

DELHI DEVELOPMENT AUTHORITY UTTIPEC

Comprehensive "CHECK LIST" of Quality Audit for UTTIPEC Approved-PROJECTS.

(Approved in 39th Governing Body Meeting of UTTIPEC held on 21.9.2012)

I. Based upon Planning & Safety Aspects.

Sl.No.	Item	Observation	Specified-Range	Remarks
1.	Obstructions in Walking Zone		No- Utility ducts, utility poles, electric, water or telecom boxes, trees, signage or any kind of obstruction should be placed within the " walking-zone in future.	
2.	Walking Zone Width		Residential Areas:- 2.00M Commercial/Mixed:- 2.50M Use Areas Commercial Nodes:- 4.00M	
3.	Kerb. Height		Max. height of a pavement (kerb, walking surface, paving) shall not exceed 150MM (6") Foot-Path and Bus- Stop surfaces should be matt finish /anti-skid.	
4.	Existence of slip road at left turn		Slip-roads or free left turns should be avoided. In case, they already exist, kerb radius should be as follows:- 1.5 M or less for roads less than 30 M width 3.0 M for most intersections. 4.5 M for industrial streets with a lot of truck traffic.	
5.	Raised driveway in front of buildings.		The motorized vehicles should pass over a gentle ramp to enter the property.	

6.	Dead width or width of frontage-Zone		For side-walks in shopping areas an extra 1 Mt. should be added to the stipulated 4.00m width. In other situations where sidewalks pass next to buildings and fences, a dead width of 0.5 M can be added. In busy areas like bus stops, Rly stn. Recreational areas width of side walk should be suitably increased to account for accumulation of pedestrians.	
7.	Provision of kerb ramps Near pedestrian Crossing		Standard kerb-ramps are cut into the foot-path. Width of such ramp should not be less than 1.2M with gradient not greater than 1:12 with flared sides. It is desirable to provide two curb cuts per corner.	
8.	Provision of raised table top crossing		Raised crossing should be located at a) Slips roads b) Where high volume streets intersect with low volume streets c) At mid block crossings.	
9.	TACTILE-PAVING		<ul style="list-style-type: none"> • Tactile-working strip to be provided on the kerb-side edge of the slope 1st & last step of every flight of each subway/FOB. It is desirable to provide two kerb-side edge of the slope. • A Distance of 600-800m to be maintained from the edge of Foot-Path/Boundary Wall/ any Obstruction. • A height of about 5mm for the raised part of the surface is sufficient for almost all persons with vision impairment to detect, without causing too much discomfort for other pedestrians. • Tactile paving must be maintained to ensure that the profile does not erode away. • Tactile tiles should have a colour (preferably canary yellow), which contrasts with the surrounding surface. • Tactile paving should be minimum 300mm wide (so that someone cannot miss it by stepping over it) 	
10.	Auditory Signals		Pedestrian traffic lights should be provided with clearly audible signals Acoustic devices should be installed on a pole at the point of origin of crossing and not at the point of destination.	
11.	<ul style="list-style-type: none"> • Slope of foot over bridge ramps. • Height of hand rail at foot over bridge/underpass ramps 		<ul style="list-style-type: none"> • A slope of 8% (1 in 12) on foot over bridge ramps with a slope of 5%(1 in 20) with landing is preferable. • Within the underpass a hand-rail set 850-900 mm above the walking surface should be provided. • Tactile-paving should be provided at top & bottom of the flight of 	

	<ul style="list-style-type: none"> • Provision of elevator/lift at entrance/exit of the elevators. 		<p>steps.</p> <ul style="list-style-type: none"> • Elevator/lift should be provided on both entrance/exit & should have minimum internal dimension of 1400 mm X 1400 mm • All lifts to have Braille buttons & Audio announcement system. 	
12.	<p>Tree pits and tree grates</p> <ol style="list-style-type: none"> 1. Size of tree pits 2. Provision of tree guards 3. Provision of tree grating 		<ul style="list-style-type: none"> • A clear width of 1800X1800 is to be left free of concrete for tree pits in order to allow access nutrients to the roots of trees. • The tree guards should be provided for young trees • Tree grates allow pedestrians to walk close to trees • Tree grating finished at the same level as surrounding pavement – allow people walk over them. 	
13.	<p>Bi-cycle and non-motorized infrastructure.</p> <p>Width of cycle/NMV lane</p> <p>Provision of cycle parking</p>		<ul style="list-style-type: none"> • Segregated cycle tracks are required in arterial and sub-arterial roads i.e roads with ROW > 45m. • Minimum width of NMV lane is 2.50 mt. & they are clearly segregated from faster moving motorized traffic. • The NMV should be constructed with smooth finished cement concrete and on both sides of street. • A 0.70 m landscaped buffer should be kept between NMV and MV lanes to maximize the speed, efficiency and capacity of NMV lanes. • Cycle parking stands can be accommodated within the multi-functional zone. 	
14.	<p>Crossings:-</p> <ol style="list-style-type: none"> a. Provision of at grade full signal crossing at junctions. b. Provision of full signal crossing at mid blocks. c. Provision of kerb ramps at crossings. d. Provision of stop line e. Provision of cautionary sign before mid block crossing f. Provision of foot over bridge. 		<ul style="list-style-type: none"> • Mid block crossing to be provided at mid-block transit/bus-stop location and Areas with pedestrian attractor like shopping areas, schools & community centers. • Mid-block crossing must include signages visible from min. <u>100 mt.</u> away. • Auditory signals are required to provide assistance to the differently abled. • Traffic calming treatment to start at least 25 m before zebra-crossing. • Spacing range: Every 80-250 m coordinated with entry points of complexes, location of bus/train stops, public facilities etc. • Foot over bridge may be necessary for streets with high speed transit corridors like BRT etc. All sub-ways and foot over bridges must have combination of either “staircase + ramp or stair-case + elevator. 	

15.	Provision of median:- <ul style="list-style-type: none"> ● Provision of refuge islands ● Height of median kerb ● Width of median/refuge island. ● Provision of safety bollards in the refuse space. 		Median & refuge islands:_ Median should be provided only on roads where design speed is greater than 20/25 km. per hour. Median should not generally provided on roads where design speed is less than 20/25 KM/hr. or Row less than or equal to 24.00 mt. <ul style="list-style-type: none"> ● Maximum height of median kerb is about 220 mm. ● Instead of fences, median should be landscape & used for storm-water management. ● Planting should be drought-tolerant, preferably capable of storm-water filtration. ● When street trees are desired, a median should be min. 1.5 m wide i/c kerbs. ● Trees in a median can provide a fuller canopy and provide a highly cooling effect on immediate surroundings. ● Clear-width of a median refuge island should be 1.2 m. ● Safety bollards in the refuge space to prevent the ‘U’ turning of vehicles. 	
16.	Street Lighting:- Checking of street lighting to be done as per approved design of lighting.		<ul style="list-style-type: none"> ● Trees causing obstructions in street lighting must be – trimmed. 	
17.	Underground utilities:- <ol style="list-style-type: none"> A. Provision and location of common utility duct (CUD) B. Type of common utility duct provided C. Provision of entrance chamber in CUD 		<ul style="list-style-type: none"> ● Common Utility Duct (CUD) ● A structure above or under the ground which contain more than two types of public utilities & include its own drainage, ventilation & lighting etc. ● Placement of services which require access covers should not be done under NMV. ● Dense-urban area e.g. Shahjanabad could consider providing common-utility ducts for carrying the services. ● Utilities must be placed in a neat & tidy manner. ● It would be prudent to leave pipes under the footpath to provide cabling & services in the future. ● Use of cement concrete should be kept to the minimum requirement, gravel, sand soil etc. is preferable as filling material. ● Manholes aligned parallel to street to facilitate conduit installation. ● Duct bank to be straight & should drain into manholes. ● Dia of duct pipe – 1.5 X O.D. of cable 2.00 O.D. of gas pipe 	

18.	<ul style="list-style-type: none"> • Location of Bus Stop • Accessibility of the Bus Stop 		<ul style="list-style-type: none"> • Bus Stops must be universally accessible and located at every 800-1000M. Criteria for location of Bus Stop as per Guidelines. • Public- Phones should be made available near Bus-stop/subway/F.O.B./etc. to take help in case of any emergency. • Bus Stop should be preferably in Multifunction Zone and should not interfere with 1.8m clear walking zone. 	
19.	Public Toilets:-		<ul style="list-style-type: none"> • Toilet should be located near every alternate Bus Stop. These should not be located on isolated places • Entrance to lady-Toilet should not be faced towards Gents-Toilets. • Provide Public Toilets at a distance of every 500-800M from each other and from any destination. • Public Toilet should be provided as combination of general Toilet and accessible toilets. 	
20.	<u>Street Signage's:-</u> <ol style="list-style-type: none"> a. Provision of Street Signs. b. Provision of Transit Signs. c. Provision of Traffic Signs. d. Provision of Information signs 		<ul style="list-style-type: none"> • Signage's provide help to pedestrian to navigate the city with ease and safety and have the following functions- • Availability of Public Transit nearby (Transit sign) • Guiding street flow (Traffic sign). • Announcing about city's (Information signs). • Conveniences:- Toilet, Dustbin etc. 	
21.	Pelican crossings		<ul style="list-style-type: none"> • Pedestrian initiated traffic lights may be installed at mid-block crossings to make traffic stop for pedestrians, cyclists and the physically handicapped. 	
22.	Provision of Dustbins		<ul style="list-style-type: none"> • Dustbins must be provided each bus stop and street intersection in order to discourage people from throwing trash on the roads. 	
23.	Provision of Hawker Zones		<ul style="list-style-type: none"> • Hawker must be accommodated within the Road R.O.W. at approximately every 500-1000M on a Public Street. • They are needed at all commercial centers and must be at walking distance from Offices, Homes and Retail Areas. • Flexible Hawking Zones can be accommodated within the Multifunctional Zones. • Essential Utilities must be provided with in the Hawking Zone. • Vendors may be allotted space to sell their goods in subways/FOB's so that, they are not isolated at any time 	

II. Based upon Critical-Engineering Aspects.

S.N.	Item	Observation	Specified Range	Remarks
24.	GEOMETRICS:- a) Road-way-width. b) Carriage-way-width. c) Camber d) Super-elevation and Extra, widening at Curves. e) Longitudinal = gradient in case of road in hilly/rolling terrain f) Provision of passing places	Actual observation -----Do----- Actual Measurement Actual Measurement Visual-observation /Measurements Visual-observations	As per approval drawing -----Do----- -----Do----- -----Do----- -----Do----- -----Do-----	
25.	<u>Earth-work& Sub-Grade:-</u> a) Quality of Material for embankment/Sub-grade b) Compaction c) Side-Slopes and profile d) Stability and workmanship of cut-slope(In-case of hilly/rolling terrain) e) Adequacy of slope-protection(In case of	Visual inspection Dry-Density of compacted layer Measurement Visual-Observations Visual-observation Measurement	Material-should be free of logs stumps, rubbish etc. As per I.S. 2720 (Part-8) As per approved Drawing -----Do----- -----Do-----	

	high embankments/ hilly rolling terrain) f) Section of retaining wall and breast wall		As per approved Drawing	
26.	Sub-base:- a) Adequacy of compaction through volumetric-analysis b) Total Thickness of layer	Field-density test by sand replacement Measurement by taking pit for full layer thickness.	As per IS : 2720(Part XXVII) As per Approved Design.	
27.	BASE-COURSE WBM/GSB/WMM a) Adequacy of compaction through volumetric analysis. b) Thickness of every layer of WBM/GSB/WMM	Hand-feel test by digging pit & <u>Volumetric-analysis.</u> Actual Measurement by taking pit.	As per I.S. 2720(Part-XXVIII) As-per design.	
28.	BITUMINOUS-LAYER:- a) Aggregate Gradation Stripping b) Mixing temperature of Mix c) Laying temperature of Mix	Gradation, Grain- size-analysis (Gradation test) Impact. Value, (flakiness index & elongation-index) Stripping-value, water absorption test Measurement of Temperature by thermo-meter -----do----- Measurement by Making pit/Core-	As per I.S. 2720 155' degree C-163' C 110 degree C-135 degree C As per design the density should not be less than 95% of the optimum density	

	<p>d) Thickness of Layer density</p> <p>e) Surface Even-ness</p>	<p>cutter method of calculating density</p> <p>By- Straight-edge</p>		
29.	<p><u>Bituminous-Layer Equipment</u></p> <p>a. Functioning of hot mix plant (Computerized)</p> <p>b. Calibration of weighing-machine</p> <p>c. Functioning of sensor paver finisher</p> <p>d. Seal-Coat- over carpeting</p> <p>e. Longitudinal and transverse joints</p>	<p>Visual – Observations(Plant bins, Computer functioning)</p> <p>Visual-observation</p> <p>-----do-----</p> <p>Visual-observation</p> <p>-----do-----</p>	As per specifications	
30.	<p><u>CROSS-DRAINAGE- WORKS:-</u></p> <p>a) Quality of material-Concrete, stone/ Brick, Masonry, Hume pipes including size etc.</p>	<p>Visual-Observations (for c.c.. verify-cub test results from records)</p> <p>Visual-observation</p>	As per specifications	

	b) Quality of workmanship such as positioning of pipes , wing walls, cushion over H pipes etc.		As per design	
31.	<u>SIDE-DRAINS:-</u> General Quality of side-drains catch water drains and their- integration with Cross Drainage.	Visual-observation/Actual measurement	As per drawing	
32.	Concrete-Pavements:- a) Quality of workmanship-wearing surface texture, surface-evenness. Adequacy of setting of concrete joints edges etc.	Visual-observations/Graduated/Straight wedge/Bump integrator-method	As per I.R.C.43-1972	
33.	Thickness of Layer	Measurement	As per design	
34.	Road Protection Works	Visual Observation/Actual Measurement	As per design	

Note:-

1. The Planning Audit of working drawings will be carried out before the execution of the project.
2. The Quality Audit based upon critical engineering aspects as mentioned above will be carried out when the progress of the work is 25%-50% and 80% respectively.
3. The Quality of material such as bitumen, aggregates etc will be checked by taking samples of materials being used at site. The no of samples to be taken will be at the discretion of the Audit Team.
4. The check list is indicative only and not exhaustive. The Audit Team can check any other item at its discretion.