

# O&M for Visually Impaired Wheelchair Users

James Scott Crawford

Affiliated Blind Of Louisiana

409 W. St. Mary Blvd

Lafayette LA 70506

337-234-6492

[scottc@affiliatedblind.org](mailto:scottc@affiliatedblind.org)

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**DISCLAIMER:** There is no one single way to address any of the issues listed below. These are just ideas that have worked with students in the past. Frequently, what has worked with one person or in one situation completely fails in another. The purpose of this handout is to help with brainstorming and to promote creative problem solving.

## **SIGHTED GUIDE**

----The obvious answer to the sighted guide question is for the sighted person to push. In many cases however, this is not the best answer. It is very difficult to push scooters or electric wheelchairs. Many ultra-light wheelchairs don't have back frames to push from. For some people, pushing themselves is a matter of pride, dignity and self-respect. Being pushed can feel humiliating.

-----Some people with electric chairs or scooters don't mind having another person operate the controls of the chair and help steer. Turn the power/speed control to a low setting. The chair controls are very sensitive and are more difficult to control from the side than they are from the seat. Especially at first, don't operate the chair from in front. It is easier to get to the person's side and face the same direction they are. Once familiar with the chair's controls, it is possible to drive from the front, but at first it is too easy to make mistakes and throw the person around.

----Some people have been able to hold onto a guide's arm. This requires adequate arm strength and flexibility. Some people who could hold on did not have fast enough reactions to make holding on safe. Instead of holding on at the elbow, it is easier for the person to put their hand on top of the guide's forearm, which is held parallel to the floor. This allows the guide to point in the directions they want to turn. Especially for turns toward the wheelchair user, this facilitates smooth turns. For manual chairs, the forearm position allows the guide to help pull the chair, while the person is pushing the far side wheel with their other hand. If the chair is unintentionally turning away from the guide, slow down so that the person can keep up with their free hand.

----If the person has sufficient vision and adequate reaction times, they can visually follow their guide. Make sure that they are observant of the guide's movements, not just "blindly" tagging along. In one case, a policeman attempted to guide a student down a short set of stairs. (They were just outside of an elevator and were the direct path to the street. She needed to turn away from the street to locate the ramp.) The student did not notice the drop of the policeman's body and would have driven off the stairs if not stopped. (SEE... MONITORING SAFETY.) By picking a particular spot on the guide's body to follow, like a belt or the transition from shirt to pants, many people can detect the drop or rise at stairs or ramps. The person also has to remember not to cut corners. Humans handle corners more sharply than the chairs. They need to remember to use their landmarks for making turns. (SEE NEGOTIATING TIGHT CORNERS)

---To Check Following Distance. Have the person follow you as you walk down the hall. Randomly adjust your speed or stop suddenly. If they come close to running into you, they either need to reduce their power/speed control or follow at a greater distance. (WARNING... watch out for beginners. They will take you out at the ankles and run your hose. You may want to start with other tasks from CONTROLLING CHAIR POWER.)

## **TRAILING**

Many people can trail walls in the same way as people without wheelchairs. They can either use their hand or a cane. Hand trailing in a wheelchair does not allow for detection of front obstacles or drop-offs. The foot plate of the chair usually extends beyond the persons reach.

---When HAND TRAILING WITH A POWER CHAIR/SCOOTER, a patting method may be preferable to dragging. If sliding their hand along the wall, watch hand positioning very closely. With the power chair/scooter, jamming fingers can be more painful/severe due to the reaction time for stopping and the breaking distance of the chair. Also, people's arms are often in a less flexible position than they are when they are standing. If the joystick is on the side with the wall to be trailed, they may not be able to use their hand. They may need to use a cane or other method. Some people have used a folded or short cane to maintain contact with a wall.

----When HAND TRAILING WITH A MANUAL CHAIR, several methods can work.

1. The hand on the wall can be used to help with propulsion or to keep the chair pointed straight. The outside hand propels the chair. The arm near the wall is held forward as far as possible and exerts pressure on the wall to keep the feet from turning into the wall. If the person needs too, they can bend the elbow near the wall in time with the push of the outside hand, then re-extend the hand on the wall as they reach back for a new push with the outside hand.
2. If the arm is too weak to keep the chair from turning into the wall, they may have to use both hands to push the chair forward one push, then reach up to check. The person should not give more than 1 or 2 forwards pushes before checking the wall.

3. Some people have learned to use both hands to push the chair, but extend their elbow, pinky or side of the hand to contact the wall.

----For those who can't use a cane or their hand to trail, some have successfully used CURB FEELERS from a car. If trying to maintain contact with the wall, the curb feelers indicate when the chair moves away from the wall, but does not let the person know when they get too close.

----ETA's like the Walkmate, Path sounder, Sonic Pathfinder or Sensory Six may also help with trailing. They have been successfully used to detect doorways, intersecting walls, open doors, and other obstacles. Some ETA's have the ability to detect drop offs, but may not be sensitive enough to detect drop offs that may tip over a chair. They can also pick up false readings from grass or other soft shorelines that indicate to the device that something is there, but not strong enough to support the chair.

### **CANE TECHNIQUES**

----Constant contact is preferred to 2-point touch. A drop off of just 2 inches is enough to tip over a chair. Many people are unable to detect such small level changes. Also, constant contact will detect cracks that 2-point will jump over.

----If needed, use a blindfold or lower field occluder to practice reacting to cane contacts. Lay out obstacle courses or random low obstacles for the person to hit with their cane and see if they react in time to keep from rolling over the obstacles. If they don't learn to stop in time, the speed on the chair or the length of the cane may need to be adjusted.

----For people in manual chairs, if they can get a foot on the ground, it will help maintain the straight line of travel and free one hand up to use the cane. The line of travel will be straightest if the hand pushing the chair is on the side opposite of the foot being used to propel/guide the chair. The person's leg does not need to be strong enough to pull the chair, just strong enough to reach forward and give a new anchor point for the chair to pull over.

----Arc Width should be wider than the chair. Side drop offs are more dangerous than front drop offs. Make sure that the person is using a wide enough arc that they have time to detect the drop off and either stop or correct before the front wheel hits the drop off. **SIDE DROP OFFS ARE MORE LIKELY TO TIP THE CHAIR THAN FRONT DROP OFFS.**

----Some people are unable to visually DETERMINE THE HEIGHT OF DROP OFFS. By locating the drop off with the cane, then pulling up to it, (just like finding the top of stairs) the cane can be raised until the tip clears the top of the drop off. This gives the person the height of the drop. By starting with the cane held as close to vertical as possible, then resting the cane against a solid object (handlebars, joystick box, lap desk, knee etc...) slide the hand holding the cane to the top of the solid object. Next, lift the

hand and cane together until the tip clears the top of the drop off. The new distance between the hand and the top of the solid object is the height of the curb. The height that a chair can safely drive off of or climb over is determined by the make of the chair, the position of the wheelie bars, and the individual's ability to drive off the drop off in a straight line. Safety is also affected by the person's ability to approach the drop off at a right angle. The two wheels (front or back) should drop/climb together. If they are not in sync, the chair could easily tip over.

### **Teach all of the standard cane techniques.**

--- A few quick tips on canes for wheelchair users

1. For most people, the longer the cane the better. Adjust the length of cane to the person's speed.
2. Hand position may need to be adjusted from a centered position to a side position. When moving at speed, the cane can get caught in cracks and "stab" the student. Having it more to the side can help keep the handle from hurting the student. (One student nearly lost her front teeth when she hit a crack and the cane handle came up and hit her in the face.)
3. Roller tips are often preferred. Try Jumbo rollers or Roller Ball tips (size of a pool cue ball) as well.
4. While most people like the compactness of telescoping canes, they tend to collapse while in motion. They have been successfully used indoors, but outdoors, they become a problem because the person has to stop every few feet to re-extend the cane.
5. Rigid canes are ideal, but they are hard to put away when not in use. One idea is to purchase a clip or clamp designed to hold reachers. The cane can be placed in the clamp when not in use. It will also help to identify the person as being visually impaired. Make sure the clamp will hold the cane tight so that it doesn't slip down and touch the ground. Also make sure that the clamp is positioned so that the person can reach it himself or herself. The cane sticking up may also help with visibility.
6. NFB style fiberglass canes have a lot of flex to them. When NFB style canes hit an obstacle, they give the user less of a jolt. They also tend to bend and free the tip when it gets caught in a crack.
7. For power chairs/scooters, primarily teach use of the cane in the non-dominant hand. The dominant hand is needed for driving.
8. For Scooters, teach the student to be able to use either hand to drive the chair, so they can in turn use the cane in either hand. This is especially important for navigating doorways.
9. Remove baskets, laptrays or other interfering attachments from the front of chairs. Many people like the baskets on the front of their chairs, but get one that is easily removable so that the cane can be used at night, in unfamiliar areas or as needed. People who choose to reach around their baskets tend to be less accurate with or responsive to their canes. Many lap desks have to be removed completely to get

them out of the way. Lap trays that are hinged on one side can be moved out of the way when needed, then swung back when needed.

### **CONTROLLING CHAIR POWER**

---Most (I want to say all, but someone would prove me wrong) electric chairs and scooters have controls to Adjust the Speed at which the chairs move. Some have an adjustment for the sensitivity level of the joystick. For indoor travel, turning the power control to half speed is usually sufficient for maintaining control. Outdoors and especially at street crossings, they may want to turn the power back up to full speed.

---- With many new chairs, the speed controls are controlled by a mode button. The student presses the button to change from one mode to another. These controls usually have visual readouts to determine what mode the chair is in. Mode 1 may be set extremely slow for tight indoor spaces, then progressively each mode operates faster and faster. A student may use Mode 1 for doorways, Mode three for cruising the halls, Mode 4 outside on sidewalks, and Mode 5 for crossing wide streets where extra speed is necessary. Some low vision students have learned to read the mode settings indoors, but then can't see them outside on bright sunny days. Check both places to make sure they know what mode they are in. One student who could not read her "Mode" when outside, would press the mode button, then lightly tap the joystick to see if the chair would move. Eventually, she would get to the ADJ (adjust settings) mode, in which the chair would not respond to the joy stick. From there, she knew that the next mode was 1, and progressed numerically up to 5 from there.

----Some chairs have a push button power button, with no auditory signal as to whether the chair is being turned on or off. The manufacturer can add a toggle on/off switch to the control box. It should be a switch where up is on and down is off, not a switch where you press down once to turn the chair on, then press down once again to turn the chair off.

-----When the person lets off the "Gas pedal" there is a delay before the chair actually stops. Work with the person so that they know their own "Breaking Distance."

-One method is to have the person drive down the hall at top speed, then yell stop. Measure the distance that the chair rolls after the "Gas Pedal" has been released. If this distance is greater than the distance at which the person can detect obstacles, drop offs, or hazards, then the speed is not safe and they need to keep their chair at a lower power/speed setting.

-A second way to check is to place something that the person can see on the floor at a random place in the hall. Have them drive down the hall at full speed and stop as soon as they see the obstacle. If the chair fails to stop before reaching the obstacle, their speed is too high. (SEE... SIGHTED GUIDE)

-A third method is to walk in front of the client with a cane pointed back to the client, but just out of reach. Randomly plant the cane on the floor so the person hit it with their cane. Without moving the instructor's cane check to see if the person can stop before running into it. If they can't, they are going too fast. The instructor should be ready to drop their cane just in case the person does not stop.

-----For some people, the factory speed settings are too fast for them to control. At the dealer, they can adjust the power settings for various actions. In particular, Turning Speed may need to be adjusted. Often, the turning speed is preset at 75-80% of full power. Many students have needed to reduce their turning speed to 50% of full power. Reducing Turning Speed gives the person more control over their turns. If when turning, they frequently overturn, reducing the speed of the turns is in order. In the chairs with multiple modes, each mode can be set individually for a specific type of environment.

### **MONITORING SAFETY**

----It is critical that the instructor has a means to stop a person's progress. Yelling stop does not always work. Instructor positioning is distinctly different depending on the type of wheelchair or scooter.

-----Wheelie bars are a very important part of safe chair operation. Many people remove them because they can get in the way when climbing/descending level changes. The wheelie bars are designed to keep the chair from tipping over backwards. They are also important in the technique described below for INSTRUCTOR CONTROLLED EMERGENCY STOPS.

### ***Wheelchairs***

INSTRUCTOR CONTROLLED EMERGENCY STOPS. (For chairs with handgrips on the back.)

For most situations, safety can be effectively monitored from behind a wheelchair.

1. As the person approaches a hazard, step up directly behind the chair and lightly place both hands on the handles.
2. If they fail to detect/stop for the obstacle, grab both handles and pull back. The chair should pop a wheelie. If the instructor's body falls back in a sitting type position, their body weight will help lift the front of the chair.

Keep pulling back until the chair stops moving forward. It should rock back onto its wheelie bars. Once on the wheelie bars, the drive wheels should spin, but not continue the forward momentum. If the momentum continues, pull the handles farther back and down. This should lift the feet farther up

**DON'T LET GO!**

After the person stops trying to continue forward, begin pulling the chair back from the hazard. Do not lower the front wheels until you are certain that they are back on safe ground. You may have to tell the client to back up. If the client is using the chair

controls to back up, the instructor must make sure that they move back as fast as the chair does so that the front wheels don't drop until over safe ground.

This is a scary process. Practice the technique in a safe environment before assessing skills in other environments. Both the student and the instructor need to be prepared for when the technique is needed. The hardest part is backing up and keeping the front wheels up at the same time. (Some lightweight instructor's were not able to perform the technique when the student and chair outweighed the instructor by too large a margin.)

**INSTRUCTOR CONTROLLED CHANGE OF DIRECTION** (For chairs with hand grips on the back.)

1. While following the chair, if the student begins to approach a hazard to the side, step up behind the chair and lightly grasp both handles.
2. If they don't detect/react to the hazard in time, tightly grab the handle in the direction of the desired turn, (side opposite of the hazard) stop walking and pull hard on the tightly grasped handle. The chair should turn in that direction. If it doesn't, perform the EMERGENCY STOP described above.
3. The process may need to be repeated more than once.
4. Practice this technique in a safe environment before assessing skills in other environments.
5. As an alternative, the instructor can walk beside the student on the same side as the joystick and when necessary, reach out and overpower the student's control the joystick
6. With manual chairs, a quick pull or push on the armrests can change the chair's direction.

**INSTRUCTOR CONTROLLED EMERGENCY STOPS.** (For chairs without handgrips on the back.)

1. While walking with the student, walk on the side of the chair with the joystick.
2. When the student veers too close to something or appears to be about to drive into or off of something, reach in and grab the students hand with the joystick.
3. Drive the joystick in the direction needed to go, or if a stop is needed, pull back and lift the student's hand off of the joystick.
4. Continue to drive the chair for several seconds until the student understands what needs to be done.
5. When you let go of the students hand, get ready to grab it again, because the student often react back to the opposite of what you did.

----One student with Cerebral Palsy was in the middle of crossing a major light controlled intersection. She hit a large bump and had a tonal reflex causing her arm to uncontrollably extend forward and out from the chair. This caused the chair to start turning hard right into the parallel traffic. The instructor over powered her hand, pushing the joystick back to the left, then straight. The first three times the instructor tried to release the student's hand, the tonal reflex caused the student to push the joystick forward and to

the right, heading back into traffic. After about 15 seconds, the student relaxed and was able to re-assume control of the chair.

---With front wheel or mid wheel drive chairs, the direction of travel can be adjusted slightly by pushing the headrest or back of the chair toward the wall or obstacle to be avoided.

### ***Scooters***

----With scooters, they can not be stopped or turned from the back. Movement is usually controlled by a two sided lever that can toggle forward or backward, allowing the driver to go forward or backward from the same side of the lever. Most people will drive with light pressure on the side that involves squeezing the lever to the handlebars to drive forward. Squeezing on the opposite side will initiate backward movement.

### **INSTRUCTOR CONTROLLED EMERGENCY STOPS.**

1. To stop the scooter, the instructor should be on the side that when squeezed initiates backward travel. (Not the same from chair to chair.)
2. If the student fails to detect a hazard ahead, the instructor can reach in and squeeze the lever to initiate backward movement.
3. The instructor should just squeeze long enough to stop the forward movement and make sure that the student will not reapply pressure to the opposite side.
4. If the instructor squeezes too long, the chair can go out of control backwards.
5. This is a scary process. Practice the technique in a safe environment before assessing skills in other environments. Both the student and the instructor need to be prepared for when the technique is needed.

### **INSTRUCTOR CONTROLLED CHANGE OF DIRECTION**

1. Direction changes can be initiated by physical manipulation of the handlebars.
2. The instructor can be on either side of the scooter. Always walking on the side of the hazard will often prompt the student to move away from the hazard without recognizing it. It is actually easier to change the scooters line of the travel by being on the side opposite of the hazard.
3. To change the direction of the scooter, reach up and push or pull the handlebar to initiate the change of direction.
4. Be prepared to repeat the process or make the opposite adjustment in case of over correction.
5. Some students become frightened or flustered when the handlebars are grabbed. Be ready for them to react by letting go, jerking the handlebars back or squeezing the acceleration handle tighter.
6. Be cautious of large turns or adjustments. Some chairs, especially three wheeled chairs, can tip over during sharp turns.

Also see... RAMPS AT BUILDINGS.



-----Another option is remote joysticks. Many chairs have the capability of including a second control box that can be carried by the instructor to operate the chair from behind or the side, overriding information given from the student's joystick.

### **NEGOTIATING TIGHT CORNERS - FORWARDS**

Often, new users or people who have recently switched from manual to electric wheelchairs have a problem with turning too sharply and clipping the corners of hallways and doors. Specific landmarks, on the chair or their body, can be established to determine where to turn. Often the head is a good landmark. "When your head is even with the near side of the opening, then turn." The specific landmark that will work depends on the design of the chair and the distance from the wall. With the head example, the student often needs to be at least arm's reach from the wall. If they have to be closer, they may need a different landmark.

-----Telling clients to pull all the way into the intersecting opening before initiating the turn can be helpful.

### **NEGOTIATING TIGHT CORNERS – BACKWARDS**

Often, people drive into a situation where there is no room to go forward and no room to turn around.

-----People who have no trouble negotiating turns forward can have a very difficult time doing the same thing backwards. In particular, people who have never driven a car seem to have more trouble with the concepts of making backward turns.

-----Again, landmarks on the chair or the person's body can be very helpful with successfully negotiating a turn. For example, When the far edge of the opening is even with the joystick, a pivot turn away from the wall will line the chair up to back through the opening.

-----Some people don't know which way they need to turn to go through the opening. If they look over their shoulder and the opening is to their left, they don't understand which way to move their feet to aim for the opening. Most people who get confused benefit from suggestions to move their feet away from the opening until it is straight behind or until the opening is even on both sides of them.

### **DOORS**

For DOORS THAT OPEN OUT, or away from the client, they can usually pull straight into the doorway until the chair lightly touches the door, exerting light pressure on the door. After operating the handle/latch, the door can be pushed open with the front of the chair. If they have the ability, it is better to push the door open and hold it open with a hand, because the chair can scratch the paint on the door. The chair should travel as straight as possible through the doorway, until the entire chair is through. Frequently, people turn too soon and get caught on the doorjamb.

For DOORS THAT OPEN IN, or towards the client, the biggest problem is getting the feet out of the way of the door.

1. Pull up to the handle side of the door, without blocking the door.
2. Pull the door open and fling it as wide open as possible.
3. Turn the feet to face the door.
4. When the door then swings shut on the feet push the door open as far as possible, or until the door is perpendicular to the wall.
5. Turn the feet to face the doorway. Once the chair is facing the opening, the person should be able to drive through the open doorway.
6. In some cases, the client may need to back up to the side of the door in step 1.

---Several spastic quadriplegics did not have sufficient range of motion, arm strength or trunk strength to reach the doorknob without blocking the door. They also only had one arm strong enough to pull the door open. They would follow the following procedure.

1. Pull up to the door so that the knob can be reached with the strongest arm. The feet will be blocking the door from swinging all the way open.
2. Place a lasso (Eyeglass strap) over the joystick, placing the loose end in their weak hand.
3. Use the stronger arm to grab the doorknob and pull the door open slightly.
4. Pull with the lasso, pulling the joystick, until the feet have turned out of the way of the door.
5. Fling the door open as far as possible
6. Turn the feet to face the door, allowing the door to swing back and hit the footrests. If necessary, push the door open again to untangle it from the footrests.
7. Use the footrest to push the door open as far as possible. Try to stay as close to the end of the door as possible (away from the hinges.)
8. Turn the chair to face the doorway.
9. Drive in, stopping to push the door if necessary to keep it from catching on the arm or shoulder.
10. The Lasso was made by threading one end of an eyeglass strap through the loop on the other end.

-----One hemiplegic student in a manual chair had a difficult time with heavy spring loaded doors. Given the fact that she only had one arm to work with, she had to modify her techniques.

With doors opening away from her to her strong (left) side, she struggle with being able to push the door open and keep the chair from being pushed backward by the weight of the door.

Her solution:

Doors opening away to the strong side, for a manual chair.

1. Pull up to the door as close as she could get.
2. Push the door open as far as she could, throwing the door away from her.
3. Extend her legs and plant her feet, allowing the door to come back and hit her feet.
4. Pull with her legs and her good arm on the wheel to pull the chair back up to the door.

5. Repeat 2-5 until the door was open to 90 degrees or until her shoulders cleared the doorframe.
6. Turn the chair away from the door and let the door slide along the chair as she moved away.

**Doors opening away to the weak side, for a manual chair.**

1. Pull up as close as she could get, in the door way, as close to the handle side as possible.
2. Push the door open as far as she could, throwing the door away from herself.
3. Extend the legs and plant her feet, to catch the door.
4. Only after the door has stopped moving and is resting on her feet, reach up to the door frame with the strong arm, grabbing the door frame.
5. Pull the chair through the doorway. With the weight of the door resting on the chair, the chair pushed the door open.
6. Once the shoulders cleared the doorway, she would turn slightly away from the door and continue on her path.

**Door opening in to either the strong or weak side, for a manual chair.**

1. Pull up to the handle side of the door. If the door opens to the strong side, the chair should be facing the wall. If the door opens to the weak side, the back should be to the wall. (actually, the feet can be turned slightly toward the door, but make sure the door will clear the chair.)
2. Pull the door open and fling the door as far open as possible.
3. Turn the chair into the door (not the doorway).
4. Push the door open as far as she could, throwing the door away from her.
5. Extend her legs and plant her feet, allowing the door to come back and hit her feet.
6. Pull with her legs and her good arm on the wheel to pull the chair back up to the door.
7. Repeat 2-5 until the door was open to 90 degrees.
8. Turn the chair into the doorway.
9. Proceed through the doorway, allowing the chair to hold the weight of the door as it closes behind the chair.
10. It may be necessary to put a hand on the doorframe to pull the chair over any uneven thresholds.

-----Seatbelts, safety harnesses, laptrays, posture aides, wind conditions, weight of doors, spring tension settings, time of day, and many other things can have an effect on whether a person will be able to open a door or not.

-----For Manual Chairs in general, it is helpful to put a hand on the doorjams to assist with navigation through the doors.

-----Some students, who could not initially open heavy spring loaded doors, developed the ability to complete the task with practice.

----Backing through doorways can be important when the room being backed into is too small to turn around in or can't be backed out of. Good examples include elevators, train doors, small offices, etc. SEE... NEGOTIATING TIGHT CORNERS – BACKWARDS

### **SIDEWALK TRAVEL**

1. Stay to the inside shoreline. It is often flatter than the outside shoreline. The edges of driveways often have severe slopes, steep enough to tip a chair.
2. Watch out for lateral slopes. Some chairs will swing out of control on steep side slopes. Some people lose control because they become frightened. Some scooters will tip if the slope is steep enough.
3. People, who auditorially or visually trail walls indoors, will have a very difficult time without those walls to follow.
4. Some people may need to reduce their travelling speed. Often, the person doesn't realize the potential dangers outdoors that were not present familiar indoor environments.
5. Watch for large cracks, especially near large trees.
6. Match the pace of the other pedestrians. Weaving in and out of people can lead to accidents.
7. Don't forget to look up for overhangs. (One student tried to drive under the tines of a forklift, which were pointing perpendicularly across the sidewalk. He was looking down and never saw them. They were at his chin level.)
8. Be careful of driving off the side of the sidewalk into the grass. In most cases it is OK, but in some, there is a severe level change, which can tip the chair.
9. Slow down as driveways and intersections are approached.
10. Recheck the cane skills to see if changes need to be made. For a wide variety of reasons, the person's cane skills can deteriorate in the transition from indoor to outdoor.
11. Due to hills, cracks, and distances to be traveled, some people who use manual chairs indoors will need to switch to power chairs outdoors. (Many PT's will fight this change. They think in terms of getting from the house to the car, not from the house half a mile to the bus stop. Inviting them on a lesson or allowing them to watch a full-length video of the student on the route can help them change their mind.)

### **RAMPS AT BUILDINGS**

-----For Manual Wheelchairs, ramps into buildings are often too steep for the person to pull independently, just using the wheels. In this case, the person can solicit assistance

or if rails are available, use them to help pull up the ramp. There is a specific sequence that is suggested for the hand motions while using the ramp, (Going up or Down)

- A. UP, 1) With one hand on the rail, and the other on the wheel, at the same time, the hand on the rail should pull, while the hand on the wheel should push forward. Try to remain straight in the process. Often, one hand or the other will move a greater distance. If not straight, adjust the down hill hand, and try again with just that hand. 2) Release with the hand on the rail and quickly reach forward to a new grasp. 3) Release with the wheel hand and quickly establish a new grasp. 4) Start over or reconsider seeking assistance. NEVER EVER LET GO WITH BOTH HANDS AT ONCE.
- B. Down. Basically, going down is the same thing. 1) Allow the chair to drop with both hands at the same time. 2) Quickly readjust the grip on the rail side. 3) Quickly readjust the grasp on the wheel. I repeat, NEVER LEVER LET GO WITH BOTH HANDS AT ONCE.
- C. "Hill Climbers" - An accessory called "Hill Climbers" allow the wheels to roll forward, but not backwards. "Hill Climbers" are essentially uni-directional breaks. They are attached above the wheel. When the lever is pushed back, the "Hill Climber" doesn't touch the tire. When the lever is pushed forward, a ridged half circle glides over the forward moving tire. When the tire moves backwards, the ridges grip and the "Hill Climber" rolls down to apply pressure, breaking the regress of the tire. The client has to be able to flip the "Hill Climber" on or off. If they are left on, the person cannot back up from a desk, obstacle, or make a backwards pivot turn.

## **RAMPS AT STREET CORNERS**

-----Ramps vary greatly from one to the next.

----Often people can see that the end of the sidewalk is approaching, but not specifically where the wheelchair ramp begins and ends.

----The cane can be used to locate the center of the ramp. By reaching to both sides of the ramp with the cane, the person should be able to detect where the curb begins to either side. Then, the center of the ramp should be the midpoint between the two curbs. Some people can swing their cane back and forth across the ramp and detect the two sides that way. Others need to reach out with their cane as far as they can, then draw it ALL the way back to the chair to determine if there is a drop off in that direction. Using the clock face, they should reach out at 10, 11, 12, 1, and 2 O'clock to search the drop off. Once they think that they have found the ramp, they should face the ramp and repeat the process. When they repeat the process, they often find that the center is not where they initially thought it was.

-----Soliciting assistance with locating ramps. When a volunteer arrives, ask them to stand at the center of the top of the ramp and then walk to the bottom of the ramp.

The person can then follow the volunteer's path down the ramp. The person may need the volunteer to wait at the top while they line up behind them.

---Some chairs have the problem of getting "high centered" in V-shaped ramps. The newest hybrid or Mid-wheel drive chairs can have a flexible system between the front anti-tip wheels and the drive wheels. With these systems, when the anti-tip wheels take the weight of the chair, the drive wheels pivot down to make contact with the ground, regaining traction. This feature is very important for people who plan to do significant amounts of independent outdoor travel.

---On chairs where the drive wheels and anti-tip wheels don't pivot, the anti-tip wheels can be raised to allow steeper "V's" to be navigated. Raising the anti-tip wheels may cause the chair to tilt forward during quick stops from higher speeds. While scary, the chair should not tip over, it will just lean way forward onto the anti-tip wheels, then drop back onto the regular wheels.

## **STREET CROSSINGS**

### ***With Ramps***

1. Ramps can face either straight across the street, face straight into the perpendicular street, point diagonally across the intersection or take up the entire corner.
2. Don't wait at the top of the ramp to initiate the street crossing. Negotiate the ramp first, and then stop to wait when the front wheels reach the bottom. Negotiating ramps can be time consuming, and take away from time needed to complete the street crossings.
3. Make sure the chairs power is turned as high as the person can safely manage.
4. If the person can see the far side of the intersection, they can wait in the ramp, parallel to the slope. If they can not see the far side, they need to align to traffic while sitting at the bottom of the ramp. This may mean pulling onto the side of the road to turn and face the perpendicular street. Stay near the point of the corner. This keeps the person out of the path of the straight travelling traffic. Traffic turning right may have to go around the chair.
5. Watch out for V Shaped Ramps. Some times, the slope of the road and the slope of the ramp combine to create a situation where the front wheels and the wheelie bars both hit ground and the drive wheels are suspended. Sometimes, these can be navigated by turning slightly at the bottom of the ramp. In unfamiliar areas, the cane can be used to check the slopes to determine if it will be a problem.
6. If the student might have trouble crossing the street in adequate time, crossing on the left side of the street may allow the perpendicular traffic on the last half of the crossing a better view of the student trying to finish the crossing.
7. On streets with steep cambers, the chair may not be able to pull the hill quickly enough. The student can turn slightly away from the parallel street to see if the chair will pull better across the hill. If it does, they can turn back toward the parallel

traffic and zig-zag up the hill. Sometimes this is only needed to get started and the first zig will be adequate to get the chair moving. The person must be able to reestablish their line of travel after the turns.

8. If the chair tends to get stuck at the bottom of the ramp, the student may have to back part way up the ramp and then get a running start to get through the valley at the bottom of the ramp. Depending on how close traffic is, they may need to start their crossing from the middle of the ramp, but if there is an adequate shoulder, they can plow through the valley, then back to the bottom of the ramp and wait for the appropriate time to initiate their crossings.

### ***Without ramps or sidewalkless***

-----If the intersection doesn't have ramps, the person can go down the quieter of the two streets and locate the nearest driveway. They can access the street from the driveway and handle the intersection as if it didn't have sidewalks.

In areas with an adequate shoulder, the people who can not see the far side of the intersection should drive around the corner onto the perpendicular street and when the edge straightens out, put their back to the edge, indenting just like people without chairs.

If the person can see the far side of the intersection, or there is not an adequate shoulder, the person should wait at the point of the corner, the person who can not see the far side needs to align with the traffic. The person who can see the far side may want to keep their chair parallel to the curb, taking up as little space as possible.

### ***Other suggestions***

1. If the street has a severe slope and the crossing is initiated uphill, turning away from the parallel street may help the chair pick up speed faster. The person may have to zig zag to the top of the hill.
2. At busy lights, cross on the left side of the road. This will increase visibility by being as far as possible from the waiting cars in the last lanes to be crossed.
3. If caught in the middle of the crossing, turn right and straddle the yellow line. This leaves you facing the traffic in the lanes remaining to be crossed.
4. Timing methods for determining safety in street crossings can be very important.

## **LIFTS**

Most professionals have suggested that lifts should always be ridden with the person's back to the van or bus. This means backing on to the lift as it sits on the ground. This allows the person to then pull straight onto the lift as it is in the air without turning around in the vehicle. It also puts the smaller front wheels toward the small guard, which is to keep the chair from sliding off the lift. If the bigger wheels are toward that edge, they might roll over the guard or allow the chair to tip over backwards, tossing the person off the lift.

### ***Technique for backing on a lift***

1. Drive across in front of the lift until the joystick (exact landmark needs to be determined for each person/chair) is even with the far edge of the lift.
  2. Execute a pivot turn to put the person's back to the vehicle.
  3. Back straight onto the lift until the front wheels are felt climbing the lift or until the front edge can be seen (some lifts have handrails that can be used as landmarks to stop.)
  4. Stop and apply breaks.
  5. If the chair doesn't back straight on, look to see which side of the lift has the most space
  6. Pull forwards a few inches.
  7. Turn the feet away from the side that had the most space.
  8. Back up again.
  9. Repeat until on the lift.
- Some people may have seat lifts, which the person transfers to, then is lifted to a car/van/truck seat, leaving the wheelchair out on the ground. Someone else then has to store the wheelchair.

### **PARKING LOTS**

Drive down the center of the parking rows, if a car approaches from either side, then move over. It is very hard for a driver backing out of a space to see the chair. Being in the middle of the lane gives the driver a better chance to see the chair.

-----Most chairs do not have enough clearance to go over speed bumps. Drive to either end of the speed bump and look for the space left for rainwater to run through.



## **ACCESSORIES WORTH LOOKING INTO:**

### ***Hill Climbers – See RAMPS and HILLS***

- Emergency Poncho. Often less than a dollar from Wal-Mart, K-mart or the Dollar Store. It folds up into a pocket sized Ziplock bag and can be put into a pouch that is always with the chair.
- Backpacks are specially designed for chairs. While more expensive than standard ones, they are made without loose straps to get caught in the wheels. Make sure no valuables are inside, because it is easy to sneak up from behind and steal the contents.
- Under seat pouches attach to the frame of the chair and must be accessed from between the person's legs. These are wonderful, even if the people can't access the pack themselves. Then at least, the person knows when someone grabs his or her keys or billfold.
- Fanny packs can be easier to access than under seat pouches, especially for things that are needed frequently. Some people find them uncomfortable.
- Lap Boards. Some lapboards are permanently attached to the chair and can be flipped out of the way. Others clip on and off. Both can be helpful, but the permanent ones can get in the way during travel and some clients can't put on/off the temporary ones. Which is best depends on the person's needs.
- Footrests come in a million shapes and sizes. There are advantages and disadvantages to each. Basically they can be divided into one piece or separate. The one-piece footrests tend to do better with pushing open doors and are often better padded which saves on the paint on the doors and walls. The separate ones are often better for positioning the feet and can be removed individually if one leg can help propel the chair.
- Umbrella's. Almost every client has asked about clip on umbrellas. They may work for the sun or very light rain, but do not do well in the wind or rain that is coming in at a slant. At speed, they can collapse or over extend. They also get in the way in tight spaces.
- Bicycle flags can be used to improve visibility, but every client who has had one eventually took it off. They tended to get in the way more than they helped.
- Driving glasses. Some people whose heads tended to droop were given glasses with prisms to make it easier to see people without lifting their heads. They helped in safe familiar environments, but they also displaced the position of drop offs and low obstacles making them seem farther away than they really were. Bifocal glasses can create problems with seeing ramps and drop offs. When the person looks down, everything is blurry due to the short focal distance of the lower portion of the bifocals. One solution was to have separate "driving" glasses without the prisms or bifocals for travelling.

## **WHEELCHAIR SKILLS**

### **CHAIR MECHANICS - ELECTRICS**

- Turn on chair
- Turn off chair
- Adjust speed control
- Apply brakes independently
- Release brakes independently
- Apply brakes w/ assistance
- Release brakes with assist.
- Disengage drive mechanism, independently
- Engage drive mechanism independently.
- Disengage drive mech. w/ assist.
- Engage drive mech. w/ assist.
- Adjust wheelie bars independently
- Adjust wheelie bars w/ assist
- Connect to charger independently
- Connect to charger w/assist.
- Disconnect charger independently
- Disconnect charger w/ assistance
- Fold/disassemble independently.
- Fold/disassemble w/ Assistance
- Unfold/assemble independently
- Unfold/assemble w/ assistance

### **INDOOR MOVEMENT**

- Stop on command
- Stop on own
- Stop for hazards, obstacles
- Control sudden stop
- Forward, straight
- Forward turn right
- Forward turn left
- Pivot in place, right
- Pivot in place, left
- Pivot forward on right wheel
- Pivot forward on left wheel
- Back straight
- Back, turn right
- Back, turn left
- Correcting away from wall while backing
- Pivot backwards on right wheel
- Pivot backward on left wheel

## **CHECKLIST**

### **NEGOTIATING**

#### **OBSTACLE/HAZARDS**

- Avoiding obstacles - high
- Avoiding obstacles low
- Detect/stop for drop - offs
- Detect slopes/ramps
- Detect/stop for overhangs
- Negotiate ramps, up
- Negotiate ramps, down
- Negotiate tight corners
- Backing through tight corners

#### **DOORS**

- Negotiate open doorways, straight in
- Negotiate open doorways, turning in left
- Negotiate open doorways, turning in right
- Negotiate open doorways, backing in straight
- Negotiate open doors, backing in w/turn
- Operating twist doorknobs
- Operating door levers
- Operating door thumb latches
- Operating panic bars
- Opening doors in
- Opening doors out
- Closing doors in
- Closing doors out
- Opening doors, spring loaded, in, right
- Opening doors, spring loaded, in, left
- Opening doors, spring loaded, out, right
- Opening doors, spring loaded, out left
- Opening doors, spring loaded, in, right, with no space to side
- Opening doors, spring loaded, in, left, with no space to side

## ELEVATORS

- Operate buttons, outside
- Operate buttons, inside
- Turn around, inside
- Turn around, outside
- Backing in
- Backing out

## SIGHTED GUIDE

- Follow visually
- Follow sounds
- Request push as needed
- Detect/react to guide's stop
- Detect/react to guide's turns
- Detect/react to guide's up/down
- Describe needs to new guide
- Describe technique for ramps
- Describe technique for stairs
- Describe technique for escalators

## LIFTS

- Back on lifts
- Pull on lift, straight
- Operate lift controls independently
- Operate lift controls w/ assistance

## TRANSFERS

- Transfers independently.
- Transfers w/ assistance
- Describes role to new assistant

## RAMPS

- Detects ramps
- Determines line of travel for ramps
- Negotiates ramps w/assistance
- Negotiates ramps w/out rails, up
- Negotiates ramps w/out rails,  
down
- Negotiates ramps w/rails, up

- Negotiates ramps w/rails, down

## SIDEWALK TRAVEL

- Maintains position on the sidewalk
- Corrects for veering
- Detects rising level changes
- Detects drop offs - front
- Detects drop offs - side
- Accurately determines the height  
of drop offs
- Safely negotiates lateral slopes

- Demonstrates good judgment

about which level changes are  
navigable

- Approaches navigable level

changes at an appropriate angle.

- Safely navigates speed bumps

- Controls decent to street
- Waits at appropriate place
- Demonstrates ability to handle  
curbs without ramps - unnavigable  
curbs

- Describes assistant's role in  
climbing unnavigable level changes

- Describes assistant's role in  
descending unnavigable drop - off

