III. Alternative Design Three

Track

This design is will consist of the slide made of steel and polyethylene will be used to the mask the slide frame. The steel structure will provide better stability and sturdiness compared to that of wood. The track will be made out of steel as well with the indents in the track. Steel U-channels will be used as the indents for the car tracks and will be welded on to the steel track. The middle portion of the steel track will have rubber treads in the event someone needs to go up the ramp. The advantage of this design is that it will have everything automated; the lift motor will be installed, winch, photo-electric sensors at the bottom of the track. The disadvantage is that it will be much more expensive than the first two designs and heavier so moving the slide around will be an easy task. The steel structure will be painted to prevent rust and corrosion. Polyethylene will be used to cover the sides of the platform. A depiction of track design three can be seen in figure four below.
**Figure 4: Track design #3.**

**Car**

The third car design will be similar to design two, however, the seat recline angle will be adjustable between zero and fifteen degrees. The operator will be able to adjust the recline angle in 5 degree increments allowing for zero, five, ten, and fifteen degree recline angles. The safety restraints will include a hip strap, a trunk strap, and lower leg Velcro straps to hold the user in place during descent and retraction. The seat bottom, back, and headrest will be made of foam padding covered with nylon fabric.

The footrest towards the front of the car will be adjustable to accommodate for user leg growth and variability. The foot platform will move forward and backward and secured in place with a bolt that will hold the foot platform at the desired length.

The frame will be constructed using 304 grade stainless steel ¼” tubing. The frame will be completely welded together, while the components will be bolted onto the frame using stainless steel parts. The rear hook for the winch connection will also be spring loaded such that the connection pin will release on the car portion of the retraction mechanism and allow the winch hook on the cable to release from the car.

**Controls**

This design has the most intricate control system. A 12V DC winch motor will be used to bring the car back to the top of the slide. The motor will be turned on and off by an RF wireless remote control and by a safety switch on the back of the motor itself. The winch cable may extend further than the length of the slide, and the remote will have one button for the winch, on. When this switch is pressed, the motor will turn on, and when the button is released the motor will turn off again. A photoelectric sensor will be installed at the top of the slide to detect when the car has been fully pulled back to starting position. When this sensor is triggered, the motor will turn and stay off, regardless of whether the start button on the remote is pressed. When the winch motor is on, a red LED light located on the top of the slide will illuminate, signaling that the winch mechanism is in use. When the car reaches the top of the hill and the photoelectric sensor is triggered, the red signal light will turn off and a green signal light will illuminate. Once the car travels down the hill and the sensor is no longer triggered, the green light will turn off again. If the battery is under 20% charged, a yellow LED light will shine instead of green when car is at the top of the hill.

Also installed on the slide will be a second piston motor. This motor will be located below the top of the slide, and will be used to lift the top platform to a slight angle so that the car can descend down the hill without needing to be pushed by an operator. The motor will be controlled by an RF wireless signal, and the switch will be located on the same controller as the winch mechanism. There will be one push button, up, that will cause the motor to begin its operation. Using a microcontroller or PLC, the motor will be programmed to raise the platform to a 15 degree angle, remain raised for 5 seconds, and then descend back to zero degree position. This motor will have the ability to turn on only when safety switch is in the on position and photoelectric sensor is triggered. This will indicate that the car has safely reached
the top platform of the slide. Lastly, when the lift motor is in use, a blue LED light will illuminate indicating the motor’s status. A microcontroller or PLC will be used to program all of the controls.