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Building Accessible, Safe & Inclusive Indian Cities

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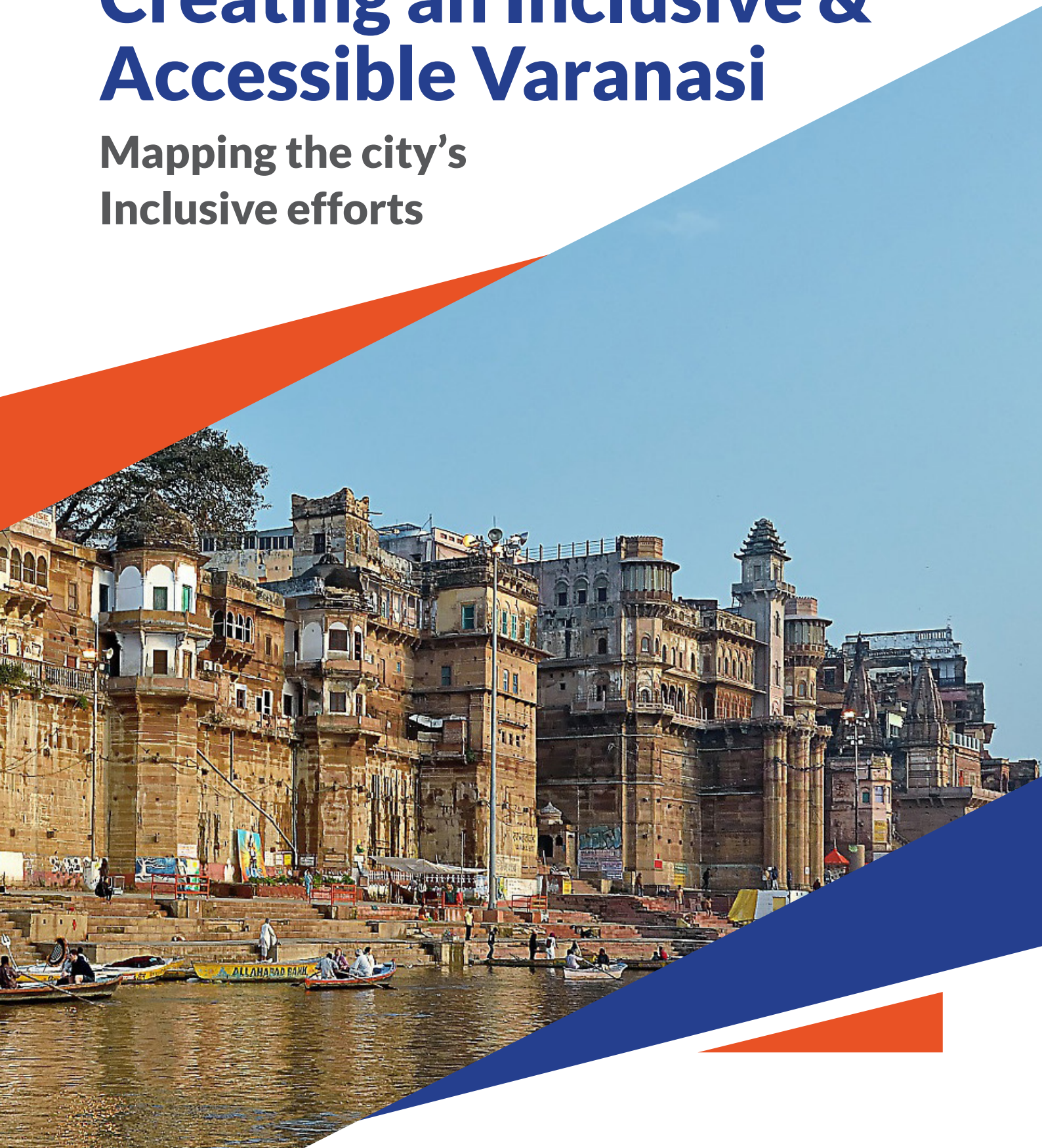
National Institute of Urban Affairs

Creating an Inclusive & Accessible Varanasi

Mapping the city's Inclusive efforts



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Mapping the City's Inclusive Efforts

CONTENTS

OVERVIEW

An Overview of Disability Inclusive Efforts in Varanasi

Today accessibility for all is recognized as a necessity and human right. Countries across the globe, including India have implemented numerous innovative measures to ensure that the infrastructure and services are inclusive for all. Inclusive design and planning principles must be considered as fundamental to all design concepts because they are not only relevant in responding to the challenges faced by Persons with Disabilities, but more importantly it creates equal opportunities for everyone to participate in every aspect of an urban environment.

To reinforce the need for universal accessibility and inclusion, the Government of India has launched numerous schemes/programmes e.g., Smart Cities Mission, Swachh Bharat Mission, AMRUT, HRIDAY, etc. These initiatives aim to promote equitable, sustainable, shared prosperity, and development while focusing on safety, accessibility, and inclusion in Indian cities. The flagship program 'Accessible India Campaign' or 'Sugamya Bharat Abhiyan' launched by the Hon'ble Prime Minister of India (under the Ministry of Social Justice and Empowerment) in 2015 and later supported by the enactment of the Rights of Persons with Disability (RPwD, Act in 2016) focusses on the concerns of urban inclusivity and accessibility related issues.

Varanasi, also known as Benares, Banaras, and Kashi is a city of cultural and spiritual beliefs situated on the banks of River Ganga and known worldwide for its ancient ghats. In the pretext of the prestigious Smart Cities Mission of Government of India, Varanasi has recently been ranked among the top 20 smart cities. The Smart City vision of Varanasi is to *"rejuvenate the oldest Indian living city of Varanasi as a great place to live and visit by conserving and showcasing its enriched heritage, culture, spirituality, and traditions through innovative social and financial inclusion solutions."* The Varanasi Smart City Limited (VSCL) is responsible for executing the Smart City Mission (SCM) in Varanasi, led by the Divisional Commissioner, Varanasi Division of Uttar Pradesh. It works closely with the Varanasi Nagar Nigam (VNN) with an objective to achieve success in the implementation of the Smart City Projects in Varanasi.

VSCL has taken numerous initiatives with an objective to create accessible, inclusive and sustainable infrastructure, which would lead to overall improvement in the city environment and provide quality of life for its citizens. Recently, the Prime Minister of India, Shri Narendra Modi inaugurated various development projects worth more than ₹1,500 crore during his visit to Varanasi.

In alignment with the objectives of the Smart Cities Mission, Varanasi Smart City Ltd (VSCL) and National Institute of Urban Affairs have formalized a partnership through an MoU under the BASIIC programme in May, 2020. The partnership has extended technical assistance to VSCL and VNN for their ongoing and pilot projects, facilitated exchange of knowledge and dissemination of learnings from global/national practices, and supported institutional/ policy reforms for promoting inclusion and universal access for persons with disabilities.

This document intends to map the inclusive efforts of VSCL. It highlights few of the completed and proposed projects in the city which aims to create an inclusive urban environment for all. The document also includes recommendations for universal design features which could be relevant for the city stakeholders and to plan, design, implement and monitor such infrastructure in adherence/compliance with the necessary standards/norms. The list would act as a checklist for the designer/planners to integrate elements of universal design features for conceptualising and designing the similar interventions.

The following list of projects are being documented from the perspective of accessibility and inclusion:

- Project 1: Machhodari Smart School *(Completion Stage)*
- Project 2: Rudraksha International Cooperation and Convention Centre *(Completion Stage)*
- Project 3: Redevelopment of Dr. Sampoornand Stadium *(Proposed Stage)*

COMPLETED PROJECTS

PROJECT 1:
Machhodari Smart School, Varanasi

1. Background
The government school (established in 1932 and owned by the municipality) has been converted into a smart school under the ongoing smart city mission. The school was been inaugurated by the Prime Minister of India, Shri Narendra Modi in July,2021. It has been developed as the Uttar Pradesh's first smart school with state-of-art infrastructure. The school is in completion stage and would be fully equipped to start the session early next year.

2. Description
The smart school is spread across a sprawling area of 4,600 sq. metre. It will cater to around 1700 students and impart education till 10th standards as per CBSE curriculum. . The three storey building has a total of 39 rooms with 14 rooms on the ground floor, 11 rooms on the first floor and 14 rooms on the second floor respectively. The school has been designed to make the education inclusive for all sections of the society irrespective of age, ability and gender.

It includes facilities such as smart classrooms, computer lab, skill development centre, library, multipurpose hall, inclusive playground, cafeteria, toilets, drinking water facilities etc. Provision for rainwater harvesting system, fire suppression, CCTV cameras, have been integrated with the built infrastructure. Accessibility features have been considered while designing the campus. The entrance and exit areas are made accessible through the provision of ramps, staircase with grab rails with elevators in each floor. Accessible toilets and RO drinking water facilities have been designed based on universal design features.

3. Objectives
The school is planned and designed with an aim to provide inclusive and affordable education for all section of the society and with special consideration for children with disabilities. The state-of-the-art infrastructure would further

Project Factsheet

Location	The school is located at Machhodari area of Varanasi. The area comprises of mixed land use with the influence of commercial and dense residential zones.
Type of Intervention	Inclusive Education | Digital Learning | Skill Training
Area of the project	The school campus is spread across an area of 4,600 sq. metre and the built area is approximately 1500 sq. metre.
Implementation Agency	The project is implemented by Varanasi Smart City Limited in support from Basic Shiksha Vibhag of Uttar Pradesh state. It will be handed over to Varanasi Nagar Nigam for overall incharge, operation, and maintenance of the facility.
Stakeholders Involved	Varanasi Municipal Corporation | Prime Minister Constituency Office | Uttar Pradesh Government | Varanasi Smart City Limited | Basic Siksha Vibhag of Uttar Pradesh State
Allocated Budget	The project is funded under the Smart Cities Mission. The total cost of the project is INR 14.21 crore
Key Beneficiaries	Children and young adults | Students with disabilities | Women | Transgender community | Urban poor

make the access to education for children with disabilities more affordable and inclusive. It also aims to empower the vulnerable section of the society, such as children with disabilities, women and transgender by facilitating skill development and vocational training courses.

4. Details of Universal Design Features

- Accessible boarding and alighting space
- Provision of parking bays especially for persons with disabilities
- Ramps with grab rails built at the main entrance of the school premise
- Accessible entrance of the multipurpose hall to facilitate barrier free accessibility for children with locomotor disabilities
- Grab rails along the staircase
- Accessible toilet in each floor
- Ergonomically designed drinking water facilities easily accessible for wheelchair users.
- Wide corridors for easy navigation by a wheelchair user
- Well-lit corridor/hallways for better navigation for person with low vision.
- Provision for CCTV for security and surveillance purpose
- Provision of an elevator in each floor
- Inclusive Playground

5. Monitoring

Varanasi Smart City Ltd. Is responsible for the monitoring of the project with support from Basic Siksha Vibhag of Uttar Pradesh.

6. Issues & challenges Identified

The school is located amidst dense urban area surrounded by commercial and residential zones with lack of proper pedestrian infrastructure. This could be a point of concern for the children with disabilities to access the premises independently and would impact the enrolment ratio. The surrounding of the school comprises of a municipal waste segregation centre. This further exacerbates the traffic movement in the immediate vicinity of the school, consequently making it unsafe for the students to reach the school premises. This also devalues the aesthetics and function of the school environment. The access to school could be improved by creating pedestrian infrastructure to provide a safe and walkable environment for the children with disabilities.

The elements of universal design features are not holistically integrated within the school planning and design process. Access through ramp is provided only at two locations i.e., at the main entrance and to connect the multipurpose hall. The available universal design features could only facilitate the hassle free movement of wheel chair users. However, it lacks features such as braille signage, tactile paving, etc. which are required for children with visual impairments.

7. Key learnings

The smart school is one of its kind in the state and at par with the infrastructure provided in the private schools. It's a huge step towards promoting inclusive education especially for children with disabilities and students from low-income families with limited access to quality education. The school aims to promote adaptive learning, skill development and create an interest in extracurricular activities amongst the students. This school could set an example for other cities and states to replicate similar infrastructure and make quality and affordable education within the reach of every child.

However, the school has scope to improve its accessibility quotient. Additional universal design features could be integrated with the school infrastructure at a phased manner. The school could also tap the potential to promote accessible digital learning system, adaptive learning system, create provision for trained teachers, sensitised staffs, etc. to understand the barriers faced by students with varied disabilities. It is definitely a positive step stone towards making education inclusive and affordable for all which have been overlooked due to misconception of high project cost and difficulty in maintaining such infrastructure.

Photographic illustration

Fig. 1 Ramp with rails on the entrance of the school

Fig. 2 Provision for Elevator with spacious hallway

Fig. 3 Inclusive Playground

Fig. 4 Ergonomically designed drinking water facilities

Fig. 5 Accessible toilet with barrier free features

Fig. 6 Ramps at the entrance of the multi-purpose hall

Fig. 7 Ergonomically designed classrooms

8. Recommendations for Inclusive School

Components	Design Components	Requirements and Recommended Standards
1. Site Wide Connectivity and Last mile Connectivity	Streets and Walkways	• Accessible car parking bays towards the entrance/exit. • Provision of pedestrian environment and provides features such as gentle gradients and resting areas • Enable easy navigation, integrating wayfinding within the landscape and building forms to aid independent movement. • Provide way-marking features that are prominent and legible from the point of arrival. • Provisions for accessible street and pedestrian infrastructure within the school locality. • Safe and accessible traffic crossing and intersection
2. Accessible Parking	Parking Bays	• Size of the designated space to be 3600 x 5000mm • Demarcation of accessible parking space • Kerb ramp • Wheelchair charging stations
3. Accessible boarding area	Boarding Point for school bus service	• Ramp for boarding of the bus • Grab rail on both sides • Minimum width of boarding platform to be 900 mm
4. Indoor Environment	Entrance	• Should be sizeable, to permit a wheelchair user and a companion. • Easily moving door swings. • Ramp at the entrance of the building at clear location • Slope of the ramp to be no less than 1:12 • Landing of at least 1500 x 1500 mm at 9m interval • Continuous Handrails on both sides at the Ramp at a height of 760-900mm • Non-slippery Material • Entrance door with a clear width of minimum 1000mm • Covering/shading over entrance ramp • Ramps for single step at entrances of all rooms • Height of door handle to be 800-1000mm
	Reception /information centers	• At least a part of the counter height should be at 800mm • Appropriate Illumination of the counter
	Corridor Spaces	• Accessible common areas including waiting rooms, lift lobbies etc. • Minimum 1500mm width of the corridors • Grab rails along the corridors
	Toilets	• At least one unisex accessible washroom on all floors with child friendly sanitation fixtures • Minimum size of cubicle to be 2.2x2 m. • Sufficient wheel chair maneuvering space inside the cubicle. • Provision of grab rail on adjacent wall to Water Closet. • Height of grab rail to be between 650-700mm • Accessible basin between 750-800mm • Flushing arrangements, dispensers and toilet paper mounted between 300mm x 800mm • Skid proof floor material • Proper drainage • Pivoted doors opening outwards
	Classrooms	• Acoustically sound design • Well illuminated rooms • Glare free windows • Accessible sockets and switches for IT based education • Flexible furniture layout • Detachable seats
	Computer Labs	• Accessible entry • Minimum aisle width to be 900mm • Enhanced visual contrast among different elements • Appropriate illumination • Provision of emergency supplies • Accessibility of evacuation path

Components	Design Components	Requirements and Recommended Standards
	Library	• Minimum 900 mm aisle width • Height of the shelves to be restricted to 1200mm • Enhanced reading room with provision of audio reading of "Audio books" or "e-books" in audio/visual formats • RFID tagging systems in books, digital cataloguing • Flexible furniture layout of reading spaces • Ergonomically designed Furniture
	Canteen/Cafeteria	• Cash and service counter below 800mm • Clear circulation path of 900mm • Accessible drinking water fountain/taps • Accessible design of vending machines and kiosks
	Lift/Elevators	• Size of the lift to be minimum 1500mmx1500mm • Control panel to be placed between 800-1000mm from the floor of the lift • Mirror at the back of the lift • Maneuvering space in the lift lobby
	Signage and wayfinding	• Directional signages • Appropriate signage for designated spaces/rooms • Colors of the signage should be distinguishable and fonts should be legible • Wall mounted signs to be placed between 900-1800 • Emergency exits should be clearly marked
5. Outdoor Environment	Playground and Open Spaces	• Accessible and usable playground space • Facilitate easy access and movement • Accessible by wheelchair and crutch users • Space to be designed based on the varying need of age and ability. • Equipment to stimulate the sensory systems (auditory, tactile, visual, etc.) • Social Space to interact and socialise • Inclusive Play zones

PROJECT 2:
Rudraksha International Cooperation and Convention Centre, Varanasi

1. Background

The foundation for the Rudraksha International Cooperation and Convention Centre was laid in 2015 by the former Prime Minister of Japan, Mr. Shinzo Abe. The centre has been developed as a cultural and modern hub. Built in the shape of a 'Shivalinga' is a confluence of both Indian and Japanese architecture reflecting the historical richness of both the countries. It has been Inaugurated by the Prime Minister of India, Shri Narendra Modi on July 15th 2021. The state-of-the-art convention centre will provide a platform to promote the city's rich art, music, literature and a hub to reflect the ancient culture and tradition of Varanasi.

2. Description

The centre is located at Sigra, which act as an official and administrative centre for the city. The entire facility has been designed with the integration of barrier free design elements to make the facilities entirely accessible for persons with disabilities. It consists of an auditorium hall with a capacity to accommodate 1200 audience. The facility also consists of a meeting hall to accommodate 150 people and is convertible into two spaces based on the seating requirement . Additionally, there are provisions for VIP room, green rooms and the lobby space has been designed as an exhibition gallery. The facility is fully air-conditioned, under CCTV surveillance and the overall functioning is being controlled by the 'Building Management System'. The entire facility includes accessible features e.g., accessible entrance, reserved parking space for persons with disabilities ramps, staircase, elevators, accessible toilets, etc. The convention centre has been rated as a green building under the Green Rating for Integrated Habitat Assessment (GRIHA) system.

3. Objectives

The convention centre would act as a social and cultural gathering space for the citizens of Varanasi. It also aims to strengthen the city's competitiveness by boosting the tourism sector and create a platform to exhibit the city's art and culture. The state of the art infrastructure would also be a platform to improve the real estate leading to rise in land prices and thus enhancing the city's local economy.

Project Factsheet

Location	The convention centre is located at Sigra, Varanasi. The area comprises of mixed land use with influence of administrative and public uses. Few of the stretches at Sigra are also occupied by commercial buildings. The Varanasi Smart City Limited office, the Kashi Integrated Command and Control Centre, and Municipal Corporation are few of the prominent buildings located in this locality.
Type of Intervention	Inclusive tourism development | Augmenting city's art and culture | Promotion of city's ancient a heritage and tradition | Enhancing the city's economic productivity
Area of the project	The two story structure is built on 2.87 hectares of land. It can accommodate more than 1,200 people and has a parking space for 120 cars.
Implementation Agency	Central Public Works Department has implemented the project with support from JICA and a Japan based consultancy firm. The facility has been handed over to Varanasi Smart City Limited for operation and maintenance purpose.
Stakeholders Involved	Varanasi Municipal Corporation | Prime Minister's Office | Uttar Pradesh Government | Varanasi Smart City | Japanese International Cooperation Agency (JICA) |
Allocated Budget	JICA has assisted the construction of the convention centre by providing a Grant in Aid of 3,042 million Japanese yen (approximately INR 200 crore) under the Japanese Official Development Assistance scheme.
Key Beneficiaries	Citizens of the city | Tourists | Persons with disabilities | Women | Children | Elderly Persons

Photographic illustration

Fig. 1 Accessible Entrance

Fig. 2 ADA Complaint Signage

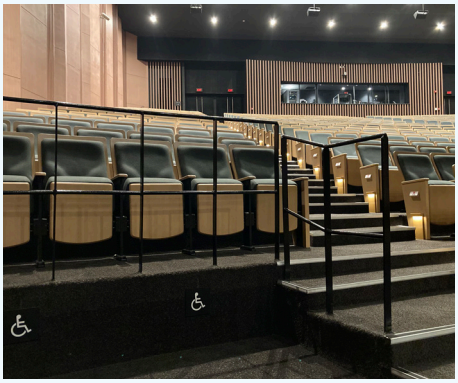

Fig. 3 Wheelchair Accessible Seating Spaces

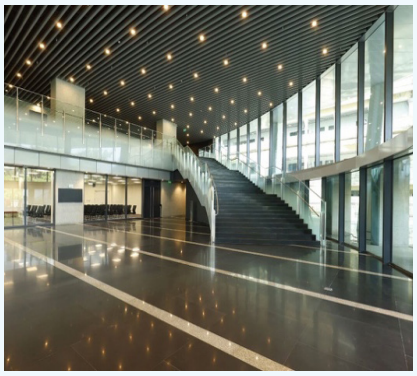

Fig. 4 Accessible Entrance & Foyer Space

Fig. 5 Signage and Wayfinding Plan

Fig. 6 Signage and Wayfinding Plan

Fig. 7 Reserved seating for PwDs

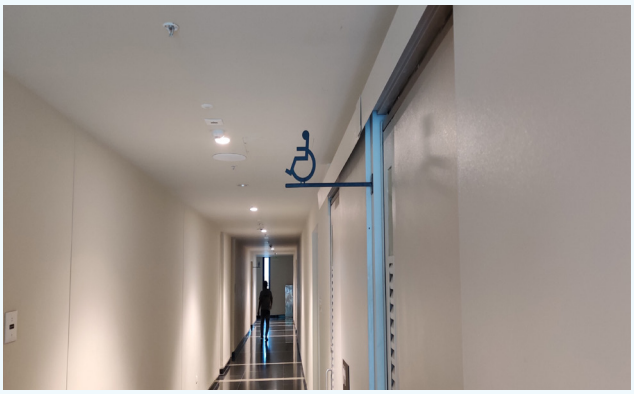

Fig. 8 ADA Complaint Signage

Fig. 9 Accessible toilet with diaper-changing station

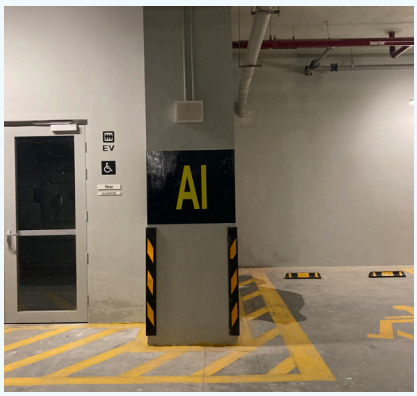

Fig. 10 Reserved parking space for PwDs placed strategically near the elevator

Fig. 11 Braille signage in the elevator

4. Details of Universal Design Features

- Barrier free entrance and exit
- Reserved Parking for persons with disability (both at the entrance and basement parking)
- Spacious and obstruction free corridors
- Staircase with grab rails
- 3D signage placement across the convention centre
- Braille signage in the elevator
- Tactile Paths
- Universally designed toilets
- Wheelchair friendly auditorium
- Accessible spectators/viewing position for wheel chair users
- Automatic light system that replaces the need to find and touch switch boards

5. Monitoring Mechanism

The Central Public Works Department (CPWD) had supervised the overall designing and implementation of the project with support from a Japan based consultancy firm. The facility has been handed over to Varanasi Smart City Limited (VSCL) for operation and maintenance purpose. An event management agency has been engaged by VSCL to ensure the functioning, operation and maintenance based on a revenue generation model for a certain lease period.

6. Issues & challenges Identified

The facility anticipates a high operation and maintenance cost of appx. INR 200,000 per day . There is a need to explore innovative measures for revenue generation and expand the scope for hosting international and national events. This could be also done through diversifying the usage of the facility e.g., renting of space for offices, commercial, exhibition purpose, etc. The accessible features of the facility are limited and focussed mostly on creating an easy access for persons with physical and visual impairments. There is a scope for integrating universal design features which caters to the challenges faced by persons suffering from varied impairment e.g., hearing, visual, cognitive and physical disabilities. These could include provision for visual contrast along the floors of the auditorium, tactile paving, ergonomically designed reception counters, audio visual tools for persons with hearing/visual impairments.

7. Key learnings

The design of the building element and aesthetics components have been done consciously considering the local context and surroundings. The centres set a good reference example for an inclusive and green infrastructure. The barrier free features have been strategically planned, designed and integrated considering the barriers and challenge faced by persons with disabilities to access similar facilities. The accessible design elements have been integrated at the initial stages of the design process and thus emphasising on not considering inclusion as an afterthought process. This also reduces the cost of retrofitting at a later stage. The project sets an example of how un urban space could be universally designed for a multipurpose use and without impacting the overall budget and objective of the project. It would also improve the overall image of the city, boost economic activity and aesthetics of the urban environment.

8. Recommendations for an Inclusive Convention Centre

Components	Design Components	Requirements and Recommended Standards
1. Site Wide Connectivity and Last mile Connectivity	Streets and Walkways	• Accessible car parking bays • Accessible entrance/exit. • Provision of pedestrian infrastructure • Accessible design of the streets with features such as gentle gradients and resting areas within the connecting streets. • Enables easy navigation, integrating wayfinding and signage plan with the infrastructure to aid independent movement. • Provides way-marking features that are prominent and legible from the point of arrival. • Safe and accessible traffic crossing and intersections
2. Accessible Parking	Parking Bays	• Sufficient Number of car parking spaces (Provided as per Norms) • Size of the car parking to be 3600 x 5000 mm • Designated spots for tricycles or adapted scooters parking of size 3000 x 2400 mm ➢ Location - 30 m from the accessible entrance of the building • Connected to the building entrance with an access route ➢ 1200 mm width ➢ easily accessed with a kerb ramp ➢ Provision of tactile tiles • International symbol of accessibility (wheelchair sign) at approaches and entrances ➢ Vertical sign at a visible height range between 1500-2100 mm ➢ Square signage with dimension at least 1000 mm but not exceeding 1500 mm in length.
3. Accessible boarding area	Boarding Point	• Ramp for boarding • Grab rail on both sides • Minimum width of boarding platform to be 900 mm
4. Indoor Environment	Entrance	• Wide entrance to permit a wheelchair user and a companion • Accessible door swings • Ramp at the entrance of the building at clear location • Slope of the ramp to be no less than 1:12 • Landing of at least 1500 x 1500 mm at 9m interval • Continuous Handrails on both sides at the Ramp at height between 760-900mm • Non-slippery Material • Entrance door with clear width of minimum 1000mm • Covering over Entrance ramp and ramp for floors • Ramps for single step at entrances of all rooms • Height of door handle between 800-1000mm
	Signage and wayfinding	• Wayfinding components at appropriate places with appropriate: ➢ Orientation ➢ Route Decision ➢ Route Monitoring ➢ Destination Recognition • Building direction signage and bulletin board signs ➢ 1800 mm from finished floor level. • Colors of the signage should be distinguishable and fonts to be legible • Emergency exits should be clearly marked • Provision for Tactile Map of the building • Both orientational and destination recognition signages for evacuation and refuge areas, elevators, lifts and restrooms should be there.
	Reception / information centers	• At least a part of the counter height should be at 800mm • Appropriate Illumination of the counter • Flexible layout of lobby and waiting areas
	Corridor Spaces	• Accessible common areas including waiting rooms, lift lobbies etc. • Minimum 1500mm width of the corridors • Grab rails along the corridors
	Lift/Elevators/ Staircase	• Clear size of the lift to be minimum 1500 x1500mm • Control panel to be placed between 800-1000mm from the floor of the lift • Provision for mirror at the back of the lift • Wide Maneuvering space in the lift lobby • Minimum 1500 mm clear width of the staircase • Provision for Grab rail on both sides

Components	Design Components	Requirements and Recommended Standards
	Toilets	• At least one unisex accessible washroom on all floors with child friendly sanitation fixtures • Minimum size of cubicle to be 2.2x2 m. • Sufficient Maneuvering space inside the cubicle. • Provision of grab rail on adjacent wall to WC. • Height of grab rail would be between 650-700mm • Accessible basin between 750-800mm • Flushing arrangements, dispensers and toilet paper mounted between 300mm x 800mm • Skid proof floor material • Proper drainage • Pivoted doors opening outwards
	Food Court	• Cash and service counter below 800mm • Clear circulation path of 900mm • Accessible drinking water fountain/taps • Accessible design of vending machines and kiosks
	Additional Services	• Accessible Drinking fountain at multiple locations • Accessible vending machines • Accessible washrooms ➢ At least one unisex accessible washroom on all floors with child friendly sanitation fixtures ➢ Sufficient maneuvering space of 2.2x2 m inside toilets ➢ Grab rail on adjacent wall to WC between 450-500mm ➢ Accessible basin between 750-800mm ➢ Flushing arrangements, dispensers and toilet paper mounted between 300mm x 800mm ➢ Skid proof floor material ➢ Pivoted doors opening outwards ➢ Space for diaper changing, baby feeding etc.
	Auditorium	• Accessible Seating ➢ Reserved seats for wheelchairs near the entrance ➢ minimum 1200 mm wide aisle for parking and maneuvering of the wheelchairs • Movement aisle ➢ Minimum 1200 mm corridor space ➢ Contrasting floor color in the auditorium ➢ Tactile tiles for persons with visual impairments • Information Dissemination ➢ Information in visual (signs, notice, digital display etc.), tactile (embossed lettering, braille), audio (announcements, speakers etc.) formats. ➢ Provision of live captioning/ sign language interpretation for persons with hearing impairments ➢ Provision of induction loop system to enhance acoustics of the hall • Stage and Green rooms ➢ Access to stage and backstage by providing ramps/ platform lifts ➢ Accessible entrance to the back stage space ➢ Maneuvering space of 1500 mm for wheelchair movement
	Meeting rooms	• Flexible furniture layout • Accessible entrance • Table space at height of 750 mm, with leg space of 480 wide
	Exhibition Space	• All exhibits to be put above 900 mm height and between 1800 mm height • At least 1500 mm to left between each exhibit • Observation space of minimum 1200 mm • Tactile displays and information
5. Outdoor Environment	Recreational/ Open Spaces	• Accessible and usable space • Facilitate easy access and movement • Design the space based on the varying need of age and ability. • Equipment to stimulate the sensory systems (auditory, tactile, visual, etc.) • Social Space to interact and socialize • Universally designed furniture

PROPOSED PROJECTS

PROJECT 1:
Redevelopment of Dr. Sampoornanand Stadium, Varanasi

1. Background
The project has been selected as one of the landmark projects under the 'Samunnat Kashi' solution proposed under Smart City Proposal of the Smart City Mission. The state-of-art infrastructure of the stadium would also uplift the urban centre, promote socio-economic overall development and would act as a catalyst for the growth of sports facilities in the city. The stadium will help in encouraging sports participation in schools, colleges and corporates. It will act as a venue for hosting national and international sports events and promote sports culture across the country. It would also act as centre for recreational, hospitality, entertainment and retail functions thus helping in generating revenue for the operation and maintenance of the facility. It would play a crucial role in creating a truly inclusive stadium venue. This project has the potential to become a beacon of good practice for Varanasi and the entire country. This can generate significant interest from a national and international audience as has been seen in east London in the UK following the delivery of inclusive sports venues on Queen Elizabeth Olympic Park.

2. Description
The stadium would be developed as a fully integrated sports infrastructure including stadiums, multiple recreational, leisure zones, gyms, parks, and support facilities and would provide barrier free accessibility to all age groups. The facility would promote economic growth through innovative means of revenue generation thus creating employment opportunities for the citizens. The phase wise planning and implementation of the project would lead to overall improvement of the surrounding area with planned pedestrian and vehicular traffic movement, promoting it as a safe and inclusive urban space for the city.

Project Factsheet

Location	The stadium is located at Sigra, Varanasi. Sigra has a mixed land-use plan, it includes few of the prominent offices, food and shopping complexes. The Varanasi smart City Limited office, the Kashi Integrated Command and Control Centre, and Municipal Corporation are also located at Sigra.
Type of Intervention	Inclusive Recreational Facilities | Barrier Free Sports Infrastructure | Enhancing the city's economic productivity
Area of the project	Total area of the site is approximately 64648.391 Sq. Mt. (15.97 Acres).
Implementation Agency	Varanasi Smart City Limited would be responsible for overall designing and planning the project. A consultant would be onboarded by VSCL on EPC model to implement the project.
Stakeholders Involved	Varanasi Smart City Limited | Sports Authority of India | Prime Minister's Office | Uttar Pradesh Government
Allocated Budget	The total estimated/budgeted cost for the project is INR 111.08 Crore which would be funded under the Smart Cities Mission.
Key Beneficiaries	Persons with disabilities | Sports Persons | Women | Children | Elderly Persons | Citizens of the city | Tourists

3. Objectives

The project aims to redevelop the stadium as a barrier free/ disabled friendly sports facility with integrated sports infrastructure to encourage participation of persons with disabilities in the sports sector. The major objectives of the projects are as follows:

- Create a barrier free/ disable friendly sports facility in the city
- Uplift the sports infrastructure as a world class facility
- Develop an integrated sports facility based on Sports Authority of India guidelines
- Encourage sports mapped to local culture and context
- Promote well-being and healthy lifestyle for the citizens of Varanasi
- Formulate revenue generation model through integrating mixed land use model
- Promote sports tourism
- Create the structure as a city identity which resonates with its contribution in the field of
- sports in the past.

4. Details of Universal Design Features

The major components of the Barrier Free Stadium would include the following elements:

- Redevelop the stadium as a barrier free/disability friendly sports facility with integrated infrastructure to encourage participation of Persons with Disabilities as both spectators and participants.
- Provide barrier free accessibility to Persons with Disabilities (irrespective of age, gender, ability socio - economic status)
- Integrate Barrier Free Design elements to provide an environment that supports independent use by Persons with Disabilities to participate in sports independently
- Safe, accessible pedestrian and vehicular traffic movement on approaches to and around the stadium
- Physical design components for a barrier free stadium must be complemented by service design considerations, staff training and regular maintenance and evaluation of accessibility to ensure standards are maintained.
- Provision of trained and sensitised staff

5. Monitoring Mechanism

The project would be built under the EPC model including Defect Liability Period for Five Years. The project phasing is planned in three stages.

Photographic illustration

Fig. 1 Snapshots of the existing site of the stadium infrastructure

6. Recommendations for a Barrier Free Stadium

The key features of inclusive design and planning principles have been identified in this to ensure accessible indoor and outdoor environment for Person with Disabilities in order to promote easy access to the Stadium. Several global/ national standards have been referred to develop this holistic list of barrier free components.

A barrier free stadium should include the following elements:

- Good signage and wayfinding to support orientation on the approaches, to and exits from the stadium while considering the needs of people with sensory impairments, visual and hearing impairments
- Adequate space should be allocated for persons using mobility devices, e.g., wheelchairs, crutches and walkers, as well as those walking with the assistance of other persons.
- (Provisions for other types of disability considered as per RPwD Act, 2016)
- Accessible mode of public transport and adequate provision of accessible parking bays
  - Accessible parking bays should include a 1200mm safety zone on both sides of each bay to accommodate a driver or a passenger with disabilities.
  - Accessible bays should be located as close as possible to the entrance and not more than 100m with resting places including seating provided every 50m.
- Accessible Entry and Exit Points including accessible vertical circulation around the building.
- Appropriate provision of wheelchair accessible viewing positions in the stadium to offer a choice of good vantage points including when spectators in front are standing.
- Appropriate accessible toilet provision in close proximity to accessible seating areas and co-located with other toilet facilities
- Infrastructure to support key disability sports including Boccia, Goal Ball, Swimming, Table Tennis, Volleyball, Wheelchair basketball and tennis.
- In addition to physical infrastructure , provisions for supplementary components could be considered e.g., Inclusive Digital Interventions that support disabled users i.e. (Mobile Apps, Maps, Smart Card, e-Kiosk, etc.)

The following guidelines (Regulatory/Recommendary in Nature) should be referred for the preparation of design and execution of the project:

- Harmonized Guidelines and Space standards for Barrier Free Environment for Persons with Disabilities (Mandatory Use)
- Space Standards for Barrier Free Built Environment for Persons with Disabilities and Elderly persons (Mandatory Use)
- Accessible Sport Facilities Design Guidelines (Mandatory Use)
- Street Design Guidelines – UTTIPEC (Recommendary Use)
- IRC Street Guidelines (Recommendary Use)
- RPWD Act, 2016 (Mandatory Use)

The list of inclusive design features for similar infrastructure has been categorized mainly into four sections:

- **Site Wide Connectivity and Accessibility** - to promote accessible and hassle free end to end movement from the point of public transport to the stadium.
- **Pedestrian Movement** - to focus on creating an integrated network of streets/pedestrian routes around the stadium.
- **Built Environment -** to integrate barrier free features for independent movement of PwD.
- **Accessible Sports Facilities** - to promote barrier free accessibility of sports facilities and to build the environment which supports the independent participation PwD.

7. List of Inclusive Design Features for Barrier Free Sports Infrastructure include the following sections:

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
1. Site Wide Connectivity and Accessibility (Site Planning)	External Routes	Streets and Pathways	• Accessibility from bus/rail stops, near to or within the site, to the entrance. • Accessible car parking bays towards the entrance/exit. • Provision of pedestrian environment and provides features such as gentle gradients and resting areas • Enables easy navigation, logically integrating wayfinding within the landscape and building forms to remove confusion and aid independent use. • Provides way-marking features that are prominent and legible from the point of arrival. • Minimum of 2000mm wide pedestrian routes • Surfaces should be firm, slip resistant and smooth • Provide pedestrian routes clearly defined from vehicular routes around the sports facility grounds.	Inclusive Design Standards, GDIH (Recommendary Use)
2. Pedestrian Movement	Public realm	Shared space/ Streets/ Pedestrian Routes	• Coordinated network of legible, safe and accessible routes. • Safety and security of pedestrians. • Facilities such as parking, play and seating areas that are well-lit with natural surveillance, • Clear sightlines, obstruction free path	Street Design Guidelines – UTTIPEC Street design and IRC guidelines Inclusive Design Standards, GDIH (Recommendary Use)
	Changes in level -Gradient	External ramps and steps, handrails, external passenger lifts, Graded routes	• The steepest allowable gradient for pathways in new sports facilities is 1:21 • Crossfall gradient on pathways and approach routes should not exceed 1:50. • Where changes in level cannot be avoided and graded routes are required, they should be designed to be as shallow as possible. Steep ramps are trip/slip hazards and often require excessive effort for some disabled people to access independently. • Significant changes in level (more than 2m) will require alternative step-free options, such as lifts. • Ramps are to be avoided where possible and not used on principal routes. Where used, gradients should not be steeper than 1:15. • Lifts to be situated in safe locations with clear sightlines of the entrances/ exits and natural surveillance.	
	Street/ Pedestrian Routes Connectivity	Bridges and Subways	• Should be designed for safety and be well-lit, have clear sightlines, preferably with natural surveillance and ideally a degree of overlooking from adjacent buildings.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
	Pedestrian routes	Width	• Take into account of people's mobility ranges vary enormously between individuals by age and ability and contributing factors such as weather, topography (gradients) and obstacles. • Bollards should be minimum 1000mm high and contrast visually against the background in which they are seen and have a minimum 150mm deep visually contrasting band to the top. • Minimum surface width of at least 1800mm for principal access routes, which is the minimum space required for two wheelchair users	
		Seating/Resting points	• Provide seating located along pedestrian routes, which may be combined with associated public facilities such as public toilets and play spaces. • Provided at regular intervals no more than 50m apart. • Well designed, accessible seats and benches that complement the surrounding environment. • Naturally sheltered from the weather, in particular wind and rain be located off main pedestrian routes as not to cause an obstruction, particularly along busy routes. • Be located on an accessible surface; seats may be provided on areas of soft landscaping. • Min. height to be considered. • Enable a wheelchair user to transfer laterally onto a bench, with a level transfer space.	
		Street Furniture	• Should be placed in areas that will not obstruct or create a hazard for people – in particular people with a visual impairment – and ideally located outside of primary circulation routes. • Located parallel to the path of travel.	
		Pedestrian Surfaces	• Have consistent use of colour and surface material if used as a wayfinding tool. • Have level changes indicated by visually contrasting surfaces that do not create confusion. • Avoid the use of busy patterns, including stripes, that may cause confusion or be disorientating. • Avoid the use of highly reflective materials, they can appear to be wet and therefore slippery even when they are not. They may also be a source of reflective glare which can be disorientating for many people with a visual impairment.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
		External Tactile Paving	• Tactile paving (buff-coloured and blister profile) should be used to provide warning and guidance to people who are blind or partially sighted when approaching a dropped kerb, or at a junction with a road or car park. • Major use of tactile paving will be to identify level changes (steps/stairs), pedestrian crossings and to differentiate cycle lanes from pedestrian footpaths. • Types of Paving; Corduroy, guidance, blister, Controlled crossings, all crossing beacons are to emit an audio sound or incorporate the rotating cone. (Be clear on use of tactile paving. It must be consistent across the site and with what else is being applied in Varanasi and ideally also across India. Consistency of use is important for blind and partially sighted people).	
		Design criteria for addressing hazards while movement	• External access route widths should maintain a clear height of at least 2.5m above ground level. • Any feature which could constitute a hazard should not project into or be located within an access route.	
		Way finding/ Signages/Com-munication System	• Recognisable routes, intersections . • Use of accessible and legible signage including visible and clearly identified street names. • Directional signage; avoid wayfinding signage gaps. • Landmarks to help people find their way around. • Visual clues such as landform, architecture or graphics. • Tactile elements such as paving surfaces or textured walls. • Audible elements such as running water and other sensory elements. • Information, such as scented plantings (olfactory). • Defined and appropriately indicated pedestrian crossing points. • Appropriate use of tactile paving as and where required including the use of guidance paving directional lighting and the colour coding of external areas and key pedestrian routes. • Audible communication methods; audible signs and descriptive wayfinding. • Tactile communication methods such as tactile and braille signage, changes in level and kerb upstands, changes in walking surface materials and texture, tactile paving.	
		Accessible toilets	• Appropriate Signages; means of wayfinding to indicate the location of accessible toilets at the Stadium.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
	Cycling	Route and infrastructure	• Includes on-street cycle lanes and segregated cycle lanes. • Clear demarcation on pedestrian and cycle movement with a change in level with kerbs. • Be no less than 2m wide, to allow wheelchair users to pass shared paths. • Bollards or gaps between kerbed upstands. • Pathway to prevent access to motor vehicles. • Have dropped kerbs (where required) that are at least 1500mm wide.	
	Safety	External light-ing	• Appropriate lighting to create safe walkable environment • Artificial lighting systems should be designed to maintain a level of illumination that is comfortable and provides a safe environment that is suitable for people who are blind or partially sighted. • Position to avoid creating glare, confusing reflections/pools of bright light and strong shadows.	
3. Built Environment	Indoor Environment	Entrance and Entrance Doors	• Should be clearly identifiable from approach, easily distinguishable, should contrast visually with the immediate surroundings. • Approach area should be level and spacious to enable easy and unrestricted movement, Entrance thresholds should be level. • Amenity lighting, automatically powered double doors • Vision panels to doors should provide a minimum zone of visibility between 500mm and 1500mm above floor level.	Harmonized Guidelines and Space standards for Barrier Free Environment for Persons with Disabilities (Mandatory Use)
		Concourse	• Should be sizeable to permit a wheelchair user and a companion to rest clear of door swings. • Minimum length 2000mm clear from any leading edge of doors (2500mm preferred) and a minimum 2000mm clear width (2500mm preferred).	
		Reception (ser-vice counters in the stadium, i.e., ticket desk, info desk, refresh-ment kiosks)	• They are to be easily identifiable from the building entrance • The approach to the desk should be direct and unobstructed with a firm, slip-resistant surface that allows for easy manoeuvre of a wheelchair. • Any queue system provided should allow wheelchair users good clear manoeuvering space to turn towards the desk and pass others in the queue. • Provide seating and a method to allow individuals who are less able to stand to queue in a way that allows them to keep their place without standing in line. • All reception desks/counters to provide a hearing induction loop. • Assisted listening systems should be implemented using an induction loop, infrared or radio transmission where glazed screens are used.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
	Horizontal Circulation	Corridors and Passageway	• Should be clutter free circulation routes. Fire extinguishers and hoses, radiators and other objects should not project into the clear corridor width. • Corridor width should be minimum 2000mm (2500mm preferred, or at least providing 2500mm passing places maximum 5000mm apart).	
	Vertical Circulation	Internal ramps, escalators, passenger lifts	• Lifts should be located close to the entrance, reception area and main circulation routes. • Door width 800-1200 mm • A clear space of at least 1500mm by 1500mm to ensure adequate manoeuvring space for wheelchair users. Where feasible, 2000mm by 2000mm should be provided at each floor level. • Audible announcements, clear visual display indicating the level reached • Buttons to be placed at 900 *1200 mm • A handrail should be provided along at least one side of the lift car.	
		Stairs	• Unobstructed landing length, clear unobstructed stair width of at least 1200mm.	
		Handrails and Handholds	• Easy and comfortable grip • Surface of handrails should be distinguishable from the background • Height of between 900mm and 1000mm from the pitch line and between 900mm and 1100mm from the surface of the landing.	
4. Accessible Sports Facilities	Sanitary Provision	Accessible toilets	• Wheelchair accessible corner layout WC cubicle for independent use, with minimum dimensions 1500mm by 2200mm. • Horizontal travel distance to a wheelchair accessible WC should be maximum 40m. (accessible WCs are close to accessible viewing areas within the stadium). • Provision for at least one accessible urinal, one accessible wash hand basin . • Contrasting grabrails fitted within all accessible cubicles. • Lowered wash hand basins and urinals / WC will also be beneficial for children and people of small stature (380mm).	Accessible Sports Facilities and Design Guidelines (Mandatory Use)
		Changing and Showering (These are large toilets with a changing bench and hoist and would require assistance)	• Combination of wheelchair-accessible incorporated provision and self-contained unisex accessible rooms should be made available. • Doors into inclusive changing areas should meet the minimum door dimensions Minimum Internal Door Leaf Width. • Each cubicle should have minimum dimensions of 2000mm by 2000mm and meet minimum door dimensions. • Where showers are provided, an inclusive changing area should have at least one wheelchair accessible incorporated shower provision, fitted with a tip-up seat and appropriate grabrails.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
	Self-contained unisex accessible changing/ shower/WC rooms	Floor finishes, level differences, access to toilet, shower zones, coat hooks, lockers, benches, signage, way findings	• At least one self-contained unisex accessible changing/shower/WC room. • Must be located outside, but close to, the male and female changing and shower areas.	
	Accessible features	Public Telephones, Outlets, Switches and Controls, Lighting, Visual Contrast, Floor Finishes and Court Markings	• Located close to the reception area and at least one should be located at an accessible height for people with disabilities, fitted with an induction coupler that is identified using symbol signage. • Lighting in internal rooms to which the public have access should be motion sensor activated. • Levels of lighting in accordance with standards should be provided on all circulation routes. • Artificial lighting should be designed to produce adequate lux levels, including within specific areas such as stairways and lifts. • Both natural and artificial lighting should be controlled to avoid glare, pools of bright light and strong shadows. • Where possible, lighting in internal rooms to which the public have access should be activated by sensitivity to movement illumination of floor surfaces should be as uniform as possible minimising the potential for shadows, reflection or glare, including on steps and stairs. • Finishes that contrast with each other in terms of colour and tone should be used to differentiate between floors, walls, doors and ceilings. • Doors and their frames should contrast visually with the surrounding wall. • Corridor ends should be finished with a contrasting colour to denote a change in direction. • Outlets, switches and controls should be distinguishable from the surrounding wall. • Grabrails e.g., in accessible toilet units, should contrast visually with the surrounding wall surface. • Where viewing areas are provided, contrasting row and seat numbering should be provided on seats and at ground level. • In washroom and toilet areas, provide visual contrast between fixtures/ fittings and the background wall surface and between fittings and flooring. • Circulation routes should be clearly distinguishable from waiting/rest seating areas.	
		Acoustics	• Successful acoustic design can reduce confusion and discomfort for people with disabilities navigating around and using sports facilities e.g., people who have a hearing loss, people with autism and people with dementia or learning difficulties.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
	Accessible Viewing Areas in Sports Facilities	Spectator/ Viewing Facilities	• There should be an adequate number of wheelchair user accessible viewing positions around the stadium. Should also consider an adequate provision of 'ambulant' amenity seating that is easy to get to for people who require additional support. • Spectators with disabilities should have a choice of accessible vantage points and should have the opportunity to sit with a companion, or within a larger group. • Design of bleacher seating and rebound screens should be considered where temporary spectator seating is provided, provision for ambulant accessible seating.	
	Accessible Communi-cation System	Signage and Wayfinding/ Language	• Good external and internal signage is essential to enable people with disabilities to successfully navigate around sports facilities unassisted. • Use simple wording in 'plain English. Wherever possible universally recognised symbols/pictograms should be used to complement wording, which will assist people with a range of abilities including people with dementia and people who do not use English • or to complement pictorial signage, toilets should be signed as accessible not disabled i.e., 'Wheelchair Accessible Toilet'; 'Ambulant Accessible Toilet'; 'Wheelchair Accessible Baby Changing. • Sentences or single word messages should begin with an upper-case letter and continue with lower case.	
		Materials	• Signs should be made from non-reflective matt finished materials.	
		Colour and Contrast	• Signboards should be of a colour that contrasts with the background on which they are mounted. • Text or pictograms should contrast with the signboard. • Use tactile, coloured or tonal wayfinding tools to guide people to and around sports facilities	
		Positioning	• Prominent positions, located at key decision points e.g., at junctions of circulation routes. Signage and symbols indicating reception counter, lifts, stairs etc. should be clearly displayed in reception areas. • Signage and symbols indicating lifts, stairs and main circulation routes should be clearly displayed at the reception area.	
		Signage Lighting	• Signs should be well illuminated and care should be taken that there are no bright lights behind that may dazzle the viewer.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
		Embossed Signs and Braille	• Large embossed pictorial signs should be provided on doors, including Braille where appropriate e.g., on all toilet doors. • Assist people who are blind or partially sighted, people with learning disabilities and people who do not use English as their first language. • Depth of embossing should be a minimum of 1mm and the edges should be rounded. • Standard pictograms such as those used on toilets should also be embossed.	
	Hearing Enhancement Systems	Audible System	• In large sports buildings, consideration should also be given to the provision of audible signs to assist people who are blind or partially sighted. • Can be placed at the reception, sales counters, key meeting rooms, rooms or areas used for viewing, with a permanent or temporary public address system. • Acoustics to be good for stadium users to clearly understand audible announcements. • The availability of induction loops should be clearly indicated using the standard symbol.	
		Visual Aids	• Incorporate features that offer the presentation of clear, informative visual information on score boards, electronic boards, video boards and to complement audible public announcement systems. • The use of large screens will assist people who may have difficulty viewing from a distance. Event commentary can serve as a visual aid for people who are blind or partially sighted. • Subtitles/visual information are required to complement public address systems, to assist people who are deaf, have a hearing loss or tinnitus. • Portable headphone system for use in viewing areas.	
	Easy access for spectators	Audience Seating/ Viewing Space	• To ensure an appropriate level of accessibility for all seating within the venues. • Spaces for fixed and removable wheel chair seating, circulation to access viewing spaces. • Handrails or other forms of support are recommended where access to easy access/ amenity seating involves using steps.	
	Exit routes	Hassle free movement	• Accessible exit routes and accessible final points of exit will assist people with disabilities to make their way safely out of a sports facility, including external routes to Fire Assembly Points.	

Components	Design Elements	Specific Features	Requirements and Recommended Standards	Referred Acts/ Guidelines
		Alarm Systems	• A fire/evacuation alarm system, which can alert people who are deaf, have a hearing loss or tinnitus of possible danger, should be installed in all sports facilities. • Fire alarm systems should be audible and visual, including within areas where visitors and staff may be unaccompanied. • Emergency assistance alarms in sanitary accommodation, changing and shower areas should be wired to a central control point. • A fire alarm system incorporating flashing beacons should be installed. E.g., provided in main circulation routes, toilet areas, changing and shower areas, lone offices, areas with high noise levels - ambient noise levels exceeding 90dB (A). • Flashing beacons should be designed not to stimulate photosensitive epilepsy.	
		Egress	• Consider where wheelchair user accessible viewing positions are and how easy these are to evacuate in an emergency. Ideally, they offer direct egress from the building. • Safe evacuation of people with disabilities (who may have a broad range of need and abilities) is essential to successful sports facility design and management. • Include features such as: fire signage and lighting; refuges ('safe areas'); horizontal and vertical means of escape; circulation routes; final points of exit; Fire Assembly Points etc. • Clear signage is essential for identification and wayfinding in relation to egress visual and audible communication.	
	Sports Specific Facilities	Athletics, shot put, discus, javelin, club throwing (for athletes with severe physical disabilities) pentathlon, long, high and triple jump, Boccia, cycling, equestrian, gymnastics, swimming, table tennis, volleyball, basketball, wheelchair rugby, etc.	• Accessible indoor and outdoor facilities, signage wayfinding, specific equipment, storage facilities, changing rooms, classification area and rooms, playing surface, court dimensions, lighting, ventilation, temperature, background noise, track, arena size,	

UK Government

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It has utilized its competencies in research, knowledge management, policy advocacy and capacity building to address the urban challenges, and continuously strive to develop sustainable, inclusive, and productive urban ecosystems in India. It has emerged as a thought leader and knowledge hub for urban development in India, and is sought out by both Indian and International organizations for collaborations and partnerships for India's urban transforming journey. NIUA is committed towards aligning its efforts towards achieving the Sustainable Development Goals (SDGs) through all its initiatives and programs.

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