



# WPI

## Accessibility Assessment of the Worcester Art Museum

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## Abstract

The purpose of this project was to work in collaboration with the Worcester Art Museum (WAM) to assess their current level of accessibility. This project not only assessed accessibility at the WAM applying the standards set by the Americans with Disabilities Act (ADA), but also goes beyond the ADA and focuses on improving the overall visitor experience. We completed the assessment using fieldwork, visitor surveys and complaints, WAM employee interviews, visitor observations and comparative analysis of other institutions. The variety of methods provided alternative perspectives that surpassed ADA requirements. Our completed assessments helped us provide a foundation to help the WAM reach their goal of becoming more accessible and visitor focused.

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*Visitor and Volunteer Services Manager*

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*Manager of Guest Services*

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Nora Nagle

*ADA and 504 Accessibility Coordinator*

Thank you for accommodating our short notice as well as allowing us to visit your museum.

## Executive Summary

There are approximately one billion people that have a disability in the world. According to the United Nations, people with a disability are “the world’s largest minority”. Of that one billion, 56.7 million people live in the United States of America as of 2010. (“Factsheet on Persons with Disabilities,”). To put that in perspective, roughly one in every five Americans (18.7 %) is challenged with some sort of disability every single day (Brault, 2012).

In the United States, the 1990 passage of the Americans with Disabilities Act (ADA) began the prohibition of the discrimination of people with disabilities and provided equal opportunity in many facets of life such as employment, transportation, and *buildings open to the public*(ADA, 2014). Providing equal opportunity for people with disabilities entails providing accommodations in accordance with the ADA. As a result, the passage of the ADA initiated reform for making *buildings open for public use* more accessible.

With the reform, *buildings open for public use*, like restaurants and museums; need to provide appropriate accommodations to be accessible. There are many factors to consider when trying to make a building open to the public accessible. These are due to the wide range of disabilities that need to be considered. As a result, the necessary reforms are often difficult and costly for many buildings or facilities. Specifically, older buildings, built before the enactment of the ADA, had no accessibility standards to follow.

One such building is the Worcester Art Museum (WAM). Built in 1898, the WAM is a vital member of the Worcester community; providing important insight on artistic aspects of cultures from around the world and generally promoting art in all its various forms. It is their vision to become more visitor friendly and inclusive to all demographics (“Worcester Art

Museum," 2014). Consequently, the Worcester Art Museum is committed to increasing their level of accessibility.

Accessibility at the WAM is important for many reasons. Currently the WAM is lacking accommodations for a certain demographic; those with physical disabilities. In order to address this, the Worcester Art Museum has sought the help of students at Worcester Polytechnic Institute to provide an initial assessment of their current level of accessibility.

Of note, the Worcester Art Museum is not only interested in meeting the ADA and its implementing regulations, they want to surpass the legal requirements. The museum cares deeply about its visitors and the visitor experience at the museum and wants to ensure that each individual has an equal experience while touring the museum.

## Methodology

The Worcester Art Museum has requested an assessment of their building on its level of accessibility for visitors with physical impairments. The goal of this project was to work in collaboration with the WAM to study the museum building and offer recommendations on changes the WAM can make to become more inclusive to their visitors. With the assistance of the Americans with Disabilities Act requirements, we identified potential areas for improvement and offered our recommendations.

To accomplish our goal of developing recommendations for the museum we came up with five objectives:

1. Educate ourselves on the Americans with Disabilities Act of 1990, and its Amendments, and identify relevant/applicable building standards.
2. Identify potential areas to improve visitor experience.
3. Assess the Worcester Art Museum's level of compliance with the building standards identified in Objective 1.
4. Assess changes that the Worcester Art Museum could make to increase visitor satisfaction based on what other institutions have done.

5. Develop recommendations for the Worcester Art Museum to help increase their level of accessibility.

For our project, we predominately worked with the museum staff and visitors. We sought out different professionals with expertise making facilities more accessible to people with disabilities. Simultaneously, we looked for other museums that have undertaken recent improvements to make their building more accessible. Below we detail the methods we used to accomplish our objectives.

To achieve these objectives we used various methods. We conducted interviews with our sponsors to determine what title the WAM fell under within the ADA. We performed a content analysis of the ADA, identifying relevant standards and guidelines. We surveyed visitors in order to gauge their experience while visiting the WAM. In addition to distributing these surveys, we utilized participant observations of visitors at the WAM to see how visitors interacted with the museum. We then conducted interviews with employees of the WAM to understand their experiences and observations with visitors and how to improve their experience. We also conducted additional interviews with staff at other museums to see what they have done to become more accessible. After conducting this research, we performed fieldwork within the WAM, assessing its level of compliance with the standards set by the ADA. Our deliverable to the WAM was a list of suggested recommendations to increase their level of accessibility and improve their overall visitor experience.

## Findings

From the various methods and research we have done to help the museum, we identified numerous findings that allowed us to deduce relevant and useful recommendations for the WAM. The following is an outline of our findings.

1. The Worcester Art Museum is committed to increasing their level of accessibility.

After working with the WAM, we found that the museum staff and executives are committed to increasing their level of accessibility. Through working with our sponsors and witnessing the work the WAM has already initiated, including construction of the new Access Bridge at the Salisbury Street entrance, we found that the WAM is dedicated to becoming more accommodating to their visitors.

2. The Worcester Art Museum falls under Title III of the ADA.

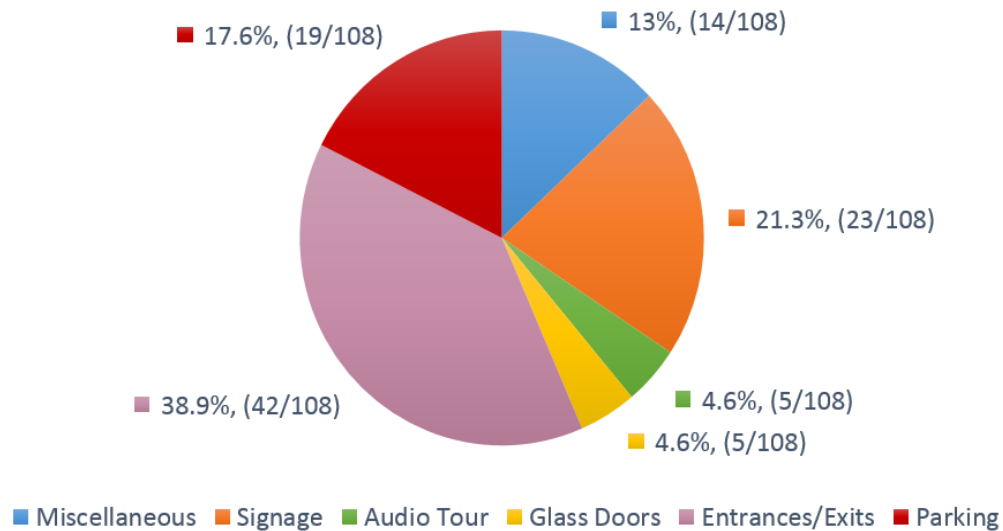
While interviewing with our sponsor we were able to conclude that the WAM fell under Title III of the ADA based on three criteria. The criteria are: 1) the WAM is privately owned, 2) the WAM is not operated by state or local government, and 3) the WAM is not federally funded.

3. The areas of the WAM that required assessment are: parking, entrances/exits, signage, lobbies, restrooms, galleries, and classrooms.

Among the covered topics within the ADA, we chose to specifically target and evaluate parking, entrances/exits, signage, lobbies, restrooms, galleries, and classrooms. We found that these areas are the most important to assess due to their high traffic within the museum and frequency of which they appeared in the 108 visitor complaints that we analyzed. The distribution of complaints can be seen below in Figure 1.



**Figure 1: Distribution of WAM Visitor Complaints from June 2011 to September 2014**



4. The structures that required assessment within the WAM were: doorways, pathways, restrooms, signage, stairs, elevators, desks, and water fountains.

We narrowed our focus to certain structures including doorways, pathways, restrooms, signage, stairs, elevators, desks, and water fountains. Visitors felt these areas needed improvement based on complaints they filled out at the WAM. The list was comprised of areas that were feasible for us to assess in our short seven-week time frame.

5. We found that the necessary tools to assess the compliance of the WAM with the ADA are a level, a measuring tape and a pressure gauge.

For our data collection process, we needed certain measurement tools to complete all of the tests that are required to verify compliance. We discovered a “Checklist” on the ADA website that presented a list of measurement tools that would be needed to conduct the appropriate tests. The list of measurement tools included: a level, measuring tape, and a pressure gauge.

6. All of the currently available parking lots at the WAM are ADA compliant.

Upon conducting fieldwork within the WAM, we found that of the parking lots that we assessed, 100% of the available parking lots were compliant with the ADA. For our assessment of the parking lots, we evaluated the widths of car spaces, van spaces, and accessible aisles.

**Table 1: Data Collection Table of WAM Parking Lots**

<b>Parking</b>	<b>Elements Assessed</b>						<b>Compliant?</b>
	<b>Location at WAM</b>	<b>Total # of Spaces (excluding handicapped spaces)</b>	<b>Total # of Handicapped Spaces</b>	<b>Width of Handicapped Car Space</b>	<b>Width of Handicapped Van Space</b>	<b>Width of Access Aisles</b>	
<b>Requirements of ADA</b>	N/A	N/A	See Table 1	≥ 96in; exemption if access aisle: measured in inches	≥ 132in; exemption if access aisle: measured in inches	60in wide min: measured in inches	check = yes x = no
<b>Assessment Date:</b>							
11/20/2014	Tuckerman Street Lot	8	4	100	N/A	60	✓
11/20/2014	Salisbury Street Lot	N/A	N/A	N/A	N/A	N/A	N/A
11/20/2014	Lancaster Street Lot	43	2	N/A	136	N/A	✓

Additionally we looked at the number of handicap parking spots and signage within each lot.

The table we used to organize this data is shown in Table 1.

7. Of the doors that we assessed, 0% were ADA compliant with the acquired amount of force to open them.

When conducting fieldwork within the WAM, we found that all of the 44 doors (22 sets of double doors) we assessed were not compliant with the ADA. For each door, we used a pressure gauge to test the amount of force to open each door in both directions. To receive the most accurate measurement, we tested each door twice and took the average of those values. We tested each door in both directions to account for the fact that the doors opened in either direction and that the amount of force varied from which direction the door opened from. In Table 2 shown below, gives an example of our data collection table.

**Table 2: Data Collection Table of Force to Open Doors**

Force to Open <u>Doors</u>	Elements Assessed								
	Location at WAM	Entering Room							
		Left Door				Right Door			
		Test 1	Test 2	Average	Compliant?	Test 1	Test 2	Average	Compliant?
Requirement of ADA	N/A	≤ 5lbs: all measured in pounds	≤ 5lbs: all measured in pounds	≤ 5lbs: all measured in pounds	check = yes x = no	≤ 5lbs: all measured in pounds	≤ 5lbs: all measured in pounds	≤ 5lbs: all measured in pounds	check = yes x = no
Assessment Date:									
11/19/2014	421	16	16	16	X	17	19	18	X
11/19/2014	422	20	18	19	X	16.5	16	16.25	X
11/12/1900	321	12	13.5	12.75	X	20	17	18.5	X
11/19/2014	317	14	16	15	X	17	17	17	X
11/19/2014	322	16	18	17	X	17	17.5	17.25	X
11/19/2014	330	14.5	16	15.25	X	14.5	17	15.75	X
11/19/2014	M238	12	12	12	X	13	15	14	X

## Recommendations

After the fieldwork, 13 interviews of the WAM staff, and four additional interviews of professional staff at other institutions and organizations, we compiled a list of recommendations for the Worcester Art Museum to become more accessible. We offered the following recommendations:

1. Improve signage around exterior of WAM so visitors have greater ease finding available lots.
2. Include more signage leading from interstates to museum.
3. Talk to nearby church to suggest allowing overflow parking in Church lot for special events.
4. Build a parking garage in the existing Lancaster Street Lot.
5. Inspect each door hinge and door closer to make sure they are working properly.
6. Check to see if door is warped or misaligned.
7. Perform humidity tests in closed galleries to verify that doors need to be closed at all times.
8. Install automatic door openers or door assist mechanisms.
9. Provide training to the WAM employee staff on navigation of elevators

The WAM’s vision to become more accessible was essential to the culmination of our work. The museum’s intention to increase accessibility for visitors with disabilities is evident from hosting our project and the work they are continuing to undertake on their facility. The

WAM's determination for change along with the foundation provided by our project will move them forward to a more accessible future.

## Authorship

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<b>Literature Review</b>	Caylee Chunga, Mikayla Pasciuto, Bryan Toribio
<b>Methodology</b>	Caylee Chunga, Mikayla Pasciuto, Bryan Toribio
<b>Findings &amp; Recommendations</b>	Caylee Chunga, Mikayla Pasciuto, Bryan Toribio
<b>Conclusion</b>	Bryan Toribio

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## 1. Introduction

There are approximately one billion people that have a disability in the world. According to the United Nations, people with a disability are “the world’s largest minority”. Of that one billion, 56.7 million people live in the United States of America as of 2010 (Factsheet, n.d). To put that in perspective, roughly one in every five Americans (18.7 %) is challenged with some sort of disability every single day (Brault, 2012).

According to the Americans with Disabilities Act, a disability is a physical or mental impairment that impedes normal function (ADA, 2009). People with disabilities communicate with and navigate the world differently than those who do not have a disability. In other words, the way people with disabilities view the world may be perceived through another lens than those who do not have a disability.

Individuals can be born with disabilities, or they can develop a disability as they age. External circumstances, like the environment, can also cause a disability. When individuals are faced with an impairment, many aspects of their lives may be impacted. Some people with disabilities may use assistive aids like wheelchairs or walkers to help them with their disability. Some may not need or decide not to use any means of assistance. People with disabilities essentially find a means to accommodate themselves so that they can perform daily tasks.

Accessibility is a major component in furthering the accommodations for people with disabilities. There needs to be equal attention given to all demographics in order to be accessible and accommodating to their needs. Making public spaces accessible for everyone has gained recognition since the 1990 passage of the Americans with Disabilities Act (ADA). The ADA is a federal law that prohibits discrimination and protects the rights of those with a disability. Additionally, the ADA provides standards and regulations for a variety of *buildings open to the*

*public*, like restaurants and museums, to become more accessible. With these regulations and standards set by the ADA, *buildings open to the public* began to make changes to become more accessible.

There are many factors that contribute to a *building open to the public* becoming more accessible. Two important factors are cost and time. Making changes that take into account the wide range of disabilities are predominantly structural and require extensive renovation to implement. As a result, the necessary reform has not always been convenient or possible for many buildings or facilities. Specifically, older buildings built before the enactment of the ADA had no accessibility standards to follow.

One such older building is the Worcester Art Museum (WAM). Built in 1898, the WAM is a vital member of the Worcester community; providing important insight on artistic aspects of cultures from around the world and generally promoting art in all its various forms. It is their vision to become more visitor friendly and inclusive to all demographics ("Worcester Art Museum," 2014). Consequently, the Worcester Art Museum is committed to increasing their level of accessibility.

Accessibility at the WAM is important for many reasons. The main reason being that currently the WAM is inadvertently excluding an entire demographic by lacking the necessary means to accommodate people with a disability. In order to address this, the Worcester Art Museum has sought the help of students at Worcester Polytechnic Institute to provide an initial assessment of their current level of accessibility.

Therefore, the goal of our project was to assist the WAM in becoming more accessible. Specifically, we investigated the WAM's current accommodations for people with mobility impairments and developed recommendations for how the WAM might improve access to the

museum wing of their facility. We started by assessing the building and determining the Worcester Art Museum's current level of accessibility. We compared their level of accessibility to the current building standards that are set by the ADA. From there we went further than the compliance with the ADA and focused on improving the overall visitor experience.

Of note, the Worcester Art Museum is not only interested in meeting the ADA and its implementing regulations, they want to surpass the legal requirements. The museum cares deeply about its visitors and their experience at the museum and wants to ensure that each individual has the same experience while touring the museum.

The remainder of our paper is separated into five chapters: chapter two, the literature review; chapter three, the methodology; chapter four, the findings; and chapter five, the recommendations, and conclusion. In chapter two, we explore the definition of disability and its association to accessibility. Also in chapter two, we describe the Americans with Disabilities Act and accessibility audits. At the end of chapter two, we introduce the Worcester Art Museum's goal to become more accessible for people of varying abilities. In chapter three, we discuss our methodological approach to accomplishing the goal of our project. We introduce the goals of the project and how we plan to accomplish them. In chapter four, we compile our findings from the data we collected during our project. In chapter five, we discuss the recommendations we made for the Worcester Art Museum. In chapter six, we offer our conclusion.

## 2. Literature Review

### I. Introduction

Art museums allow visitors the opportunity to experience how someone else sees the world. However, not every individual who visits a museum has the same opportunity to access what it has to offer. Within the last two decades, there has been a growing trend to consider accessibility in buildings intended for public use. The 1990 introduction of the Americans with Disabilities Act (ADA), a law which prohibits the discrimination of people with disabilities, brought upon a reform for making buildings of public use more accessible. The ADA defines *buildings open to the public* as privately operated institutions that offer some sort of service or affect commerce (42 U.S.C. §1201 et. seq 36. (2014)). Since the passage of the ADA, there are now requirements for all *buildings open to the public* to be equally accessible to people of all abilities.

Prior to 1990, there was minimal governmental attention paid to accommodating those with disabilities. At best, the government had either institutions for people with mental impairments or secluded people with disabilities from the rest of the population (Griffin & McClintock, 2007). People with disabilities received very little to no means of accommodation in their lives. Rather they were often shunned for their condition.

The topic of accessibility started to receive a higher level of attention in the late 1900s within the United States. Since the 1990 enactment of the ADA, *buildings open to the public* must make accommodations for people with a disability. According to section 36.104 of the Americans with Disabilities Act, a *building open to the public* is “a facility operated by a private entity whose operations affect commerce (42 U.S.C. §1201 et. seq 36. (2014)). *Buildings open to the public* are areas that provide some form of services to the general public, such as museums, markets, and restaurants.

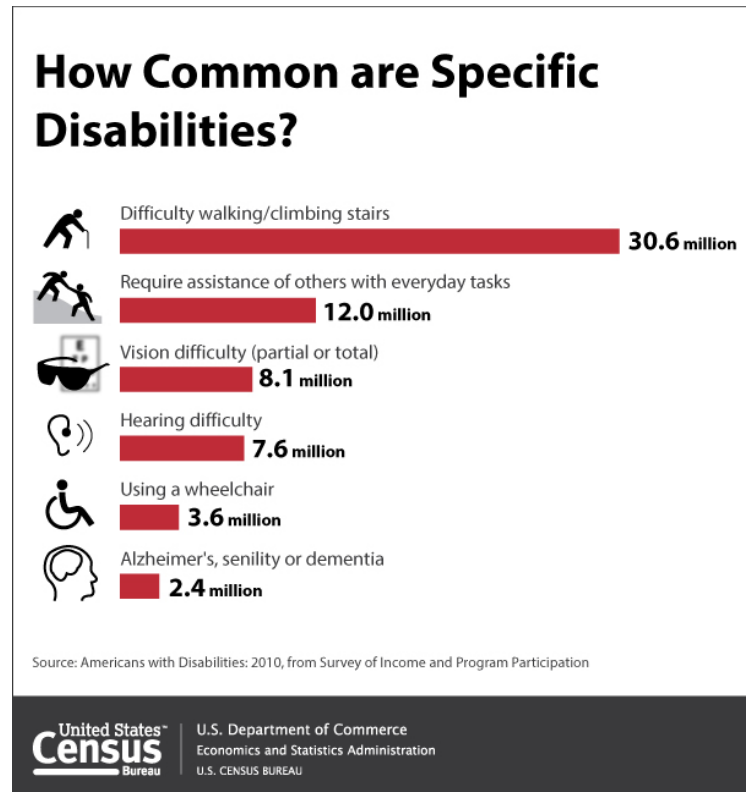


In this project we will be assessing the accessibility of the Worcester Art Museum for people with mobility limitations. In section II of this chapter we explain the meaning of the word disability. Within this section we discuss mobility, auditory and visual impairments. We describe the different levels of severity of each disability as well as assistive tools, adaptations, and accommodations that are available to people with mobility, auditory and visual impairments. In section III we discuss the issues with accessibility prior to 1990 and then describe the disabilities movement and its impact on society. We discuss the Americans with Disabilities Act of 1990, the 2008 Amendments to the ADA and their benefits. Also in section III, we examine the building standards created under the ADA. In section IV we discuss the creation of access audits under the ADA and how audits have been completed in the United Kingdom and more specifically in museums. Lastly, in section V we introduce the Worcester Art Museum, its accessibility challenges, and the focus of our project.

## II. Disability

According to the ADA, a person with a ‘disability’ is described as “...a person who has a physical or mental impairment that substantially limits one or more major life activities (ADA, 2009)” There are varying types of disabilities. Many can be grouped into three categories: mobility impairments, auditory impairments, and visual impairments. A breakdown of the most common types of disabilities is shown in Figure 2. This figure lists the proportions of disability based on their type and frequency of occurrence within the United States in 2010.

Figure 2: (How Common are Specific Disabilities?, 2010)



### A. Mobility Impairments

As of 2010, the U.S. Census found that in the United States approximately 30.6 million people aged 15 and older (12.6%) had difficulty “walking, climbing stairs, or using a wheelchair, cane, crutches, or walker” (Brault, 2012). As a nation we must be cognizant of such limitations and provide adequate accommodations for people with disabilities within *buildings open to the public*. Stairs or curbs can pose a challenge to those utilizing a wheelchair or crutches. Entrances and walkways also pose potential issues for those who have difficulty moving. How is it possible for a person who is unable to use their arms to turn a knob or push a door? There are different levels of obstacles that cascade into one another. From entering a building only accessible by stairs, which then leads to a large door that can only be opened by the person themselves, people

with mobility challenges are set up for failure before they are even able to enter many public spaces.

#### i. Severity

There are a multitude of impairments, either orthopedic or neuromuscular, that can impact mobility (Washington, 2001-2004). Mobility impairments may result from conditions such as “multiple sclerosis, cerebral palsy, spina bifida, diabetes, muscular dystrophy, and paraplegia (H.D. Institute, n.d.).” People with mobility challenges already face obstacles on a daily basis. Conditions listed above can affect several different parts of an individual’s body. Multiple sclerosis, cerebral palsy and muscular dystrophy affect the nervous system, which is responsible for making the connection between the brain and parts of the body, like the arms and legs. When the nervous system is affected by a medical condition, it can lead to abnormal behavior in bodily function and increasing the difficulty with which an individual can move. In extreme cases these conditions inhibit movement completely (Clinic, 2013). These challenges can often be large hindrances when people who have these disabilities go about their daily lives. The barriers they face are only exacerbated when facilities they may visit do not have the proper accommodations to allow them access.

Some impairments may only exist for a short period of time, such as a broken arm or leg. Though with time the impairment will heal, it is still considered an impairment for its duration. There are several assistive technologies used to help individuals who have mobility impairments. The severity of their condition typically dictates what type of assistive tools they use. We discuss the variety of assistive tools available in the next section.

## ii. Mobility Assistive Technologies

People with mobility impairments may use several kinds of devices to assist in movement. Some examples of these assistive tools include: walkers, canes, crutches, braces, manual or power wheelchairs, and electric scooters (Mobility Aids etc, 2014). Many assistive technologies can be separated into groups of whether they are powered by an outside source (i.e. electric scooters), or powered by the user (i.e. crutches and wheel chairs).

In most cases, the severity of the impairment usually indicates the power or complexity of the aid. Crutches and wheelchairs are dependent on the user to physically move them. People who have lost substantial use of their bodies take more intensive measures. Individuals with more severe impairments are more likely to need electric or gas fueled assistive technology (Mobility Aids etc., 2014).

## iii. Building Adaptations/Accommodations

Under the Americans with Disabilities Act, all buildings that offer services to the general public must be “fully accessible to people with disabilities if built after January 26, 1992”. Places built before that date must “undertake readily achievable barrier removal.” (“Opening Doors,2010) This implies that all *buildings open to the public* need to make the appropriate changes in order to become more accessible. Since older buildings are difficult to remodel, there is more leniency than with new construction. These buildings or facilities are considered to be “pre-ADA”, meaning they were established before the Title II accessibility requirements that were set by the ADA. As long as there is some initiative to make improvements, those which are not too difficult or expensive, these buildings will satisfy the standards set by the ADA (42 U.S.C. §1201 et. seq 35. (2014). Essentially, if there is any architectural barrier within these “pre-ADA” facilities, these places either remove such physical barriers, or provide “program access”.

Program access allows for a “pre-ADA” facility to move their offered service to an accessible location, or find a means of making all architectural changes to make the program, service, or activity readily usable by individuals with disabilities (ADA, 2008).

The ADA implementing regulations explain the requirements that *buildings open to the public* need to abide by in detail (Accessible Design, 2010). Examples of these regulations include: the need/use of ramps for building entrances, appropriate dimensions of doorways to accommodate wheelchairs, and proper heights for bathroom dispensers. All buildings, new construction or older, are required to provide “accessible routes”, or walking surfaces that are accommodating to people of all abilities (42 U.S.C. §1201 et. seq 35. (2014)). We elaborate on the specific standards of the ADA within section III (C) below.

## B. Auditory Impairments

According to the 2010 U.S. Census, approximately 7.6 million people (3.1 percent) in the United States have some level of difficulty hearing and 1.1 million people have a severe hearing impairment (Brault, 2012). People suffer from different severities of deafness that inevitably change how they interact and communicate. There is a level of frustration that only those who suffer from such impairment can know. This can include interaction with others, which can be strained or limiting. For example, people who are unable to effectively share a thought to a person with an auditory impairment may feel uncomfortable or as if they are insulting the other individual. While on the opposing side, the person with the impairment may also feel a level of discomfort and frustration. As a result, there can be unintentional barriers created between people of varying auditory abilities.

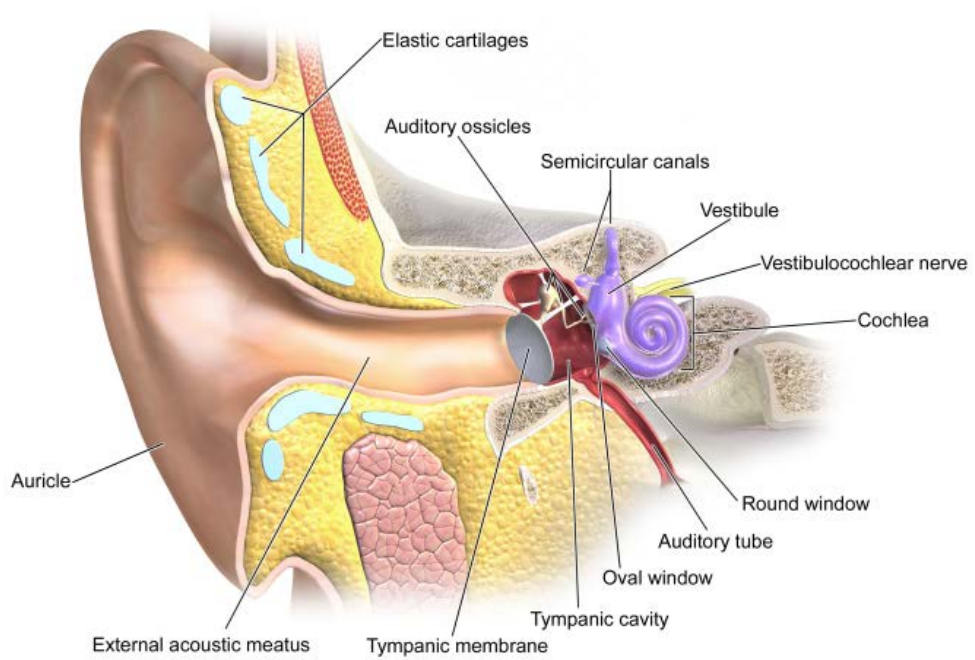
In a *building open to the public*, such as a museum, auditory accommodations may include how loud a docent speaks to a tour group, whether a video art exhibit offers an

adaptation for the hearing impaired, and if a medium of interpretation is necessary. People with hearing impairments exist on a continuum of hearing ability. In order to understand the variety of accommodations available to people of different hearing ability, we explore the different levels of severity below.

#### i. Severity of Hearing Impairments

Hearing impairments can have varying levels of effect on an individual. The severity of hearing impairments can be categorized by type of hearing impairment: conductive hearing loss, sensorineural hearing loss, and mixed hearing loss. *Conductive hearing loss* is when “sound is not conducted efficiently through the outer ear canal to the eardrum and the tiny bones (ossicles) of the middle ear (Types of Hearing Loss, 2014)”. Conductive hearing loss usually results in a reduction in sound level heard or the ability to hear lower sounds. *Sensorineural hearing loss* (SNHL) occurs “when there is damage to the inner ear (cochlea), or to the nerve pathways from the inner ear to the brain.” Considered the most common type of permanent hearing loss, it cannot be corrected through medical or surgical means. SNHL also reduces the ability to hear faint sounds as well as difficulty hearing speech. *Mixed hearing loss* is when a combination of conductive hearing loss and sensorineural hearing loss occurs. With mixed hearing loss “there may be damage in the outer or middle ear and in the inner ear (cochlea) or auditory nerve (Types of Hearing Loss, 2014)”. A detailed image showing all parts of the ear can be found in Figure 3 below. To assist individuals who do have a hearing impairment, there are assistive aids available. We discuss the types of assistive tools for hearing impairments in the next section.

**Figure 3: Anatomy of the ear (Blausen, 2014)**



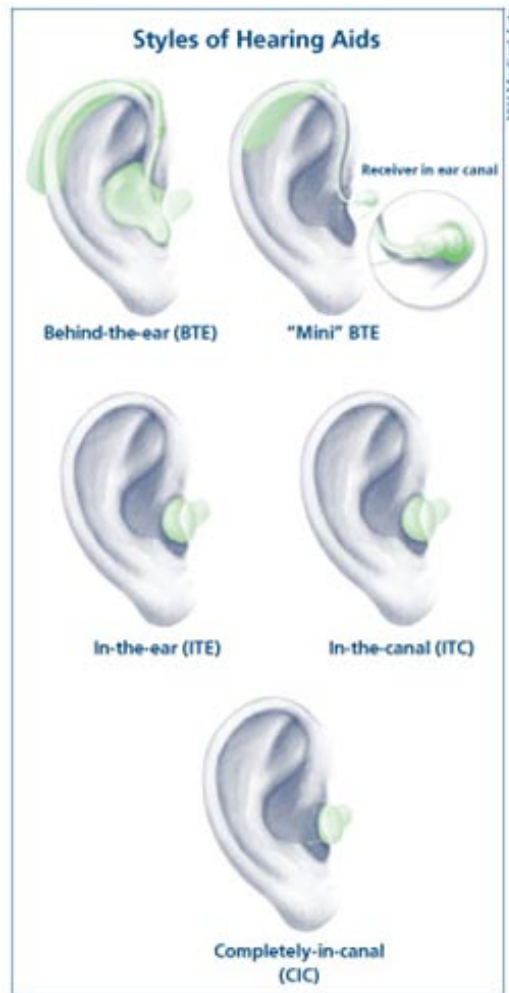
## The Anatomy of the Ear

Photo Credit: Blausen 0328 EarAnatomy [CC BY 3.0](https://creativecommons.org/licenses/by/3.0/)

### ii. Auditory Devices

There is a wide variety of assistive devices available for those with a hearing impairment. According to the U.S. Food and Drug Administration, hearing aids are “...sound-amplifying devices designed to aid people who have a hearing impairment (Health, 2014)”. Most hearing aids have similar designs. A hearing aid begins with a microphone to pick up the sound. An amplifier circuit picks up the sound and delivers a louder sound. The different types of hearing aids include: Behind-the-ear (BTE) aids, “Mini” Behind the ear aids, In-the-ear aids, and In-the-canal aids (Health, 2014). Figure 4 below shows how each type of hearing aid is worn.

**Figure 4: Styles of Hearing Aids (Administration, 2014)**



Courtesy of NIDCD/NIH

Other means to help communication include: American Sign Language (ASL), lip reading, written communication, and oral communication (H. D. Institute). Each individual decides how much assistance they would like and need. We discuss accommodations for people with hearing disabilities in the next section.

### iii. Adaptations/Accommodations

According to the ADA, the range of assistive technologies and services available for people who are deaf or hard of hearing include: the use of qualified interpreters, note takers, written materials, and assistive listening systems. *Buildings open to the public* can choose which



assistive technologies to use that will provide the most effective means of accommodation for an individual with an auditory impairment. For example, in addition to having a qualified interpreter present on site, it may be necessary to ensure that anyone with a hearing impairment has a direct line of sight to the interpreter ("Public Accommodations," 2014).

### C. Visual Impairments

Visual impairments involve difficulty seeing or inability to see. This can stem from a variety of issues. As with any disability, there are different severities of visual impairment. Knowing the wide range of severity and how to accommodate such range will assist museums and other facilities to improve access for people of varying visual abilities.

#### i. Severity

Visual impairment is characterized as eyesight that cannot be corrected to a normal level (Mandal, 2013). A normal level of vision implies that the individual has "20/20 vision" or that they are able to read letters that are 3/8 inches in size at twenty feet away from the posted letters (Lusby, 2013).

Vision is measured in two areas: visual acuity, and visual field. Visual acuity is defined as vision that is used to look at objects in detail, like reading a book or watching television. Visual field is defined as the ability to see around the edges of your normal vision while looking straight ahead (NHS, 2013). Figure 5, shown below, gives an example of the difference between visual acuity and visual field. Visual acuity is shown in image (b) and visual field in image (a). There are different levels of visual impairment. The levels range from partially sighted, low vision, legally blind, to totally blind (Gabbert, 2012).

Partially sighted indicates an individual has some form of a visual impairment. Low vision implies that an individual has an impairment which cannot be corrected. A person with

low vision is considered to have a low or severe visual ability. To be legally blind implies that there is profound visual impairment. This means that the individual is able to see objects at 20 feet that people with normal vision, or 20/20 vision, can see at 200 feet. Total blindness implies the person has no light perception at all and has total visual impairment (Gabbert, 2012). In the next section we describe the types of visual aids associated with visual impairment and the levels of severity.

**Figure 5: Visual Acuity vs. Visual Field (Nini, 2006)**



## ii. Visual Assistive Technologies

Visual aids are characterized as devices that help people with visual disabilities go about their daily lives (Foundation, n.d.). One of the more common visual aids are eye glasses. They come in different prescriptions based on the need of the individual. For more severe cases of visual impairments, an individual might use a cane to navigate their surroundings and/or a service animal to serve as their eyes. Service animals are typically dogs that are trained to provide assistance to an individual with a disability (Service animals, 2011). The service animals act as guides to help individuals with visual impairments to move around and interact with their

environment. In the next section, we describe accommodations for people with visual impairments.

### iii. Adaptations/Accommodations

Under Title II of the ADA individuals who are blind, deaf-blind, or visually impaired may not be denied access to the equal enjoyment of all services and goods that a facility provides (Act, 2012). These facilities include state or local government buildings as well as *buildings open to the public* (Disability Rights Resources, 2014).

Forms of accommodations include: (1) the use of braille, (2) large font on all signs and bodies of text (ADA Rights of Blind, n.d.), and (3) the use of audio devices to communicate information.

## III. Disability and its Associations with Accessibility

Every day people with varying levels of mobility, sight or hearing ability may have difficulty accessing public places. Most people without a disability take for granted the ability to go somewhere without worrying if they will be able to get inside or be able to navigate the inside of the building. Lack of accessibility has been a serious issue for decades and it was only in 1990 that the Americans with Disabilities Act was passed to help rectify the situation (Ju, 2008).

### A. Accessibility Issues (1900-1990)

Prior to the passage of the ADA, people with a disability had sporadic access to public spaces and could not rely on any place accommodating their varying abilities. Not only could people with disabilities not rely on access to public buildings, it was common practice in the early 1900's to institutionalize, sterilize, or even euthanize a child or adult that had a disability against their will (Griffin & McClintock, 2007). During the 1950's the United States passed legislation that established programs and provided some benefits for people with disabilities.

Specifically, Congress passed amendments to the Social Security Act in 1950, 1956 and 1958. These amendments provided funding for individuals who were no longer able to work because of a disability, created the Social Security Disability Insurance program for those with a disability who were of retiring age, and provided financial support to those who depended on someone who was forced to leave work because of a disability (Griffin & McClintock,2007).

Despite the changes to the Social Security Act, people with disabilities found it hard to live independently because of the societal standards at the time (Rosenthal & Kanter, 2000). In the 1950s there were no building standards requiring accommodations for people with disabilities; such as entrance ramps for people with mobility issues, or braille for people with a visual impairment. People who had disabilities could not exercise the same rights as those who did not have a disability. It was not until the early 1960's that a disability rights movement formed to counter this discrimination and gained enough momentum for Congress to take action (Mayerson, 1992).

The disability rights movement was started mainly by people with a disability, family members of people with a disability, and veterans. The movement quickly started to grow after World War II when thousands of veterans who had disabilities came home and realized that they could not live independently in the country they had just fought for. This rise in the number of people with a disability or who were related to someone with a disability was a major contributing factor to the need for Congress to address this issue. The people involved in this movement fought for equality in education, transportation, employment, and basic rights that other residents of the United States already had (History, 2000). The culmination of this movement ended with Congress passing the Americans with Disabilities Act of 1990.

## B. Americans with Disabilities Act and Amendments

The Americans with Disabilities Act of 1990 was the first piece of federal legislation to help protect the rights of people with disabilities. The Act defines what constitutes a disability and prohibits discrimination against individuals with a disability. This civil rights law prevents discrimination in all areas of public life including employment, transportation, and schools. The main purpose of the ADA is to ensure that “people with disabilities have the same rights and opportunities as everyone else (Network, 2014)”. In addition to the enactment of this law, the statute and implementing regulations established rigid guidelines for how new public buildings should be constructed and how existing buildings would need to be made more accessible to those with disabilities (Mayerson, 1992). We elaborate further on the ADA building standards in section III (C).

### i. The Americans with Disabilities Act of 1990

The ADA was enacted to secure the rights of those with disabilities, prevent discrimination against people with disabilities and establish accommodation requirements for public spaces. As expressed by the United States Civil Rights Office, this Act:

“Gives civil rights protections to individuals with disabilities that are like those provided to individuals on the basis of race, sex, national origin, and religion. It guarantees equal opportunity for individuals with disabilities in employment, public accommodations, transportation, state and local government services, and telecommunications (US DEP. Education, 1990).”

The 1990 version of the ADA lacked detail and specification and was therefore interpreted differently by different people. The 1990 iteration of the ADA did not provide a definition of the term disability or a strict guideline that determined what was and was not constituted as a disability. Because of this ambiguity, some people believed they were not being secured the rights the Act was supposed to protect. Due to this confusion, many additional

actions were taken to try and clear up the misunderstanding. The first action was developing policy guidance. These policies served as more explanation to the term disability and provided a concrete structure that was never originally stated to define a disability. Between the date that the 1990 ADA was enacted and July 2, 2000, there were a total of 375 filed lawsuits against the ADA (E.E.O.C, n.d.). After the 1990 version of the ADA passed, discrimination continued to occur in various situations. For example, in 1997, Ella Williams was terminated by the Toyota Motor Manufacturing Company for excessive absences from the job (*Toyota Motor Mfg, v. Williams*, 534 U.S. 184 (2002)). Ms. Williams sued the company claiming that she had a disability and did not receive an appropriate accommodation from Toyota. While the United States Supreme Court found for Toyota, the case opened a door with questions and contradictions that illustrated the issue with the vague definition of what type of disability is covered by the law (*ibid*).

In the case mentioned above, Ms. Williams claimed that she was unable to adequately perform her job because she was disabled by carpal tunnel syndrome. The District Court found that Ms. Williams's impairment did not constitute as a disability. Under the ADA, a disability was only seen as "a physical or mental impairment that substantially limits one or more major life activities of such individual (L. I. Institute, n.d.). In order to establish that Ms. Williams was limited in her daily activities, she performed certain tasks to prove this point. These tasks exposed her limitations to the Court and forced hesitation as to what should be recognized as a disability and what should not ("Toyota Motor Mfg., Ky., Inc. v. Williams 534 U.S. 184 (2002)," 2001).

This case, as well as many others identified holes and flaws within the 1990 Americans with Disabilities Act. After countless court cases of inconsistent implementation of the Act, a

movement for reform was an inevitable result. (ADA Amendments 2008, n.d.). The start of this movement did not become fully realized until 2008 when Amendments to the 1990 Act were implemented (ADA Amendments 2008, n.d.).

## ii. 2008 Amendments to the Americans with Disabilities Act

Between the years 1990 and 2008, there were many court cases arguing over the meaning of what constituted a disability. In 2008, Congress passed amendments to the ADA in an effort to lay to rest further confusion about what constituted a disability (ADA Amendments 2008, n.d.). The 2008 Amendments to the ADA broaden the definition of disability as well as clarify areas that had resulted in confusion. Section 4 Titled “Disability Defined and Rules of Construction” of the 2008 Amendments reads,

*“(1) The term ‘disability’ means, with respect to an individual, a physical or mental impairment that substantially limits one or more major life activities of such individual; a record of such an impairment, (2) Major life activities include, but are not limited to, caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, communicating, and working; (3) Major life activity also includes the operation of a major bodily function, including but not limited to, functions of the immune system, normal cell growth, digestive, bowel, bladder, neurological, brain, respiratory, circulatory, endocrine, and reproductive functions (“Americans with Disabilities Act,” July 26, 1991).”*

As discussed in section III (B.i) (above), there was change in 2008 as a result of 18 years of court cases, advocacy, and shifts in public awareness. These Amendments helped make the issue of accessibility a priority. The focus created by the Amendments made in 2008 created momentum that carried into 2010.

## C. Building Standards

To provide a rigid structure for requirements to maximize accessibility, the Department of Justice (DOJ) passed regulations interpreting portions of the ADA. The DOJ established

building standards to set stern guidelines that applies to all *buildings open to the public*. These regulations were set in place to clarify any confusion and misinterpreted areas. These building standards are enforced through a process called an *accessibility audit* ("2010 ADA Standards," 2010).

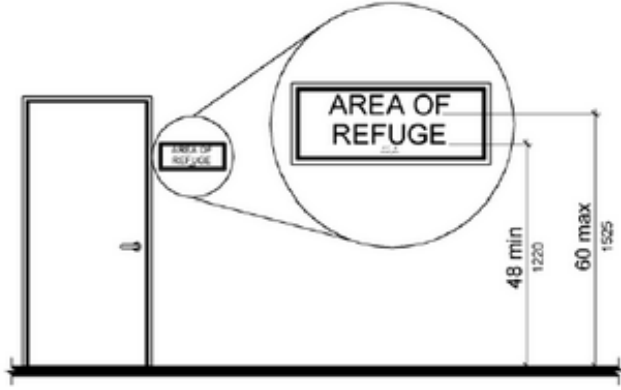
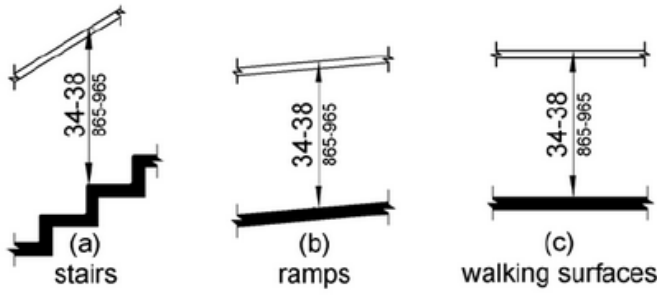
An accessibility audit is an assessment of a particular *building open to the public* against the most current building standards available concerning availability and services. In the next section we explore *access audits* and their purpose.

The *2010 ADA Standards for Accessible Design* states and explains the regulations enforced by the *accessibility audits*. These standards must be met in order for a *building open to the public* to be accommodating to people with disabilities.

Below we provide examples of acceptable buildings designs. Each example, Figure 6 through Figure 8, illustrates a different ADA building standard. Figure 6 shows the correct width for walking surfaces, Figure 7 shows the height in which all signs must be placed within *buildings open to the public*, and lastly Figure 8 shows the handrail height in relation to stairs, ramps and walking surfaces.

Figure Title	Drawing	Description of Standard
Figure 6: Correct Width for Walking Surfaces	<p>The drawing shows a top-down view of a walking surface. A central horizontal bar represents the walking surface, with a width dimensioned as '48 min' and '1220'. On either side of this bar, there are two sets of dimensions: an outer dimension of '36 min' and '915', and an inner dimension of '32 min' and '815'. The inner dimensions are aligned with the walking surface bar. At the ends of the bar, there are two vertical lines, each with a dimension of '24 max' and '610' extending from the end of the bar to the outer edge of the 36-inch clearance area.</p>	<p>Within Section 403.5.1 of the <u>2010 ADA Standards for Accessible Design</u>, it states the clear width of walking surfaces which should be 36 inches minimum.</p>



<p>Figure 7: Height and Font Sizes of Signs</p>		<p><b>Within Section 703.4.1 of the 2010 ADA Standards for Accessible Design, it states the height of signs should be located 48 inches minimum above the ground and 60 inches maximum.</b></p>
<p>Figure 8: Height of Handrails</p>		<p><b>Within Section 505.4 of the 2010 ADA Standards for Accessible Design, it states handrail heights next to stairs ramps and walking surfaces shall be 34 inches minimum and 38 inches maximum.</b></p>

#### IV. Access Audits

In order to facilitate compliance with ADA requirements, the Department of Justice created a structured process in which all *buildings open to the public* were to be made fully accessible. The implementation of these standards and regulations were enforced by accessibility audits. An accessibility audit will list all the ways that an institution does not meet the current standards. Completed audits provide a strict guideline for buildings to follow and have demanded change within many buildings throughout the country (Sakkas & Pérez, 2006).

##### A. Audits in Public Buildings

Since the passage of the ADA, accessibility audits have become a focus for *buildings open to the public*. Not only is this necessary for these buildings to comply with the standards set by the ADA and its implementing regulations, but it also increases the demographic that is

attracted to the organization housed in the building. The United Kingdom (UK) has served as a model for other countries, blazing the trail in performing access audits and making the required renovations (Imrie & Kumar, 1998).

#### i. Audits in the United Kingdom

There have been many accessibility audits completed in the UK that can offer guidance for institutions in the United States. Accessibility audits have become a major focus within the last twenty years (Griffin & McClintock, 2007). Some examples of museums that underwent accessibility audits and subsequently made the necessary changes include the Royal Armouries Museum in Leeds and the Castle Museum in York ( Access Audits and Consultancy, n.d.). After these institutions underwent an accessibility audit, the museums learned what areas lacked sufficient accommodations and began to make changes to correct these areas.

The York Castle Museum underwent changes to make the entire first floor of the museum fully accessible including the gift shop and café. Specifically, they widened some of the pathways that had previously been too small for a wheelchair to fit through and used a small ramp instead of the stairs that had previously been there. The Museum also installed a wheelchair lift to make a separate wing of the museum accessible to people with mobility issues (Museum, 2014). The Royal Armouries Museum installed automatic doors that would allow for people with mobility impairments to enter and exit the museum without difficulty. They also renovated their restrooms throughout the museum to make them handicap accessible (Armouries. n.d.).

#### ii. Audits in Museums

Museums can be great candidates for accessibility audits given the public service they provide. In addition, most museums were constructed before the passage of the ADA, making their level of accessibility inconsistent with ADA standards. *As buildings open to the public,*

museums must comply with the standards set by the ADA. Museums may have a difficult time accommodating people with disabilities. Museums are open to people of all physical and mental abilities and need to remain cognizant of the importance of the intended vision that the museum is trying to give to all its visitors. Museums often plan out their exhibits according to the path that most visitors will follow during their time at the museum. If a museum only has one accessible route, compared to many routes that are not accessible, then the museum is forcing people with mobility impairments to travel through rooms that they have already gone through to get back to the accessible route (Harvey, Loomis, Bell, & Marino, 1998). People who have mobility impairments would then be experiencing the museum differently from those who do not have a mobility impairment.

## V. Worcester Art Museum

Since its founding in 1898, the Worcester Art Museum (WAM) has been a pioneer in the appreciation and collection of various forms of artwork. They have helped expand the admiration of art within Worcester, Massachusetts and throughout the world. A picture of the Worcester Art Museum is shown below in Figure 9. The WAM is credited with being the first museum in the United States to buy a Claude Monet painting and to show photography as a form of art ("Worcester Art Museum," 2014).

The WAM hopes to no longer be the "hidden gem" of Worcester, but rather to increase recognition of what they have to offer throughout the country. An important step in expanding their audience and increasing their reputation is by expanding their visitor demographic. The WAM wishes to increase the level of accessibility throughout the building, thereby attracting a greater audience to its multitude of exhibits ("Worcester Art Museum," 2014). Consequently, the goal of our project was to help the Worcester Art Museum become a place where visitors of

varying abilities can enjoy an equally wonderful experience. In the next chapter we describe our methodological approach to achieving this goal.

**Figure 9: Worcester Art Museum (Chunga, 2014)**



*This figure shows Lancaster St. entrance to the Worcester Art Museum.*

### 3. Methodology

The Worcester Art Museum (WAM) has requested an assessment of their building on its level of accessibility for visitors with physical impairments. The goal of this project was to work in collaboration with the WAM to study the museum building and offer recommendations on changes they can make to become more inclusive to their visitors. With the assistance of the Americans with Disabilities Act (ADA) requirements, we identified potential areas for improvement and offered our recommendations.

To accomplish our goal of developing recommendations for the museum we came up with five objectives:

1. Educate ourselves on the Americans with Disabilities Act of 1990, and its Amendments, and identify relevant/applicable building standards.
2. Identify potential areas to improve visitor experience.
3. Assess the Worcester Art Museum's level of compliance with the building standards identified in Objective 1.
4. Identify what similar institutions have done to become more accessible.
5. Develop recommendations for the Worcester Art Museum to help increase their level of accessibility.

In the following sections, we explain our approach to achieving these objectives. In section one, we discuss how we planned to familiarize ourselves with specific standards and regulations set by the ADA in relation to the Worcester Art Museum's area of focus. In section two we build off section one and discuss our approach on how we planned to assess the Worcester Art Museum to improve the experience of visitors. In section 3, we discuss our plan for assessing the Worcester Art Museum's level of compliance with the ADA using fieldwork. In section 4, we discuss our approach to and rationale for visiting other similar institutions. In section 5, we discuss the criteria we used to develop recommendations for the Worcester Art

Museum. Finally, our timeline for the IQP project term is in Appendix I. Within the figure there is the list of objectives with start and end dates, and a Gantt chart of the schedule.

I. [Objective 1: Educate ourselves on the Americans with Disabilities Act of 1990, and its Amendments, and identify relevant/applicable building standards.](#)

To begin the project, we familiarized ourselves with the Americans with Disabilities Act of 1990. The ADA details the necessary requirements for *buildings of public use*. For the purpose of this project, and in accordance with the ADA, we define “buildings of public use” as privately operated facilities that offer service and affect commerce (“Americans with Disabilities Act,” July 26, 1991). More generally, a *building of public use* can be understood as any building that people are able to use for casual interaction. These interactions may include the offering or purchasing of services, or anything that welcomes visitors for interaction with the respective establishment. Examples of *buildings of public use* include: restaurants, hotels, and museums.

To educate ourselves on the ADA we analyzed the law searching for sections that would apply to the Worcester Art Museum’s building. Using content analysis, we identified relevant portions, and we extracted required measurements and standards from the ADA. We began by categorizing all requirements that are necessary for *buildings of public use*. The ADA has different rules set for buildings built before 1996 (see *Building Adaptions/Accommodations* in Background Chapter). Since the WAM was built in 1898, we used the requirements established by the ADA implementing regulations for structures built prior to 1996. These rules entail that the building/area will comply with the ADA if the owner/operators take initiative to make renovations for increasing accommodation. These renovations do not warrant immediate attention nor should they cost an excessive amount of time and money (Americans with Disabilities Act Title 11 Regulations., 2012).

We focused on accommodations for people with physical disabilities. Originally, we were going to analyze ways to improve the WAM building for people with physical and visual disabilities. However, given the seven-week period, extent of fieldwork involved in conducting a preliminary access audit, and our sponsor’s desire to focus on physical disabilities, we narrowed our scope to accommodations for people with mobility impairments.

The “2010 ADA Standards for Accessible Design” has the most recent edition of the specific measurements and regulations for *buildings open to the public*. We began looking at where the WAM was categorized within the ADA. Through interviews with our sponsor, we gathered specific criteria that placed the museum under Title III of the ADA<sup>1</sup>. These criteria were that the WAM is privately owned, is not governmentally funded and is not operated by state and/or local government (Hicks, 2014). Title III, labeled as “Public Accommodation”, deals with the accessibility of all services of *buildings open to the public* (Hicks, 2014). With this information, we were able to identify the portions of the ADA that are applicable to the WAM.

## II. [Objective 2: Identify potential areas to improve visitor experience](#)

Once we completed the content analysis of the ADA, we determined the most applicable standards for the museum. As mentioned in Objective 1, we focused our assessments on physical disabilities and the regulations that pertain to them. Fran Pedone, Director of Operations of the Worcester Art Museum, provided us the following list of focus areas within the museum:

- accessibility of doorways and entrances
- width of hallways
- heights of signs, labels, and light switches
- heights of paintings
- heights of visitor service desks
- availability of wheelchair accessible bathrooms

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<sup>1</sup> Although we analyzed the law and consulted experts in the field, our assessment and categorization of the WAM under Title III is part of an educational exercise and is not meant to be conclusive.

- heights of toilet paper dispensers and paper towel dispensers
- heights of sinks in restrooms
- availability of accessible parking
- availability of elevators

The above list was preliminary and gave us a place to begin. The driving force for the above list was a result of our sponsor's dedication to making the WAM more accessible to all. Along with making the museum more accessible, the sponsors want to surpass the compliance with the ADA, gearing their attention to improving the visitor experience overall.

The areas we focused on expanded and contracted based on the results of our content analysis of the ADA (described by Objective 1), analysis of the visitor complaints (discussed below), interviews with members of the staff, and fieldwork of the WAM (discussed in Objective 3).

The main goal of this objective was to improve the experience of all visitors with mobility impairments within the WAM. For the purposes of this project, we defined improving the visitor experience as making the museum more accessible to people with physical disabilities. In addition to doing a content analysis of the ADA, we also analyzed visitor complaints provided by the museum, conducted surveys within the museum, and utilized participant observations within the museum.

The WAM provided us with a list of visitor complaints. These complaints were filed with the WAM and covered a range of topics within the museum. We analyzed the complaints, paying attention only to those that referenced issues with accessibility. Any potentially relevant complaint was placed within a separate excel document that was further analyzed for its content.

To begin the organization of the complaints, we analyzed each complaint and separated them into categories. These categories were formed based on keywords, phrases and themes



found within each complaint. After placing each complaint in relative categories, we then found the most common theme(s) throughout the years. Breaking up each complaint into appropriate groups allowed us to deconstruct the list and expose the percentage that each category represented within the total list of complaints. The resulting percentages provided an analysis of the areas within the museum that visitors felt needed improvement. We then used these areas to help form a more specific visitor survey.

To expand our pool of data and explore additional sources of information, we selected an exploratory sample of WAM visitors to answer surveys. We felt it appropriate to survey visitors to gauge their experiences at the WAM. With our survey geared toward the museum's accessibility, we wanted to highlight any areas of the museum we did not consider from any of our previous research. The sample of visitors was created by asking all who were present and willing to participate at the museum. Each participant was asked to answer a set of standardized questions. We distributed these surveys on different days of the week and at different times of the day in order to reach a larger population of visitors and to avoid potential bias, such as excluding people who work nine to five jobs during normal weekdays.

We also surveyed visitors on specific days when the WAM anticipated heavy attendance. These days included: Community Day, a yearly event they hold celebrating different cultures, the third Thursday of November, and Saturdays in general. Our rationale for surveying on these specific days was that there are typically more visitors during such days compared to the average weekday. The survey questions focused on the accessibility of the Worcester Art Museum. A draft survey is shown in Appendix B.

We used several means to distribute the survey. While on site at the museum, we made paper copies as well as an online version of the survey available to visitors. We walked around

the museum with both paper and online versions to give visitors an option of how they could complete the survey. We then utilized the WAM's website and Facebook page, leaving a link to the online survey, to allow visitors a chance to fill it out at home. Using the website and Facebook page gave us another means of reaching a larger population of the WAM's visitors as well as provide more convenience to anyone who would like to take the survey. Along with the use of the websites, we also generated a QR code for visitors to scan so that they could take the survey at a more convenient time for them. Finally, we created a placard to put up around the museum with the QR code and paper copies of our survey. The placard allowed us to draw in visitors within the museum to take the survey.

While conducting surveys, we were able to actively utilize participant observation within the museum. Surveying on the days with WAM special events that were mentioned above, as well as during weekdays, gave us an opportunity to see how visitors were able to move about the museum. We were able to see first-hand how visitors navigated the museum as well as how they interacted with exhibits and galleries. Making regular observations allowed us to see where visitors experienced difficulty moving about the museum. With the data collected from our observations, we could shape recommendations for the museum to target these problem areas.

In order to triangulate the results, we interviewed different groups of people. This list included the employees of the Worcester Art Museum, staff at area museums, and professionals in disability services. In Objective 4, we discuss the interviewing process of those not associated with the Worcester Art Museum. For each of these interviews we obtained either written or verbal consent from the participant. The interview questions were tailored to the particular individual being interviewed. See Appendix C for sample interview questions.

We interviewed WAM employees involved with visitor services because any employee that interacts with the visitors of the WAM may have insight into how the WAM can improve visitor experiences. Employee interviewees included: WAM security guards, visitor desk employees and café/gift shop employees. A sample list of interview questions for WAM employees is in Appendix C.

### III. [Objective 3: Assess the Worcester Art Museum's level of compliance with the building standards identified in Objective 1 and areas for improvement identified in Objective 2](#)

As discussed in Objective 2, our team developed a list of certain structures within the museum. These structures included, yet were not limited to the list our sponsor provided in Objective 2. We conducted fieldwork in the WAM to evaluate whether certain areas of the building complied with the ADA standards identified in Objective 1.

To begin our analysis of the museum, we modeled our approach after an accessibility audit. An accessibility audit is an evaluation of a building or facility to see if it is accommodating to all people, with or without disabilities (What Is An Access Audit, n.d.). The ADA has made a “Tool Kit” which describes how to effectively assess the accessibility of a building (Access Toolkit, 2004). With this research, we began to use the relevant standards and regulations collected in Objective 1, and the areas of focus from Objective 2, to structure an accessibility audit for the WAM.

Based on the information we gathered from Objective 2 and with the help of one of our sponsors Mr. Pedone, we were able to generate a priority list of areas that we would assess. This priority list was comprised of areas considered to be *high traffic*, as well as locations that

received complaints mentioned in Objective 2. We deemed *high traffic* areas as locations that saw the highest number of visitors. Our priority list is shown below.

1. Areas outside the WAM
  - a. Parking
  - b. Signage
  - c. Entrances and Exits
2. Museum
  - a. Lobbies
  - b. Restrooms
  - c. Galleries/Exhibits
3. School
  - a. Restrooms
  - b. Classrooms

We planned on assessing as many areas as possible, but due to time constraints we were unable to assess the Higgins Education Wing of the Museum.

In addition to focusing on these areas within the museum, we also narrowed our scope to certain structures and objects. We chose to narrow our scope in order to fit the time constraints of the seven-week term. These structures and objects were brought to our attention through visitor complaints and by our assessment of the ADA. The detailed list of what we assessed can be found in Appendix D.

We created a note taking tool to facilitate our ability to assess the WAM and to create an easy method for comparing data against the applicable ADA building standards. Each table was focused on one ADA standard to keep the data as organized as possible. This was done due to the large number of areas, structures, and objects that were being evaluated. In these tables we listed the specific area that we assessed, the measurements we took, the ADA compliant measurements for that specific type of object, whether or not the area complied with the ADA and future recommendations or suggestions for that specific area. Formatting our data in this way

helped us focus on sections of the museum that needed improvements and/or adjustments. A sample of the note-taking tool we used is in Appendix A.

We then cross-referenced our findings against the relevant complaints identified in Objective 2 and the data we collected within the museum. Through this process, we gained a deeper knowledge, as well as a personal understanding of the visitors' perspective. We were able to compile a list of areas that visitors felt needed improvement and were not covered by the ADA.

In order to help the WAM improve their visitor experience as much as possible, we included these findings in the list of areas that we would be providing recommendations for. We discuss our process for developing recommendations in more detail in Objective 5.

#### IV. [Objective 4: Identify what other museums and similar institutions have done to become more accessible.](#)

It is the Worcester Art Museum's vision to be more visitor-friendly and accessible to all. Fran Pedone said "The Worcester Art Museum's vision is that the facility becomes universally accessible so all visitors can enjoy what the Museum has to offer (Pedone, 2014)."

In order to offer recommendations that addressed this goal we decided to analyze what other museums and organizations have done to increase their accessibility. We interviewed employees at their respective institutions who had experience in planning and implementing projects focusing on accessibility for people with disabilities within their institutions. We were able to gain new insight on recommendations that we could provide to the WAM.

We interviewed people who had extensive knowledge of the ADA, and have had experience working with the regulations and standards. We personally wanted to see how these

organizations provided accommodations and how they changed their buildings to be more accessible. We contacted seven museums and institutions in Massachusetts and were able to visit the following: Worcester Polytechnic Institute (WPI), the Boston Museum of Fine Arts, the Boston Museum of Science, and the Peabody Essex Museum.

All of the aforementioned institutions either underwent changes to become more accommodating to people with disabilities or have offices within their institutions focused on accommodating people with disabilities. Through these interviews, we were able to gain a better understanding of how to extrapolate the most useful information from the ADA, interpret it properly and apply it correctly. Visiting and interviewing members from these institutions helped inspire us to think of more recommendations that we could ultimately give the WAM. For an example of the questions we used when performing these interviews, see Appendix E through Appendix H.

In order to gain a better understanding of the options that exist to increase accessibility, we interviewed people who have experience planning or making institutional changes at their respective locations. Interviewees included: Aaron Ferguson, the Director of Disability Support and Student Accommodation Services at Worcester Polytechnic Institute (WPI), Hannah Goodwin, the Manager of Accessibility at the Museum of Fine Arts, Amy Curtis, Manager of Guest Services at the Peabody Essex Museum, and Alfredo DiMauro, the Assistant Vice President of Facilities at WPI. For a sample of the questions we used when conducting these interviews, see Appendix E through Appendix H.

V. Objective 5: Develop recommendations for the Worcester Art Museum to improve the accessibility of its building

Once we synthesized our research based on information gathered from the ADA and the interviews we conducted, we compiled a list of recommendations for the Worcester Art Museum. We separated our recommendations into two categories:

1. Short-Term Recommendations
2. Long-Term Recommendations

For the purpose of this project, we considered *short-term recommendations* as recommendations that the museum could accomplish in a short amount of time, with relatively low cost and labor. We defined the parameters of the amount of money and time that can be considered for short-term recommendations as established by the WAM's standards for budget size and their methods of allocating completion time for a project. We categorized changes that fit the guidelines of a short-term recommendation based on the research we conducted. We tailored short-term recommendations so that the museum will be able to accomplish them within one to twelve months.

We defined *long-term recommendations* as recommendations that the museum can consider accomplishing within the span of one to two years. The recommendations in this section will be for possible improvements the museum can take on if they choose. This section is for the more costly changes that will take a substantial amount of time and planning. Ideally, these recommendations will lay some framework for any future projects the museum may take on to further increase their accessibility.

For our categories of recommendations, we developed tables to display and compare the data from our research and the fieldwork done at the Worcester Art Museum. A sample of the data table we used is found in Appendix A. The first column highlights the areas of focus as

detailed in our research. The second column features the ADA standards and regulations associated with the areas of research. The third column was the actual measurement and findings from our field work at the museum. Lastly, the fourth column organized the data results as to whether the area complies with the ADA.

Once we compiled and processed our data into a readable format we then gave it to the appropriate museum staff to analyze. Compiling and processing our data began with the separation of our goals into short-term and long-term. Once given to the staff, we were able to show the work we have done throughout the term and receive feedback on our recommendations and supporting data. With this format, we hoped to initiate change by offering the WAM reasonable suggestions for how to improve their accessibility.



## 4. Findings & Recommendations

Through our data collection, we compiled findings during our time with the Worcester Art Museum (WAM). We identified different aspects of the WAM's level of accessibility that ranged from visitor experience to the facility itself. In this chapter, we will discuss our findings on the museums accessibility, and observations and recommendations for improving the current level of accessibility.

### I. The Worcester Art Museum is committed to increasing their level of accessibility.

The Worcester Art Museum (WAM) has articulated a strong intention to make their museum more accessible to their visitors. The construction of the new Access Bridge at their Salisbury Street entrance is the most recent demonstration of this intention. The museum continues to improve their level of accessibility in order to reach their vision of becoming a cultural center in the city of Worcester. Below we will describe in detail their efforts and commitment to becoming more accessible.

#### A. Commitment of the museum staff

The WAM's commitment to improving the visitor experience through becoming more accessible is apparent by the dedication of the WAM staff and directors. From the beginning of our project we have been able to see the drive and commitment of the WAM, through the efforts of Laura Riach, the Visitor and Volunteer Services Manager, and Fran Pedone, Director of Operations. They have been responsive to our needs, providing crucial support for the advancement of our project.

With the goal of making the WAM a more welcoming place to visitors of all abilities, Ms. Riach took initiative to provide effective ways to help visitors. Through her leadership position as Visitor and Volunteer Services Manager, Ms. Riach influences her staff of Visitor Service Representatives (VSRs) to be vigilant of the visitor's interactions with the WAM to ensure that the visitor experience within the WAM is positive for all who enter the museum. In addition, part of her strategic goals for the fiscal year of 2015 is to provide hands on training in accessibility for her Visitor Services staff.

It is Ms. Riach's responsibility to develop strategies to improve the visitor experience. For example, when it was brought to her attention that visitors had trouble navigating the museum, she developed a new visitor map to help alleviate confusion. She became aware of the issue through visitor complaints. Many of the complaints dealt with the lack of clarity of the previous map the museum provided. For example, even after reading the previous map, some visitors were unaware that the museum had four floors. To improve the quality of the map, she incorporated descriptive signs within the map and increased the font size of the wording. She also color-coded the map for improved clarity and visual appeal. To further appeal to visitors, she added example pictures of art pieces that corresponded to the four floors. Her rationale for incorporating the example pictures was to allow visitors using the map a preview of what was on each floor. From here, visitors could have a better idea of what part of the museum they wanted to see first. Figure 10 below shows the previous map. Figure 11 below shows the revised map Ms. Riach worked on.

Figure 10: Previous Visitor Guide

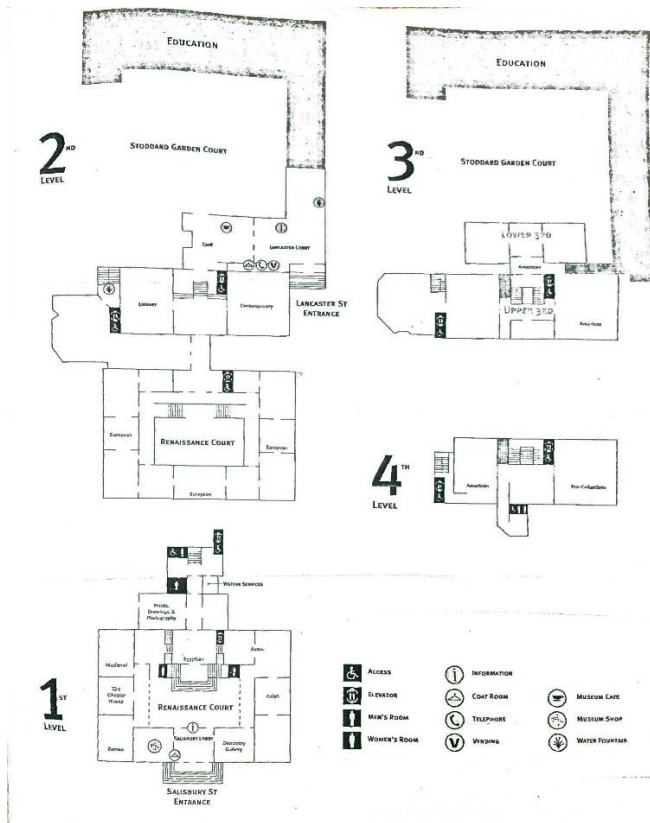


Figure 11: Revised Visitor Guide



Mr. Pedone manages the facilities at the WAM. He maintains the WAM's facilities, keeping all galleries and exhibits in operable order. Along with the responsibilities of keeping the museum intact, part of his job is also to ensure that the museum is accommodating to people of varying abilities.

Mr. Pedone is on the forefront of making the museum buildings more accessible to people with physical disabilities. He is driven to make the WAM more universally accessible. He has been more than willing to assist our group in accomplishing different parts of the project. For example, he provided us the floor plans of the museum to help us when conducting field work in the museum. He also purchased the measurement tools we needed to conduct fieldwork. The tools included were a level, measuring tape, and a pressure gauge. He was willing to purchase

the tools for us because he wanted to keep them in hand to further assess the museum and make changes in the future. His initiative to purchase the tools displayed the WAM's commitment to maintaining and improving their level of accessibility.

## B. Efforts to become more accessible

The WAM has publicly stated accessibility is a key component of their vision for the future of the museum. The WAM's vision of being visitor focused has been the driving force behind their recent reconstruction and design efforts. Below we detail some of their efforts.

One of the larger projects WAM has taken on to increase their level of accessibility is the installation of the Access Bridge. Shown below in Figure 12 is the intended design of the Access Bridge. The construction began September 15, 2014. The goal of the Access Bridge is to make the Salisbury entrance of the WAM more accessible. The addition of the Access Bridge will give the museum a new handicap accessible entrance, providing greater convenience for visitors.

**Figure 12: Access Bridge Model**



Model Credit: wHY Architecture, Creative Director: Kulapat Yantrasast

The WAM's willingness to host this IQP project also indicates their investment in becoming more accessible. They invited WPI to the museum to assess areas in the museum wing to see whether they complied with the Americans with Disabilities Act (ADA). The fact that the WAM allowed us to assess the museum and provide recommendations for the betterment of their facilities through this project demonstrates their commitment to improving accessibility through transparent and open process.

Employees of the WAM were welcoming and cooperative to the work we did throughout the term as well. We were able to conduct interviews with different VSRs and employees of Protective Services at the WAM. They were all willing and open to speak of the museum and their experiences with visitors.

## II. The Worcester Art Museum falls under Title III of the Americans with Disabilities Act.

Through our research we were able to deduce that the WAM falls under Title III of the ADA. Below we discuss why the WAM falls under Title III and its implications.

### A. What is covered under Title III of the Americans with Disabilities Act

Title III applies to "Public Accommodations and Commercial Facilities" in the ADA. For WAM, the three traits that classify it as a Title III area are:

1. The WAM is privately owned.
2. The museum is not operated by state or local government
3. The museum is not federally funded.

We learned this information through interviews with our sponsors, Ms. Riach and Mr. Pedone.

Pursuant to Title III, the WAM must abide by specific accessibility regulations and guidelines.

With this knowledge, we were able to narrow our scope within the ADA to find standards relevant to the WAM.

## B. Applicable standards from ADA.

Utilizing this more narrowed scope within the ADA, we found pertinent regulations and standards that we could use to assess the WAM. For our project, we found and utilized the 2010 ADA Standards for Accessible Design. The document contains all measurement specifications for *buildings of public use*, or facilities that offer a service that is intended for the general public.

## III. The areas of the WAM that required assessment are: parking, entrances/exits, signage, lobbies, restrooms, galleries, and classrooms.

Through interviews with our sponsors and analysis of visitor complaints at the WAM, we found parking, entrances/exits, signage, lobbies, restrooms, galleries, and classrooms to be the highest priority areas. Due to our short seven-week time frame, we narrowed our focus to evaluation of the highest priority areas. Below we discuss our rationale for prioritizing these areas.

### A. Priority List of Areas to Assess

We reviewed a list of visitor complaints provided by the WAM ranging from June 2011 to September 2014. After separating out the complaints related to accessibility, we sorted the accessibility complaints into common themes. These themes included parking, signage, entrances/exits, glass doors, audio tour, and miscellaneous. The miscellaneous category consisted of complaints about the elevators, wheelchairs, bathrooms, water fountains, stairs, pathways and available seating. These complaints were placed in the miscellaneous category because they did not have a high enough frequency to be placed in a category of their own. There were a total of 108 accessibility related complaints that we placed into each of the six categories. Figure 1 shows the distribution of the complaints.

**Figure1: Distribution of WAM Visitor Complaints June 2011 to September 2014**

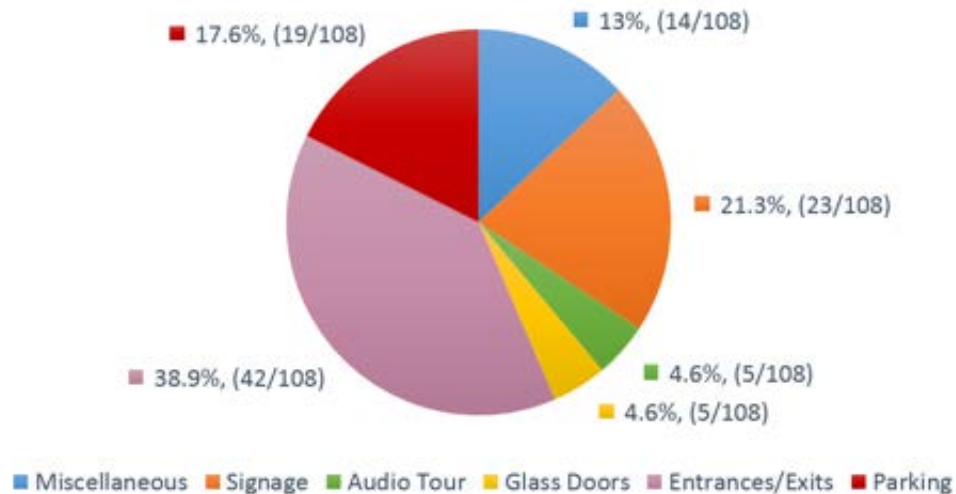


Figure 1 shows the areas that visitors feel need improvement. Entrances (38.9%), signage (21.3%), and parking (17.6%) accounted for almost 80% of the visitor complaints. Taking into consideration that the majority of complaints were about the outside of the museum and entering the museum, we chose to focus on these areas first.

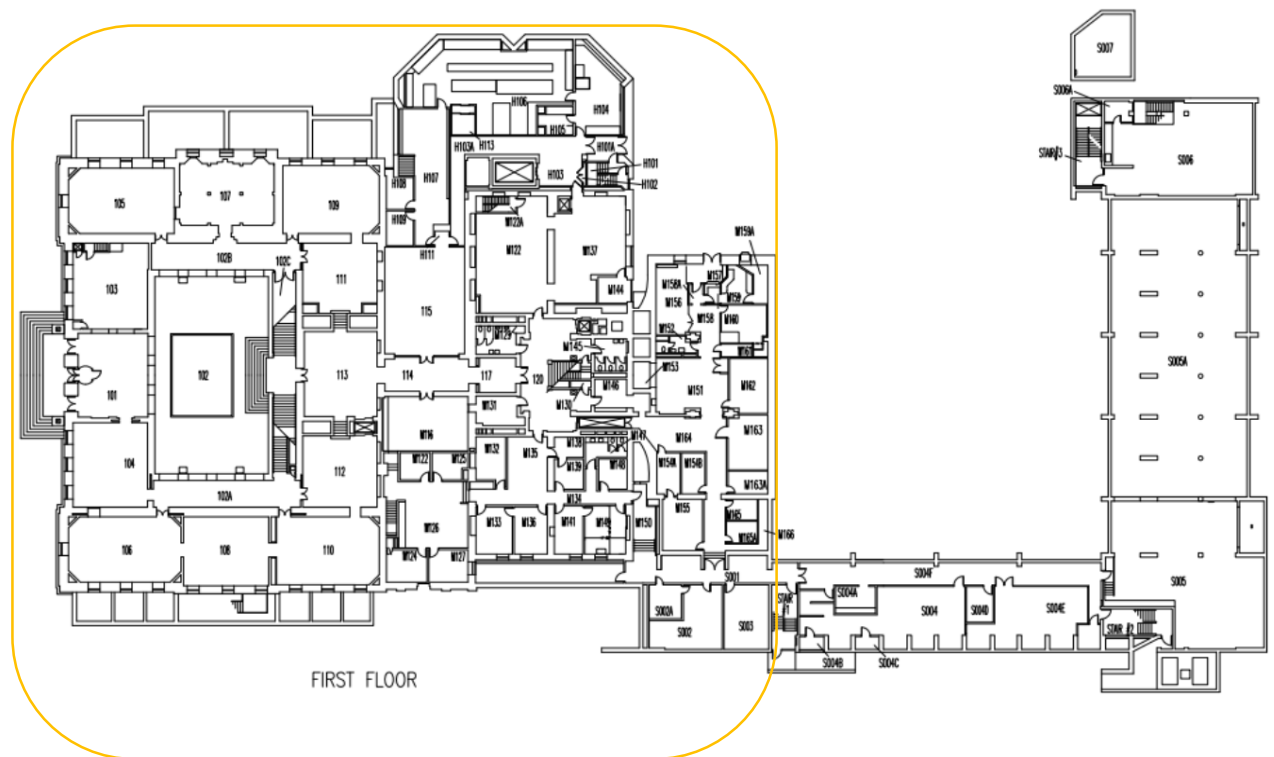
After discussing our need to limit the areas we would assess with our sponsor Mr. Pedone, we created a list of priority areas that we would assess for our field work. The first part of our list consists of areas that received the most complaints from visitors. The second part of our list focuses on areas of the museum that are visited most frequently. We referred to these locations as *high traffic areas*. The list below shows the order that we followed when assessing the building.

1. Outside Museum
  - a. Parking
  - b. Entrances/Exits
  - c. Signage

2. Museum Wing of Building
  - a. Lobbies
  - b. Restrooms
  - c. Galleries/Exhibits
3. Higgins Education Wing of Building
  - a. Restrooms
  - b. Classrooms

During our project, it became evident that we would not have enough time to assess the Higgins Education wing of the building. The remaining findings only discuss structures outside of the museum and in the Museum wing of the building. Figure 13 shows the Museum wing of the WAM.

**Figure 13: Museum Wing of the WAM**





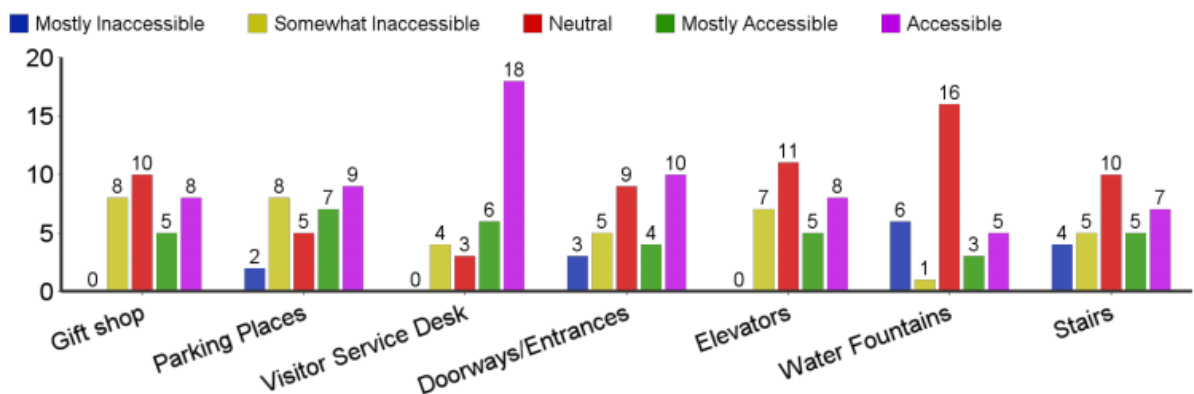
IV. The structures that required assessment within the WAM included doorways, pathways, restrooms, signage, stairs, elevators, desks, and water fountains.

Due to the time constraints of our project, it was clear that we would not be able to assess the compliance of the museum in its entirety. After we narrowed our focus to the priority areas discussed previously, we had to narrow our focus even further concerning which structures we assessed within those areas. Using our content analysis of the ADA and its implementing regulations, results from our visitor survey, and participant observations, we created a list of structures that we planned to assess.

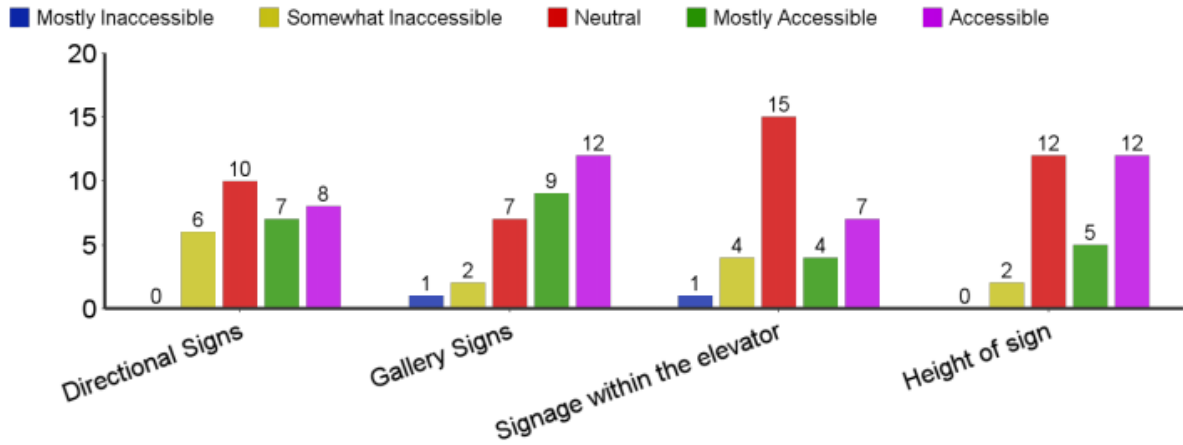
A. Survey Results

We surveyed visitors of the Museum to gain an understanding of what structures they thought needed improvement. One question asked visitors to rate the level of accessibility that they felt each structure had. We divided the structures we asked about into three categories: general, signage, and restrooms. The results of these survey questions are shown in Figures 14, 15, and 16.

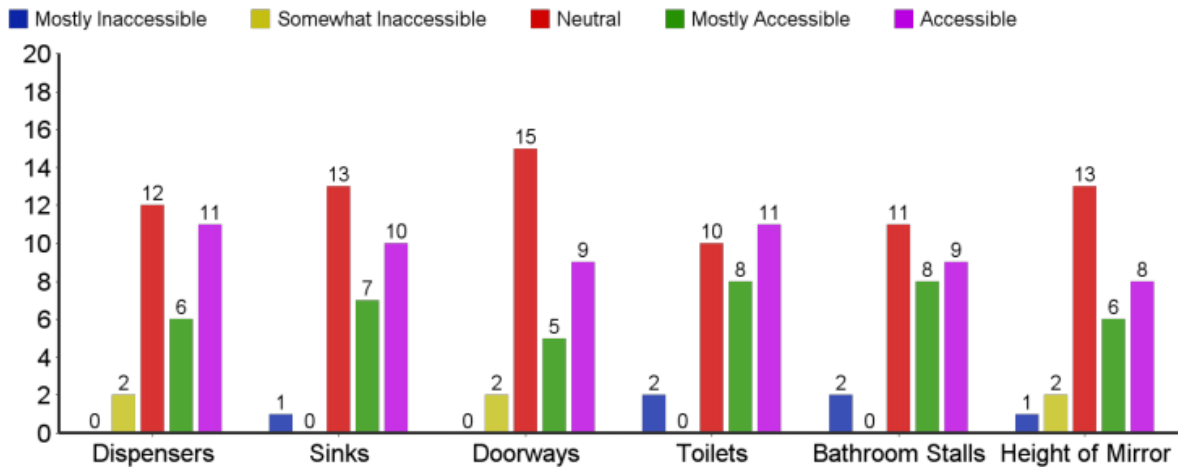
Figure 14: Accessibility of General Structures



**Figure 15: Accessibility of Signage**



**Figure 16: Accessibility of Restrooms**



There were 31 responses for this question except for Bathroom Stalls and Height of Mirror, which only received 30 responses. Since every category received votes for being either mostly inaccessible or somewhat inaccessible, we added all of them to our list of structures that we planned to assess. We felt that it was important not to exclude a response saying that a structure was inaccessible because the WAM’s goal is to improve the visitor experience of every

visitor. Therefore, if just one person marked a structure as somewhat inaccessible we wanted to investigate that structure.

## B. Priority List of Structures to Assess

Once we identified the areas that visitors felt needed the most improvement we were able to create a list of the structures that we would assess. We then went through the ADA and identified the relevant standards and requirements to assess those structures. We provide the list of structures and their characteristics that we assessed below.

1. Doorways
  - a. Width
  - b. Force to Open
  - c. Closing Speed
  - d. Thresholds
2. Pathways
  - a. Pathways in gift shop
  - b. Thresholds
3. Restrooms
  - a. Stalls
  - b. Toilets
  - c. Sinks
  - d. Mirrors
  - e. Shelves
  - f. Dispensers (soap, paper towel, and toilet paper)
4. Signage
  - a. Height
5. Stairs and Ramps
  - a. Handrails
6. Elevators
  - a. Signage
  - b. Call buttons
7. Desks
  - a. Visitor Service Desks
  - b. Gift Shop Desk
8. Drinking Fountains

- V. We found that the necessary tools to assess the compliance of the WAM with the ADA were a level, a measuring tape and a pressure gauge.

For our data collection process, we needed certain measurement tools to complete all of the tests that are required to verify compliance. We utilized a “Checklist” available on the ADA website that presented a list of measurement tools that would be needed to conduct an accessibility audit on the chosen structures. The list of measurement tools included: a level, measuring tape, and a pressure gauge. When we spoke to Fran Pedone, the Director of Operations at the Worcester Art Museum, he purchased each of the tools that was listed so that our team could perform the assessment of the WAM’s compliance with the ADA. In addition to our project, Mr. Pedone found that purchasing these items would allow the WAM to continue to assess accessibility beyond this project.

- i. Two Foot Long Level

The first tool we used was a standard two foot long level. This level was used to assess ramps, handrails, and thresholds. For ramps and handrails the tool was used to find the slope and pitch. For thresholds, we looked at both hallways and doorways. The level was used to check that the thresholds were symmetrical and uniform. The threshold was symmetrical if the height on either side was the same, and uniform if the threshold was the same measurement along its entirety. Figure 17 is an image of the level we used.

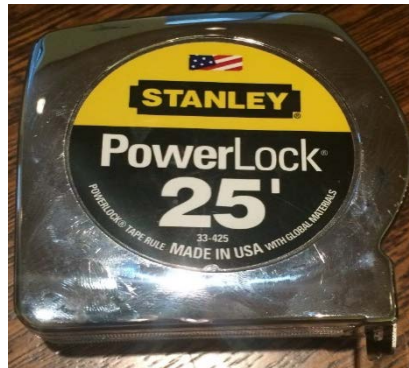
**Figure 17: Level**



## ii. 25 Foot Measuring Tape

The next tool we used was a 25 foot measuring tape. The measuring tape was used in nearly every test for ADA compliance. The multiple uses of the measuring tape included: measuring the widths of doorways, heights and depths of stairs and lengths of grab bars within bathrooms. Below in Figure 18, is an image of the measuring tape we used.

**Figure 18: Measuring Tape**



## iii. Pressure Gauge

The last tool we used was a pressure gauge. The pressure gauge was vital to assessing the force it takes to open the doors within the WAM. The pressure gauge can measure up to 35 pounds (lbs) of force. All of the doors within the WAM can either be pushed or pulled open therefore we were able to use this tool to assess each door within the museum. The pressure gauge is shown below in Figure 19.

**Figure 19: Pressure Gauge**



VI. Of the thresholds that we assessed, 79% were compliant with the regulations set by the ADA.

From the 24 thresholds that we assessed, 22 of these were in doors and two were in hallways. Of the 22 thresholds in doorways, 18 were compliant. Of the two thresholds that we assessed in hallways, one was compliant. The requirements that we looked at included measuring the height, symmetry, and uniformity of the thresholds.

A. ADA Requirements

The ADA requires that each threshold must be the same height across the entire length of the threshold and have the same height on both sides of the thresholds. The ADA also requires that the height must be no more than 0.25 inches high unless the threshold is beveled, in which case it must be no more than 0.5 inches high. Figure 20 shows our group assessing a threshold.

**Figure 20: Threshold Measurement**



## B. Employee Interviews

We learned through interviews with our sponsor Laura Riach that in the past visitors have tripped on the thresholds in the hallways. The threshold between rooms 120 and 117 in particular has caused many complaints.

## C. Recommendations

To address the thresholds that did not meet compliance with the ADA standards, our group developed a list of recommendations.

- i. Replace thresholds that are not uniform.*  
By replacing thresholds that are not uniform, the WAM could make those thresholds compliant with the requirements set by the ADA
- ii. Add a visual sign, such as tape, to thresholds that cannot be altered.*  
By adding a visual sign, such as tape, to thresholds that would be difficult to alter, the WAM would provide visitors with a warning of the change in height.
- iii. Bevel all thresholds that are not already beveled and not compliant.*  
By beveling all thresholds that are not compliant and not currently beveled, the WAM can decrease the change in height of some of their thresholds, making them easier to walk over.

## VII. One out of three elevators that we assessed are compliant with the requirements set by the ADA.

Through interviews with our sponsor, we learned that the WAM has received waivers for their non-compliant elevators. However, we decided to assess the WAM's elevators regardless of the waivers because there were visitor and employee complaints about them. We decided to only assess features of the elevators that were addressed in visitor and employee feedback. In doing so, we found that the most frequent complaint dealt with how confusing the elevators were to navigate the museum rather than the physical structure of the elevators.

## A. ADA Requirements

There were two ADA requirements concerning elevators that we assessed: the height of the call buttons and the size of the call buttons. Call buttons are the buttons that move between floors, open or close an elevator door, or call for assistance. The ADA requires that call buttons be 54 inches maximum off the ground. Call buttons are also required to be 0.75 inches long minimum in their smallest dimension.

## B. Feedback from Visitors

Visitor complaints about elevators accounted for 2.8 % of all accessibility related complaints from June 2011 to September 2014. They focused on the layout of the elevators within the building being confusing. Seven out of 31 responses to the visitor survey said the elevators were somewhat inaccessible.

## C. Feedback from Employees

Elevators were a common theme among our employee interviews and employee surveys. Seven out of 11 employees commented on the layout of elevators being confusing for both employees and visitors. Among their responses, we noticed that many of the complaints focused on the directories in the elevator.

## D. Recommendations

Since the majority of complaints focused on the layout of the elevators being confusing, we investigated the layout of the call buttons and directories. We noticed that elevators had buttons for almost every floor even if the elevator did not go to that floor or wing of the museum. The interior call buttons within an elevator are shown in Figure 21. However, the directories in



the elevator listed the floors that that particular elevator was capable of going to. Based on the data we collected concerning elevators we provided the following list of recommendations.

**Figure 21: Call Buttons within a WAM elevator**



- i. *Remove call buttons that do not work.*  
Removing all call buttons that do not work for that particular elevator will help alleviate visitor confusion.
- ii. *Improve elevator Directories.*  
Improving elevator directories to contain information on why each elevator does not go to every floor will help alleviate visitor confusion and frustration.
- iii. *Provide elevator training for employees.*  
Providing elevator training for employees will help them explain to visitors how to navigate the elevators more effectively.

#### VIII. Of the two drinking fountains that we assessed, none were compliant.

There are two drinking fountains in the Museum wing of the Worcester Art Museum of which only one works. The ADA requires that there be two water fountains per floor if there is a water fountain on that floor, a lower one and a higher one. The WAM has one water fountain on the first floor and one on the fourth floor.

## B. ADA Requirements

The ADA requires that where drinking fountains are provided there be at least two. This is to accommodate people who may be in a wheelchair and to accommodate those who have difficulties bending over. The other requirements that we assessed included the height of the drinking fountain unit, the height of the spout, the height of the water flow, the distance of the spout from the front of the water fountain, and the distance of the spout from the back of the water fountain. The ADA requires that the height of the unit for a lower unit be a minimum of 27 inches high and for a higher unit be between 38 and 43 inches from the floor. The requirement for the height of the spout for a lower unit is 36 inches maximum from the floor. The requirement for the height of the water flow for a lower unit is between 4 and 5 inches. The spout must be located 15 inches minimum from the back of the unit and 5 inches maximum from the front of the unit. Figure 22 and 23 show an example of our group assessing these requirements. The drinking fountain on the first floor was compliant except for its missing taller counterpart. The drinking fountain on the fourth floor was not compliant for two reasons: it is missing the higher water fountain unit and the drinking fountain unit was too short to meet the matching requirement.

**Figure 22: Spout Location Measurement**



**Figure 23: Height of Drinking Fountain**



### C. Visitor Feedback

Seven out of 31 responses from the visitor survey found that the drinking fountains were either somewhat inaccessible or mostly inaccessible. There was also one visitor complaint out of 108 accessibility related visitor complaints that focused on drinking fountains. The complaint focused on the drinking fountain on the fourth floor not working.

### D. Recommendations

Based on the data we have collected concerning drinking fountains we have provided a list of recommendations.

- i. Repair or Replace the broken drinking fountain*  
Repairing or replacing the broken drinking fountain will provide an additional place for visitors to get a drink of water.
- ii. Adjust the height of the drinking fountains that do not meet compliance*  
Adjusting the height of the drinking fountains that do not meet compliance will make getting a drink of water easier to access to people of all abilities.

- iii. *Add two more drinking fountains that complement the existing drinking fountains*  
Adding additional drinking fountains that complement the existing drinking fountains will help make getting a drink of water easier for those who have difficulty bending.

## IX. Of the 12 pairs of handrails that we assessed, none were compliant.

Of the 12 pairs of handrails (24 handrails total) that we assessed, none of them met the requirements set by the ADA. The ADA has three sets of requirements for handrails, one for ramps, one for stairs, and one for walkways. The handrails that we assessed at the WAM consisted of two sets of handrails on ramps and 10 sets of handrails on stairs.

### 1. ADA Requirements

The ADA has five requirements for handrails; the height of the handrails, whether they are continuous or not, their distance from the walls, the length that they extend on the top, and the length they extend at the bottom of the ramp or stairs. Handrails must be between 34 and 38 inches from the floor, continuous, and must be at least 1.5 inches away from the wall. For ramps, handrails must extend an extra 12 inches horizontally on the top and bottom of the ramp. For stairs, handrails must extend an extra 12 inches horizontally on the top of the stairs and at least the length of the depth of one step at the bottom of the stairs continuing with the same slope. Both of the handrails on the ramps were too short, as were seven of the handrails on the stairs. The remaining three sets of handrails did not have the required extensions on the top and bottom of the stairs. Examples of handrails that are not compliant with the ADA can be found in Figure 24.

**Figure 24: Handrails that are not ADA compliant**



## 2. Recommendations

Based on the data we collected concerning handrails, we provided the following list of recommendations for the WAM.

- i. *Raise the height of the handrails that failed to meet compliance with this ADA requirement*  
Raising the height of certain handrails would help make the WAM more ADA compliant.
- ii. *Extend the handrails that failed to extend to the proper length of the ADA requirement.*  
Extending the length of certain handrails would help make the handrails ADA compliant.
- iii. *Place a dividing handrail on stairs that are exceedingly wide*  
Placing a dividing handrail on wide staircases would aid visitors who need or prefer to hold a handrail when using stairs.
- iv. *Increase the distance from the handrail to the wall for the handrails that failed to meet compliance with this requirement*  
Increasing the distance from the handrail to the wall for certain handrails would make the handrails easier to grab.

## X. One hundred percent of the parking lots at the WAM are ADA compliant.

WAM has three parking lots on three different streets surrounding the museum. Those streets include Tuckerman, Lancaster and the Salisbury Street. Currently, Salisbury Street Lot is unavailable due to construction, therefore we were not able to verify whether or not it was ADA

compliant. Our group assessed the available lot and found that the WAM currently has 57 spaces available to its visitors. Within the Tuckerman Street Lot and the Lancaster Street Lot, we found the number of spaces, widths of spaces and widths of access aisles are ADA compliant. In Figure 25, Lancaster Street Lot is shown in (a), Tuckerman Street Lot is shown in (b) and in Salisbury Street Lot is shown in (c).

**Figure 25: Parking Lots**



#### A. Number of Accessible Spaces

At Tuckerman Street Lot there are a total of 12 parking spaces. Of the 12, four of them are reserved as handicapped spaces for cars. The requirement within a lot size ranging from one

to 25 spaces is only one accessible space. At the Lancaster Street Lot there are a total of 45 spaces with two of them delegated to handicapped use only. The requirement for a parking lot with 26-50 spaces is two accessible spaces. Therefore both parking lots meet the requirement for the proper number of accessible parking spaces.

### B. Widths of Accessible Car and Van Spaces

Next our group assessed the width of the handicapped car spaces within the lots. For the width of the handicapped car spaces, the ADA requires the space to be greater than or equal to 96 inches wide. The Tuckerman Street Lot had four accessible car spaces in which all of the spaces were greater than the ADA requirement. The Lancaster Street Lot had two van accessible spaces in which the requirement for the width is greater than or equal to 132 inches. Out of the two accessible van spaces, both were greater than this width and therefore ADA compliant. Below in Figure 26, is an image of an accessible car space on the left and the sign on the right. Lastly in Figure 27 is an accessible car space on the left and an accessible van space sign on the right.

**Figure 26: Accessible Car Space**



**Figure 27: Accessible Van Space**



**C. Widths of Access Aisles**

The requirement of the ADA is that if there is an access aisle present within a parking lot adjacent to an accessible space, the width of the aisle must be at least 60 inches. Within both the Lancaster and Tuckerman Street Lots we found that all of the access aisles meet ADA compliance. Below, in Figure 28, is an image of the Tuckerman Street Lot. The access aisles can be seen bordering the accessible car spaces with diagonal lines through them.

**Figure 28: Tuckerman Street Lot**





#### D. Supporting Data from Complaints and Surveys

From the list of complaints the Visitors Service Desk has received, 19 out of 108 revolved around parking. This value represents 17.6% of the total complaints from June, 2011 to September, 2014. These complaints expressed issues that varied from visitors having difficulty finding parking, not enough parking available and handicapped accessible parking being too far from an accessible entrance. In addition to the complaints, we found a similar trend within the surveys we distributed to WAM visitors. The survey that we distributed can be found in Appendix B. On our survey, question five focused on rating areas that the visitor felt needed improvement in terms of accessibility. From the 20 total responses we received, 14 people rated parking as either a very important or reasonably important area that the WAM needed to improve. Consequently, while WAM is ADA compliant for all of the parking areas we assessed, it could still implement changes to improve visitor experience with parking.

#### E. Other Institutions

During our project we visited multiple museums within Massachusetts including: the Museum of Science (MoS), the Museum of Fine Arts (MFA) and the Peabody Essex Museum (PEM). During our visits, through participant observation we were able to experience accessibility of parking, and adequacy of way finding and parking at each museum. As new visitors to each of these museum, we were able to assess the ease with which we could locate the museum and the parking. Each museum we visited had detailed signs to find available parking and parking garages. We were also able to navigate with ease due to the abundant signage beginning on the interstate highway.

Additionally, the MoS, MFA, and PEM all had an easily accessible parking garage either just for museum visitors or one that was reasonably close to their facility. This provided a great deal of parking spaces and limited the nuisance of searching for parking.

#### F. Recommendations

Due to the fact that the WAM is compliant with the ADA in regards to parking, our group has developed recommendations to improve visitor satisfaction.

- i. *Improve signage around WAM so visitors have a greater ease in finding available lots.*  
Place more signs around the museum to direct visitors to available parking lots and reduce confusion on where parking is offered.
- ii. *Include more signage leading from interstates to museum.*  
To improve direction from interstates, provide more signs that direct a route to the museum.
- iii. *Talk to nearby church to suggest allowing overflow parking in church lot for special museum events.*  
Attempt to work out a deal in which the museum can borrow the lot adjacent to the Lancaster Lot during special events or when expecting high traffic.
- iv. *Build a parking garage in the existing Lancaster Street Lot.*  
Long term recommendation of investing in a parking garage within Lancaster lot and potentially working a deal with the church to extend parking lot.

#### XI. *Of the doors that we assessed, 0% were ADA compliant with the required amount of force to open them.*

Within the WAM, we assessed 22 sets of double-doors that are open to the public, excluding bathroom and fire escape doors. After testing every door with the pressure gauge tool, we found that no door tested met the ADA requirement. The requirement of the ADA is that no door used by the public and within an accessible route may require a force of more than five pounds to either pull or push open.

### A. Force to open doors

All doors within the galleries that we tested, can either be pushed or pulled open. Only one set of doors, the lobby doors near the security desk, can be pulled open. This is a security feature to control access to the museum portion of the building. In addition to this, all the doors we tested were glass double doors. We tested each door in both the push and pull direction.

From all of the tests we completed, the lowest force required to open a door was seven pounds and the highest amount of force was 28 pounds. Within this range, over 50% of the doors require more than 15 pounds of force, which is three times the maximum ADA requirement.

Figure 29 shows the pressure gauge and how it is applied to the door.

**Figure 29: Application of Pressure Gauge**



### B. Supporting Data from Complaints and Surveys

Visitors also found the weight of the glass doors problematic. Question five of our visitor survey focuses on the level of accessibility of these doors and how visitors viewed them. Of the

five categories mentioned in question five, glass doors were highlighted as the third most popular improvement that visitors felt the WAM should make.

The complaints we assessed also highlighted issues with the glass doors. From a total of 108 accessibility focused complaints, five complained about the glass doors. Specifically, visitors complained that: the doors are too heavy, the doors are hard to open, and the doors limit accessibility for the elderly as well as those in wheelchairs.

### C. Employee Interviews and Suggestions

In addition to survey data, we gained an important perspective by interviewing WAM employees. An example of a set of questions asked in an interview can be found within Appendix C. From the interviews we conducted, 11 out of 12 staff members explained that they have witnessed people experiencing difficulties with operating the doors. Employees also report being directly told by visitors that many find the doors too heavy and inconvenient. Additionally, some employees mentioned that they have had to assist either an elderly person or a person in a wheelchair by holding open the doors to galleries.

### D. Other Institutions

During our visits to other institutions, specifically the Museum of Fine Arts, we discovered two different solutions for issues associated with the doors. The first option that the MFA looked into was installing door openers to all of their doors. Similar to the WAM, the MFA has a multitude of heavy glass doors. The MFA chose to install automatic door openers within stages throughout their exhibits. These stages were implemented gallery by gallery, reducing the cost for the museum at that current time as well as limiting the areas under construction. Another option the MFA looked into was leaving the doors open so visitors did not have to open them upon entering or exiting a gallery. Historically, the majority of the doors to the galleries at the

MFA were closed in order to regulate the humidity to preserve the pieces of artwork. The MFA tested their humidity controlled galleries to see if the humidity of the room was affected if the gallery doors were open or closed. After testing they found that there was no difference in humidity when doors were left open. The results of this testing therefore allowed the MFA to limit the amount of automatic door openers and utilize door stops instead of replacing the doors with a lighter material. These alternatives directly reduced the cost the museum had to put towards door openers and the amount of time to fix them.

#### E. Recommendations

Considering that the force to open doors within the WAM are not compliant, we have created a list of recommendations to improve their level of accessibility:

- i. *Inspect each door hinge and door closer to make sure they are working properly.*  
Start by first inspecting each door to make sure that the door hinges and door closers are working properly.
- ii. *Check to see if door is warped or misaligned.*  
Verify that each door is properly aligned and that there is no mechanical error that can be fixed before proceeding with more expensive projects.
- iii. *Humidity test to verify that doors need to be shut at all times.*  
During our visit to the MFA, we learned of a valuable test to verify if the doors need to remain closed to provide humidity control within galleries. We recommend performing this test to see if the doors need to remain closed to assure the humidity control of the gallery, or if the doors can be removed.
- iv. *Replace glass doors with a lighter material.*  
To keep the same historic value of having clear gallery doors, replace the doors with another clear material that is of a lighter weight.
- v. *Install automatic door openers or door assist mechanisms.*  
Buttons next to each door that automatically open the door, to assist with the weight of the heavy glass doors.

## XII. 18% of doors at WAM have a closing speed that is compliant with the ADA.

At the WAM, we assessed 22 sets of double doors. Of the 22 sets of doors that we assessed, only four sets were entirely compliant with the closing speed required by the ADA. To test this regulation, we measured the time in which the door took to go from being open 90 degrees to 12 degrees. The requirement of the ADA is that no door with a door closer shall take less than five seconds to go from 90 degrees to 12 degrees.

### A. Closing Speed of Doors

As previously mentioned, the vast majority of doors within the WAM can either be pushed or pulled open. Only one set of doors, the lobby doors near the security desk, can be pulled open. The same doors that were tested to find the force to open were then tested for the compliance of closing speed. For the door to be entirely compliant for closing speed, both doors required a time greater than five seconds to go from being open 90 degrees to 12 degrees.

From all of the doors we tested, four out of 22 sets of double doors took more than five seconds to go from 90 degrees to 12 degrees. Although a total of 18% of the closing speeds of doors are compliant within the WAM, an overwhelming 82% are not compliant. Within the 82% that are not compliant, the fastest closing speed of a door is 1.50 seconds, which is three times faster than the ADA requirement.

### B. Employee Interviews and Suggestions

Likewise, during our interview with our sponsor, Laura Riach, she explained many incidents in which visitors were injured due to the quick closing speed of the doors. Ms. Riach gave a specific example of a gentleman who was injured while trying to pass through a set of gallery doors. Due to the combination of the heavy weight of the door and the quick closing

speed, the gallery door closed on the man's hand and cut open his knuckle. This is just one of many incidents concerning the closing speed of the glass doors.

### C. Recommendations

Considering that the closing speed of doors within the WAM are not compliant, we have created a list of recommendations to improve their level of accessibility:

- i. *Inspect Door Closers and hinges.*  
Verify that each door closer and hinge are properly functioning and replace any that are worn out or old.
- ii. *Make sure each door is properly aligned.*  
Inspect to ensure that each door is properly aligned with the hinges and is not warped or bowed.
- iii. *Install automatic door closers.*  
Regulate the speed in which the door closes to compensate the quick closing speed.

### XIII. Of the doors that we assessed, 59% of the door widths are ADA compliant.

For a door width to be compliant with the ADA, the width must be greater than or equal to 32 inches. At the WAM, each door we assessed was a double door. For these doors to be compliant, the width of each door had to be greater than or equal to 32 inches. Of the 22 sets of doors that we assessed, 13 sets of doors met the requirement of the ADA.

#### A. Widths of Doors

For each set of doors, we used the tape measurement tool and measured the width of each door. The regulation set by the ADA requires each door to have a pathway greater than or equal to 32 inches. From our field work, we found that the nine out of 22 doors did not meet this requirement. Of the nine that were not accessible, one was 26.5 inches wide and eight were as small as 23.5 inches wide. The largest doorway we found within the WAM was located at the

door near the security desk, which measured 41.5 inches wide. Figure 30 gives an example of a door we assessed.

**Figure 30: Width of Door Assessment**



### B. Employee Interviews and Surveys

When conducting employee interviews, we found that three out of 12 employees mentioned that they have witnessed visitors have difficulty with the narrow doors. They elaborated on how three employees have helped visitors by opening the doors. One employee explained that they needed to help a visitor pass through the gallery doors due to the fact that the visitor's wheelchair could not fit. Due to the gallery door being too narrow, the employee as well as another visitor had to hold open both gallery doors so that the visitor in the wheelchair could pass through.

### C. Recommendations

Considering that the widths of doors within the WAM are not compliant, we have created a list of recommendations to improve their level of accessibility:



- i. *For doors that are a width of 23.5 inches wide, turn the double door into a single door.*  
These doors surround the Renaissance Court. We recommend making these double doors into one single door.
- ii. *For the door that is 26.5 inches wide, (M222 = Library Door) utilize available space on side of doors to widen width of each door.*  
Utilize the space on each side of the door to increase the width and extend into the glass that is next to the door.

#### XIV. Of the ramps that are inside and outside the WAM, 100% are compliant with the ADA.

From the three ramps that we assessed, all three met the requirements of the ADA. To assess the ramps at the WAM, we looked at multiple regulations that included: the width, slope, and landings. For a ramp to be compliant with the ADA, it had to be compliant with each individual regulation.

##### A. Width

The first requirement that we looked at when assessing ramps was the width. The ADA requires that all ramps must be at least 36 inches wide between the handrails. Of the ramps we assessed, all three were greater than 36 inches wide. We found that the widths ranged from 40.5 inches to 87.50 inches. Therefore, all ramps are compliant in relation to width.

##### B. Slope

Another requirement of the ADA is the slope/pitch of a ramp. To assess the slope of a ramp, we used a level and a measuring tape. From using these tools, we were able to find the rise, the length and thus the slope. Each slope at the museum met the requirement of the ADA. Two of the slopes were a pitch of 1:12 and the third ramp had a pitch of 1:10.5. The maximum pitch allowed by the ADA is 1:12.

### C. Landings

At the top and bottom of each ramp, the ADA requires that there is a landing of at least 60 inches in length. We found that each ramp we assessed had both a ramp and the top as well as bottom of the ramp and was at least 60 inches in length. Therefore, the ramps at WAM are compliant.

### XV. Of the stairways we assessed, 61% were not compliant with the ADA.

Of the 23 sets of stairs that we assessed, nine stairwells were compliant with the ADA. For a set of stairs to be compliant with the ADA, each stair must be uniform in height, depth and nosing. To assess the compliance of each set of stairs, we measured each individual stair with a measuring tape. We divided up each stairwell by each direction the stairs were in to take note of any variation within the stairways.

#### A. Height of Stairs

The requirement of the ADA is that each stair within a stairwell is of the same height and has a minimum height of four inches and a maximum of seven inches. When looking at the heights of stairs, we found that some heights were not uniform. Of the stairs we assessed, 14 out of 23 sets had varying heights. One set of stairs had a drastic range of 4.50 to 7.00 inches. Due to the varying heights, these sets of stairs were not compliant with the ADA.

#### B. Depth of Stairs

The minimum depth of a stair required by the ADA is 11 inches. Of all the stairs we assessed, each individual stair was in compliance with the ADA. The variation in depth within each set of stairs was where the stairwell was not compliant with the ADA. We found that six out

of 23 sets of stairs had varying depths. The most drastic change in depth was a range of 12.00 to 14.00 inches. This variation caused these sets of stairs not to be compliant.

### C. Nosings

According to the ADA, there are four different types of nosings: standard radius, curved nosing, angled riser, and beveled riser. A nosing is the portion of the end of the stair that tends to have a ledge that slightly overhangs the proceeding stair. Within the WAM, all stairs either have a beveled riser nosing or no nosing at all. The standard that the ADA requires for a beveled riser nosing is 1.5 inches maximum. From our fieldwork, we found that all nosings on the stairs within the WAM are under 1.5 inches and therefore compliant with the ADA.

### D. Visitor Complaints and Surveys

Of the 108 complaints analyzed, four visitors commented on the stairs within the WAM. These complaints ranged from a visitor tripping up the stairs to the Salisbury Entrance to generally finding the amount of stairs a nuisance. In addition to the complaints, survey results show a similar trend. Nine out of 31 people found that the stairs were either somewhat inaccessible or mostly inaccessible. From that 29%, five found the stairs mostly inaccessible.

### E. Recommendations

Considering that the WAM is a building that was built in 1898, they are not allowed to make major renovations that would alter the historic value of the museum. Therefore, we have created a list of recommendations to improve their level of accessibility in terms of improving the visitor experience:

- i. *Place grip tape at the first and last step of each set of stairs.*  
Placing grip tape at the first and last step of each set of stairs will assist visitors in distinguishing steps and give them a visual warning as to when the flight of stairs begins and ends.

ii. *Improve lighting over stairs.*

Improving lighting over staircases will help visitors differentiate each step and improve visitor's depth perception as they navigate the stairs.

XVI. One out of three main entrances to the museum are not ADA compliant.

At the WAM, there are three different entrances and exits, the Lancaster, Salisbury and Café entrances. We found that two entrances, the Lancaster and Salisbury entrances are not compliant with the ADA. The different elements we assessed for each entrance were the signage around the entrance, width of door, clear space adjacent to door, threshold, one hand test, height of door handle, thickness of carpets and closing speed. If an entrance did not comply with one of these requirements, it was not compliant. In Figure 31 there is an image of each entrance to the museum; Salisbury Entrance (a), Lancaster Entrance (b) and Café Entrance (c).

**Figure 31: Entrances to the WAM**

(a)



Salisbury Entrance

(b)



Lancaster Entrance

(c)



Café Entrance

### A. Signage

For any entrance that is not accessible to those with a disability, the entrance must obtain certain signs. These signs must indicate whether or not the entrance is accessible and inform where the nearest accessible entrance is located. Both the Lancaster and Salisbury entrances lack signage that specify that they are not accessible and where there is an accessible entrance. Figure 32 shows the signage outside the Café Entrance. It adequately indicates that the entrance is accessible with easily visible signs.

**Figure 32: Signage outside Café Entrance**



## B. Width of Door

We found that each entrance was compliant with the appropriate door width. The requirement of the ADA is that no doorway is smaller than 32 inches. Between the three different entrances, the smallest door width is 38 inches and the widest is 61 inches. From these measurements, we were able to verify that each door was compliant in door width.

## C. Clear Space

For those in a wheelchair, it is necessary for each entrance to have a certain amount of clear space surrounding the doorway. All three entrances meet the requirement in terms of clear space. The requirements are that there is a minimum space of 18 inches adjacent to the front of a pull side door as well as a minimum of 60 inches of a landing prior to the door.

## D. Thresholds

Within every doorway, of the entrances we assessed, all of the thresholds were compliant with the ADA. We found that the Lancaster Entrance and the Café Entrance was less than 0.25 inches. The Salisbury Entrance exceeded 0.25 inches, but was beveled and therefore compliant.

## E. One Hand Test

Each door that we assessed passed the one hand test and is therefore compliant with the ADA. To perform this test we formed a fist and tried to open each door. This test verifies that someone who does not have full mobility of his or her hands could still operate the door without difficulty.

## F. Height of Door Handle

Of the doors we assessed, each handle was of the appropriate height to be ADA compliant. The Lancaster Entrance has two sets of automatic doors and therefore this regulation

was not enforced. For the Salisbury Entrance, the door handle ranged between 35 and 45 inches above the ground and the Café Entrance ranges from 42 to 46 inches. The requirement of the ADA is a minimum of 34 inches and a maximum of 48 inches.

#### G. Carpets

For carpets that are in entranceways and pathways entering the facility, the ADA requires that the carpet be less than 0.50 inches in thickness. This requirement is to allow for greater ease for someone in a wheelchair to enter. There are carpets present at the Salisbury and Lancaster Entrances. All of the carpets we assessed were compliant and less than 0.50 inches in thickness.

#### H. Closing Speed

One out of three doors are compliant with the closing speed required by the ADA. The Lancaster Entrance is two sets of automatic doors, therefore the closing speed does not apply to these doors. We found that the left door to the Café Entrance took at least 10.00 seconds and the right door 7.60 seconds to close. We also found that the Salisbury Entrance door took 2.60 seconds to close. The requirement of the ADA states that no door should close from 90 degrees to 12 degrees in less than five seconds. This shows that only the Salisbury door is not compliant.

#### I. Visitor Complaints and Surveys

Of the 108 complaints that we assessed, 42 focused on entrances and exits of the facility. This number totals to be 39% of the entire list of complaints we analyzed. The majority of the complaints focused on visitors having difficulty locating accessible entrance and not being informed of an accessible entrance. In addition to the complaints received by the Visitor Service Desk, survey data supports that eight out of 31 people found that doors and entrances were either somewhat inaccessible or mostly inaccessible.

## J. Other Institutions

When our group visited other institutions such as MFA, MoS and PEM, we observed their entrances and exits. From all three locations, we saw universal means of entry. Universal entry implies that entrances are accessible to people of all abilities. For example, all of these museums have a low sloped ramp that leads directly to the main entrance. This reduces the segregation between people who cannot use the stairs and for people who can.

## K. Recommendations

Considering that the entrances to the WAM are not fully compliant, we have created a list of recommendations to improve their level of accessibility:

- i. *Provide signage outside of Lancaster and Salisbury entrances.*  
Provide signage that describes where accessible entrances are.
- ii. *Making Lancaster Entrance an accessible entrance.*  
Making Lancaster entrance handicap accessible will provide more convenience to people of all abilities.
- iii. *Decrease closing speed of Salisbury entrance.*  
The current closing speed of the Salisbury entrance is not compliant. Bringing it up to compliance would be beneficial to making the entrances of the WAM more accessible.

## XVII. Of the 31 signs that we assessed, 19 were compliant with the height standards set by the ADA.

Throughout the four floors of the museum wing of the WAM, there are various signs that help visitors navigate the museum. For this assessment we evaluated signs that provided a form of direction and labeled a specific room. We did not assess signs that were informative such as descriptions alongside a painting because they are not covered by the ADA. Of the 31 signs we assessed, we found that 19 were compliant with the height standard set by the ADA.



#### a. Height

For a sign that delegates a certain room or provides direction, there is a height standard required by the ADA. This standard is that the bottom tactile character, or text on a sign, is a minimum of 48 inches from the ground and that the top tactile character is a maximum of 60 inches from the ground. We found that the signs within the WAM ranged from being as low as 46.50 inches to as high as 85.75 inches off the ground.

#### b. Complaints and Survey Results from Visitors

Of the complaints we analyzed, 23 of 108 focused on signage of the museum. The complaints we received from the Visitors Service Desk mainly addressed visitors having issues with signage on the exterior of the museum. The survey we distributed went into greater depth and asked specific questions regarding signage within the museum. Question five from the survey (found in Appendix B) asks the visitor to rate the level of accessibility of directional signs, elevator location signs, gallery signs and heights of signs. From the 31 people that filled out the survey, six people found that directional signals were either somewhat inaccessible or mostly inaccessible; three people found that gallery signs were either somewhat inaccessible or mostly inaccessible; five people found that signage within the elevator was either somewhat inaccessible or mostly inaccessible and lastly, two people found that the heights of signs were either somewhat inaccessible or mostly inaccessible.

#### c. Participant Observation

During our project we observed visitors and their interaction with the museum. At multiple locations within the WAM, when attempting to distribute surveys, we were stopped and asked for directions. Numerous visitors recognized the badge we were wearing indicating we were volunteers working there and questioned us as to where certain galleries were. We were

also commonly asked where the nearest restroom, elevator and entrance was. In addition to this, we came across one visitor who was interested in taking our survey, but suffered from dyslexia. He pointed out that the fonts of signs are particularly small and that he had difficulty reading them.

#### d. Recommendations

Considering that the entrances to the WAM are not fully compliant, we have created a list of recommendations to improve their level of accessibility:

- i. *Raise or lower signs in order to comply with the requirement.*  
To come into compliance with the ADA, the tactile characters of the sign need to be between 48 and 60 inches above the ground.
- ii. *Increase font size on descriptions and location signs.*  
Increasing the font size will make signs easier to read for visitors.
- iii. *Increase the number of directional signs that tell visitors where certain locations are.*  
Install directories within the museum that show the visitor where they are and where other galleries are located in relation to where they are.
- iv. *Description signs that are within exhibit cases be standing up.*  
Some galleries have signs that are laying down and that are higher than 48 inches, which make them impossible for someone to read if they were in a wheelchair.

### XVIII. Additional Recommendations

In this section we will provide and explain additional recommendations that are not covered by the ADA but that we believe could significantly improve the visitor experience at the WAM. These recommendations were mainly inspired by actions taken by similar institutions, such as the Museum of Fine Arts, Museum of Science, and the Peabody Essex Museum. Since the majority of these recommendations would be considered long-term recommendations by our standards but were outside the scope of our project, we decided to label them as “good practices”. These good practices can be seen as examples of what is available in the field of accessibility even though they may not be feasible for the WAM at this time.

## A. Accessibility Department or Team

During our visits to the Museum of Fine Arts, Peabody Essex Museum, and the Museum of Science, we noticed that the Museums that had someone in charge of accessibility were noticeably more accessible than the Museums that did not. Amy Curtis, the Manager of Guest Services at the Peabody Essex Museum, has informally taken on the role of Manager of Accessibility. She has accomplished much in the field of accessibility but it is not the main focus of her job. Hannah Goodwin, the Manager of Accessibility at the Museum of Fine Arts has been a trailblazer in the field of accessibility. She has been on the forefront of offering employee training concerning accessibility at the Museum of Fine Arts and other museums throughout New England. We believe that having a specific person or department in charge of accessibility will help improve the focus on improving accessibility at the WAM. Additionally, it is actually an ADA requirement that all institutions must have an ADA Coordinator or someone in charge of organizing compliance with the ADA and performing self-evaluations. Since it may not be possible to implement this immediately, we would also like to suggest the use of a cross-functional team in charge of accessibility. A cross-functional team consists of a member from each relevant department or group in an organization. This group works together to ensure that all departments collaborate to produce a specific outcome or accomplish a goal. We recommend that the WAM create a cross functional team whose purpose is to keep the WAM compliant with the ADA and its implementing regulations. Additionally, the team will work to make the WAM accessible overall.

## B. Form Working Relationships with Organizations or Institutions that Help People with Disabilities

Forming a relationship with organizations that help people with disabilities was something we hoped to utilize during our project but due to time constraints, we were unable to do so. We believe that inviting groups of people with disabilities to the Museum to provide feedback on their visit would greatly improve the museum's awareness of any potential accessibility related problems. We created a list of organizations that we recommend the Worcester Art Museum consider contacting for feedback on their available accommodations at the Museum.

- a. Cotting School
- b. Special Olympics
- c. Worcester Commission on Disability
- d. Brockton Veterans Affairs
- e. Institute for Human Centered Design
- f. Nearby Nursing or Retirement Homes
- g. Nearby Hospitals

This list is only comprised of some organizations that the WAM could consider contacting. We added organizations that were referred to us during our project term.

## C. Explore Accessibility Related Funding

During our interview with Amy Curtis of the Peabody Essex Museum, we briefly discussed the topic of available funding for accessibility related projects at museums. Although this topic was out of the scope of our project, we thought it would be appropriate to discuss the information we learned about it. There are many available grants or awards for institutions that are interested in increasing their accessibility. We created a list of some organizations that offer these types of funding shown below:

- a. Mass Cultural Council
- b. Institute of Museum and Library Services
- c. National Endowment for the Humanities

We recommend that the Worcester Art Museum explore accessibility related funding because the visitors at the WAM would greatly benefit from the effects of increased funding.

#### D. Create Tours for People with Disabilities

While interviewing Hannah Goodwin of the Museum of Fine Arts in Boston, we discussed guided tours designed specifically for people who have a disability. The Museum of Fine Arts offers different types of specialized tours including a tour for visitors who are blind or have low vision and a tour for visitors who are deaf or hard of hearing. We recommend that the Worcester Art Museum create specialized tours for people who have disabilities. If offering these specialized tours year round is not a feasible option, the WAM could consider offering them at certain times of the year.

#### E. Lower Exhibits in Galleries

While visiting the Museum of Science, we noticed that every exhibit that was presented in a case was at waist level for a standing person or lower. These exhibits were all low enough for someone who was visit going in a wheelchair to be able to comfortably view the exhibit and read the accompanying descriptions. We recommend that the WAM lower the height of some of their exhibits that are in cases.

#### F. Improve Website

Before we visited the Peabody Essex Museum in Salem, the Boston Museum of Science, and the Boston Museum of Fine Arts we noticed that the information on accessibility provided on their websites was detailed and visitor friendly. The accessibility pages were easy to find on their respective websites and provided an in depth description of the available accommodations that

each museum provided. We recommend that the Worcester Art Museum improve the accessibility related information on their website.

#### G. Braille Brochures and Books

While not the focus of our project, during our field work we discovered certain practices that the WAM might be able to implement to improve visitor experience for additional populations of visitors. When we visited the Peabody Essex Museum, Mrs. Curtis showed us the brochures she had made in Braille. There was a raised map of one of the exhibits, an authentic Chinese house, as well as Braille descriptions of the structure and historical significance of the house. This exhibit was chosen because it is one of their more popular permanent exhibits. The second braille brochure was about the history of the museum. Mrs. Curtis mentioned that she would like to have more braille brochures made in the future because they have already proven to be incredibly helpful. In addition to the braille brochures, Mrs. Curtis purchased children's books in braille. The museum already had a selection of regular children's books but now there is an option available for children who are visually impaired. We recommend that the WAM invest in material in Braille because of its proven success at PEM.

#### H. Increased Font Sizes on Signage and Brochures

Increased font sizes on museum signs and in print materials was a common change described by the other institutions that we visited. Both the Peabody Essex Museum and the Museum of Fine Arts have brochures that are made in a larger font to help those that are visually impaired. The Museum of Fine Arts is also currently in the process of increasing the size of their gallery signage. We recommend that the WAM implement the use of larger font sizes on their museum signs and in their print materials.

## I. Increased Lighting in Galleries

While we were visiting the Museum of Fine Arts, we noticed that it shared many similarities with the WAM. One of these similarities was the low lighting in their galleries. However, in order to address this problem the Museum of Fine Arts has placed floor lamps in areas that seemed dim. We recommend that the WAM improve the lighting conditions, whether by installing ceiling lamps or by adding floor lamps to areas that are not well lit. This could significantly help people who are visually impaired read the gallery signage more easily.

## J. Improved Audio Tour

Although not in the scope of our project, we noticed that audio tours was a common theme in the WAM Visitor Complaints from June 2011 to September 2014. The complaints focused around the audio tour layout being confusing and the limited languages it was offered in. Unfortunately we did not get the chance to take the WAM audio tour ourselves so we cannot offer our personal perspective. However, audio tours was a topic that we discussed with both Amy Curtis of the Peabody Essex Museum and Hannah Goodwin of the Museum of Fine Arts.

Hannah Goodwin was influential in the creation of an application for a mobile device that offers audio tours for visitors. The tour is offered in a multitude of different languages, including a video portrayal of the audio tour in the American Sign Language. Unlike most audio tours this application allows visitors to explore the museum without following a set path The Peabody Essex Museum has audio tours available in many different languages for a majority of their exhibits. For the convenience of the visitor, these audio tours can be found in the galleries that they focus on. The Museum of Science in Boston had a different approach to providing audio tours. Almost every exhibit had a listening device attached nearby, that you could hold up to you ear to hear information about the specific object. A picture of the listening device can be seen

below in Figure 33. We recommend that the WAM improve their audio tours and offer them in additional languages.



**Figure 33: MoS Audio Tour Station**

#### **K. Improve and Increase Number of Available Wheelchairs**

While conducting our employee interviews, we learned that the available wheelchairs that the WAM provides for visitors are outdated. Specifically, they have limited options to adjust features that are available on most wheelchairs today. We recommend that the WAM invest in more improved wheelchairs for the comfort of their visitors who request them.

#### **L. Purchase seating with armrests**

Through interviews with our sponsor Ms. Riach and Hannah Goodwin, Manager of Accessibility, at MFA, we found that seating with armrests are beneficial to visitors who have difficulty standing up from a sitting position. The armrests provide stability to visitors. We recommend that the WAM invest in purchasing more seating with armrests.



#### M. Provide accessibility training to employees

We found giving specialized training to employees of the WAM on accessibility would be beneficial. The trainings would include knowing the accommodations that the museum currently provides to assist visitors. The training should also include how to effectively give tours so that people of all abilities could participate within the tour. We recommend that the WAM invest in providing accessibility related trainings to the museum staff.

## 5. Conclusion

The Worcester Art Museum (WAM) is committed to serving as a visitor-focused cultural center within the city of Worcester. Consequently, the WAM wishes to continually improve upon WAM visitor experiences and be fully accessible to all of its visitors.

Our work within the project allowed us to continue and build on the museum's efforts to become more visitor-focused by increasing WAM's accessibility. WAM personnel openly recognize areas of difficulty within the museum and welcome visitor feedback. The feedback from visitors was the catalyst for WAM's efforts to become more accessible.

For a period of seven weeks, our team analyzed visitor feedback, conducted interviews and distributed surveys within the museum to gauge the experience of WAM visitors and employees. We also interviewed professionals at area museums who had made major accessibility improvements to educate ourselves on innovative techniques for improving the visitor experience. Finally, we assessed WAM doors, bathrooms, elevators, parking lots, thresholds, and stairways for compliance with the Americans with Disabilities Act (ADA) and potential for improvement beyond ADA requirements. Within a day of our project culminating, WAM VSR director, Laura Riach, required all VSR staff and docents to read the entirety of our report to educate themselves on WAM accessibility issues and secure VSRs involvement in addressing these issues.

WAM's vision to become more accessible was essential to the culmination of our work. The museum's intention to increase accessibility for visitors with disabilities is evident from hosting our project and the work they are continuing to undertake on their facility. The WAM's

determination for change along with the foundation provided by our project will move them forward to a more accessible future.

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**Appendices**

Appendix A: Sample Table for Organizing Data

List of Areas	ADA Standards	Actual Measurements	Complies with ADA standard

Appendix B: Survey Questionnaire for Visitors

We are students from Worcester Polytechnic Institute who are doing a project to assess and provide recommendations to the Worcester Art Museum (WAM) on how to improve accessibility for their visitors. Your participation in this survey is voluntary. Your identity will remain confidential.

**Question 1:** Please check any of the following assistive devices which you use regularly.

- |   |  |
|---|--|
| <input type="checkbox"/> Wheelchair           | <input type="checkbox"/> Service Animals |
| <input type="checkbox"/> Cane                 | <input type="checkbox"/> Baby Stroller   |
| <input type="checkbox"/> Walker               | <input type="checkbox"/> None            |
| <input type="checkbox"/> Crutches             | <input type="checkbox"/> Other: _____    |
| <input type="checkbox"/> Visual Magnification |  |

**Question 2:** Please rate each area based on the level of accessibility you felt it had. If you are unsure of what to put, just set your answer to neutral.

General	Mostly Inaccessible	Somewhat Inaccessible	Neutral	Mostly Accessible	Accessible
<b>Gift Shop</b>	○	○	○	○	○
<b>Parking Places</b>	○	○	○	○	○
<b>Visitor Service Desk</b>	○	○	○	○	○
<b>Doorways/Entrances</b>	○	○	○	○	○
<b>Elevators</b>	○	○	○	○	○
<b>Water Fountains</b>	○	○	○	○	○
<b>Stairs</b>	○	○	○	○	○
Signs/Labels	Mostly Inaccessible	Somewhat Inaccessible	Neutral	Mostly Accessible	Accessible
<b>Directional signs</b>	○	○	○	○	○
<b>Gallery signs</b>	○	○	○	○	○
<b>Signage within elevator</b>	○	○	○	○	○
<b>Height of signs</b>	○	○	○	○	○

**Question 5:** Please individually rate the areas below that you feel would most significantly improve the accessibility for visitors at the Worcester Art Museum. The rating is from 1 to 5, where 1 is “not important” and 5 is “very important”.



Bathrooms	Mostly Inaccessible	Somewhat Inaccessible	Neutral	Mostly Accessible	Accessible
<b>Dispensers (Soap, Paper Towel and Toilet Paper)</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Sinks</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Doorways</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Toilets</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Bathroom Stalls</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Height of Mirror</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\_\_\_\_\_ Parking

\_\_\_\_\_ Glass door renovations

\_\_\_\_\_ Visitor Service Desk

\_\_\_\_\_ Signage around the museum

\_\_\_\_\_ Restroom renovations

**Question 6:** Do you have any suggestions that might improve your ability to experience what the museum has to offer?

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**Question 7:** The WAM values visitor opinions. May we contact you with additional questions?

Name: \_\_\_\_\_

Best way to be contacted: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Thank you very much for your participation. If you would like to contact us please email us at [wcpc14wam@wpi.edu](mailto:wcpc14wam@wpi.edu).

Appendix C: Interview Questions for WAM Employees

**WAM Employee Interview**

We are students from Worcester Polytechnic Institute who are doing a project in collaboration with the Worcester Art Museum (WAM) to assess and provide recommendations to the WAM on how to improve accessibility for their visitors. Your participation in this survey is voluntary. Your identity will remain confidential.

**Question 1:** What is your full name? If you do not feel comfortable leaving your name please leave the question blank.

**Question 2:** What is your current position at the WAM?

**Question 3:** Have you ever witnessed a visitor having difficulty gaining access to the museum? Examples include: visitors with strollers, or people using assistive technologies like wheelchairs and canes. If yes, please explain how?

**Question 4:** What are the most common complaints you hear about the WAM from the visitors in regards to accessibility?

**Question 5:** Please rate each area based on the level of accessibility you felt it had. If you are unsure of what to put, just set your answer to neutral.

General	Mostly Inaccessible	Somewhat Inaccessible	Neutral	Mostly Accessible	Accessible
<b>Gift Shop</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Parking Places</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Visitor Service Desk</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Doorways/Entrances</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Elevators</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Water Fountains</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Stairs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Signs/Labels	Mostly Inaccessible	Somewhat Inaccessible	Neutral	Mostly Accessible	Accessible
<b>Directional signs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Gallery signs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Signage within elevator</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Height of signs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please provide additional explanation for any of the above that you ranked as "Mostly Inaccessible" or "Somewhat Inaccessible".

Bathrooms	Mostly Inaccessible	Somewhat Inaccessible	Neutral	Mostly Accessible	Accessible
<b>Dispensers (Soap, Paper Towel and Toilet Paper)</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Sinks</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Doorways</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Toilets</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Bathroom Stalls</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Height of Mirror</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Question 6:** Please individually rate the areas below that you feel would most significantly improve the accessibility for visitors at the Worcester Art Museum. The rating is from 1 to 5, where 1 is “not important” and 5 is “very important”.

- \_\_\_\_\_ Parking
- \_\_\_\_\_ Visitor Service Desk
- \_\_\_\_\_ Restroom renovations
- \_\_\_\_\_ Glass door renovations
- \_\_\_\_\_ Signage around the museum

**Question 7:** Do you have any suggestions that might improve the visitor experience in relation to accessibility?

**Question 8:** Can we come back to you later if we have any additional questions?

**Question 9:** Is there anyone that you recommend we speak to?

Thank you very much for your participation. If you would like to contact us please email us at [wpcp14wam@wpi.edu](mailto:wpcp14wam@wpi.edu).

## Appendix D: Priority List

1. Doorways
  - a. Width
  - b. Force to open
  - c. Closing Speed
  - d. Threshold
2. Pathways
  - a. Including gift shop
  - b. Threshold
3. Restrooms
  - a. Stalls
  - b. Toilets
  - c. Sinks
  - d. Mirrors
  - e. Shelves
  - f. Dispensers (soap, paper towel, toilet paper)
4. Signage
  - a. Height
5. Stairs and Ramps
  - a. Handrails
6. Elevators
  - a. Signage
  - b. Call Buttons
7. Desks
  - a. Visitor Service Desks
  - b. Gift Shop Desk
8. Drinking Fountains

## Appendix E: Interview Questions for Hannah Goodwin of the Museum of Fine Arts

We are students from Worcester Polytechnic Institute working in collaboration with the Worcester Art Museum to assess and provide recommendations to the Worcester Art Museum on how to improve their accessibility. We are interested in seeing how other museums/organizations have made their museums accommodating to their visitors. These questions are optional and your identity will remain confidential if you choose, however all feedback we receive is much appreciated.

1. Can you describe your current position at the MFA?
2. Can you list some of the changes you have made towards increasing accessibility that have had the biggest impact?
3. What has been some feedback on the accessibility work you have done within the MFA?
4. What are some of the biggest changes you have seen in the visitor experience based on the museums approach to accessibility?
5. Has the MFA made any changes that were not initially motivated by compliance with the ADA that have improved accessibility? If so, please describe and explain what your motivation was for making those changes.
6. Are there additional changes you would like to make in the future? If so which ones and why?
7. Would it be alright if we contacted you if we have additional questions?
8. Is there anyone else that you could recommend we speak to?

Thank you!

## Appendix F: Interview Questions for Aaron Ferguson

We are students from Worcester Polytechnic Institute who are doing a project to assess and provide recommendations to the Worcester Art Museum on how to improve their accessibility. We are interested in the work you have done to address the issue of accessibility. These questions are optional; you do not have to answer them if you do not want to. However all feedback we receive is much appreciated.

1. How long have you worked at WPI?
2. Can you explain your position?
3. We know there have been some recent renovations done to campus including renovating Morgan and Kaven Hall. Did you have any involvement in such projects?
4. Can you recommend the correct language for us to use when talking about people with disabilities or issues surrounding disabilities. We want to be sure that we are being appropriately sensitive to all populations.  
Ex. auditory aids, persons who are disabled, persons who have a disability, handicap
5. Can you describe the “culture” associated with a disability?
6. Have you ever been to the Worcester Art Museum?
7. Do you have any recommendations on how to proceed in conducting an accessibility audit?
8. Are there any resources you recommend we look at for the project such as an accessibility audit?
9. Are there any other individuals you would recommend we speak with?
10. If possible, could we contact you during the B-term project to discuss our progress and gain more insight or even have weekly meetings?
11. Is there anyone that you recommend that we speak to?

Thank you!

## Appendix G: Interview Questions for Amy Curtis of the Peabody Essex Museum

We are students from Worcester Polytechnic Institute working in collaboration with the Worcester Art Museum to assess and provide recommendations to the Worcester Art Museum on how to improve their accessibility. We are interested in seeing how other museums/organizations have made their museums accommodating to their visitors. These questions are optional and your identity will remain confidential if you choose, however all feedback we receive is much appreciated.

1. Can you describe your current position at the PEM?
2. Can you list some of the changes you have made towards increasing accessibility that have had the biggest impact?
3. What has been some feedback on the work you have done within the PEM?
4. What are some of the biggest changes you have seen in the visitor experience based on the museums approach to accessibility?
5. Has the PEM made any changes that were not initially motivated by compliance with the ADA that have improved accessibility? If so, please describe and explain what your motivation was for making those changes.
6. Are there additional changes you would like to make in the future? If so which ones and why?
7. Can we come back to you later on if we think of additional questions?
8. Is there anyone that you recommend that we speak to?

## Appendix H: Interview Questions for Alfred DiMauro

We are students from Worcester Polytechnic Institute working in collaboration with the Worcester Art Museum to assess and provide recommendations to the Worcester Art Museum on how to improve their accessibility. We are interested in seeing how other museums/organizations have made their museums accommodating to their visitors. These questions are optional and your identity will remain confidential if you choose, however all feedback we receive is much appreciated.

1. How long have you worked at WPI?
2. Can you explain your position?
3. We know there has been some recent renovations done to campus including renovating Morgan and Kaven Hall, did you have any involvement in such projects?
4. Have you ever been to the Worcester Art Museum?
5. What is your experience with working with the ADA?
6. Do you have any recommendations on how to proceed in conducting an accessibility audit?
7. Are there any resources you recommend we look at for the project?
8. Are there any other individuals you would recommend we speak with?



Appendix I: IQP B-term detail list and timeline

Task Name	Start	Finish
Familiarize ourselves with Museum	10/28/14	10/28/14
Read ADA standards and Regulations	10/29/14	11/01/14
Field Work: Assess museum compliance with regs.	11/02/14	11/06/14
Review complaints of visitors/staff	11/05/14	11/08/14
Compile/Categorize visitor/staff complaints	11/09/14	11/11/14
Conduct surveys	11/07/14	11/20/14
Interview/visit other institutions	11/07/14	11/18/14
Interview persons w/ disabilities	11/12/14	11/27/14
Conduct Focus Groups	11/20/14	11/29/14
Analyze/compile survey and interview data	11/27/14	12/03/14
Synthesize findings	12/01/14	12/06/14
Categorize recommendations	12/06/14	12/11/14
Write paper	12/07/14	12/15/14

