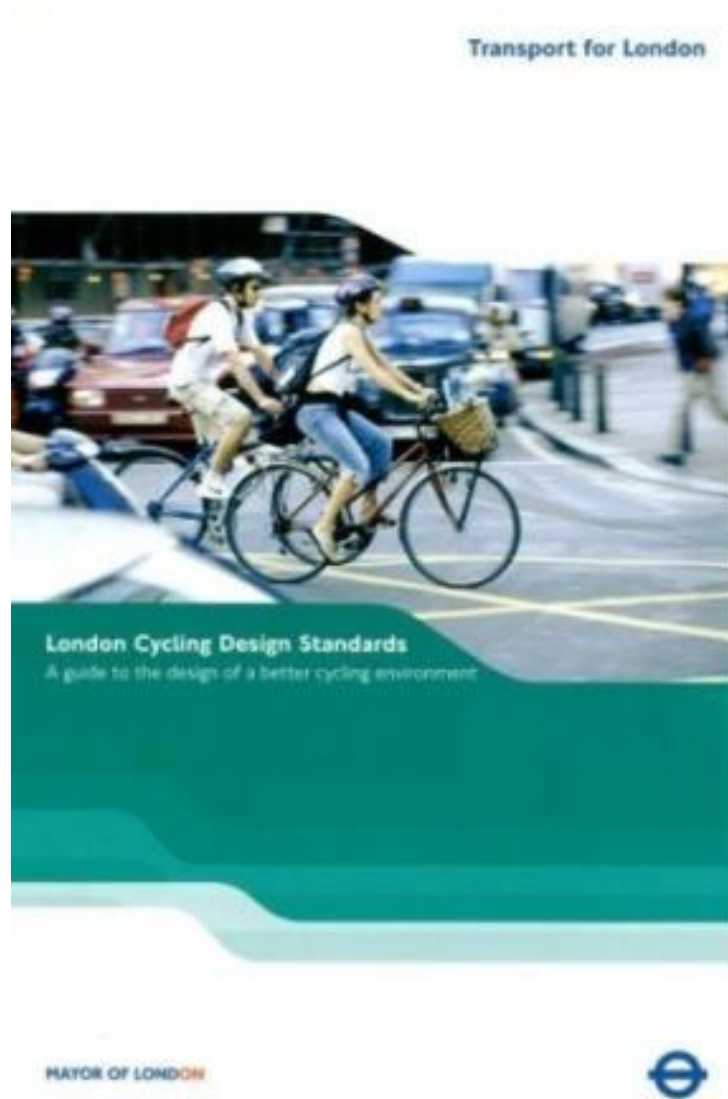


LCDS revision

Design principles & levels of service

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**THE MAYOR'S
VISION FOR
CYCLING IN LONDON**
An Olympic Legacy for all Londoners



What's new in LCDS (1)?

- Response to changing policy context (Vision, Go Dutch, APPCG)
- Driving quality through current investment (Superhighways, Quietways, Grid, Mini-Hollands)
- Integration with spatial planning and urban design
- New quality framework:
 - design principles
 - level of service assessment
- Defining best practice & drawing on international benchmarking
- Dealing with interaction with other modes
- Promoting innovation and trialling



What's new in LCDS (2)?

- More design options for segregated / lanes and tracks, and their interaction with other infrastructure
- More and clearer ways of achieving cycle priority
- Emphasising the importance of area permeability for cycling, and of area-wide traffic management/reduction
- Guidance on off-highway cycling
- Expanded guidance on cycle parking
- Dealing with cyclists at road works and long-term development areas
- Phased implementation of cycling infrastructure



Design Principles

SAFETY

- Separation / protection from motor traffic
- Low speed / vehicle restricted environments
- Subjective and actual safety – day/night
- Considerate, consensual behaviour by all users

DIRECTNESS

- Convenient, connected, visible routes
- Minimise deviations
- Permeability – closures, exemptions
- Design speed of cyclists

COMFORT

- Smooth riding surface
- Design for effective width
- Minimise undulations, gradients, deflections, pot holes
- Well-sited, secure cycle parking

COHERENCE

- Continuous network
- Consistent standards of provision
- Legibility & wayfinding
- Simple, appropriate to the place

ATTRACTIVENESS

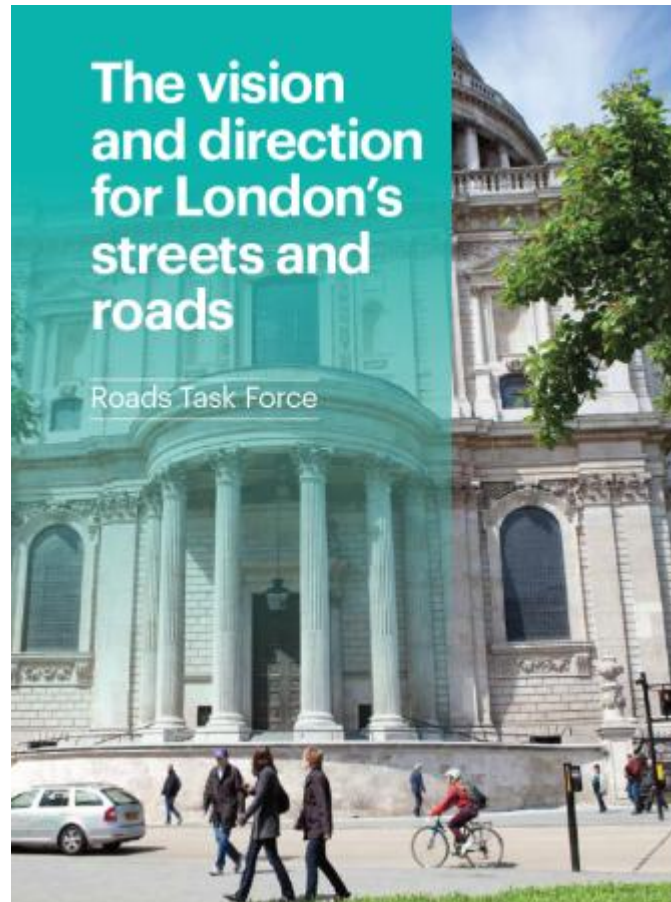
- Tidier, decluttered streets
- Integration with kerbside activity
- Wider environmental enhancements
- Improvement of pedestrian accessibility

ADAPTABILITY

- Durable, easy to maintain
- Allowing good interchange between modes
- Cycling facilities kept open during roadworks
- Temporary and trial layouts
- Able to grow over time



New strategic framework for cycling interventions: the Roads Task Force report



Cyclists take one less sick day per year than non-cyclists, estimated to save UK business £128m per year and potentially £2bn over the next ten years²⁰.

- more efficient/flexible use of space
- managing demand by shifting to more sustainable modes
- improved safety for vulnerable road users

The RTF's vision focuses on three core aims:

- To enable people and vehicles to move more efficiently on London's streets and roads
- To transform the environment for cycling, walking and public transport
- To improve the public realm and provide better and safer places for all the activities that take place on the city's streets, and provide an enhanced quality of life

Cycling facilities by RTF 'Street-type'

Movement Function



Place Function



Work on a “Cycling Level of Service Assessment Tool”

Cyclist Level of Service Assessment Tool						
Sections that fail to meet the minimum standard should receive no score. This may indicate that immediate action is required.						
Principle	Measurement		Score (for reference)			ROUTE/JUNCTION SCORE
	Factor	Indicator	1 (Poor)	2 (Average)	3 (Good)	
Safety	Collision risk	Left/right hook at junctions	Side road junctions frequent and/or unrestricted	Side road junctions fewer and with effective entry treatments	Side roads closed or treated to blend in with footway	
		Collision alongside or from behind	Cyclists in unrestricted traffic lanes or cycle lanes less than 2m wide	Cyclists in cycle lanes at least 2m wide on carriageway	Cyclists away from unrestricted traffic	
		Kerb-side activity (bus stops, parking loading) or collision with open door	Frequent kerb-side activity on rear side of cyclists - narrow cycle lanes	Less frequent kerb-side activity on rear side of cyclists - wide cycle lanes	Segregated cycle lanes (driving, including activity) or no kerb-side activity	
		Other vehicle fails to give way or disobeys signals	Poor visibility, route continuity across junctions and understanding of priority	Clear route continuity through junctions / good visibility and understanding of priority	Cycle priority at signalised and uncontrolled junctions	
	Feeling of safety	Separation from heavy traffic (if not segregated) Speed of traffic (if not segregated) Volume of traffic	Cyclists in unrestricted traffic lanes or cycle lanes less than 2m wide 80% percentile greater than 35mph Greater than 20,000 AADT	Cyclists in cycle lanes at least 2m wide on carriageway 85% percentile 25-35mph 5,000 - 20,000 AADT	Cyclists away from unrestricted traffic 85% percentile less than 25mph Less than 5,000 AADT	
		Interaction with heavy traffic (HGVs and buses)	Frequent interaction between cyclists and HGVs/buses	Occasional interaction between cyclists and HGVs/buses	No interaction between cyclists and HGVs/buses	
		Relief of crime	High fear of crime	Low fear of crime	No fear of crime	
		Lighting	Large stretches of darkness	Small stretches of darkness	Route lit thoroughly	
	Social safety	Isolation	Route passes far from other activity	Route always close to activity	Route always overlooked	
		Highway environment behaviour	Highway design encourages aggressive user behaviour	Highway design controls behaviour	Highway design encourages calmer behaviour through road layout and landscaping	
Directness	Journey time	Ability to maintain own speed on links	Cyclists travel at speed of slowest vehicle/cycle ahead	Cyclists can usually pass traffic and other cyclists	Cyclists can always choose their own speed (within reason)	
	Delay at junctions	Delay at junctions	Cyclists journey time longer than motor vehicles	Cyclists journey time around the same as motor vehicles	Cyclists can bypass signals or have their own stage	
Coherence	Directness	Directness of route	Cycle route longer or with more turns than main road	Cycle route around the same length and turns as main road	Cycle route shorter or has fewer turns than main road	
	Connections	Ability to join/leave route safely and easily, consider left and right turns	Cyclists cannot connect to other routes without dismounting or rushing	Cyclists can connect to other routes	Cyclists have dedicated connectors to other routes provided	
Comfort	Wayfinding	Signage	Difficult to get lost	Easy to get lost	Impossible to get lost	
	Surface quality	Density of defects including non-cyclic friendly potholes, raised kerbs, uneven pavements	Numerous defects	Minor defects	Smooth high grip surface	
	Pavement construction	Hand rolled HRA, unstable bitcracks	Machine laid HRA, smooth blocks	Machine laid HRA, smooth blocks	SMA, smooth and firm blocks undisturbed by turning heavy vehicles	
	Effective width without conflict	Allocated riding zone range, segregated or nearside lane allocation, south direction	<1.5m	1.5-2.0m	>2.0m	
	Gradient	Uphill gradient over 100m pitch	<5%	3-5%	>3%	
	Deflections	Pinch points caused by horizontal deflections (not segregated)	Lane width <3.2-4.0m	Lane width <3.2m	Lane width >4.0m	
	Undulations	Vertical deflections	High impact round top humps	Shoulder humps	None	
	Prioritise walking and cycling	Highway layout, function and road markings adjusted to promote walking and cycling	Little priority given to walking and cycling	Some priority given to walking and cycling	Priority given to walking and cycling	
	Greening/GUDs	GUDs/green infrastructure or sustainable materials incorporated into design	No greening element	Some greening elements	Full integration of greening elements	
	Air quality	PM10 & NO2 values	High (exceeding EU levels)	Medium	Low	
Attractiveness	Street family	Appropriate design for link and place	Poor match	Some compromises	Good fit for surroundings	
	Minimise street clutter	Signage required to support scheme layout	Large amounts of signage to conform with regulation due to counter intuitive or over engineered solutions	Moderate amount of signage per locality around junctions	Signage for wayfinding purposes only	
	Secure cycle parking	Ease of access to secure cycle parking within businesses and on street	No additional cycle parking provided or small provision in insecure non overlooked areas	Some cycle parking provided but not enough to meet demand	Cycle parking provided to meet demand	
	Public transport integration	Smooth transition between modes or mode continuity maintained through bus/train interchanges	No consideration for cyclists within interchange area	Cycle route continuity maintained through interchange and some cycle parking available	Cycle route continuity maintained and secure cycle parking provided. Transport of cycles available	
Adaptability	Flexibility	Facility can be expanded or layouts adopted within area constraints in order to counter collision risk or an increase in demand. Utility road works can be managed without route closure	No adjustments are possible within constraints and road works will lead to circuitous diversion routes	Links can be adjusted to meet demand but junctions are constrained by motor vehicle capacity limitations. Some road works will require closure	Layout can be adjusted freely without constraint to meet demand or collision risk. Adjustments can be made to maintain full route quality when roadworks are present	
	Growth enabled	Route matches predicted usage and has evidence built into the design	Provision struggles to cope with existing cycling demand which could lead to conflict with other modes	Provision is matched to predicted demand flows	Provision has spare capacity for large increases in predicted cycle use	
TOTAL						Max 93
						<div> <div>Range 1: <40</div> <div>Range 2: 40-70</div> <div>Range 3: >70</div> </div>

- Measurable criteria, grouped by Design Principle
- Developed from IHT tool, Go Dutch matrix, emerging TfL best practice
- Applicable to individual schemes, options or route choices
- Adjustable to fit different route types



SAFE – Objective and Subjective (48/100points)

Cyclist Level of Service Assessment Tool

Low level scores on critical factors must be mitigated through realignment or highway layout changes irrespective of high scores in other categories

Measurement			Score (for reference)			ROUTE/LINK/JUNCTION SCORE
Principle	Factor	Indicator	0(Red)	1 (Amber)	2 (Green)	
Safety	Collision risk	Left/right hook at junctions	Side road junctions frequent and/or untreated. Major junctions conflicting movements not seperated	Side road junctions fewer and with effective entry treatments. Major junctions route alignment stream conflicts seperated	Side roads closed or treated to blend in with footway. Major junction all conflicting streams seperated	6 Critical
		Collision alongside or from behind	Cyclists in unrestricted traffic lanes or cycle lanes less than 2m wide	Cyclists in semi segregated cycle lanes at least 2m wide on carriageway	Cyclists away from unrestricted traffic	6 Critical
		Kerbside activity (bus stops, parking loading) or collision with open door	Frequent kerbside activity on nearside of cyclists – narrow/no cycle lanes	Less frequent kerbside activity on nearside of cyclists – wide cycle lanes	Segregated cycle lanes (floating kerbside activity) when frequent or no kerbside activity	6 Critical
		Other vehicle fails to give way or disobeys signals	Poor visibility, route continuity across junctions and understanding of priority	Clear route continuity through junctions / good visibility and understanding or priority. Cyclist priority across minor junctions	Cycle priority at signalled and uncontrolled junctions	2
	Feeling of safety	Separation from heavy traffic	Cyclists in unrestricted traffic lanes or cycle lanes less than 2m wide	Cyclists in cycle lanes at least 2m wide on carriageway	Cyclists away from unrestricted traffic	2
		(If not segregated) Speed of traffic	85% percentile greater than 25mph	85% percentile 20-25mph	85% percentile less than 20mph	6 Critical
		(If not segregated) Volume of traffic expressed as Vehicle Risk Unit (VRU)	>5000 VRU per day	2000-5000 VRU per day	<2000 VRU per day	6 Critical
		Interaction with heavy traffic (HGVs and buses)	Frequent interaction between cyclists and HGVs/buses	Occasional interaction between cyclists and HGVs/buses	No interaction between cyclists and HGVs/buses	6 Critical
	Social safety	Risk/fear of crime	High fear of crime due to ambush spots, loitering, poor street maintenance	Low fear of crime as open, well designed and maintained area	No fear of crime as high quality streetscene and pleasant interaction	2
		Lighting	Large stretches of darkness	Small stretches of darkness	Route lit thoroughly	2
		Isolation	Route passes far from other activity	Route always close to activity	Route always overlooked	2
		Highway environment behaviour	Highway design encourages aggressive user behaviour	Highway design controls behaviour	Highway design encourages civilised behaviour through negotiation and forgiveness	2



COMFORT – Objective (20/100points)

Comfort	Surface quality	Density of defects including non cycle friendly ironworks, raised/sunken covers/gullies	Numerous defects	Minor defects	Smooth high grip surface	6	Critical
	Surface material	Pavement construction with Hot Rolled Asphalt, Stone Mastic Asphalt or blocks/bricks/sets	Hand laid asphalt, Unstable blocks/sets	Machine laid HRA, smooth blocks	SMA, smooth and firm blocks undisturbed by turning heavy vehicles	2	
	Effective width without conflict	Allocated riding zone range. Segregated or nearside lane allocation each direction	<2m Superhighway <1.5m Quietway	2.0 - 2.5m Superhighway 1.5m to 2m Quietway	>2.5m Superhighway >2m Quietway	6	Critical
	Gradient	Uphill gradient over 100m range	>5%	3-5%	<3%	2	
	Deflections	Pinch points caused by horizontal deflections (non segregated)	Lane width 3.2-4.0m	Lane width <3.2m	Lane width >4.0m	2	
	Undulations	Vertical deflections	High impact round top humps	Sinusoidal humps	None	2	



DIRECT – Objective and Subjective (8/100points)

Directness	Journey time	Ability to maintain own speed on links	Cyclists travel at speed of slowest vehicle/cycle ahead	Cyclists can usually pass traffic and other cyclists	Cyclists can always choose their own speed (within reason)	2
		Delay at junctions	Cyclists journey time longer than motor vehicles	Cyclists journey time around the same as motor vehicles	Cyclists can bypass signals or have their own stage	2
	Value of Time	VOT for cyclists compared to private car use during normal weather conditions	>than private car use value due to uncomfortable and stressful conditions	Equivalent to private car use value with similar delay inducing factors and convenience	<private car use value due to attractive nature of route	2
	Directness	Directness of route	Deviation factor against straight line or main road alternative >40%	Deviation factor against straight line or main road alternative 20 - 40%	Deviation factor against straight line or main road alternative <20%	2



COHERENT – Objective and Subjective (6/100points)

Coherence	Connections	Ability to join/leave route safely and easily: consider left and right turns	Cyclists cannot connect to other routes without dismounting or rushing	Cyclists can connect to other routes	Cyclists have dedicated connections to other routes provided	2
		Density of other routes based on mesh width	Network density mesh width >400m	Network density mesh width 250 - 400m	Network density mesh width <250m	2
	Wayfinding	Signing	Easy to get lost	Hard to get lost	Impossible to get lost	2



ATTRACTIVE – Objective and Subjective (12/100points)

Attractiveness	Impact on walking	Highway layout, function and road markings adjusted to minimise impact on pedestrians	Reduction in quality of provision for pedestrians	No impact on pedestrian provision	Pedestrian provision enhanced by cycling provision	2
	Greening	Green infrastructure or sustainable materials incorporated into design	No greening element	Some greening elements	Full integration of greening elements	2
	Air quality	PM10 & NOX values referenced from concentration maps	High (exceeding EU levels)	Medium	Low	2
	Noise pollution	Noise level from recommended riding range	>78DB	65-78DB	<65DB	2
	Minimise street clutter	Signage required to support scheme layout	Large amounts of signage to conform with regulation due to counter intuitive or over engineered solutions	Moderate amount of signage particularly around junctions	Signage for wayfinding purposes only and not causing additional obstruction particularly in segregated facilities	2
	Secure cycle parking	Ease of access to secure cycle parking within businesses and on street	No additional cycle parking provided or small provision in insecure non overlooked areas	Some cycle parking provided but not enough to meet demand	Cycle parking provided to meet demand	2



ADAPTABLE– Objective and Subjective (6/100points)

Adaptability	Public transport integration	Smooth transition between modes or route continuity maintained through bus/train interchanges	No consideration for cyclists within interchange area	Cycle route continuity maintained through interchange and some cycle parking available	Cycle route continuity maintained and secure cycle parking provided. Transport of cycles available.	2
	Flexibility	Facility can be expanded or layouts adopted within area constraints in order to counter collision risk or an increase in demand. Utility road works can be managed without route severance	No adjustments are possible within constraints and road works will lead to circuitous diversion routes	Links can be adjusted to meet demand but junctions are constrained by motor vehicle capacity limitations. Road works will not require closure; cycling will be maintained although route quality may be compromised to some extent	Layout can be adapted freely without constrain to meet demand or collision risk. Adjustments can be made to maintain full route quality when roadwork's are present	2
	Growth enabled	Route matches predicted usage and has exceedence built into the design	Provision struggles to cope with existing cycling demand which could lead to conflict with other modes	Provision is matched to predicted demand flows	Provision has spare capacity for large increases in predicted cycle use	2



- +Separation of streams, slow circulating traffic
- Large area required, Intuitive?



- +Protected space for cycling, benefits for all users
- Bus stop conflict, relies on good will



- +Bicycle street, usable by all bike types
- Access for residents



- +Bypass bus stop without mixing with traffic
- Pedestrian cycle conflict if high bus use



- +Good cut through, well lit, dropped kerb flush
- Narrow footway, line marking on footway?



Barking and Dagenham



- +Wide, good surface quality, pleasant, greenway
- No lighting so intimidating at night



Barnet



- +Cycle route through closure, street trees, open feel
- Positioning could be more central to avoid conflict?



Bromley



+Access through closure, streetscape, open

-Traffic calming on a cycle track?



Camden



- +Ingenious way to end two way track and allow all movements at signalised junction
- Counter intuitive, tight entrance to general traffic



Camden



- +Offside segregated cycle track
- Only one direction catered for, left or straight on



Camden



- +Bridge protection incorporating segregation, wide
- Wide enough to overtake easily without clipping



City of London



- +Symbols placed perfectly, dooring zone gap
- Ambiguity at junction?



Hackney



- +Two way cycle route that avoids heavy bus route
- Taking provision away from pedestrians



Hammersmith & Fulham



- +Cycle Track feeding into ASL
- Footway too narrow <1.8m, Symbols badly placed



Hammersmith & Fulham



- +Clear route through paving, single level
- Conflict downhill with pedestrians?



Harrow



- +Cycle lane maintained up to junction
- Cycle lane leads to kerb buildout and parking bay



Harrow



- +High quality lighting provided on park route
- Unmade path needs upgrading (better use of



Harrow



- +Clear route to toucan, shared area, safe crossing
- Pedestrians tripping on antiskid?



Hillingdon



- +Red surface to indicate potential for conflict
- No deflection on roundabout entry/exit so high



Hillingdon



- +Reallocation of road space to accommodate ACL
- Primary road position may be better past side road,



Hillingdon



- +Remove central hatching to accommodate ACL
- Why not MCL is no parking allowed?



Hounslow



- +Permeability through a narrow road
- Pedestrian conflict in town centre



Islington



- +Offside lane inside offside bus lane
- Difficult to access, PGR and footway division



Sutton



- +Two way track and traffic calming on road, hybrid
- Footway width, pedestrian permeability across?



Tower Hamlets



- +Narrow segregation island ,<450mm clearance
- Risk of vehicle strike on signal post?



CS3



- +Rubber traffic island 500mm wide
- Temporary look and feel?



CS7



- +Maintain route continuity through junction
- Is secondary road position advisable?



Full consultation planned for November

