

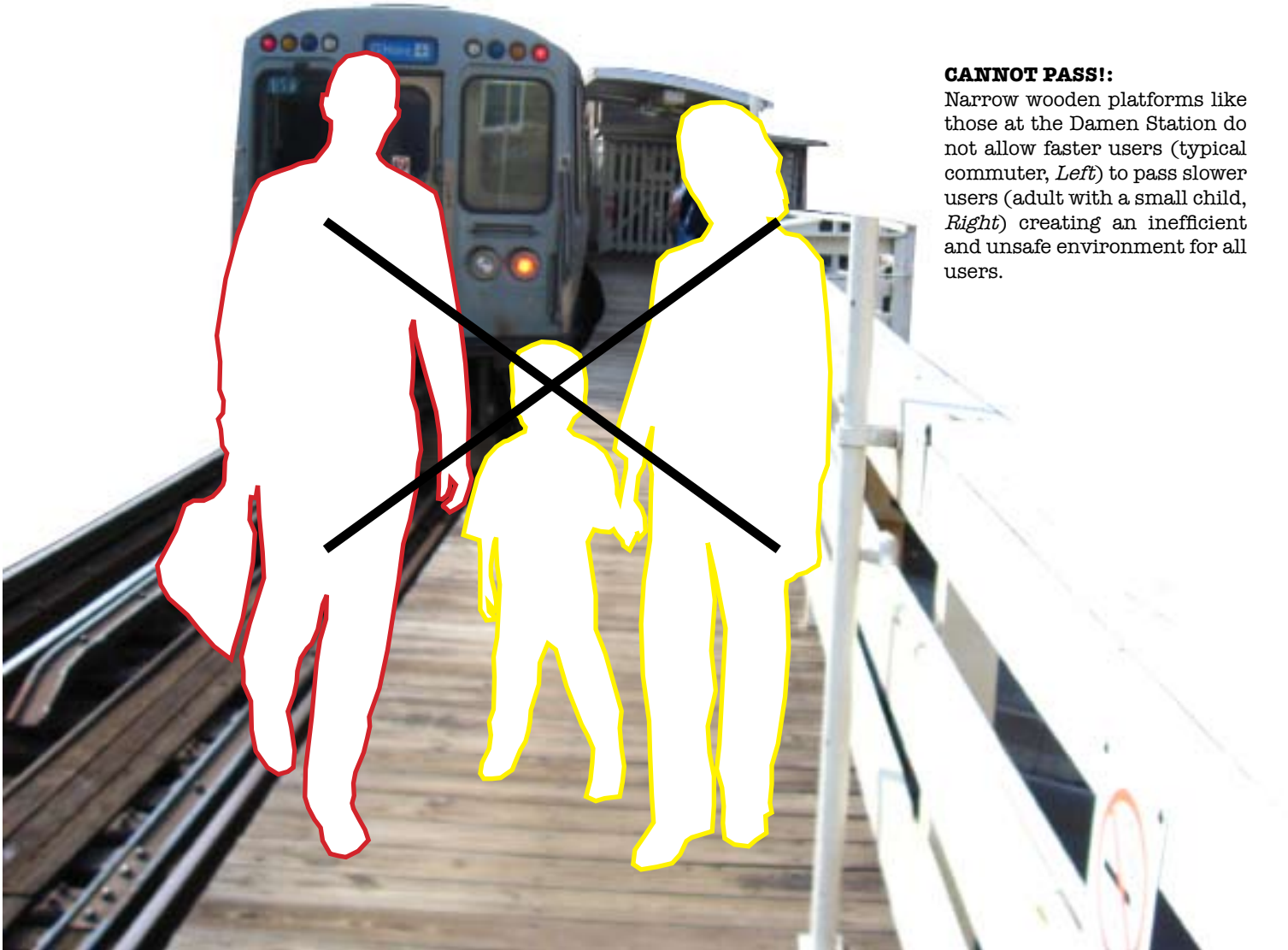
**WARNING: Narrow Platform Ahead!
CANNOT PASS!**



An observation of safety and efficiency along
the Chicago 'L' Damen Station platform

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As part of this observational study, I chose to focus on an area of the Chicago train system (CTA) that stood out the most to me when I first moved to Chicago - the narrow platforms that exist in several stations within the CTA System. Specifically, I studied the elevated wooden platform at the Damen Station along the Blue Line. I examined the pace, flow, use of space and the overall experience both physically and psychologically from the point of view of different composite users. Ultimately, I found that the 41" wide platform raises significant safety issues particularly for those who have problems with balance, need more space or require more time to move along the platform. The inefficient flow of people is a concern as there is not enough room for faster users to safely pass slower users. Understanding these different perspectives and how the CTA does and does not allow users to move safely and efficiently, offers critical information about the design, usability and function of the transit system and the City of Chicago as a whole.



CANNOT PASS!:
Narrow wooden platforms like those at the Damen Station do not allow faster users (typical commuter, *Left*) to pass slower users (adult with a small child, *Right*) creating an inefficient and unsafe environment for all users.

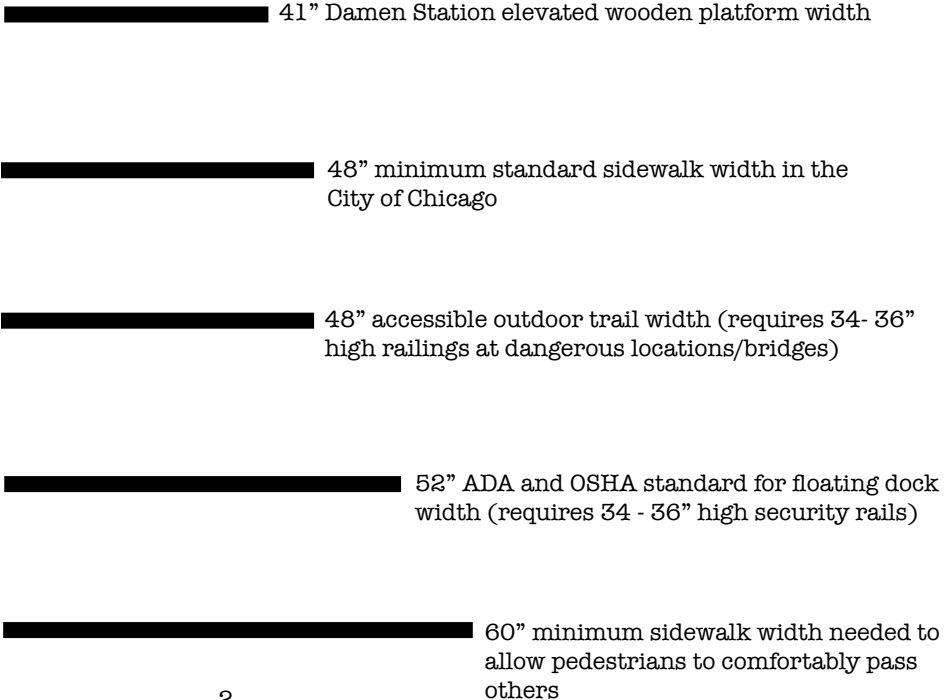
As a newcomer to Chicago, there were several aspects of the transit system that were surprising to me. One was the differences in the layout and navigability I experienced from one station to another. I noticed the dramatic contrasts between the elevated stations versus the below grade stops, the difference in materials from concrete to wood and the change in light from the brightness of sunshine reflecting off a passing train above to the low light along the stairwells and turnstiles below. Even the way in which the doors open change from train to train; one car may have the older inwardly pivoting doors while another is equipped with newer sliding doors. I found it difficult to get into a flow of the system when each station required a new way to navigate it - the contrasts seemed to outweigh the similarities.

As I approached the focus of this observation, I began to think about how differently abled users navigate these varied stations. I decided to look at the biggest contrast that I had experienced - the varying widths of the platforms, particularly the narrow wooden platform at the Damen station compared to the wider platforms at other stations. While other aspects of the CTA and public infrastructure in general have initiated many safeguards to protect the public -- using warning signs, handrails, and raised warning strips for example -- this station has none of these things. There are no signs warning users of the narrow platform ahead nor are there any guard rails to protect an unsteady or jostled user from falling onto the tracks. This platform is one example where users are on their own to navigate the 41" width walkway.

Thousands of users navigate this narrow platform on a weekly basis. The CTA's ridership report from June of this year states that an average of 4,719 riders use the Damen Station each weekday.¹ How does the narrow width of the platform affect the safety of the users and impact the efficiency of how they move through the station?

To answer this question, I began by looking at the width of the Damen platform compared to other public walkways. The standard minimum width for a sidewalk in the City of Chicago is 48".² However, this width is not recommended for allowing one pedestrian to comfortably pass another, especially if one requires more space than the 32" width standard used for able bodied persons. A sidewalk with a width of 60" is recommended for two able bodied pedestrians to pass one another or for an able bodied pedestrian to pass someone with a walking aid or wheelchair.³

Width of the Damen Station Platform Compared to Other Public Walkways



I also looked at comparable public walkways that have similar dangerous drop-offs like the Damen platform which sets above the tracks. The minimum width for a commercial use floating marine dock is 36" while the ADA recommends a minimum width of 52", as well as 34 - 36" high security rails along both sides.⁴ The minimum for accessible outdoor trails is 48" and also requires 34-36" railings along dangerous areas.⁵

I also observed the various users of the Damen Station. I choose not to focus on wheelchair persons or other users traditionally identified as disabled. The Damen Station is not a designated accessible station and as such these users are less likely to utilize the station. Disabled users are more apt to rely on an accessible station along the Blue Line, like the Western or Clark/Lake stations, which are equipped with elevators, braille signage and truncated warning strips. They may also use paratransit services like those provided by the Pace transit system.⁶ However, there are many other users who may fall outside of the traditional disability category but still have different needs, specifically as it relates to navigating a narrow wooden platform like that at the Damen Station. I identified six composite users, from the average commuter to a user carrying luggage to one who is overweight; each one relies on the Damen Station for various reasons and experiences its platform in a different way.

Description of Various Damen Station Users



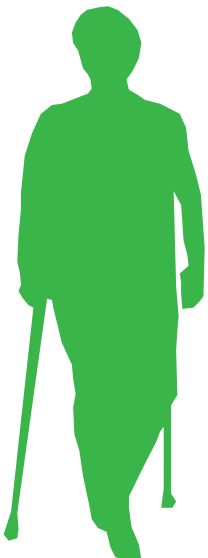
User Profile
Name: Commuter
Description: Uses CTA everyday to travel to and from work/school
Pace: Moves along platforms quickly, likely to pass slower users



User Profile
Name: Traveller
Description: Takes CTA to Midway & O'Hare
Pace: Moves at quick pace but is slowed by luggage, likely to pass slower users if room enough to accommodate suitcase



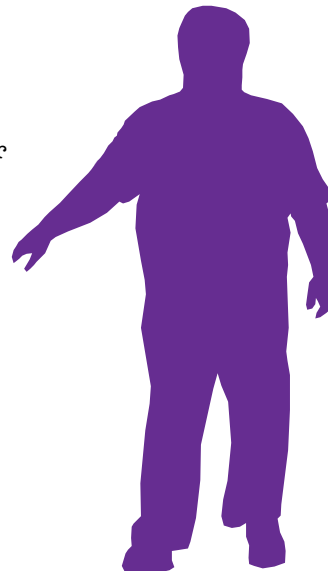
User Profile
Name: Parent with small child
Description: Uses CTA to run errands & take child to day care
Pace: Moves at moderate pace with child walking alongside holding hands, likely to be passed by faster users



User Profile
Name: User with crutches
Description: Regular CTA user, broken bone requires crutches
Pace: Moves slower than usual, crutches and cast are cumbersome, likely to be passed by faster users



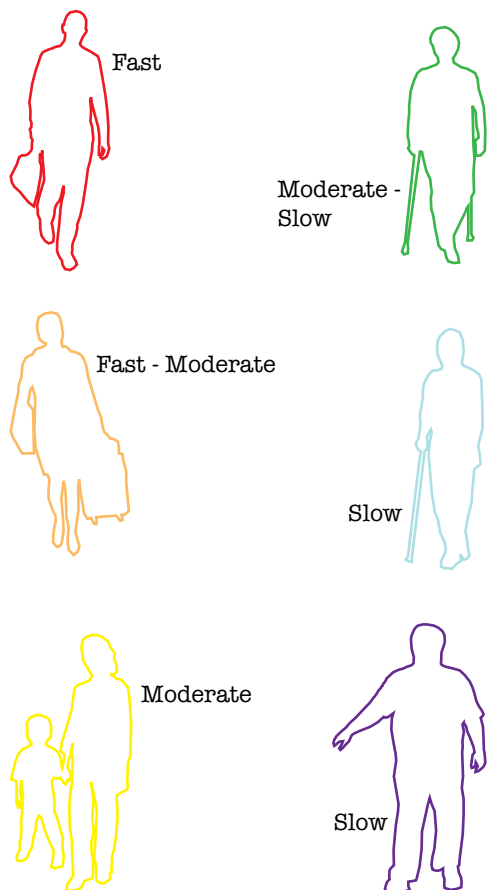
User Profile
Name: Elderly User with cane
Description: Relies on CTA to see family/friends, run errands and go to medical appointments
Pace: Moves slowly, sometimes must stop to rest, occasionally has difficulty with balance, often passed by faster users



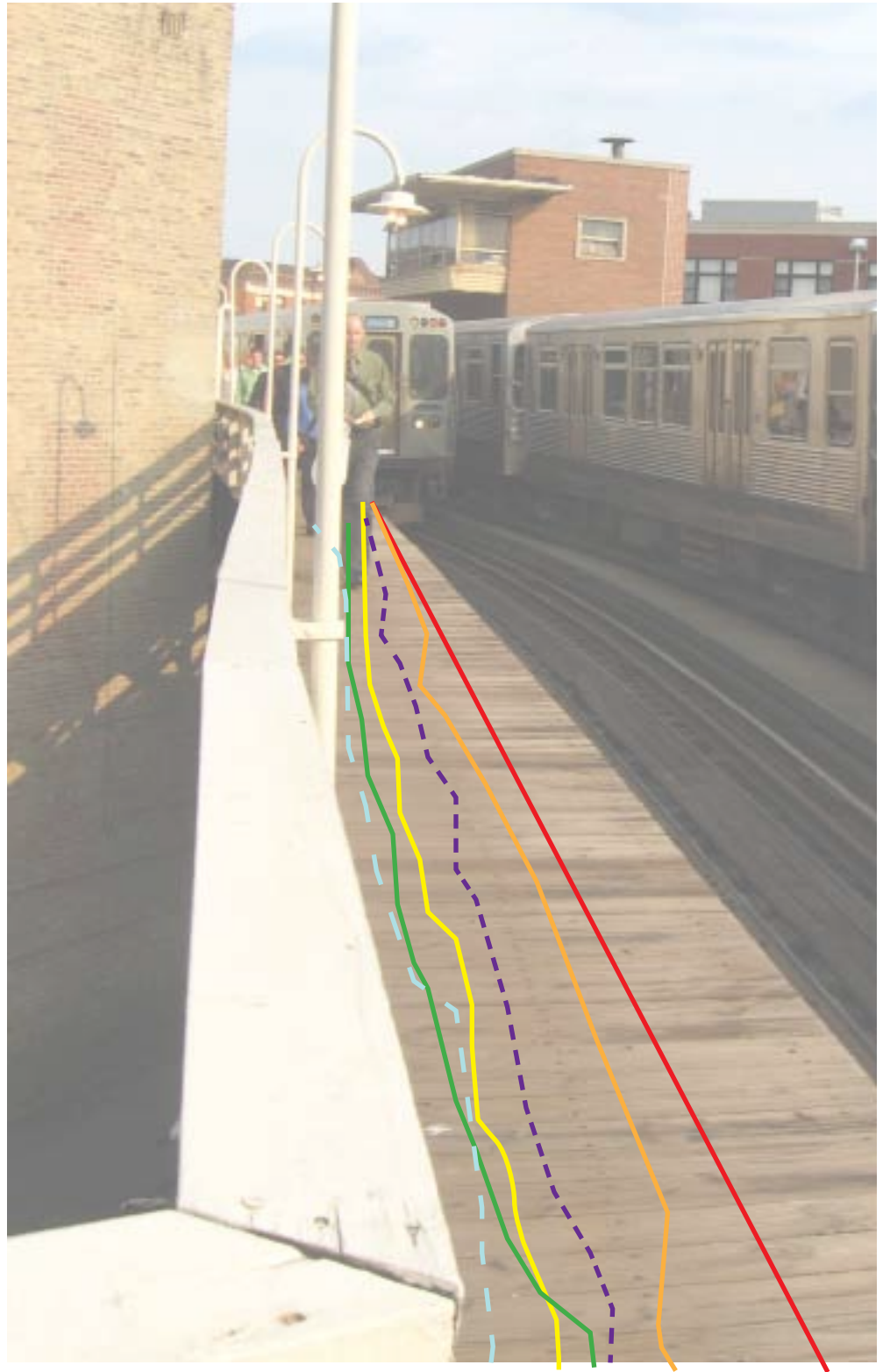
User Profile
Name: Obese User
Description: Uses CTA everyday to travel to and from work/school and run errands
Pace: Moves slowly along platforms, must often stop to catch breath, likely to be passed by faster users

I also looked at the typical path taken by these various users as they moved along the narrow platform. I found that the slower paced users stayed closer to the outer edge and relied on the railing. These slower paced users also were more likely to pause along the way. On the other hand, faster paced users were more likely to walk down the center of the platform. They did not rely on the railing and kept a constant speed.

Without enough room to pass, the faster users were forced to slow down behind slower paced users. The slower paced users either moved faster or continued at their own pace while aware of the line of foot traffic behind them.



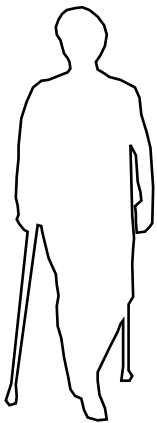
Typical Travel Paths and Relative Speeds of Users



The contrasting speeds between differently paced users coupled with the inability to safely pass on the platforms creates a safety issue, particularly for the slower paced users. This encompasses both physical safety as well as psychological safety. For example, an elderly user may worry about her strength and balance as she walks carefully along the platform. This presents a very real physical safety concern for her; while the pressure to move more quickly because of the faster traffic in front and behind her, can make this elderly user feel psychologically unsafe.

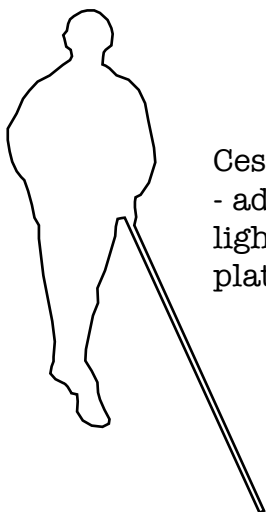
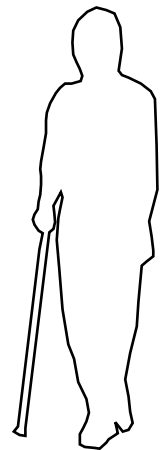
I had the opportunity to speak with three users with differing levels of ability who frequently use the Damen station as well as other non-accessible stops. They all voiced concerns about their discomfort with the narrow width of the platforms, but overall, explained that they have adapted to them by walking slowly and/or staying close to the wall or railings. These three users have used the CTA for several years, and commented positively about the system's upgrades to various facilities. However, they still found many stations difficult to navigate as safely and efficiently as they would like.

CTA User Interviews



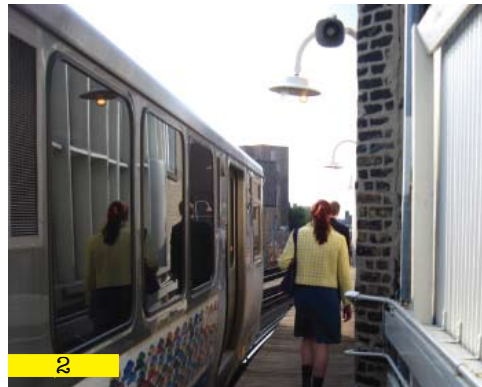
Deirdre: "Since I fractured my foot, getting around the CTA on crutches has been difficult, scary and just too much. Particularly the narrow passageways along the platforms."

Rodney: "My legs are too weak. I don't trust them when I'm walking along the trains. I try to stay as close to the wall as I can."



Cesar: "The CTA has made some improvements - adding the strips along the platforms. But the lighting makes it difficult to see clearly along the platforms, especially the narrow walkways."

My own experience travelling along the platform at the Damen stop, underlined the stress and inefficiency of its design for all users. As I exited the train during rush hour traffic, I found my place, single-file, in a line that stretched from the train's doors to the end of the platform. People walked briskly along the narrow platform seemingly unaware as I was of its height and dramatic drop off into the tracks below. I took a sequence of photographs as I moved along. I stopped briefly along the way, which caused the woman behind me to have to stop as well. I felt pressure to keep a faster pace than I wanted to as I hoped to experience what a typically slower paced user must feel walking along this area and other narrow platforms like it within the CTA system.



Walking along the platform, I am in a line of other commuters going at a faster pace than I am travelling.



I pause near the narrowest part of the platform. The person in front of me gets farther ahead -- the person behind is forced to stop.



The train passes by me. It is a disconcerting feeling to not be facing it as it passes. The people in front are exiting the platform while those behind me are left to wait as I make my way off the platform towards the exit.

Ergonomics of Space Requirements and Speeds of Users

In order to better understand the factors affecting the safety and efficiency of this location, I examined the ergonomic issues that come into play along the Damen Station platform. In particular, I looked at the how much space different users require as they move along a directed path. The narrowest portion of the Damen platform measures 41" in width. As I outlined earlier, this distance is less than the minimum standard for other public walkways, including sidewalks, marine docks and nature trails. How much of this 41" is actually used by different users?

On average, an able bodied pedestrian requires a 32" clearance. However this is a minimum. Many users require more space than this. "Although people who use walking aids can maneuver through clear width openings of 32" (815 mm), they need 36" (915 mm) wide passageways and walks for comfortable gaits. Crutch tips, often extending down at a wide angle, are a hazard in narrow passageways where they might not be seen by other pedestrians." The ADA recommendation is a minimum of 36" to allow ample space for people of different abilities.

The 41" span of Damen Station allows little extra space for one user let alone two. This platform does not allow for safe passing of two pedestrians. The ADA states that, "Able-bodied persons in winter clothing, walking straight ahead with arms swinging, need 32" of width, which includes 2" on either side for sway, and another 1" tolerance on either side for clearing



Inefficient Flow: A person using a cane may require more space than the average 32" clearance and may walk at an average pace of 2.62 ft/sec. This is compared to a younger pedestrian moving at a pace of 4.95 ft/sec. Along the narrow Damen station, faster users like the average commuter, right, is unable to pass the slower user and is forced to slow down. The result is an inefficient flow of traffic as well as physical and psychological stress on the slower user and frustration for the faster user.

nearby objects or other pedestrians. Almost all wheelchair users and those who use walking aids can also manage within this 32" width for short distances."⁸ Two streams of traffic can comfortably pass within a width of 64". Two users can pass one another in a 60" span although this can create a restricted flow of traffic. "Forty-eight inches (1220 mm) is the minimum width needed for an ambulatory person to pass a non-ambulatory or semi-ambulatory person. Within this 48 in (1220 mm) width, the ambulatory person will have to twist to pass a wheelchair user, a person with a service animal, or a semi-ambulatory person. There will be little leeway for swaying or missteps."⁹ In order for faster users to safely pass slower users, the platform at Damen Station needs to be at least 19" wider.

I researched the average walking speeds of pedestrians to understand the disparity that exists between slower and faster paced users. Many transportation studies use an average of 4.0 feet per second as a measure to determine the timing of pedestrian crossing signals.¹⁰ Studies looking at the crossing time of pedestrian found that the average walking speed for older pedestrians was 4.11 feet per second, compared with 4.95 for younger pedestrians. On average, older females had the slowest walking speed at 3.89 feet per second. The difference in speed between older men and older women was .42 feet per second while the difference between younger men and younger women was .32.¹¹

Looking at the spacial dimensions and average walking speeds is important to understanding how the Damen Station functions for the diversity of current users. It is also critical to examine the shifting demographics of the broader population. For example, "127 million adults -- over half the adult population -- are now classified as overweight, with almost half of those considered obese, according to data compiled by the American Obesity Association. Of the obese, 9 million are classified as extremely obese."¹² By the year 2020, one study predicts that 77.6% of men will be overweight and 40.2% obese, while 71.1% of woman will be overweight and 43.3% obese.¹³ This dramatic shift in the average weight of the population has significant implications. The design and redesign of various products reflect this. For instance, wider, stronger wheelchairs are now available to accommodate larger sized people. Larger coffins are also on the market for those people unable to fit within a standard casket. Obese users on the CTA also have different spacial needs. Substantially overweight users at the Damen station take up a larger portion of the 41" platform, and

Mean walking speeds for disabled pedestrians and users of various assistive devices.
 Source: *Human Factors in Traffic Safety*⁽³⁾

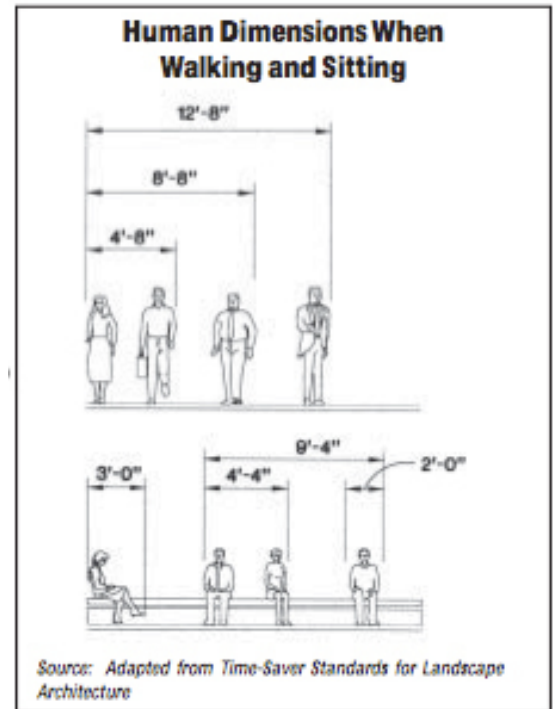
Disability or Assistive Device	Mean Walking Speed, m/s (ft/s)
Cane or crutch	0.8 (2.62)
Walker	0.6 (2.07)
Wheelchair	1.1 (3.55)
Immobilized knee	1.1 (3.50)
Below-knee amputee	0.7 (2.46)
Above-knee amputee	0.6 (1.97)
Hip arthritis	0.7 to 1.1 (2.24 to 3.66)
Rheumatoid arthritis (knee)	0.7 (2.46)

Ergonomic Considerations: The average walking speeds of different users can vary greatly. Persons with a disability or an assistive device may walk 1.97 feet per second to 3.66 feet per second compared to a young, able bodied man who can average 4.95 feet per second.¹⁶

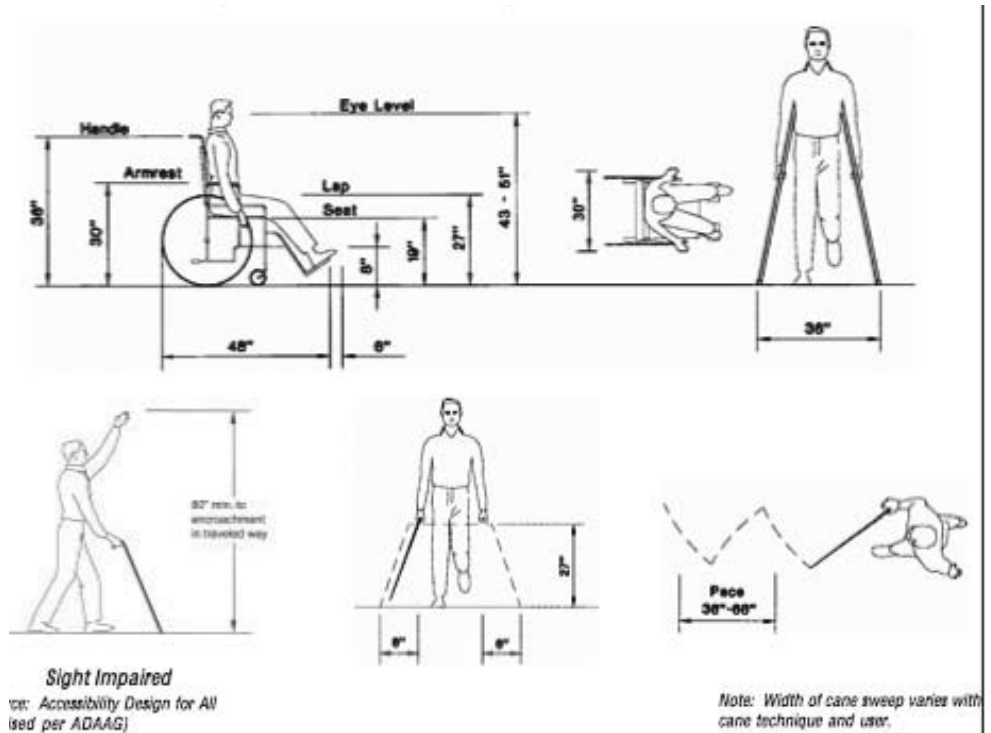
due to their size, need to walk closer to the edge than average sized users. Obesity and its impacts on the body can also cause these users to walk more slowly. Again, the narrow width of the platform will not allow faster users to pass obese, slower moving users at this station.

The other shifting demographic that is important to consider is the increasing number of people over the age of 65. "People 65 years and older represented 12.4% of the population in the year 2000 but are expected to grow to be 20% of the population by 2030."¹⁴ An aging population can mean greater numbers of people with disabilities. In 2002, 52% of older persons reported that they had some type of disability (sensory disability, physical disability, or mental disability). While some of these disabilities may be relatively minor others may cause people to require assistance for daily tasks. Almost 37% of people over 65 years old reported a severe disability and 16% reported that they needed some type of assistance as a result.¹⁵ As the aging population grows but continues to require transportation services, systems like the CTA will need to adapt to the needs of these users.

Understanding ergonomic issues such as the spacial dimensions and walking speed of current users underlines the weaknesses in the current design of the Damen Station platform. Furthermore, as the pool of possible users continues to age and become more overweight, there is an ever greater need for this platform and others like it within the CTA system to be changed to accommodate a broader range of users and their differing abilities.



Ergonomic Considerations: (Above) A comfortable width for two streams of pedestrian traffic ranges from a minimum of 48" to an ideal width of over five feet.¹⁷ (Below) Persons in a wheelchair or utilizing a cane or crutches require more than the average clearance of 32".¹⁸





Little Has Changed: Damen Station located along the Blue Line (Top Left) was built in 1895. The canopies, railings, light fixtures (Top Right) and station house (Bottom Left) are still original.

The Damen station is historically significant, dating back to the opening of the Metropolitan 'L' in 1895.¹⁹ This station still boasts its original canopies, railings and is one of only two stations left with shepherd's crook lights glowing with incandescent bulbs. The elevated tracks were built between existing buildings which determined the size and shape of the station. The narrow portion of the wooden platform follows the jog in the line that runs along Milwaukee Avenue. The age and site of this station make it more complicated to retrofit for greater accessibility although recent upgrades have been made to other older stops along the Blue Line, such as the California and Western stations. Changes to the station need not negatively effect the historical character of the station. In fact, improvements in the efficiency and safety of the station can increase ridership for a greater variety of users who can enjoy this historical part of the L system.



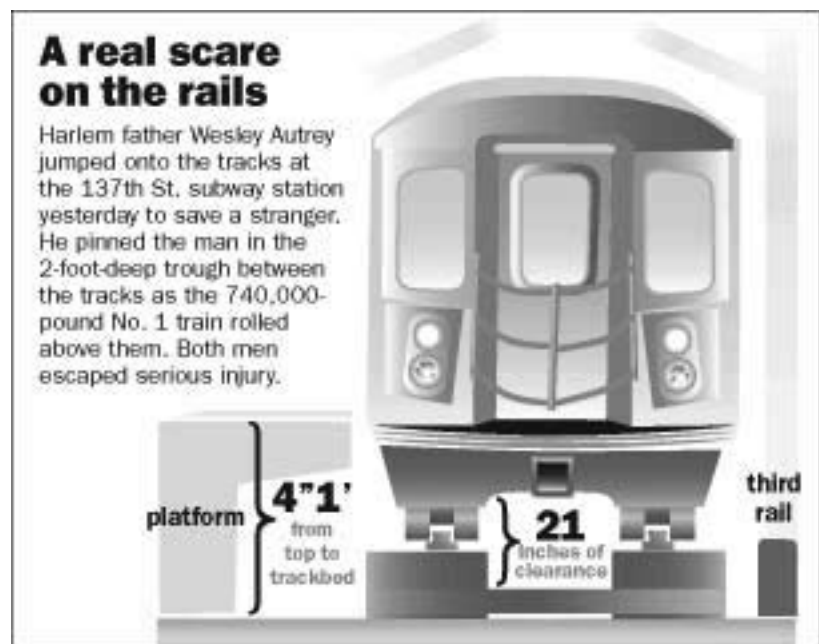
Little to no change has been made to the Damen Station as it pertains to safety along the platforms. Yet safety should be a major concern to the CTA. Instances of fatalities and rescues along the rails have been a reality within the CTA and other comparable subway systems in the U.S. One of the most publicized subway rescues to make the national headlines in recent years was in January of 2007, when a 50-year old construction worker saved a stranger on the tracks of the New York City subway. A young man standing along the platform went into convulsions causing him to fall unto the tracks.²⁰ Without any barriers or protection, this man was left exposed to the threat of the tracks below. Amazingly, the rescuer jumped onto the tracks and protected the young man as a train passed over them.

Similar stories have made headlines. A teenager in Toronto helped a blind man to safety after he had mistakenly fallen onto the tracks. While text messaging on her cell phone, a woman accidently fell to her death onto the tracks in NY. Additionally, suicides are a fairly common occurrence along city subway systems and though homicides are less common, they do occur. Perhaps one of the most notorious incidents involved a young woman who was killed after a mentally ill person pushed her onto the tracks. Such occurrences illuminate the need for basic protection along platforms. The level of vulnerability is particularly poignant along a narrow platform like that at the CTA Damen Station.

Several cities around the world have recognized the danger of exposed platforms and have instigated safety



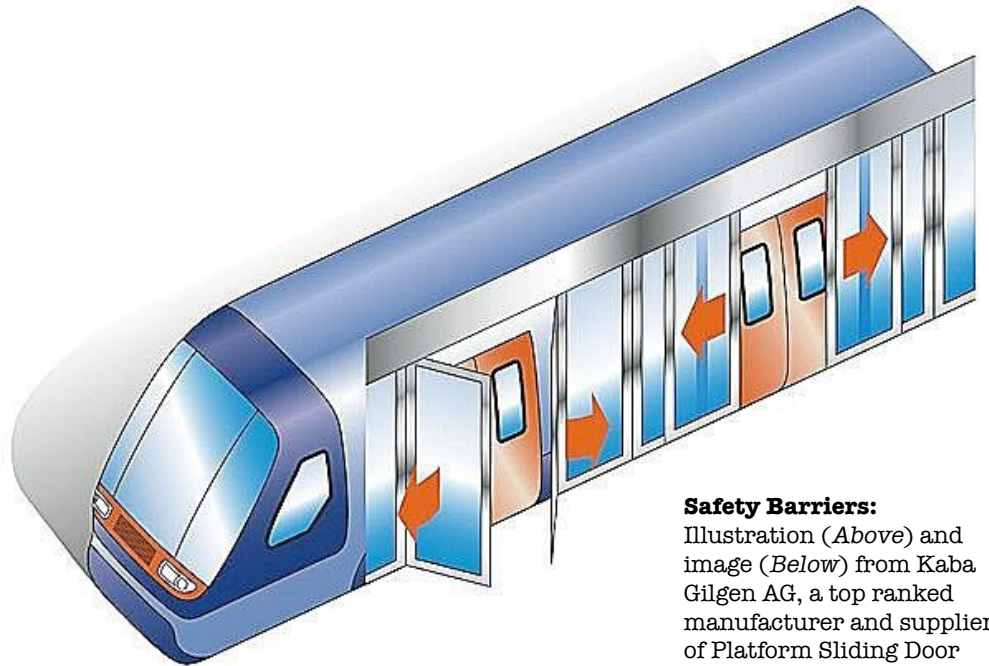
Little Has Changed: Although the station has been renovated at different times over the years, the narrow wooden platform still leaves passing users exposed to the tracks (Above). Such exposed platforms leave many users vulnerable to falling into the tracks as occurred on the New York City subway tracks in January of 2007 as illustrated in this graphic (Below) from a *New York Times* article covering the story.²¹



measures. At stations along the transit lines in London, Paris, Hong Kong and Shanghai, for example, platform screen doors (PSD) have been installed. These doors provide a barrier between transit users and the exposed tracks. Automatic doors slide open when the train arrives at the station. Trains are set to stop at precise points in order for the car doors to line up with the platform sliding doors. Full and half door designs have been installed in new train stations as well as retrofitted within older stations. KABA Gilgen AG, a manufacturer and supplier of platform sliding door systems suggests that these systems not only enhance the safety for passengers but also provides more space on the platforms. "The passengers instinctively feel that the PSD protects them from the dangers of the track area, which encourages them to use the entire width of the platform."²²

Retrofitting the Damen Station with platform sliding doors is one solution for making this station safer, more efficient, and ultimately more enjoyable for CTA users. The rise in the use of these doors worldwide illuminates the need for such measures and highlights the market's acceptance of these products.

There is the opportunity to take the standard platform sliding door system and go one step further by making the Damen station a model project for innovative public design. A functional, visually compelling door system can be designed and implemented that complements the rich history and dense urban setting of the station. By engaging Chicago's top designers and artists to create a



Safety Barriers: Illustration (Above) and image (Below) from Kaba Gilgen AG, a top ranked manufacturer and supplier of Platform Sliding Door (PSD) systems states that safety is enhanced and more space is used on transit platforms as a result of these systems.²³



Platform Screen Doors "PSD full-height"
Façade de Qual "FQ haute"
Hohe Bahnsteigtüren
for train stations with air conditioning

platform door system blending modern transit technology with living sculptural elements, this otherwise dangerous and inefficient platform can become an example of innovative solution finding. As a demonstration project, the CTA can leverage funds outside of the standard budget for infrastructure improvements. It can utilize advertising revenue as well as public art funding.

The addition of a sliding door system along the platform creates a new advertising revenue stream. The added surface area offers opportunities to implement innovative advertising strategies. The Damen Station sits in one of the trendiest areas of Chicago and as such, it can become prime real estate for companies and organizations eager to reach their target markets.

This increased opportunity for attracting advertising dollars is especially pertinent for the CTA, which often struggles to keep in the black. So far it has stuck to fairly traditional advertising -- selling ad space on the side of buses and train cars, inside and outside of bus shelters and along the outside walls of some train stations. At the beginning of 2009, the CTA began installing digital advertisement displays in some of its stations. In a press release, it announced, "The 47th Street Red Line station is the first CTA station to be equipped with



Standard Advertising:

To compensate for budget shortfalls, the CTA has sold advertising space throughout its system, including fairly conventional advertising on the side of trains (Above), buses (Right) and along the walls of its platforms (Top Right). In January of this year, the CTA announced it would begin installing digital advertisement displays in some of its stations.²⁴



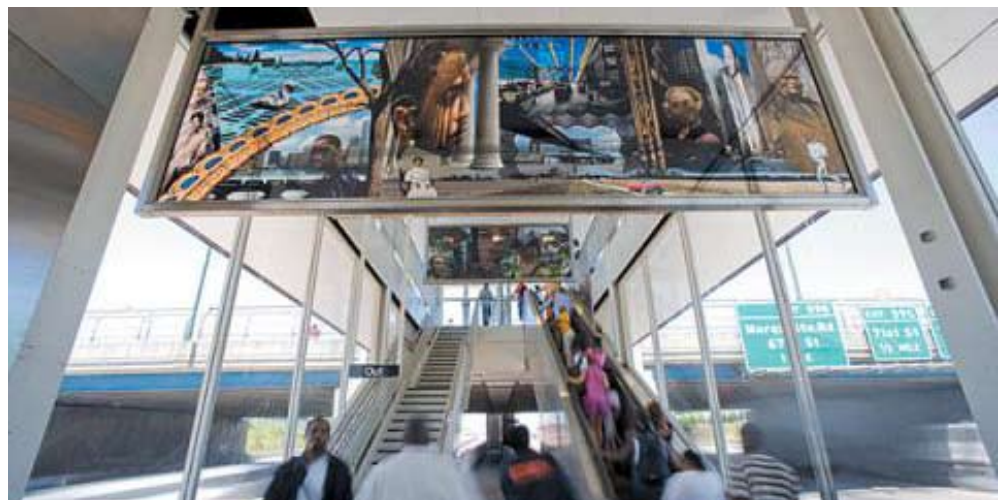
the digital advertising displays, which also will feature next train arrival and other service information and generate more than \$100 million in revenue over the next 10 years."²⁴ Building from these initiatives, sliding door platform advertising offers the CTA opportunities to promote more cutting edge advertising venues, utilizing interactive media, new materials and inventive campaigns.

Despite its budget woes, the CTA has supported several notable public art projects. From murals to installations, well-known artists to students, engaging works can be viewed at stations on across the Chicago -- on walls, sidewalks, turnstiles, and overhead. However, there is opportunity to make these art pieces more fully integrated into the CTA infrastructure. By introducing public artwork into the design and functionality of the sliding platform doors, the work becomes more accessible and engaging to the public.



Engaging Public Art:

The CTA has commissioned a number of successful public art projects within its system including a mural (Above), *Ice Cream Dream*, created by Hector Duarte at the Blue Line Western Stop, Ellen Harvey's *Carpet* (Bottom Left), an oriental rug-like glass and marble mosaic located at the Brown Line Francisco Station and Stephen Marc's color photographic murals (Bottom Right) at the 79th Street Red Line stop.



In summary, the Damen Station provides the CTA with an opportunity to greatly improve the level of safety and efficiency for all users by implementing a market driven solution that combines public art, community design, cutting edge technology and innovative advertising. As users' needs continue to change and the CTA tries to attract a greater number of riders, it needs to compensate for the different spatial dimensions and disparity in walking speeds. To do this, the CTA should look to a holistic design solution like platform sliding doors in order to improve the system for current and future users. This design solution can serve as a model for upgrading other stations throughout the CTA system.

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- ² City of Chicago, Mayor Richard M. Daley, Chicago Department of Transportation. Cheri Heramb, Acting Commissioner. "Street and Site Plan Design Standards." April 2007: 7.
- ³ Virginia Commonwealth University: VCU DBTAC Coordination, Outreach and Research Center. National Institute on Disability and Rehabilitation Research. www.dbtac.vcu.edu.
- ⁴ Architectural and Transportation Barriers Compliance Board. 36 CFR Parts 1190 and 1191. Americans With Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Recreation Facilities. Federal Register/Vol. 67, No. 170/ Tuesday, September 3, 2002/Rules and Regulations.
- ⁵ Architectural and Transportation Barriers Compliance Board. 36 CFR Part 1195 Architectural Barriers Act (ABA) Accessibility Guidelines for Outdoor Developed Areas; Proposed Rule Federal Register/Vol. 72, No. 118/Wednesday, June 20, 2007/Proposed Rules.
- ⁶ Chicago Transit Authority (CTA). Accessible Services. <http://www.transitchicago.com/maps/accessible.html>
- ⁷ Virginia Commonwealth University: VCU DBTAC Coordination, Outreach and Research Center. National Institute on Disability and Rehabilitation Research. www.dbtac.vcu.edu.
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- ¹⁰ John LaPlante, PE, PTOE and Thomas P. Kaeser, PE, PTOE. A History of Pedestrian Signal Walking Speed Assumptions. 3rd Urban Street Symposium. Seattle, Washington. June 24-27, 2007
- ¹¹ Richard L. Knoblauch, Martin T. Pietrucha, and Marsha Nitzburg. "Field Studies of Pedestrian Walking Speed and Start-Up Time." Transportation Research Record No. 1538, Pedestrian and Bicycle Research:1996.
- ¹² James W. Harrell, FAIA, FACHA, and Bill Miller, AIA, ACHA . "Big challenge." Architecture + Design. Health Facilities Management Magazine. March 2004 . www.hfmmagazine.com
- ¹³ Christopher J. Ruhm. Current and Future Prevalence of Obesity and Severe Obesity in the United States. National Bureau of Economic Research, Inc. NBER Working Papers number 13181. Jun 2007. <http://www.nber.org/papers/w13181.pdf>
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¹⁵ Department of Health and Human Services, Administration on Aging. "A Profile of Older Americans: 2006: Disability and Activity Limitations." <http://www.aoa.gov/prof/Statistics/profile/2006/16.asp>

¹⁶ U.S. Department of Transportation. Federal Highway Administration. University Course on Bicycle and Pedestrian Transportation Lesson 8: Pedestrian Characteristics. July 2006.

¹⁷ Georgia Department of Transportation. "Pedestrian & Streetscape Guide." September 2003. http://www.dot.state.ga.us/bikeped/ped_streetscape_guide/index.shtml.

¹⁸ Georgia Department of Transportation. "Pedestrian & Streetscape Guide." September 2003. http://www.dot.state.ga.us/bikeped/ped_streetscape_guide/index.shtml.

¹⁹ www.Chicago-L.org. "Damen." <http://www.chicago-l.org/stations/damen-ohare.html>

²⁰ "Man Is Rescued by Stranger on Subway Tracks," New York Times, 3 January 2007, <http://www.nytimes.com/2007/01/03/nyregion/03life.html?ex=1325480400&%23038;en=bfb239e4fab06ab5&ei=5090>

²¹ "Man Is Rescued by Stranger on Subway Tracks," New York Times, 3 January 2007, <http://www.nytimes.com/2007/01/03/nyregion/03life.html?ex=1325480400&%23038;en=bfb239e4fab06ab5&ei=5090>

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²³ Kaba Gilgen AG. "Automatic Platform Screen Doors for Public Transportation." www.kaba.com.

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