Deliverable I

## Client Feedback

1.1 Locking Bar

Our original design plan for the bar that would lock the skis into place included only one bar that connected to the frame directly behind the big rear wheel of the chair, in that the right ski would connect to the frame on the same (right) side. Our clients recommended that we should instead connect the locking bar for the right ski to the frame on the left side of the chair, creating a cross pattern underneath the chair.

We have come to the conclusion that we are not going to change the locking bar design we originally had, due to the fact that it will be sturdy enough to support the ski and the weight distributed onto the ski. Implementing the clients idea would cost too much, and would simply be unnecessary.

1.2 Wheels

Our clients recommended that the wheels protrude out the top and bottom of the ski very little, approximately half an inch. This was apart of our original design at roughly ¾ inch of the wheel protruding out of the top and bottom of the ski, but the clients wanted less.

Through the process of building our second prototype and testing the effect of the skis on snow, we decided that it wouldn't actually necessary to have wheels on the skis at all. We initially decided to add wheels to the skis for two reasons:

1. To keep the skis off of the ground to minimize damage if the skis were to come into contact with concrete or asphalt
2. To allow for a greater amount of traction

Instead, we decided to set the locking bars so that the ski will not be in contact with the ground when installed on the wheelchair. This will allow the skis to become useful only when the wheelchair encounters snow and/or ice, and will not allow the skis to become damaged.

## Ultimate Design Goal

Our ultimate design goal is a product that is very flexible to switching between different surfaces and weather conditions. This will be accomplished by giving each of the skis the ability to have the wheel protrude out of the bottom to provide smooth mobility while on pavement. However, while the skis are in deep snow the depth difference between the snow and the pavement would allow the skis to automatically take over and thus provide increased maneuverability while in deeper snow. The wheels would ideally sink into the snow and allow the skis to bear most of the weight, efficiently transferring most of the work done to the skis. The skis will also have two sets of guard rails bordering the sides of the main wheel cutout to ensure that the wheel does not dislodge itself while the skis are in use. On top of this the skis would have a locking bar mechanism installed on them to provide another avenue of secure attachment to the wheelchair frame.

## Client Presentation

* We will have a tri-fold presentation including pictures of the construction of both prototypes, as well as the skis being used on a functioning wheelchair.
* We would like to play the video that we made for our client to show them how we pitched the idea.
* We would like to display prototype 1, and prototype 2/final design to show them how we worked up towards our final design.
* If our client can physically make it to design day, then we would like to verify that our goal has been achieved by letting the client try the prototype on their personal wheelchair in the snow.
* We would also like to present them with the aspects of the design that we had to change because we either deemed it unnecessary or because it simply wasn’t a good fit for the design.

## Prototype 2

[Pictures Here]

The function of this prototype is to provide a base set of features that we envision for the final product. This prototype will also finally transition into our final prototype as the skis used as the base of modifications for this prototype will be the very same skis used for the final design. This prototype is, in its essence, a rudimentary design of the final prototype. Modifications and changes will be made to this prototype after a meeting with the client to fine tune the fit of the skis to the desired wheelchair. Any shortcomings in the design can be revised by doing this as well.

Components of this prototype include:

1. Downhill Skis
   * Through the transition from our first prototype to our second prototype, we were able to acquire a pair of downhill skis. The downhill skis used for this prototype will be the same skis used for our final design, as explained above. The rigid and reliable construction of downhill skis make them the perfect fit for final design, as well as this prototype. As you can see in **Figure 1**, the downhill skis have a slit cut out towards the middle rear to allow for the big rear wheel of the wheelchair to pass through, which allows the wheelchair to function normally with the skis on. The dimensions of the slits for our second prototype are 10” long and 1.5” wide, although through testing we have found that the slit will have to be bigger to allow a perfect fit for the wheelchair wheel. Our final design slit dimensions will be roughly 12.5” by 1.75”. The orientation of the skis on the wheelchair have also been changed, due to the fact that we have eliminated the ski wheels. The skis will be oriented roughly an inch off of the ground to allow for normal wheelchair functionality and to avoid damage to the skis on rough surfaces like concrete or asphalt. This will be done by setting the locking bars at a specific length that will keep the skis off the ground; the locking bars have not been included in this prototype because we are finalizing its design.



**Figure 1 -** *Slit cut into the downhill skis*

1. Locking Bars
   * As stated above, we have not installed the locking bars on this prototype because we are still finalizing the design for them. It is not seen in the pictures, but we have determined the location of the mounts for the locking bars on the skis, and we have pre-drilled holes in the skis for them.
2. Metal Rear Wheel Catch Slides
   * We have constructed L-shaped wheel catch slides out of sheet metal to attach to the two sides of the slits on each ski to allow as a guiding system for the rear wheel. They have not yet been installed on the skis because we are determining the best way to install them; our two options are traditional screws or doweling with epoxy.
3. Images





