HIGH VOLUME TRANSPORT APPLIED RESEARCH

LAMATA

SLR

Inclusive Interchanges Design Brief

Summary guidelines and design appraisal template for public transport interchanges

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Abstract	
The Inclusive Interchanges Design Brief (IIDB) has been developed for use by public transport and urban planning authorities, to provide: a catalogue of design topics to be taken into account during the design of a public transport interchange, together with summary guidance and inclusion of links to more detailed guidelines; a template enabling design appraisal of existing interchanges, as well as those currently in the design process; and a document to record appraisal comments, as well as interchange design and management suggestions.	
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Contents

Abbreviations/Acronyms

BRT	Bus Rapid Transit
FCDO	Foreign, Commonwealth & Development Office
HVT	High Volume Transport
IIDB	Inclusive Interchanges Design Brief
ITDP	Institute for Transportation and Development Policy
ITS	Intelligent Transport Systems
LAMATA	Lagos Metropolitan Area Transport Authority
PT	Public Transport
SSATP	Africa Transport Policy Program

UITP	International Association of Public Transport

About

Public transport interchanges are vibrant focal points in city life, where transport, commerce and social interaction weave together. Getting interchange design right is key to enabling and promoting low carbon, efficient, inclusive and affordable mobility, while getting it wrong can lock in disincentives and problems for many years.

The **Inclusive Interchanges Design Brief (IIDB)** has been developed for use by public transport and urban planning authorities, to provide:

- a catalogue of design topics to be taken into account during the design of a public transport interchange, together with summary guidance and inclusion of links to more detailed guidelines;
- a template enabling design appraisal of existing interchanges, as well as those currently in the design process; and
- a document to record appraisal comments, as well as interchange design and management suggestions

The term 'inclusive' applies to both:

- Socially inclusive – delivering public transport that is accessible to all, for example by providing a safe option for women and families, and ensuring that people with disabilities can move with ease through the interchanges.
- Sectorally inclusive – providing the ability for both formal and informal transport and retail/market trading stakeholders to operate at an interchange in a mutually beneficial manner.

Highlighting informal transport/paratransit in this way acknowledges that, in the context of cities in Sub-Sahara Africa, these services are expected to continue to play an important role and can contribute to providing a dense network of collective mobility in the future. With regards to informal market trading, the income achieved is fundamental to the livelihoods of many families, and in inclusive interchanges, traders could continue to provide convenient and affordable shopping options for passengers.

This IIDB template was developed in collaboration by Lagos Metropolitan Area Transport Authority (LAMATA) and Vectos (part of SLR), through an iterative approach that involved design appraisals of two interchange case studies in Lagos (Mile 2 and Marina). If you are interested to learn more about the findings from this process, as well as the results of a pilot Inclusive Interchanges passenger survey, please refer to the **T-TRIID Inclusive Interchanges: Report on LAMATA pilots and IIDB Deployment Strategy.**

Structure and use

When to use the IIDB template

This IIDB template provides for: a summary appraisal of an interchange site; followed by an evaluation of a proposed interchange design or existing facility, in relation to four main topic categories. It is possible to use the IIDB at different stages of a design or refurbishment process, with differing emphasis on the purpose. To illustrate this, the Royal Institute of British Architects 'Plan of Work' provides one example of a process map for the design and construction of complex projects (RIBA 2020). In the table below, we indicate how the IIDB could be utilised at relevant stages of this Plan of Work.

It is clear that the IIDB is to be used as a tool as part of the wider interchange planning and design process, which will involve many other important elements such as stakeholder engagement, Environmental and Social Impact Assessment (ESIA), as well as the completion of detailed technical studies on many of the design topics covered by the IIDB (e.g. public transport operational requirements and passenger forecasts, Intelligent Transport Systems, building systems, flood risk assessment etc.)

Table 1 - Use of IIDB at different stages of RIBA Plan of Work

RIBA Plan of Work	0 Strategic Definition	1 Preparation & Briefing	2 Concept Design	3 Spatial Coordination	4 Technical Design	5 Manufacturing & Construction	6 Handover	7 Use
Use of IIDB	Untertake site appraisal Define transport requirements (formal & informal sectors) Assess potential for Transit Oriented Development	Use IIDB to prepare design brief/list of requirements and sustainability outcomes for design team	Apply IIDB for design appraisal of concept design, providing feedback and suggestions to design team	Update IIDB design appraisal, based on final drawings for planning applications/ board approval	Use summary guidelines and IIDB references to inform and check results of technical studies (e.g. lighting, building energy efficiency)			IIDB used to appraise potential improve-ments to existing facilities Passenger Survey utilised to gain feedback.

Design categories and topics

In total, the IIDB promotes consideration of 55 design topics, which have been divided into four main design categories, as set out in the table below.

Table 2 - Overview of design categories and topics

IIDB Section	Content summary
1. Context and Site Appraisal	• Interchange location and transport connections • Interchange zone • Interchange site and proposed layout • Forecast passenger numbers
2. Multimodal sustainable mobility	**2.1 Multi-modal interchanges** 12 topics relating to the layout of the interchange site and buildings, and measures to enable efficient and inclusive movement of passengers between transport modes.
	2.2 Transport mode specific 14 topics covering the provision of different transport options and related operational requirements, as well as future-proofing for alternative fuelling.
3. Comfort and safety	13 topics addressing the fundamental passenger requirements for inclusive interchanges, including gender dimensions, safety and security.
4. Hubs for public life	9 topics that cover the role of interchanges as hubs in public and cultural life, that can provide opportunities for work, shopping and leisure, while also generating income streams.
5. Integrated planning and design	7 topics ensuring that broader planning considerations relating to Transit-Oriented Development (TOD), energy efficiency and generation, as well as climate resilience, are taken into account.
References & further inspiration	A full list of the guidance and publications referred to in the IIDB is provided in the final section.

Format of the design guidance and appraisal tables

For each of the appraisal sections 2 – 4, the design topics are presented in a standard table format, as illustrated below. This includes summary guidelines, as well as space for the interchange appraiser to make their own notes. To help prioritise those topics requiring attention 'Traffic light' grading of the current interchange site or design status can be undertaken, for example, as follows:

- Green – All, or the majority, of design considerations are addressed to a satisfactory level
- Light green – The majority of design considerations are satisfactorily addressed, but some further improvements are identified
- Amber – One or more important design considerations are not addressed and the topic should be investigated further
- Red – Design considerations are poorly addressed, or not at all
- N/A – the design consideration is not considered relevant (Not Applicable) for the interchange being appraised
- ? –insufficient information is currently available to appraise the topic.

Table 3 - Format of the design appraisal tables

Topic	Guidelines & resources	Status	Site appraisal and recommendations
Topic title	Explanatory statement, plus checklist of design considerations: • Design issue 1 • Design issue 2 Recommendations for more detailed guidelines	● ● ● ● ? N/A	Explain the 'status' of traffic-light grading for each topic: • what works well • which design issues are not addressed • ideas and recommendations to put forward to the design team

Interchange layout concept and terminology

For reference while using the IIDB template, the interchange concept diagram below introduces selected terminology and principles, including the terms ENTRANCE, DECISION and OPPORTUNITY space, and MOVEMENT corridors (these are based on the Transport for London 'Interchange best practice guidelines, comprehensive guide' from 2021).

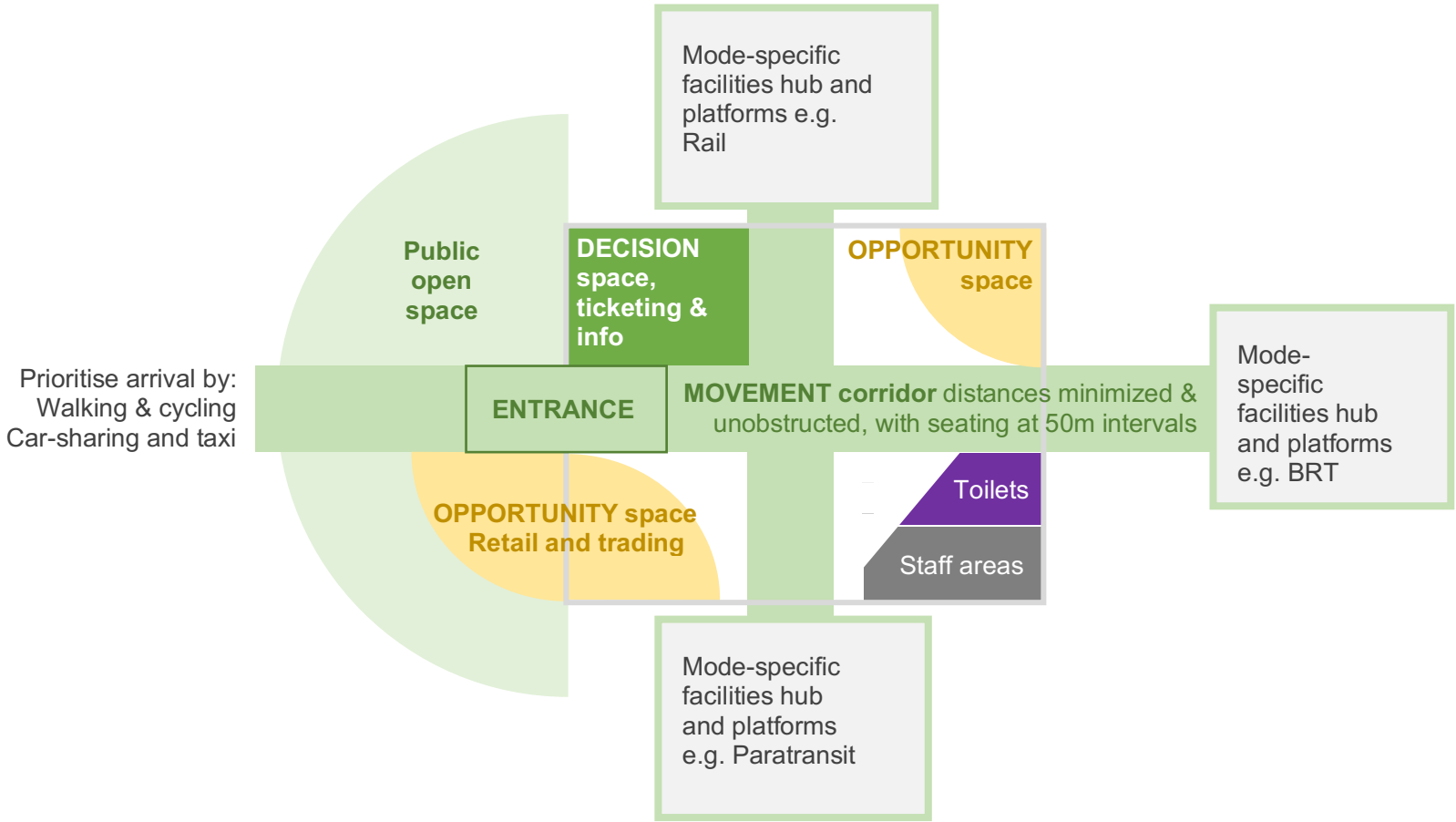

Figure 1 - Interchange layout concept and terminology diagram

Interchange design categories and topics

The table below provides a full listing of design topics per category and includes links, enabling quick movement to specific design topics

Table 4 – Interchange design categories and topics index table

2. Multimodal sustainable mobility									
2.1	Multi-modal interchanges	2.2	Transport mode specific	3.	Comfort and safety	4.	Hubs for public life	5.	Integrated planning and design
2.1.1	Interchange entrance	2.2.1	Prioritising sustainable modes	3.1	Temperature and ventilation	4.1	Formal retail	5.1	Transit Oriented Development (TOD)
2.1.2	Interchange decision space	2.2.2	Intelligent Transport Systems	3.2	Shelter at waiting areas	4.2	Informal market trading	5.2	Renewable energy generation and storage
2.1.3	Movement corridors	2.2.3	Walking routes	3.3	Seating	4.3	Cashpoints	5.3	Energy efficiency of buildings and infrastructure
2.1.4	Movement for people with disabilities	2.2.4	Cycling routes	3.4	Lighting	4.4	Advertising		
2.1.5	Opportunity space	2.2.5	Cycle parking and storage	3.5	Noise	4.5	Business lounge	5.4	Construction materials and sourcing
2.1.6	Mobility service information & wifi	2.2.6	Cycle sharing and rental	3.6	Toilets and baby changing areas	4.6	Provision for families and children	5.5	Urban greening
2.1.7	Wayfinding and signage	2.2.7	Rail platforms	3.7	Drinking water	4.7	Lockers and luggage storage	5.6	Climate resilience – temperature and heatwaves
2.1.8	Mobility service info and wayfinding for people with disabilities	2.2.8	BRT and bus services	3.8	Passenger safety through design	4.8	Public open space	5.7	Climate resilience – sustainable drainage and flood risk mitigation
		2.2.9	Informal public transport	3.9	Security staff	4.9	Public performance & art		
2.1.9	Access/egress and integrated ticketing	2.2.10	Electric vehicle charging infrastructure	3.10	CCTV				
2.1.10	Operations control centre	2.2.11	Taxi services	3.11	Gender dimensions and safety				
2.1.11	Staff rooms	2.2.12	Car sharing	3.12	Waste management				
2.1.12	Vehicle maintenance	2.2.13	Private car and motorcycle	3.13	Emergency response				
		2.2.14	Parcel collection						

1. Context and site appraisal

Interchange location and network connections ***IIDB user notes**: Input information on the interchange location and role in the city's sustainable mobility network, alongside maps and images. Background information should include a list of the formal and informal mobility services that: currently operate from the site; and will operate from the proposed interchange.*	*Space to insert maps and network diagrams*	*Space to insert maps and network diagrams*
Passenger numbers and flows ***IIDB user notes:** This sub-section can be used to record available infomation on the existing and proposed levels of passengers using a facility. This will help to determine the sizing of the interchange, movement corridors, waiting areas, and any supplementary facilities.*	*Space to insert tables and charts where available*	*Space to insert tables and charts where available*

Interchange zone ***IIDB user notes:*** *To promote use of the new interchange it is beneficial to identify important sources of passenger trips. This will help inform access points to the interchange and improvements to priority sustainable mobility approach routes, as well as knowledge of frequent user groups.* *Insert an annotated map that defines 'interchange zone' based on the following parameters:* • *Typical walking distance (approx. 400m, up to 800m)* • *Locations of other public transport hubs in the vicinity* • *Locations of key local destinations or starting points for passengers (e.g. high density business parks, health and education facilities, entertainment venues)* • *Other transport nodes*	*Space to insert maps and photos*	*Space to insert maps and photos*
Interchange site and building layout ***IIDB user notes:*** *Maps and images of the existing and proposed interchange should be used to present the main:* • *Entry, Decision, Movement and Opportunity areas and corridors of the interchange (see the Interchange Layout Concept diagram).* • *Key walking and cycling routes to reach the Interchange.* • *Other important opportunities and challenges.*	*Space to insert drawings, photos and visualisations*	*Space to insert drawings, photos and visualisations*

2. Intermodal sustainable mobility

Addressing the core function of the interchange, section 2 of the Design Brief is divided into two-sections: 2.1 Multi-modal interchange, covering the layout and design of the interchange; and 2.2 Transport modes, covering provision for, as well as specific design considerations, for different modes.

2.1 Multi-modal interchanges

Objectives

- To enable ease of access to and efficient transfer between transport modes for passengers, including informal transport modes, with priority given to sustainable motorised and non-motorised modes.
- To ensure inclusive accessibility for all groups of people, including people with disabilities, older age groups and for people travelling with children.
- To facilitate efficient and safe operations for transport and mobility providers.
- To support a switch to clean and low carbon fuels.
- To provide integrated journey planning, wayfinding and ticketing.

Topics	Guidelines & resources	Status	Appraisal notes and suggestions
2.1.1 Interchange 'Entrance'	When entering the interchange, a concourse entrance requires clear sightlines in a well-lit, spacious area to offer a positive first impression. This will keep stress levels low throughout the station. Well-defined transport entrances are a good idea here, as well as a cohesive environment to filter passengers further into the station and prevent a blockage early on which could result in delays.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.1.2 Interchange 'Decision' space – information and tickets	'Decision spaces' provide a place for passengers to pause and plan the next stage of their journey. Key design considerations are: • They should include information and ticket purchase offices and points; They are positioned out of main movement corridors to avoid conflicts;	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Appraisal notes and suggestions
	• They have good sight lines along movement corridors and to clear signage.		
2.1.3 'Movement' corridors and transfer distances	Movement spaces connect decision spaces and public transport platforms and stops. Conflicts of movement (for efficiency and to enable physical distancing during potential pandemics), queues and obstructive street furniture should be avoided: • A key aim is that transfer distances between platforms and stops should be minimized, with a distance of around 400m considered the maximum[1]. • Seating should be provided at 50m intervals throughout the interchange to enable rests (see Topic 3.3). • Movement corridor widths of min. 5.5m (including a 4m pedestrian zone and 1.5m furniture zone) are recommended (based on ITDP 2018) • Throughout the interchange, for user comfort, surfaces should have a maximum gradient of 1:60. • Where this is not achievable a 1:20 max should be applied. Anything steeper would be considered a ramp. Design concepts for consideration include: • Promote 'cross-platform' interchange between high capacity / footfall services • Multi-level interchange can enable compact design, but may hinder access for mobility impaired people. For more info see 'Station Planning and Sizing' in Network Rail (UK) Station Planning Guidance	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

[1] There is limited guidance on walking distances between platforms and bus stops at interchanges and the 400m figure is actually based on the typical walking distance to a bus stop, which takes into account a range of passenger convenience, operational and economic considerations (see for example humantransit.org). The objective should clearly be to minimize the time and physical effort required to transfer from one mode to the other, working within the constraints of an interchange site.

Topics	Guidelines & resources	Status	Appraisal notes and suggestions
2.1.4 Movement for people with disabilities	The transport environment can have a very significant impact on whether people with disabilities can travel at all. Problems with a single part of the trip-chain can make the entire journey impossible and therefore the design of future interchanges will have a major impact. Considerations are: • Provision of step-free access to all areas of interchanges. • Optimise all lift and escalator locations and designs and ensure space for maneuvering of wheelchairs. • Ramps should have maximum gradients of 1 in 20 (5%) and each section should not exceed 10m. Resting places should be provided for longer ramps. • Tactile surfaces will warn visually impaired users and are encouraged at platform edges, stairs and changes in level.A drainage crossfall of no more than 1:40 should be adopted for walkways. • Kerbs and platforms should be provided at the right height to provide step-free access. • Use contrasting colours to differentiate areas and surfaces, which will aid visually impaired users. • Shelters at bus stops and on platforms should be designed to provide space for people in wheelchairs to maneuver. For detailed information see: Road Note 21 – Guidelines for Practitioners (February 2022).	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.1.5 'Opportunity' space – retail and services	Opportunity spaces provide areas for formal and informal retail and service provision for passengers within and around the interchange building and structures. These should be	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Appraisal notes and suggestions
	positioned to the side of movement corridors, but can provide passive surveillance along movement corridors. These are covered in more detail in Section 4.		
2.1.6 Mobility service information & wifi	Mobility service information should be provided in a highly visible format throughout the interchange, comprising: • Primary departures boards covering all (formal) modes with real-time information at main entrances/'decision' spaces and waiting rooms/areas • Secondary departure boards for individual platforms and stops • Provision of clocks in main 'decision areas' and at platforms/stops • Provision of free wifi to enable use of journey planning apps, as well as benefitting passengers more generally	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.1.7 Wayfinding and signage	Wayfinding becomes an essential part of the experience in any interchange and should aim to ensure smooth journeys for all users. Consideration should be given to: • Network and interchange maps should be displayed prominently. Network maps can distinguish between daytime and nighttime services. • Create simple routes, with clear signage at 'decision' areas and along movement corridors. Signage should be visible at night. • Signage format and naming should remain consistent across the interchange and network • Where possible utilise colours and symbols over written wayfinding for accessibility.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Appraisal notes and suggestions
	• Where written signage is necessary, consideration should be given to providing multi-lingual signage. • Use technology with real time information to support wayfinding (with other methods to act as a back-up if power failures occur) • Illuminated emergency evacuation route signage should be provided and benefit from a back-up energy supply (see also section 3.13). For more info see 'Pedestrian wayfinding' and 'Traffic signs' in this guidance, and London Underground Signs manual (Issue 4, 2002)		
2.1.8 Mobility service information and wayfinding for people with disabilities	Mobility service and wayfinding information should also be made available for people with disabilities, including those with visual and hearing impairments, through approaches that include: • Signage and network maps should show designated step-free and obstacle free routes for accessibility • Network and interchanges maps to be provided in braille format • Public announcements of departures and safety instructions • Screens displaying safety announcements (additional to departure information)	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.1.9 Access/egress controls and integrated ticketing	Access and egress controls should enable both electronic and conventional ticket use to help ensure inclusivity.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.1.10 Operations	Provision of space for OCCs will enable local monitoring and management of: traffic and congestion; safety and security; and response in	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Appraisal notes and suggestions
Control Centre (OCC)	emergency situations. A central location enabling good visibility of the interchange (through CCTV and good sight lines) and quick response times will be beneficial.		
2.1.11 Staff rooms	Provision for staff members and transport drivers to rest, refresh and take breaks is important within a busy interchange. Depending on the size of the interchange it may be favourable to provide multiple spaces to prevent drivers in particular walking too far from their vehicles. Decentralization will assist with providing passive surveillance and staff presence throughout an interchange.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.1.12 Vehicle maintenance	Vehicle maintenance laybys and depots can be provided to enable routine maintenance and to prevent blockages to other traffic movements through the interchange.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

2.2 Transport mode specific

Topics	Guidelines & resources	Status	Site context & approach
2.2.1 Prioritising sustainable modes at the interchange	In order to promote sustainable mobility, access to the interchange via Non-Motorised Transport (NMT – walking and cycling), public and shared modes of transport should be prioritized over use of private cars. This overall principle is followed in the topics below.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.2 Intelligent Transport Systems	Intelligent Transport Systems (ITS) involve the deployment of information and communication technologies in relation to traffic management and mobility management, with the aim to use infrastructure in an efficient way (ERTICO-ITS 2019). ITS deployment at interchanges could include:	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	• Traffic signal management and prioritization of public and non-motorized forms of transport; • Public transport lane/ facility violation monitoring; and • Automatic monitoring/tracking of public transport and informal public transport to enable Real-Time Passenger Information (RTPI – see section 2.1.6) and promote safe driving practices. For more info see: SSATP Toolkit on ITS for Urban Transport		
2.2.3 Walking routes to the interchange	The majority of passengers arriving from the local area are likely to walk. Safe primary walking routes to the interchange, from key local destinations in the 'interchange zone', should: • comprise walkways of min. 2m width segregated from traffic (not more than 150mm higher than the carriageway); • be well lit to promote safety; and • provide safe crossing points on major roads. For more info see ITDP: Streets for walking and cycling	●	• Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.4 Cycling routes to the interchange	For those travelling longer distances to reach an interchange (typically >800m), cycling can be encouraged through the provision of safe cycle lanes along primary access routes. These should be min. 2m for a one-way movement and 3m for two-way movement. For more info see ITDP: Streets for walking and cycling	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.5 Cycle parking and storage	Provision of secure cycle parking and storage options in well-lit locations visible to security staff	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	will be key to encouraging cycling. Design considerations are: • Provision of short-term cycle parking (used for up to 2hrs) typically open cycle racks located close to entrances. • Provision of longer-term secure cycle storage (suitable for commuters or staff) comprising enclosed shelters or buildings, which can be staffed or un-staffed. • Provision of charging points for e-bikes Provision of cycle maintenance services, in the case of staffed cycle storage provision. For more info see: The Danish Cyclists Federation Bicycle Parking Manual		
2.2.6 Cycle sharing, rental and shared micro-mobility	Cycle sharing and rental services provide the opportunity for passengers arriving at an interchange to continue their journey by bicycle. There may be options to cooperate with companies/ organisations to also facilitate other forms of shared micromobility, such as e-scooters, for first and last mile trips. Key design and management considerations include: • Creation of clear guidelines on parking and provision of space for this. • Licensing to control numbers of operators and fleet sizes. For more info on regulatory and infrastructure measures adopted by cities in Europe see: Polis – Catch me if you can: How European cities are regulating shared micromobility.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.7 Rail platforms	To be safe, platforms need to be suitably wide to provide space for: boarding and alighting; circulation along the platform; and an 'activity' zone for seating and passenger facilities. Platform widths are based on calculations based on peak passenger numbers. Rail platforms	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	should be set at a height to enable ease of access and egress to and from trains, for people using wheelchairs, or with prams and heavy luggage.		
2.2.8 Bus Rapid Transit & bus services	High capacity bus services should be provided with priority access and egress between highway and interchange, with stops located to minimize walking distances to access other services. Four main platform layouts are: • Linear – suited to short duration on-street stops • Sawtooth – space efficient, drive-in drive-out arrangement with good kerb alignment, not requiring reversing maneuvers • Angle – drive-in, back out arrangement that is very space efficient and suitable where buses stop for longer durations. • Drive through platforms – drive-in drive-out arrangement that is space efficient, but can lead to more bus vs pedestrian conflicts. Bus stop platforms should be set at a height to enable ease of access and egress to and from buses, for people using wheelchairs, or with prams and heavy luggage. For more info see Auckland Transport Public Transport Interchange Design Guidelines 2013	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.9 Informal Public Transport (IPT) bus/minibus	As providers of high frequency public transport, licensed IPT services should be provided with dedicated space for passenger collection and drop-off in locations that minimize interchange distances. Provision of linear street-side laybys (that maintain free movement on highway carriageways) are likely to maximise speed and flexibility of IPT services, although other layouts	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	(see 2.2.7) could be considered, taking into account the amount of space available. For more information on approaches for working with the Informal Public Transport sector see the HVT TRANSITIONS Routemap		
2.2.10 Electric vehicle charging infrastructure	Where electric buses are not yet operating, consideration should be given to 'future-proofing' of interchanges, through provision of depot-charging and/or opportunity charging infrastructure. This can involve installation of electric sub-stations and underground cabling, during the construction phase, with sufficient capacity to enable the later addition of charging points with minimal disruption. Provision of charging facilities for other modes are also prompted in the following sections. Ensuring suitable overall capacity of the grid, and security of energy supply, is a key consideration for enabling future electrification of transport.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.11 Taxi services	Taxis provide an important supplementary role for public transport users, delivering extra flexibility in terms of destinations and timing of services. Design considerations include: • Creation of dedicated pick-up and drop-off bays (or co-located with kiss & drive where there are space constraints) • Provision of waiting areas in view of the pick-up and drop-off bays, potentially providing passive surveillance of interchange areas • Provision of (or future-proofing) provision of electric charging stations.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.12 Car sharing	Provision of dedicated bays for car-sharing (and/or rental) vehicles at interchanges should be considered, as this could provide the basis for a city-wide network of provision in highly accessible locations, as well as providing a	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	convenient option for passengers to continue longer trips.		
2.2.13 Private car & motorcycle	'Kiss n ride' bays, similar to taxi bays, can be provided for passengers dropped off and collected by car, but these should not take priority over the locations for public transport stops. Design considerations for private car and motorcycle provision, include: • The overall level of parking to be provided will depend strongly on location (i.e. city centre or city periphery), with the overall aim to minimise parking for private vehicles where there is not a clear rationale for providing park & ride services, enabling onward travel via public transport. • Parking spaces closest to interchange facilities should be allocated for people with disabilities, families, car sharing (see 2.2.11) and car pooling. • General Parking space dimensions are recommended to be a minimum of 5m x 2.5m. An additional 0.35m is added if the bay is next to an obstruction. For disabled accessibly bays, an additional 1.2m safety or transition zone marked with cross-patterned stripes should be added on one side of the parking bay. • Electric Vehicle charging should be provided, or 'future-proofed' in the specification of sub-stations and cabling. For more information see The Institution for Structural Engineers Car Park Design guidance.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
2.2.14 Parcel collection facility	Provision of parcel lockers or offices (potentially co-provided at convenience stores) can facilitate the delivery and collection of e-commerce goods by passengers, who are not at home during parts of the day. This can be provided a convenient	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	solution for passengers, while also reducing unsuccessful home delivery trips.		

3. Comfort and safety

A person's perception of an interchange, and whether it is safe and comfortable to use, or not, will influence their mobility decisions. This perception will be based on a range of factors, and will vary from person to person according to their demographic (Dogrusoy & Zengel 2017; Llinares et al. 2020).

Objectives

- To provide the fundamental conditions for passenger comfort and safety, to ensure that the interchange promotes, rather than discourages, sustainable mobility choices.
- To deliver inclusive interchange design, through gender responsive design and special consideration for the needs of people with disabilities.

Topics	Guidelines & resources	Status	Site context & approach
3.1 Temperature & ventilation (Concourse and semi-enclosed areas)	(Where they are provided) concourses can provide comfortable spaces, particularly for passengers with longer waiting times. Designs should provide for: • Comfortable temperatures, with priority given first to building insulation and natural ventilation, over mechanical air conditioning with cost. maintenance and energy implications. • Air exchange rates that minimise risks from air pollution (incl. from vehicles) and infection risks. For more info see Lo & Leung 1998 and Section 5.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
3.2 Shelter at waiting areas	Additional to any main concourse, shelter from sun, rain and wind should be provided at platform/stop waiting areas. This should be located outside movement corridors (aiming for a min. 2m footway width) and provide for: • Visibility – of vehicles and for safety purposes; • Low maintenance and durability • Seating and leaning rails (see 3.3) • Lighting	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	• Inclusion of planting with shelter/shade benefits For more info see Project for Public Spaces: Bus Shelters		
3.3 Seating	Seating should be provided to enable all passengers to rest while waiting for services, and also while walking longer distances between platforms and stops. Design considerations are: • Provision of seating within the concourse and shelters at rail platforms and stops, as well as providing rest points on longer walks • Demarcation of seats for older people and pregnant women, as well as segregated space for women and girls, in busy locations • Provision of seating in a contrasting colour, to improve visibility for people with sight impairments. • Seating should be provided at regular interval. Recommended maximum walking distance without rest for people with disabilities are listed here: Wheelchair users – 150m; Vision impaired people – 150m; Walking stick and cane users – 50m; Mobility impaired people without a stick or cane – 100m (DfT UK 2021) • Inclusion of armrest to indicate 'personal space' and prevent sleeping • Low maintenance and durability For more info see PTI Design Guidelines, Auckland Transport	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
3.4 Lighting	Adequate lighting is essential for safety and security purposes, and combined with material and colour choices, can reduce traveller stress and assist with legibility and wayfinding. Design considerations are:	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	• Lighting levels of min. 150 lux at ground level are recommended for main entrances, stairs and ramps. Colour Rendering Index (CRI) of 80 is recommended for waiting rooms and ticket offices, and CRI of 40 should be achieved for platforms, stops and underpasses (based on European Standard UNE 12464-I) • 'Accent lighting' can be used to highlight information and ticket offices, as well as wayfinding boards. • Linear lighting can be used to indicate movement corridors. • Natural lighting, combined with bright ceilings can positively influence mood and behaviour – but, glare should be avoided. • Energy efficient lighting should be specified • Durable, weather and vandal-proof lighting should be specified. • Provision of back-up electricity generation for lighting should be considered where 'black-outs' occur.		
3.5 Noise	Chronic exposure to environmental noise, including transport noise, can lead to annoyance and stress reactions (EEA 2022). This could affect passengers, workers and nearby residents. Interchange design and management considerations to reduce noise include: • Installation of sound and noise barriers and insulation (where these will not reduce legibility and visibility) • Speed restrictions along neighbouring highways • Mode specific measures, such as rail grinding and wheel and track absorbers for railways • Instructions to switch of idling vehicle engines (e.g. buses)	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
3.6 Toilets and baby changing facilities	An inability to access hygienic toilet facilities can be a deterrent to taking multi-stage journeys using public transport. Based on surveys in London, the provision of toilets were found to be the single most important facility that passengers want to see at interchanges (London Travel Watch 2014) Toilets and baby changing facilities should be: • Located centrally in relation to the network of movement corridors, with potential for additional decentralised provision at high-capacity platforms. • Toilet locations should be clear signposted • Amount (scale) of provision can be assessed using guidelines at BS 6465-1 2009, Annex B. • Provision for women and men should be completely segregated and the building layout should avoid long corridors, blind ends and spaces to hide. • Entrances should be a minimum of 1600mm to avoid congestion, or separate entry and exit can be provided (min 850mm width to facilitate access for disable people). • Provision should be made for wheelchair accessible toilets – see BS 8300-2:2018 for details • Toilets should be staffed to ensure cleanliness, safety & security, with layouts providing for storage of cleaning equipment.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
3.7 Drinking water	Provision of free or low cost drinking water at interchanges contributes to improved comfort and health of passengers, particular during periods of high temperature. Enabling passengers to refill their bottles at water fountains or dispensers also contributes to reducing plastic waste, as passengers are not forced to purchase bottled water. See for	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	example the plans of the Belgian network operator, SNCB.		
3.8 Passenger safety through design	Visibility is a key aspect of security, alongside lighting (3.5), confident wayfinding (2.1.5) and presence of security staff (3.9). Visibility can be maximised by avoiding recesses and corners, creating open stairs, using transparent panelling, and including mirrors to extend sight lines. For more info see Secure Stations Scheme (UK) A further approach Is to promote natural surveillance and informal ownership of semi-public spaces through positioning of staffed and well populated facilities (e.g. ticket machines, cafes etc.) See the concept of territoriality in Crime Prevention Through Environmental Design.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
3.9 Security staff	Both interchange operational staff and security staff play can play an important role: • Interchange staff help deter crime through their presence and can provide reassurance to and assistance to vulnerable passengers. Value of staff presence can be maximised by increasing their visibility, movement around the interchange and widening their responsibilities. • Security staff presence helps to enhance actual and perceived levels of safety. Staff should be well-trained, from a responsible organisation and easily recognisable. A constant presence of staff, even at quieter times, is required. For more info see Secure Stations Scheme (UK)	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
3.10 CCTV	Installation of CCTV (so that it is visible) can provide numerous benefits including: deterring criminal activity; recording criminal activity when	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	this occurs; and for crowd management (TfL 2021)		
3.11 Gender dimensions and safety	Women's physical harassment in public transport and public spaces is a pervasive and pressing issue across the globe, which can influence important decisions about when and where women are willing to travel. Design and management considerations include: • Provision of segregated areas waiting and seating areas for women and families, where harassment is commonplace. This can include creation of staffed 'safe spaces' at interchange for when people feel uncomfortable or scared. This can include a safe and discrete room to report harassment (no matter how minor). • Ticket queues and machines are high risk areas, so surveillance measures are recommended . • Avoidance of men 'helping' women and girls to enter or alight from vehicles, requiring vigilance from staff and high fines. • Use of posters with symbols/pictograms (important where literacy is low) to clearly show what behaviour is unacceptable and fines that will result. • Free wifi to enable use of distress apps For more info see the HVT EMPOWER SHE CAN Tool.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
3.12 Waste management	Cleanliness of the interchange will have an important influence on people's perception of comfort and safety. Design factors include: • Provision of waste and recycling bins in visible locations in well-populated areas and at high capacity platforms and stops.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	• Operational management to ensure regular emptying of bins and cleaning of surfaces.		
3.13 Emergency response	A clear plan and processes should be set in place to deal with incidents ranging from personal injuries through to larger scale incidents, such as flooding or terrorist threats. Key design and procedural elements will include: • Early identification of incidents and warnings • Defined leadership responsibilities and lines of communication with interchange staff and emergency services. • Means of communicating with passengers via alarms, announcements, signage. • Provision of direct and clear evacuation routes, together with identification of spaces outdoors where people can gather in safety (e.g. in case of a fire) • Ensuring access routes for emergency vehicles • Availability of equipment for handling small incidents (e.g. first aid kits, fire extinguishers). For more info see the Public Transportation System Security and Emergency Preparedness Planning Guide	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

4. Hubs for public life

Interchanges can influence a significant part of people's daily lives, providing additional opportunities to buy daily essentials, eat and drink, and even to enjoy art and public performances. Creating vibrant environments where they are happy to spend more time, improves the travel experience and can create additional revenue streams for interchange operators.

Objectives

- To foster the role of interchanges as hubs in public and cultural life, as well as the transport network.
- To provide additional opportunities for users to work, shop and play, as well as to support convenient, comfortable and multi-purpose journeys.
- To support the local economy through provision of space for retail and informal trading marketplaces.
- To investigate ways to generate revenue streams for maintenance and ongoing enhancement of the interchange through, e.g. providing retail and advertising space.

Topics	Guidelines & resources	Status	Site context & approach
4. 1 Formal retail provision	Retail provision within interchanges can help to make passenger's journeys more comfortable, bring vitality to interchange environments, as well as generate an income stream for operators. Design considerations include: • Creation of defined (enclosed) retail spaces that can be locked for security reasons • Promoting uses such as pharmacists, alongside food & drink, that could be meet the daily needs of passengers • Locating retail uses so that they do not obstruct movement, but provide passive surveillance within the interchange	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
4.2 Informal market trading	Informal market trading makes a significant economic contribution, alongside providing convenient shopping opportunities for passengers. Design and management considerations include (Sepadi & Nkosi 2023): • Providing defined spaces where market trading can occur will help to ensure the	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	continuity of these activities, while minimising disruption to passenger movement and interchange operations. • Creation of lockable stalls or storage areas for goods will help reduce the amounts of products that need to be transported on a daily basis. • Market trading activity could be licensed, involving registration as a vendor, to enable management of activity at a particular site.		
4.3 Cashpoints	Cashpoints or cash offices should be located relatively close to ticket offices and areas of the interchange with high security presence.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
4.4 Advertising	Advertising provides a mean for creating visual interest for waiting passengers, while providing a source of income for the public transport operators. Options include the use of posters or digital displays along movement corridors, as well as on vacant wall spaces in waiting areas and along platforms.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
4.5 Business lounge	Business lounges (potentially with restricted access) could be created that provide: • Workspaces, silent zones and call booths • Wi-fi and charging points for mobile phones and other devices • Showers	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
4.6 Provision for families and children	Consideration should be given to how journeys can be made for all family members, including provision of: • Nursing/Breast feeding - these can take the form of pods and (partially) screened areas in convenient locations at stops and on platforms (see also Section 3.9). • Kid's play zone – where interchanges become natural foci for people meeting and	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

Topics	Guidelines & resources	Status	Site context & approach
	retail activities, or where longer waits between connections occur, provision of play areas can be considered.		
4.7 Lockers and luggage storage	At interchanges used by large numbers of inter-city or inter-state passengers, consideration should be given to the provision of secure luggage lockers or staffed storage areas. These enable business travellers and tourists to conveniently store heavy luggage while visiting parts of the city.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
4.8 Public open space	Provision of public open space at the entrance to interchanges provide opportunities for journey planning, providing outdoor seating and further opportunities for market trading, but also provision of additional space for dealing with crowds in abnormal or emergency conditions.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
4.9 Public performance and art	Art can be integrated in station design or encouraged at later stages, and take several forms: • use of visual art on construction hoardings; • providing space for art on sculptures within and around interchange buildings • enabling performance art in public open space and 'opportunity' spaces	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

5. Integrated planning and design

Interchange design can promote continuity with the 'interchange zone' (appraised in Section 1), helping to reflect and highlight characteristics of the local district, as well as avoid the segregation of communities that transport infrastructure lines can result in, by providing high quality sustainable mobility routes to and through the interchange. Interchange projects may also present opportunities for provision of further residential, office and other commercial development in highly accessible locations, and should be designed to be climate resilient.

Objectives

- To investigate the potential for Transit-Oriented Development (TOD) to reduce the need to travel and to deliver further public services in accessible locations.
- To create opportunities for low carbon energy generation and ensure energy efficiency of buildings and infrastructure.
- To design buildings and infrastructure in line with circular economy principles.
- To ensure that interchanges are designed mindful of climate change and city resilience.

Topics	Guidelines & resources	Status	Site context & approach
5.1 Transit Oriented Development (TOD) - residential, commercial & cultural	TOD, or Transit-Oriented Development refers to an approach of bringing people, activities, buildings and public space together, within easy walking and cycling distances and with excellent public transport connections to the rest of the city (ITDP 2017). As interchanges are key elements of the TOD concept, they are good locations to explore potential for urban densification, taking advantage of the public transport accessibility. Design considerations include: • Potential for provision of residential development (including affordable housing) on or adjacent to the interchange site. • Potential for creation of office and other commercial floorspace on or adjacent to the interchange site. • Potential for provision of cultural, sports and entertainment venues on or adjacent to the interchange site.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

5.2 Renewable energy generation and storage	On-site renewable energy generation provides the opportunity for transport authorities to (at least partially) meet the operational needs of buildings, infrastructure and vehicles. Solar energy generation, using the roofspaces of interchanges, canopies and shelters, together with micro-wind installations in appropriate locations, are expected to provide the most viable options. On-site energy storage options may need to be explored in parallel.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
5.3 Energy efficiency of buildings and infrastructure	The energy efficiency of buildings and infrastructure (e.g. cooling requirements and lighting) will have implications for long-term GHG emissions and operational costs. Key design considerations include: • Building and canopy designs and materials choices to reduce passive solar heat gain, • Maximising natural ventilation and specification of energy efficient cooling systems, and • Specification of energy efficient lighting systems Assessment approaches such as BREEAM (buildings), BREEAM Infrastructure and LEED inform systematic design choices.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
5.4 Construction materials and sourcing	The choice of building materials for buildings and infrastructure, together with the way these are sourced, will also have major implications for the embodied GHG emissions. Basic principles include local sourcing of materials, and use of accredited supply chains for material sources. Assessment approaches such as BREEAM (buildings), BREEAM Infrastructure and LEED inform systematic design choices.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
5.5 Urban greening	Creation of green space and tree planting in cities have been proven to provide multiple benefits, including provision of shade and cooling of street	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

	spaces, enhancing energy efficiency of buildings (in the case of green roofs and walls), enhancing biodiversity, and having positive effects on mental health. Design considerations for interchanges include: • Selection of planting that provides shade, while maintaining street level visibility for safety reasons • Creation of planting areas to avoid mosquito breeding sites and introduction of mosquito repellent plants		
5.6 Climate resilience – temperature & heatwaves	Buildings and infrastructure should be designed having regard to the predicted increases in prevailing temperatures. For example, in the case of roads, high temperatures might soften bituminous surfacings and cause rutting. As an example, and for more information, see Road Note 31 – A Guide to the Structural Design of Surfaced Roads in Tropical and Sub-tropical Regions.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.
5.7 Climate resilience – sustainable drainage and flood risk mitigation	Climate change is resulting in increasing temperatures (see ventilation and cooling topics in Section 3 and above), together with more variable and intense rainfall events, as well as sea-level rise. These latter two impacts result in the following design considerations: • Design of interchanges taking into account risk of coastal or fluvial flooding (as appropriate) in line with relevant projections. • Specification of Sustainable Urban Drainage Systems (SUDS) that help to slow runoff and store rainfall during intensive weather events.	●	Add notes and images on the interchange current design, together with any suggestions for improvements.

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