global Positioning System (GPS) is a satellite-based navigation system that determines the user's position and displays it on the unit's electronic map. With the GPS installed in the vehicles, the operators can regulate bus movements, ensuring smoother running of services. In addition, information about when the bus will arrive is sent to some bus stops to alert passengers.			
a)	No. of Public Transport Vehicles and IPT with functional onboard GPS / GPRS and connected to common control center	No	Calculate total No. of Public Transport Vehicles and IPT with onboard GPS / GPRS which are connected to common control center
b)	Total no. of Public Transport Vehicles and IPT	No	Calculate total no. of Public Transport Vehicles and IPT
c)	Global Positioning System / GPRS	%	**Calculate [a / b] * 100.** Compute LoS as mentioned in indicator 3: Global Positioning System

4. Signal Synchronization			
To improve the traffic flow along the road networks, the signals along the corridor are inter connected. The phasing of the signal at any specific intersection are in tune with the phasing of the intersection before and after it to provide a continuous green phase for the traffic stream. It helps in reducing congestion and stopping time at each intersection.			
a)	No. of signals which are synchronized	No	Calculate total No. of signalized signals which are synchronized in the city
b)	Total no. of signalized intersections	No	Calculate Total no. of signalized intersections in the city
c)	Signal Synchronization	%	**Calculate [a / b]* 100.** Compute LoS as mentioned in indicator 4 : Signal Synchronization
5. Integrated Ticketing System			
Integrated ticketing may be understood as a single common ticket which can be used across all modes of public transport for a single trip. It helps in providing seamless interchange across the Public transport modes and also reduces the overall travel time as the users do not have to stand in queues each time they interchange to purchase the tickets. **Aim is to have complete integration across all operators of same modes and across all modes and operators.**			
a)	Total Number of modes and operators in the city (Buses, IPT, Metro etc) which have integrated ticketing system	no	Calculate number of public transport modes and operators for each route in the city which are integrated
b)	Total Number of modes and operators in the city (Buses, IPT, Metro etc)	no	Calculate the total number of public transport modes and operators for each route in the city. Eg. If there are ten operators for buses and one operator for metro, one for monorail, the total number shall be twelve.
c)	Integrated Ticketing System	%	**Calculate [a / b] *100.** Compute LoS as mentioned in indicator 5: Integrated Ticketing system

Overall Level of Service (LoS) of usage of Intelligent Transport System (ITS) City-wide		
The calculated Level of Service (LoS) of Intelligent Transport system = (LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5)and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	5 - 7	The city has adequate ITS facilities
2	8 - 10	The City has ITS facilities which may need some improvements in terms of integrated ticketing system, signal Synchronization, GPS/GPRS, PIS etc as some parts of the city are nor served by it.
3	11 - 15	The City has ITS facilities which may need considerable improvements terms of integrated ticketing system, signal Synchronization, GPS/GPRS, PIS etc as many parts of the city are nor served by it.
4	16 - 20	The city lacks adequate ITS facilities

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Based on some information collated from secondary sources
Intermediate level (C)	Only information collected from city authorities without any checks
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	Field observers should be properly trained, data formats provided, and observations be properly tabulated.

1.5 TRAVEL SPEED (MOTORIZED AND MASS TRANSIT) ALONG MAJOR CORRIDORS

This level of service provides an indication of effective travel time or speed of Public or private vehicles by taking into account indications of congestion or traffic density. This level of service is along corridors, and not indicative of overall level of service from origin to destination. Level of service (LoS) may be measured along key corridors and then aggregated for the city.

- Year 1 target is to arrest worsening of the situation in the initial period
- Subsequently target to improve the service conditions to a reasonable level

Level of Service is defined in terms of average travel speed of all through vehicles on the key corridors. It is strongly influenced by the number of vehicles along the corridor, number of signals per kilometer and the average intersection delay. The speed of motorized vehicles can be improved by segregating public transport and non motorized vehicles through dedicated lanes or lane demarcation wherever possible.

Indicators to calculate City-wide Level of Service (LoS) of Traffic Speed along Major corridors		
Level of Service	**1. Average Travel speed of Personal vehicles (Kmph)**	**2. Average Travel speed of Public Transport (Kmph)**
1	> =30	> =20
2	25 - 30	15 -20
3	15 - 25	10 - 15
4	< 15	< 10

Data Requirement to Calculate the Level of Service of Traffic Speed along Major corridors			
S.No	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Travel speed of Personal vehicles along key corridors			
a)	Delineate the key corridors of road traffic (personal vehicle) in the city.	No.	Identify the key corridors using motorized transport in the city (C1, C2, …. Cn). These corridors may be within the city, or moving radially outwards.
b)	Compute Average speed on the key corridors		Determine the average speed along the corridor by the equation:- **Arterial Speed of corridor in kmph= (Length) / [total journey time in hours].** The speeds should be observed during peak hours on working days and an average of the peak hour speeds for each corridor should be used for determining the LoS.
c)	Level of Service for personal vehicle along each corridor	1/2 /3/4	On the basis of characterization of LoS mentioned above, determine the LoS along each corridor. The LoS along the corridors may be denoted as say LoS1 for C1, LoS2 for C2, ... LoSn for Cn
d)	Weights of each corridor based on volume of personal traffic	Ratio	Weightages of each corridor should be determined on basis of length of the corridor as share of the total length (say W1 for C1, W2 for C2, W3 for C3, …. Wn for Cn)
e)	**City-wide Level of Service of motorized vehicles**	1/2 /3/4	Computed as weighted aggregate of LoS density i.e. = [(W1*LoS1) + (W2*LoS2) + …….. (Wn*LoSn)], rounded off to the next whole number
2. Travel speed of Public Transport along key corridors			
a)	Delineate the key corridors of public transport in the city.	No.	Identify the key corridors using public transport in the city (C1, C2, …. Cn). These corridors may be within the city, or moving radially outwards.
b)	Compute Average Speed on the key corridors		Compute **Arterial Speed of corridor in kmph= (Length) / [total journey time in hours]** of each identified Public Transport corridor. The speeds should be observed during peak hours on working days and an average of the peak hour speeds for each corridor should be used for determining the LoS.
c)	Level of Service for public transport along each corridor	1/2 /3/4	On the basis of characterization of LoS mentioned above, determine the LoS along each corridor. The LoS along the corridors may be denoted as:-say LoS1 for C1, LoS2 for C2, ... LoSn for Cn
d)	Weights of each corridor based on volume of passengers	Ratio	Weightage of each corridor should be determined on basis of length the corridor as share of the total length (say W1 for C1, W2 for C2, W3 for C3, …. Wn for Cn)
e)	**City-wide Level of Service of Public transport vehicles**	1/2 /3/4	Computed as weighted aggregate of LoS density i.e. = [(W1*LoS1) + (W2*LoS2) + …….. (Wn*LoSn)], rounded off to the next whole number

Overall Level of Service of Travel speed along major corridors City wide		
The calculated LoS of Travel speed along major corridors = (LoS_1 + LoS_2) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	2	Primarily free flow- operations at average travel speeds usually about 70% of the free flow speed for the key corridors
2	3 -4	Small increase in flow may cause substantial increases in approach delay and hence, decrease in arterial speed.
3	5 -6	Significant approach delays and average travel speed of 1/3 of free flow speed or lower. Such operations are caused by some combination or adverse progression, high signal density, extensive queuing at critical intersections and inappropriate signal timing.
4	7 -8	Key corridors at extremely low speeds below 1/3 to 1/4 of the free flow speed. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Assessments do not cover all important corridors in the city. Assessments also do not follow the suggested frequency of measurement.
Intermediate level (C)	PCU units for corridors are not measured, and average of LoS along key corridors is considered as overall LoS.
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	Measurements as described above. Field observers should be properly trained, data formats provided, and observations be properly tabulated.

1.6 AVAILABILITY OF PARKING SPACES

It indicates the restriction on free parking spaces for all vehicles in a city. The indicators to calculate the parking facilities are as follows:

1. **Availability of paid public parking spaces (%):** To cover at least 50% of on street public parking spaces under 'paid parking'
2. **Difference in Maximum and Minimum Parking Fee in the City:** To keep maximum and minimum parking fee difference to at least 2:1 (Parking rate to be computed two hourly).

Indicators to calculate City-wide Overall Level of Service (LoS)		
LoS	**1. Availability of on street paid public parking spaces (%)**	**2. Ratio of Maximum and Minimum Parking Fee in the City**
1	> =75	> 4
2	50 - 75	2 - 4
3	25 - 50	1 - 2
4	< 25	1

Data Requirement to Calculate the Level of Service of Performance Indicators			
S.No	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Availability of paid public parking spaces			
a)	Total available on street paid parking spaces in (Equivalent Car Spaces) ECS allotted for all vehicles	ECS	Total available on street paid parking spaces= number of parking spaces for (cars x1 + two wheelers x 0.25) All the Arterial, sub arterial roads to be taken into account including service roads along these roads.
b)	Total available on street parking spaces in (Equivalent Car Spaces) ECS allotted for all vehicles	ECS	Total available on street Parking Spaces= number of parking spaces for (cars x1 + two wheelers x 0.25)
c)	**Availability of paid public parking spaces**	%	Calculate = **[a / b] * 100.** Compute LoS as mentioned in indicator 1 i.e. Availability of paid public parking spaces (%)

2. Ratio of Maximum and Minimum Parking Fee in the City			
In the CBD of the city, the land is generally available at a premium, which makes it difficult to provide for organized parking spaces in these areas. One of the management measures for reducing parking demand in the CBD is high parking charges, which discourages the use of private vehicles. The parking fee being charge by private parking operators may also be considered.			
a)	Maximum parking fee being charged per 2 hours in the city for public parking	Rs	A very high premium is being charged for land in CBD
b)	Minimum parking fee being charged per 2 hours in the city for public parking	Rs	Free parking rates are not to be counted.
c)	**Ratio of Maximum to Minimum parking fee**	Ratio	Calcúlate = [**a / b].** Compute LoS as mentioned in indicator 2 i.e. Ratio of Maximum and Minimum Parking Fee in the City.

Overall Level of Service (LoS) for Parking Space City-wide

The calculated Level of Service (LoS) for parking space = (LoS_1 + LoS_2) and identify overall LoS as mentioned below.

Overall LoS	Calculated LoS	Comments
1	2	Paid parking spaces are available in the city and the demand is well managed by incorporating differential parking rates for the CBD.
2	3 - 4	Paid parking spaces are available in the city and the demand is well managed by incorporating differential parking rates for the CBD. However some improvements may be required
3	5 - 6	Paid parking spaces provided in the city need to be improved upon and to cater to the demand some differential parking rates for the CBD have been adopted. The city authorities need to initiative considerable improvements measures.
4	7 - 8	The city authorities need to initiate immediate actions with respect to providing paid parking spaces and demand management for parking.

Reliability of measurement

Reliability Scale	Description of method
Lowest level of reliability (D)	The parking capacities have been estimated as per the information from secondary source
Intermediate level (C)	Parking capacity is based on information from concerned offices only and no survey has been conducted for validation
Intermediate level (B)	Parking capacity is measured from field surveys only and not verified from concerned offices
Highest/preferred level of reliability (A)	Parking capacity should be measured by proper field surveys, and marked on maps to scale. Latest data from concerned offices of RTO should be collected.

1.7 ROAD SAFETY

With increasing road traffic, many cities are witnessing rising level of accidents, leading to rising levels of injuries and fatalities. Level of fatality is an indication of road safety. Road design and available road infrastructure, traffic management and other such reasons significantly contribute to road safety. Therefore fatality rate should be monitored. The benchmark for the same is zero, as ideally fatalities and injuries out of accidents should be brought down to nil. Within the number of accidents, the vulnerable road users are pedestrians and persons with non-motorised vehicles. It is therefore, critical to monitor the extent to which such road users are impacted within the overall set of road users. The benchmark value for the same is also zero. The indicators to calculate the LoS of road safety is as follows:

1. **Fatality rate per lakh population:** To bring down fatality rates to 2 persons per lakh or below in all million plus cities within two years.

2. **Fatality rate for pedestrian and NMT (%):** To bring down fatality rates for pedestrian and NMT such that the share comes down to less than 40% within two years.

Indicators to calculate City-wide Overall Level of Service (LoS) of road Safety		
Level of Service	**1. Fatality rate per lakh population**	**2. Fatality rate for pedestrian and NMT (%)**
1	< =2 persons	< =20
2	2 -4 persons	20 -40
3	4 - 6 persons	40 - 60
4	> 6 persons	> 60

Data Requirement to Calculate the Level of Service of Performance Indicators			
S.No	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Fatality rate per lakh population			
a)	Total number of fatalities recorded in road accidents within city limits in the given calendar year	No.	Record of fatalities from police records. Data should be considered pertaining to the urban limits or jurisdiction of police department for the urban areas within that district.
b)	Population of the urban agglomeration in that year	No.	Population of the urban agglomeration as per the latest census should be projected to arrive at current population, taking into account the projected growth rate.
c)	**c) Fatality rate per 100000 population**	Ratio	Calculate= **[(a*1,00,000) / b].** Compute LoS as mentioned in indicator 1 i.e. Fatality rate per lakh population
2. Fatality rate for pedestrian and NMT (%)			
a)	Total number of fatalities recorded of persons who were pedestrians or on non-motorised transport vehicles, in road accidents within city limits in given year	No.	From the records from police, the number of persons of above, who were pedestrians or on non-motorised vehicles (such as bicycles, cycle-carts / cycle rickshaws, etc.)
b)	Total number of fatalities recorded in road accidents within city limits in the given calendar year	No.	Record of fatalities from police records. Data should be considered pertaining to the urban limits or jurisdiction of police department for the urban areas within that district.
c)	**Fatality rate for pedestrian and NMT**	%	Calculate = **[(a / b)*100].** Compute LoS as mentioned in indicator 2 i.e. Fatality rate for pedestrian and NMT (%)

Overall Level of Service (LoS) for Road Safety City-wide		
The calculated level of service (loS) for Road Safety = (LoS_1 + LoS_2) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	**2**	Level of Fatality rate in a city is very low.
2	**3 - 4**	Need some improvements in Road design and available road infrastructure, traffic management and in other such reasons which significantly contribute to road safety.
3	**5 - 6**	Need considerable improvements in Road design and available road infrastructure, traffic management and in other such reasons which significantly contribute to road safety.
4	**7 - 8**	Level of Fatality rate in a city is very high.

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Estimations based on previous records
Intermediate level (C)	Not Applicable
Intermediate level (B)	Not Applicable
Highest/preferred level of reliability (A)	Records from police headquarters of the district, providing fatality and injury rate from road accidents. Data should pertain to urban areas within the district. Population data should be from Census records.

1.8 POLLUTION LEVELS

This indicator indicates the Level of air Pollutants in the city i.e. average level of pollution in urban areas. The indicator to calculate the pollution levels is **Annual Mean Concentration Range (µg/m3).**

Indicators to calculate the Pollution level - Annual Mean Concentration Range (µg/m3)				
Level of service*	**1. SO_2**	**2. Oxides of Nitrogen**	**3. SPM**	**4. RSPM (Size less than 10 microns)**
1 (Low)	0 - 40	0 - 40	0 - 180	0 - 40
2 (Moderate)	40 - 80	40 – 80	180 - 360	40 - 80
3 (High)	80 - 120	80 – 120	360 - 540	80 - 120
4 (Critical)	> 120	> 120	> 540	> 120
*** As per CPCB guidelines:** Annual Arithmetic Mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval (Data from CPCB)				

Overall Level of Service (LoS) for Pollution levels		
The calculated Level of Service for Pollution level is LoS = (LoS_1 + LoS_2 + LoS_3 + LoS_4) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	**<=5**	Level of pollution in a city is very low.
2	**6 - 9**	Need some improvements in emission standards, checking pollution etc.
3	**10 - 13**	Need considerable improvements in emission standards, checking pollution etc.
4	**14 - 16**	Level of pollution in a city is very high.

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Based on some information collated from secondary sources
Intermediate level (C)	Only information collected from city authorities without any checks
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	Field observers should be properly trained, data formats provided, and observations be properly tabulated.

1.9 INTEGRATED LANDUSE-TRANSPORT SYSTEM

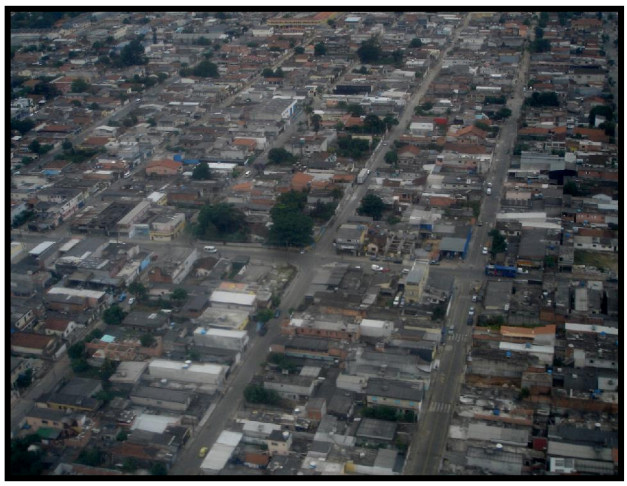
It Indicates the effectiveness of land use-transport arrangements and Identify the level of integrated land use transport system expected to result in overall trip reduction and mode shift in favor of public transit The indicators to calculate the Land use transport integration are as follows:

1. Population Density - Gross (Persons/Developed Area in hectare)
2. Mixed Landuse on Major Transit Corridors/Network (% non residential area)
3. Intensity of Development city wide - (Floor Space Index - Master Plan/DP)
4. Intensity of development along transit corridor- Ratio of FSI on Transit corridor to city FSI (provision as per Master Plan / Development Plan/ Any other policy)
5. Clear pattern and Complete network
6. Area under roads (%)
7. Proportion of network having exclusive ROW for Transit

Indicators to calculate (LoS) of Integrated land use Transport System							
Level of Service	**1. Population Density - Gross (Persons/Developed area in hact.)**	**2. Mixed Land-use on Major Transit Corridors / Network (% area under non residential use)**	**3. Intensity of Development - City wide (FSI)**	**4. Intensity of development along transit corridor (FSI transit corridor/ FSI)**	**5. Clear Pattern and Completeness of the network**	**6. % of area under Roads**	**7. %age network having exclusive ROW for Transit network**
1	>=175	>=30	> =2	>=3	Clear pattern (ring-radial or grid-iron) and complete network	> = 15	> = 30
2	150-175	15-30	1.5-2.0	2-3	Some what clear pattern (ring-radial or grid-iron) but somewhat incomplete network	12 - 15	20-30
3	125-150	5-15	1.0 - 1.5	1.5-2	somewhat unclear pattern and incomplete network	10 -12	10-20
4	< 125	<5	<1	<1.5	no clear pattern incomplete / sparse network	< 10	<10

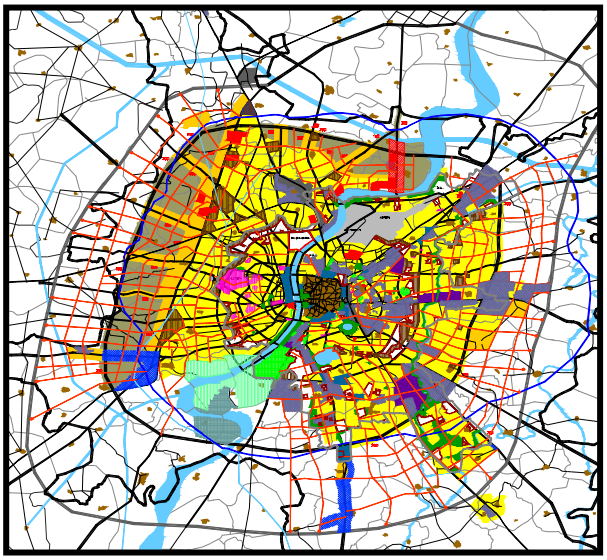
Data Requirement to Calculate the Level of Service of Performance Indicator			
S.no	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Population Density			
a)	From remote sensing/satellite image or from Google compute developed area (Hectare)	Ha.	Total developed area
b)	Population of current year or the year for which data is available.	No.	Population of 1991 and 2001 may be taken to estimate current population
c)	**Population density**	**No.**	**Calculate population density= [b / a].** Compute LoS as mentioned in indicator 1: Population Density - Gross (Persons/Developed area in hectare)
2. Mixed Land-use Zoning (Proportion of non residential area)			
a)	Inventory of landuse along major transit corridors (500 meters approx) based Master Plan/Development Plan	Ha.	As per approved Master Plan/DP
b)	**Mixed land use Zoning (% of area under non residential use)**	%	Calculate % of non residential area out of total area along transit corridor and Compute LoS as mentioned in indicator 2.

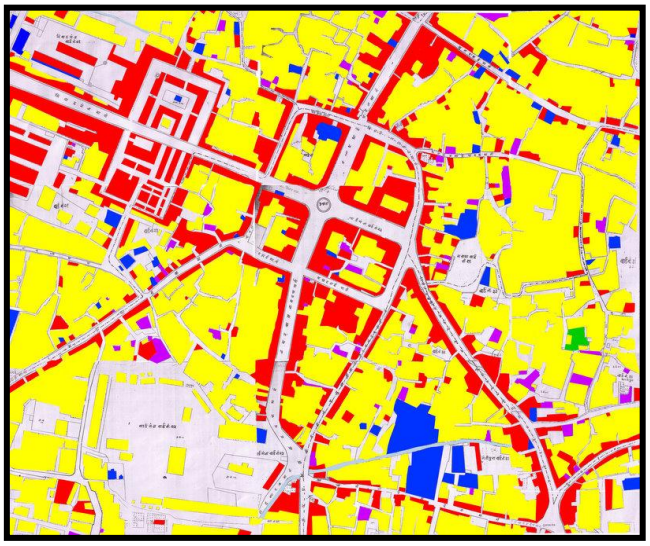
3.Intensity of Development – Citywide			
a)	Floor space Index (applicable to most part of the city as per Master Plan/DP.	No.	As per Master plan/Development plan as applicable to developed/developable area and Compute LoS as mentioned in indicator 3 i.e. Intensity of Development - City (F.S.I (Floor Space Index - Master Plan/DP)
4. Intensity of Development along Transit Corridors			
a)	Floor space Index (applicable to most part of the city as per Master Plan/DP.	No.	As per Master plan/Development plan as applicable to developed/developable area
b)	FSI along transit corridors	no.	As per Master plan/Development plan as applicable to areas along transit corridors.
c)	**Intensity of Development along Transit Corridors**	Ratio	**Calculate Ratio = [b / a].** Compute LoS as mentioned in indicator 4 i.e. Intensity of development- Ratio of FSI on Transit corridor to city FSI
5. Road network Pattern and Completeness			
a)	Based on existing & proposed network recognize/identify major roads and pattern	No of Rings & radials /grid network	Both existing and proposed
b)	Extent of clarity and completion	qualitative (high to low)	
c)	**Road network Pattern and Completeness**	1/2/3/4	Compute LoS as mentioned in indicator 5 i.e. Pattern and Completeness of the network
6. % of Area under Roads			
a)	Measure overall developed area	km. sq	Measure developed area of a city
b)	Measure overall area under road network.	km. sq	Total area under roads
c)	**Percentage of area under road network**	sq.kms	**Calculate [b / a]*100.** Compute LoS as mentioned in indicator 6 i.e. % of area under road Network
7. % Network with Exclusive ROW for transit (for > 1 million population as per 2001 census)			
a)	Total urban road and rail network	Kms	Total length of roads (arterial and Sub arterial) having ROW 9m and above plus total length of urban rail network
b)	Total network with exclusive ROW	Kms	Total length of road having exclusive BRT/Metro/LRT/Mono rail
c)	**% Network with Exclusive ROW for transit**	%	**Calculate [b / a] * 100.** Compute LoS as mentioned in indicator 7 i.e. %age network having exclusive ROW for Transit network



Overall Level of Service (LoS) for Land Use Transport Integration City-wide			
For > =1 million population = The city wide calculated LoS is derived by adding the LoS = LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5 + LoS_6 + LoS_7 and identify overall LoS as mentioned below. For < 1 million population = The city wide calculated LoS is derived by adding the LoS = LoS_1 + LoS_2 + LoS_3 + LoS_4 + LoS_5 + LoS_6 and identify overall LoS as mentioned below			
Overall LoS	**Calculated LoS**		**Comments**
	> = 1 million population	**< 1 million population**	
1	<=8	< =9	City Structure is appropriately planned in a manner which patronizes public transport.
2	9 -15	10 -14	City structure is some what coherence with the public transport system
3	16 - 22	15 - 20	Faint coherence between city structure and public transport system
4	23- 28	21 - 24	Inconsistency in the city structure and public transport system leading to lesser ridership and high dependence on personalized motor vehicles

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Based on some information collated from secondary sources.
Intermediate level (C)	Only information collected from city authorities / different agencies without any checks.
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	All the data for above mentioned performance parameters is collected / measured as mentioned above. Field observers should be properly trained, data formats provided, and observations be properly tabulated. Population data should be from Census records. Actual surveys are undertaken which are either carried out by or verified by the independent agencies.





1.10 FINANCIAL SUSTAINABILITY OF PUBLIC TRANSPORT BY BUS

The indicators to calculate the financial sustainability of public transport by bus is as follows:

1. **Extent of Non-fare Revenue (%):** All city transit system operators to achieve a minimum of 20% and above share.
2. **Staff /bus ratio:** To keep at a level as defined in LoS 2 or above.
3. **Operating Ratio:** To take the operating ratio to atleast 1.

Indicators to calculate City-wide Overall Level of Service (LoS)			
Level of Service	**1. Extent of Non fare Revenue (%)**	**2. Staff /bus ratio**	**3. Operating Ratio**
1	> 40	< = 5.5	< 0.7
2	40 - 20	5.5 - 8	0.7 – 1.0
3	20- 10	8 - 10	1.0 - 1.5
4	< =10	>10	> =1.5

Data Requirement o Calculate the Level of Service of Performance Indicators			
S.no	**Data required for calculating the indicator**	**Unit**	**Remarks**
1. Extent of Non Fare Revenue			
Percentage of non-fare revenue is an important indicator since it reflects on the financial sustainability of the public transport system. Non-fare revenue comprises revenue from advertising on buses / coaches, at bus stations and other spaces, rental spaces at terminals, etc. If the share of non-fare revenue is higher, it implies significant cross-subsidization of basic fares. Therefore, even if there are changes in the cost of operations (due to increase in fuel costs, etc.), the impact can be partly shielded by other revenue streams, thereby making the system more financially sustainable. It is therefore important to monitor this indicator. Assuming that the transport utility does not receive substantial subsidies, higher level of non-fare revenue will also imply lower fares.			
a)	Revenue collections per annum from non-fare related sources (i.e. sources excluding tariff box collections)	Rs.	This should be the aggregate of non-fare related sources from all service providers engaged in public transport services, as defined above. This will include both government and private service providers.
b)	Total revenue per annum from all sources	Rs.	This should be the aggregate of revenue sources from all service providers engaged in public transport services, as defined above. This will include both government and private service providers.
c)	**Extent of non-fare revenue**	**%**	**Calculate = [a / b]*100.** Compute LoS as mentioned in indicator 1 i.e. Extent of Non fare Revenue (%)
2. Staff per bus ratio			
a)	Calculate the total staff of bus operation and maintenance	No.	Total staff includes number of drivers, conductors and supporting staff / officials for operations and maintenance.
b)	Calculate the total number of buses	No.	Calculate the total number of buses in a city (only public operator)
c)	**Staff per bus ratio**	**Ratio**	**Calculate= [a / b].** Compute LoS as mentioned in indicator 2 i.e. Staff /bus ratio

3. Operating Ratio			
a)	Calculate cost / bus	Rs	Cost includes Depreciation cost, Operation & Maintenance Cost, Manpower cost etc.
b)	Calculate earning /bus	Rs	Total revenue generated from all sources such as Fare revenue and non fare revenue.
c)	**Operating Ratio**	**Ratio**	**Calculate= [a / b] and compute LoS as mentioned in indicator 3 i.e. Operating Ratio**

The Overall LoS for Financial Sustainability of Public Transport city wide		
The calculated Level of Service LoS = (LoS_1 + LoS_2 + LoS_3) and identify overall LoS as mentioned below		
Overall LoS	**Calculated LoS**	**Comments**
1	**< = 4**	The public transport of a city is financial sustainable.
2	**5 - 7**	The public transport of a city is financial sustainable but needs some improvements
3	**8- 9**	The public transport of a city is financial sustainable but needs considerable improvements
4	**10 - 12**	The public transport of a city is not financial sustainable.

Reliability of measurement	
Reliability Scale	**Description of method**
Lowest level of reliability (D)	Based on some information collated from secondary sources.
Intermediate level (C)	Only information collected from city authorities / different agencies without any checks.
Intermediate level (B)	Only surveys are undertaken
Highest/preferred level of reliability (A)	All the data for above mentioned performance parameters is collected / measured as mentioned above. Field observers should be properly trained, data formats provided, and observations be properly tabulated. Population data should be from Census records. Actual surveys are undertaken which are either carried out by or verified by the independent agencies.

Section 2:

Performance Report Card

2.1 Performance Report Card

The minimum frequency of computation of the performance indicators is annually and the geographic jurisdiction for which it should be measured is municipal limits or planning boundary. On the basis of the above framework, ULBs should prepare Performance Report Cards, which would form the basis for reporting and monitoring performance. The Report Cards should necessarily contain the following information:

- Municipal Areas / Development Authority
- The time period for which performance is being reported
- Current baseline and actual accomplishment of performance as time passes
- Targeted performance levels for subsequent time periods (annually).
- The Measure of reliability of the systems, on the basis of which the indicator has been measured (viz. either A or B or C or D)
- Brief plan of action for achieving the targeted performance level for each of the forthcoming time periods.

2.2 Illustrative Performance Report Card Submitted to State / Central Govt.

Demographic details-

- Population:
- Population density:

Modal Share:

- Public Transport
- Intermediate Public Transport (IPT)
- Private vehicles

Total area in sq km:

Reporting Frequency: Annual

Time Period: FYI 09-10

Reporting Jurisdiction: Limits of Municipal Boundary / Planning Boundary

S.No	Service level Benchmark	LoS Actually achieved	LoS Targeted for next year	Action Plan to achieve the target
1	Public Transport facilities			
2	Pedestrian Infrastructure facilities			
3	Non Motorized Transport (NMT)facilities			
4	Level of usage of Integrated Transport System (ITS) facilities			
5	Travel speed (Motorized and Mass Transit) along major corridors			
6	Road Safety			
7	Pollution levels			
8	Availability of Parking Spaces			
9	Integrated Land Use Transport System			
10	Financial Sustainability of Public Transport			