Park System Improvement: Accessibility and Management

Brookline's Parks and Open Space Division

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Tom Brady
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Dear Mr. Tom Brady:

Enclosed is our report entitled "Park System Improvement: Accessibility and Management". Preliminary research for this report was completed in Worcester, Ma between January 12 and March 2, 2006. Data was collected and field research, recommendations and conclusions were completed at the Brookline Town Hall during the period of March 14 through April 28, 2006. Copies of this report are being submitted to professors Susan Vernon-Gerstenfeld and Arthur Gerstenfeld for evaluation. Upon faculty review, the original copy of this report will be cataloged in the Gordon Library at Worcester Polytechnic Institute. We are grateful for the time and dedication you gave our project.

Sincerely,

James Anderson

David Fogaren

Ryan Hollister

Kathryn Strumolo

ACKNOWLEDGEMENTS

Our team would first like to thank our liaison, Mr. Tom Brady, who worked closely with us throughout our research on this project. His prior experience with the American with Disabilities Act and a good relationship with the surrounding cities helped us in completing our objective for this project and make our recommendations to help the city of Brookline.

We would also like to thank to Mrs. Feng Yang, the head of the Geographical Information System Department for all her help in teaching us how to use the GIS system. We greatly appreciate the time and effort in helping us with this very complicated subject.

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ABSTRACT

This report, prepared for the Town of Brookline's Parks and Open Spaces Division, investigates the American with Disabilities Act (ADA) and how it pertains to Brookline's park and open spaces. The guidelines described by the ADA were used in conjunction with the Geographical Information System that was implemented to evaluate the position of Brookline with the ADA's guidelines. The information provided by the team will enable Brookline to assess the feasibility of the need to develop a proper maintenance plan for its parks and open spaces to ensure ADA compliancy.

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EXECUTIVE SUMMARY

Compliance with The American with Disabilities Act has been a problem for many organizations since its enactment in 1990. Any structure that is being renovated or being built must comply with the guidelines stated by the ADA. However, these guidelines are only guidelines and are open for interpretation because they are still in debate. There have not been any regulations that have been passed.

In Brookline, some parks have been renovated and have been built according to the guidelines provided by the ADA, but there have still been some complaints because of elements that are not in compliance. The current way of discovering if there is a compliancy issue is to hire an outside consulting agency to come to the site and investigate the park to see if there is an issue. This is a costly process for the town of Brookline and can be avoided if they understand the guidelines and are knowledgeable of what each park and open space contains.

Our goal was to assist the Town of Brookline's Parks and Open Spaces Division in their processes for complying with the ADA. We implemented a database and Geographical Information System (GIS) to aid in this decision making. The database software that we utilized was Microsoft Access and the GIS system that we utilized was ArcGIS.

Using these technologies, we were able to study a park or open space and observe its contents (benches, picnic tables, trash barrels, etc.). By utilizing different layers in the GIS software, we can see the locations of all the items and whether or not they are on an ADA accessible path. An ADA accessible path is one of the most important required elements in a park; thus, it is important to visualize it on the maps. In addition to this, we

can observe each individual element and see attributes such as its condition as well as if it is ADA compliant.

In order to learn about GIS, the first few weeks were dedicated to inventorying the smaller parks of Brookline and entering the information into the Access database and plotting it in the GIS system. Once we had done this for a park, we would double-check the park and make sure we had entered in the appropriate data that needed to be inventoried.

Once we had completed several parks, we researched heavily into the ADA. The two most important documents that we used were the Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas – Final report, which was published by the ADA commission in 1999 and the ADA Accessibility Guidelines for Play Areas, which was published by the ADA commission in 2000.

During our ADA research, we also interviewed the ADA Coordinators of the cities of Boston, Cambridge and Newton to inquire as to how they manage the ADA and how they incorporate GIS into their every day activities and decisions. In addition to these cities, we also interviewed the head of the ADA Commission of Brookline to inquire about the current system of how Brookline deals with the ADA.

With the knowledge that we gained we are recommending that the town of Brookline establish a proactive approach to the ADA. Currently the position of Brookline is that it is "100 percent compliant until there is a compliant" (Stephen Bressler, Brookline ADA commissioner). Based on interviews with the towns and cities of Cambridge, Newton and Boston, we believe there is room for improvement. In addition to the outside agency, Brookline has to investigate the issue in order to confirm

the complaint is tangible. There is a chance of a lawsuit if someone were hurt because of the issue, as well as the cost of fixing the problem in order to comply with the ADA guidelines. The benefit of a proactive approach can easily be seen because it would result in fewer complaints. With fewer complaints, the town will have to hire an outside agency to evaluate the parks less often. Furthermore, redesign and redevelopment is a costly process that could be avoided by doing things right the first time.

We also recommended that the town of Brookline consults with Boundless Playgrounds. Brookline has a lot of work to do to become compliant, but we feel that being compliant is not enough. Working with the nonprofit organization will ensure that the parks and playgrounds are not only accessible, but also fun and easy to use for everyone—with or without disabilities. The playgrounds will be transformed into places where children of all disabilities can socially interact and develop, and no one will have to feel left out.

Currently, the Brookline ADA grievance form is not easily obtainable. We have found that other towns and cities have their grievance forms located on their websites. It would be much easier for the citizens if Brookline's grievance form were located on the town website. This would allow citizens to access the form at their convenience and enable them to file complaints immediately.

INTRODUCTION

Access to a clean, safe, and proper park is desired by the population in most towns and cities. Today's society emphasizes indoor recreation, but parks provide an invaluable opportunity to breathe fresh air, meet people, and provided a social setting for children to interact with each other. Parks not only provide visual and recreational assets to communities but also help to improve land value, city image, and health. In a study published by the CDC (2001), they found that the percentage of people who exercise increased by 25.6 percent when there was access to a place for physical activity. Sjerp de Vries (2001) found that people who live in greener environments will complain less about their health, and feel healthier both physically and mentally. An extensive report completed in 1996 by the U.S. Surgeon General found that when people perform regular physical activity they benefit from reduced risk of premature death; reduced risk of coronary heart disease, colon cancer, hypertension, and non-insulin-dependent diabetes; continued muscular strength, better joints, as well as countless other benefits. (CDC, 1996)

Parks also play a large role in youth development by giving the community's younger generations opportunities to enjoy physical activities and social interaction in a safe and productive environment. "Research on the brain demonstrates that play is a scaffold for development, a vehicle for increasing neural structures, and a means by which all children practice skills they will need in later life."(TPL, 2006) In a time when public funds are limited, people are demanding an increase in funding for parks and open spaces. In November of 2002 voters in ninety-three communities in twenty-two states voted in favor of a combined $2.9 billion to acquire new public open spaces. (LTA, 2002)

Parks also gives the older populations a place to participate in activities like bike riding, walking, running, site-seeing and playing frisbee.

In an ideal world, every city would have parks that are safe, up to date and accessible by healthy and disabled citizens alike. There is no doubt that every community would benefit from and enjoy a park such as New York City's famous Central Park; however, many communities cannot reach this goal because of budget constraints and lack of community effort among other things.

Parks must be designed and redesigned for the surrounding population. In order to accomplish this, demographic and population data should be considered. Over the years, parks may become outdated. Communities need to plan on parks that will dynamically change over the years, just as the population does. For instance, a park that was developed several years ago in a community primarily inhabited by families with small children may now be inappropriate because the children have grown up.

In order for local governments to maintain their parks properly, they need to know what equipment is currently in their parks, where it is, and what condition it is in. An efficient solution to this problem is a well-maintained inventory database. An inventory database theoretically would allow the local parks departments to evaluate quickly where the immediate need for money is located throughout the parks. The utilization of a geographical information system (GIS) would help tightly integrate all of the data by showing what equipment each park has and the position of the equipment in each park.

The town of Brookline, Massachusetts, for example, is an affluent town that is consistently investing money into upgrading and maintaining its open spaces. Brookline currently has one of the most advanced GIS in use today (Feng Yang, Brookline GIS

Administrator) and it is currently utilized in other town operations. Officials have seen the benefits of GIS and now want it to be incorporated into their program aid in ADA compliancy, an inventory management system, as well for future projects such as a waste refuge plan. These technologies will also allow Brookline to be able to see where its money needs to be spent, and how to utilize its money efficiently.

The purpose of this project was to further improve the overall park management system. To accomplish this it was necessary to take several different approaches. The first was to update the existing database with the most recent information we collected from our visits to the twelve parks. After this we then began to create the framework for GIS layers that would represent all the features in the parks. With the database being established prior to this project it was necessary to build the frameworks for the GIS layers around that of the database. We created appropriate GIS layers to display the inventory visually, and creating these layers turned out to be very intricate and time consuming. Not knowing who would be continuing our work, we created a simple manual that outlines all the steps needed in order to create the proper layers in ArcMap (See Appendix B).

Once we had an understanding about Brookline's parks and what elements were contained in them, we then looked at a way to improve the management of ADA grievances as well as overall compliancy within the municipality. To accomplish this it was necessary to become familiar with the guidelines and regulations published by the state and federal government. After interviewing many of the town and city officials as well as investigating it first hand, we found these documents to be complicated and unclear. During our research we outlined the most important information and have

compiled it to be used as a reference. (See Appendix H) Our ADA research goes far beyond this and will be discussed in further detail later.

A "great park" does not necessarily mean a park with state-of-the-art equipment, or the greenest grass or even the best location. The true standouts are the parks that define the identities of their cities, which tend to share certain elements that, together, explain a great deal of their success.

An example of a park that does this is Pioneer Courthouse Square located in Portland Oregon. Portland Courthouse Square, nicknamed "Portland's Living Room" is a part of the Portland Parks Department even though there is not one blade of grass growing there. The Square's role as transit hub makes it the nerve center of downtown Portland. Its popularity stems from its central location and the 300 separate events it hosts every year. According to Madden (2004), the attraction of the square can also be attributed to its close proximity to the transit system, good management, and multiple funding sources. The park boasts a Starbucks that assists in funding the park while reputed as being the largest-grossing Starbucks in the country (PPS, 2006). Having multiple revenue sources allows the management to constantly look to improve the park without being dependant on government funding.

Figure 1 - Starbucks in Pioneer Courthouse Square

One of the most famous parks in the world, Central Park is the type of park that tries to serve every facet of the community. Central Park, located in New York, NY along

with Prospect Park located in Brooklyn, NY serve as examples of parks that run by an extremely successful management system. Their management system is described by Madden (2004) as “superb,” credits the parks’ “flexible design” which accommodates numerous activities during all seasons. The many organizations involved with the parks enable the implementation of complex restoration projects, capital improvements, maintenance programs, and event schedules.

Madden (2004) also names Plaza Hidalgo in Mexico City, Mexico for its flexible design which enables its wide assortment of amenities that act as the centerpieces of the park. Such amenities include market stalls, benches, and small fountains under trees where people typically congregate, and scattered throughout the park are vendors selling fresh lemonade and other treats.

A parks’ identity is the basis of its success. Boston’s own Public Garden is acknowledged for its excellent attractions which provide a strong identity for itself and the city (Madden, 2004). The "Make Way for Ducklings" sculpture located in the Garden that honors children's author Robert McCloskey leaves an everlasting impression on the children and families.

The theme of what makes a great park “great” seems to boil down to two basic elements, the level of its management system and whether or not the park brings identity to its location. The identity of the city that the parks system brings can be a positive one but it could also be a negative one if the parks are crime ridden and run down. Of the fifty large U.S. cities surveyed by TPL in 2003 approximately half collected crime statistics in and around their parks. Of these that did collect data only a hand full had a plan to use

this information. Every park system should have a plan to evaluate and handle crime within their parks. The best way to deter crime within parks is to increase usage.

BACKGROUND

In order for our project to have an impact on Brookline it was necessary to become familiar with the town. In doing this, we investigated the various advantages and disadvantages parks bring to Brookline. These parks also must accommodate the disabled by following The Americans with Disabilities Act (ADA). The following chapter will highlight the importance of these subjects.

History of Brookline

Looking at the customs of Brookline will give one the general feeling of how and why they value their parks. The Town of Brookline, Massachusetts was incorporated in 1705 and is bordered by Boston and Newton. Currently, it is run by a representative town meeting and the executive branch of the government is run by a board of five selectmen that are elected on a rotating basis.

Outdoor recreation has a history in Brookline; it is home to the first private country club in the nation known as The Country Club and it has hosted the US Open three times and the Ryder Cup once. Due to its proximity to Boston it is a very convenient place for commuting to Boston. The M.B.T.A. (Massachusetts Bay Transit Authority) has multiple stops in Brookline which provides easy and convenient access to Boston for those commuters and residents as well.

Brookline is a predominantly white town. At 81 percent (US Census, 2000), Caucasians make up the vast majority of the town's population with the Asian population at 12.8 percent and the African American population totaling 2.7 percent (US Census, 2000). The median household income is rather high at $66,711 (ePODunk.com, 2001).

This can most likely be attributed to 77 percent of the population age 25 and older having a Bachelor's degree or higher (ePODunk.com, 2001). Having a large median income like that allows the departments in the city to have a more flexible budget.

Brookline is a town full of character and has a lot of history and culture distinct from Boston. In a suburban setting, it features many nice shopping areas, recreational parks, large homes, and modest apartments. Brookline has a density of about 8,409.7/mi² which makes it a dense population. With the dense population comes the shrinking of resident's personal yards. This could be a reason for the overall sense of ownership among Brookline residents towards their parks. Brookline is also home to the "Fairsted". The "Fairsted" is a 100-year-old home of the famous architect Fredrick Law Olmsted and the Olmsted Brothers firm. This is such an important landmark to Brookline that it is now the Frederick Law Olmsted National Historic Site. Even historic sites like the Olmsted National Historic Site are part of the Parks and Open Spaces department of Brookline. Appendix I shows the numerous parks and open spaces scattered throughout Brookline. For being a geographically small town, the number of parks is high and the history of parks and open spaces in America can be traced back to Brookline. Frederick Olmsted was the landscape architect for Central Park as well as numerous other parks in the Americas and Europe.

Why Do We Need Parks?

Parks provide many benefits, some of which are not so obvious. Many will agree that there are several health benefits associated with parks and other recreational facilities, because it is common sense that any extra physical activities promote better health. However, there are other, not so apparent, benefits offered by parks. For instance,

parks can provide a social setting that may not be available in work or academic settings. In addition, studies have shown the impact on the economy and environment afforded by parks (Sherer and The Trust for Public Land, 2003) (The Trust for Public Land, "Benefits of Urban Open Space").

Health Benefits

Today, parks are vital to sustaining a healthy community. Obesity among U.S. adults between the ages of 20 and 74 was at 15 percent in 1980. Obesity among the same age group in 1999 was found to be at 27 percent according to the CDC. Parks have evolved from a place for children to play to a place where children and adults alike go to play and exercise. When a community has better access to parks and recreational facilities, more people will exercise. A study published by the Centers for Disease Control and Prevention (CDC) showed that the creation or enhancement of places for physical activities led to an increase of 25.6 percent in the number of people exercising three or more days per week (CDC, 2001). Studies reviewed in the American Journal of Preventive Medicine support this by saying that the "creation of or enhanced access to places for physical activity combined with informational outreach" resulted in 48.4 percent increase in the frequency people exercise.

Studies have shown that parks not only enable people to exercise more and enjoy more leisure activities, but also have an effect on psychological health. One such study found that in a greener environment people report fewer health complaints, more often rate themselves as being in good health, and have better mental health (de Vries et al, 2001). The colors, shapes, textures, and smells that nature creates can be some of the most peaceful and enjoyable things on earth. When the medical records spanning ten

years were reviewed it was found that patients with trees outside their window had shorter hospitalizations, and less need for painkillers when compared to patients who had brick walls outside their windows. (TPL, 2003)

Economic Benefits

Studies have shown that property that is closer to parks and green space has a higher value than property that is not. Since parks are more pleasant than rundown buildings, highways, and other common structures in urban environments, some people prefer to buy homes that are close to parks and open spaces. A study done in Boulder, Colorado examined the effects of greenbelts on residential property values. A greenbelt is defined by Merriam-Webster as a belt of parkways, parks, or farmlands that encircles a community. This study found that there was a $4.20 decrease in the price of residential property for every foot one moved away from the greenbelt, and that the average value of homes next to greenbelts was 32 percent higher than those 3,200 feet away (Sherer and The Trust for Public Land, 2003).

Parks also help attract and retain businesses. Towns and cities with more parks and open spaces afford a higher quality of life and attract better people, which in turn attract better businesses. For instance, many new companies picked Portland, Oregon because their employees preferred its quality of life (TPL, n.d.). Bill Calder, a spokesman for Intel, says “Companies that can locate anywhere they want to will go to places that attract good people” (TPL, n.d.).

Environmental Benefits

The environmental benefits of parks are dramatic. The main benefits observed are the management of storm water runoff, decreased energy consumption, and improved air quality. The U.S. Forestry service determined that over the span of fifty years one tree can generate $31,250 worth of oxygen, control air pollution worth $62,000, recycles $37,500 worth of water, and controls soil erosion worth $31,250.

Parks and open spaces can more effectively control storm water runoff. Urbanization of towns results in a reduction of green space and an increase in the number of impervious surfaces such as parking lots, roads, and sidewalks. Because of this, storm water must be managed in another way; sewers, storm drains, and drainage ditches must be built. This is a long and costly process. It also costs more in the long run because it must be maintained. Pervious surfaces are a better solution to managing water runoff and also offer other benefits. Excess water from storms is absorbed into the soil, which is then used by the various plants for nourishment. Through this process, the storm water is purged of many pollutants, such as nitrates, phosphorous, and potassium. (Keating, n.d.). There is also an economic benefit to reducing storm water runoff. A study done in 2000 (Beattie, Kollin, Moll) in Garland, Texas found that its existing trees handle 19 million cubic feet of storm water. Facilities to manage an equivalent amount of water would cost $38 million.

Trees are also known to reduce residential energy costs. They provide shade for houses and are most effective when placed near air conditioners, windows, and walls. They are also more effective when shading the areas receiving the most exposure to the sun. A study done by American Forests (2001) found that tree cover in metro Atlanta

accounted for an annual savings of $2.8 million for residents. In a study, the evaporation from a single tree can produce the cooling effect of 10 room size air conditioners running 20 hours per day (U.S. Department of Agriculture, n.d.).

Trees have an important role in the reduction of air pollution. They remove pollutants from the air such as nitrogen dioxide, sulfur dioxide, ozone, and carbon monoxide (American Forests, n.d.). In 1994, Nowak found that trees in New York City removed an estimated 1,821 metric tons of air pollution, with an estimated value of $9.5 million. Similarly, trees account for a savings of $2.1 million in Washington, DC, $47 million in Atlanta, GA, $4.8 million in Portland, OR, and $2.6 million in Denver, CO (American Forests, n.d.).

The Americans with Disabilities Act

Legally, parks have to meet certain regulations to accommodate their public. The American with Disabilities Act was passed by the United States Congress in 1990 in an attempt to stop discrimination against Americans with disabilities. The ADA states specific guidelines that need to be met so that non-discriminatory acts occur. The ADA as a whole is a very complicated and intricate document covering all accessibility issues of where, for example a medical building and how many ramps per entrance are appropriate for that particular building should be addressed.

There have also been complications regarding what exactly is “disabled” and who is considered disabled? As defined by the ADA, the term “disability” means with respect to an individual: “A physical or mental impairment that substantially limits one or more of the major life activities of such individual.” Contrary to what most think, the ADA has also defined an individual with a disability to include individuals with contagious and

non-contagious diseases such as HIV, epilepsy, cancer, heart disease, tuberculosis, and alcoholism (The Americans with Disabilities Act of 1990, 01/15/97).

Under the Americans with Disabilities Act, parks fall under Title III: Public Accommodations. A place of public accommodation is a facility owned by a private entity that either operates, leases, or leases to a place of public accommodation whose operations affect commerce and fall within certain categories (ADA Questions & Answers, 10/07/2003). One such category includes a park, zoo, amusement park, or other place of recreation. Within these categories fall various departments. Park management is located in the Department of Interior which includes all programs, services, and regulatory activities relating to lands and natural resources, including parks and recreation, water and waste management, environmental protection, energy, historic and cultural preservation, and museums.

The details of the ADA can become confusing; a representative from the Brookline Parks and Recreation Department, Tom Brady expressed such uncertainty when interviewed (January 24, 2006). He explained that the ADA just has far too many technicalities and stipulations. In order for the Brookline Parks and Recreation Department to make sense of the guidelines they are looking to create a separate policy for each of the different kinds of parks located in Brookline. Often, the Brookline Parks and Recreation Department tries to understand what exactly is needed for the parks but often finds it hard to get a clear answer due to its complexity and lack of precise requirements. For example, the following table shows the relationship between required accessible ground-level equipment to elevated equipment.

TABLE 1: NUMBER AND TYPES OF GROUND LEVEL PLAY COMPONENTS REQUIRED TO BE ON ACCESSIBLE ROUTE

Number of Elevated Play Components Provided	Minimum Number of Ground Level Play Components Required to be on Accessible Route	Minimum Number of Different Types of Ground Level Play Components Required to be on Accessible Route
1	Not applicable	Not applicable
2 to 4	1	1
5 to 7	2	2
8 to 10	3	3
11 to 13	4	3
14 to 16	5	3
17 to 19	6	3
20 to 22	7	4
23 to 25	8	4
More than 25	8 plus 1 for each additional 3 over 25, or fraction thereof	5

("Making Playgrounds Accessible", 2005)

Another problem lies in the design process of parks and playgrounds. Many times the designer does not take into account the essential parts in creating an appropriate place for individuals with disabilities. Something as simple as bark chips makes it impractical for a wheel chair to be mobile. Other designers' problems include making the playground itself accessible; many require cutting through grass or "natural terrain" to get to the play structure. Cutting through the natural terrain often times degrades the overall quality of the natural setting. The next issue arises with the contractors because in general contractors do not like to take on the accessibility dilemma.

A third issue that frequently arises when assessing ADA compliancy is when an issue does exist, who is responsible for fixing it? Repairs can be quite costly. Therefore ADA compliancy should be implemented in the planning stages. Investing money into work that will need to be fixed at a later date is futile. Municipalities can easily save money by consulting third party organizations to make sure that all requirements of ADA

are covered in the initial stages. Brookline, Massachusetts does this quite frequently with an organization called Adaptive Environments. (http://www.adaptenv.org/) Adaptive Environment is used to ensure that the work they do is also in accordance with the ADA. This company is non-profit and has the sole intention of helping the public and private sector make the right choices. In speaking with Juanita Mincey, Disability Program Specialist for the City of Boston, she showed the utmost respect and admiration for certain individuals within Adaptive Environments as well as the company itself.

There are many other organizations that are similar to Adaptive Environments such as Boundless Playgrounds (http://www.boundlessplaygrounds.org/). Within Brookline we found many of the parks to be well on their way to ADA compliancy. Many of the ADA issues arose in terms of the play structures themselves. Consulting Boundless Playgrounds would have ensured that the play structures would be accessible by all. Boundless Playgrounds is a nonprofit organization headquartered in Bloomfield, Connecticut. It was founded in 1997 by a passionate team of parents and professionals and has since been dedicated to helping communities create extraordinary playgrounds where all children can develop essential skills for life as they learn together through play. At the time of this writing, there are over seventy-five Boundless Playgrounds in twenty-one states and provinces with dozens more in development.

Parks aim to please its public and to be utilized as much as possible. The ultimate goal of most park facilities is to meet the ADA standards, and to satisfy its public, but the complications of the requirements inhibit them from accomplishing this goal.

METHODOLOGY

The purpose of our project was to better Brookline's Parks and Recreation Department by establishing a methodology for inventorying parks, updating the database and starting the implementation of the GIS system. These tools then can be used to further ADA compliance within the parks and open spaces.

Inventorying of Selected Parks

The first step of this project involved the inventorying of twelve parks in the town of Brookline. We went to each park with an aerial map of the park and a field book. Using the map, we recorded the locations of all the equipment. We decided to use a number system. Each item was given a specific number, which was then used as a reference in the field book. This inventory included all equipment, paths, utilities, and fences, as well as the current condition and location of each item. The condition was recorded (poor, fair, good, or excellent) relative to other equipment we witnessed throughout the park system. Other attributes were also recorded, which included the type of equipment (toddler swing set, chain-link fence, climbing structure, etc.) as well as various type-specific attributes.

GIS Map Layer Creation

For each park inventoried, a GIS map was created. This involved creating the necessary layers and adding the appropriate icons and lines to represent the data. Most elements required an icon to be placed at their corresponding location, whereas others required lines and polygons to be drawn on the map.

A link was needed between the items on the maps and the data. To do this, each item on the map was assigned an ID which corresponded to the database. This link is crucial and makes the maps much more useful.

These newly created maps will help Brookline by giving an overhead view of the parks and also aid in analyzing the data. With a GIS map, park officials will be able to see the location of their equipment, along with current conditions and other relevant data. This will act as a tool for maintenance and replacement decisions, the development of a new refuse management plan, and a plan for ADA compliance.

For more information, refer to Appendix B of this document.

Americans with Disabilities Act

Complying with the Americans with Disabilities Act (ADA) can become extremely difficult according to Tom Brady (1/24/2006). One of our goals of the project was to help simplify the ADA's guidelines so that the town of Brookline can easily abide by their regulations. This has been accomplished by numerous interviews from ADA coordinators from surrounding towns and cities. In addition to these interviews there has been work put into developing simplified versions of two federal ADA guidelines. These simplified guidelines can now be used as a reference by Brookline or any other municipality.

DATA AND ANALYSIS

In order to fulfill our objectives, we gathered data from twelve parks in Brookline and used this data to determine the current state of ADA compliance. We found it necessary to first become familiar with what comprised a park. Only after then could we begin reviewing the guidelines and associating them with particular issues within the parks. We found issues within even the most recently renovated parks of Brookline. With these issues we were able to provide examples of why a proactive program is necessary when dealing with ADA problems. We have also interviewed the ADA coordinator of Brookline and the surrounding towns and cities in order to compare the different policies currently in use. With this information, we have combined the best practices of Boston, Brookline, Cambridge and Newton to compile what we believe is the best practices that should be used by all municipalities.

Classification of Parks

To determine the accessibility of each individual park, it was necessary to use our research into the ADA to examine what was compliant with the ADA and what was not. In addition to Brookline we investigated Boston, Cambridge and Newton to learn about their different approaches to complying with the ADA.

Park 1: Lawton Playground – Brookline, MA

Lawton Playground is a one acre park located on Lawton Street in Brookline. Lawton Street separates two lots of nearly equal sizes. The north side is primarily used for its basketball court and sunbathing, while the south side has a playground primarily

used by younger children. Within the park there are two play structures, sandboxes, and a spray pool. The park was last renovated in 1990, ten years before the Accessibility Guidelines for Play Areas were published. This renovation included two new play structures. We have found most of the elements in Lawton Playground to be in violation of these guidelines.

Outdoor Guidelines

All the outdoor recreation access routes in the Lawton Park are fully ADA accessible. The outdoor recreation access routes are asphalt, so they are firm and stable, and they average between 40 to 60 inches in width, which complies comply with 16.3.2 (Clear Tread Width) of the ADA guidelines. The terrain is mostly flat, so there are no requirements for resting areas (Appendix H, Section16.3.7.2.1). The rest of the guidelines are met for outdoor recreation access routes, except that the access routes show signs of age and need to be fixed.

Figure 2 - Bench in Violation due to lack of armrests

All the trash containers are ADA compliant as stated in 16.8 (Fixed Trash/ Recycling Container). There are two trash barrels in total, and both are placed along an outdoor recreation access route.

There are a total of twelve benches at Lawton Park, which means that six of them need to be ADA accessible. After inspecting the park, none of them are. Fifty percent as required by 16.12.1.1 (Multiple Benches) of the six accessible benches need to have armrests, but none of the benches in the park do, please refer to Figure 2. Brookline needs to install new benches that have arm rest to comply with 16.12 (Benches). If there were accessible benches installed, all the other criteria for 16.12(Benches) would be passed.

There was one picnic table located near the pre-teen play area of the park (Figure 3). Section 16.5 (Fixed Picnic Tables) of the guidelines state that if there is only one picnic table, it must be accessible, and the one in this park is not. All four sides contain a bench, and there is no space for a person in a wheel chair to be able to come up and sit at the table as required by Section 16.5. In order for Brookline to comply with this guideline, they must upgrade their picnic to one that is accessible and follows the guidelines stated in 16.5.

Figure 3 - Non-accessible picnic table due to lack of required space for wheelchairs

The transitions from one type of pathway to another were in good condition as seen as Figure 7. There was very little change in elevation where the two surfaces meet, much less than an inch, and can barely be felt.

Figure 4 – Example of a compliant change in surface types

Play area compliancy

Lawton has several different play areas, most of which do not meet the guidelines. The pre-teen play area has several problems. This play area has one composite structure, which is comprised of two slides, a play panel, a steering wheel, stairs, and a climbing component. Because this structure has less than twenty elevated components, no ramps are required; however, at least fifty percent of these components must be off of an accessible path and connected by a transfer system or ramps. Figure 8 shows this structure.

Figure 5 - Composite Climbing Structure

There are two main problems with this structure: the elevated components are not accessible and there are no ground-level components. In this case, there is a ramp, but the ramp itself is not compliant. The ramp must be a continuation of the accessible path, but this cannot be fulfilled because there is no accessible path leading to the ramp. In addition, the entrance to the ramp is not flush with the path. The handrails of the ramp have compliancy issues as well. The rails must have horizontal gripping surfaces on both sides of the ramp. The tops of these surfaces must be between 20 and 28 inches above the ramp surface. The picture shows that these handrails do not have gripping surfaces that meet these parameters. The lack of a proper ramp or transfer system restricts the use of this structure to children that have no disabilities.

The guidelines specify how many ground-level components must be on an accessible route based on how many elevated components exist in the play area. This play area has six elevated components. In order to be in compliance, it would be required to have two ground-level components, each of a different type.

The toddler play area has some problems as well. This area contains ground-level components and a composite structure with elevated components. The elevated components in this area are not accessible either. This structure also utilizes a ramp to provide access to the elevated components. This ramp is noncompliant, but for different reasons. Figure 6 shows this ramp. The ramp is noncompliant for two reasons: the slope and the handrails. The slope is required to be no greater than 1:12. The slope of this ramp is much greater, 1:4. To be in accordance with the ADA, for every 12 inches a ramp goes forward, it can only rise one inch, and in this photo, the ramp only goes four inches before it changes elevation by one inch. Although these handrails offer gripping surfaces, these surfaces do are not at the correct height. It is apparent that this ramp was not designed for children in wheelchairs.

Figure 6 - Non Compliant Ramp

Park 2: Coolidge Park – Brookline, MA

Coolidge Park is a community park located on Columbia Street. It is a 1.68 acre park that contains a basketball court, tennis court, spray pool and two playgrounds containing swing sets, climbing structures, and a sandbox. Also, the park has a lighted and fully paved pathway as well as trash containers and benches throughout the park.

Outdoor guideline

All the outdoor recreation access routes in the park are fully ADA accessible. The outdoor recreation access routes are asphalt, so they are firm and stable, and they average around 72 inches in width. This complies with not only Section 16.3.2 (Clear Tread Width) of the ADA guidelines, but also Section 16.3.6 (Passing Space) because the path is over 60 inches wide. The rest of the guidelines of Section 16.3 are compliant with Coolidge's outdoor recreation access routes.

According to Section 16.8 (Fixed Trash/Recycling Containers) all trash containers must be on an accessible path, and the trash barrel in Figure 7 is not on located on an accessible path on Kenwood Street next to the bulletin board.

Figure 7 - Non Complaint Trash Can

The path is not firm or stable going to it, and also it does not comply with Section 16.3.5 because where there is a change in surface types, the dirt and the concrete, it is a greater

than one inch change in elevation between them, please refer to Figure 7. Section 16.3.5 states that the change must be less than an inch, otherwise a ramp has to be installed. Besides this one trash barrel, all the other barrels are fully compliant with Section 16.8. In order to make the barrel compliant, it needs to be moved next to the path, and have the opening of the barrel face the path.

In total, there are fifteen benches in Coolidge Playground, and it is requires that eight of those benches be ADA accessible throughout the park, and four of those need to be located on a main access route. All of the benches throughout the park are accessible according to the ADA guidelines in Section 16.12. Although the benches around the toddler play area and the tennis courts do not have armrests, this is allowed by the ADA guidelines because it states only 50 percent of the benches that are accessible need to have arm rest.

Also, all of the benches have the proper clear space, Figure 8, proper front edge height of the seat, Figure 9, and comply with all the guidelines of Section 16.12.

Figure 8 - Proper Clear Space Around Benches

Figure 9 - Proper Bench Height

The last outdoor element that is found in the park that deals with this section is that of the water spout. Section 16.16.3 of the guidelines requires that all fixed water spouts (drinking fountains) are located between 28 and 36 inches off the ground and are required to be centered at the edge of a minimum 60 inch by 60 inch clear space. The water spout that is shown in Figure 10 and 11 is compliant with ADA because it has a height of 35 inches and the path that it lies on is 160 inches wide, which is more than what is required by the guidelines.

Figure 10 - ADA Compliant Fountain

Figure 11 - Space surrounding this fountain is sufficient

Figure 12 - Transfer System

Play area compliance

A better example of compliancy is the recently renovated Coolidge Playground. This playground exhibits only minor compliancy issues. Figure 12 shows a transfer system that has been correctly designed to enable access to the elevated components. This composite structure is located in the toddler play area. In order for

a transfer system to be compliant, the transfer platform is required to have a height between 11 and 18 inches. It must also have a depth of at least 14 inches, and a width of at least 24 inches. This platform meets these criteria. The transfer steps leading to the top of the structure must be no greater than eight inches tall, at least 24 inches wide, and 14 inches deep. These steps also meet the requirements. Transfer supports are also required in a transfer system. They include handrails, handgrips, or handholds. Figure 12 shows the handholds along the perimeter of the platform.

The ground surfacing in the play areas at Coolidge Playground are Fibar. Fibar is considered ADA compliant when installed and maintained properly. It is an engineered wood fiber that is 100 percent ADA compliant and it is frequently used by parks departments in place of traditional wood chips (http://www.fibar.com). According to the company's website, it must be installed to a depth of 8 or 12 inches (Fibar Systems, 2006). Figure 13 shows that the Fibar in Coolidge Playground has a depth of about 8 inches. The proper rubber matting is also installed at all of the high-use zones, namely underneath the swings and at the bottoms of the slides. Some settling and displacement of the Fibar has occurred due to frequency of use. The manufacturer notes that it must be raked and redistributed when this occurs; it also may be necessary to add more Fibar, depending on how much settling has occurred (Fibar Systems, 2006). There has been a slight amount of settling in the toddler play area

Figure 13 - Fibar Depth

Figure 14 - Fibar Settling

of Coolidge, which could make the area inaccessible. Figure 14 shows the amount of settling around the border of the playground, as well as the resulting lip.

The Americans with Disabilities Act – Grievance Procedures

The grievance procedure is very important in towns like Brookline. Grievance procedure is important because, although some work is done while a park is being redesigned to make it ADA compliant, most of the time ADA compliancy does not become an issue until a grievance is received. In addition to making the parks more compliant we would also like to see the grievance procedure more efficient and effective.

The current process is explained on the official "Town of Brookline – The American's with Disabilities Act – Grievance Procedure" form. The grievance process begins with a person completing the form and submitting it to the town ADA Coordinator. The form states that "[t]his complaint should be submitted by the complainant or his/her designee as soon as possible, but no later than thirty (30) days after the alleged violation". This established time limit varies some from other towns that were also examined. Newton for example puts no time limit on their ADA complaint form. Cambridge states on their website that "[a]ll complaints of discrimination must be filed within six months of the occurrence of the last act of discrimination." These time limits vary drastically thus it is necessary to be investigated further. For example the limit of thirty days imposed by Brookline may not allow enough time for someone to consult an attorney before they file the complaint. This could be both beneficial and detrimental to a town or city. On the one hand, if a citizen had time to consult an attorney before filing the complaint then they may be able to find out that they do not have basis for their complaint. This in turn would save the town or city valuable time and money. On the

other hand, a more lenient time limit could be harder for a town or city to deal with, for just like any investigation, facts become harder to find the longer they remain dormant.

Although the time frame is important, we do not feel that it is a serious problem. The form continues to explain the process by saying within five (5) calendar days of the receipt of the complaint the ADA Coordinator will forward the complaint onto a Conciliator. If the complaint is in regards to an employment policy or practice then the complaint will be passed onto the appropriate personnel director. If the complaint is in regards to non-employment benefits provided by the Town of Brookline the complaint will be forwarded to the appropriate Department Head. Within thirty days the Conciliator will meet with the complainant to discuss the complaint and possible resolutions. The complainant will then be forwarded a formal response in writing. The Town of Brookline also outlines an appeal process on this same form. The form itself is short and does not initially collect much information. Although the form is short it does an excellent job of explaining the procedure to the complainant. We found that the other communities do not lay out the procedure as well on their forms. In comparison to Newton's grievance form Brookline's could go much further to initially collect information. Brookline's form asks for a name, address, telephone and a brief description of the complaint. Although this could be sufficient in some circumstances, it is always useful to collect as much information as possible. Newton's form attempts to collect more information in terms of what the complainant intends to do or already has done. This form asks questions such as "Have efforts been made to resolve this complaint through any other means?" and "Has the complaint been filed with the any Federal, State, or local civil rights agency or court?" These are two important questions that should be asked initially. Having the

answer to these questions could save time and money. It would be useful to know if there have been previous attempts to resolve this issue and also what the outcomes of those attempt where so as to not repeat past efforts. Also, knowing if the person has filed with a state or federal agency could raise a red flag to the town or city as to how serious this issue may be.

CONCLUSIONS AND RECOMMENDATIONS

We believe that the town of Brookline should be using a more proactive approach to comply with the ADA rather than the passive approach that is currently being used. We have reviewed the different ways that the City of Boston, Cambridge, and Newton deal with ADA compliance, identified several ADA compliance issues within Brookline's parks, and determined our recommendations based on how other towns and cities have dealt with these issues, as well as from a cost-benefit analysis.

This study was completed in Brookline. While the government structure and available funds may vary from Brookline's, the recommendations for ADA compliancy and open space management can be applied universally. Based on the experiences and information that we have gained over the course of our project we see certain areas that are done well within Brookline and other areas that can be improved. We have established the framework of the park inventory database but the work will need to be continued. With limited time, we completed the inventory and GIS maps of the elements of twelve of Brookline’s parks. The data for the smaller parks of Brookline is complete and the setup work of the system is done. Brookline will need to continue our work and maintain the information in order for the system to be used to its fullest potential. After changes have been made to a park, the employees that worked on that park should make these changes in the database and reflect these changes on the GIS maps. To help with this process, we have developed a manual to help with instructions on how to do this.

Once complete, the database and GIS maps have potential to be used in many facets of the town government. One specific use of this tool would be to easily determine compliancy issues for certain features of the parks. For example, with the walkways and

benches visualized on the map, Parks and Open Spaces would be able to determine if the correct number of accessible benches is on accessible routes within the parks. Having features like electrical boxes, manholes, and plumbing access placed on the map will be useful for those particular departments when performing maintenance and renovations.

The use of this system is not limited to the Parks and Open Spaces. Access to the system could be expanded to the general public. Putting these maps online will allow anyone to determine what the park in their neighborhood has or where they would have to go to enjoy an accessible visit. The possibilities are endless and will be left up to the user to determine the actual uses.

Proactive Approach to ADA compliancy

Our recommendation is to create a more proactive approach to comply with the ADA; this would save the town of Brookline valuable time and money that could be spent elsewhere in its parks system. With the current passive approach, problems with compliance are not dealt with until a formal complaint has been filed or a park comes under redevelopment. A formal complaint might only arise once a person is injured, and could put the town in legal trouble. Also, with a formal complaint that has been filed, Brookline is often inclined to bring in an outside consulting company.

Outside consulting companies cost the community time and money. By taking a proactive approach, all the parks can be evaluated by the staff at the open spaces division of Brookline, to continuously examine ADA issues. Although the town of Brookline might have to spend money to fix the problems initially, it will save them time and money in the future since fewer complaints will be filed and the chance of a law suit due to an injury will be lessened. An approach could be as simple as educating the employees

who visit the parks daily about certain key aspects of ADA compliancy. Our idea is that the more people aware of ADA, the better the chance of identifying issues before they become a problem.

Community Surveys

Completing user satisfaction surveys on a regular basis would allow the parks department to become more familiar with their customers. Fort Worth, Texas Department of Parks and Community services began their user satisfaction surveys when the state decided that they would not fund any master plan development without a needs assessment. The survey included a random sample of people that used the parks and people that didn't use the parks. Within this random sample five hundred teenagers were included. This small sample is then extrapolated for the full population. Some information that was gathered from these surveys included a user rating of the parks, open spaces, and recreational programs. In addition to these questions users were asked what they would like to see in the parks as well as if they brought out-of-town visitors to these parks. Statistical information such as usage of the parks, time spent in the parks, what time of day, and what day of the week these visits were.

These surveys were completed by a third party and provide both positive and negative feedback. Fort Worth has found that these surveys to be useful when presenting information to city officials. A third party voice often is viewed as less bias. These surveys cost about $30,000 initially and then about $15,000 for following surveys. This is a small price to pay for the valuable information collected. (TPL, 2003)

Collaboration with Boundless Playgrounds

After inventorying the components of twelve parks, we realized that most of the playgrounds are not compliant with the guidelines—even the most recently renovated parks. Becoming compliant with the ADA is an important first step, but we believe that this is not enough. The guidelines only go so far as to make sure that all children—disabled or not—have something to utilize in a playground. The guidelines do not require that all components of a playground are accessible, only a certain percentage. Furthermore, the guidelines are primarily focused on people in wheelchairs. There are many more disabilities, such as blindness and sensory disabilities, which should be taken into consideration when designing playgrounds.

Following the guidelines, elevated components are considered to be accessible if there is a transfer station. It can be embarrassing for children to have to abandon their equipment in order to reach the higher points of a structure. All children should be able to reach these points without struggling or facing humility. Brookline should continue their efforts to reach a fully accessible park system.

Working with Boundless Playgrounds

The Boundless Playgrounds website (http://www.boundlessplaygrounds.com) contains a wealth of information. One can find information about budget considerations, ways to get started, forming committees and various subcommittees, as well as where to find more information. A comprehensive checklist is available which lists everything that is present in a Boundless Playground. There is also a list of ten steps to take in order to develop a new playground.

Apart from the free information and services, Boundless Playgrounds also offers fee-based services and training programs. The services offered include a design review service for existing playgrounds, mentoring services, which offer training, and custom configuration services, which will be helpful in designing a one-of-a-kind layout. The training is segmented into different levels, from beginner to advanced, and will help to ensure that all involved in the design process of new playgrounds will have the knowledge to create barrier-free playgrounds that are accessible by everyone.

Communication with the Public

Communication with the public is something we found to be very strong among most of the communities that we investigated. A master plan, annual reports summarizing the system, and monthly newsletters were some of the many ways these communities communicated with the public. Every municipality should adopt these practices for it informs the community of the many facilities and services that the park system has to offer. This does not happen in more than half of the large cities across the United States (Harnik, 2003). Communication with the public can lead to broader community involvement as well as increased usage.

BMC® Remedy® Change Management

During our investigation of the Cambridge Human Services Department we found a software solution that manages issues and complaints within their government. This software solution allows the town officials to easily file a complaint. This system is essentially a work order management system. This management system is integrated with

their GIS in that it allows the user to choose the road and the nearest intersection of the problem.

We have spoken with the Program Manager, Scott Hamilton, about the work that went into implementing this software. BMC offered the base line software and then it was highly customized by GE IT Solutions. The total package cost around $350,000 with the BMC software costing around $250,000 and then the customization from GE costing around $80-90,000. Our main focus was on the reporting of the ADA issues within the system but this system is intended for the whole government. This system can be used to track labor costs as well as vehicle costs. This system also aids in overall consistency. For example, someone might enter “Mass Ave.” where as someone else might enter “Massachusetts Ave.”. The specific software that Cambridge uses is "BMC® Remedy® Change Management” and “BMC® Remedy® Asset Management”. This particular software may not be the right one for Brookline but similar software solutions exist. These types of software solutions should be investigated further.

Complaint Form

Our recommendation is that Brookline and other towns begin to take steps to handle ADA grievances more effectively by expanding the communication lines between the citizens and the city or town. By utilizing the Internet and also having the ADA complaint form available at other town offices this can be achieved. We would like to see governments allow for more feedback rather than strictly grievances. If citizens can provide formal and informal feedback to the town or city then many issues can be resolved before they become serious.

In order to formally complain about an ADA compliancy issue, it is necessary to complete Brookline's complaint form and submit it to the ADA Coordinator. The problem lies in the location of these forms. Currently, if a citizen wishes to file a complaint it would require a trip to the ADA Coordinator's office and retrieve the form. It would be favorable if the form were readily available and located on Brookline's website (http://www.townofbrooklinemass.com). This would provide the town's citizens with access to the form at their convenience. Having the form readily available is imperative to a timely response to the issue at hand due to the thirty day limit that is in place. The form could also be expanded to be a form that a citizen could fill out on the website and electronically submit the grievance. If a feedback channel for issues within the parks were opened then the municipalities would receive more comments and recommendations. The more accessible it is for someone to file a complaint the better the chance of the city or town to be able to rectify the issue at the local level without having to escalate the problem to the state or federal level.

Web Content Accessibility Guidelines

Not only do we recommend that this form be online, the Web site will need to conform to the World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines (WCAG). The WCAG provide techniques for making sites more accessible. A total of 14 guidelines help to ensure that everyone can access the site. There are different types of disabilities that affect the way a person interacts with a site. Colors have to be chosen carefully to assure that people with colorblindness will be able to read the text. The layout must be chosen wisely so that screen readers will be able to interpret and read the page correctly. People with cognitive disabilities may have trouble with animations or

moving objects; these should be kept to a minimum. Using these guidelines will help to make the form as accessible and available as possible.

In summary we believe that the implementation of our recommendations would greatly improve ADA compliancy within Brookline's parks. In addition to improving ADA compliancy they will also improve park management. Since a vibrant park system can benefit a community in so many ways, improving the system should be a high priority for any municipality.

APPENDIX A

Project Sponsor Contact Information

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Parks and Open Space Division – Mission Statement

http://www.town.brookline.ma.us/recreation/

To develop a safe accessible well maintained network of parks and open spaces for both passive and active recreational uses the preserves the historic integrity and cultural significance of Brookline's landscape.

Parks and Open Space Division – Goals and Objectives

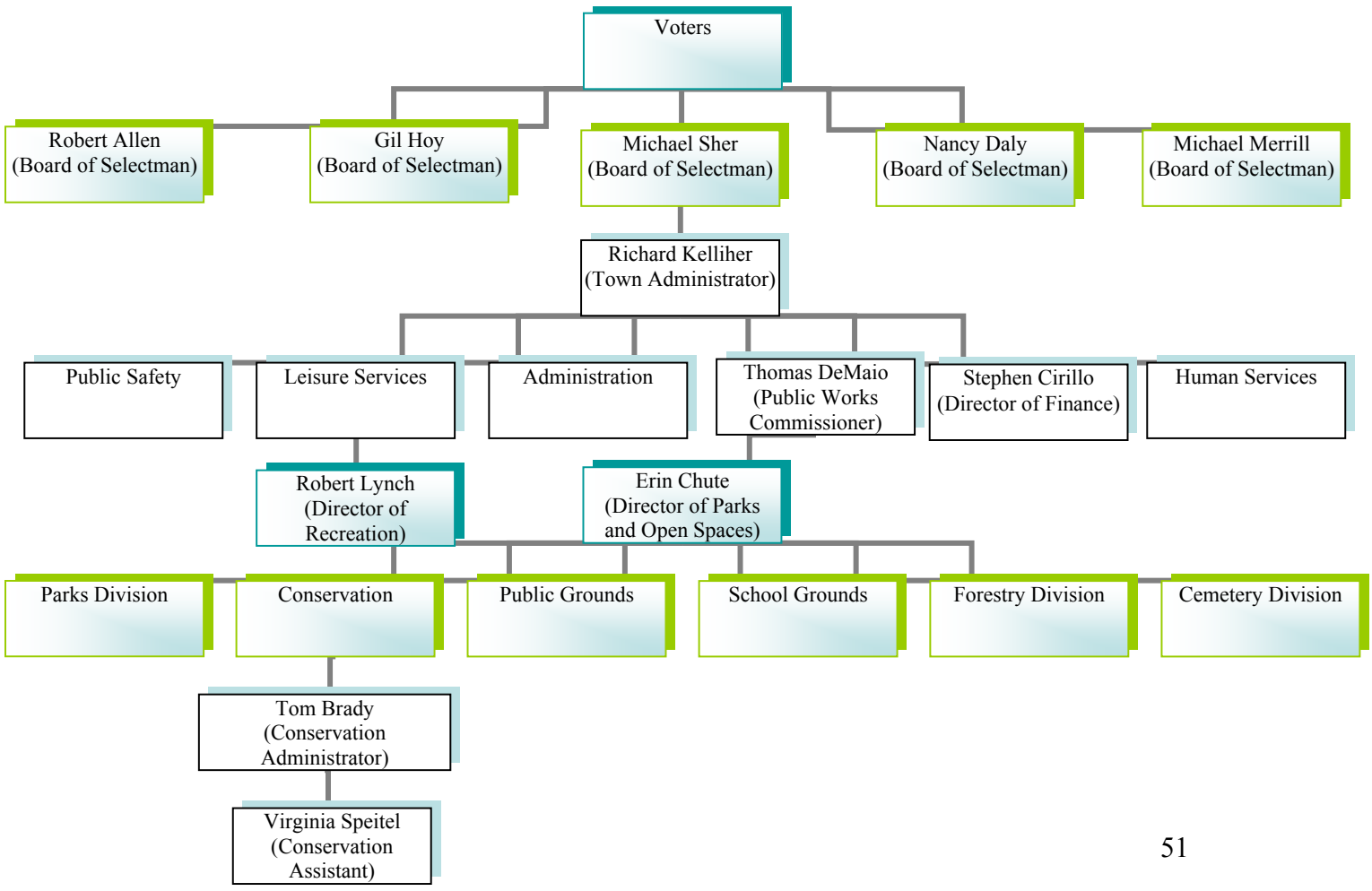
The purpose of the Parks, Recreation and Open Space Master Plan is to guide recreation, parks and open space amenities, services, programs and facilities within the Town of Brookline for the next ten years. The Master plan established a policy framework for parks, opens spaces, and recreation; management and maintenance program recommendations; and capital improvement plan. The strategic objective of this document requires that the entire Town-owned parks, open space, and recreation system be evaluated on a Town-wide level. The scope of this Plan is far-reaching, ranging from sports to community programs, parks to community center, as well as municipal user fees. The recommendation of the Master Plan for Parks, Open Space and Recreation are

designed to meet the mission and goals of the Recreation Department and Parks and Open Space Division.

Work Completed So Far

The previous work done by the Parks Department is limited at best. Parks data was collected several years ago and is outdate. The general information about the parks is fairly complete. The information becomes inadequate when the condition of the equipment is considered. For example, the equipment inventoried several years ago is either removed or the condition has changed. In addition to this, the location of the park assets has yet to be determined.

Organizational Chart



APPENDIX B

MANUAL

INTRODUCTION

What this manual is: This manual is intended to be used by those who will be continuing our efforts in creating GIS maps of the parks of Brookline. It describes the process of inventorying the components of a park. It then outlines the process of creating a new map, including the necessary layers, what icons and colors to use, and how theses layers should be ordered on the map. The process of joining tables in the database with tables from the map is also described.

What this manual isn't: This manual will not teach the basics of the ArcGIS suite, nor will it describe the process of using Microsoft Access.

HOW TO INVENTORY

Start off by printing a blank map of the area. This can be done by printing the aerial photo from the Access database, or by finding the park in ArcMap. Usually the ArcMap photos are of a higher quality and are preferred. We have found that printing two copies is best. One copy can be used for all of the equipment, and one can be used for outlining walkways, stairs, curbing, and ramps.

What should be included

Here is a partial list of what should be included in the inventory. To become more familiar with all of the data, we suggest that you browse the database.

- Access points
- Trash barrels
- Play structures
- Benches and sitting walls
- Picnic tables
- Walkways
- Utilities (electric boxes, lighting, meters, water fountains)
- Drains (catch basins and sewers)
- Fences
- Memorials
- Signage
- Recreation buildings
- Athletic fields

Required attributes

Every element has required attributes that must be recorded. For all elements, the location, condition, and accessibility are required.

Access points	• Type (pedestrian or maintenance)
Trash barrels	• Type (fixed metal or portable plastic) • Manufacturer
Play structures	• Type (swing set, climbing structure, spring toy, sandbox) • Manufacturer • Ground surfacing • Age group (infant, toddler, child) • Climbing structure components: ○ Slides, play panels, monkey bars, tracks, etc.
Benches and sitting walls	• Type (wood, metal, plastic, cement) • Base (cement, pavement) • Manufacturer • Angle (which way the bench is facing)
Picnic tables	• Type (wood, metal, plastic, cement) • Base (cement, pavement) • Manufacturer
Walkways	• Type (dirt, gravel, pavement, cement)
Utilities	• Type (electric boxes, lighting, meters, water fountains, storage, recreation facility) • Manufacturer
Drains	• Type (catch basins and sewers) • Notation (“Sewer”, “Br W W”)

Fences	• Type (cast iron, vinyl-coated chain-link, chain-link, decorative metal) • Height
Memorials	• Type (sign, granite) • Message
Signage	• Type (interpretive, rules and regulations) • Message
Athletic Fields	• Type (baseball, basketball, open space, tennis court, football, soccer)

How to record the data

Along with the printed maps, a field book is required. The easiest way we have found to record the data is to number each item. On the map, each element will have its own number. In the field book, the number is written down along with what the number refers to and all of its attributes. Similar items can have the same number. For instance, if there are several fixed metal trash barrels—all of the same type—they can share one number. For curbing, stairs, and walkways, we find it easiest to draw the element on the map and write its attributes next to it. The number system can also be used here. This is just one way of doing it that has worked well for us, but there is always more than one way to do it.

Editing the Access Database

The database is located on the network drive \\tfile001\conservation\GIS Projects\ParkInventory\Parks Database.mdb. When opening the database, you are presented with the main form.

All of the data can be entered through this form, but it is more practical to edit the tables directly, as this will allow you

ID:	Park:	Type
414	Cypress St F	Benches
413	Cypress St F	Benches
412	Cypress St F	Benches
411	Cypress St F	Benches
410	Cypress St F	Benches
409	Cypress St F	Benches
408	Cypress St F	Benches
407	Cypress St F	Benches
406	Cypress St F	Benches
405	Cypress St F	Benches
402	Cypress St F	Benches
401	Cypress St F	Benches

to see the IDs of the items you are entering. Each element is required to have its own ID. The parks that have not yet been updated will need to be corrected. For instance, each bench needs to be entered as one item. Currently, all of the benches are grouped together as one entry. If a park has ten (10) benches, there must be ten entries in the database. This is required for every type of element. The locations are also important, as the location entered into the database must match the location of the item on the GIS map.

Entering the Information into ArcCatalog

Creating a map

Outline:

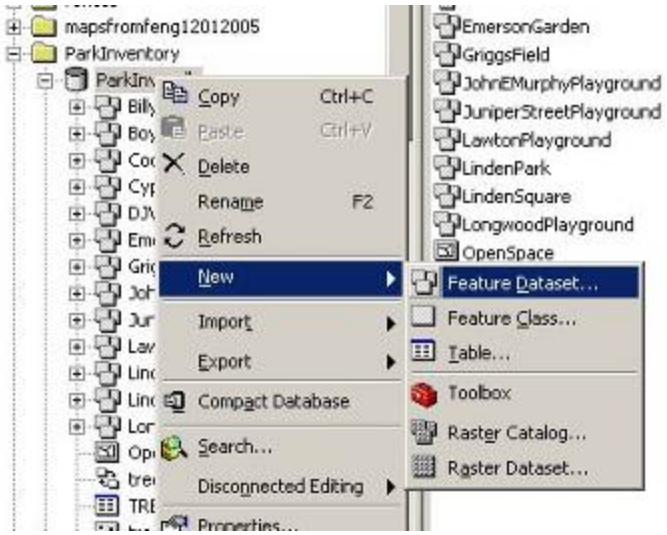
- Create a new Feature Dataset in ArcCatalog
- Create the necessary layers
- Create a new map from template in ArcMap
- Insert the layers created in ArcCatalog
- Add all of the elements, inputting the IDs corresponding to the database
- Add the tables from the database to create joins
- Create joins for the necessary layers
- Group the layers
- Create a printable version of the map

ArcCatalog

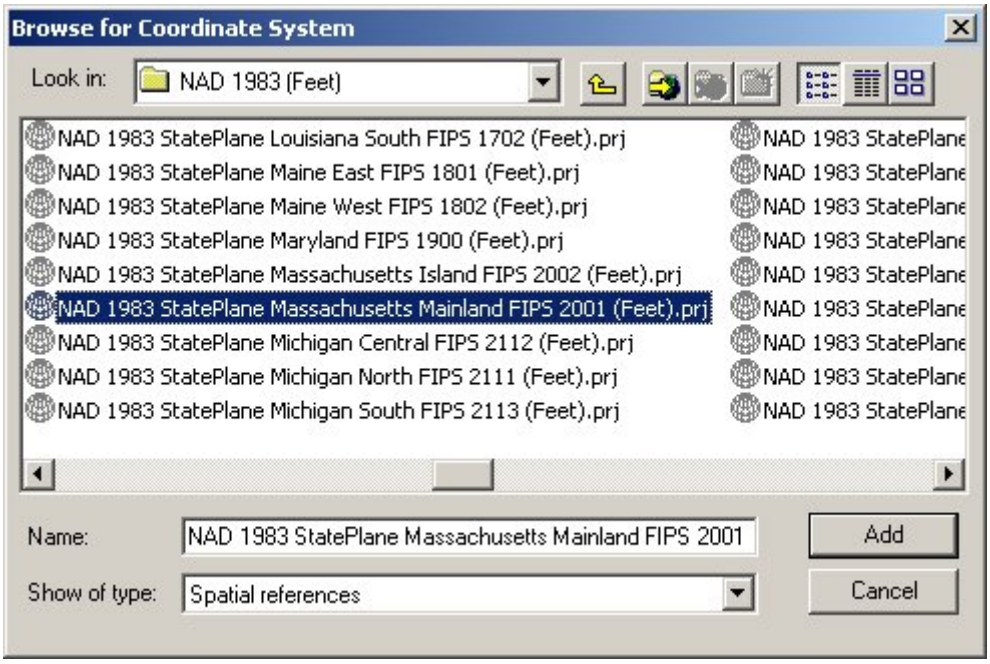
The database for the GIS maps is located in \\tfile001\conservation\GIS Projects\ParkInventory. The database is called ParkInv.mdb (note: this is a separate database from the parks database. The parks database is called Parks Database.mdb). Each layer of the GIS map must have it's own table in the database. These tables are called Feature Classes. The layers are grouped in what ArcCatalog calls a Feature Dataset. For each park there is one feature dataset containing multiple classes.

Creating a new Feature Dataset

1. Right-click on ParkInv.mdb and click New->Feature Dataset. Give it a name of TestMap



2. Click Edit to define the spatial reference. You should now have a new window titled "Spatial Reference Properties."
    a. Under the Coordinate System tab, click the select button.
    b. Now double-click Projected Coordinate Systems, State Plane, NAD 1983 (Feet), and finally NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 (Feet).prj.
    c. Next, click on the X/Y Domain tab. Change Min X to -10000000, Min Y to -8000000, and Precision to 100.
    d. Click the OK button in this window, followed by the OK button in the New Feature Dataset window.



You are now ready to start adding layers.

Adding layers

1. To add a new layer, right-click on the newly created dataset (TestMap) and click New->Feature Class. For this example, you will add two layers, one for furniture, and one for utilities.
2. In the New Feature Class window, enter the name Furniture_TEST[1]; then click Next.
3. The defaults in the next window are fine; click Next again.
4. Here you need to add three fields: ParkID, FurnitureID, and Angle[2]. ParkID and FurnitureID are both of type Long Integer and Angle is of type Double.
5. Click on the SHAPE field and change the Geometry Type to Point[3]. Now click Finish.

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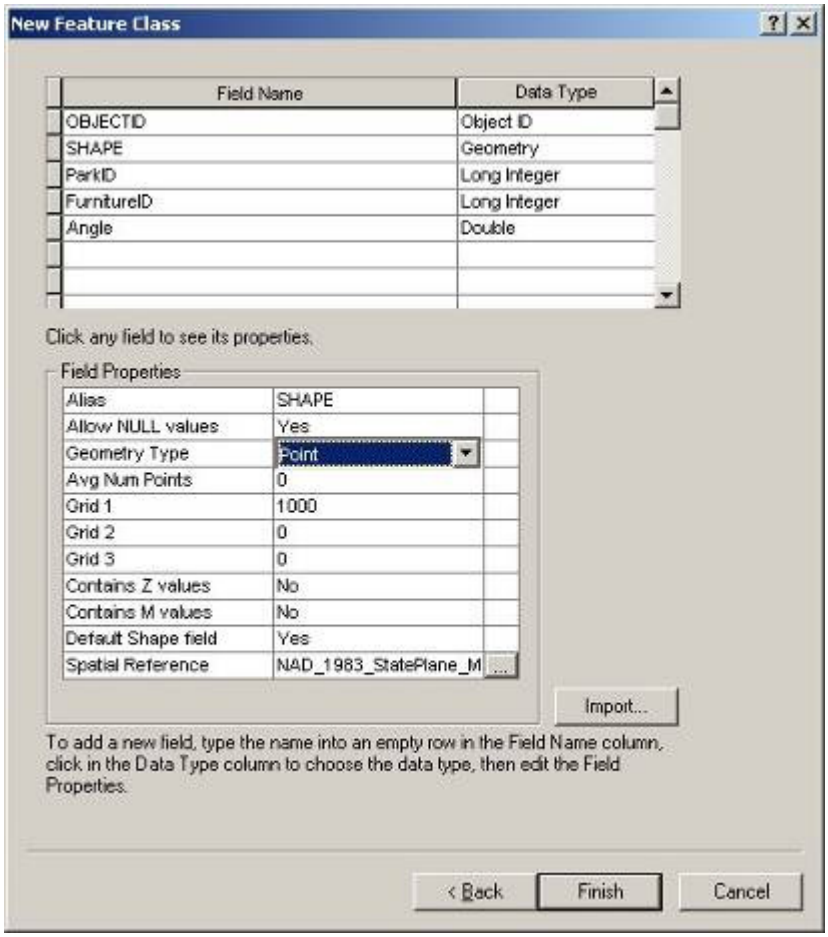
[1] The _TEST ending is necessary in order to differentiate between the furniture layers in each park. The naming convention we use is the first four letters of the park, and will be required as a suffix for each layer created.

[2] The furniture layer is the only layer which requires the Angle field. This field will be used to rotate the benches so that they face the proper direction.

6. Repeat steps1 – 5 for each layer required. Remember that only the furniture layer requires the Angle field.



ArcMap

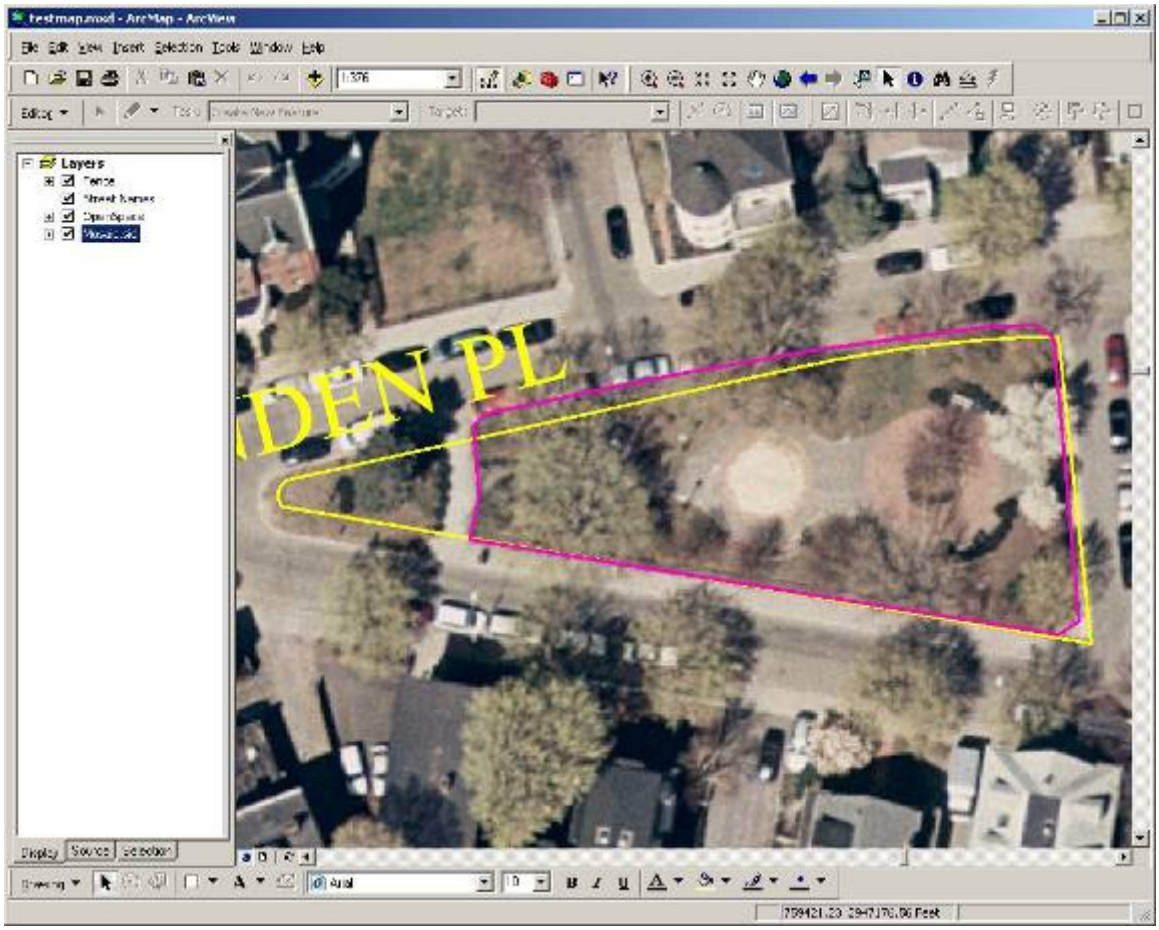
Starting a new map

When opening ArcMap, you will first be presented with a dialog. In this dialog, select Start using ArcMap with A template, then click OK. In the next dialog, click the browse button  in the lower right corner. Select ParkTemplate.mxt (this should be the only template available) and click Open.

---

[3] The Geometry Type is not always going to be Point. For instance, the Athletics Fields layer uses the Polygon Geometry Type. Please refer to the document which describes all of the layers.

Now you need to find the location of the park. To do this you will use the find dialog. Click Edit->Find. For this example, you will add items to Linden Park. In the Find text box, enter linden, then click Find. Two objects will be found. Right-click Linden Park and click Zoom to feature(s). This will focus the map on Linden Park. Now close the find dialog. Your screen should look similar to the screenshot below.



Next click File->Save As to save the map. You will save the example as testmap. Type “testmap” into the File name text box, then click Save.

Now you are ready to add the layers to the map.

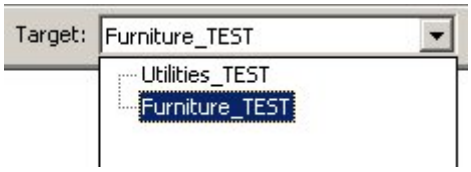
Adding Layers

To add the two layers that you created in ArcCatalog, click File->Add Data. Navigate to the ParkInv.mdb database, double-click TestMap, then highlight the two layers and click Add.

Start Editing

1. To start adding the data to the map, click the Editor button 

on the Editor toolbar, then click Start Editing.
    a. If the toolbar is not visible, click View->Toolbars->Editor.
2. In the dialog, choose ParkInv.mdb; then click OK.
3. On the Editor toolbar, make sure the target is set to Furniture_TEST.



You can now insert all of the furniture.

Inserting the furniture

You will now add the six benches around the sandbox, the four around the tree, the three picnic tables, and the two trash barrels. Their IDs are already in the database, so you will use those IDs.

1. Click the Sketch Tool button  on the Editor toolbar.
2. Insert the first one on the northern side of the sandbox; then click the Attributes button.
3. Enter the ParkID, which is 14, and the ID of a bench located around the sandbox. There are six of them in the database, the first one starting at 264.

4. Leave the angle alone for now; you will get back to this later.
5. Add the remaining furniture, entering the appropriate IDs for each item.
    a. Insert the other nine benches.
    b. Insert the three picnic tables. There are two at the tree on the right, one to the left of the sandbox.
    c. Insert the two trash barrels. There is one at each entrance.

When you are done you should have something which looks like the following screenshot (Note: the color and size of the icon has been changed to make it easier to see them in the screenshot).

Save your edits by clicking Editor button, then Save Edits. Then click Stop Editing in the same menu.

Joining tables

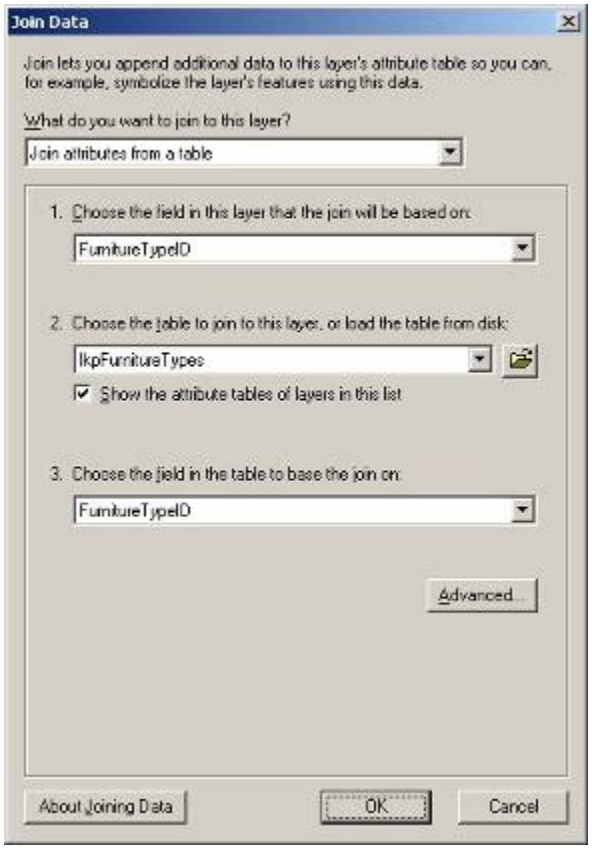
Having all of the furniture on the map is nice, but kind of useless when the different types share the same icon. To fix this, you need to add some tables to ArcMap and perform some joins on these tables.

The type of furniture (table, bench, trash) is actually an ID number. There is a lookup table which specifies what each of these numbers stands for. The lookup table is in the Parks Database, as well as the data table. Because of this, you need the lookup table and the data table. For furniture, you must add lkpFurnitureTypes and tblFTRFurniture. To do this, click the Source tab on the bottom left of ArcMap, then click File->Add Data. Navigate to Parks Database.mdb; then add lkpFurnitureTypes. Repeat the process for tblFTRFurniture.

Joining the tables

First you need to join the lookup table with the data table so that the furniture types will be displayed, instead of the ID numbers.

1. Right-click on tblFTRFurniture, then click Joins and Relates->Join.
2. In the dialog: For part 1 choose FurnitureTypeID; for part 2 choose lkpFurnitureTypes; for part 3 choose FurnitureTypeID. Then click OK.
3. Switch back to the display tab.
4. Right-click on the Furniture_TEST layer, then click Joins and Relates->Join.

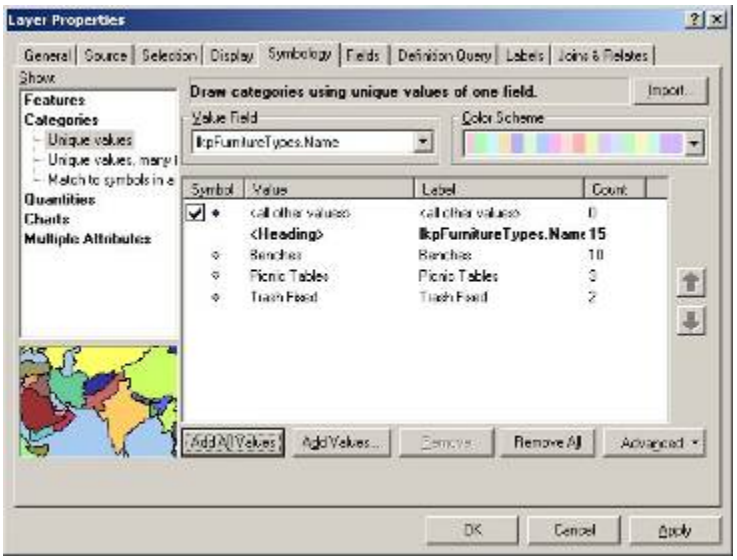


5. For part 1 choose FurnitureID; for part 2 choose tblFTRFurniture_lkpFurnitureTypes (this is the joined table you just created); for part 3 choose tblFTRFurniture.FurnitureID. Then click OK.

These steps enable us to distinguish between the different types of furniture, which will allow us to give them different icons.

1. To do this, right-click on the Furniture_TEST layer, then click Properties.
2. In the Layer Properties dialog, click the Symbology tab.
3. To the left there is a list box labeled “Show”. Click Categories, and under this click Unique values.
4. There is a box labeled Value Field. In here choose the last item, which will be lkpFurnitureTypes.Name.
5. Click the Add All Values button.

You should now have a dialog that looks like the one below. You can see that there are 10 benches, 3 picnic tables, and 2 fixed trash barrels. This is correct, and a good way to check that you are doing things correctly. Uncheck the <all other values> check box. Click OK.



Now each type of furniture has its own icon. It would be nice if the individual types could be hidden and shown separately, but this is not possible with the current setup. The solution you are using for this is simple.

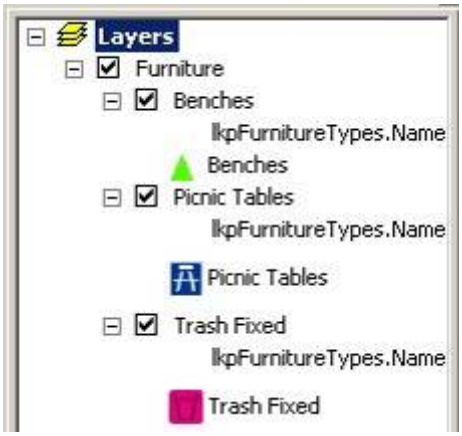
1. First, right-click on Layers at the top of the Display pane, then click New Group Layer.
2. Right-click on the new item, then click Properties.
3. In the dialog, change the layer name to Furniture, then click OK.
4. Drag the Furniture_TEST layer into this group layer.
5. Next, right-click on this layer and click Copy; then right-click on the Furniture group layer and click paste. Do this twice.

Steps 6 – 8 describe the process of changing each layer's symbol. The bench layer is the only layer that requires a font. The rest of the icons are in the built-in lists, and can be found in the appendix at the end of the manual.

6. For each layer:
    a. Go to layer properties, then the Symbology tab.
    b. If it is not already showing the categories, click Categories.
    c. Click on Picnic Tables, then Remove. Do the same for Trash Fixed.
    d. Now double-click the icon next to Benches. Click the Properties button.
    e. In the Type field, choose Character Marker Symbol.
    f. Change the font to ESRI US MUTCD 2.
    g. Change the Unicode number to 196, set the size to 11, the angle to 90, and the color to Medium Apple.
    h. Click the OK button on all three dialogs.

i. Now change the layer name to Benches.

7. Repeat the same process for the next layer, leaving all but Picnic Tables in the list.
    a. Double-click on the icon.
    b. Under More Symbols, click Civic.
    c. Choose the Picnic Area 2 icon. Click OK on the two dialogs.
    d. Change the layer name to Picnic Tables.
8. Finally, for the last layer, leave everything but Trash Fixed in the list.
    a. Double-click its icon.
    b. Under More Symbols, choose Forestry.
    c. Under Category, choose Facilities.
    d. Choose the first icon, which is Drinking Water.
    e. Change the color to Black, and the size to 13.
    f. Click OK on both dialogs.
    g. Change the layer name to Trash Fixed.

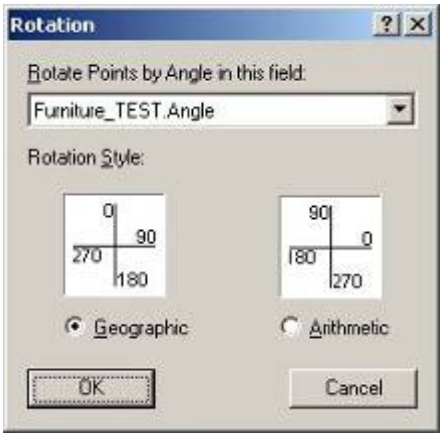


Rotating the benches

The final step with the furniture layer is to rotate the benches. First you need to tell ArcMap which field to use for rotation.

1. Right-click the benches layer and click Properties.
2. Switch to the Symbology tab. Click Categories.
3. Click benches (this should be the only item in the list).

4. Click the advanced button, then click Rotation.
5. Change the item in the box from <None> to Furniture_TEST.Angle.
6. Click OK on both dialogs.

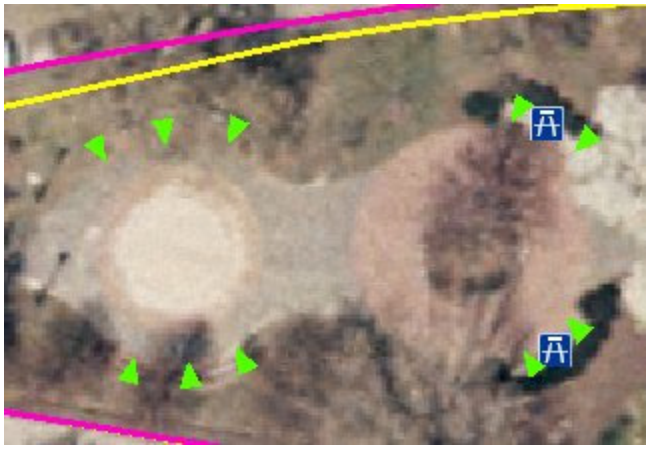


And now to change the angles:

1. Start editing again, choosing the ParkInv.mdb database.
2. For each bench, click on it, then click the attributes button.
3. Let's start with the first bench you added. The benches around the sandbox face the sandbox, so that is what you will rotate it to do. An angle of 150 seems best for this bench. Enter 150 into the angle field.
4. Repeat steps 2 and 3 for each bench, choosing the angle that looks best.

   Tip: Negative angles can be used.

Your map should look similar to the following.



Stop editing and save your edits.

The same steps are required for the utilities layer. This includes adding the joins and creating the group layer. However, nothing else needs to be rotated. The table names and icons will be different, but the process is the same.

All layers are required to be joined to the corresponding tables to provide the link to the database. However, only the furniture, utilities, and sitecontrol2 layers must be put into group layers with separate icons.

Creating a printable map

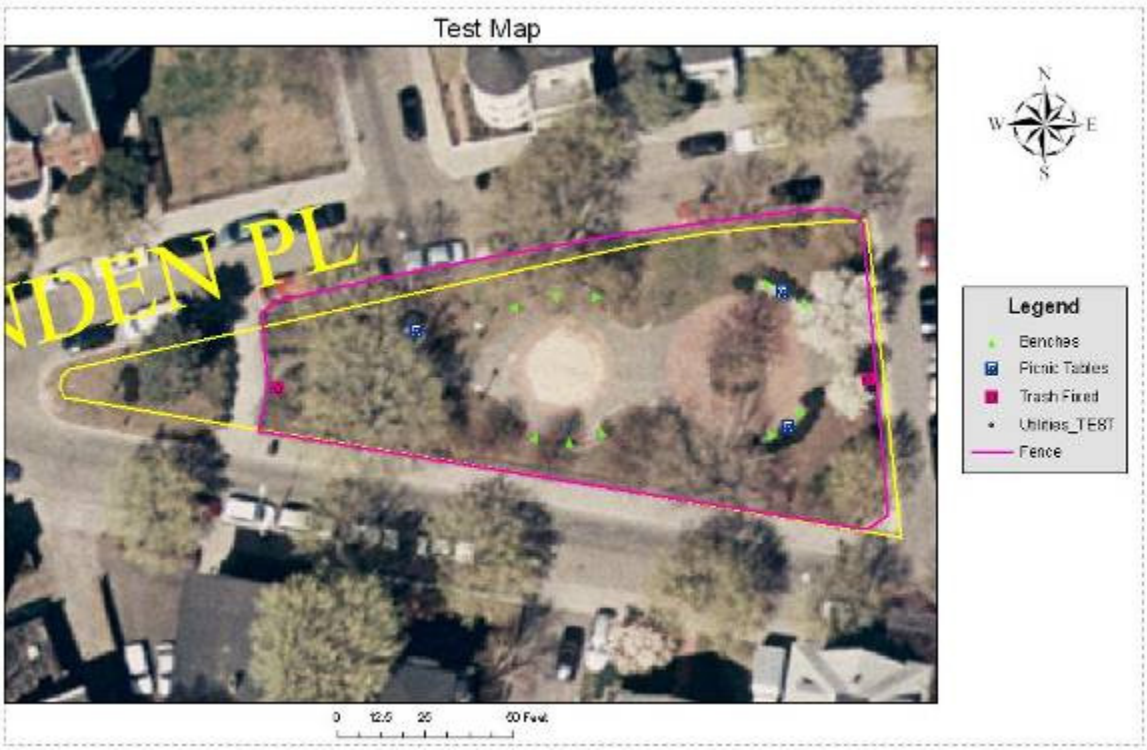
The data view is great for seeing the data, but not so great for printing a map. The layout view is more suitable for this, providing tools allowing for titles, scales, legends, and north arrows, among other things.

Setting up the layout

1. To switch to the layout view, click View->Layout.
2. Linden Park has more of a horizontal shape, so a landscape layout is best. Click File->Page and Print Setup. In this dialog, change the size to 11x17 and the orientation to landscape. Click OK.
3. Resize the map portion to take up most of the space, leaving a small margin at the top and bottom for the title and scale, and a larger margin on the right for the legend and north arrow.
4. Insert a title by clicking Insert->Title. Change the text to Test Map, then center it at the top of the page.
5. Click Insert->North Arrow to select a north arrow. We have chosen ESRI North 7. Select this and click OK. Move the arrow to the top-right corner and resize it as you see fit.

6. Click Insert->Legend to insert a legend.
    a. In the legend wizard, remove OpenSpace and Mosaic.sid. You don't need these in the legend. Click Next.
    b. Under Title Justification, choose to center the title, then click Next.
    c. For the border choose 0.5 Point, and give it a Grey 10% background. Then click Next twice, and finally finish.
    d. Right-click on the legend, then click Properties. In the Legend Items list select all of the items, then click Style. Choose the third choice (Horizontal Single Symbol Label Only), then click OK.
    e. Using the vertical arrows, reorder the items in the legend so that they are in ascending alphabetical order. Click OK.
    f. Move the legend into the right margin, resizing either the map or the legend so that they fit nicely. The legend is dynamic, so any layer names or icons that you change will also change in the legend.
7. Finally you insert the scale by clicking Insert->Scale Bar. Choose the first one, then click OK. Resize the scale bar, then center it at the bottom of the page.

You should now have a layout that looks like the following.



Depending on the particular map, a portrait view may be used, but the steps are still the same.

APPENDIX C

Interview with Beverly Droz

Newton Director of Human Services & ADA Coordinator

Monday, April 10, 2006

History

- Newton has Mayor's Commission for People with Disabilities
    - Commission has been active for 30 years and meet monthly
- Issues the Commission handles
    - Planning and development program and funding
    - Community Access- What needs to be fixed?
        - Elements that the city knows what and when to fix because they are "city owned"
        - Curb cuts, sidewalks, pedestrian crossings, signals etc.
- Citizen Issues
    - Call-ins from handicapped people
        - Recommendations and complaints as to what needs to be fixed

Complaint Forms

- Newton presently has multiple forms that can be accessed on the internet (www.ci.newton.ma.us)

Process

- When Beverly receives a complaint:
    1. It is tracked within her office

2. She consults her co-worker from the Planning and Developing Department
3. General complaints are also handled by their Inspectional Services Liaison Lowell Haynes (ramps to stores, walkways etc.)
4. Once the investigation is considered, Beverly handles the resolution and informs the concerned citizen that their complaint is in process
5. Beverly then filters the problem and proposed resolution to the appropriate department

Parks and Recreation Department

- Evaluations of how parks can be more accessible
- Example of safe and accessible park in Newton: Albermarle Playground
- There is not a set time frame as to how often parks are renovated
- Example of park that needs to be renovated: Playground located adjacent to Mason Rice Elementary School
- Major Park in Newton: Cold Springs
- During the months of July through October, Newton holds an open air market that is completely accessible
- Parks and Recreation Department works closely with Mayor's Commission of People with Disabilities and addresses their "To Do" list
- Normally, they are on top of what needs to be fixed

Law Department

- Newton has a great resource in their law department to refer to
- When there are legal issues in question, they can always consult with their legal department

Board of Aldermen

- Comprised of 24 members
- Biggest in Massachusetts

APPENDIX D

Interview with Michael J. Muehe

Cambridge Executive Director Commission for Persons with Disabilities/ADA Coordinator

Tuesday, April 18, 2006

Commission for Persons with Disabilities

- Comprised of staff members and volunteer citizens
- Meet on a monthly basis
- Duties
    - General reference for disabled citizens regarding issues such as parking requirements, transportation etc.
    - Work in conjunction with Cambridge City Government to ensure all city programs are accessible
    - Consultants for private sectors such as: training sessions and technical assistance

Programs

- Facade Improvement Program (Community Development Program)
    - Example: If a business spends up to $35,000 on their store front, the Façade Improvement Program will match that as long as the store front is now ADA accessible
- Accessible Taxi Cabs
    - Cambridge has seven mini-van type accessible taxi cabs

    - Implemented this program due to the costly expenses of "Private Chair Cars"
- Inter-department Open Space Committee
    - Attendees
        - Department of Public Works
        - Water Department
        - Community Development Department
        - Commission for Persons with Disabilities
    - Address various issues
        - Park accessibility
        - Curbing
        - Ramps

Complaints

- Forms
    - Reasonable Accessibility
    - Grievance

Process

- Very few complaints come intro Michael
    - Typically the same people
- Case by case approach
- Sent out to appropriate department

Cambridge Request System

- Computer-based form
- Linked to Cambridge's GIS System
- Process
    - Indicate specific complaint and its location
    - System will e-mail which staff member that is responsible
    - Progress will be tracked
    - Regular reminders will be sent to staff member until problem is resolved

After the interview was completed, Ryan and Katie visited a local park with Michael called Reginald Wilder Playground. Topics specific to that particular playground were discussed.

APPENDIX E

Interview with Professor Malcolm FitzPatrick

Civil & Environmental Engineering Department

1. Have you ever used GIS and if so, how would you describe its uses?

A: Well have you heard of Earth Google? Basically, GIS's functions depends on its use. It makes "data layers." For example, you can have street layers, tree layers, house layers. You can layer them all at once or perhaps you could just have trees and houses displayed. On a more advanced level, you could have street conditions and layer it by good street conditions, fair street conditions, and poor street conditions. Have you seen Fabio Carerra's Thesis? It deals with that sort of thing. The GIS System can help tremendously with design.

2. In your opinion, what is a parks' role in urban planning?

A: Their uses entail protecting natural garments such as trees and waterways. They serve as a respite from an urban environment where people can get exercise, go for a picnic etc. The parks serve as linkages for people to travel from one place to another.

When a city or environment has many parks, a much higher density is allowed which can also lead to mass transportation.

3. We've been looking a lot into the demographics of Brookline, what affect does demographics have on the parks?

A: The only conflicts that I could see arising with parks in conflicts of usage. For example, rollerbladers vs. mothers with baby carriages. I think it's every town and

city's intention to be able to include the entire community but sometimes that is not always possible.

When I think of parks I think of a various amount of things such as large open spaces to neighborhood parks that include not only "neighborhood" use but regional use. Parks should be somewhere where both young and older people can mingle among each other.

You know, some studies have even shown that in some areas land right next to parks decrease in value due to acts of vandalism etc. Despite that study in general, a park improves the overall value of a neighborhood as long as it's far enough away from the park itself.

4. What characteristics does a park need to be great?

A: The parks' safety, maintenance, esthetics, and what specifically the park is known for. Like the park in the North End that people always play chess and bocce ball in. Also, it always helps the atmosphere of a park when there are snack or concession stands or something of that variety.

5. Do you have any reference recommendations for us?

A: The Journal of American Planning Association, Town and Country is a British Journal (Prof. wasn't sure if that was the name), and Land and Recreation Society.

6. Have you ever had to accommodate to the ADA and what have been your experiences with it?

A: Yes I have and my only recommendation is to abide by it! The ADA can get confusing because there's so many different levels of it. It's good to get a landscape architect who knows the ins and outs of the ADA.

APPENDIX F

Interview with Juanita Mincey

Boston ADA Coordinator

Wednesday, April 19, 2006

History

- ADA, Human Rights and Civil Rights are all one concept
- ADA in parks is still a working process
    - Other issues need to be handled: employment, housing etc.
- Accessibility is a necessity
- Getting outside of your house is a necessity when one is handicapped
- Accessible parks should be a place to reassure disabled persons that their disability is not *all* of them, only a part
- Accessible parks
    - Meditate
    - Different frame of mind
    - Necessary for better health
    - Enables to change from one environment to another
- Important Accessible Features
    - Water Fountains
    - Tables
    - Benches
- Water Features are ideal

- Problems within accessible parks
    - Holes
    - Bricks
    - Bridges
    - Gravel
    - Grass
- Access and Design
    - Difference within drawings and regulations and its implementation
    - Landings
    - "Learn by doing" process is what really works
    - Massachusetts one of the most stringent states in the U.S. for applying federal regulations
        - With this comes numerous pressures

Complaints

- Does not receive many complaints in relation to their parks
- Numerous phone calls are parents and citizens inquiring as to where the accessible parks are
- Anything built in the city of Boston has to approved by the ADA Department
- It will not be built unless it has a "stamp of approval"
- Historical sites in Boston try to "sneak by" some of the ADA regulations
- Boston does not have a Disabled Person Commission
- Boston does not have a complaint form for its citizens to complete

Process

- Complaints are received by telephone, then computerized
- Mayor does not believe in voice mail
    - Staff are to be available at all times
    - Should talk to a person, not a machine
- Mayor's 24 Hour Hotline
- Mandatory to respond with 24 hours of a complaint
- When complaints are anonymous, the response process does not need to be as timely
- Citizens sometimes have unreasonable expectations
- ADA Department never makes any promises, nor do they try to "sugar-coat" issues
    - Makes the process a lot easier

Examples of Complexity of ADA Process

- Chares River Park area are extremely particular
- Parties involved in CRP construction
    - Commissioner
    - Community residents
    - Public meetings
    - BRA
- Elevator needs to be installed in State House
- Four Committees just for this issue

APPENDIX G

Interview with Stephen Bressler
Brookline ADA Coordinator

Monday, April 3, 2006

1. How many complaints are received per year?
    - I receive fewer than a handful complaints a year, but that doesn't mean the other departments receive complaints.

2. Who receives most of the complaints?
    - Sometimes the people contact the source directly, the town webmaster, Commission for the Disabled, walk-ins, phone calls to the state, Massachusetts Commission for Disabled or throughout the community.

3. If a complaint were to come to town hall, would it ultimately be channeled to you?
    - It is channeled to the Department Head that would have to deal with the issue.

4. How are they documented?
    - We file the complaint forms. Sometimes cases become a "he said, she said" situation.

5. Are they public? If so, where can they be accessed?
    - Yes, the complaint forms that are filled out are kept on file.

6. Is the ADA Transition Team still active? If so, how can they be reached?
    - Yes the team is ongoing. The team meets periodically. Topics such as: packed gravel, traffic lights, and pedestrian lights with audible signals (particularly on Beacon St.)

Discussion

- I meet periodically with the DPW among the several departments. We try to accomplish a self-evaluation.
- Complaints
    - After winter, around now, we receive a lot more complaints because of the effect of the weather on the outdoor equipment
    - Mobility problems with slopes of ramps and cracks in ramps
    - People with hand disabilities: have problems with railings, gates rusting etc.
- Construction
    - Sometimes when there are a lot of things wrong with the park, it might not be worth to fix because it is just going to be torn up and done again
    - Pounds of pressure needed to be put on gates is a problem for people with hand disability
    - Gravel and Fibar issues: some people like it, some people don't
- Halls Pond

    - Competing interests
    - Can't exactly black top a sanctuary so wheelchairs and crutches can use it
    - Parents want their children to have the full experience
    - Always complaints about "getting the full experience"
    - Try to make accessible as possible: DVDs, videos, internet etc.
- Where Stephen Bressler fits in
    - Facilitate resolution of complaint
    - Cooperation among all parties involved
    - Every case is unique
    - Never an easy fix
- Examples
    - School for brain-damaged teens
        - Wanted a path of travel which meant the walkway would have to be modified in a national historic area which was not feasible.
        - Blasting, a lot of money and altering the area's character would be involved

APPENDIX H

REGULATORY NEGOTIATION COMMITTEE ON ACCESSIBILITY GUIDELINES FOR OUTDOOR DEVELOPED AREAS – GUIDELINES EXPLAINED THAT PERTAIN TO BROOKLINE, MA

CONTENTS

PREFACE

What this section is designed for is to help simplify Sections 16, Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas. It is not a section of regulation that pertains to ADA issues but the guidelines as stated by the ADA commission in 1999. This entire appendix is a summary of Section 16, and none of it is written by the authors of this paper, except some examples pertaining to Brookline. Some sections from the original document have been omitted because they do not pertain to Brookline or most city areas. Sections related to campgrounds and campground related materials such as fix pitted toilets, fire rings, utility sinks, and rinsing showers have been excluded from this document. This document is referred to several times in the data and analysis chapter, which will help the reader to understand the ADA regulations.

SECTION 16

Outdoor developed areas covered in this section shall comply with the applicable requirements of section 4 and the special applications sections, except as otherwise modified in this section. The following document is guidance to provide and assist designers and operators of these outdoor facilities

SLOPE AND RISE

Slope represents the proportion of vertical rise to horizontal length and can be represented as a ratio, percentage, pitch or in degrees.

Rise:length	percent	pitch (tangent)	degree
1:8	12.50%	0.1250	7.13

1:10	10	0.1000	5.71
1:12	8.33	0.0833	4.76
1:13	7.69	0.0769	4.40
1:14	7.14	0.0714	4.09
1:15	6.67	0.0667	3.81
1:16	6.25	0.0625	3.58
1:17	5.88	0.0588	3.37
1:18	5.55	0.0555	3.18
1:19	5.26	0.0526	3.01
1:20	5.00	0.0500	2.86
1:50	2.00	0.0200	1.15

16.1– GENERAL

All newly designed and constructed pedestrian trails, altered portions of existing pedestrian trails connecting to designated trailhead or accessible trails shall as well as all newly designed and constructed parks, playground equipments, facilities, and picnic areas shall comply with this section (Section 16).

Routine or periodic maintenance activities do not trigger the technical and scoping provisions of section 16. For example, if an entirely new bridge were installed to replace a step stone crossing, the bridge would be required to comply with the relevant provisions of Section 16. However, the trail on either side of the new bridge would not require modification.

As a general rule, alterations are performed to change the original purpose, intent, or design of a facility. Examples of actions that would be considered alterations include, but are not limited to:

1. Installation of a new trail tread surface, bridge, boardwalk, railing, safety barrier, signage, and/or puncheon(plank road)
2. Construction, reconstruction, or installation of a new trail segment, new built features such as restrooms or picnic areas, bridges, gates, benches, safety barriers, and/or steps
3. Removal of existing features
4. Hardening of trail surfaces
5. Rerouting or widening a significant portion of an existing trail

Maintenance and repair are performed to return a facility to the standards or conditions to which it was originally designed and built. This type of work is not an alteration because it does not change the original purpose, intent, or design of the facility. It is recognized that in outdoor environments, the ability to maintain the facility is usually much more limited than in the built environment. Except in highly developed areas, maintenance and repair occurs relatively infrequently. Examples of actions that would be considered maintenance and repair includes, but are not limited to:

1. Removal of debris and vegetation such as downed trees or broken branches in the trailway, clearing the trail of encroaching brush or grasses, and/or removing rock slides
2. Maintenance of the trail tread such as filling of ruts and entrenchments, reshaping the trail bed, repairing the trail surface and washouts, installing rip rap (rock placed to retain cut and fill slopes), and/or constructing retaining walls or cribbing to support the trail tread

3. Replacing or installing necessary drainage structures such as drainage dips, water bars, or culverts, and/or realigning sections of trail to deter erosion or avoid boggy/marshy areas; and
4. Repair of trail and/or trailhead structures, including painting, removing graffiti, and/or replacement of deteriorated, damaged, or vandalized parts of structures such as sections of bridges, boardwalks, information kiosks, fencing, and/or railings.

16.1.1 – Extent of Application

Departures from specific technical provisions of this section shall be permitted where specified, and where at least one of the following conditions is present. You will see many EXCEPTIONS in this document that will refer to this section, but it is important to remember that the conditions in this section do not prevent or limit in any way obligations to comply with 16 at any point that the conditions are not present.

16.1.1.1 - Cultural, Historic, Religious, or Significant Natural Features or Characteristic

Where compliance would cause substantial harm to cultural, historic, religious, or significant natural features or characteristics. Examples of these conditions include:

1. Areas protected under Federal, State, or local laws.
2. Species designated as threatened or endangered.
3. Designated wetlands that could be threatened or destroyed by full compliance with the technical provisions.
4. Burial grounds and cemeteries.

5. Significant historical features may include properties on or eligible for the National Register of Historical Places or other places of recognized historic value.
6. Significant religious features may include sites sacred to Native Americans and other properties designated or held sacred by an organized religious belief or church.
7. Significant natural features may include a large rock outcrop or a unique water feature.

16.1.1.2 – Alteration of the nature of the setting or the purpose of the facility, or portion of the facility

Where compliance would substantially alter the nature of the setting or the purpose of the facility, or portion of the facility. Examples of these conditions include:

1. Trail intended to provide a rugged experience such as a cross country training trail with a steep grade or a challenge course with abrupt and severe changes in level.
2. Where compliance with certain provisions would not provide the intended and desired level of challenge and difficulty to users.
3. Trails that traverse over boulders and rocky outcrops where the purpose of the trail is to provide people with the opportunity to climb rocks. To remove the obstacles along the way or reroute the trail around the rocks would destroy the purpose of the trail.

Furthermore, compliance is not intended to negatively impact the unique characteristics of the natural setting.

1. People using primitive trails, for example, expect to experience the outdoor environment in a more natural state with limited or no development.
    a. Evidence of manufactured building materials or engineered construction techniques in such a setting could change its primitive character, and therefore, the user's experience. In these settings, compliance with specific technical provisions, for example those related to surface and tread obstacles, could destroy the 'natural' or 'undeveloped' nature of the setting. Actions may also compromise the 'nature of the setting' such as constructing an imported surface on a trail in a remote location or removing ground vegetation in meadows or alpine areas.

16.1.1.3 - Compliance would require construction methods or materials that are prohibited by federal, state, or local regulations or statutes

Where compliance would require construction methods or materials that are prohibited by federal, state, or local regulations or statutes. Examples of these conditions include:

1. Federally designated and some State designated Wilderness Areas prohibit the use of mechanized equipment, limiting construction methods to hand tools.
2. Imported materials may be prohibited to maintain the integrity of the natural ecosystem.

    a. NOTE: This provision is not intended to automatically exempt organizations restricted under regulations or statutes from the technical provisions specified in Section 16.

3. Aquatic features protected under Federal or State laws have limited allowable construction practices.
    a. For example, constructed water crossings required under the technical provisions might not be permitted under certain laws or regulations. Construction methods and materials employed in designated wetlands or coastal areas are also strictly limited.
4. Local regulations and statutes address conditions where "conservation easement" or "development rights" programs prohibit or restrict construction methods and practices.
    a. For example, where land is purchased from farms, certain use restrictions may prohibit the importation of surfacing materials. On the other hand, local regulations or statutes may not be developed or initiated with the sole purpose of prohibiting use by people with disabilities. For example, initiating a new local regulation that arbitrarily restricts trail width to a dimension that would not allow passage of wheelchairs or other mobility devices is not permitted under this conditional departure.

16.1.1.4 - Where compliance would not be feasible due to terrain or the prevailing construction practices.

The term "not feasible" is used in this situation to specify what is "reasonably do-able." It does not refer to the technical feasibility with the technical provisions.

1. EXAMPLE 1: Providing a trail with a 1:20 slope or less up a 1,500 foot tall mountain using heavy construction equipment may be feasible, but the trail would be at least 5.8 miles long (rather than 2 miles long under a traditional back-country layout), and may cause inappropriate environmental and visual impacts. The intent of this conditional departure is to recognize that the effort and resources required to comply would be disproportionately high in relation to the level of access created. Although technically feasible, the effort and resources required are not "reasonable."
2. EXAMPLE 2: Complying with the technical provisions, for running slope (16.2.7) in areas of steep terrain may require extensive cuts or fills that would be difficult to construct and maintain, or cause drainage and erosion problems. Also, in order to construct a trail on some steep slopes, the trail may become significantly longer causing a much greater impact on the environment. Certain soils are highly susceptible to erosion. Another example might be in areas where soils expand and dramatically contract with water content. If compliance requires techniques that conflict with the natural drainage or existing soil, the trail would be difficult, if not impossible, to maintain.

This condition may also apply where construction methods for particularly difficult terrain or an obstacle would require the use of equipment other than that otherwise used throughout the length of the trail (i.e., techniques different from prevailing construction practices).

1. EXAMPLE: Requiring the use of a bulldozer to remove a rock outcropping when hand tools are the commonly used method of construction for that trail.
2. EXAMPLE: Where compliance with the provision for a firm and stable surface conflict with the prevailing construction practices by requiring the importation of a new surfacing material that would not otherwise have been used. If the prevailing construction practices would not include the importation of a new surface material and the natural surface material could not be made firm and stable, the trail would not be required to comply with that specific provision.

Trail construction practices vary greatly, from the use of volunteer labor and hand tools, to professional construction with heavy mechanized equipment. For alterations to an existing trail, the "prevailing construction practices" are the methods typically used for construction or maintenance of the trail. The available resources and the environmental conditions (e.g., soil type and depth, vegetation, natural slope) primarily determine the "choice" of construction practices (e.g., machinery, skilled operators, finances). The intent of this conditional departure is to ensure that compliance with the technical provisions does not require the use of construction practices that are beyond the skills and resources of the trail building organization. It is not intended to automatically exempt an

organization from the technical provisions simply because of a particular construction practice, (e.g., the use of hand tools) or to suggest that hand tools can be selected as the tool of choice to avoid compliance when more expedient methods and resources are available.

16.2 – TRAILS

Definition: What is a Trail?

A trail is a route that is designed, constructed, or designated for recreational pedestrian use or provided as a pedestrian alternative to vehicular routes within a transportation system. A trail does NOT include trails primarily designed for equestrians, mountain bicyclist, snowmobile users, or off-highway vehicle users, even if the pedestrians may occasionally use the same trails. Trails include, but are not limited to, a trail through a forested park, a shared use path, or a back country trail. Trails covered by 16.2 do not include pathways such as sidewalks, pathways in amusement parks, commercial theme parks, carnivals, or between buildings. These exterior accessible routes are covered by ADAAG 4.3.

Definition: What is a Designated Trailhead?

A designated trailhead is a designated point of access that may contain a parking area, information kiosks, restrooms, water hydrants, and may be reached by vehicular or pedestrian access.

Definition: What is a Tread Width?

The tread width is the path or visible trail surface perpendicular to the direction of travel. The clear tread width of the trail is the width of the useable trail tread, measured perpendicular to the direction of travel and on or parallel to the surface of the useable trail tread. The minimum clear tread width is the narrowest measurement on the useable trail tread.

16.2.1 Surface

DEFINITION: What is a firm surface?

A firm surface is that of which does not give way significantly under pressure, i.e. walking in it. An example of firm surface would be an asphalt walkway, and an example of a non-firm walkway would be of sand or loosely packed earth.

Firmness classification

Firm

- Very Firm = 0.3 inch or less penetration
- Moderately Firm = greater than 0.3 and less than 0.5 inch penetration

Not Firm = greater than 0.5 inch penetration

DEFINITION: What is a stable surface?

A stable surface is a surface that does not shift from side-to-side when turning on it. An example of this is a stable surface is a asphalt walkway, and a non-stable surface would be made of sand or loosely packed earth

Stability classification

Stable

- Very Stable = 0.5 inch or less penetration
- Moderately Stable = greater than 0.5 and less than 1.0 inch penetration

Not Stable = greater than 1.0 inch penetration

Test Method for Firmness and Stability

The following test methodology is based on a preliminary test procedure for the measurement of surface firmness and stability which is one of the ways that firmness and stability can be measured. For more information, consult the "Accessible Exterior Surfaces Technical Report" available through the U. S. Access Board.

Test Equipment

The recommended test equipment for determining firmness and stability on outdoor surfaces is the rotational penetrometer, a device consisting of three main components: penetrator, frame, and reference base. The penetrator consists of an 8 x 1¼ inch (20 cm x 3 cm) pneumatic caster and a means to press the caster into the surface with a known force. The frame is an attachment to the reference base that provides a

means for allowing the penetrator to move freely, perpendicular to the reference base. The reference base is a flat, rigid, surface used to position and anchor the testing equipment relative to the test surface. It has an area through which the penetrator can pass and rotate freely without hindering the movement of the surface material being tested or interfering with the test results. The reference base may also provide a platform for the device operator during testing. The rotational penetrometer is instrumented with a method to measure the amount of vertical displacement of the penetrator into the test surface.

Test Procedure

To test surface firmness and stability, the rotational penetrometer is placed on the surface to be tested. A person stands on the reference base of the rotational penetrometer to stabilize its position during testing. The penetrator is lowered onto the test surface and an initial vertical displacement measurement is taken. A load of 44 ± 1 lbs. (20 ± 0.5 kg) is applied to the penetrator and then a second measurement of the amount of vertical displacement is completed. Then, with the load still applied, the penetrator caster is rotated through four 90 degree rotations about an axis perpendicular to the surface, alternating the direction of rotation (clockwise, counter-clockwise) after each 90 degree rotation. The final amount of vertical displacement is then measured. This test procedure is repeated on the same surface in a different test area until a total of five trials have been completed.

16.2.1 Requires that the surface of accessible trails to be firm and stable.

1. Trails however do not have to be slip-resistant because it can not be guaranteed on an outdoor environment because of factor such as leaves rain and ice.

2. Examples of a firm surface that can comply with this are a concrete or asphalt path, and packed soil.
3. A firm and stable surface can also be naturally occurring surface with some type of stability agents such as wooden planks, stone, grass and packed dirt.
4. EXCEPTION: This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies

16.2.2 – Clear Trail Tread

A clear trailhead requires that the width of a trail be at the least 36 inches of clear space that has a solid and firm surface.

1. EXCEPTION: Allows for a 32 inch minimum width if one of the provisions from 16.1.1 applies to a path
2. EXCEPTION: Allows for departure from the 32 inch minimum from the previous exception if the width of the path can not be provided because of one or more of the conditions stated in 16.1.1

16.2.3 – Openings in the Surface of a Trail

Requires that if you have an opening in a path, like a drain for example, that it can not allow the passage of a ½ diameter object to pass threw it.

1. Elongated opening must be placed so that the elongated opening are placed perpendicular or diagonal to the dominate direction of travel.
2. EXCEPTION 1: Elongated opening can be parallel to a path if the do not allow the passage of a ¼ inch diameter object.

a. Example – A wooden path like a bridge or a walkway, over some wetlands.

3. EXCEPTION 2: Allows for opening of ¾ inch diameter where one or more conditions of 16.1.1 apply.
    a. Example – A Wooden path needs proper room for expansion and contraction because of weather conditions, and for proper drainage. A ½ inch open space may be normal, but during the winter or colder months, the boards will contract, and the opening will be more than ½ of an inch.
4. EXCEPTION 3: Allows for departure from this provision if a ¾ inch diameter opening is not feasible due to at least one of the four conditions of 16.1.1.

16.2.4 – Protruding objects

Requires that all protruding objects on a trail, i.e. signs, trees, other such objects, shall have a minimum of 80 inches of clear head room.

1. If a object has less than 80 inches of clear head room because of one of the four condition of 16.1.1, then there must be some type of barrier to warn the blind or visually impaired of the low height of the object.
    a. This allows for a trail to pass threw things like caves or ledges to provide these experience to disabled people.
2. THERE IS NO DEPATURE FROM THIS PROVISION

16.2.5 – Tread Obstacles (Changes in Level)

Requires that no tread obstacle shall exceed a maximum of two inches in height. Tread obstacles are natural features, such as roots, rocks, and ruts that cannot be avoided.

1. EXCEPTION 1: Permits of height of three inches where a running and cross slopes are 1:20 or less.
2. EXCEPTION 2: Permits the height of more than three inches where a condition in 16.1.1 applies.

16.2.6 – Passing Space

Require that a passing space be provided where the clear tread width of a path is less than 60 inches every 1000 feet maximum.

1. A T-shaped intersection or a turning circle is all so permitted in this proposition.
2. CONSIDERATION: The provision of more frequent passing spaces should also be considered in areas with steep or difficult terrain or limited sight lines, so that users do not have to back up long distances to reach a passing space.
3. CONSIDERATION: More frequent passing intervals should also be considered on trails with heavier use, especially closer to trailheads and prominent features.
4. If a bridge that is less than 60 inched wide is provided, a 60 x 60 inch minimum passing space should be provided at either end of the bridge.

5. Passing intervals may be located to one side of the trail and/or co-located with resting intervals.
6. EXCEPTION: Permits departure from this provision where clear space can not be provided because of one or more of the conditions provided in 16.1.1.

16.2.7 – Slopes (Cross and Running Slopes)

Definition: What is a cross slope?

A cross slope is the slope that is perpendicular to the direction of travel, i.e a slope from side to side.

Definition: What is a running slope?

A running slope is the slope that is parallel to the direction of travel, i.e. a slope in the middle of a path leading to a drain.

16.2.7.1 will address cross slope, an d 16.2.7.2 will address running slopes

1. EXCEPTION 1: Open drain structures
    a. A running slop of 14% is permitted for a distance of 5 feet maximum with a cross slope of 1:20
2. EXCEPTION 2: Cross slopes at the bottom of an open drain is permitted to be 1:10 where the clear tread width is 42 inches or more.
3. EXCEPTION 3: Permits departure from 16.2.7 where one of more conditions of 16.1.1 exists.
4. Handrails are not required on trails, no matter the slope, instead of handrails, the use of resting intervals are used.

16.2.7.1 – Cross Slope

Requires that the maximum cross slope of a trail segment be at maximum 1:20. Trail cross slope is the angle of the trail tread perpendicular to the direction of travel (the side to side slope of the trail). The recommended unit of measurement is percent or rise over run (e.g., 2% or 1:50). Cross slope measurements should be determined across a 24 inches width, at intervals not exceeding 100 feet in length, from the trail head to the destination. Cross slope measurements are taken perpendicular to the path of travel over the most level section of tread at each point.

16.2.7.2 – Running Slope

Requires that trail segments shall comply with one or more of the provisions of this section, and no more than 30% of the total length of the train shall exceed a running distance of 1:12. The running slope represents the steepness of individual segments of the trail and should be measured parallel to the direction of travel. The recommended unit of measurement is percent or rise over run (e.g., 2% or 1:50). Uphill and downhill trail segments should be measured separately. The distance measured may be as short as 10 feet, but should not exceed 100 feet in length. The running slope should be measured for each consecutive trail segment, from the trail head to the destination.

16.2.7.2.1

Permits a running slope of 1:20 or less for any distance.

16.2.7.2.2

Permits a running slope of 1:12 maximum for 200 feet maximum Resting intervals complying with 16.2.8 (Resting Intervals) should be no greater than 200 feet apart.

16.2.7.2.3

Permits a running slope of 1:10 maximum for 30 feet maximum. Resting intervals complying with 16.2.8 (Resting Intervals) should be no greater than 30 feet apart.

16.2.7.2.4

Permits running slope of 1:8 maximum for 10 feet maximum Resting intervals complying with 16.2.8 (Resting Intervals) should be no greater than 10 feet apart.

16.2.8 – Resting Intervals

Requires that resting interval be 60 inches in length and as wide as the widest portion on the trial segment leading to the resting interval.

1. Resting intervals should be provided between uphill and downhill trail segments if the running slope for either segment exceeds 1:12, as well as at intervals on a continuous slope as specified by 16.2.7.2 (Running Slope).
2. Rest intervals should be positioned so that a smooth, gradual transition is provided between running slope segments.

3. Rest intervals may be located within the trail tread. However, locating the rest interval outside of the main path of travel will ensure that users who are resting are not at risk of collisions with other trail users.
4. EXCEPTION: Permits departure from this condition where at least one of the conditions are meet in 16.1.1.

16.2.9 – Edge Protection

Does not require edge protection to be on accessible trails.

1. Where provided however, must be a minimum of 3 inches in height.
2. The higher edge protection is required because trail surfaces are likely to have natural variations in the height of the surface. As a result, people with limited vision using navigation canes may search or scan at a higher level in natural outdoor environments than they would in an indoor environment. The higher edge protection will assist in its detection and identification and help to distinguish it from variations in the natural surface of the outdoor environment.

16.2.10 – Signs

Requires signs on all newly constructed or altered trails and trail segments that they comply with all the technical provisions of 16.2 to be designated with a symbol at the trail head or designated access points. Signs that identify accessible trail segments shall include the total distance of the accessible segment and be located at the first point of departure.

1. CONSIDERATION: Given the wide variability in the actual trail characteristics that may be encountered on a trail, it is strongly recommended that objective information about the actual trail conditions be provided for all trails, whether or not they are accessible.
    a. Objective information about actual trail condition for all trails will assist users in determining whether the trail meets their own abilities.

2. CONSIDERATION: That the location of specific trail features and obstacles that do not comply with accessibility provisions be identified and that a profile of the trail grade and surface be included.

3. Items to include on a sign for trails that comply with the ADAAG specifications for recreational trails it is recommended that the following additional information be provided:
    a. Trail Symbol
    b. Running slope (average and maximum)
    c. Cross slope (maximum)
    d. Clear Tread Width (minimum)
    e. Surface type
    f. Trail length
    g. Trail elevation (at trailhead)
    h. Maximum elevation attained

4. Trails that do not comply with one or more provisions of the ADAAG Technical Specifications for Recreational Trails (Section 16.2, including exemption levels):
    a. Running slope (average and maximum)
    b. Cross slope (average and maximum)
    c. Clear tread width (minimum and average)
    d. Surface type, firmness, and stability
    e. Tread obstacles (magnitude and frequency)
    f. Trail length
    g. Trail elevation (at trailhead)
    h. Total elevation change

MAXIMUM AND LOWEST ELEVATION ATTAINED

16.3 – OUTDOOR RECREATION ACCESS ROUTE

Definition: What is an Outdoor Recreation Access Route?

An outdoor recreation access route is a continuous unobstructed path that is designated for pedestrian use and is used to connect accessible elements within a park such as picnic areas, camping areas, or a designated trailhead. For example, a path that connects a parking area with a picnic area or a picnic area to a bathroom facility is considered an outdoor recreation access route.

1. Outdoor recreation access route do not do not include pathways such as sidewalks or other pathways addressed in ADAAG 4.3 (sidewalks only pathway relevant to Brookline's parks).
2. Outdoor recreation access routes are required to connect elements that are required to be accessible. For example, where a cooking grill and a picnic table are provided in a park, an outdoor recreation route is required to connect these elements.
3. Elements located along a trail (benches, picnic tables, etc.) are not required to be connected by an outdoor recreation access route

16.3.1 – Surface

Requires that the surface of the outdoor recreation access route be firm and stable.

16.3.2 – Clear Tread Width

Requires that the width of an outdoor recreation access route to be a minimum of 36 inches.

1. EXCEPTION: Where an outdoor recreation access route meets one or more of the conditions of 16.1.1, a minimum of 32 inches for a distance of 24 inches is allowed.

16.3.3 – Openings

An opening is that of a hole in the ground weather it is for drainage or some other type of application.

1. Openings can not be larger that a ½ an inch in diameter.
2. If you have a drain for example in place, the elongated opening must be placed so that it is perpendicular or diagonal to the dominate direction of travel.
    a. Required so that it is not possible for cane tips, wheelchair wheels, or skate wheels to get caught.
    b. EXCEPTION: If an opening is less than ¼ inches in diameter, than the openings can run parallel to the dominate direction of the path.

16.3.4 – Protruding Objects

Requires that protruding objects on an outdoor recreation access route follow ADAGG 4.4 (external link) – link to guideline:

Below are items that are relevant to parks:

1. A vertical clearance of 80 inches minimum clear head room
    a. If vertical clearance of an area adjoining an accessible route is reduced to less than 80 inches, a low lying tree for example, a barrier to warn blind or visually-impaired people shall be provided.
2. Free-standing objects mounted on posts or pylons may overhang 12 in maximum and be 27 in to 80 from the ground.
    a. This is so that a blind person's cane will hit the pylon or post first before he/she does.
3. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space. Path must still remain clear for a minimum 36 inches as stated in 16.3.2 (Clear Tread Width).

16.3.5 – Tread Obstacles

An example of a tread obstacle is that of surface material changes such as from asphalt to a concrete slab.

1. A tread obstacle can not exceed a one inch maximum height.
2. EXCEPTION: May be increased to a two inch maximum height if the tread obstacle is beveled and meets at least one of the conditions of 16.1.1
3. If over two inches, a ramp must be installed in order to be compliant.

16.3.6 – Passing Space

Requires a passing space for outdoor recreation access path that are less than 60 inches in width.

1. A passing space can either be a space of 60 by 60 inches along a path or a T shaped intersection complying with ADDAG 4.2.3.
    a. 4.2.3 states that the arms and stem of the T shaped path must extend at least 48 inches beyond the intersection.
2. Required in intervals of 200 feet maximum.
3. EXCEPTION: A passing space may be increased to 300 foot intervals if it is not possible to provide a passing space within the 200 feet because of an environmentally sensitive area for example.

16.3.7 - Slopes

Addresses both cross slopes as well as running slopes.

16.3.7.1 – Cross Slope

Permits a maximum of 1:33 cross slope for outdoor recreation access routes.

1. EXCEPTION: A 1:20 slope is allowed when required for proper drainage only. This is only to prevent water ponding on an outdoor recreation access route.

16.3.7.2 – Running Slope

Designers have a choice of what technical provision that they may apply.

16.3.7.2.1

Permits a maximum of or 1:20 slope for any distance along an outdoor recreation access route.

16.3.7.2.2

Permits a maximum of a 1:12 slope for a distance of no more than 50 feet. Resting areas must be made present at a distance no greater that 50 feet apart and comply with section 16.2.8 (Resting Intervals)

16.3.7.2.3

Permits a maximum of a 1:10 slope for a distance of no more than 30 feet. Resting areas must be made present at a distance no greater than 30 feet apart and comply with section 16.2.8 (Resting Intervals)

16.3.8 – Resting Intervals

Requires that all resting intervals along an outdoor recreation route to be no less than 60 inches in length and have a width as wide as the route connecting it, i.e. if the path is 36 inches wide, the resting area has to also be 36 inches wide or greater.

1. EXCEPTION: Permits a 1:20 slope where surface conditions require it for proper drainage.

16.3.9 – Edge Protection

Requires that where edge protection is present, it must have a minimum height of 3 inches.

16.5 - FIXED PICNIC TABLES

Definition: What is a fixed picnic table?

A picnic table that is "fixed" to the ground, (i.e. permanently attached to the ground by being bolted down, having a concrete footing, or chained to the ground).

Definition: What is a picnic area?

A picnic area is an area that is designated as a location where picnic related elements are located, i.e. picnic table. An outdoor developed area can contain several different picnic areas. For example, one picnic area can be located next to a lake in a park, and a picnic area at a pavilion is a different area of the park would be considered two separate picnic areas. Picnic areas can also be separated by designation of different names or being connected to a separate entrance road.

16.5.1 - Compliance per Number of Picnic Tables

16.5.1.1- Single Picnic Table

Requires that if one bench is present in a picnic area, then it has to be accessible an comply with 16.5

2. Table must be located along an outdoor recreation access route that complies with 16.3 (Outdoor Recreation Access Route).

16.5.1.2 – Multiple Picnic Tables

Requires that where there are two or more picnic tables in a picnic area, that at least 50% of the picnic tables must be accessible and comply with 16.5

1. EXCEPTION: - If there are only two picnic tables, in this case both must be accessible and be located along an outdoor recreation access route that complies with 16.3 (Outdoor Recreation Access Route).
2. If there are more than two picnic tables, of the picnic tables that are required to be accessible, 40% of them must be located on an outdoor recreation access route that complies with 16.3 (Outdoor Recreation Access Route)
3. Example – If there are 10 picnic tables in an area, five tables would be required to be accessible, and 40% of them, or two picnic tables MUST be located on an outdoor recreation access route that complies with 16.3 (Outdoor Recreation Access Route). The other accessible benches are not required to be on a access route, but are required to have some type of ADA compliant path leading to them, i.e. a path made of Fibar.

16.5.2 – Dispersal of Tables

Requires that accessible picnic tables be dispersed among the various types of picnic settings or opportunities that a picnic area provides.

For example, a particular picnic area may offer picnic sites near the lake, in the woods, and in the open, sunny portion of the area. This provision requires that the number of accessible tables be distributed throughout the area, so that people with disabilities would have a choice of picnic locations similar to what other visitors to the area have. This section would not increase the total number of accessible tables required in 16.5.1.2(Multiple Picnic Tables). Using the previous example, if you have four picnic tables in an area, two of which need to be accessible as stated as 16.5.1.2(Multiple Picnic Tables, and have three different sites included in that picnic area, you still only need to have two of the picnic tables accessible even though there are three different settings in the picnic area.

16.5.3 – Number of Wheelchair Seating Spaces

Requires that with each accessible picnic table, there be at least one wheelchair seating space

1. Where a picnic table that has a table top perimeter of less than 24 linear feet, one wheelchair seating space is required.
2. Where a picnic table that has a table top perimeter of more than 24 linear feet, the following table provides the number of wheelchair seats required:

Table Top Linear Feet	**Number of Wheelchair Spaces**
25 lf - 44 lf	2 spaces
45 lf - 64 lf	3 spaces

65 lf - 84 lf	4 spaces
85 lf – 104 lf	5 spaces

3. Location of the seating spaces is left up to the discretion of the discretion of the designer of the picnic table, although it is recommend to spread of the spot throughout the picnic table rather than clustered in one location, but it not required for compliancy.

16.5.4 – Wheelchair Seating Space Size

Requires that each accessible seating space must provide knee space of at least 30 inches wide, 24 inches deep, and 27 inches from the ground/floor to the bottom of the table top

1. NOTE: There is an addition five inches of depth added on to the toe space of the seating space because of the solid leg on each end of the table. A 19-inch deep space at the end of a solid leg table would not allow a person using a wheelchair to be sufficiently close to the table.

16.5.5 – Table Clearance

Requires a 36 inch minimum clear space surrounding the useable portions of an accessible table, measured from the outside edge of the seat, or the outside edge of the table if no seat is provided.

16.5.6 – Surface

Requires that the surface of the clear space and accessible seating space to be firm and stable.

1. Slip resistance surfaces are not required because of outside factors such as:
    a. Tree leaves and needles
    b. Duff (partly decayed organic material on the forest floor)
    c. Mud
    d. Snow
    e. Ice
    f. Other such factors that often cover outdoor areas.
2. EXCEPTION: This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies

16.5.7- Slope

Requires that the slope of the required clear spaces may not exceed 1:50 in any direction.

1. EXCEPTION 1: On a natural or natural-appearing surface that are often used in picnic areas, a 1:50 slope may not be adequate for proper drainage. In this case a maximum slope of 1:33 in any direction is allowed.
2. EXCEPTION 2: This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies.

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16.7 – COOKING SURFACES, GRILLS PEDESTAL GRILLS

16.7.1 – Minimum number

16.7.1.1 – Single Cooking Surface

Requires that where one cooking surface, grill or pedestal grill is provided in an area, it must comply with 16.7.3 through 16.7.7 and shall be connected to an outdoor recreational access route complying with 16.3 (Outdoor Recreation Access Route).

16.7.1.2 – Multiple Cooking Surfaces

Requires that where two or more cooking surfaces, grills or pedestal grills are provided in a area, at least 50%, but never less than 2, shall comply with 16.7.3 – 16.7.7. Also, like picnic tables, 40%, but never less than two, must be located on an outdoor recreational access route and comply with 16.3 (Outdoor Recreation Access Route).

16.7.2 – Dispersal

Requires that accessible cooking surfaces shall be dispersed among the types provided. This not just includes dispersing the accessible cooking surfaces around the cooking areas, but also the different types. If you have 3 of each type of cooking surface,

at least one of each must be accessible. This doe not require however, an increase in the total number of accessible cooking surfaces required in 16.7.2.

16.7.3 – Cooking Surface Height

Requires that the surface height of the cooking surfaces must be installed between 15 and 34 inches above the ground.

1. 34 inches is consistent with counter tops in homes.
2. 15 inches is consistent with the minimum low forward reach stated in ADAAG 4.2.5.

16.7.4 - Operating Controls and Mechanisms

Requires operation controls, if any, of the containers to comply with ADAAG 4.27.1 (General), 4.27.2 (Clear Floor Space) and 4.27.3 (Height):

1. 4.27.2 - Clear floor space complying with 4.2.4 that allows a forward or a parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment.
2. 4.27.3 - The highest operable part of controls, dispensers, receptacles, and other operable equipment
    a. Placed under 48 inches but over 15inches of the ground if allowing for forward approach
    b. Placed under 54 inches but over 9 inches of the ground if allowing for parallel use

c. EXCEPTION: These requirements do not apply where the use of special equipment dictates otherwise.

3. Is not reasonable or feasible in the outdoor environment because elements must be vandal-resistant, large animal resistant and adaptable to weather conditions of extreme heat, cold, and moisture.

16.7.5 – Clear Floor or Ground Space

Requires that a minimum clear space of 48 inches deep by 48 inches wide to be provided at all useable portions of the cooking surface, grill or pedestal grill.

1. This allows for front and parallel approach.
2. If one or more of the conditions of 16.1.1 apply, then the clear space requirements can be reduced to no less than 36 by 36 inches space

16.7.6 – SLOPES

Requires that with like picnic tables, the slope of the clear space at useable portions of the cooking surfaces, grills, and pedestal grills to not exceed 1:50 in any direction.

1. It is permitted to have a slope of 1:33 if for the use of drainage.
2. This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies.

16.7.7 – SURFACE

Requires that the surface that is defined in 16.7.5 shall be stable and firm.

1. This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies.

16.8 – FIXED TRASH/RECYCLING CONTAINERS

Definition: What are Fixed Trash/ Recycling Containers?

A fixed trash container is a trash barrel that is attached to the ground via footings or being bolted down to it. The same is of a recycling container, but it is use for only the disposal of recyclable material such as paper, plastics and metals.

16.8 requires that all trash and recycling containers to be accessible and comply with the following:

1. Accessible clear space that allows a forward or a parallel approach by a person using a wheelchair shall be provided.
2. Maximum height of a container shall be 54 inches.

16.8.1 – Accessibility of Trash and Recycling Containers

ALL trash and/or recycling container provided be accessible.

1. It is considered to be a health issue, so it is imperative that all containers meet the provisions for accessibility.
2. EXCEPTION: If a trash or recycle bin is a multi-bin container, having more than one compartment, then only 50% of the multi-bin needs to be accessible.

16.8.2 – Clear Space around Trash and Recycling Containers

Requires that clear space of trash and/or recycling containers comply with ADAAG 4.2.4.1 and 4.2.4.2 which state:

1. 4.2.4.1 - The minimum ground space required to accommodate a single, stationary wheelchair and occupant is 30 in by 48.
    a. The minimum ground space for wheelchairs may be positioned for forward or parallel approach to an object.
2. 4.2.4.2 - One full unobstructed side of the ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space.
    a. If a clear floor space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided, i.e. more space to allow for turning around.

16.8.3 – Surface

Requires that the surface of the outdoor recreation access route be firm and stable.

1. EXCEPTION: This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies.

16.8.4 – Slope

Requires the slope of the clear space to be no greater than 1:50.

1. EXCEPTION: Permits a 1:33 maximum slope where surface conditions require it for proper drainage.

2. EXCEPTION: This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies.

16.8.5 Controls and Operating Mechanisms

Requires operation controls, if any, of the containers to comply with ADAAG 4.27.3 and 4.27.4 which state:

3. 4.27.3 - The highest operable part of controls, dispensers, receptacles, and other operable equipment
    a. Placed under 48 inches but over 15inches of the ground if allowing for forward approach
    b. Placed under 54 inches but over 9 inches of the ground if allowing for parallel use
    c. EXCEPTION: These requirements do not apply where the use of special equipment dictates otherwise.
4. 4.27.4 - Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.
    a. The force required to activate controls shall be no greater than 5lb of force.
5. EXCEPTION: 4.27.4 does not apply is using hinged, sliding or other type of lids and/or controls designed for large animal exclusion.
    a. It is a necessity to protect the health of the user and of the animal population, thus this overrides these accessibility requirements.

b. The U.S.D.A. Forest Service Technology and Training Center (San Dimas, CA) has issued a document which provides information about animal resistant garbage containers. Suggested designs may be useful in complying with these provisions ; #9523 1205 SDTDC 444 East Bonita Ave. San Dimas, CA 91773

16.10 - OVERLOOKS/VIEWING AREAS

16.10.1 Number of Accessible Viewing Areas

Where viewing areas are provided on designated overlooks, each viewing area shall comply with 16.10.2 through 16.10.5 and be located on an outdoor recreation access route complying with 16.3 or a trail complying with 16.2.

1. EXCEPTION: Where multiple viewing areas are provided, a minimum of one of each viewing opportunity for distinct points of interest shall be accessible.
2. EXCEPTION: This provision does not have to be met if at least one or more of the conditions in 16.1.1 apply.

16.10.2 Maneuvering Space

The viewing area shall have at least one maneuvering space complying with ADAAG 4.2.3.

16.10.3 Unrestricted Viewing Opportunities

Each location providing viewing opportunities for distinct points of interest shall provide at least one unrestricted viewing opportunity for each distinct point of interest.

Viewing opportunities shall accommodate eye levels between 32 inches (815 mm) minimum to 51 inches (1295 mm) maximum.

1. EXCEPTION. The provisions of does not have to be met if at least one or more of the conditions in 16.1.1 applies.

16.10.4 Slope.

The maneuvering space required by 16.10.2 shall have a slope which does not exceed 1:50 in any direction.

1. EXCEPTION: Where surface conditions require slopes greater than 1:50 for proper drainage, a 1:33 maximum slope is allowed.
2. EXCEPTION: The provisions of 16.10.4 do not apply where at least one of the conditions in 16.1.1 applies.

16.10.5 Surface.

The surface of clear space required by 16.10.2 shall be stable and firm.

1. EXCEPTION. The provisions of 16.10.5 do not apply where at least one of the conditions in 16.1.1 applies.

16.12 – FIXED BENCHES

16.12.1 – Minimum Number of Benches

16.12.1.1- Single Bench

Requires that is only one bench present in a park that it must be used by all visitors and therefore must be accessible and comply with 16.12.2 - 16.12.8 as well as have one armrest can handle 250 pounds of force as well as not rotate in its fitting as stated an ADAAG 4.26.3 to facilitate its use.

16.12.1.2 – Multiple Benches

Requires that at least 50% of the fixed benches in an area must be accessible and meet the proposed provisions in the section.

1. Of the required 50% of fixed benches that are accessible, at least 50% of those MUST provided an armrest complying with ADAAG 4.26.3.
    a. Example, if you have 20 fixed benches in your park, 10 of them need to be accessible. If you make 15 of them accessible, only 5 of them need to have armrest that comply with ADAAG 4.26.3 because only 50% of the 50% of the required fixed benches that need to be accessible need to comply with this proposed provision.
    b. Of the benches that are required to be compliant, 40% of them have to be located to an outdoor recreation access route complying with 16.3.

16.12.2 –Fixed Bench Dispersal

Requires that of the total accessible benches that are an area, they have to be spread out into a variety of places.

2. This provision does not require you to add additional benches.
    a. If you have three different areas of your park, and only four benches throughout the park, only two still need to accessible, but both accessible benches need to be in a different area of the park.

16.12.3 – Height of Fix Bench

Requires that the front edge of the bench seat to be between 17 inches and 19 inches above the ground.

16.12.4 – Space Requirement around Fixed Bench

Requires that at least one clear ground space that is compliment with ADAAG 4.2.4. ADAAG 4.2.4 states:

1. 4.2.4.1 - The minimum ground space required to accommodate a single, stationary wheelchair and occupant is 30 inches by 48 inches.
    b. The minimum ground space for wheelchairs may be positioned for forward or parallel approach to an object.
2. 4.2.4.2 - One full unobstructed side of the ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space.

c. If a clear floor space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided, i.e. more space to allow for turning around.

3. 4.2.4.3 - clear floor or ground spaces for wheelchairs shall comply with 4.5

    a. 4.5.2 - Changes in level up to 1/4 in may be vertical and without edge treatment. Changes in level between 1/4 in and 1/2 in shall be beveled with a slope no greater than 1:2. Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with 4.7 or 4.8.

    b. 4.5.4 - Gratings. If gratings are located in walking surfaces, then they shall have spaces no greater than 1/2 in wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

Space should not overlap another clear space requirement.

1. Example: If a picnic table is located near the bench, the bench can not be in the picnic tables 36 inch clear space, it must have its own clear space and not include in its clear space that of any surrounding element's clear space.

16.12.5 – Back Support

Back support must be provided on each bench, and must be the full length of the bench.

16.12.6 – Surface Conditions

Requires that the surface of the clear space for the bench be firm and stable.

1. EXCEPTION: If one of the conditions of 16.1.1 exists, this provision does not apply.

16.12.7 – Slope

Requires that the slope of the clear space not exceed 1:50 in any direction.

1. EXCEPTION: Permits a 1:33 maximum slope where surface conditions require it for proper drainage.
    a. It is important for the stability of the occupant of the clear space that the surface condition provides adequate support.
2. EXCEPTION: This provision does not have to be met if at least one of the conditions in proposed section 16.1.1 applies.

16.12.8 – Armrest

Requires that an accessible bench have at least one armrest and shall comply with ADAAG 4.26.3 which states that an armrest must be able to handle 250 pounds of force as well as not rotate in its fitting.

16.16 – UTILITIES

16.16.1 Utility Accessibility

Requires that all utilities such as electricity, water, sewage and other similar types of utilities be comply with 16.16.2 through 16.16.5 of this proposition.

16.16.2 – Controls and Operating Mechanisms

Requires that all controls and operating mechanisms shall comply with ADAAG 4.27 (Controls and Operating Mechanisms).

1. EXCEPTION: ADAAG 4.27.3 and 4.27.4 which state that there needs to be a certain clear space around the object as well as height requirements do not apply to sewage hookups.
2. EXCEPTION: ADAAG 4.27.4 which states that all controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist does not apply to hand pumps.

16.16.3 – Water Spouts

Requires that all fixed water spouts (drinking fountains) to be located between 28 and 36 inches off the ground as well as have be centered at the edge of a minimum 60 inch by 60 inch clear space.

16.16.4 – Slopes

Requires that slopes of the clear spaces required by 16.16.2 and 16.16.3 have a maximum slope of 1:50.

1. EXCEPTION: Permits a 1:33 maximum slope where surface conditions require it for proper drainage.

16.16.5 – Surface

Requires the surface of 16.16.2 and 16.16.3 to be firm and stable.

REFERENCE: ADAAG GUIDELINES OFTEN REFERRED TO IN THIS DOCUMENT

Items contained here were not summarized as part of this document. They are directly from the ADA site located at http://www.access-board.gov/adaag/html/adaag.htm. They are here for your reference and clarity to them being referred to in the body of the document. To help keep this document short however, we have taken some irrelevant information that did not pertain to parks and open spaces out of this section.

4.2 SPACE ALLOWANCE AND REACH RANGES

4.2.1 Wheelchair Passage Width

The minimum clear width for single wheelchair passage shall be 32 in (815 mm) at a point and 36 in (915 mm) continuously (see Fig. 1 and 24(e)). Appendix Note

4.2.2 Width for Wheelchair Passing

The minimum width for two wheelchairs to pass is 60 in (1525 mm) (see Fig. 2).

4.2.3 Wheelchair Turning Space

. The space required for a wheelchair to make a 180-degree turn is a clear space of 60 in (1525 mm) diameter (see Fig. 3(a)) or a T-shaped space (see Fig. 3(b)). Appendix Note

4.2.4 Clear Floor or Ground Space for Wheelchairs

4.2.4.1 Size and Approach

The minimum clear floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 in by 48 in (760 mm by 1220 mm) (see Fig. 4(a)). The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object (see Fig. 4(b) and (c)). Clear floor or ground space for wheelchairs may be part of the knee space required under some objects.

4.2.4.2 Relationship of Maneuvering Clearance to Wheelchair Spaces

One full unobstructed side of the clear floor or ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space. If a clear floor space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided as shown in Fig. 4(d) and (e). 4.2.4.3 Surfaces for Wheelchair Spaces. Clear floor or ground spaces for wheelchairs shall comply with 4.5. Appendix Note

4.2.5 Forward Reach

If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48 in (1220 mm) (see Fig. 5(a)). The minimum low

forward reach is 15 in (380 mm). If the high forward reach is over an obstruction, reach and clearances shall be as shown in Fig. 5(b). Appendix Note

4.2.6 Side Reach

If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 54 in (1370 mm) and the low side reach shall be no less than 9 in (230 mm) above the floor (Fig. 6(a) and (b)). If the side reach is over an obstruction, the reach and clearances shall be as shown in Fig 6(c). Appendix Note

4.3 ACCESSIBLE ROUTE

4.3.1 General

All walks, halls, corridors, aisles, skywalks, tunnels, and other spaces that are part of an accessible route shall comply with 4.3. Appendix Note

4.3.2 Location.

1. At least one accessible route within the boundary of the site shall be provided from public transportation stops, accessible parking, and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance they serve. The accessible route shall, to the maximum extent feasible, coincide with the route for the general public.
2. At least one accessible route shall connect accessible buildings, facilities, elements, and spaces that are on the same site.

3. At least one accessible route shall connect accessible building or facility entrances with all accessible spaces and elements and with all accessible dwelling units within the building or facility.
4. An accessible route shall connect at least one accessible entrance of each accessible dwelling unit with those exterior and interior spaces and facilities that serve the accessible dwelling unit.

4.3.3 Width

The minimum clear width of an accessible route shall be 36 in (915 mm) except at doors (see 4.13.5 and 4.13.6). If a person in a wheelchair must make a turn around an obstruction, the minimum clear width of the accessible route shall be as shown in Fig. 7(a) and (b).

4.3.4 Passing Space

If an accessible route has less than 60 in (1525 mm) clear width, then passing spaces at least 60 in by 60 in (1525 mm by 1525 mm) shall be located at reasonable intervals not to exceed 200 ft (61 m). A T-intersection of two corridors or walks is an acceptable passing place.

4.3.5 Head Room

Accessible routes shall comply with 4.4.2.

4.3.6 Surface Textures

The surface of an accessible route shall comply with 4.5.

4.3.7 Slope

An accessible route with a running slope greater than 1:20 is a ramp and shall comply with 4.8. Nowhere shall the cross slope of an accessible route exceed 1:50.

4.3.8 Changes in Levels. Changes in levels along an accessible route shall comply with 4.5.2. If an accessible route has changes in level greater than 1/2 in (13 mm), then a curb ramp, ramp, elevator, or platform lift (as permitted in 4.1.3 and 4.1.6) shall be provided that complies with 4.7, 4.8, 4.10, or 4.11, respectively. An accessible route does not include stairs, steps, or escalators. See definition of "egress, means of" in 3.5.

4.3.9 Doors. Doors along an accessible route shall comply with 4.13.

4.3.10 Egress

Accessible routes serving any accessible space or element shall also serve as a means of egress for emergencies or connect to an accessible area of rescue assistance.

Appendix Note

4.26.3 STRUCTURAL STRENGTH.

The structural strength of grab bars, tub and shower seats, fasteners, and mounting devices shall meet the following specification:

1. Bending stress in a grab bar or seat induced by the maximum bending moment from the application of 250 lbf (1112N) shall be less than the allowable stress for the material of the grab bar or seat.
2. Shear stress induced in a grab bar or seat by the application of 250 lbf (1112N) shall be less than the allowable shear stress for the material of the

grab bar or seat. If the connection between the grab bar or seat and its mounting bracket or other support is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stress, which shall not exceed the allowable shear stress.

3. Shear force induced in a fastener or mounting device from the application of 250 lbf (1112N) shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.
4. Tensile force induced in a fastener by a direct tension force of 250 lbf (1112N) plus the maximum moment from the application of 250 lbf (1112N) shall be less than the allowable withdrawal load between the fastener and the supporting structure.
5. Grab bars shall not rotate within their fittings.

4.27 Controls and Operating Mechanisms.

4.27.1 General

Controls and operating mechanisms required to be accessible by 4.1 shall comply with 4.27.

4.27.2 Clear Floor Space

Clear floor space complying with 4.2.4 that allows a forward or a parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment.

4.27.3 Height

The highest operable part of controls, dispensers, receptacles, and other operable equipment shall be placed within at least one of the reach ranges specified in 4.2.5 and 4.2.6. Electrical and communications system receptacles on walls shall be mounted no less than 15 in (380 mm) above the floor.

1. EXCEPTION: These requirements do not apply where the use of special equipment dictates otherwise or where electrical and communications systems receptacles are not normally intended for use by building occupants.

4.27.4 Operation.

Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 pounds of force.

APPENDIX I

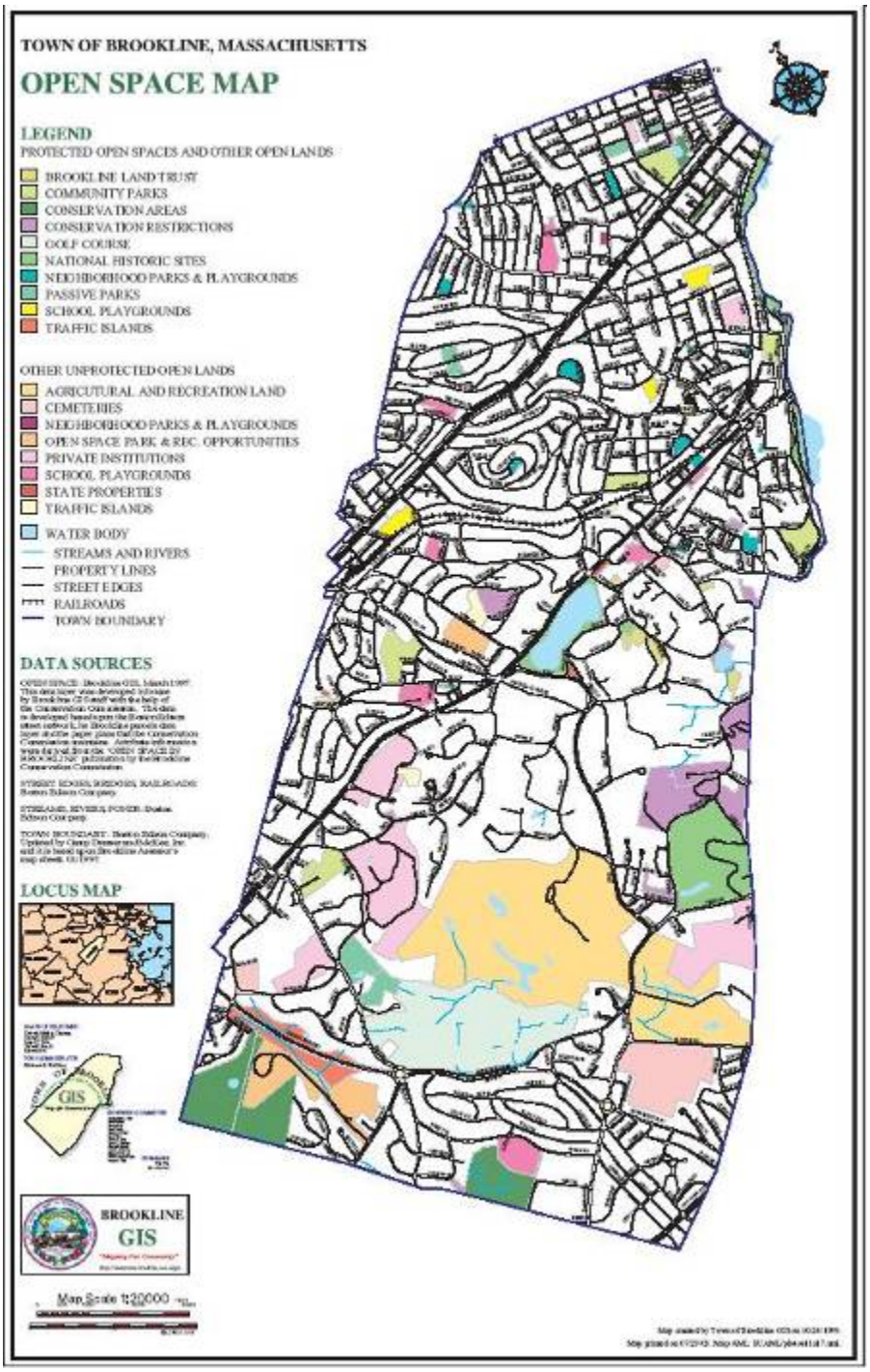
TOWN OF BROOKLINE, MASSACHUSETTS
OPEN SPACE MAP
LEGEND
PROTECTED OPEN SPACES AND OTHER OPEN LANDS
BROOKLINE LAND TRUST
COMMUNITY PARKS
CONSERVATION AREAS
CONSERVATION RESTRICTIONS
GOLF COURSE
NATIONAL HISTORIC SITES
NEIGHBORHOOD PARKS & PLAYGROUNDS
PASSIVE PARKS
SCHOOL PLAYGROUNDS
TRAFFIC ISLANDS
OTHER UNPROTECTED OPEN LANDS
AGRICUTURAL AND RECREATION LAND
CEMETERIES
NEIGHBORHOOD PARKS & PLAYGROUNDS
OPEN SPACE PARK & REC. OPPORTUNITIES
PRIVATE INSTITUTIONS
SCHOOL PLAYGROUNDS
STATE PROPERTIES
TRAFFIC ISLANDS
WATER BODY
STREAMS AND RIVERS
PROPERTY LINES
STREET EDGES
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Figure 1: http://www.infinitec.org/play/outdoor/playgrounds.htm

Figure 2: http://gis.esri.com/library/userconf/proc97/proc97/to200/pap196/p1966.