Alternative Design 3

In order to lift Ronald Hiller from his wheelchair into his pool and hot tub we intend to use a lift that has a moving part that can go down to his seat and up into the pool. The moving mechanisms we have looked at are either hydraulic lifts or a winch lift system. This design will utilize a hydraulic lift. The lift will be attached to a metal plate which is attached to a cement block in the ground. The shaft of the lift will be approximately 6 feet tall. Attached by a hinge to the top of this lift will be the boom of the lift which will range from at an angle of approximately 135 degrees to 90 degrees. Welded to both the boom and shaft will be a support beam creating a triangle including the hinge. This will provide the support necessary for this design. The hydraulic pump will be attached to the boom of the lift. This will give it a straight line of action to the pulley at the end of the boom. The rope and seat will be attached to the end of the boom. The lift will be able to move vertically four feet moving the chair down to Ron’s wheelchair and still have enough lift to clear him over the edge of the pool. This set up will allow Ron to be lifted out of his chair to a height of at least 6 feet which is more than enough to clear the edge of the pool and then finally placed down into the pool.

The second and more important change for this design would be the change in where the rotational axis is located. In the first design it is located at the top of the shaft between the shaft and the boom. In this design since the angle between the shaft and boom will be welded the location for rotation must change. The rotational axis here will be at the base of the lift. The shaft is hollow which will allow a smaller diameter rod to be placed inside of the shaft. This rod will be welded to the plate attached to the cement. The shaft will slide over this rod and be allowed to rotate around it freely. Using either a nylon bearing or a ball bearing support, there should be no trouble rotating the lift. By attaching the joint between the shaft and boom with a hinge, there are only three pieces of metal required above the rotational axis, much less than in the original design. At the base of the shaft there will need to be a solid piece of metal or a thick cylinder to support the torsional strain that is caused by
Ron’s weight on the end of the boom. The weld between the shaft and base will need to be strong and the bearing will need to be able to support the weight of the lift and Ron.

Figure 3: Diagram of Alternative Design 3