Universal Design 2016: Learning from the Past, Designing for the Future
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Universal Access in Heritage Sites: A Case Study on Historic Sites in Jaipur, India

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Abstract. A nation is recognized by a range of its significant historical, cultural and natural properties. These properties are generally preserved and maintained either by national administration or by private owners and charitable trusts due to higher value of their cultural inheritance and termed globally as heritage or historic sites. Heritage sites are a significant asset, a unique and irreplaceable resource which reflects a rich and diverse expression of past societies and forms an integral part of local, regional and national cultural identity. Today, heritage sites also play an important role in communication and knowledge exchange. Thus the rapidly increasing heritage tourism industry faces several challenges too. One of the challenges is that there is a segment of society who is not yet able to equally enjoy the visit to historic structures /sites and attractions, facilities and services. This paper aims to study the experience and develop understanding regarding the heritage structures/sites approached and interacted by diverse users. This study is an outcome of a hands on workshop conducted with diverse users at various historic sites in the city of Jaipur viz. at The City Palace Complex, Jaipur, *Jaigarh* Fort and the *Haveli* at Kanota near to Jaipur India.

Keywords. accessible heritage, universal accessibility, diverse users, simulation, heritage sites and museums.

1. Introduction

A nation is recognized by a range of its significant historical, cultural and natural properties. These properties are generally preserved and maintained either by national administration or by private owners and charitable trusts due to higher value of their cultural inheritance and termed globally as heritage or historic sites. Heritage sites are a significant asset, a unique and irreplaceable resource which reflects a rich and diverse expression of past societies and forms an integral part of local, regional and national cultural identity. Today, heritage sites also play an important role in communication and knowledge exchange. Thus the rapidly increasing heritage tourism industry faces several challenges too. One of the challenges is that there is a segment of society who is not yet able to equally enjoy the visit to historic structures /sites and attractions, facilities and services. The ones who face difficulties are persons with mobility impairment, elderly, children, women, and families with rural background unfamiliar with urban life, poor and unschooled. Like most of the heritage sites, the City Palace Complex of Jaipur, the *Jaigarh* Fort and the *haveli* at Kanota was not originally designed to accommodate

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people with disabilities and special needs. In fact, these historic structures mentioned above are designed either for defensive purposes or for residential purposes catering to royal families and nobles. Presently the historical premises and buildings accommodate museums, cafes, shops, library, hotel and other public amenities and it is expected that not only able bodied users but persons with physical and sensory limitations should experience the sites, landscapes, buildings, and spaces in the same manner as other users.

This study is an outcome of a hands-on workshop conducted with diverse users at various historic sites in the city of Jaipur viz. the City Palace Complex, Jaipur, *Jaigarh* Fort and the *Haveli* at Kanota near to Jaipur India. This study will facilitate to generate heritage tourism for all so that the people with disability or with special needs may enjoy in a self reliant manner, services and resources designed for everyone.

2. Aim and Objective of the Study

The paper aims to study the experience and develop understanding regarding the heritage sites and buildings approached and interacted by diverse users.

The objectives of the study are:

- To understand the difficulties faced by diverse users in the three different heritage sites in Jaipur, India.
- To sensitize concerned heritage professionals to the needs of persons with disabilities and elderly, and to enable them with critical thinking towards practical application of Universal Design in such sites.
- The solutions are leading towards social, environmental and economic sustenance.

The proposed study is focused to investigate, identify and an attempt to find solutions and recommendations for making the spaces more user friendly for all in the heritage structures/sites.

3. Methodology adopted for Study

The methodology of the study involved mainly five stages including simulation, documentation, problem identification and generation of multiple solutions for the same. Three important historic sites/structures were selected viz., the City Palace Complex, Jaipur, *Jaigarh* Fort and the *Haveli* at Kanota in the city of Jaipur, India.

Critical examination of the space led to identification of problems faced by all types of diverse users. Tools were designed in the form of an audit checklist and code driven design to map and review various spaces with their respective circulation pattern and functional aspects. In order to gather information of the difficulties and problems faced by users and visitors, simulation exercises were conducted. Documentation of the same led to a list of problems faced by persons with disability. The participatory approach of learning was pursued. Finally, an attempt was made to find solutions for making the spaces more user friendly for all including the elderly and persons with disability in the specified locations. The results can be implemented on site and the process can be used as an exemplary method for similar historic sites and structures (See Table 1).

Table 1: Stages explaining the methodology

Stage	Intention	Activity
	To create awareness and sensitivity among professionals	Input given to professionals about principles of universal accessibility, universal accessibility checklists, different types of disabilities, simulation exercises, code driven design, tourism, etc.
	Shaping Perception	Conducting and documenting the simulation exercise at various historic sites and structures of Jaipur city. The use of auditing checklists for conducting accessible auditing.
	Identification of problems faced by the specially able	While the simulation exercise and through the auditing process, various problems faced by the users is understood and listed in the existing premises.
	Proposing design solutions	Possible design interventions to make the premises more accessible for the diverse users.

4. Stage 1- Creating Awareness

To make the built environment more accessible, it is essential to be aware of people's different needs and how these needs can be met in a variety of ways. It is important to remember that often the best and most appropriate way to make historic sites more accessible is through management solutions and creating awareness among all [1].

The participants were trained on the principles of Universal Design which are equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, size and space. The participants were also made aware about all the different type of disabilities and also people with special need. The target groups are listed in the Figure 1.

Figure 1. The target groups

Participants were made sensitized with the universal accessibility checklists: viz. Access Audit to learn about the existing Indian accessibility standards and Universal Design Audit to learn about the International Universal Design standards. The participants were asked to apply any one of the tools to assess the universal usability of their proposal.

5. Stage 2- Shaping Perception

Applying Universal Design principles to ensure that built environments are accessible and inclusive involves understanding the vast range of human abilities and frailties at all stages of life from childhood to old age [1]. In seeking solutions the general aim is to find one that is usable by everyone. To arrive at an acceptable solution, user consultation can be a key factor. By involving people with disabilities, older people and user groups in the process, it may be possible to ensure that solutions are practical and priorities are accurately identified [1].

The participants were instructed for conducting and documenting the simulation exercise at selected Historic sites and structures of Jaipur city. The professionals had hands on experience by playing the role of differently able users or people with special needs. The idea is to address diverse need by design, including the needs of most vulnerable ones. Also the simulation exercise will help in understanding that accessibility do not only address needs of person with disabilities, but include real life users of all ages, abilities and conditions. Accessible auditing was conducted with the help of given checklist to understand the physical barriers existing at the locations.

The State of Rajasthan in India has many important historic sites and tourist destinations of which one is the culturally rich city of Jaipur also known as Pink City. The city of Jaipur is located 250 kms from the Indian capital, New Delhi. It forms the part of Golden triangle historic tourist circuit along with Agra and New Delhi. The city itself is rich in heritage, culture and architecture and also serves as a gateway to other historic tourist destination in the state of Rajasthan. It is also famous for its splendid fortresses, majestic palaces, tranquil temples and beautiful *havelis* [2]. As a part of workshop, several historic sites were identified but for the purpose of this paper, three important historic sites/structures have been identified and documented as case studies.

5.1. Case Study 1: The City Palace Complex, Jaipur

The City Palace complex was the residential complex for the royal family of Jaipur built during early 18th century. The palace complex is located deep within the walled city of Jaipur and is a fusion of Mughal and Rajput architecture. The palace incorporates an impressive and vast array of courtyards, gardens and buildings and gateways [3]. The city palace complex presently house museums, cafes, shops and residence of the present royal family. The images of the certain areas of city palace complex are seen in Figure 2.

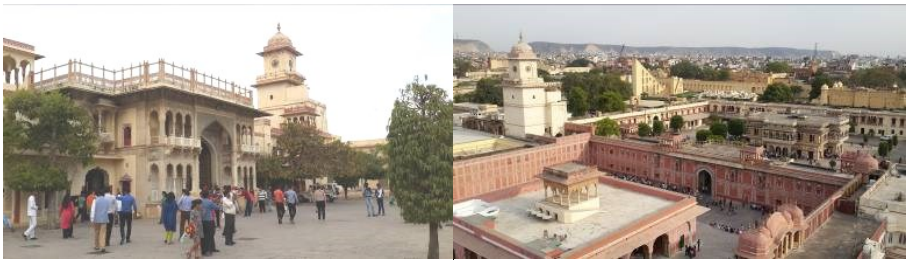

Figure 2. The City Palace Complex, Jaipur

The participants of the workshop conducted the simulation exercise at the premises. The participants were divided into teams and were given ten different real life roles and were asked to simulate those in the different sections of the premises. The real life roles given were e.g. a). A international expert on wheel chair visiting premises in his visit to India, visiting with caregiver, b). A traditional woman with a veil/burqua, a child in lap and bag in hand, taking the trip with her husband. c). A couple visiting along with daughter in pram and a hyperactive son running around etc. Figure 3 depicts the real life role plays conducted in the city palace complex. The participants went about the entire premises and assessed the human conditions and ergonometric setting. With the help of measurements and checklists they mapped the entire area right from parking and entrance to the galleries via ticket counters and other provisions.

Figure 3. Simulation exercise at the City Palace Complex, Jaipur

5.2. Case Study 2: Jaigarh Fort, Jaipur

The Jaigarh fort is located on one of the peaks of Aravalli range, 10 kms away from the Jaipur city overlooking the Amer Fort and Maota lake. The fort was built by Jai Singh II in 1726 AD to protect the Amer Fort and its palace complex. The fort is 3 kilometers long along the north – south direction and width of 1 kilometers [4]. The fort houses a cannon named Jaivana which was manufactured in the fort and was world one of the largest cannon on wheels. The fort complex today houses museums, an armoury, cafes, shops and large water tanks. The images of the certain areas of city palace complex are seen in Figure 4.

Figure 4. The *Jaigarh* Fort, Jaipur

The participants of the workshop conducted the simulation exercise at the premises. The participants were divided into teams and were given ten different real life roles and were asked to simulate those in the different sections of the premises. The real life roles given were e.g. a). a tourist with hearing and speech impairment visiting alone, b). a foreign visitor (non English speaking) visiting first time to India, taking the trip alone, c) a businessman with mobility impairment (arthritis) coming to Jaipur to visit nearby mines but visiting *Jaigarh* fort in short visit etc. The participants went about the entire premises and assessed the human conditions and ergonometric setting. With the help of measurements and checklists they mapped the entire area right from parking and entrance to the indoor exhibits and outdoor exhibits via ticket counters and other provisions. The simulation exercise led to understanding the difficulties faced by the disabled users. This led to the identification of contextual problems by the participants. Figure 5 depicts the real life role plays conducted in the *Jaigarh* Fort.

Figure 5. Simulation exercise at the *Jaigarh* Fort, Jaipur

5.3. Case Study 3: Haveli at Kanota, Jaipur

The haveli of Kanota is located 15 kilometers east of Jaipur on the Jaipur-Agra highway. The haveli is spread over 8 acres of land and takes a person back to the grandeur of the past. The haveli was a residential complex of a noble family serving the Jaipur royal family. It has a majestic Durbar hall, big beautiful gardens with fruit orchard and is fortified around. The haveli presently houses the hotel, library and museum armory and residential areas. Figure 6 depicts the premises of the haveli at Kanota.

Figure 6. Haveli at Kanota, Jaipur

The participants of the workshop conducted the simulation exercise at the premises. The participants were divided into teams and were given ten different real life roles and were asked to simulate those in the different sections of the premises. The participants went about the entire premises and assessed the human conditions and ergonometric setting. With the help of measurements and checklists they mapped the entire area right from parking and entrance to the hotel rooms, kitchen, indoor exhibits and outdoor areas and other provisions. The simulation helps them to realize the problems faced by different diverse disabilities and the consequent limitations in the built environment.

6. Stage 3- Identification of Problems Faced by the Specially Abled

The Simulation exercises led to the understanding of the various problems faced by the disabled users caused due to ergonometric disproportions and existing human conditions. The problems found in the case studies are enlisted below.

6.1. Case Study 1: The City Palace Complex, Jaipur

The City Palace Complex is located in the walled city of Jaipur, mostly flat terrain. The whole complex has series of courtyards and palaces with outdoor and indoor exhibits at different levels of the complex. The ticket counters are at the entrance gate of the complex and are inaccessible for the especially abled users. The palace complex has series of narrow pathways leading to larger areas thus the indoor exhibits are spread all over. There are no designated pathways or paved areas for the movement of wheel chairs around the outdoor exhibits. Thus the outdoor exhibits are mostly inaccessible. There is no designated accessible parking while entering the premise. Lack of proper signage causes confusion for first time visitors. The high risers of the steps are difficult for children, elderly and pregnant women. The staircases have disconnected or no railings. The ramps provided in the outdoor areas are not of the required gradient and are obstructed with planters, leading to compulsory assistance required by wheel chair bound person. The pathways and the outer flooring provided are uneven and are prone to accidents for the usual users also. The indoor exhibit areas have been refurbished with ramps, low risers, railings, lifts, escalators, non-slippery flooring and signage. But still there are still certain problems which need to be addressed like, provision for drinking water fountains and accessible toilets, the gradient of ramps are steep, missing railings, tactile pavers and missing signage for especially abled users. The entire premises lacks in the availability of tactile pavers, signage and designated pathway for wheelchair bound persons (See Figure 7).

Figure 7. Identification of the problems at City Palace Complex, Jaipur

6.2. Case Study 2: Jaigarh Fort, Jaipur

The *Jaigarh* Fort is located on a hilly terrain and is 3 kilometers long with a width of 1 kilometer wide. The whole area is contour site with outdoor and indoor exhibits at different levels of the site. The ticket counters are at the entrance gate of the museum and are inaccessible for the especially abled users. The site being located on a rocky terrain and is vast thus there are several structures spread all over the site. There are no designated pathways or paved areas for the movement of wheel chairs around the site. There is no designated accessible parking while entering the premise. Lack of proper signage causes confusion for first time visitors. There are steep staircases and ramps on the site as it was designed for defensive purpose. Thus the proportion of the number of risers in one flight is difficult even for children, elderly and pregnant women. The staircases have disconnected or no railings. The ramps provided in the outdoor areas are not of the required gradient leading to compulsory assistance required by wheel chair bound person. The pathways provided are uneven and are prone to accidents for the usual users also. There are still certain problems which need to be addressed like, provision for drinking water fountains and accessible toilets, the gradient of ramps is steep, missing railings, tactile pavers and missing signage for specially abled users. The entire premises lack the availability of tactile pavers, signage and designated pathway for wheelchair bound persons (See Figure 8).

Figure 8. Identification of the problems at *Jaigarh* Fort, Jaipur

6.3. Case Study 3: Haveli at Kanota, Jaipur

In the simulation exercise, the real life role plays with different types of disabilities was considered. Hence, problems were identified from the perspective of each role play. From the perspective of the visually impaired person, the site being a hotel, museum and library was found to be lacking in the provision of tactile pavers and signage in Braille.

There were also no provisions for people with linguistic disability. There were several level differences up to 6 inches all over the complex. A wheel chair bound person could not move about without assistance. The flooring texture was also not appropriate for the movement of a wheelchair. There are still certain problems which need to be addressed like, provision for drinking water fountains and accessible toilets, the gradient of ramps is steep, missing railings, tactile pavers and missing signage for specially abled users. The entire premises lack the availability of tactile pavers, signage and designated pathway for wheelchair bound persons (See Figure 9).

Figure 9. Identification of the problems at *Haveli at Kanota*, Jaipur

7. Stage 4 - Results and Findings in the form of Design Solutions

After the conduction of simulation exercise and access audit the participants identified various problems regarding accessibility at all the three chosen historic sites. The participants also identified the different expectations and requirements of the users depending on the purpose of their visit. Most of the results and findings were common for all the three locations with a few site specific ones. The proposed design solutions are an attempt to make these historic sites/structures users friendly to all types of especially abled people. Several design solutions were proposed collectively for all the locations which are as follows:

Pre visit Information: there could be a provision of information in advance of, any visit to all the three chosen historic sites/structures which were City Palace Complex Museum, fortresses and havelis. The pre visit information will be helpful to visitors to decide and plan in advance and to know which all areas are accessible, or no access or limited access. The online websites are useful aid to provide previsit information.

Interpretive information: helps in informing the visitor about the place itself or its contents, its architecture or its services. Information should be designed to be accessible to as many people as possible both in terms of sensory and intellectual access. These methods may include: pictorial symbols, annotated maps and models, tactile guides, haptic models: these are 3D models of objects which communicate information about the object through touch to people with vision impairment, audio guides and easy to read leaflets [1].

Facilities: There are some of the key facilities which are required to be provided at all the historic sites mentioned in the study. These is a need of reception facilities at all the three locations. Reception should be located near the entrance with a clear evenly lit unobstrucive route. The reception desk should have lower level counter top which could be used either by someone in wheel chair or by people of short stature. **Sanitary facilities**: all the three locations require proper accessible toilets with grab bars, easy wheel chair movements, clear signage and clear access route. (See Figure 10).

Figure 10: Proposed design solutions for reception, sanitary facilities and signage

Arrival and Parking: The arrival to all the three locations was access by everyone through the principal entrance. A provision for designated accessible car parking and set down areas are required at all the locations. The parking area must be close to the building or site entrance. At the city palace complex and Jaigarh fort where the parking area was not possible to be close to the entrance, provision need to made for minimum travel distance or some form of shuttle service (See Figure 11).

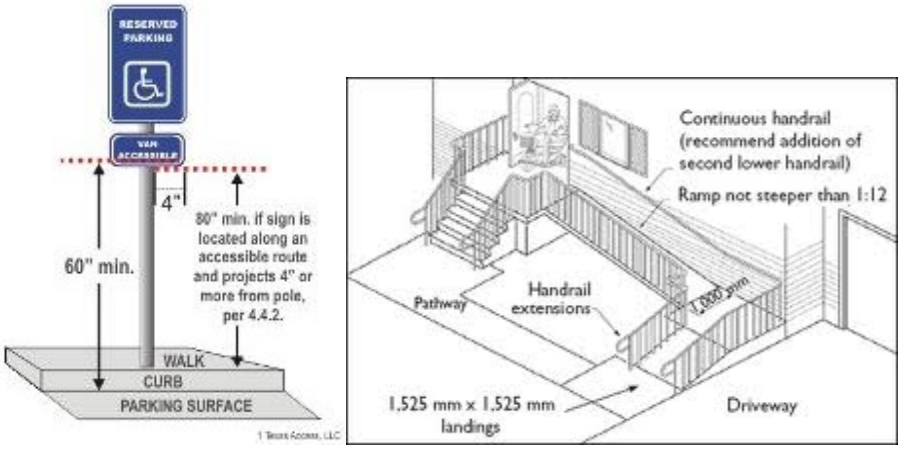

Figure 11: Proposed design solutions: designated accessible parking, ramps, handrails

Accessible routes and surfaces: A designated route is required to be provided for the outdoor exhibits and locations in the Jaigarh Fort and to approach the parking in the historic sites. The routes need to be wide enough to cater to all users viz. wheelchair users, people with buggies, people who cannot walk very far or people who are blind or have vision impairment. The surfaces should be even and slip resistant. In the area where the ground is uneven or wet, as in case of the timber broadways or other alternative anti slips materials can be used to create the routes.

Tactile paving is provided at a few locations and missing at a few. There is need for tactile paving to be provided along the routes and should be well designed and harmonise with the adjoining surface and also providing tonal contrast for people with vision impairment.

Steps, Ramps and Mechanical Lifts The level changes exist in the study locations are either as a result of the natural topography or as part of the original design and layout. These level difference need to be addresses. Ramps are generally preferable to mechanical solutions, such as lifts, particularly where level changes are small or where there is sufficient space to integrate a ramp. However, ramps are not suitable for everyone and steps may be required also as an alternative for some users with mobility difficulties [1]. Ramps can be permanent, semi-permanent (or demountable) or temporary (or portable). Handrails are required either on both sides or on one side depending upon the location to facilitate a person going both up and down.

Resting places and Signage The study locations require rest areas along the accessible routes, waiting areas and exhibit areas for all types of users. Proper, well designed and clear signage at the strategic locations without obstructing the views are required all along the three historic sites/structures of the study (See Figures 10 and 11).

8. Conclusions

The entire methodology adopted here is an effective hands-on exercise for the teaching – learning process. This exercise led to the development of an understanding of the difficulties faced by the disabled users. Due to unawareness and lack of incorporation of the right ergonomic factors at the design stage itself, inconvenience is caused to diverse users. Hence creating awareness and shaping the perception of professionals towards universal accessibility through such simulation exercises proves beneficial pedagogical strategies which can be incorporated to develop multiple design solutions which are practical and universally accessible.

During the learning process, participants are acquainted with the principles of universal accessibility and with tools like the accessible audit checklists. With the help of such tools and techniques incorporated in the methodology, solutions generated, are leading towards social, environmental and economic sustenance. We further emphasize that such a methodology of learning should be incorporated with its application in particular design situations for sustainable and accessible spaces for all in the public realm locations.

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