
16th URBAN MOBILITY INDIA CONFERENCE CUM EXHIBITION 2023

EVALUATING ACCESSIBILITY OF A MULTIMODAL TRANSPORTATION HUB

A CASE STUDY OF VYTTILA MOBILITY HUB, KOCHI, INDIA

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Presentation Outline

- Introduction
- Research Problem
- Synopsis
- Study Area
- Literature Review
- Primary Study
- Design Recommendations
- General Recommendations & Conclusion



TRANSPORTATION

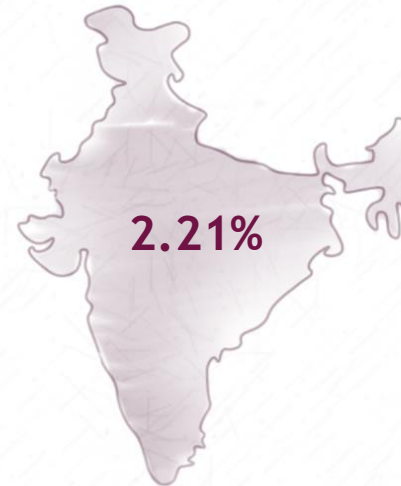


Vulnerable Groups

ACCESSIBILITY

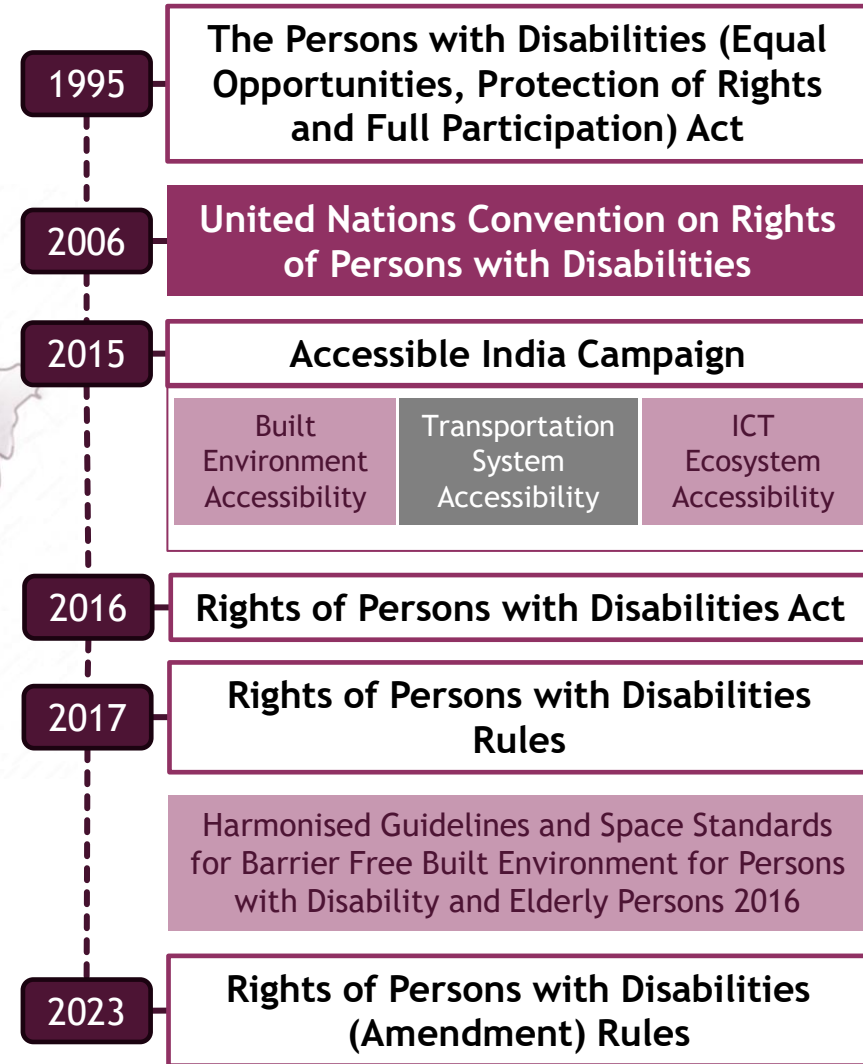


- Ensures full participation in society
- Supports Economic Prosperity
- Greater social equity
- Better productivity
- Enhances physical and mental health



Sustainable Development Goals

1	No poverty	11	Sustainable Cities and Communities
3	Good Health and Well-being	13	Climate Action
8	Decent work and Economic Growth	17	Partnerships for the goals



EXPECTATION



(Source: BFCC, 2023)



(Source: BFCC, 2023)

VS

REALITY

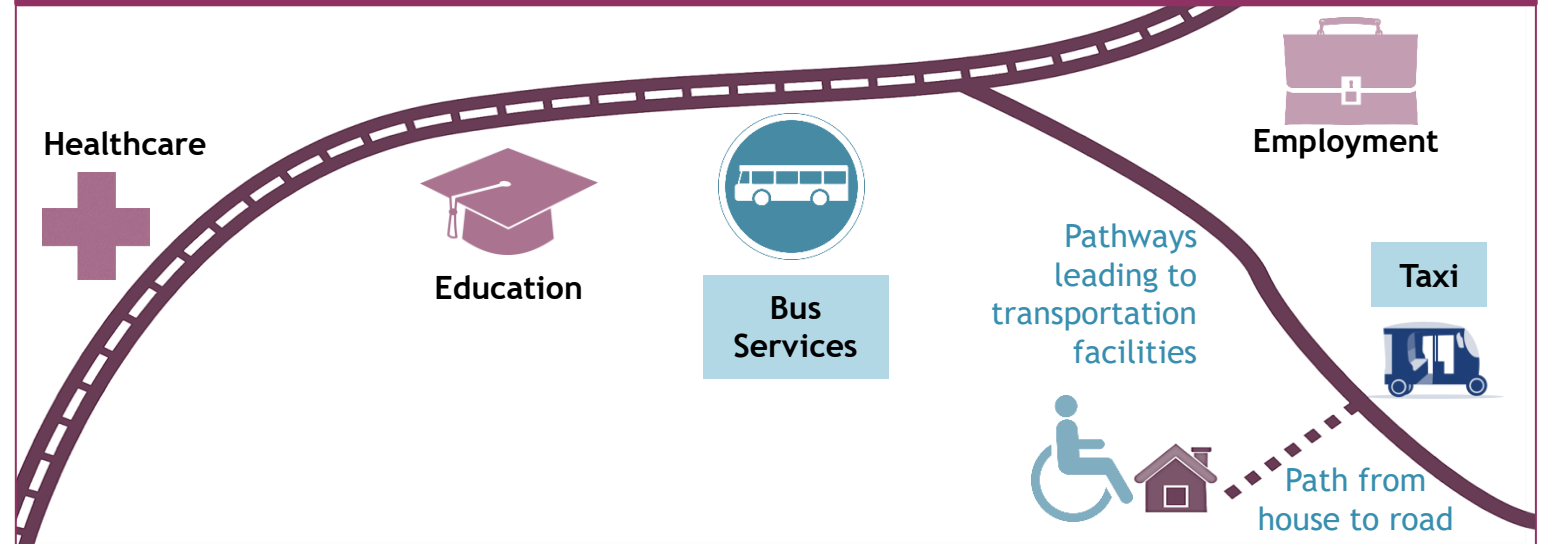


(Source: BFCC, 2023)



(Source: <https://scroll.in/roving/894005/in-photos-why-wheelchair-users-in-delhi-find-it-difficult-to-use-buses-even-low-floor-ones>)

What can be done?

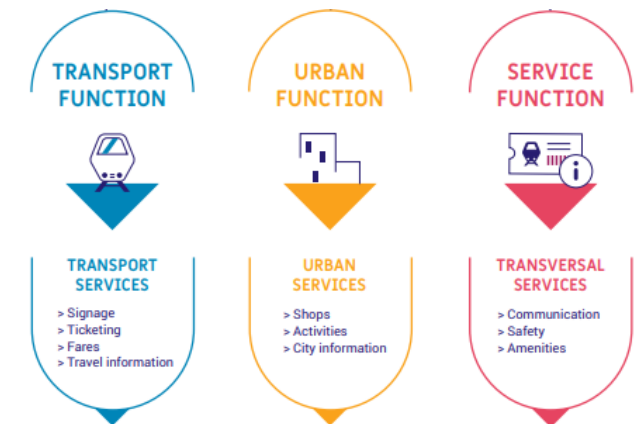
SEAMLESS TRANSPORTATION
Multimodal Transport System (MMTS)

An integrated approach incorporating multiple modes of transportation into a single coordinated system (Kumar, 2011)



Transfer between modes

Multimodal Transportation Hub (MMTH)



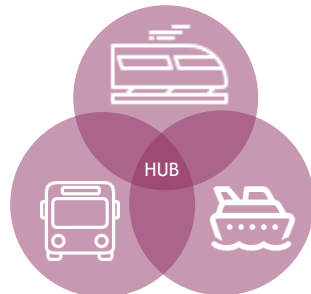
(Source: Carmo, 2020)

Why Kochi?



 **21,19,724**

 **ONE in FIFTY** 



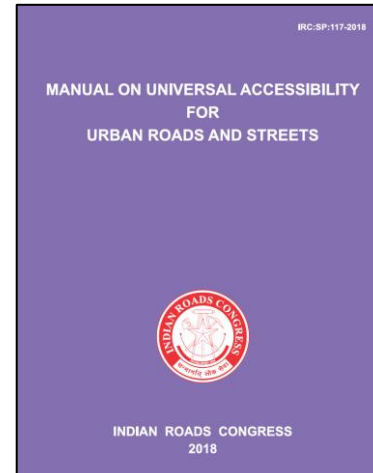
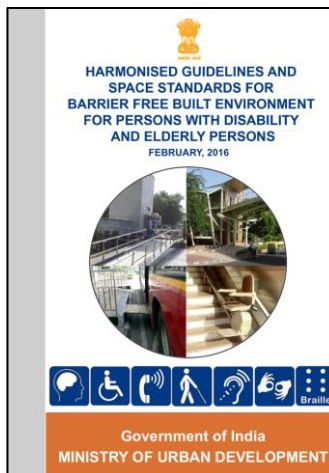
Aim

To assess the environmental accessibility of Vyttila Mobility Hub in the city of Kochi

Objectives

- To identify the tools and methods to assess environmental accessibility of a transportation hub
- To assess the environmental accessibility of Vyttila mobility Hub using access audit
- To suggest recommendations for improving overall accessibility for the vulnerable groups

Guidelines



Methodology

Literature Review

Public Transportation

Multimodal Transport Systems

- Multimodal Transportation Hub
 - Case Study

Accessibility

Guidelines

- Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons
- IRC:SP:117-2018 Manual on Universal Accessibility for Urban Roads and Streets

Primary Study and Analysis

Access Audit

Terminals

Connectivity

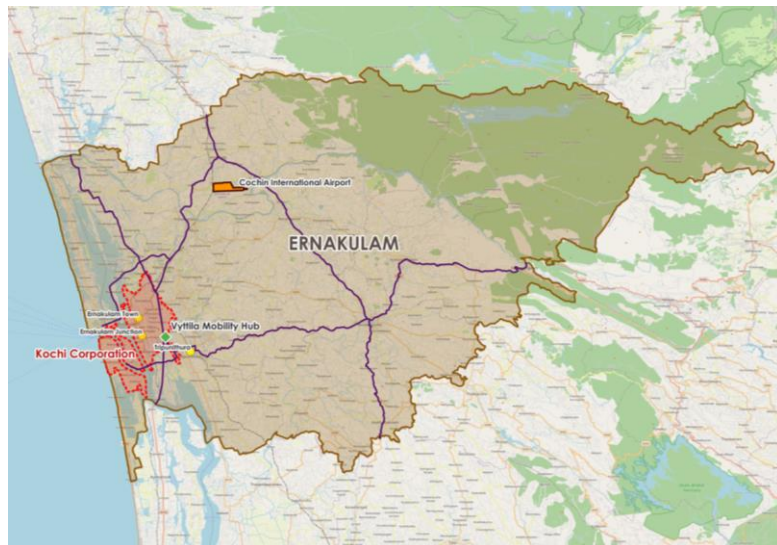
User Interviews

Analysis

Findings and Recommendations

Site-Specific Recommendations

- Terminal Specific Recommendations
- General Recommendations



Bus Terminal



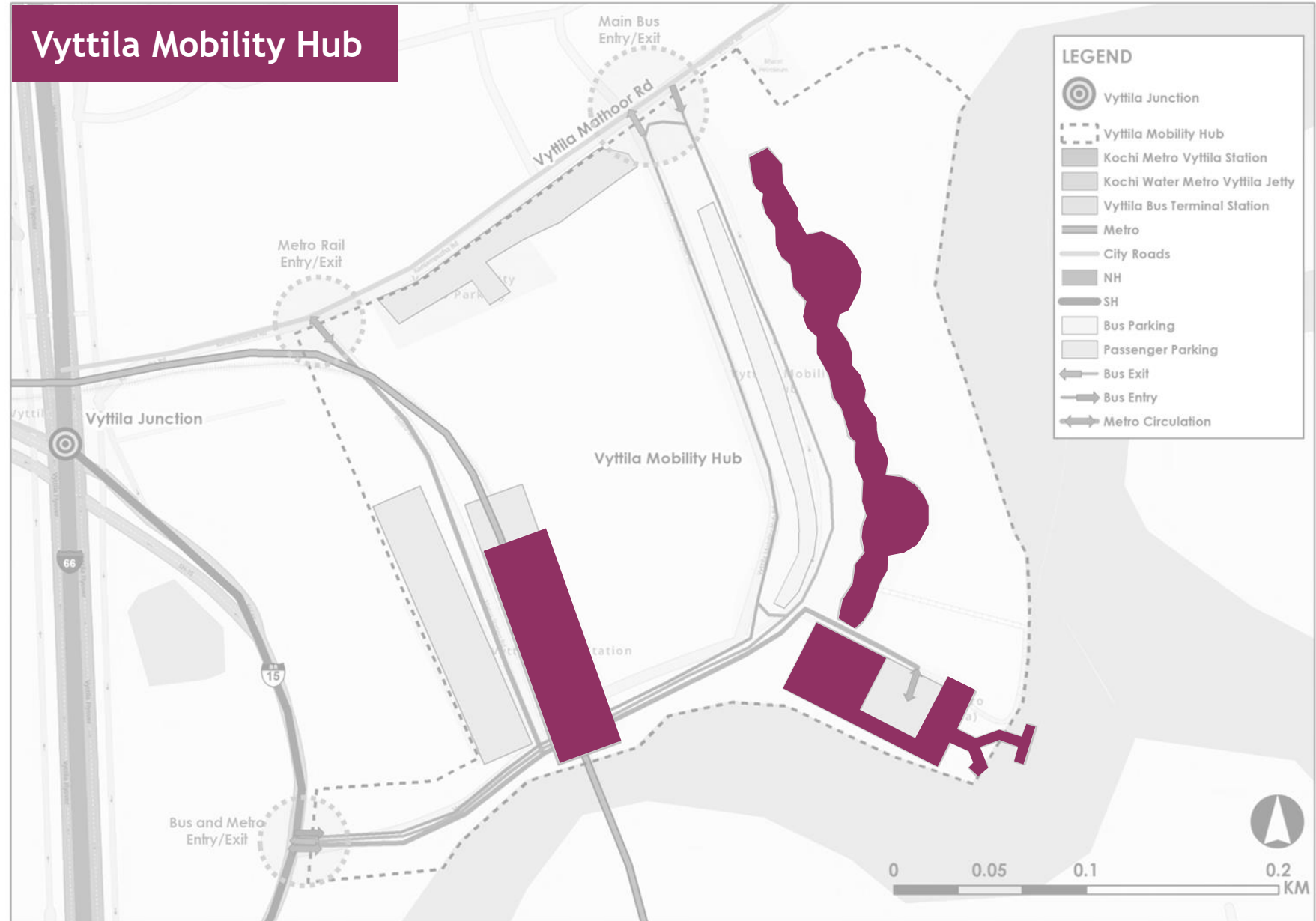
Metro Rail Station



Water Metro Jetty



Vyttila Mobility Hub



VIEW 1 : Site Entrance to Water Metro Jetty

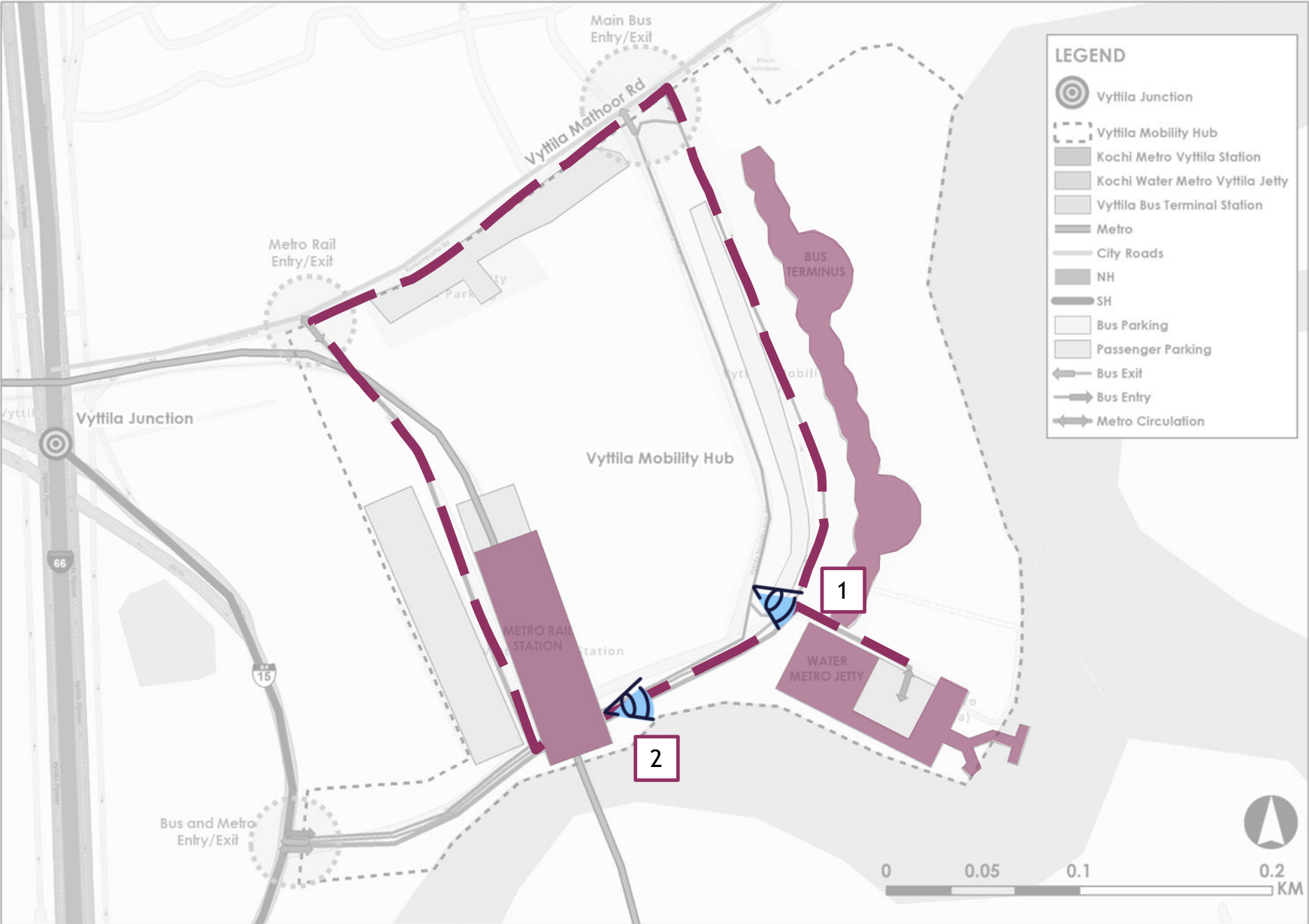


VIEW 2 :Metro Station to Bus Terminal / Water Metro Jetty



Table 1: Shortest distance between each terminal

Transfer Points	Distance
Bus Terminal to Water Metro	205 m
Water Metro to Bus Terminal	97 m
Metro Station to Water Metro	284 m



CASE STUDY ANALYSIS

Table 2: Analysis of the case of Portland

Mode	Accessibility of Vehicle	Accessibility of associated built infrastructure	Organizational Systems
Bus	<ul style="list-style-type: none">• Announcements• Buses provided with boarding ramps or power lifts• Priority Seating area for PwDs and elderly• Area for securing mobility devices	<ul style="list-style-type: none">• Bus stops with digital displays, audio buttons to announce the arrival of the bus	<ul style="list-style-type: none">• Allows service animals inside the bus• Individual and Group Travel training for the elderly and PwDs
Light rail	<ul style="list-style-type: none">• Ramps extending to sidewalk• Priority seating area for PwDs and elderly• Audio system and reader boards show the name of the next station	<ul style="list-style-type: none">• Accessible Ticket machines• Textured tiles,• Braille/Raised letter signage• Digital and audio announcement using a push button	
Streetcar	<ul style="list-style-type: none">• Ramps• Reader boards and audio announcements• Space for wheelchair	<ul style="list-style-type: none">• Signs indicate the time of the next streetcar and the details regarding service lines	
Pedestrians	<ul style="list-style-type: none">• Wheelchair accessible taxis available	<ul style="list-style-type: none">• Smooth & wide Sidewalks with curb cuts	<ul style="list-style-type: none">• Free accessible parking for wheelchair users

REVIEW OF GUIDELINES

Table 3 : Parameters identified from existing guidelines

Guideline	Parameters	
Building Level Accessibility		
Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons 2016	<ul style="list-style-type: none">• Main Entrance• Ramp• Parking• Reception & Information Counters• Doors• Corridors• Lifts	<ul style="list-style-type: none">• Stairs• Handrails• Toilets• Canteen• Drinking Water• Signages• Emergency Exits• Resting Facilities
Accessibility of Connections between the transit nodes		
IRC:SP:117-2018 Manual on Universal Accessibility for Urban Roads and Streets	<ul style="list-style-type: none">• Walking Path Model Conflict• Availability of Walking Paths• Availability of crossing points• Accessible Infrastructure• Security• Motorist’s Behaviour• Obstructions• Wayfinding Signages	

- Checklists were utilised from both these guidelines to conduct access audits of both terminals and their connectivity.
- Only the parameters related to the connectivity were considered from the checklist IRC:SP:117-2018

Step 1

Accessibility of Individual Parameter (P) % = (nx100)/t
where n is the number of compliant sub parameters, t is the total number of sub parameters

Step 2

Accessibility of Terminal (A) % = Σ (P)/T
where T is the total count of individual parameters considered.

Table 3: Accessibility rating of Individual Parameters of Each terminals

	Accessibility of Individual Parameter (P) in %		
	Kochi Metro Vyttila Station	Kochi Water Metro Vyttila Jetty	Vyttila Bus Terminal
Main Entrance	91	89	50
Ramps	60	71	22
Parking	25	0	0
Reception & Information Counters	67	67	33
Doors	100	57	NA
Corridors	100	100	20
Lifts	100	NA	NA
Stairs	78	NA	NA
Handrails	71	75	NA
Toilets	83	78	50
Canteen	50	NA	40
Public Telephone	NA	NA	NA
Drinking Water	75	75	0
Signage	88	88	13
Emergency Exits	100	100	NA
Resting Facilities	100	100	100
Accessibility of Terminal (A) in %	79.2	75	32.8

Table 4: Accessibility rating of connections between each transit terminals

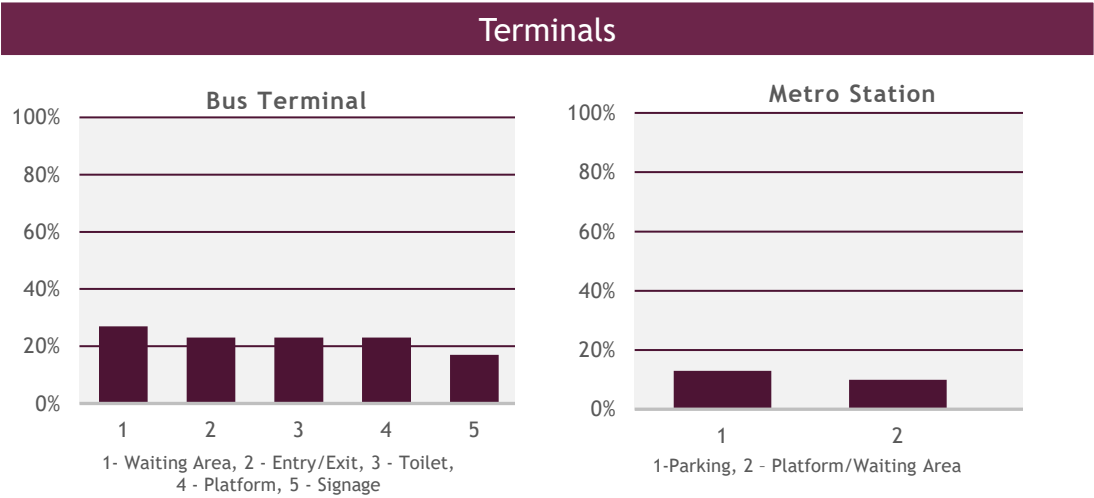
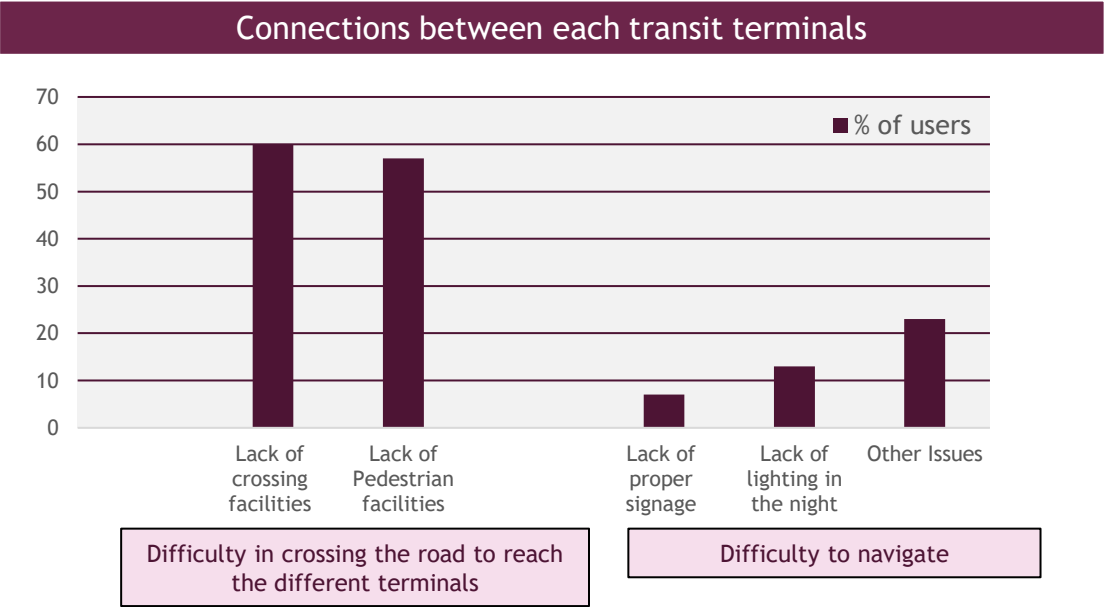
	Accessibility of Individual Parameter (P) in %		
	Kochi Metro Vyttila Station - Vyttila Bus Terminal	Kochi Metro Vyttila Station - Kochi Water Metro Vyttila Jetty	Kochi Water Metro Vyttila Jetty - Vyttila Bus Terminal
Walking path modal conflict	0	0	67
Availability of footpaths	0	0	0
Availability of crossing points	0	0	0
Accessible infrastructure	0	0	0
Security	14	25	83
Motorist behavior	0	0	100
Obstructions	20	20	67
Way finding signage	0	0	0
Accessibility of Connections between the terminals (A) in %	4.25	5.625	39.625

Sample Size: 30 participants
Sampling Method
Purposive and Convenience sampling
PwDs, elderly persons, persons with temporary disabilities, Persons without disabilities and staff

Table 5: Inference from the Responses from Users

Mode	Vehicle	Associated Built Infrastructure	Organisational Systems
Bus Terminal	<ul style="list-style-type: none">Lack of wheelchair accessible busesHigh ground clearance of buses - difficulty in boarding/deboarding	<ul style="list-style-type: none">Improper acoustics of bus bay causing echoes, amplifying the announcement of the bus conductors regarding the bus routes - overwhelming for visually impaired usersLevel difference causes difficulty in boarding & deboardingPavements laid in an improper mannerBolts in the corridor is a tripping hazardLack of amenities such as waiting areas (ladies), restaurants, clean toilets, etc.	<ul style="list-style-type: none">Buses from certain routes do not enter the terminals which makes it difficult for peopleFrequency and timing of busesInformation regarding bus arrivals available at the information counters
Metro Station	<ul style="list-style-type: none">Accessible	<ul style="list-style-type: none">More seating required in the platforms	
Water Metro	<ul style="list-style-type: none">Accessible		<ul style="list-style-type: none">Limited routes currently

Issues addressed by User Groups



Vyttila Mobility Hub

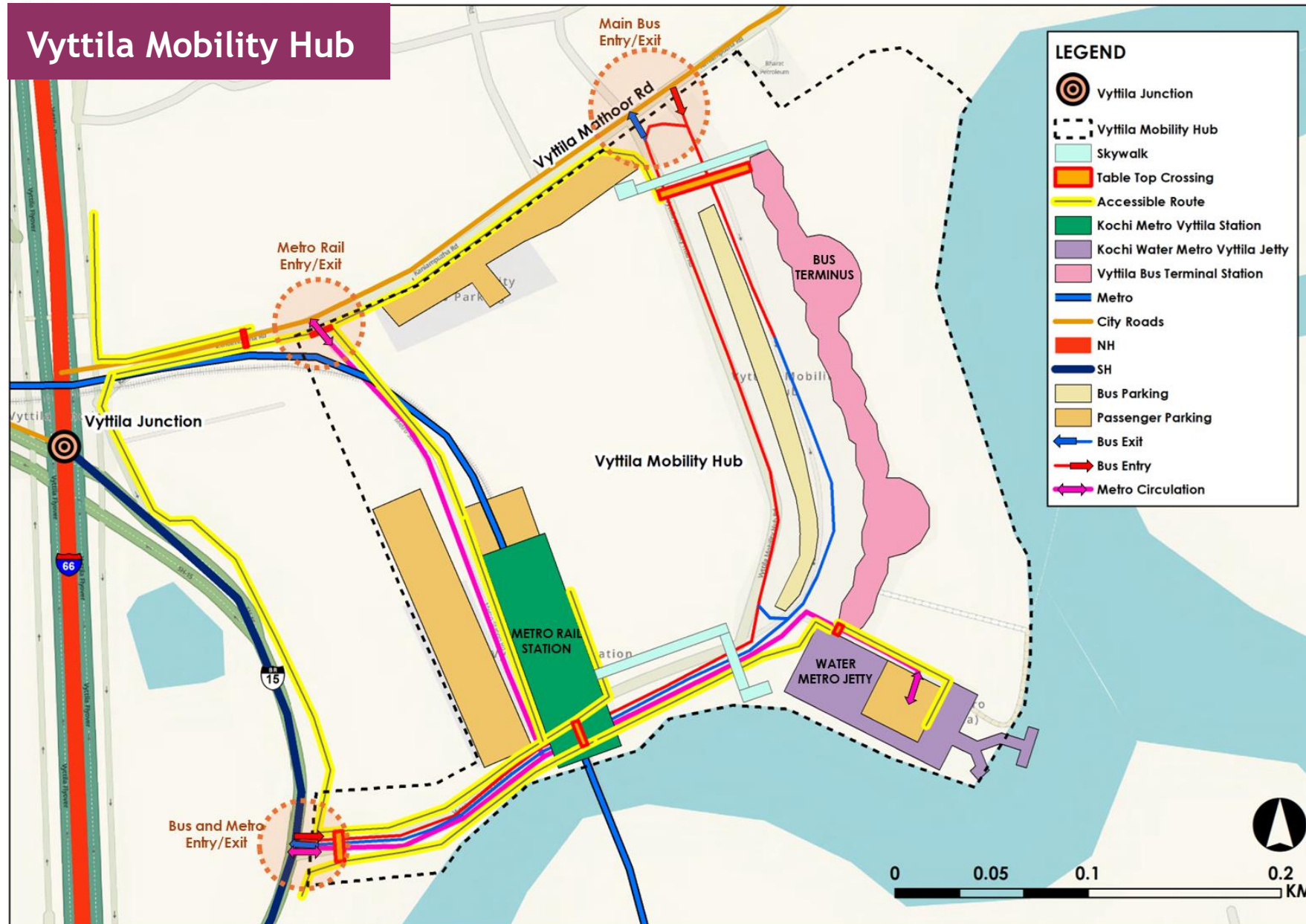


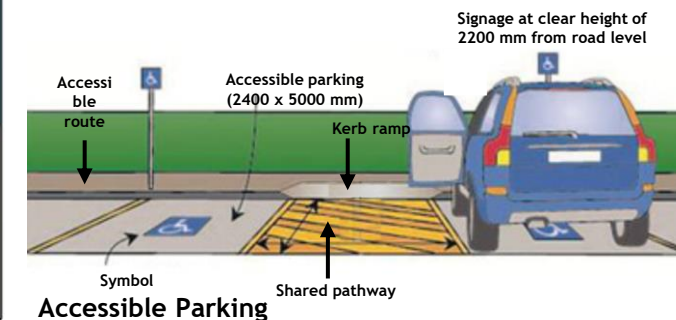
Table-Top Crossings

Source: ITDP, Complete Streets



Pedestrian Pathways

Source: ITDP, Complete Streets



Accessible Parking

GENERAL RECOMMENDATIONS		Vehicle	Associated Built Infrastructure	Organisational Systems
Associated Built Infrastructure <ul style="list-style-type: none">• Accessible parking• Emergency alarm systems• Accessible eating outlets and drinking water facilities• Accessible Tactile maps Organisational Systems <ul style="list-style-type: none">• Sensitisation of staff	Kochi Metro Vyttila Station		<ul style="list-style-type: none">• Ramps - as per guidelines• Handrail extensions - 300mm• TGSI at landings	
	Kochi Water Metro Vyttila Jetty		<ul style="list-style-type: none">• Automatic doors• Markings - on the glass doors	
	Vyttila Bus Terminal	<ul style="list-style-type: none">• Ramps - as per guidelines- to board and deboard• Buggies	<ul style="list-style-type: none">• Accessible bus parking provisions• Obstructions in the corridor to be removed and TGSI to be provided• Accessible Information counters• Unisex accessible toilet - as per guidelines	<ul style="list-style-type: none">• Proper announcement systems• Improved security systems in the terminal

CONCLUSION

Vyttila Mobility Hub, with its three modes of transportation, is crucial for the growth of both Kochi City and its hinterlands.

Identifying accessibility gaps and implementing recommendations will broaden its user base, emphasizing the need for inclusive and barrier-free transportation for the vulnerable groups thus encouraging everyone to use public transportation modes thus bringing the goals of both the Sustainable Development Goals and Accessible India Campaign closer.

Nationwide, making multimodal transportation hubs accessible to vulnerable groups will require design and policy interventions, including unified metropolitan transportation authorities to enhance efficiency

“I don’t think I felt, really, shame about my disability. What I felt more was exclusion.”

Judith Heumann
Mother of the Disability Rights Movement

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Thank You

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