

Anthropometrics Study - Warehouse Navigating with a Cane/Wheelchair/Scooter



Why Do I Need Mobility Aids?

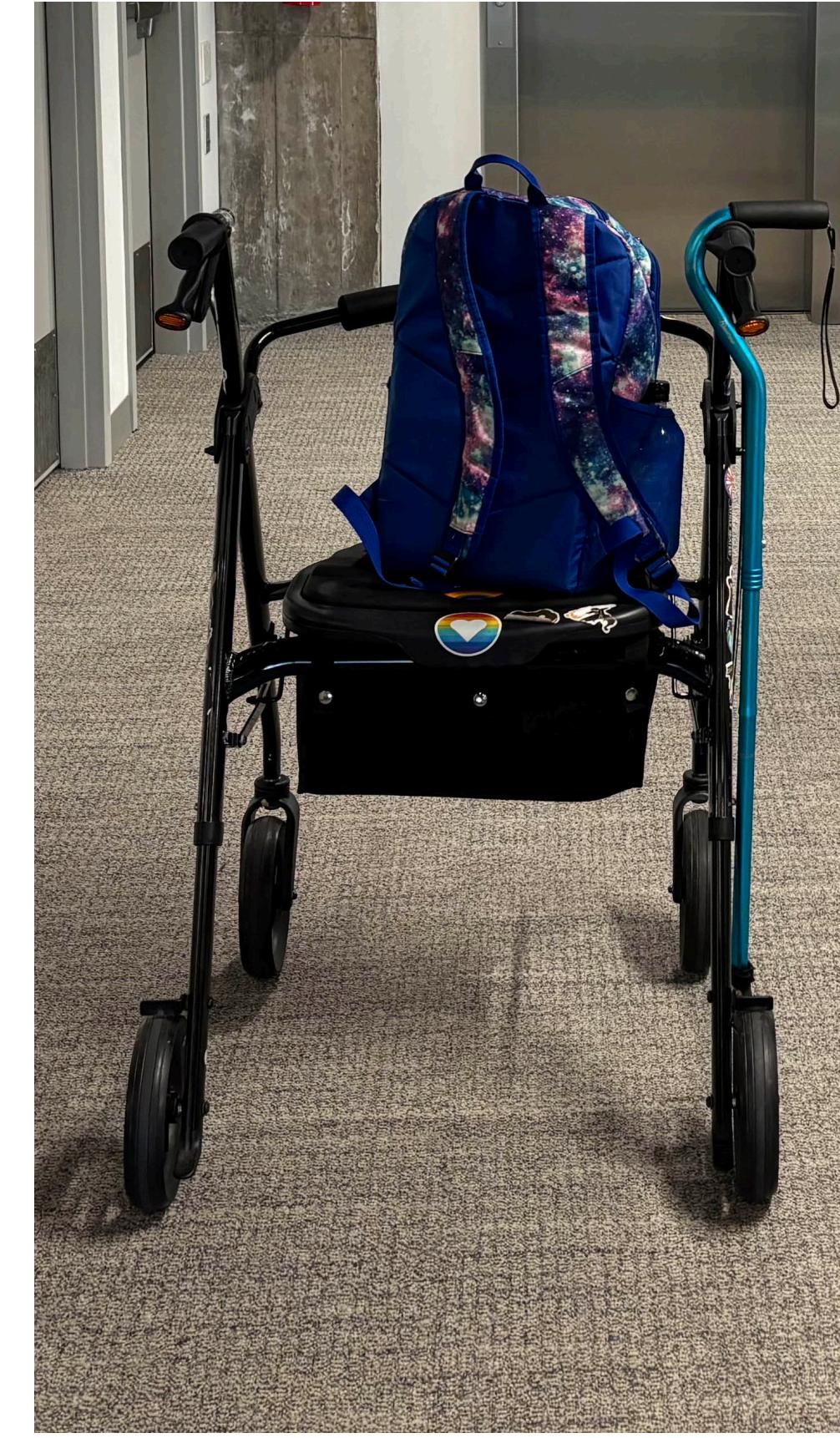
Because of my disabilities, my body doesn't always cooperate with what the world expects it to do. Walking long distances, standing for hours, or trying to balance on uneven ground can be painful, exhausting, and sometimes unsafe. My rollator, cane, and scooter aren't just accessories they're what make it possible for me to show up, move through space, and live my life without pushing myself past my limits.

My Life with Mobility Aids

These devices give me choices. My rollator keeps me steady and lets me sit when I need to. My cane works for shorter trips when I just need a little backup. And my scooter makes longer distances doable without draining all my energy. With them, I don't have to miss out, I can decide how I want to move depending on the day and the space.

My Life Before Mobility Aids

Before I started using mobility aids, I spent a lot of time just trying to "push through." That usually meant pain, fatigue, and sometimes not being able to finish what I started. It also meant avoiding things altogether, which made my world feel smaller. Accepting mobility aids was a big shift for me, they gave me back safety, energy, and confidence to take up space again.





What Are Mobility Aids?

Mobility aids are tools made to support people when their bodies don't move with ease on their own. They can be as simple as a cane or as complex as a powered scooter. The purpose is the same: to bridge the gap between what our bodies can do and what the built environment demands of us.

What Are They Used for?

They help reduce pain and strain, prevent falls, and open up the door to independence. With them, we can reach places we couldn't without them, keep up with activities, and engage with environments that would otherwise shut us out. In design terms, they expand how the body can interact with space, which also highlights when spaces are designed without people with disabilities in mind.

How Do People Live Like This??

Mobility aids aren't a weakness; they're freedom. They make it possible to move, work, and socialize on my own terms. They're how people like me take back control of our lives and find ways to thrive in environments that weren't built for us. Independence doesn't come from pretending we don't need help, it comes from using the tools that let us live fully.

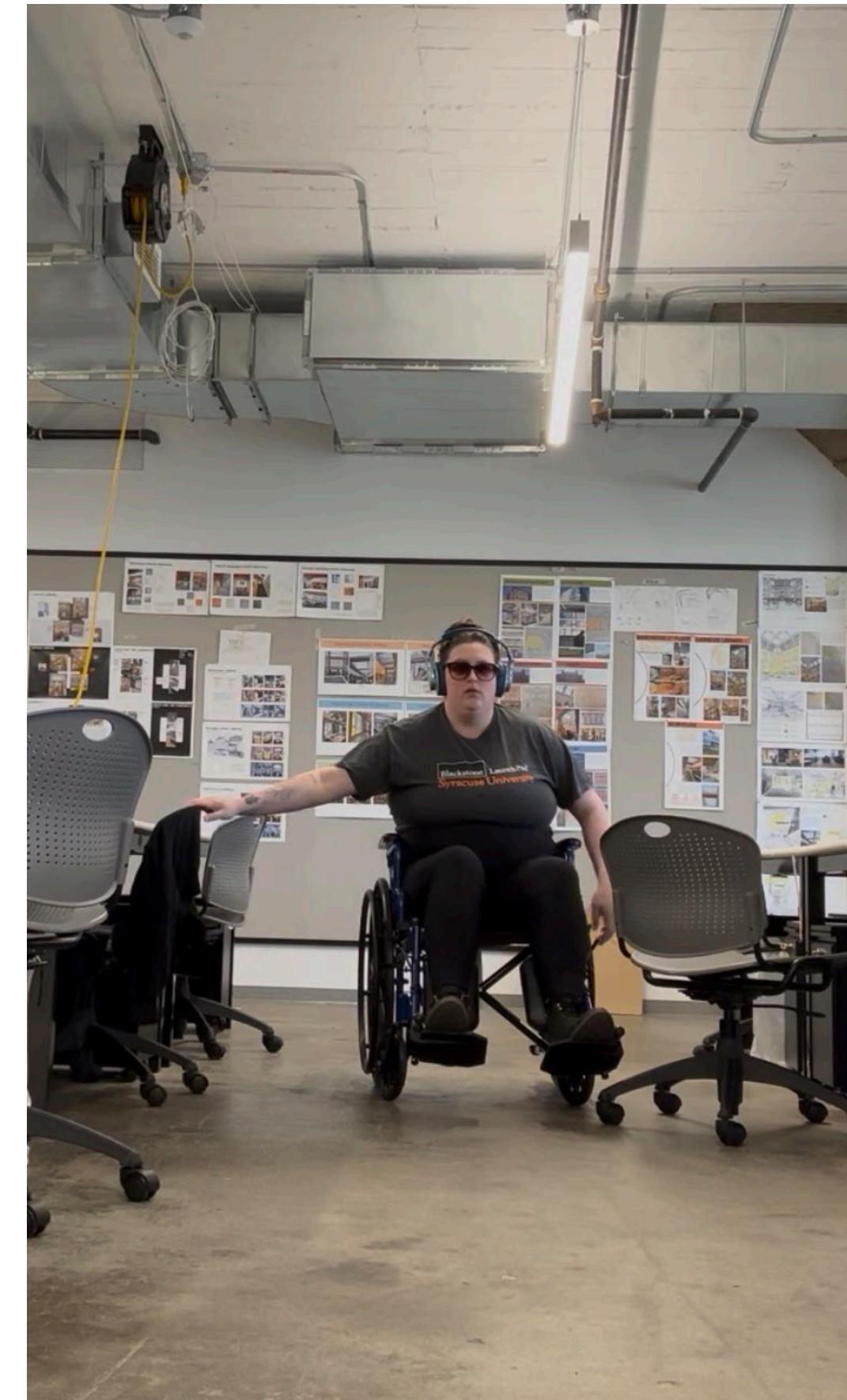
Moving Through Space

Tight Turns In Small Spaces

In the bathroom, the space is too tight for me to turn the wheelchair around. Trying to line up, the effort pulls at my upper back and arms. Even with my rollator, stalls this narrow trap me in awkward angles and I choose to leave it behind instead. To transfer to the toilet properly, I'd have to back in, which demands even more coordination. The sink is easy to use because it's open, but the stall itself feels like it's working against my body. For a manual chair user, this maneuver requires upper-arm and shoulder strength, but without turning clearance, it's impossible to transfer. Powered chair users may not even fit to attempt the maneuver. The lack of space forces the body into awkward, energy-draining positions.

Blocked Pathways

Trying to get down the classroom aisle with the chairs pulled out, I have to stop every few feet to ask people to move or move empty chairs myself. It feels like an obstacle course when all I want is to get to my seat. For manual chair users, threading between desks means pushing, stopping, and realigning – repetitive arm and core effort. Powered chair users can't angle around chairs at all if there isn't enough clearance. Layouts that don't account for mobility aids instantly become barriers.





Elevator Maneuvering

In the elevator, I need the people inside to move so I can back out or turn in. My whole body stiffens with embarrassment as I twist awkwardly to fit into the small space. My scooter adds another layer of difficulty because it needs more clearance and no one knows where to stand to make room. Elevators are often wide enough for the chair, scooter, or rollator itself, but not wide enough for turning without others shifting aside. Manual users engage arms and core for every small back-and-forth, while powered users rely on precision that still demands space for aligning to the doorway.

Ramps and Outdoor Paths

On the ramp with my scooter, I take up nearly the whole width, leaving little room for anyone to pass. There's no place to turn around, so I have commit to going all the way forward before I can adjust or turn around if I forgot something. On my "walk" to school, the lack of sidewalk and the potholes shake my scooter constantly. My wrists absorb the vibration, my lower back aches, and my energy drains quickly as I fight to stay steady. Potholes jar the chair (for both scooter and manual), transferring shock into the arms and spine. Manual chair users rely on repeated arm powered pushes, shoulders and core burning with each rotation, and they need enough width to pump the wheels. Without smooth, continuous pathways, navigation turns painful and it hard on my body and equipment, requiring more frequent maintenance and rest.

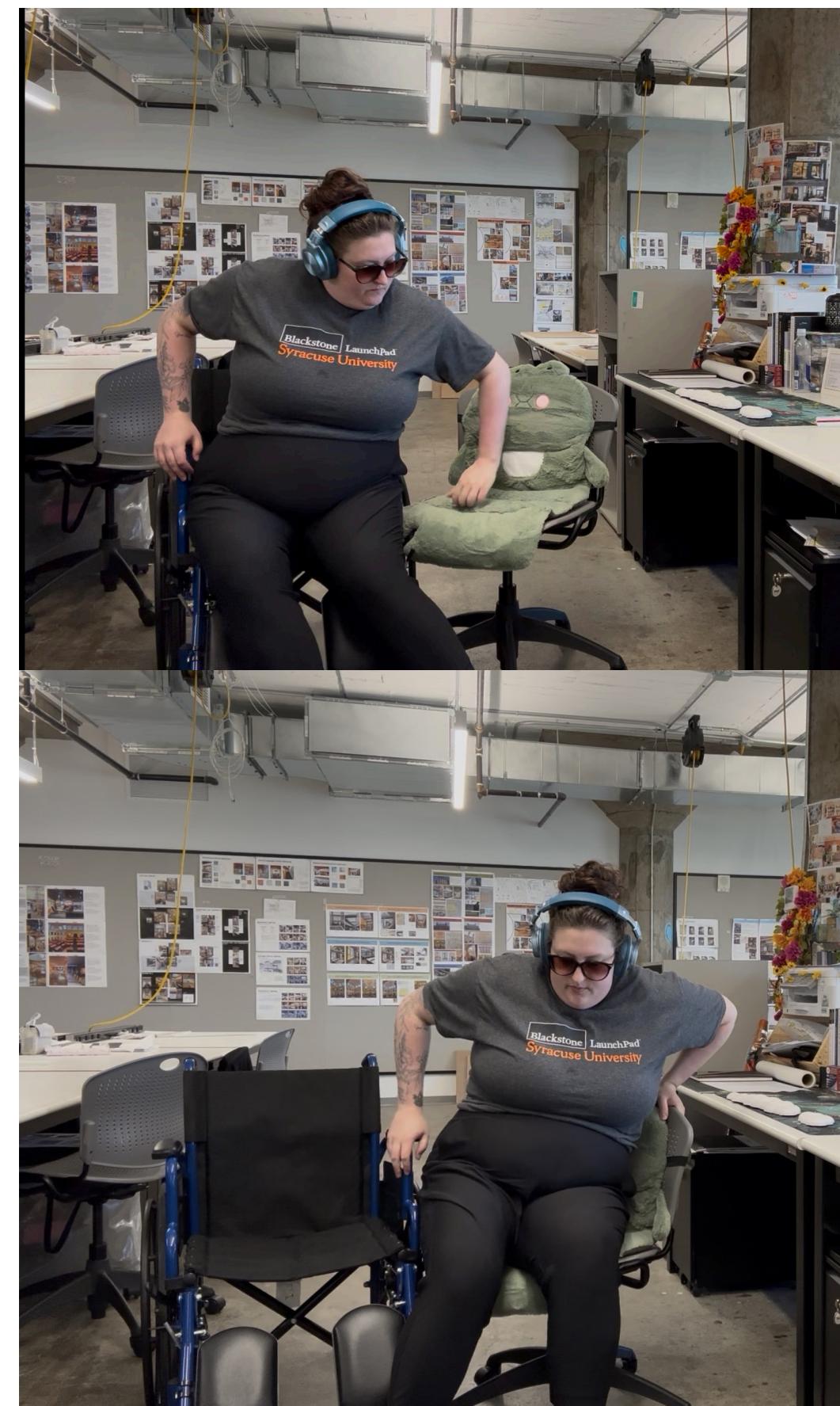


Changing Levels or Positions

Transferring to Studio Chair

Moving from the wheelchair to my desk chair looks simple in photos, but it takes a surprising amount of body coordination. First, I have to shift my legs manually out of the leg rests, lifting them with my arms, which pulls at my shoulders and strains my lower back. Then I line the two chairs up as close in height as possible so I don't have to "climb" up or down.

To transfer, I plant one arm firmly on the desk chair to stabilize, then push hard with the other arm on the wheelchair to lift and shift my body weight across. My triceps and core do most of the heavy lifting while my back tightens to stop me from tipping. There's relief once I'm seated, but I feel the fatigue ripple through my arms and torso. For someone who uses a wheelchair daily, this transfer is routine but physically demanding. It requires arm, shoulder, and abdominal strength in unison, plus enough space around both chairs to line them up safely. Even small misalignments in height force more effort through the arms and core, making the move risky or exhausting.





From Standing to Bent Over

Picking up my backpack from the floor with my rollator, I brace one hand firmly on the rollator handle to steady myself, then bend at my knees and waist to reach. My thighs burn as they hold me, my core tightens to keep me from tipping forward, and my shoulders strain under the added weight of the bag. Because of the rollator frame, I also have to shuffle back slightly to create clearance to pull the bag upward. That extra adjustment engages my forearms and wrists as I shift the rollator, before I can even use both arms to lift the bag.

From an anthropometric perspective, this motion requires multiple joints working in sequence: knees flexing deeply, hips hinging forward, spine bending, and shoulders rotating downward, all while one arm remains engaged for balance. The added load of the bag increases the torque on my back and shoulders, amplifying the risk of strain. The movement also demands more clearance space around the rollator than is typically allowed in narrow aisles or crowded rooms.

Reaching for objects below seat level often means leaning far forward or sideways. Mobility aid users anchor one hand on the chair, recruiting abs, obliques, and back muscles to stabilize while stretching down with the other. This shift of the body's center of gravity toward the floor increases the risk of tipping forward, especially if the object is heavy. Many rely on reacher tools to reduce the strain and keep balance safe.

Stationary Postures



Seated on My Rollater

When I sit at a table on my rollator, my body never feels fully supported. Because I'm tall, my rollator is at an adjusted height higher than other mobility aid users aids usually are. My heels hover slightly off the floor, which forces my calves to tense and my thighs to bear the majority of the pressure. The seat edge presses into the backs of my thighs, cutting circulation and making my legs tingle and feel heavy after only a short time. Adjusting the rollator height could help, but switching it back and forth between "walking mode" and "sitting mode" isn't practical and drains energy and time that I don't always have.

From an anthropometric perspective, this posture puts my body in conflict with the seat: my knees flex at sharper angles than ideal, my hips rotate forward, and the lack of heel contact removes the stabilizing function of my feet. The uneven weight distribution concentrates pressure on my thighs and calves while the spine and lower back stiffen to compensate for the imbalance. Sitting, which should be restful, instead becomes a source of strain and discomfort.





From Standing to Bent Over

When I sit in the wheelchair at a desk, my knees hit the underside structural bar immediately, forcing me to press them down unnaturally just to slide underneath. This sharpens the angle at my knees and hips, making my quads tighten and my lower back arch as I try to stay in place. Even when I manage to get my legs under and my knees can go back to a natural position, the frame of the chair catches on the desk supports, limiting how I can shift or reposition. It feels like my body is being compressed to fit a space that wasn't designed for a wheelchair.

Anthropometrically, this situation shows a clear mismatch between body dimensions and furniture design. Knee height, thigh length, and foot positioning are all compromised. The pressure points are concentrated at the knees and hips, compressing joints and limiting circulation; straining both posture and comfort over time. What should be a neutral, stationary posture becomes a sustained load on multiple joints and muscle groups, draining energy and making the desk less usable for extended periods of work.



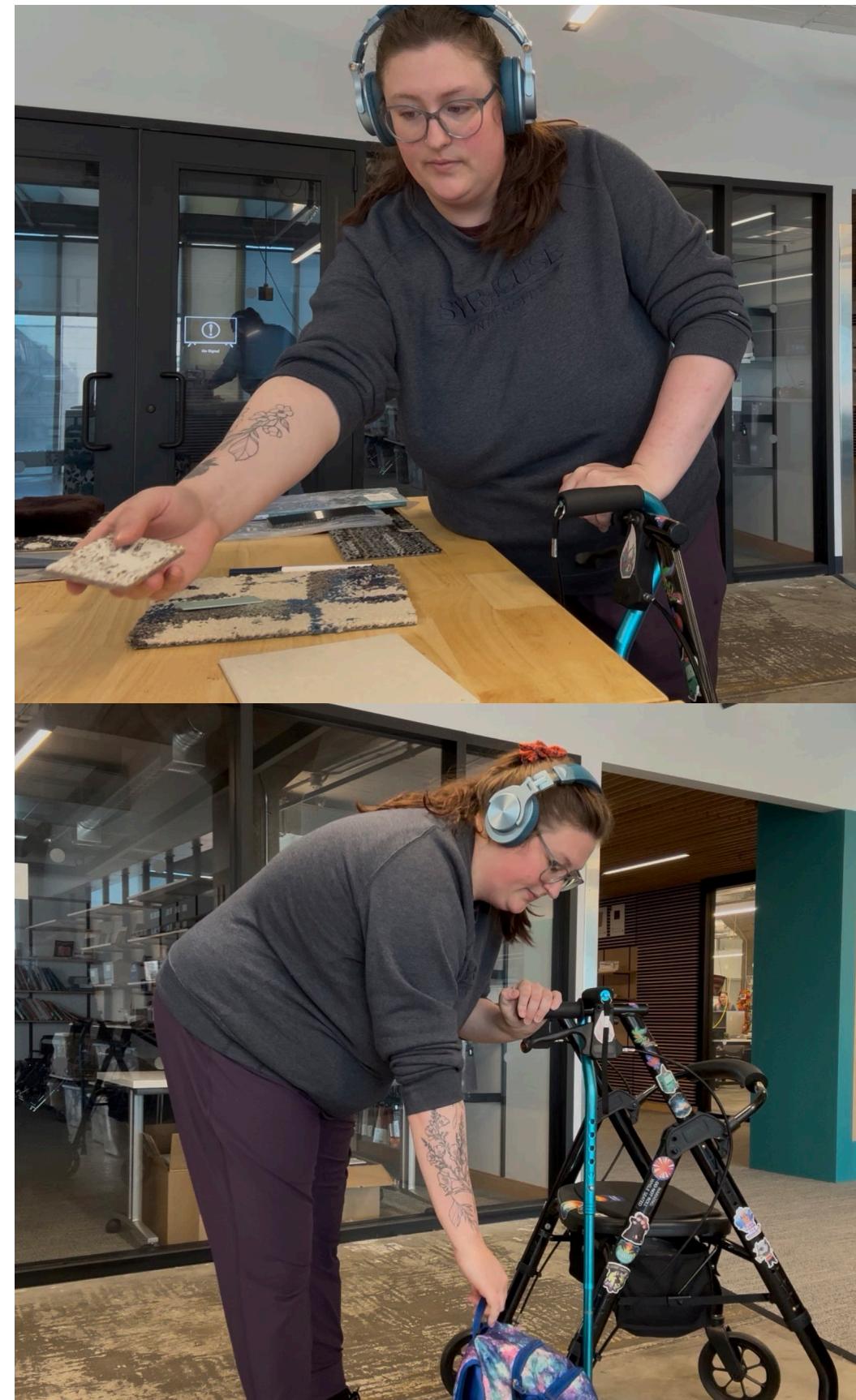
Reaching, Placing, and Retrieving

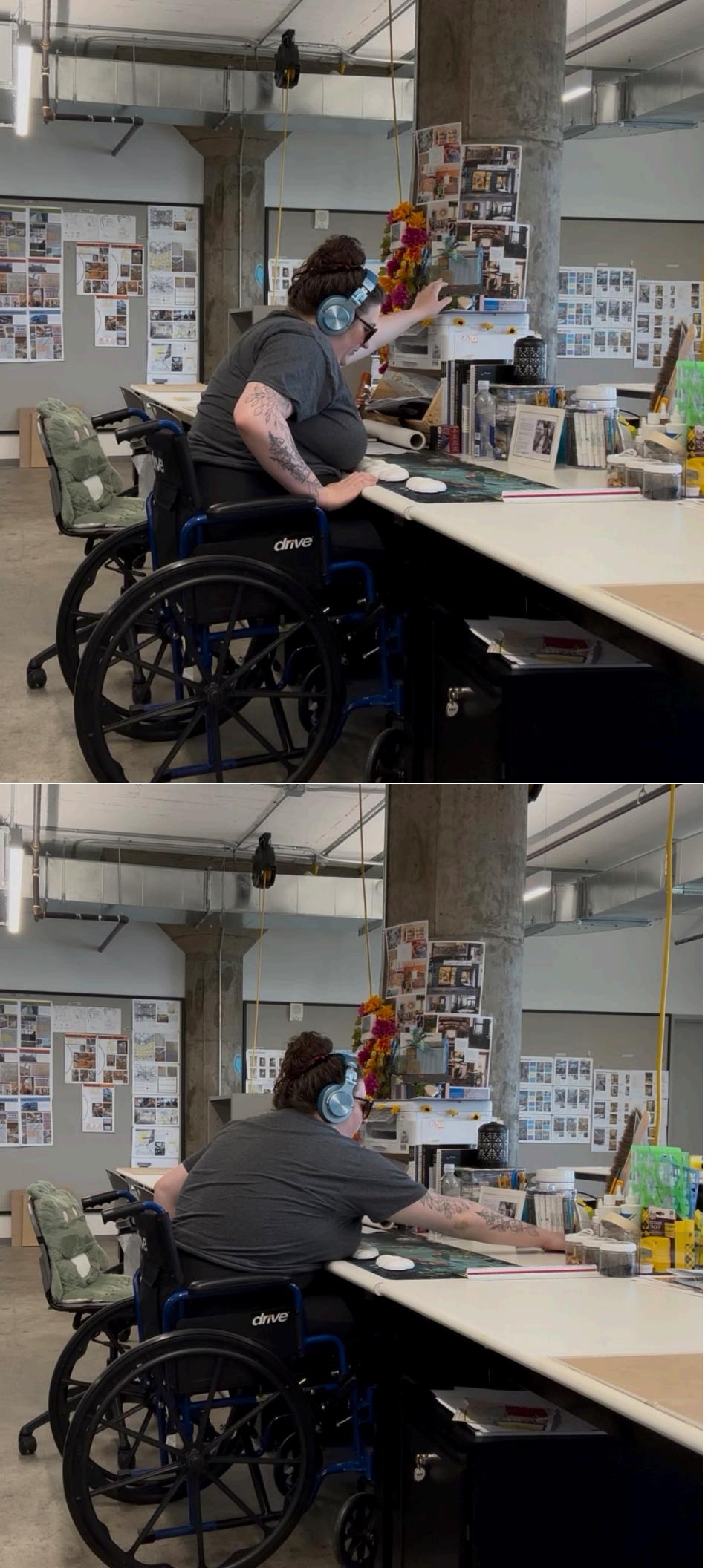
Reaching and Retrieving

I bend at the knees with my cane to support me as I pick up a marker from the ground. I brace on the cane to steady myself, then press most of my weight through my hand and wrist on the cane to help push myself upright. Without that support, my knees send sharp pain through the joint and it feels like the bones grind together (some days my knees slightly dislocate as well). With the cane, I spread the effort between my arms, core, and quads instead of relying on knees alone. The movement still drains me, but it prevents collapse.

I use my rollator as a brace to reach forward for a tile on the counter. My body leans forward, my shoulders and lower back tightening as I extend one arm while the other keeps me balanced. When I reach down for my bag, the rollator steadies me but I still feel pressure in my thighs and back as I bend, then strain in my shoulders and wrists as I pull upward with extra weight.

These movements highlight how reaching requires stabilizing the body's center of gravity; which can be painful if the movement is held or prolonged.





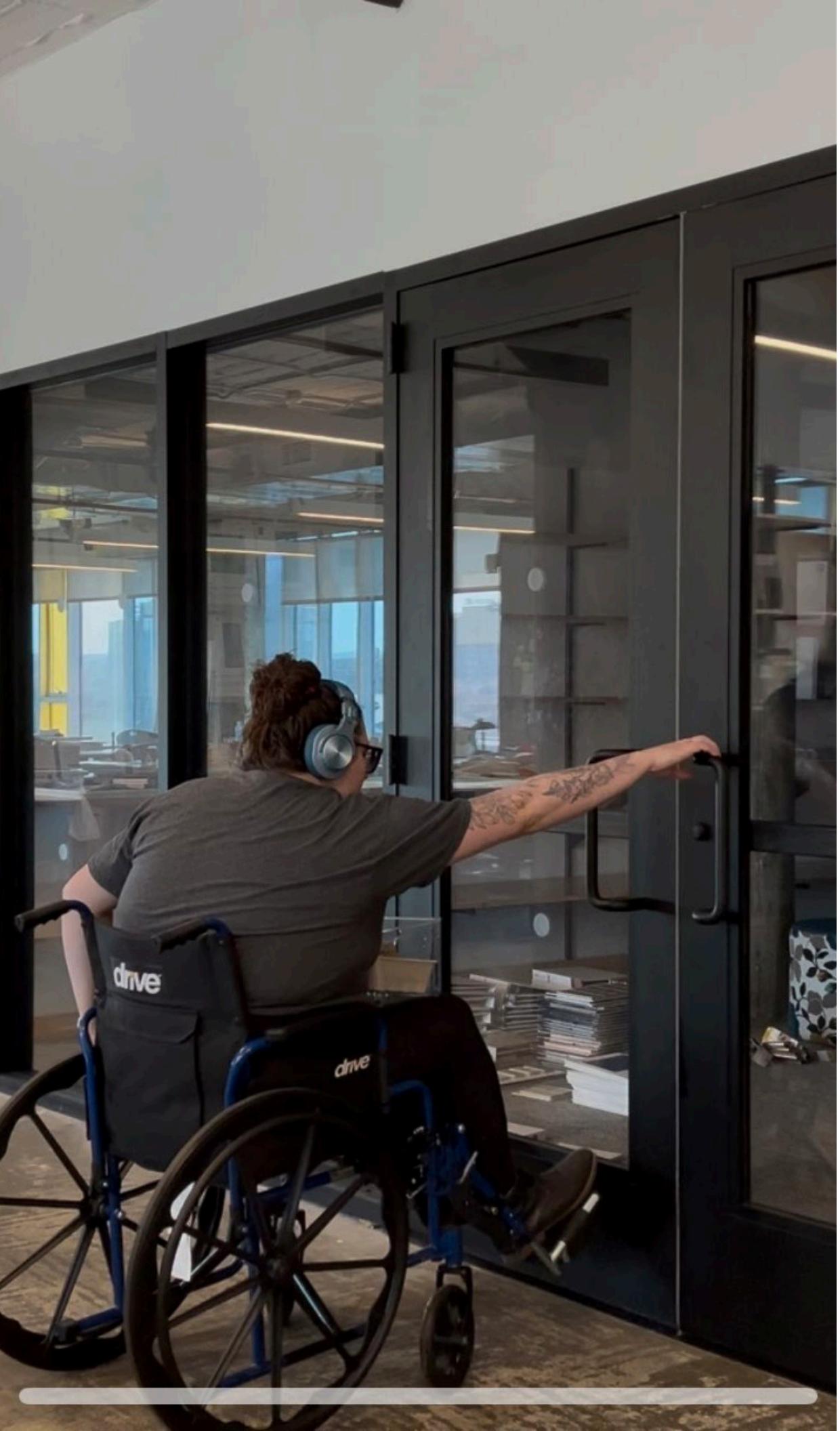
Reaching in Seated Positions

In the first wheelchair photo, I bend forward to reach for the same marker as before. With no cane or rollator for bracing, my core muscles and lower back strain to hold me from tipping forward. My shoulders stretch downward, and my thighs push into the seat edge, compressing circulation as my body leans. My ribs hit the arm rest and require me to position my body around it to finally reach the floor.

In the next set of photos, I reach forward from the chair for an object on the desk, then extend upward to reach above desk height. Reaching forward requires core stability and shoulder extension, but the further I lean, the more my balance point shifts. Reaching upward forces my shoulders into overhead flexion, with the spine and ribs lifting to compensate.

Anthropometrically, both postures highlight limits: forward reaching risks tipping if the movement isn't able to be stabilized properly and requires stamina, while overhead reaching exceeds natural shoulder range, causing strain and requiring the strength to stabilize. Without assistance, these tasks could quickly fatigue the arms and core.

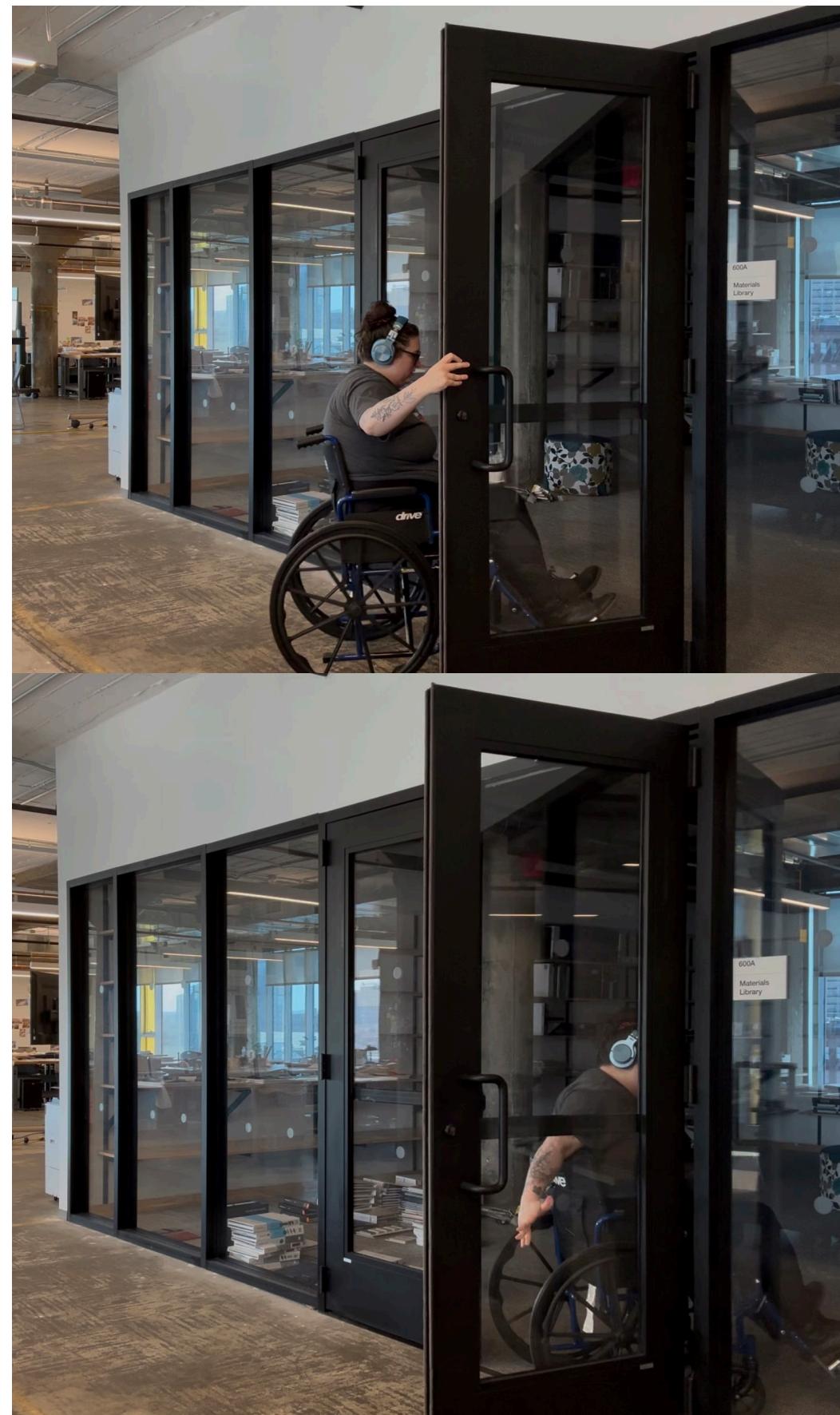
Operating and Interacting



Heavy Door Operation

In this first set of photos, I'm struggling to open and move through a heavy studio door. The process requires me to stop, lean forward, and pull with my shoulders and arms. My triceps, deltoids, core, and wrists all work at once just to budge the door and keep the chair in a stationary position. My core tightens to keep balance while I try to roll forward through the gap. Because the door is heavy, every small adjustment takes repeated bursts of arm and shoulder strength. If the chair doesn't line up perfectly, I have to back up and try again or shimmy though the doorway.

Anthropometrically, this shows how door hardware and hinge resistance create barriers for seated bodies. A manual chair user must coordinate grip, pull, push, and roll in sequence; a full-body task that demands upper-body endurance. The space constraint of the doorway adds to the strain, forcing me into awkward angles and stalling my motion. Emotionally, the process feels clumsy and exposing: what should be one smooth movement turns into a drawn-out, visible struggle just to enter the room.





Interacting

These photos show interaction with various spaces i use everyday. The rollator frame often wedges into doorways, leaving me stuck until I pull it back, angle it differently, and try again or again shimmy it through. To make progress, I have to let go of the handles and use both arms to fight with the door, which means giving up my balance support. My shoulders and wrists strain from forcing the hinge open, while my core braces tightly. Every time I do this, I feel the trade-off: safety for forward movement.

In the elevator, my rollator takes up almost the entire width of the doors. Scooters amplify the awareness of how much space my aids take up, they're longer and less compact, making it harder to angle or back out gracefully. People often stare, start, or shuffle awkwardly out of the way, which adds emotional strain on top of the physical. In the bottom photo, I have to angle my rollator or scooter carefully to approach swing-hinge doors or cabinets.

Anthropometrically, these situations reveal how built environments expect a narrow, able-bodied profile that moves in straight lines. My aids expand my body's footprint, forcing me to constantly be aware. The emotional strain isn't just social embarrassment, it's a constant reminder that these spaces weren't designed for people like me in mind.