Universal Design Building Standard for INDIA: A Critical Inquiry

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Abstract. Universal Design is now a global term, used to design a product or an environment which will be usable by large number of people without having a specialized design. However, accessible design is a design process in which the needs of people with disabilities are specifically considered. Building standards on accessibility contains scoping and technical requirements for accessibility to sites, facilities, building and elements by individual with disability. INDIA is also following its prescriptive types of various building standards for the creation of physical environment for people with disabilities. These building standards are based on western models instead of research based standards to serve Indian needs. These standards lack contextual connect when reflects in its application in the urban and rural environment. This study focuses on critical and comparative study of various international building standards and codes, with existing Indian accessibility standards to understand problems and prospects of concept of Universal Design building standards for INDIA. The result of this study is an analysis of existing state of Indian building standard pertaining to accessibility and future need of performance based Universal Design concept.

Keywords. Universal Design, Accessibility, Building Standard, Built-environment

1. Introduction

Universal Design is a term coined by late Ronald Mace in the 1980's. However, it is considered an ancient concept that has been extant in cultures such as those in INDIA for ages.1 System of joint family is an integral part of Indian tradition and the houses constructed to the need for them always had design consideration for elderly, children, women and differently abled. It can be said that the concept of Universal Design was implicitly expressed but well embedded in Indian houses. However, with the innovation of technology and influence of western model, approach of building design has now changed in INDIA. With the rapid development, various issues are raised in built environment in which accessibility is a major concern for the architects, engineers, socialist, developers etc. To address these issues; some measures have been taken in the form of policies and acts by Govt. of INDIA that is PwD Act, 2005.

Accessibility was one of the key challenges which were dealt by the Indian development authorities after its independence. Building standards were created to make accessible built environment (IS: 4963-1987, National Building code, CPWD guidelines

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etc.). These building standards are behind evaluation of western models instead of research based standards to serve local Indian needs. It lacks contextual connect when reflects in its application in the urban and rural environment. However, Universal design focuses one step ahead from accessibility and accommodates large masses of people in the built environment. This gives impetus to up gradation of existing accessible standard and development of performance based universal design standard for INDIA.

This study focuses on critical and comparative study of various accessibility/universal design based international building standards, with existing Indian accessibility standards; and to understand problems and prospects of concept of Universal Design building standards for INDIA.

2. Background

'Standards and guidelines take a wide variety of forms and serve diverse functions. Some are simply advisory and informative. Others are voluntary but have specific requirements that must be met to claim conformance. Standards are very important to universal access for a number of reasons. Some standards deals with built in accessibility and other standards deal with interconnectivity; and allow users to connect their assistive technologies in standard and predictable ways to mainstream products to make them usable. Finally, performance standards ensure that the features operate in a manner that is safe and sufficient to meets users needs' [11].

In INDIA, accessibility related standards are prescriptive in nature and they specify for building component where minimum requirements must satisfy the code, such as minimum ramp gradient levels and its width. These prescriptive requirements are simple to use and follow, but they lack local contextual connect, validation and assessment of built environment. Prescriptive standards are not able to consider the interactions between the building systems and measures that could optimize the combined performance. These open the innovation barrier and restrict the regulations. Therefore, substitute of these codes are needed to promote building designers to create an integrated approach for better accessibility [2].

A research based survey done by Access-ability (NGO, at INDIA) revealed that 85% architects are aware of Indian PwD act but only 11% of them are aware of any accessibility guidelines. Even only 63% have studied the concept of accessibility. Accessibility standards are well permitted to create an enabling environment. People are generally unaware of good building standards and refer similar local building guidelines. However, those who are aware of standards, most often raises the questions on its post performance [12].

The aim of the Universal design standard is to accommodate the large number of people and facilitate them throughout their life. It specifies the design requirements which will ensure increased user safety and quality for all. It ensures certain level of performance. Various developed and under developed countries have amended their accessibility standard in to universal design standard or in process to do so. In 2009, Norway successfully amended its Planning and Building Act in order to incorporate Universal Design standards and now it targets to infuse these standards on ground by 2025. U.S.A

is in process of development of GUDC voluntary Universal design standard, New Zealand and Singapore amended accessibility standard and made it more pragmatic in to performance based. Canada with its access design standard ensures equal access for people with disabilities and look at how universal design principles may apply across all disabilities [10].

3. History of accessibility standard in INDIA

History of INDIA emphasizes on accessibility after its independence and declaration of democratic-republic nation in 1947-50. Constitution of INDIA in its fundamental-rights, Article-15 clearly protects its citizens from discrimination on the ground of race, religion, caste, sex and place of birth. It also protects people with disability from the discrimination and allows them to access safely to the built environment. To promote Article -15 of the constitution; Bureau of Indian standard has published an Indian standard (IS) code in the year 1968, further revised in 1992; named as IS 4963: Recommendations for Building & Facilities for the Physically Handicapped. This standard applies to all buildings and a facility used by the public but does not apply to private buildings. It has considered four types of disabilities to facilitate in built environment. However, latest census of INDIA (2011) provides statistical data on 11 types of disabilities in the country which need to be considered for any development. 'IS 4963, is intended to make all buildings and facilities used by the public accessible to, and functional for the physically handicapped through and within their doors, without loss of function, space or facility where the general public is concerned' [13]. It could not be considered as an ideal standard to follow as it does not consider performance criteria, all type of disability, and material specification etc.

In 1970, National building code (NBC) has included Annexure-D as special requirement for planning of public buildings meant for use of physically challenged in its development control rules-general building requirement (part-3). NBC is applicable to all building construction activity in the nation used by the public and Annexure-D does not apply to private development. It could be considered as supplement to IS 4963: 1982, where performance of accessibility in built environment is not a measure.

In 1968, Central public works department (CPWD) has published a 'Guideline and Space standards for Barrier Free Environment'. An ideal initiative taken in this guideline is to promote education in accessibility, up gradation of local building codes to enrich access in the built environment and application of the measured measures to public-private development. However, these guidelines are not mandatory for any development in the nation and have been considered as design support. Details in terms of architectural detail are detail out in the guideline with anthropometric studies. Specification of material for issue area is also dealt in the guideline which would support designer to identify the specification. Although, various details are available here but lacks in contextual connect and requirement of Indian society. Guidelines are not considered ideal in contemporary situation where Information communication Technology (ICT) plays an important role in development.

The Persons With Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995, is to give effect of Proclamation on the Full Participation and Equality of the People with Disabilities in the nation. Its chapter-V promotes removal of

architectural barriers from school, colleges or other institution. Chapter-VI promotes healthy and safety measures and creation of a non-handicapping environment in places where persons with disabilities employed. Chapter-VIII promotes non discrimination and accessibility in transport, built environment etc. However, accessibility in the act is not provided as a mandatory requirement for development of built environment and applied to public buildings only.

In the year 2001, Office of chief commissioner, People with Disability had published a guideline 'Planning a Barrier Free Environment' to encourage barrier free environment in the built environment. This manual is concerned with access to, movement within and around, buildings, by people with disabilities. 'The specifications of this guideline are intended to make buildings accessible to its users with such physical disabilities as the inability to walk, difficulty in walking, reliance on walking aids, blindness and visual impairments, speech and hearing impairments, in-coordination, reaching and manipulation disabilities, lack of stamina, difficulty interpretation and reacting to sensory information, and extremes in physical size' [14]. A new initiative in this guideline was to promote access audit for the existing environment through a set format and make developers aware of issue area which must be considered while designing.

INDIA entered as a signatory to the United Nation Convention on Rights of Person with Disabilities (UNCRPD) in 2008, to realize human rights and development for persons with disabilities by designing barrier free built environment.

Due to lack of Indian literature on accessibility provision in built environment, architects are relied on unpublished work or foreign literature which does not fit in Indian context. This is so because IS: 4963, NBC- Annexure-D, CPWD Guidelines, Guideline of Barrier Free Environment by Chief commissioner, PwD is not mandatory for any development and are accountable separately to the public buildings. This has given major thrust and a good step taken by the Ministry of Urban Development (M.U.D) is to synchronize the above mentioned standard and guidelines. The initiative had also started to update standards to latest design requirements as per international standards. Some salient features included in this guideline are:

1. Inclusion of universal design principles for creation of internal and external building elements.
2. New buildings and those which are to be retrofitted must consider full accessibility concept/standard.
3. Promote equivalent level of safety for everyone while emergency.
4. Integration of accessibility with buildings function, form and architectural quality.

The major objective of the Barrier Free Design Guidelines, which are based on Universal Design Principles, is to guide city authorities while considering or developing public projects. The guideline serves as a reference for developing future policies, guidelines, standards and other initiatives that serve the needs of persons with disabilities [6].

4. International perspective and INDIA

Accessibility codes are being created in last 40 years of the twentieth century and considered as a new event. ANSI-A117.1 (1961) American national standard is considered as first accessibility standard in the world. U.S Civil rights movement of the 1960s that gave thrust to the U.S civil rights act of 1964 and was considered as first legislation for prohibiting discrimination based on race; and further established the basis of civil right laws. With the technical part of standard and concept of non discrimination new development in accessibility regulation began [7].

U.S congress had enacted 'The Americans with Disabilities Act in 1990 (ADA) to protect people against discrimination based on disability. It gave the thrust to the concept of accessibility. Now, designer and developers are fully responsible to provide safe access to the building occupants and accessibility based building code guide them to this mandate.

The initial term used around the world was Barrier Free Environment, and it was meant to remove barrier for disabled people from built environment. This phrase later replaced with the term Accessibility (1970), which focused on issues of mobility, such as wheel chair access, in many countries. In 1985 the term Universal Design coined by RON MACE has changed the concept of UD in the way it brings. Accessibility is a function of compliance with regulations or criteria that established a minimum level of design necessary to accommodate people with disability. However, Universal Design is an art and practice of design to accommodate the widest variety and number of people throughout their life spans (NCSU, 1997). The seven principles of Universal Design developed in 1997 by the Centre for Universal Design with a group of U.S experts, articulated a process by which to define and evaluate the usability of design elements. These principles has given major thrust to develop Universal Design built environment in place of only accessibility and awareness of these seven principles are evident of world wide. Now universal design principles are widely accepted by various countries like Norway, Germany, France, Indonesia, Japan, Italy, Korea, Netherlands, Sweden, Spain, and Portugal for the development of built environment [5].

Although, JIM S. Snadhu in his research paper title: The Rhinoceros syndrome: a contrarian view of Universal Design [7] says that seven principles are not useful to or applicable to developing countries like INDIA and China; and has little connection with poverty and rural populations. Sandhu viewed Universal design concept without its contextual connect with the developing countries like the things which had heard about, but not seen.

5. Universal design INDIA principles

Indians are very different from the west in the way of culture and tradition. The social fabric of Indian culture is very unique and diversified too. Anything which is foreign cannot be adorned over it to look good as it never fits in, and so are the imported as standards. Therefore, Universal Design principles in Indian context may require its contextual connection. With the objective of "Design for All", Universal design INDIA principles were developed by an interdisciplinary team of Indian experts to identify and support the need of diverse population of the country in its own context [4].

'The UDI principles [1. Equitable, 2. Usable, 3. Cultural, 4. Economy, 5. Aesthetics] are standalone universal design goals that focus on Indianess, inclusivity and social differences related to culture, age, gender, disability, caste, class, religion, poverty and urban/rural background. UDI principles neither make any connection to nor build upon seven Universal Design principles' [3]. However, these principles are now reflected in new or updated guidelines of various Indian government agencies. Latest publication of 'Harmonized Guidelines and Space Standards for Barrier Free Environment for Persons with Disability and Elderly persons [Govt. of MUD, INDIA] is an example of inclusion of Universal Design concept for designing of building elements.

6. Indian accessibility standard: validation study

In INDIA, accessibility standards are always a debatable issue and often criticized by various non-government organizations. The issue raised by NGO'S are, 1) standards are not fit for Indian people and does not cater Indian people need, 2) accessibility issues are not seriously undertaken in the standard and excluded various types of disabilities, 3) too many standards on accessibility creates ambiguity for the designing of built environment.

To eliminate these issues 'Harmonized Guidelines and Space Standards for Barrier Free Environment for Persons with Disability and Elderly persons [Govt. of MUD, INDIA] has been published in 2016. And it is mentioned in the standard that issues of accessibility are identified and suggestion made are higher than other developed countries.

To validate effectiveness of Indian accessibility standard ,latest version on accessibility are compared with international standards to identify differences, attributes, shortcoming and future need of Indian accessible standards. International standards which are compared with Indian standard are considered to be influential in its geographical setup and belong to different continent of the world.

Stage 1: To compare on the same raised area and attributes, four dependent variables of built environment are identified:
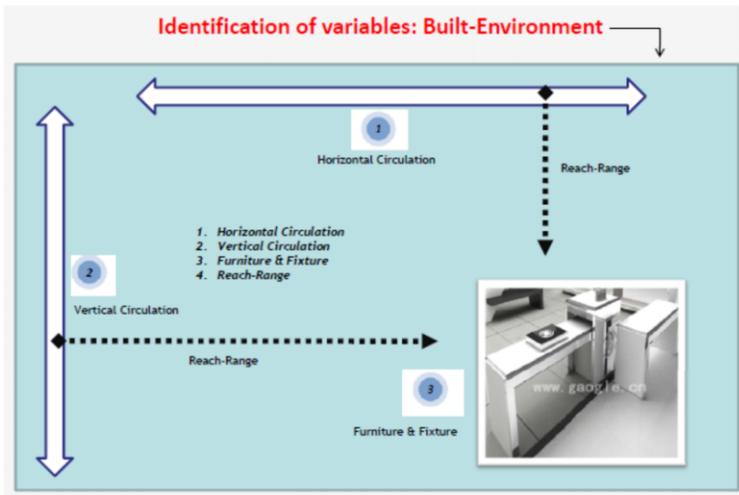
Figure 1. Built environment variable for accessibility
Source(s): Author's, 2016

Stage 2: Variables are detail out by identifying various indicators which influence comprehensiveness of built environment variable:

Table 1: Comparison of standards

			USA	INDIA	Australia	Singapore	South-Africa
Horizontal circulation	Walks/Pathway	Clear Width					
		One wheelchair					
		Two wheelchair					
		One Wheel Chair with one person					
	Change in level With slope length	Height UP TO 6 MM					
		Rise between 6 to 13 MM					
		Rise up to 75 MM					
		Rise up to 3000 MM					
	Turning Space	Circular					
		T-Shaped					
	Protruding object	Total Height required					
		Clear Height above Ground					
		Protrusion limit					

Source(s): Author's, 2016

Stage 3: User group identification to understand comprehensiveness and inclusion of people in the standards
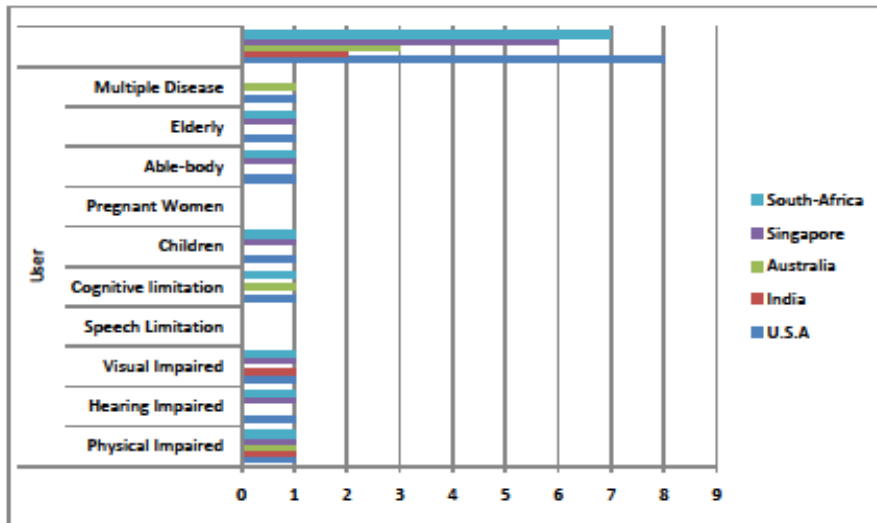

Figure 2. User group identification
Source(s): Author's, 2016
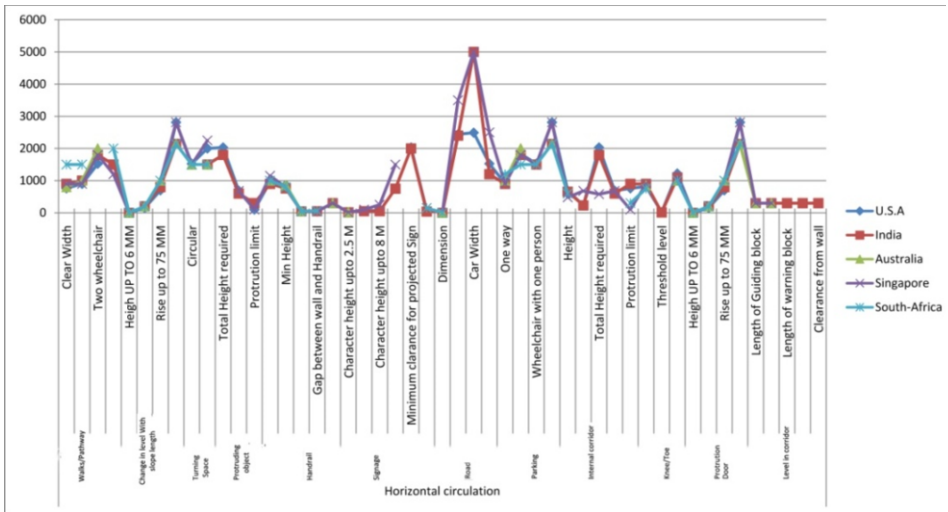
Stage 4: Analysis of standard comparison

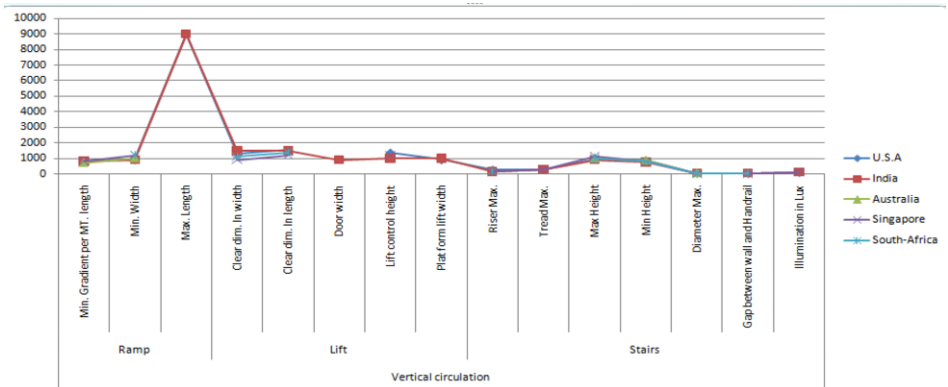**Figure 3.** Analysis of horizontal circulation
Source(s): Author's, 2016

Figure 4. Analysis of vertical circulation
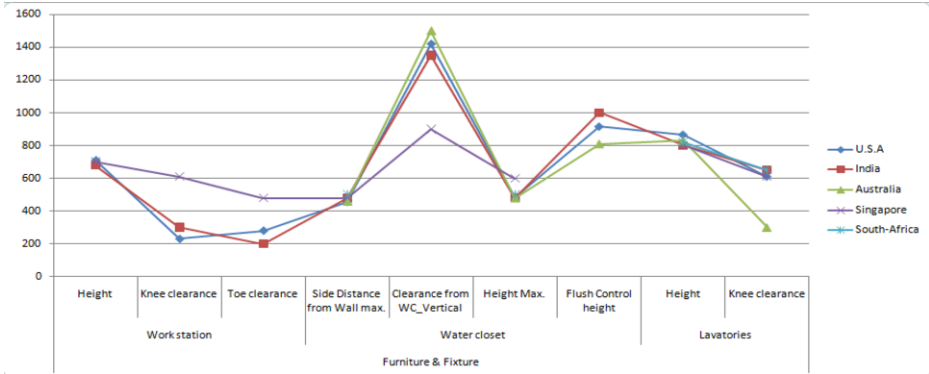Source(s): Author's, 2016

Figure 5. Analysis of Furniture & Fixture
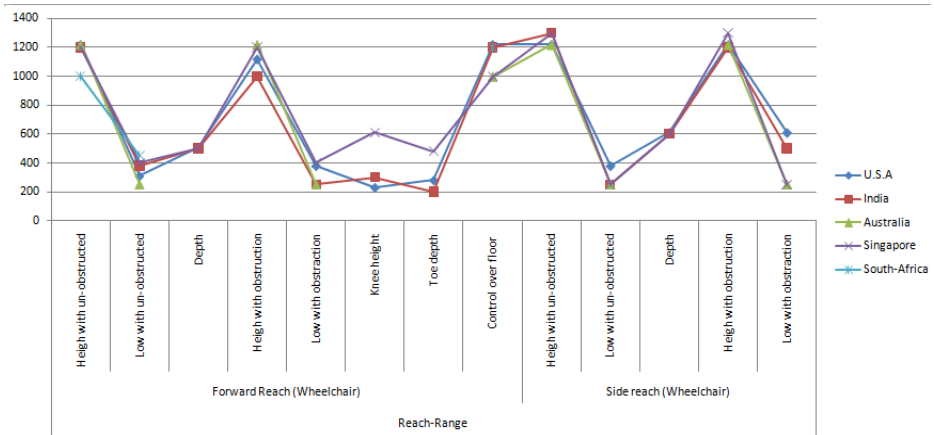Source(s): Author's, 2016

Figure 6. Analysis of Reach-Range
Source(s): Author's, 2016

7. Observation

Comparative analysis of accessible standards between U.S.A, INDIA, Australia, Singapore and South-Africa indicate that latest version of accessibility based Indian standards has various shortcoming and some issues identified by this research are as follows:

1. Indian standard is not mandatory for designers to comply to design any built-environment. Hence, application is not significantly identified in the country.

2. User identification in Indian standard is not as per demography survey (census of INDIA 2011) where 11 types of disabilities are identified. Hence, Indian standard is assist only two types of disabilities in the standard.

3. Anthropometric data in the latest version of Indian accessibility standard are similar to American anthropometric data. Hence, there is lack of research based

study for the consideration of Indian anthropometric data. Detail survey and validation is required on certain essential dimensional variables such as height, reach-range, vision, knee-toe distance etc.

8. Conclusion

Universal Design concept offers a guideline to design and handle the accessibility features considering wide variety of users. Adoption of Universal Design standard promotes single reference document to design built environment for everyone. Inclusion of everyone in the society promotes research based local data of anthropometric and usability of a product or environment. Universal Design has been recognized globally as important for social strength and high potential of design for all. Building standard using Universal Design concept will certainly eliminate existing shortcoming of Indian accessibility standard. Authors consider good prospect of "Universal Design Building Standard for INDIA" in future.

References

[1] Balaram, Singanapalli. "Universal design and the majority world." *Universal Design Handbook*.(pp. 3.1-3.6). New York: McGraw-Hill (2001).

[2] Hui, Sam CM. "Using performance-based approach in building energy standards and codes." In Proceedings of the Chonqing-Hong Kong Joint Symposium 2002, pp. 8-10. 2002.

[3] Khare,Rachna, and Abir Mullick. "Universal Design India Principles; A Contextual Derivative for Practice." In Proceedings of the Human Factors and Ergonomics Society Annual Meeting, vol. 56, no. 1, pp. 624-628. Sage CA: Los Angeles, CA: SAGE Publications, 2012.

[4] Mullick, Abir. 2011. "Universal Design in India."Universal design handbook.(pp. 24-36). India: Design for All India Institute of India Publisher.

[5] Ostroff, Elaine. "Universal design: an evolving paradigm."Universal design handbook, 2nd ed.(pp. 1.3-1.11). New York: McGraw-Hill (2011).

[6] Roy, Protap Chandra, and Ratna Bandyopadhyay. "Designing barrier free services for visually challenged persons in the academic libraries in India." (2009).

[7] Salmen, John PS. "US accessibility codes and standards: challenges for universal design." Universal design handbook.(pp. 12.1-12.8). New York: McGraw-Hill (2001).

[8] Sandhu, Jim S. "The rhinoceros syndrome: A contrarian view of universal design."Universal design handbook.(pp. 44.3-44.12). New York: McGraw-Hill (2011).

[9] Standards Newzealand. 2001. "Design for Access and Mobility-Buildings and Associated Facilities, NZS, 4121:2001. Newzealand Standard Publisher.

[10] The City of Calgary. 2010. "Universal Design Handbook". Creative Services Publisher. https://www.calgary.ca/CSPS/CNS/Documents/universal_design_handbook.pdf?noredirect=1

[11] Vanderheiden, Gregg C. "Standards and Guidelines."Universal Access handbook.(pp. 54.3-54.21). CRC Press, 2009.

[12] World Health Organization. 2011. "Enabling Environment."World Report on Disability.(pp. 169-201). WHO Library Cataloguing. http://www.who.int/disabilities/world_report/2011/chapter6.pdf

[13] Bureau of indian standard. "Recommendations of Buildings and facilities for physically handicapped, 1987." IS:4693-1987. BIS, 1987.

[14] Empowerment, MInistry of social justice and. Person with disabilities Office of Chief Commissioner. 2001. http://svayam.com/ConsoleAdmin/Publication/PublicationFile/1_Publication_PlaningBarrierFreeEnviro nment-ccpd.pdf (accessed September 15, 2016).