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Making College Campus Wheelchair Accessible: Students Perspective

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Abstract:

According to the International Disability Center (Joniandfriends.org), 1.6 million people in the United States use wheelchairs for a number of reasons, including but not limited to muscle weakness, spinal cord or brain injuries interrupting muscular control and command, joint pain and the absence of one or both legs. Whether the use of the wheelchair is temporary or permanent, it is important for the user to have the ability to access any and all things desired.

The Americans with Disabilities Act (ADA) protects these individuals by requiring public and employers to make "reasonable accommodations" to allow them to perform jobs that they are qualified to do and to be able to move around comfortably. After three years on CMU campus, it is observed that some areas/buildings have not completely achieved this goal. Because of the difficulties, many individuals on wheelchair cannot visit these buildings on their own without help, they must seek assistance from others, and will be limited in participating in desired activities (American Disabilities Association, 2009).

The purpose of this paper is to educate and inform others about the difficulties encountered regarding wheelchair accessibility on college campuses. To point out areas of improvement, safety and relevant redesign to accommodate the needs of wheelchair accessibility.

INTRODUCTION:

According to the American Disabilities Association, architects and construction workers typically only follow the local building codes and regulations, which usually do not account for considerations needed to make buildings handicap accessible. In both new and old buildings, people in wheelchairs often encounter problems in the parking lot, getting into buildings, navigating through them, and utilizing the features of the buildings such as high service counters and inaccessible restrooms. Because of the difficulties, many individuals in wheelchairs cannot independently visit these buildings on their own and must seek assistance from others and will be limited in participating in desired activities (American Disabilities Association, 2009).

With this information in mind, developing a college campus that is 100% wheelchair accessible is an important aspect of the design process. The purpose of this project is to educate and inform others about the difficulties encountered regarding wheel chair accessibility on Central Michigan University's campus. Upon completion of this activity, areas requiring improvement to become more accessible to wheelchairs will be recognized. Safe and relevant redesign recommendations to accommodate the needs of wheelchair accessibility will be provided with the intention of improving wheelchair accessibility.

STATEMENT OF WORK:

The purpose of this project was to determine how wheelchair accessible Central Michigan University's campus is and offer suggestions where improvements are necessary. To determine how accessible the campus is, we borrowed a wheelchair from CMU's Indoor Athletic Complex

Athletic Training Room and wheeled it around campus. Each group member took a turn self-propelling the wheelchair so we could all get a feel for what it is like to navigate through campus in a wheelchair. We used doorways, ramps, sidewalks and handicap accessible features all over campus. We tried to think of every possible destination that a wheelchair would want/need to go and we went there. On the campus exploration trips, we documented our findings through pictures. When an area on campus was inaccessible via wheelchair, we tried to imagine what could improve on the problem area and determined the best possible solution.

Along with real-life exploration of the campus, we researched wheelchairs and requirements for making areas handicap accessible. Many resources listed common problem areas, such as restrooms and doorways, and offered suggestions on dimensions for easy handicap accessibility. We considered these suggestions and adjusted them to make the redesign as efficient as possible. Using the wheelchair ourselves allowed us to experience the necessity of wheelchair accessibility, which is required for easy and convenient wheelchair use.

We attempted to contact a CMU student who is wheelchair bound to gain insight on problem areas he encounters. However, our efforts were unsuccessful and we were unable to contact the student. Therefore, we had to rely on our own explorations to determine the problem areas requiring improvements and redesign.

With our research, we realized that there are many types of wheelchairs available for use, including self-propelled and motorized. Each type of wheelchair has several variations in regards to wheel type, cushion type [3], size and other additional accessories. The advantages and disadvantages of each design are based on personal preference of the user and where/how, the chair will be used. These characteristics also determine the functionality of the chair for the specific user; what works for one individual may not work for another. Although the different styles may have different accessibility issues, we focused our project on the use of a standard, self-propelled wheelchair, as this is probably the most common type used by individuals.

DESINGS AND EXPLANATIONS/JUSTIFICATONS:

Design of the chair: Having proper design of the wheelchair can minimize the physical stress placed on the user by providing appropriate ergonomic positioning of the body. Figure 1 accesses the dimensions suggested by the American Disability Act (ADA) for making the wheelchair more user-friendly.

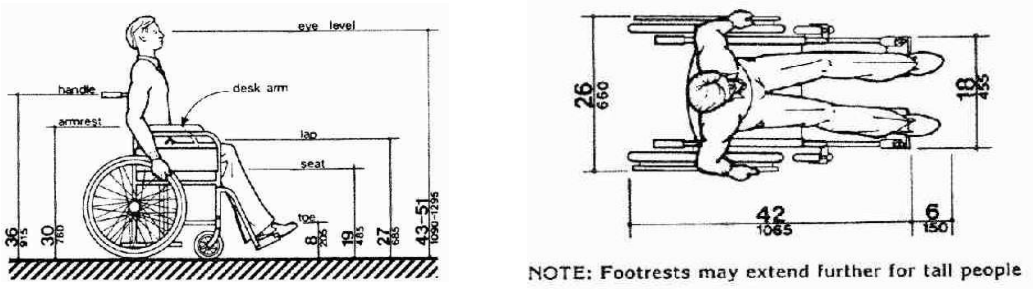


Figure 1: Dimensions for Adult-sized wheel chair (ADA)

Size/measurements

- measure the length from elbow to palm for the armrests
- measure from waist to the point you want the backrest to end
- measure from hip to knee for length of the seat, and hip to hip for width

- measure from knee to foot to determine the necessary length for the footrests
  Cushion
- **Temperature control-** it is important for the seat to absorb heat because the user is going to be sitting for a long period of time. Cooling cushions made of gel or thermoplastic urethane reduce heat build-up and allow air to circulate so you stay cool and dry.
- **Moisture control-** A cushion should keep you dry and prevent sweating because when moisture builds up next to the skin, it can make skin wet and cause it to be more susceptible to damage.
- **Friction-** The proper cushion friction between clothing and the cushion cover is essential for user safety. Too much friction makes it difficult for transfers to and from the chair whereas too little friction can be dangerous because the user could slide off of the cushion very easily.
- **Maintenance requirements-** A cushion should come with an owner's manual that explains the cleaning and maintenance procedures for the cushion.
- **Life expectancy-** Most cushions will last two to five years before they need to be replaced, with the exception of foam cushions, which have a shorter life expectancy. Prior to purchasing a cushion for a wheelchair, find out approximately how long it would last before requiring replacement.
- **Flammability-** A cushion should not be made of flammable material. Flammable cushions can be very dangerous, particularly for wheelchair users who smoke.
- **Fail safety-** The user should know how to tell when a cushion is broken and unsafe to use so it can be replaced immediately.
- **Infection control-** The material that a cushion is made of should inhibit the growth of bacteria and other germs to prevent infection.
- **Redistribution of pressure-** One of the most important features of cushions for wheelchairs is to prevent the formation of pressure sores. In order to maintain the health of the skin, a cushion must support the user's body weight and distribute pressure evenly.

- **Handgrips-** The overall diameter of a handgrip will affect its propulsion. Having a large diameter will make climbs easier, while a smaller diameter creates increase speed on a flat surface. Figure 2 shows ADA recommended use of handgrip.

- **Tires –**While spoked wheels are lighter, they require extra maintenance with continued use. Composite wheels on the other hand usually wear out at the bearings. The zero camber tire gives a slender wheelchair measurement. When the camber is increased, the measurement at the wheel's bottom is also increased and the measurement at the top is decreased, providing steadiness, and allowing turning to be performed with ease.

- **Folds up**- Portability of the chair is very important. Manual wheelchairs can be made to fold and come apart, to store in the trunk or a passenger seat. Being lightweight and portable, the chair can be disassembled. The wheels can be removed, in addition to the foot and arm rests.

- **Brakes/Locks** -The side-mounted type provides easy operation, though one has to be careful when pushing as thumbs can easily be caught in the wheel lock. Thumbs cannot be easily caught in the under-seat brakes, but these are much more difficult to use since reaching under the seat is required.

Design of places around campus: While we were exploring campus on the wheelchairs, we made sure to visit common locations that a wheelchair would need to have access to. In the following sections, problems we encountered and suggestions for fixing the inaccessibility are given.

Bathrooms: The biggest problem encountered in regards to bathrooms was the size of the handicap stall. Even though the stall is designed for handicap access, we had a lot of difficulty maneuvering the wheelchairs inside of the stalls. We discovered in these small stalls that it is necessary to wheel the chair through the entrance backwards in order to be in the correct position to transfer to the toilet since there was not enough room to turn around inside the stall. In some of the bathrooms, the sink was placed right next to the toilet, which left no room for the wheelchair making it impossible for a wheelchair-bound person to transfer to the toilet. Also, the sinks and counters inside the bathrooms were a little too high to reach the soap dispenser and the faucet. Finally, the hand dryer was placed at a level where it is accessible; however, the positioning of the dryer blew the water right into the face of the wheelchair user.

To make a bathroom more accessible for wheelchairs, the stall needs to be large enough so a wheelchair can turn around inside of it and position the chair right next to the toilet for easy transferring. A *minimum* of 42 inches should exist between the swinging space of the stall door and any obstacles inside the stall. Handrails need to be placed behind the toilet and on the wall closest to the toilet so the user has something to grab onto to assist in the transferring. Finally, the countertops need to be low enough so a wheelchair can reach the soap dispenser. There should be empty space below the counter to leave room for the chair to fit underneath it. Figures 2 and 3 depicts the necessary bathroom clearances and space recommended by ADA

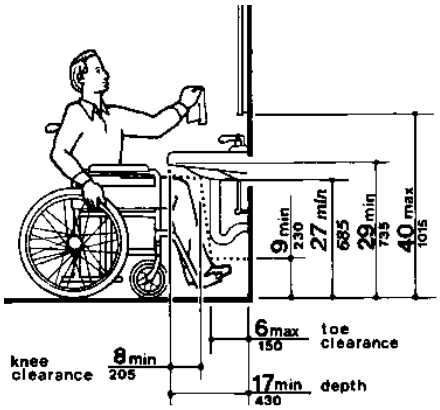


Figure 2: Lavatory clearances (ADA)

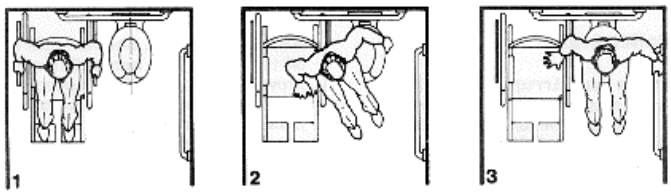


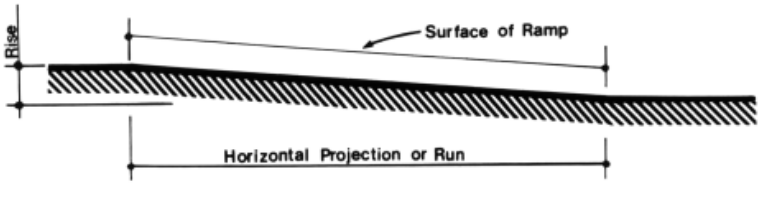
Figure 3: Grab bars most commonly used (ADA)

Building accessibility: Even though a building had handicap accessible doors, they were not always in the most convenient location. Some buildings only had one accessible door out of the many available entrances. The handicap exit on one building did not lead to the entrance to a neighboring building, making the person do unnecessary work in order to get from one place to another. We had to wheel around the building in order to access the appropriate entrance. The

positioning of the handicap button was also a problem. Most buttons were located too far off to the side making it difficult to reposition and go through the door before it shuts. Another problem encountered was the access ramps to the building. Most ramps were far too steep, had large cracks, and some lacked appropriate railing. The presented hazards could cause one to lose control, fall out of their chair, or not be able to successfully go up the ramp. Another problem with the outside access was the height of the curbs to enter onto the sidewalks. Many times, the footrests of the wheelchairs got stuck on the small rises in sidewalk, making it impossible for a wheelchair to get over them.

Once inside the building, new problems arose. The rugs in front of the doors were very thick and difficult to roll over. In addition, some buildings had very thick carpet which caused unavoidable friction between the wheels. The doors to the classrooms and the offices typically did not have handicap assistance. Most of these doors were extremely heavy, making the user lean too far forward putting an unnecessary strain on their back. Many of the teacher's offices were too small for a wheelchair to enter and comfortably talk with their advisors. However, most buildings had adequate hallway space for a wheelchair to fit through and still allow room for others to walk.

To fix these problems possible solutions include making more than one entrance handicap accessible, which would allow for more efficiency for wheelchair users. Doors need to be at least 32 inches in width to allow proper clearance for wheelchairs. Positioning the handicap buttons in a more accessible spot would eliminate reach and pointless repositioning of the chair to go through the door. The button should be placed in such a way that the chair is directly lined up with the door while still allowing enough room for the door to swing open. This would give the user more time to safely get through the door. To make a wheelchair friendly ramp, decreasing the amount of slope and providing flat areas for resting, the approach in Figure 4 was recommended. All ramps need to have handrails so the user has something to grab onto if needed. Figure 5 shows difficulties encountered moving from a parking lot to a building. Users must have someone to help move from the road to the crosswalk due to a sharp and unleveled edge.



	Maximum Rise		Maximum Horizontal Projection	
Slope	in	mm	ft	m
1:12 to < 1:16	30	760	30	9
1:16 to < 1:20	30	760	40	12

Figure 4: Components of a single ramp run and sample ramp dimensions (ADA)

Figure 5: Testing of a short ramp on campus

Suggestions once inside the building are to use thinner rugs in front of entrances to limit the amount of struggle. Having tile or very thin carpet for the main flooring will make it easier for the wheelchair to navigate through the building. Replacing heavy doors with material that is

lighter in weight or providing a handicap button off to the side will eliminate strain. Increasing office sizes will increase equal opportunity for all students to be able to seek assistance when needed.

Classrooms: Inside the classrooms, several characteristics made it difficult for a wheelchair to use. Many lecture halls had ramps to provide access for all wheelchairs, but there was very limited space for the wheelchair to go without obstructing the view of other students. In the older buildings, some classrooms have stairs leading to the seating which provides no where for a wheelchair to go, while others had stairs leading to the front of the class which makes it difficult for wheelchairs to access. None of the classrooms we went into had adequate desks for wheelchairs; they were all too low for the armrests of the chair to fit underneath. Also, some older buildings had the chairs with built-in desks, leaving nothing for the wheelchair user to do their work on. The aisle width throughout the classrooms was difficult to navigate because the wheelchair was too wide to fit between the desks.

To make the classrooms accessible it is necessary to provide adjustable desks so a wheelchair can use the desk, while still allowing the user to maintain appropriate posture. The top of a desk needs to be, at a minimum, 30 inches from the floor, but ideally, the table should be tall enough to allow the arms of the wheelchair to fit underneath the desk. The arrangement of the classroom needs to be in such a way to provide adequate space for the wheelchair to fit through. Unfortunately, some of the old buildings are incapable of being redesigned due to the slope of the floor and would require complete reconstruction to provide adequate accessibility. Replacing stairs with a ramp would allow a wheelchair to access the front of the classroom, but it will be necessary to be sure, the ramp is not too steep. Rearranging the classroom to provide adequate aisle space will improve accessibility tremendously. Also by rearranging, the wheelchair can be placed in a position to allow adequate viewing for both the user and other students. Figures 6 and 7 demonstrate the level of comfort of some of the rooms frequently used by wheelchair users on campus.

Figure 6: Student lounge

Figure 7: Testing table height in study area

Figure 8 shows a typical desk provided in the classroom for wheelcahir use; while this was found to satify the recommendation by ADA (Figure 9), having only one of such desk in a classroom is inadequate.

Figure 8: Typical desk for wheelchair (CMU)

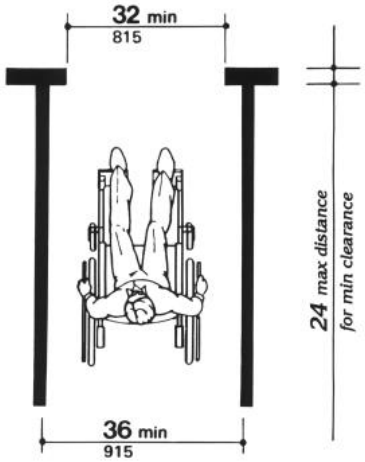


Figure 9: Minimum clearance width for single wheelchair (ADA)

Parking: Parking seems to be a major problem for handicap access into buildings. Handicap parking spaces need to be planned out and designed ahead of the construction plan because the parking spaces must be larger, allowing for space in-between cars for easier accessibility into and out of automobiles. Rather than having actual handicap parking spaces, most parking lots painted old, regular parking spaces with blue lines and handicap signs. This is not sufficient though, because normal parking spaces do not allot enough space in-between the spaces for easy handicap accessibility. In addition, the curbs and sidewalks surrounding handicap parking spaces must be relatively flat, with a slightly sloped incline to get onto the sidewalk. The sidewalks should also be smooth, with a decreased amount of cracks and holes in the sidewalk. Most parking lot around campus meets all the requirements stated above and in Figures 10 and 11. However, some are too far from any building entrance as seen in Figure 12.

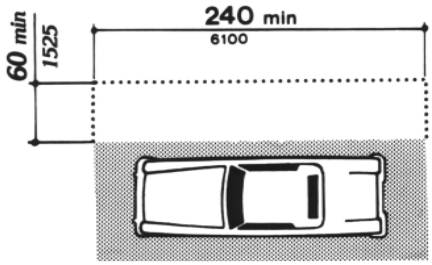


Figure 10: Access aisle at passenger landing zone

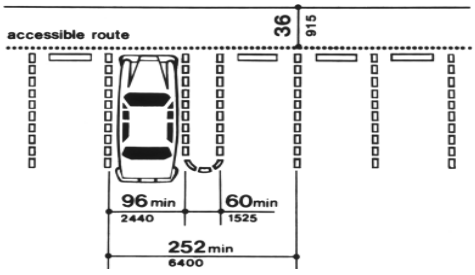


Figure 11: Dimensions for parking spaces

(a)

(b)

Figure 12: Checking parking lots for compliance

Elevators: In the elevators, the biggest problem we encountered was the size. In the newer buildings, the elevators were large enough for the wheelchair to fit in and still leave room for others as well, but they were not large enough for the wheelchair to turn around inside of them. In the older buildings, the elevators were large enough for the wheelchair to fit in, but left no room for others to use them simultaneously, and certainly no room for turning around. Without the space to turn around, either the wheelchair user must enter the elevator backwards, or exit backwards, both of which are difficult and impractical. Another problem encountered inside the elevators was the height and location of the buttons. In the small elevators, it was difficult to place the wheelchair in a position to reach the buttons without extreme reach, which would put an excessive amount of strain on the user. Having an elevator that does not leave enough room for others to use at the same time as a wheelchair is both inconvenient and dangerous. If something were to happen to the wheelchair user, such as a health care emergency, and there is no one else using the elevator because they could not fit, there is no way for the wheelchair user to receive assistance.

Suggestions for improving an elevator include making it large enough for a wheelchair user to turn around inside of it. Having an elevator this large would also provide enough room for others to use the elevator at the same time, which would be safer for the wheelchair user and more practical for everyone involved. Another idea is to provide elevators with two doors, one on each side, so that the user can enter or exit from either side without needing to turn around. To make it easier for the user to push the buttons, it would be a good idea for elevators to have a set of buttons on either side of the door so that they do not need to reposition to push the buttons inside. In addition, it is important to make sure the ground leading up to the elevator is smooth and that the crack between the elevator and the solid ground is nonexistence or minimal. This would make it easier for a wheelchair to enter into the elevator. Examples of elevator control panels is shown in Figure 13; while Figure 14 depicts a comparison of elevator spaces in old and new buildings.

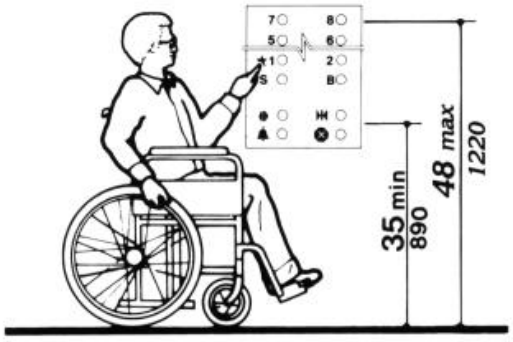


Figure 13(a): Control height

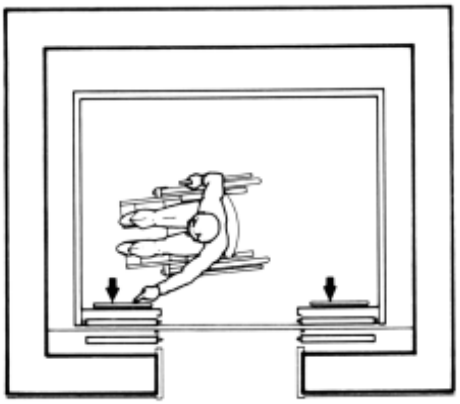


Figure 13(b): Alternate location of panel with center opening door

(b) Old buildings.

(a) New buildings.

Figure 14: Elevator Accessibility Examples

Phone/service desks: In many of the buildings, explored, the service desks were uncomfortable due to the level of stain presented due to their excess heights for wheelchair users. It was difficult for the user to see over the counter, let alone successfully perform business transactions over it. The phones were much too high to adequately reach all of the buttons. For both the service desks and the telephones, the user had to perform extreme reaching, which puts unnecessary strain on the body. Even now that the popularity of cell phones is increasing, public phones should still be accessible to wheelchair should the need to use one arises.

Phone booths and service desks should both be low enough for easy access to reduce the amount of reach that an individual in a wheelchair may have to perform. Figures 15 and 16 shows such recommendation from ADA. The booths should be about 32 inches from the ground to allow the individual in the wheelchair sufficient ability to reach all of the buttons. Also, the phone booth must allow for adequate room for the wheelchair's armrests to fit under or around the booth, to enhance adequate closeness to the phone. Service desks must be low enough for individuals in wheelchairs so that they can see above the desk and reach items on the desk comfortably. In addition, they must be able to get as close to the desk as possible, so there must be space underneath the desk to allow clearance of the wheelchair to get partially underneath the desk. If possible, the use of high service desks (as shown in Figure 17) in any building should be avoided. To make things easier on everyone, service desks should be at a lower height to allow ease of access for all.

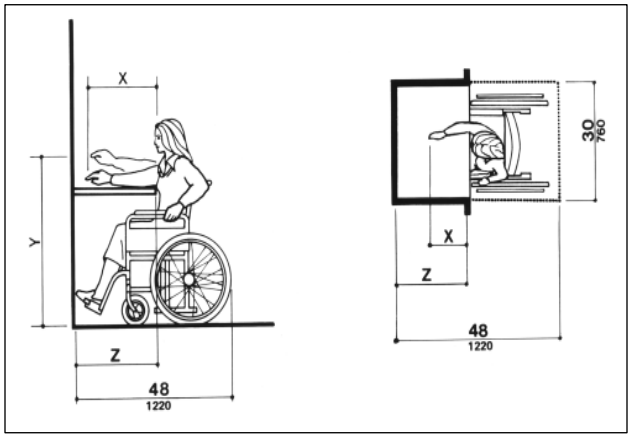


Figure 15: Maximum forward reach over obstruction

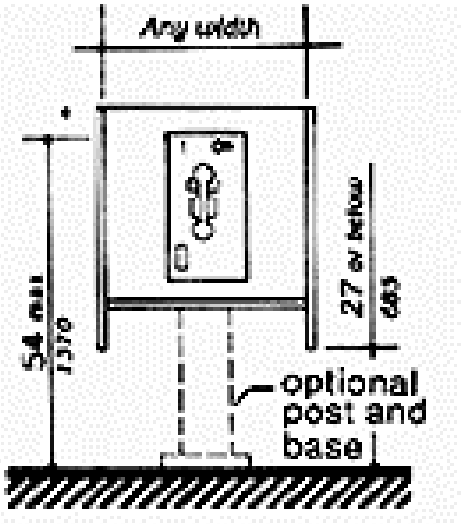


Figure 16: Side reach possible elevation for telephone (ADA)

Figure 17: Bovee center service center

Drinking fountains: In most buildings, the drinking fountains were very large, and very bulky. It was very difficult to wheel the chair close enough to the fountain, and still be able to successfully drink out of the spout. The wheelchair could not fit underneath because of the size of the fountain, so it was almost impossible to reach the water coming out of the spout. In the newer buildings, the water fountains were lower and provided more room for the chair to fit underneath of them. Because of this, it was easier to get a drink of water because the user could get closer to the spout.

Drinking fountains must also be low enough for the individual in the wheelchair to be able to get a drink comfortably. The spout of the drinking fountain should be no higher than 36 inches. The fountain must be high enough to accommodate a wheelchair underneath it (at least 27 inches as depicted in Figure 18). Must be wide enough to allow for the armrests of the wheelchair to wrap around the fountain (19 inches), and need to have a minimum floor space of 30 by 48 inches to allow for adequate room for the wheelchair to move around.

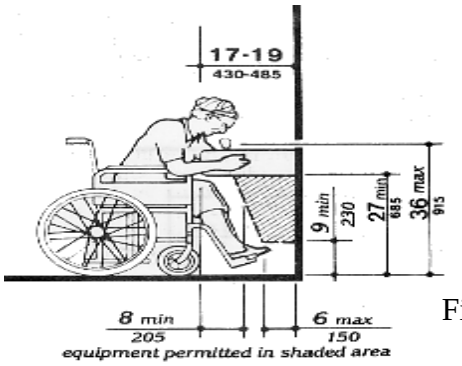


Figure 18: Spout height and knee clearance (ADA)

Cafeteria/dorms: Although we had access into the cafeterias around campus, we did have access to the Bovee UC food court located downstairs. In order for a handicap individual to be able to access this cafeteria, they would have to access the elevator entrance located outside. The entrance is improperly labeled and therefore would be hard for someone to locate. The elevator is nice because it opens at both sides so someone in a wheelchair would not have to turn around. The other entrance is located all the way around the back of the building in which one would have to wheel up a very long ramp. Once inside, the cafeteria was generally wheelchair accessible. There was a ledge around each of the food stations, which allowed the wheelchair user to slide their tray along and not have to carry it on their laps, preventing spills. It may be difficult for wheelchair users to see the food being made and all the ingredients they can choose from because of the height of the tables. There was plenty of space throughout the cashier station and cafeteria for one to get around in a wheelchair. There were tables that a wheelchair could roll up to, however were not high enough for the armrest to go under increasing reach causing strain on their back. In addition, napkin dispensers and silverware were hard to reach because of the height of the counters.

To make the Bovee more accessible to wheelchairs, one suggestion would be the location of the handicap doors. Putting up handicap signs and moving the locations of the doors to a more accessible area would reduce the amount of search to find the right way to get into the building. Another suggestion would be to relocate the elevator somewhere else other than by the outside of the building. This would be more convenient for wheelchair users. Instead of making the food service places lower, menus of ingredients or choices should be low enough for wheelchair users to see, this would be a quick and inexpensive fix. Counters that contain the napkins and silverware should be lowered as well to decrease the amount of reach and strain put on the wheelchair user as recommended by ADA Figures 19 and 20. Final suggestions would be for the cafeteria to contain a few adjustable tables in order for the wheelchair's armrest to fit underneath. This way, wheelchair users can enjoy eating their foot comfortably.

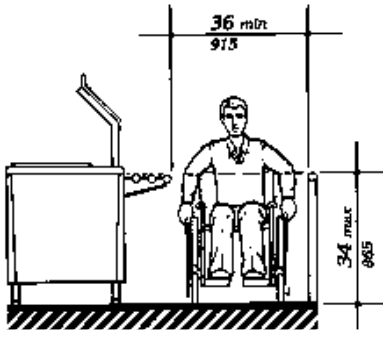


Figure 19: Food services line check (ADA)

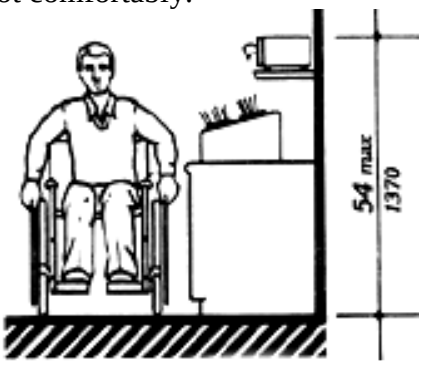


Figure 20: Tableware areas (ADA)

The dorms also provided a bit of a challenge to look into since none of us live in the dorms anymore. Handicap accessible dorms are available throughout campus but are limited to one or two per dormitory. These are all located on the first floor for easy accessibility. Most of the dorms also have handicap buttons to go in and out of the hallways and buildings. There are also elevators located in every building for a handicap person to be able to navigate through the entire dormitory. Flooring throughout the dormitory is also very appropriate. Most have thin carpet or tile allowing a wheelchair to move efficiently throughout the building. All the handicap rooms are very accessible and have the proper measurements to function in their daily lives. However, due to the lack of room for handicap individuals, putting more than one wheelchair user in the same room would make it more difficult to move around and may not be considered handicap accessible. Some ramps may be a little too long (see Figure 21), but most do provide a rail for help if needed. Service desks are also low enough for a wheelchair user to go up and ask for help or information. Overall, the dorms were very accessible to the handicap population.

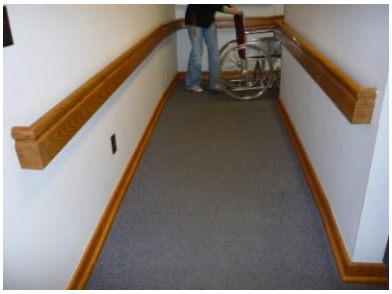


Figure 25: Too long internal connector between buildings.

There are not a lot of suggestions that we could make for redesigns for handicap dorms. Proper measurements and heights of material in the rooms are already properly provided and need no change. One idea could be to increase the amount of space in the handicap accessible rooms just in case there has to be more than one wheelchair in the room at a time. Another idea is to increase the amount of handicap accessible rooms throughout the dorms to at least one on each floor just in case there is a large request. Some of the ramps can be changed so they are not so steep and make sure the long ramps have a flat period in which someone could take a rest if needed.

Figure 22: Bookstore accessibility check

Figure 23 Checking ramp to a building

SAFETY CONSIDERATIONS:

Pathways

- Make sure that the sidewalks are even and smoothly paved.
- There should be minimal holes and cracks to make wheelchair transportation easiest.
- Make sure that the snow and ice is removed from the sidewalk in a timely manner to make wheelchair transportation easier.

Figure 24: Typical wheelchair size

Figure 25: Example of ramp connecting buildings (Damaged)

Cross walks

- Make sure that the pavement by crosswalks is smooth and there is a limited number of holes and cracks to make wheelchair transportation easier.
- Make sure that the crosswalk button is at the most 32" from the ground to allow a wheelchair individual an easy height to touch the button.
- Decrease the amount of distance the wheelchair individual must cross.

Fire exits/tornado/shooting

- Make sure that fire exits, tornado shelters, and shooting safety plans include wheelchair and handicap individuals in the plans to ensure safety for the whole population

Heavy doors

- Have doors that are light in weight making them easier to swing open.
- Have doors that automatically open with the touch of a button to make access to buildings easier.
- In classrooms, have doors that stay swung open to make access to classrooms easier.
- Make sure the doors stay open for an adequate amount of time to prevent the door from closing on the wheelchair before they have made it through the doorway

Steep ramps

- Make sure that ramps are not too steep for easy access throughout buildings and into buildings. Steep ramps may cause the user to lose control, fall out of the chair or have to work excessively hard to get up the ramp.
- If a ramp is greater than 12 inches from the ground, make sure the ramp has railings on both sides to increase safety.

Blue lights for help on campus

- Blue lights that are set up throughout campus should have safety buttons that are 32" from the ground so wheelchair individuals can reach the buttons. Also, the phones should be about 32" from the ground to allow access to wheelchair individuals.

Night rides

- Night Ride automobiles should grant access to wheelchair individuals, especially the ones that cannot get out of their wheelchairs by having lift systems in the van.
- The automobiles should have adequate room in the trunk or backseat to allow for a folded up wheelchair.

Injuries handicap people are more prevalent to get

- Handicap individuals that have to reach too high have a high prevalence of shoulder and neck injuries.
- Individuals that have to reach too far have a high prevalence of shoulder, back and neck injuries.
- Individuals that have problems transporting around campus due to cracks, holes, and unclear sidewalks have a higher prevalence of shoulder, forearm, wrist, hand, and low back injuries**.**

Proper training to employees

- All employees that work for the campus should have proper training for dealing with handicap individuals, especially transfers from wheelchair to cars, chairs, and vice versa**.**

COSTING INFORMATION:

Most improvements discussed will cost large sums of money and the hiring of a professional to reconstruct the problem area. Some suggestions for quick and less expensive fixes include adjustable tables, wheelchair accessories (tires, pads), rearrangement of the room (increasing aisle space), training of all staff in proper wheelchair handling (proper transfers in and out of cars), thinner rugs at entrances and exits, and locating safe evacuation routes/shelters. The remaining redesigns will be more expensive but are 100% necessary. The more expensive solutions include things such as flooring (tile or thin carpet), fixing cracks and sidewalks, doors (decreasing weight, placing of handicap accessible buttons), handrails, and redesigning bathroom stalls and elevators (increase size for turnarounds). Even though it will cost a lot of money to implement these suggested solutions, they are necessary to ensure a safer and more accessible campus for wheelchair bound individuals. We did not explore or discuss the cost of implementing all these suggestions. However, the findings have been presented to the appropriate quarters, and should the university like to know this, we will be glad to do it.

Table 1 shows a list of some of the buildings explored and the problems with elevators chambers that do not permit wheelchair turn around. Some of the building built prior to 1977 have this problem.

STUDENT LEARNING

Overall, the students have enjoyed the time they put into this venture and being sports management majors they have expressed how the experience has helped them to appreciate those on wheelchairs. Most importantly, their working together as a team and there interaction with people as they go around exploring the campus.

Table 1: Deficiencies in Buildings

Building	Deficiencies	Comment
Anspach	Elevator chamber, unleveled entrance (gap)	The location of the elevator does not permit modification. This can only be redesign.
Bovee (UC)	Elevator chamber, long WC path connecting building to other buildings.	Elevator can be modified to eliminate backward entrance or exit. Long path can be redesigned to include landing.
Dow	None found	
ET	None found	
EHS	None found	
Foust	Elevator chamber	Can be modified to eliminate backward travel
Grawn	Elevator chamber, toilet	Modification is possible in both cases
HPB	None	
Moore		
Pearce	Elevator space	Elevator well positioned to accommodate opposite door

CONCLUSIONS.

Even though buildings and the campus appear to be wheelchair accessible from an outside perspective, it is very difficult to navigate through without any obstacles. Many buildings and locations had the same problems such as small elevators, cracked sidewalks, inadequate building access, and inappropriate bathroom stalls. As new buildings are being constructed on campus, handicap accessibility increases with each building but there will always be room for improvement. In every location on campus we encountered an obstacle in some way, shape, or form. Some obstacles that we encountered were more difficult to overcome than others, but we believe that the designs we suggested will improve accessibility for all users.

References

1. Accessology , Inc. *Uniform Federal Accessibility Standards,* n.d. Web 21 Nov. 2009. http://www.access-board.gov/ufAS/ufas-html/figures.htm

2. International Disability Center. *Joni and Friends*, n.d. Web 21 Nov. 2009. <Joniandfriends.org>

3. Joules Sowder. *Mobility Advisor*, n.d. Web 21 Nov. 2009. < http://www.mobility-advisor.com/wheelchair-cushion.html>

4. United States Department of Justice. *American Disabilities Association* Civil Rights Division, n.d. Web. 3 Dec. 2009. www.ada.gov

5. United State Department of Justice. *Project Civic Access* Civil Rights Division Disability Rights Section, n.d. Web. 3 Dec. 2009.< www.ada.gov/civiccommonprobs.htm>