



# Makalu

Sherpa Gear Collection

Valiant. Adaptable. Resilient.

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**2020 Graduate**

Winter-Spring 2020  
Process Book

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# The Overlooked Heroes of Everest

## 'Clothing the Portable Environment'

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## Part 1: Project Scope

Many people know Mount Everest as one of the deadliest mountains on planet earth. With an elevation reaching over twenty-six thousand feet, it's attracted decades-worth of individuals attempting to conquer the mountain. Everest presents



Figure 1 - Edmund Hillary and Sherpa Tenzing Norgay, 1953 (Gambino, 2008)

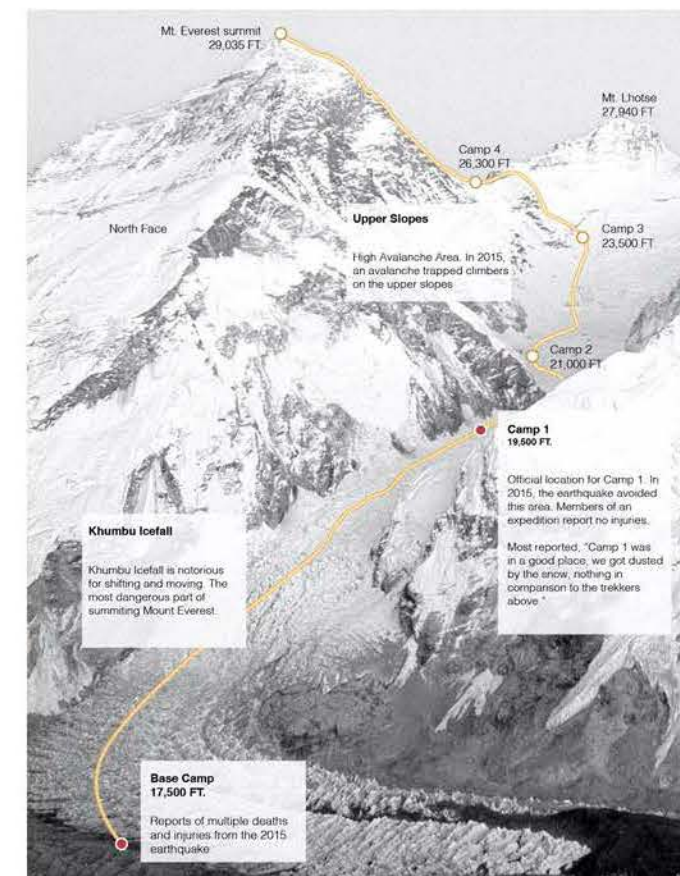


Figure 2 - Elevation at each Mount Everest Camps (Arnette, 2019)

incredible physical and physiological dangers such as altitude sickness, weather, and wind, as well as significant hazards from avalanches and the Khumbu icefall (located just above Base Camp at 17,000ft). The terrain of Everest, itself, holds many dangerous climbing points. There are 3 total camps to help you acclimate to the elevation. It takes a total of 6 – 9 weeks to get to summit Everest.

The final leg of the climb is most famously known as the Death Zone. When you enter into the Death Zone, your body succumbs to

near death experience, meaning the body tissue is used for energy to keep us alive.

Therefore, there is a period of time where one can physiologically withstand the effects of high altitude (Gumbel, 2018). Mount Everest has an extreme snow and frigid climate. In January, the coldest month, the summit temperature averages about -33 degrees F (Avila, 2016).

Early explorers of the Himalayan region were assisted by guides that reside in the local areas. Sir Edmund Hillary and Sherpa Tenzing Norgay were the first people to summit Everest in 1953. Since then, mountaineers and adventurers have been following their footsteps up

the 8,850-meter peak straddling the border of Nepal and Tibet. Mount Everest is located on the border of Tibet and Nepal nestled in the Asian Himalayas. It is situated in the Mahalngur Range on the



Figure 3 - (World Maps, n.d.)

Tibetan Plateau known as Qing Zang Gaoyuan. The summit is directly between Tibet and Nepal (Rodgers, 2019). It's the highest point on earth, and the most forbidding. It is such an exclusive feat to accomplish such a climb. Tourists are driven by the element of danger and joining the ranks of the world's most accomplished mountaineers. Hundreds of tourists arrive each year with one goal: To stand atop the world. Some are experienced climbers, many are not. The one commonality they all share, is they cannot climb Everest without a Sherpa guide.

While there are no rules on Mount Everest, there are strict regulations on equipment brought up the mountain from the Sagarmatha Pollution Control Committee (SPCC) (Apa, 2019). The government requires you to put down a \$4,000 deposit to minimize pollution. Whatever is being taken up the mountain is tracked and if it doesn't come down with you, you will lose the deposit (Apa, 2019).

It is strongly recommended by the Nepalese government that you have climbed multiple peaks at high altitude before even attempting the Mount Everest summit. Climbers must also submit a certificate of good health and physical fitness and be accompanied by a trained Nepalese guide (Beauont, 2019). Unlike the western culture wanting to conquer the mountain, for Sherpas, the highest mountain peaks are the homes of the gods and should be revered from afar- not conquered (Foreman, 2017). The obsession with summiting was originally a European idea.

Sherpas are also not a guarantee against your own death. They are tasked with running ahead of the assigned group to set up ropes and ladders, which inevitably makes them responsible for the safety of clients who have paid for their professional services (Foreman, 2017). But some clients, struck by summit fever and knowing that they may only have one shot at the top, start to take risks and push safety limits. A high proportion of Everest climbs die on the mountain, which does not bode well for Sherpa careers.

The majority of Sherpas are male, but there have been a few female Sherpas who have made summiting Everest a career. The beginning of a Sherpas mountaineering career begins at a young age. Starting in the late teens gain experience by climbing other mountains in the same range as Mount Everest (Arnette, 2019). The most experienced Sherpa's will have summited a few times before claiming to be a professional. From ages 16 to 60, Sherpas will work their entire lives climbing Mount Everest to support their families. When asked in an interview about the dangerous nature of this work, Sherpa Ang Tshering responded by saying, "We have no other choice. There is no other work." (Gumbel, 2018).

Sherpas are a Nepalese ethnic group estimated around 150,000 (Calamur, 2014). As of 2019, there are 41 different teams with a total of 378 climbers who have been permitted to climb Mount Everest during this year's spring climbing season (Evans, 2019). The term Sherpa in its most recent sense refers to a variety of ethnic groups in the region who have exhibited excellent mountaineering and trekking skills

(Editors, 2015). With the growth in popularity in climbing Mount Everest, comes the growth of trash being left behind. It's been deemed as the "world's highest garbage dump" as what hikers take up, they do not bring down (Windridge, 2019). In a 2019 census, the government of Nepal announced that 24,200 pounds of garbage were pulled off the mountain during a 45-day cleanup expedition (Swenson, 2019). Although there have been many pounds of trash pulled of the mountain, there are still hundreds of pounds to go. Many items are left behind such as: oxygen cylinders, plastic bottles, cans, batteries, food wrappings, fecal matter and kitchen waste (Windridge, 2019). This trash build-up has only come to light because of the recent climate change epidemic; as the snow melts, more trash and bodies are revealed (Swenson, 2019).

Where does the trash come from? Western successors to Edmund Hillary hire the Sherpa successors to Tenzing Norgay as pack animals. Outfitters are paid tens of thousands of dollars to set up mount Everest expeditions only to pay Sherpas and Porters a small fraction (Swenson, 2019).

According to *The Aspen Times*, Base Camp doesn't serve it justice, it's been deemed as "base spa" for the westerner. Western tourists pay commercial guiding outfitters upward of \$100,000 for an all included service.

Depending on how much you pay, the climber can have access to WIFI, laptops, gourmet food, beer, wine and helicopter service, whilst relaxing in private tents with



Figure 4 – What's left behind on Base Camp including human waste and trash (Picheta, 2019)

wood floors and furniture. This is not an easy mountaineering expedition, and with the lack of experience from westerners and carelessness of the Sherpa community, trash does get left behind.

In 2015, Mount Everest experienced one of the deadliest earthquakes to date. Multiple avalanches caused by the earthquake set off the loose ice within Khumbu Icefall following avalanches that sent people running for their lives (Harris, 2015). With earthquakes comes movement, and with the extreme movement that occurred with ice and snow, it pushed all camps gear down the mountain and buried a lot of it as well. This set back all clean-up initiatives that had started in the early 1990's and 2000's (Harris, 2015).

There are two main climbing routes with access points from southeast Nepal and from the North in Tibet. The rising tourism in Sagarmatha National Park, which is the base location in Nepal for Mount Everest, has made trash and plastics management a challenge. Nepal has issued 374 climbing permits to foreigners as of April 16th, 2019. There are 364 people on the Tibetan side, 208 Nepalese Sherpa, 144 foreigners, and 12 Chinese climbers (Arnette, 2019). After decades of letting trash sit on this iconic mountain, privately owned companies have started to make an effort in keeping Everest clean. Mountain guides and trekking guides are the real heroes of the mountain, according to Raj Sth (Sth, 2019). Raj is the owner and creator of *Let's Clean Up Nepal*. Once a great mountaineer and trekker, has turned advocate for the Mount Everest Clean-Up initiative. He states, "Mountain guides and trekking guides are the real heroes of the mountains, by giving an environmental education to those who wish to trek along our beautiful Nepal." (Sth, 2019).

The biggest issue with removing waste is the human labor associated with it. Climbing Everest is challenging even for the best mountaineers. The variability of weather, as well as lack of preparation could prove potentially fatal. A total of 306 people have died on both sides of the mountain since 1924 (Arnette, 2019). Spread across the various routes, at least 200 bodies are buried in deep crevasses or have

moved due to melting glaciers (Arnette, 2019). This subject turns out to be incredibly controversial amongst the Sherpa and family members of the deceased. The local communities consider leaving the bodies on Everest disrespectful to the Mountain Gods, as the families of the deceased members wish their loved ones to remain where they died. A warming planet adds to the urgency of the issue as long-buried bodies are now exposed and it's happening on all of the world's mountains.

This brings us to the point of: where does the trash begin and end? As stated previously, because global warming is a huge part of trash being revealed, some trash stays on the mountain

while others move downhill with glacier movement. This brings us to the issue that I would like to focus on for my thesis. No one had envisioned Mount Everest to receive so much attention after the first summit in 1953. As



Figure 5 - Hauling trash and human waste to Gorak Shep (Pitcheta, 2019)

the issue of trash and human waste is accelerating each year, I would like to create equipment and apparel that can work hand-in-hand to assist in the Everest clean-up initiative. The impact the garbage and human waste leaves is detrimental to surrounding communities. It affects the entire water table and drinking system as it pollutes the ice and glacier runoff that feeds rivers and lakes that are used for drinking water. This is creating one of the biggest issues associated with leaving trash behind on Mount Everest, water pollution and the inevitable health issue for the local communities (Arnette, 2019).

Trash and waste are currently delivered on foot to Gorak Shep, the nearest village to Everest, sitting at 16,942 ft in elevation (Arnette, 2019). The porters drop the waste into unlined pits, leaving it to slowly dehydrate and break



Figure 6 - Trash clean up, below base camp 2 (Pitcheta, 2019)

down in the open air, which, at such high altitudes, can take years. In the meantime, the waste mars the landscape and contaminates the town's water supply. Both the Nepalese government and the climbing community recognize that this method of disposal is a hazard to the environment as well as human health, but given the remoteness of the site and the magnitude of the problem, solutions have remained elusive (MEF, 2015). Many climbers believe that harsh weather, the monsoon snows, or disposal in crevasse will keep the mountain clean – that the items they leave will somehow harmlessly disappear into the mountain.

The current clean-up effort is frustrating for a lot of people. The government is an expert at manipulating the press with announcements of programs that are rarely enacted. "The press just parrots the news," according to Alan Arnette. Arnette is well known in the outdoor community as, "one of the world's most respected chroniclers of Everest" - Outdoor Magazine. I reached out to Arnette in the hopes of better understanding some questions with articles and forums left unanswered. He has decades of experience, trekking to Everest Base Camp in 1997, attempting to summit Everest in 2002, 2003 and 2008. Plus, a summit on Everest in 2011, along with attempts to Lhotse in 2015 and 2016. With his experience on Mount Everest, he has

grown close to the community. He shared stories of staying in teahouses, camping and developing a close relationship with one of the climbing Sherpas, Kami, and his wife and 5 children. After speaking to Arnette, he gave great insight to the current clean-up effort.

On the Tibet side, nothing was done for decades including leaving many, many bodies on the route itself in plain view. The last few years, China, or more specifically the China Mountaineering Association out of Lhasa, has stepped up their efforts to police all expeditions. *“They instituted a \$4,000-dollar expedition trash deposit and levied a \$1,500 per climber trash, not deposit, to fund serious clean-up efforts”*, Arnette states. The general public believes the government is responsible, but it’s actually the complete opposite. Efforts in removing trash left behind on Everest are done mostly by privately owned companies. Many expedition companies claim to care about the environment but really use it as a marketing tool.

Shredded tents and equipment that is left behind on the mountain isn’t the only thing that’s creating havoc amongst local communities. The most serious problem on both sides is solid human waste. It simply stays where it was put and never degrades due to the lack of



Figure 7 - Trash left behind below base camp (Pitcheta, 2019)

oxygen. Expeditioners have been asked to use “blue bags” where the person defecates in a plastic bag and brings it down themselves like is done on Denali and Aconcagua mountains, but it has failed to catch on (Arnette, 2019). It could even be debated that this is a cultural or ego problem, but the simple solution is to hike out your own waste. Even so, the only place where climbers don’t have to worry about contaminating the

mountain with their own waste is at Base Camp. Even so, installing a bathroom at that location took years and doesn’t solve the issue of what’s happening on-top of the mountain.

The experience needed to participate in climbing Mount Everest or even just trekking to Base Camp 1 requires a training regimen that prepares you for physical and mental exertion. The Sherpas and other ethnic groups have lived on the high plateau of the Himalayas at an average of more than 14,700 feet going back at least 6,000 years (Sohn, 2017). An American study in 1976 concluded that Sherpas had undergone genetic adaptations after living in one of the world’s highest

regions for thousands of years (Foreman, 2017). This gave them an advantage when in high altitudes with low oxygen. Adaptations include unique hemoglobin-binding enzymes, doubled nitric oxide production, hearts that can utilize glucose and lungs with an increased efficiency in low oxygen conditions (Foreman, 2017). The oxygen pressure at the top of Everest is about a third of what is at sea level, which means you aren’t able to get enough air into the lungs which stops the supply to the brain (Gumbel, 2018).

Because of these physiological adaptations, Nepalese Porters and Sherpas tend to be more efficient. The Nepalese Porters routinely carry head-supported loads, which often exceeds their body mass, over long distances up and down the steep mountain footpaths (Bastien, et al. 2016). In the article, *The mechanics of head-supported load carriage by Nepalese porters*, it states, “The Nepalese porters develop an equal amount of total mechanical work as Western control subjects while carrying



Figure 8 - Sonam Dorji Sherpa, from Phortse carries some of the last loads down from Everest (Huey, 2015)

loads of 0 to 120% of their body mass at all speeds measured (0.5 – 1.7 m s<sup>-1</sup>), making even more impressive their ability to carry loads without any apparent mechanically determined trick” (Bastien, et al. 2016). Therefore, showing that Nepalese porters have a higher efficiency, at slow speeds and high loads (Bastien, et al. 2016).

It remains inhospitable for the majority of westerners to live in this elevation for an extended period of time. In an article called, *Proceedings of the National Academy of Sciences* it states: “the muscles of the Sherpas, the cells’ mitochondria (the energy-producing parts) converted more oxygen into energy”. Therefore, making the Sherpa Community almost superhuman in their abilities to summit Mount Everest... again... and again. The capacity to take on such a mountain by any is a challenge in and of itself.

An article written in 2017 by Emily Sohn, states because Sherpas have adapted to high altitudes over hundreds of generations, they offer a window into the potential of the human body to deal with oxygen deprivation (Sohn, 2017). Studies like this might help explain why some people deal better with hypoxia, or low oxygen levels in their tissues. As many as 25 percent of people with hypoxia die and those who survive are unable to recover their previous quality of life (Sohn, 2017). These physical adaptations would benefit the clean-up efforts on Mount Everest; privately owned companies are hiring Sherpa community members to aid and assist in the clean-up. The higher up the mountain you go, the worse the trash gets. Part of this is the pure volume and lack of respect by the expedition operators, climbers and Sherpas/Tibetans that feel their trash will just blow “away” (Arnette, 2019).



Figure 9 - When nature calls, carrying human waste down the mountain – current equipment used (Pitcheta, 2019)

With the importance of the clean-up happening on Mount Everest, we should analyze the product they are using to assist them in the efforts. The equipment being used for the clean-up is, human labor. With the assistance of woven baskets and blue plastic bins to carry out trash and human waste. Why do I feel like this is an important topic? The entire earth is polluted with trash left behind by people; the everyday adventurer, mountaineer, climber and trekker carries items up the mountain and a lot of the time, it never makes it back down. Especially on mountains like Everest where it’s difficult to haul things off the mountain in freezing temperatures. The motto “LNT” or best known as Leave No Trace Behind, has been used as a marketing tool for many years. As people have become more aware of their carbon footprint, some also choose to ignore issues that are right in front of them.

My initial thoughts after diving into this subject, I need to focus on key elements for a successful project. These are:

- Sustainable & Affordable
- Equipment/Bag to assist in carry off trash and waste
  - o Functional Jacket

With the number of westerners paying an obscene amount of money to climb a mountain that's most likely out of their league and the communities surrounding it aren't getting more than one percent? The system has proven to fail the surrounding communities. This mountain is seen as a holy monument. One that should be cherished, loved and respected.

My goal: to assist the communities cleaning up Mount Everest equipping the surrounding communities in gear that helps their clean-up effort. A group of engineers and architects from the Seattle area formed a non-profit called Mt. Everest Biogas. They have designed a system that will safely break down human waste and create clean burning methane gas for the Sherpa community. This technology is predominantly used prolifically throughout Nepal, India and China. The only issue is, mountaineers, climbers and trekkers, need to carry off their own waste for this project to work. Or, have outside privately-owned companies come in and do the work for you. Designing functional equipment and apparel to assist clean-up efforts on Mount Everest and how this project can bring light to a problem that is so prevalent in society today.

The gear available to the clean-up crew involves a woven basket and a blue plastic crate (for human waste) as seen in Figure 8 and 11. At times, bags (even plastic bags) are used to haul trash off the mountain as well.



Figure 10 - Blue crate and woven baskets (Pitcheta, 2019)

What if we could create equipment to assist in carrying trash and waste off the mountain? Mt. Everest Biogas has created a solution at the Base of the mountain. If we aided in creating equipment that could help carry all trash and waste of the mountain, it could aid in cleaner water and eliminating land degradation for local communities.

The apparel available is a different story. Depending on the season you choose to climb will determine the type of apparel you wear. Normal climbing months for Mount Everest are in April, May and June of each year. My goal for the apparel piece is to create a jacket that can function alongside the equipment you carry. The typical piece that Porters and Sherpas carry to haul trash out involves a rig strapped to your back and around your head to carry maximum weight. Apa Sherpa even describes the weight carried to be heavier than your own body weight. A jacket currently worn to climb Mount Everest has to withstand temperatures that are as low as -35°F in the winter months and -13°F in the summer months.

The most popular pieces are from The North Face, Mountain Hardwear and Marmot. These full body suits provide ultimate warmth in ascending Mount Everest. Here's the catch, I'm not designing for the conqueror, the person that wants to climb Mount Everest – my design is purposeful and specifically to the clean-up efforts done by local Sherpa communities. Which means, functionality within the jacket is the most important. I feel as if designing a jacket that can function along-side the equipment built is key. Taking in key factors such as: mobility, warmth and ability to be transformed. The following apparel pieces are used when summiting Mount Everest from base camp to the peak of the mountain.

#### **Historic Color Story:**

1920



Figure 12 - 1920s mountaineering (Altitude, 2012) Figure 11 - 1920's mountaineering (Altitude, 2019)

1953



Figure 14 - Tenzing Norgay and Edmund Hillary (Bisceglio, 2013)

Figure 13 - Edmund Hillary's gear (Bisceglio, 2013)

1963



Figure 16 - (Niswonger, 2013)

Figure 15 - The First Indians on Everest 1965 (Ghosh, 2015)

1975



Figure 18 - First all-female group with Sherpas to climb Everest (Gambino, 2008)

Figure 17 - (Gambino, 2008)

**1994**



Figure 19 - Most dangerous climb in 1994, claimed eight lives (Gambino, 2008)



Figure 20 - Apa Sherpa climbing for the 16th time on Everest (Apa, 2019)

**Present**



Figure 22 - Apa Sherpa (Apa, 2019)



Figure 21 - (Freire, n.d.)

I wanted to put an emphasis on what the color history means to the project. Outerwear has changed drastically throughout the years, especially in materiality. Along with materiality, the color of outerwear has moved from a natural color scheme and moves to bright bold colors to today. I started by looking at the 1920's when cold weather mountaineering and what was used then. Soft neutral tones were carried through time until the 1990's where bold bright colors matched with

black started taking over the neutral tones. In many stories I have read, the brighter colors help keep track of people who are climbing in this cold weather. The current color palette for the equipment and apparel revolves around bright neon apparel colors, with dark contrasting gloves. The color chosen for these apparel and glove pieces are more for if you get caught in a place you can't get out of - they can find your body a little more easily. Although, bright and contrasting color exudes confidence and energy and to climb Mount Everest, you will most likely need as much energy as you possibly can. The equipment used by Sherpas and Porters are handmade woven baskets, earth tones, no paint. Color for the Sherpa community doesn't seem to be a big part of what their mission entails.

**Graphic Logos:**



**Apparel:**



Figure 24 - The North Face Summit Series \$999.95



Figure 23 - Mountain Hardwear Zero Down Suit \$974.96



Figure 27 - The North Face Himalayan Down Pant \$598.95



Figure 26 - Himalayan Parka \$649.00



Figure 25 - Marmot 8000m Suit \$874.97

Many of these products have the exact same features and benefits. For Figure's 24, 25, 26. These include:

- 800 fill goose down / maximum warmth
- Welded baffle construction
  - This eliminates punching holes into the fabric, creating a more efficient sub-zero climate suit
- DWR coated
  - A coating on the outer fabric to keep moisture from penetrating the core of the suit
- Full Leg Zips for accessibility
  - You're climbing boots should be fully accessible, this provides a benefit for access
- Thick warm draft yoke around neck and shoulders
  - With sub-zero temperatures this will be an added benefit to keep air from entering into your suit
- Lower leg insulation

**Features and benefits for The North Face Himalayan Parka (Figure 27):**

- Welded-baffle construction
  - Eliminates the need to punch holes in fabric, creating an efficient sub-zero climate suit
- Extra-long, two-way center front double zip with draft tube

- Coated DWR finish
  - Keeps the frigid air out
  - A coating on the outer fabric to keep moisture from penetrating the core of the suit
- Draft yoke around neck and shoulders
- Chest drop pockets external and internal access
- Tough grip zones on shoulders and hips
- Relaxed fit

**Gloves – Included materials (NOT INCLUDED IN COLLECTION)**



Figure 28 - Marmot Randonee Gloves



Figure 29 - Insulated Shell Gloves Black Diamond



Figure 30 - Rab Expedition 8000

**Features and Benefits for (Figure 29) Marmot Randonee Gloves:**

- Falcon-grip articulation
- Gore-tex waterproof and breathable glove inserts
- DriClimate lining
- Wrist strap
- Absorbent nose wipe

**Features and Benefits for (Figure 30) Black Diamond Gloves:**

- Durable goat leather palm
- PrimaLoft insulation (removeable)

- Gore-tex with XCR Product Technology inserts
- Four-way stretch nylon shells

**Features and Benefits for (Figure 31) Rab Expedition 8000:**

- Partex Endurance outer fabric
- 850-fill goose down insulation
- Cordlock wrist leash

**Patents:**

Many of the patents involved in these specific pieces are from the technology advances in each. Such as, PrimaLoft®, Partex®, and GORE-TEX®. The PrimaLoft® patents states: A blowable insulation material comprising batt shredded into blowable clusters. In preferred embodiments, the clusters comprise water repellent or lubricant finished fiber and/or dry fiber and/or binder fiber and may be mixed with opened fiber (Groh, 2017). For GORE-TEX®, acting as a waterproofing agent; its composition is provided to improve adhesive strength

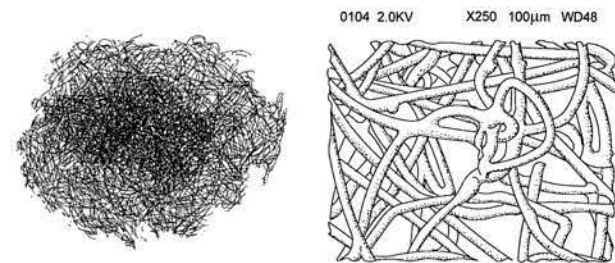


Figure 32 - PrimaLoft insulation Google Patents (Groh, 2017)

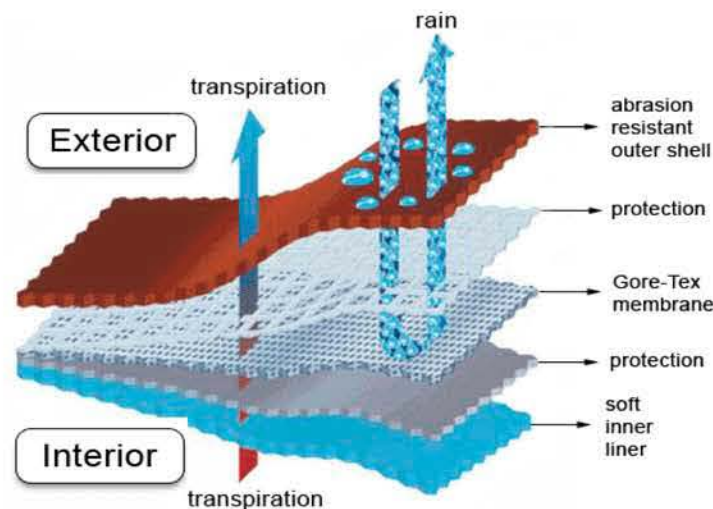





Figure 31 - U.S. Patent 3,953,566, issued April 28<sup>th</sup>, 1976

without the deterioration of penetration, drying property and workability and to prevent waterproofed coated layers from coming off (Gore-tex, patent).

**The Manufacturing Processes:**

The designer first creates a pattern that is printed and cut out with a laser cutter or by hand using large scissors that work much like a jigsaw. Many outerwear jackets are made by sewing two jackets together: an insulation jacket on the inside and a wind breaker on the outside. The inner insulation jacket is usually made with a nylon lining where it sewn to a piece of interfacing for stabilization and then the insulation itself. Working with one pattern piece at a time, they will top stitch the inner layers together including: insulation, nylon piece and interfacing. After the excess edges are cut off, you can start sewing the inner pattern pieces together. The outer fabric is a thinner nylon piece that acts as a wind breaker. This is where you can seam seal all the stitched pieces together so no drop of water can enter into the jacket. Once the two jacket elements (insulated and wind breaker) are sewn separately, they can be brought together by sewing the collar, zipper cuffs and hem.

The baskets are woven by local Sherpa communities. It's called Doko by local community members and is made from bamboo. The are hand-woven in a conical or "V" shape. Normally used to carry food and goods, but also used to help with the nearby Everest cleanup efforts (Karoobar Daily, 2019). To carry trash this doesn't seem like that big of an ordeal, but to carry human waste it proves otherwise. Blue crates that are used for food to keep water out are placed inside the baskets to carry waste to Gorek Shep (Picheta, 2019).

 <p>Himalayan North Face Parka</p>	<p>Lightweight Fits slightly big but overall true-to-size Large and spacious hood Windproof</p>	<p><u>From customer reviews:</u> Wrist cuffs have uncomfortable seams between the thumb and index fingers. The down in the arms doesn't stay after worn multiple times. Poorly designed zipper on center front and pockets</p>	<p>The opportunities this jacket presents is developing this jacket as if it were functional piece including, mobility, dexterity, portability and transportability. This is where I see the most opportunity.</p>	<p>Just like the gloves, there are multiple pieces on the market that are of this type of genre.</p>
 <p>The North Face Himalayan Down Pant</p>	<p>Best for cold/extreme Allows free movement Comfortable Durable Lightweight Stylish Warm</p>	<p>Poor zipper design- It gets caught on the material</p>	<p>There is an opportunity here for fit and functionality. A lot of outerwear pants</p>	<p>The threat for this product is the suit. If you are going to buy two separate pieces that would allow more air in, you might as well purchase the full suit</p>
 <p>The North Face Summit Series</p>	<p>Comfortable Lightweight Stylish Warm Best for cold/extreme weather</p>	<p>Threads in the chest area come loose easily Fits in a bag, but damage occurs on the in and out</p>	<p>Mobility and functionality with equipment and apparel combination</p>	<p>Price and accessibility</p>

**Materials:**

**The woven basket:**


- Predominately made with bamboo and leather straps that circle around your head. It takes about a day to complete one basket.






**Apparel Pieces:**

- All of these outerwear pieces have something in common. Their materials – because of the specific climate you are entering, materials tend to stay the same if it works well. Therefore, the state-of-the-art fabric used is:
  - Synthetic Insulation: 80 G/M<sup>2</sup> PrimaLoft®
  - Body: 30D 56 G/M<sup>2</sup> (1.65 Oz/Yd<sup>2</sup>) Pertex® Endurance – 100% Nylon Ripstop
  - Down Insulation: 800 Fill Goose Down in Main Body and Sleeves
  - 700 Fill Goose Down in Back Panel and Lower Shoulders
  - Lining: 50D 61 G/M<sup>2</sup> (1.65 Oz/Yd<sup>2</sup>) GORE WINDSTOPPER®
    - Active – 100% Nylon Ripstop


**Gloves (above)**

Product	Strengths	Weaknesses	Opportunities	Threats
 <p>Insulated Shell Gloves - Black Diamond</p>	<p>Warm Dry Last a long time and durable</p>	<p>Thick/Bulky Poor articulation Uncomfortable</p>	<p>Warm gloves like these tend to have weird sizing. There is an opportunity to create consistent sizing that works with articulation and comfort</p>	<p>There are many types of gloves on the market that are for purchase. Creating gloves for a specific niche space could be difficult.</p>

 <p>Himalayan North Face Parka</p>	<p>Lightweight Fits slightly big but overall true-to-size Large and spacious hood Windproof</p>	<p><u>From customer reviews:</u> Wrist cuffs have uncomfortable seams between the thumb and index fingers. The down in the arms doesn't stay after worn multiple times. Poorly designed zipper on center front and pockets</p>	<p>The opportunities this jacket presents is developing this jacket as if it were functional piece including, mobility, dexterity, portability and transportability. This is where I see the most opportunity.</p>	<p>Just like the gloves, there are multiple pieces on the market that are of this type of genre.</p>
 <p>The North Face Himalayan Down Pant</p>	<p>Best for cold/extreme Allows free movement Comfortable Durable Lightweight Stylish Warm</p>	<p>Poor zipper design- It gets caught on the material</p>	<p>There is an opportunity here for fit and functionality. A lot of outerwear pants</p>	<p>The threat for this product is the suit. If you are going to buy two separate pieces that would allow more air in, you might as well purchase the full suit</p>
 <p>The North Face Summit Series</p>	<p>Comfortable Lightweight Stylish Warm Best for cold/extreme weather</p>	<p>Threads in the chest area come loose easily Fits in a bag, but damage occurs on the in and out</p>	<p>Mobility and functionality with equipment and apparel combination</p>	<p>Price and accessibility</p>

 <p>Rucksack</p>	<p>Made locally (price) If it breaks, it can be easily fixed Natural materials It's been used for generations Different sizes</p>	<p>Uncomfortable No performance benefits No organization – stacked items Lack of stability – not securement</p>	<p>Ease of hauling items off the mountain Fits to the body Multipurpose space Opening and closing mechanisms for gloved hands</p>	<p>Research will prove to be difficult for this. But experiencing it overseas will bring light to the subject.</p>
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Product	Strengths	Weaknesses	Opportunities	Weaknesses
 <p>Marmot Randonnee Gloves</p>	<p>Allow for movement Wrists can be tightened for extra security</p>	<p>Sizing is a bit off with these gloves according to product reviews. The get damp and cold really quickly. Safety cord is troublesome.</p>	<p>Re-figure the sizing chart Materials change Longer wrist to forearm design</p>	<p>Many companies make gloves that are warmer and provide more movement</p>
 <p>Rab Expedition 8000</p>	<p>Fingers in one space means more warmth</p>	<p>It can be difficult to maneuver in mittens  Cord doesn't stay when tightened</p>	<p>Sizing is off, tends to be larger than stated</p>	<p>Other mittens are designed with more curve to the fingers, this one is designed flat</p>
 <p>Mountain Hardwear Zero Down Suit</p>	<p>Lightweight Sub-zero temperatures Wrap around face for warmth</p>	<p>From Customer Feedback: Pant cuff is too slim to cover ski or climbing boots fully zipped. Zipper snags on this product.</p>	<p>Compact for travel Zipper redesign Sizing issues Same colors have been used for 10+ years (see color story)</p>	<p>Alpine pocket placements – Not very useful when you can't take your hands out of the gloves</p>

		Bottom half is tight in comparison to top half		
 <p>Marmot 8000m Suit</p>	Very roomie in the legs and chest for extra clothing	To large in the shoulders Not very well designed in comparison to other products Color scheme outdated	Articulation in the elbow and knee New color scheme	Competing against brands that are creating and innovating in fabrics and technology will be the biggest threat to Marmots suit

**SWOT conclusion:**

The current product available to the Sherpa and Porter communities are that of community made products. The equipment currently used by communities surrounding the mountain work because they've been used for decades, it's the same product to carry things up and carry them back down. I believe that to be a strength of theirs, using what they have in lieu of using something that is wasteful. What I believe to be its greatest weakness is inability to function as something to carry trash and human waste. Staying sanitary is also a big issue when cleaning the mountain of left-over human trash. The apparel side is similar, the product functions wonderfully for what is what designed to do. Porters and Sherpas have been wearing similar gear to aid and assist in westerners climbing for decades. I believe its greatest weakness would be its ability to have mobility alongside its equipment. Why can't they function as one? Eliminating the restrictions that clothing and

equipment cause for ease of transport and pickup. Although there are suits designed for the expedition, there are also pants and jackets that play along the same lines. I believe the jacket is more functional in the aspect of what I'm trying to accomplish for my project in lieu of the full body suit.

Analyzing my own idea of the products space strengths, weaknesses, opportunities and threats – I find that this project greatest strength is its purpose. The unsung heroes of Mount Everest are creating this initiative to better this mountain that they consider holy. Creating equipment and apparel that work hand-in-hand in assisting the clean-up is its greatest strength. Its biggest weakness is, there are an incredible number of apparel pieces that are made for the ascent to Mount Everest. Convincing the audience that an apparel piece is necessary will be tricky, but I feel that as a designer creating an apparel piece that can function with the equipment will turn its weakness into a strength. I believe that the biggest opportunity for this project is how it can translate to other project pieces like this one. All over the world there are mountain ranges, peaks and valleys that are littered in trash and human waste. If this project ends up being successful, it could be used in other places and spaces like Mount Everest.

Although this SWOT and product analysis is of state-of-the-art condition, I can't help but compare photos of the western climber vs Sherpa. The Sherpa climbers wear the same products as the western climber; the only difference is they wear their products over and over again and repair where they can. This means that they could have gear from the 90's that are sufficient enough to climb in today. The gear they buy, they intend to use for their career. Whereas the western climber, will use all their gear **once** to obtain an 'on top of the world' experience.

### **Strengths as a product innovator:**

Carly has spent her entire life in the outdoors with her family creating memories. Living in a city that has the greatest snow on earth helped foster her love for the mountains. Her passion for sustainability came from living in a state that had and has no motivation towards helping climate change. Living in a society that cares nothing about their actions was completely opposite to what she was raised believing. Throughout her young adult life, she made choices like living in a different country to educate and teach communities about the consequences of unsustainable actions. Her upbringing was the foundation that helped her understand that, what kind of world would this be – if we didn't help each other succeed? Which is why she is choosing to focus her capstone on an idea that revolves around implementing change in an area that's bigger than all of us. Her strengths as a designer revolve around the outdoor community. She understands what it means to love and cherish the mountains and hopes to one day design and innovate in a space that involves the outdoor community.

As somebody that loves to explore, she wants to do the same with her career. What better way to work than to use her knowledge of design to help increase exploration everywhere. Being passionate about nature and everything that comes along with it, is Carly's drive to want to design to help better everything we do outside. The Sherpa community struck home with Carly as she related to their stories of love for the mountains. As a community of explorers, we stay curious about new ideas, places and people.

Throughout her time in the Sports Product Design graduate school, she discovered her strengths through analyzing what she's best at through each project. At the beginning of her graduate school experience, she took the strengths assessment on-line to learn how to interpret her strengths as they related to her experience as a designer. Her first two strengths were on the line of Strategic Thinking and Execution. Throughout her design experience at the University of

Oregon, she feels that she has stayed true to what her original strengths findings were. She has always been the type of person who likes to be well prepared for whatever assignment is thrown at her. Trying to figure out pieces and resources that can be arranged for maximum productivity is something that excites her for the future.

She chose a thesis topic that is different and breaks out of the normal confinements of Sports Product Design and into a realm that following along her passion for sustainability. This product space is focused on those who Focusing on equipment and apparel to aid and assist in the Mount Everest clean-up efforts; Everest is one of the most well-known mountains around the world.

She can see this body of work leading her into a company fully prepared to take on the next generation of outerwear design. The outdoor industry is paving the way for a sustainable future generation. Companies like Patagonia, The North Face and Columbia Sportswear are creating business models that help aid and assist in eliminating the fast fashion industry. She hopes to someday be a part of implementing a sustainable way of design that acts upon what it's selling. Not just telling people the LCA is a great way to reduce your carbon footprint, but actually implementing it in a business model.

Carly believes that her strengths revolve around providing the best equipment and apparel for outdoor performance athletes, sustainably. The Sherpa and Porter community are the most athletic people on planet earth. Being able to withstand 26,000 ft in elevation with no oxygen assistance and carry all the westerners gear, is incredible. All the more reason Carly wants to assist in providing gear to help these communities keep their communities and sacred mountain clean.

## Part 2: Project Development

### Research in Nepal:

The first few weeks of January I traveled to Nepal to conduct research surrounding the equipment and apparel pieces of my thesis. I started my trip by trekking through the Himalayas; in and around local Sherpa towns and communities. My purpose was to experience Sherpa communities and ask as many questions as possible about the pollution and needs in development of new apparel and equipment. Each day I trekked I met and talked to many guides, porters and local community members including Sherpa's. They all had a lot to say about the current environmental implications that



Figure 33 - The start of Carly's trek in Nepal. Lukla Airport

tourists bring into Nepal. Interestingly enough, many of them have also admitted that the Nepalese economy and way of life couldn't survive without them.

It is important to be able to differentiate between a regular guide and a Sherpa mountain guide. For tourists that have no desire to summit Mount Everest, but still want to experience trekking in the Himalayas, they would hire a regular trekking guide. You can go through a trekking company, or you can buy a plane ticket through a local agency and hire a trekking guide and porter once landing in Lukla Village. A Sherpa Mountain guide is hired in advance usually through a trekking or climbing outfitter. It's very rare to hire Sherpa Mountain guides without planning in advance,

like you can with a trekking guide. Sherpa Mountain guides are highly sought after climbers that rarely summit more than once or twice in a season.

Through the 10-day trekking experience, I met people from all over the world that signed up to experience base camp at the bottom of Mount Everest. The farthest point I had traveled to was half-way to base camp, which is where that majority of Sherpa Mountain Guides were born and raised. We traveled through the



Figure 34 - Namche Bazzar, town where Sherpa's were born and raised

following communities: Lukla, Phakding, Namche Bazar, Tengboche and Khumjung Village. All of which are on the original path that Tenzing Norgay and Edmund Hillary had climbed back in 1953. Namche Bazar and Khumjung village are at a height of

12,000ft. Because the villages are located at high elevation, this gives Sherpa mountain climbers the ability to withstand climbing higher longer.



Figure 35 - Sudip and I pointing at Mount Everest

I talked to individuals on the trek as I passed through the villages en route. They answered questions such as how much it costs for a guide or a Sherpa to climb mount Everest regardless of whether or not they have a sponsor. What I found interesting was the passion they had about climbing Everest. Every guide or porter has a dream of someday

ascending the highest peak in the world. From what I researched online it was the complete opposite. When I asked the question, “Do you want to climb mount Everest someday”, the majority of answers were: absolutely. The only issue is cost; many guides can’t afford to pay their own path to climb Mount Everest, so they require a sponsor to help their efforts. The younger generation of climbers seem to love the idea of climbing Everest while the older generation preaches again and again to gain an education before making the choice to become a mountain guide.

#### **Itinerary of trekking trip:**

- Day 1: Stay in Kathmandu upon arrive from the USA
- Day 2: Fly to Lukla; Trek from Lukla to Phakding
- Day 3: Trek from Phakding to Namche Bazzar
- Day 4: From Namche Bazzar, hike to Everest view hotel (for the view) back to Namche
- Day 5: Trek from Namche Bazzar to Tengboche Monastery Village
- Day 6: Trek from Tengboche Monastery Village back to Namche Bazzar
- Day 7: Trek back to Lukla
- Day 8: Stay in Lukla
- Day 9: Fly Back to Kathmandu from Lukla



Figure 36 - Dawa Pasang Sherpa



Figure 37 Gombu Sherpa



Figure 38 - Arun Karaki

I met many trekking company owners and operators along with Sherpa Mountain guides in Kathmandu. The owner of Nepalgram, Arun Karki put me in touch with a few of his Sherpa mountain guide friends to ask questions. Their names were Dawa Pasang Sherpa and Gombu Sherpa. Dawa and Gombu both said, “As mountain guides, we want to make sure our clients have the best climbing experience. A lot of us still enjoy climbing as a career.” Arun had stated that most of the Sherpa climbers of younger generation take pride in their climbing abilities. They want to provide the best experience for tourists and clients that want to climb Mount Everest. Where if you talk to any older generation, you’d find that they would encourage those who are just starting out as guides to get an education before they choose their path of life. I left the United States with a goal to ask specific questions to guides and Sherpas.

**Those research questions include:**

<b>Questions:</b>	<b>Feedback/Answers:</b> <b>By Arun Karki</b> <b>Dawa Pasang Sherpa</b> <b>Gombu Sherpa</b>
<b>What are you carrying when you're climbing mount Everest? and what are you carrying when you come back? Do you pick up anything extra? Including trash, waste, etc.?</b>	Oxygen will be supplied by the company and are stored in different place and as Sherpa we carry one cylinder with us. We put oxygen in the Bag side and the regulation and pipe connects to our face to inhale if needed. Some bag are designed to adjust cylinder and we use those.
<b>What do you normally wear?</b>	As Sherpa we use normal brand but warm and light apparel. No any specific brand but they must be warm and tested by our friend climber in their previous climb. Basically we use the stuff recommended rather than choosing any specific brand.
<b>What physiological differences happen from base camp to camp 4? Do you wear different clothing from base camp to camp 4?</b>	From Base camp to camp 4 a lot changes. It is really hard to climb to the camp 1 from the Everest base camp as it. From Base camp to camp 4 we do change the type of cloths. Interestingly we use less cloth once we get higher. Outfit we use to climb from the base camp of Everest to the camp1 is mostly thick and bulky as we have to walk in the narrow section in between Nuptse and Lhola mountains before hitting Mount Lotse.

<b>Options for oxygen or no oxygen? Where do you usually put oxygen for climbs? In a bag? Is there a specific harness to hold oxygen?</b>	Oxygen will be supplied by the company and are stored in different place and as Sherpa we carry one cylinder with us. We put oxygen in the Bag side and the regulation and pipe connects to our face to inhale if needed. Some bag are designed to adjust cylinder and we use those.
<b>What are the apparel pieces from skin up? Favorite Brands?</b>	As Sherpa we use normal brand but warm and light apparel. No any specific brand but they must be warm and tested by our friend climber in their previous climb. Basically we use the stuff recommended rather than choosing any specific brand.
<b>Is gloves or mittens preferred?</b>	For nights and the morning we use thick gloves and in the daylight we use thin gloves. Gloves are like mandatory thing to wear in mount Everest expedition.
<b>Superstitions? - on equipment or apparel: color, where it came from, how it's put on, any traditions or good luck things you do at base camp or on Mount Everest?</b>	Superstition or a call for good luck - whatever it is called; we organize puja ceremony before starting any of the expedition. We do puja ceremony at our own home with family lama and then entire expedition group will do one in any of the monastery and lastly we do offering at the base camp with lama and mantra. This is for a best possible success to the summit and good fortune. When we do offering means, we worship our gears at the same time; specially rope and ice axe. As a good luck thing, lama who performs ceremony for good luck gives us good luck thread or a knot with thread, which we tie on our arm or wear around the neck.

<b>Where do you get your clothing? - donated, store, making it, westerners leave it, handed down?</b>	we ask our guest to bring clothes from their country for better quality and cheap but branded gears. At the end of the trip guest gives climbing gears. Climbers leaving gears behind are main source of our climbing gear.
<b>Where do you get your gear to climb mount Everest? Online? The Shops on Thamel? Where specifically?</b>	If we need to buy gears our self, we buy them at Thamel. We do not use online but ask our clients coming from different countries to bring some gears for us. When we buy at Thamel we buy from branded shops at Durbar marg than from Thamel.
<b>What do Sherpa Mountain Guides spend on gear? How much do Sherpa mountain guides make in a season?</b>	Earning depends on the tip we get and if we do not consider the Tip the earning is around 1000 USD to 4000USD per season. And for Everest there is only one season "spring". We make our more earning from climbing to other peaks in Nepal or we go to work in western countries like Norway, Sweden, Colorado, New Zealand etc.
<b>Do you get paid to bring trash down off the mountain? Your own trash? Waste?</b>	As a rule of Nepal government or SPCC; every climber need to bring 8 kg of waste with them. In this case we bring our 8kg and most of the time we need to bring in the name of our clients as well. When we submit the trash to the SPCC committee we get paid. We do carry down our human waste like sewer as well; in this case we are paid extra. Some Sherpa just carry those human waste only, they are get paid.
<b>What pockets do you use for specific things? Do you wish there was anything designed differently on your climbing gear?</b>	We use pockets from camera battery, phone, carabiners, extra gloves and cap, sunglasses. All of these things are kept in the random pockets

<b>Hood or no hood? Do you have a preference on your down suit or jacket?</b>	whichever is adjustable. Most of the pockets are on the jacket.
<b>Mask/face guard? Do you have a preference on whether or not you have a mask or faceguard for climbing?</b>	As Sherpa we rarely use mask but our guests who climbs very slow must use it even during the sunny day. We use mask mostly when there is no sunlight. We prefer to have mask or face guard for climbing.
<b>How important is mobility in your apparel? Shoulders, knees, hips, ankles.</b>	To keep ourselves warm we need thick down jacket and most of the inner apparel we use are also thick. Thickness is unavoidable but this blocks easy mobility, this is annoying sometime. We need more mobility in Knee, ankle, fingers and neck. However as a Sherpa helping climbers we need wider mobility in all body part.
<b>Where do you get cold the most? Hands, feet, body?</b>	Feet or toe is where we get cold mostly.
<b>Down or synthetic gear?</b>	Down gear.
<b>Extra notes?</b>	If we can use gears which are warmer but thinner would be great. Something like a pocket which can be kept close to trap the warm air inside, when it is cold and the same pocket can be zipped off to release the warm air side the pocket trap and can be used as an useful pocket to keep our stuff.

After my big trekking adventure, I stayed in Kathmandu to research the gear that is available for tourists and local trekking guides. As I weaved in and out of

stores on Thamel (the main shopping street in Kathmandu), I realized the gear was all counterfeit. Going into the gear research part of the trip – I had heard rumors that none of the gear was authentic. That became my biggest discovery; how the economy is purely run off selling fake gear and tourism. With overly large logos, embroidered in a location that's off-brand, it's obvious that the local shops are making an effort to convince those unaware to purchase product that's counterfeit. I also found that the majority of Sherpa Mountain Climbers are gifted their gear by clients. Because of the lack of real gear and expensive product sold by name brand stores, guides ask their clients to bring trusted brands as gifts for the upcoming seasons ascent.

### Key takeaways:

Today's Sherpa Mountain Guides take pride in their work. The older generation may try to convince them to find another path, but the passion developing in the younger generation is unwavering. There will be more years of Everest climbing to come but with the more people ascending, the Sherpa guides are concerned about what is going to happen to the neighboring communities. The trash that people bring with them is increasing with the tourism increasing. The governments blatant disregard for the fact that people are getting sick from the trash polluting the water supply creates fuel within the clean-up initiative. With my questions, it became apparent at how excited the guides were about having something created for such a specific cause.

As I was on the trek, I noticed that I couldn't take more than ten steps without seeing a piece of trash along the way. The community porters carrying supplies to and from villages would eat energy bars and throw the wrappers on the trail without thinking twice. I believe that creating the gear would benefit not only trekking guides but Sherpa Mountain Guides.

### Naming the collection:

Makalu is a collection that includes a Jacket, Pant (Bib) and Pack. Makalu is a mountain peak that sits beside Everest. As the 5<sup>th</sup> highest peak in the world, it's known for its mystic appearance and folk lore. I wanted to name this product after



Figure 39 - Asian Trekking Company comparing Everest and Makalu

Everest's sister mountain because of it. f the most sacred mountain peaks in the world, its sister mountain is known for being mystical and magical. Every year, people that climb Mount Makalu claim to have seen evidence of a yeti. The yeti is a character in ancient legends and folklore of the Himalaya people. The yeti is commonly used by the people indigenous to the region and is known for its strength and unwavering determination; similar to a Sherpa Mountain Climber. Therefore, I gave the collection the name Makalu for the products to reflect the Sherpa stature: Strong, determined and commonly seen has an amazing climber in the Himalayan mountain range.

### Design priorities and Design Briefs:

Mind mapping was used to analyze my design priorities and figure out how I can incorporate those priorities into my sketching. The design priorities/problems I am solving for are the following:

#### Jacket and Pant:

- Storage
- Mobility
- Thermal regulation
- Don/Doffing

#### Equipment:

- Storage
- Adjustability/modularity
- Sanitation



Figure 40 Body warmth mind map

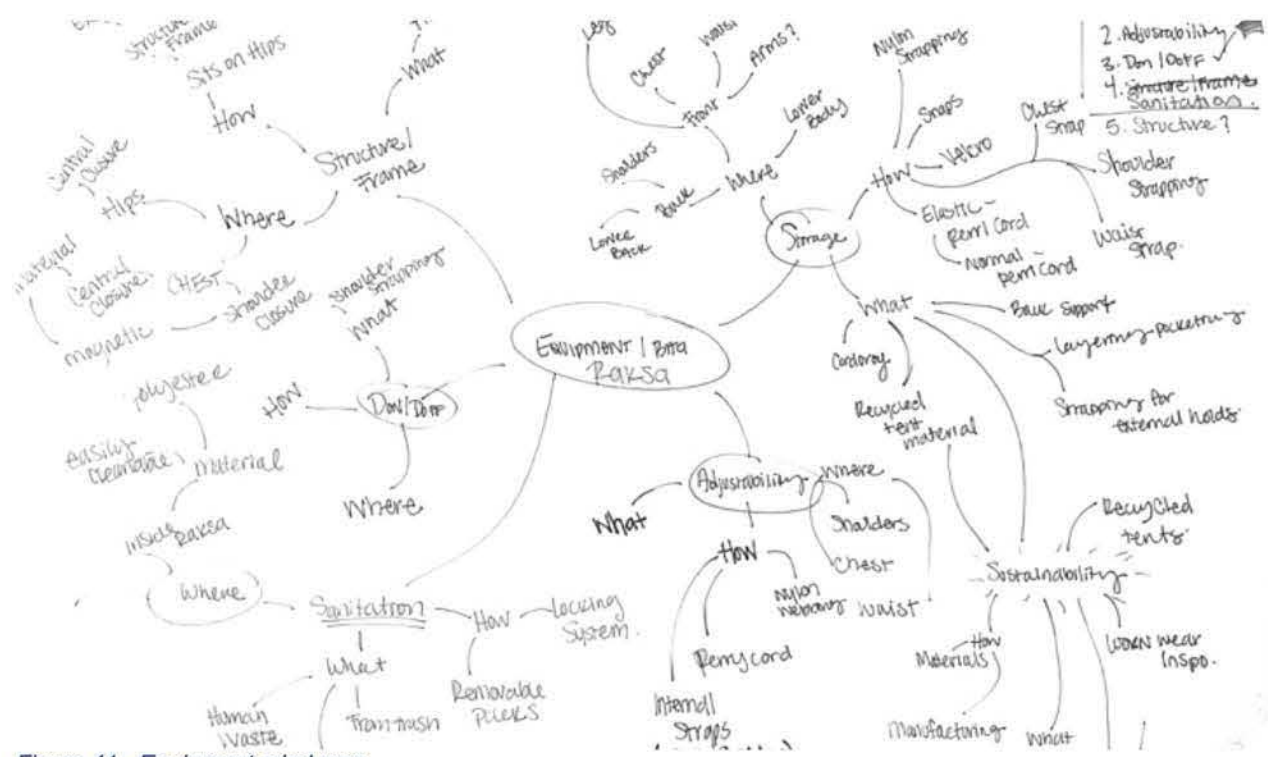


Figure 41 - Equipment mind map

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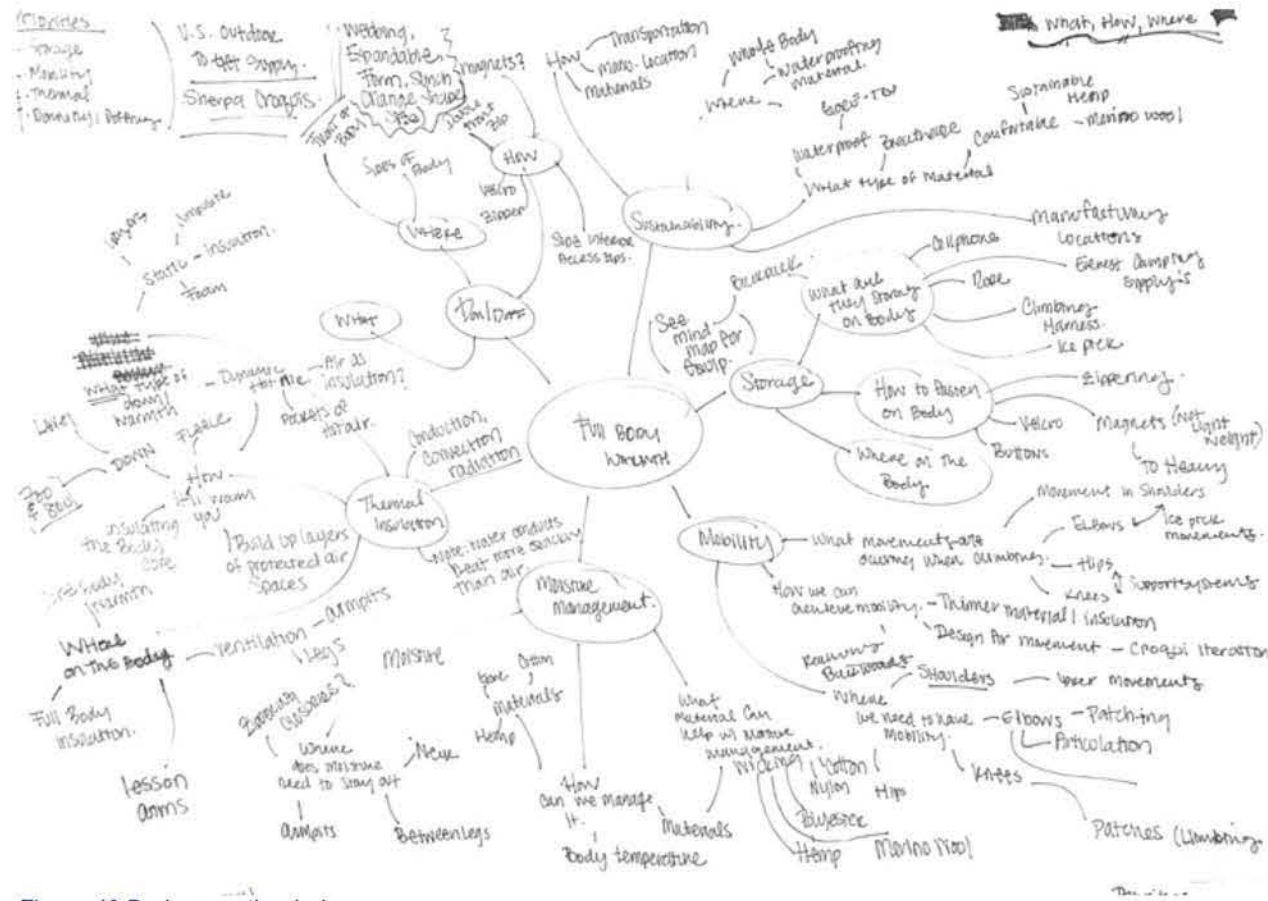


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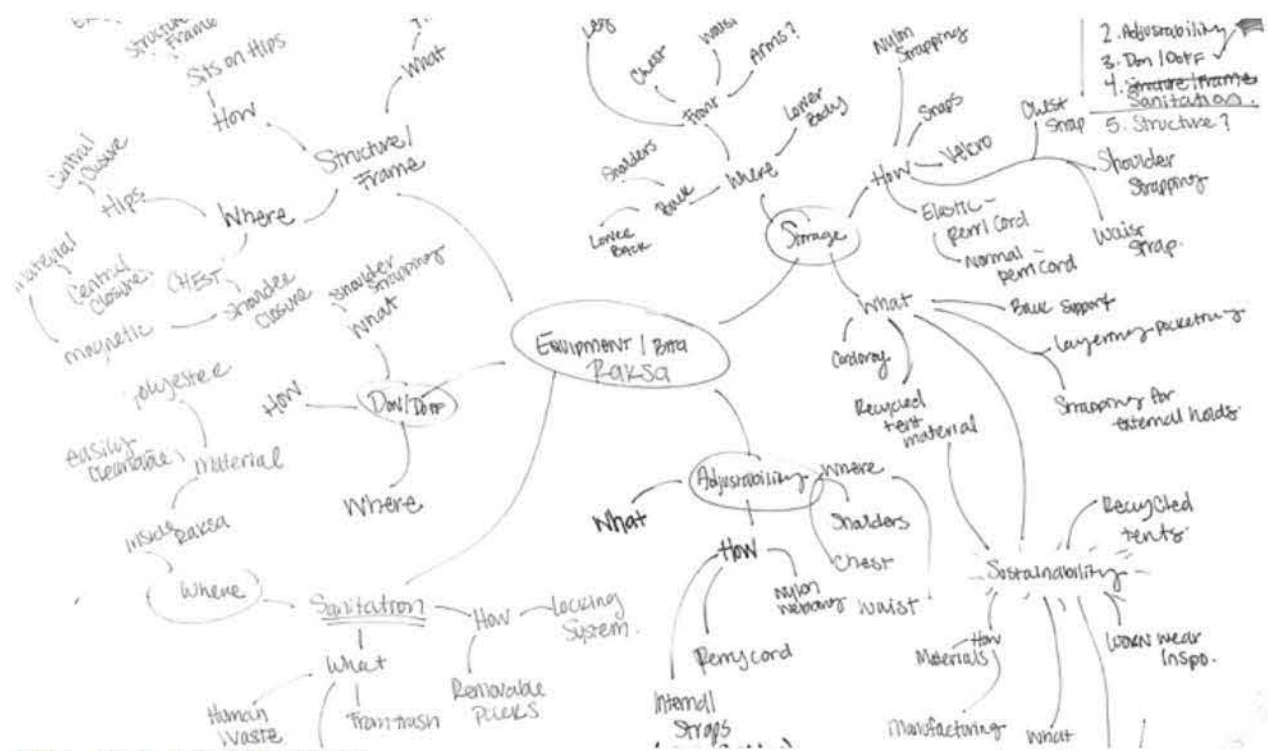


Figure 41 - Equipment mind map

From athlete feedback, I determined that the apparel needs to have storage for easy access items such as phone, water & snacks. Mobility in the arms is another portion that Dawa and Gombu wanted solved within the apparel piece. Because temperatures on Mount Everest go well beyond negative zero, thermoregulation is another key design priorities. For the equipment sector, much of the feedback I received was about how there is only enough room for what they take up and bring down. Creating expandable storage, modularity, ease of don/doff and creating a system for easy cleaning are the top for design priorities for this piece.

### Makalu Jacket



Goal	Price:	Season:
A Sherpa Mountain Guide specific jacket that is developed for mobility, storage, thermal regulation and don/doffing, specifically aiding in the trash clean up on Mount Everest	Retail: \$400.00 FOB: \$80.00	Spring/Summer 2024

Figure 42 - Makalu Jacket Design Brief

## Makalu Pant



Goal	Price	Season:
A Sherpa Mountain Guide specific pant that is developed for mobility, storage, thermal regulation and don/doffing, specifically aiding in the trash clean up on Mount Everest	Retail: \$450.00 FOB: \$90.00	Spring/Summer 2024

Figure 43 - Makalu Pant Design Brief

## Makalu Pack



Goal	Price	Season:
A Sherpa Mountain Guide specific pack that is developed for expandable storage, adjustability, sanitation and structure specifically aiding in the trash clean up on Mount Everest	Retail: \$250.00 FOB: \$50.00	Spring/Summer 2024

Figure 44 - Makalu Pack Design Brief

## Ideation Process:

### Methods used:

The ideation process involved a few different methods including the following:

- Paper modeling
- Sketching
- Physical prototyping for proof of concept

### Results and Findings:

My ideation process started with paper modeling. Attempting to wrap my head around the form of a pack has been the most different part of the ideation process. The paper modeling was not as successful as I was hoping it would be. I believe I needed to move through this ideation process to



Figure 45 - Paper prototypes done for the Makalu Pack

understand what was working and what wasn't. Though I did come up with some forms that helped me move towards a more successful form of ideation through sketching. In architecture school I used to scribble with a pencil and draw over top of it with a black pen to figure out how I wanted shapes and forms to come through. I took that process and applied it to my current sketching process. I found that I like this process so much more than sketching on the iPad or trying to sketch perfectly the first-time round with a pencil. The forms that I've been developing using the pencil and pen technique is one that I could see myself following through my career.

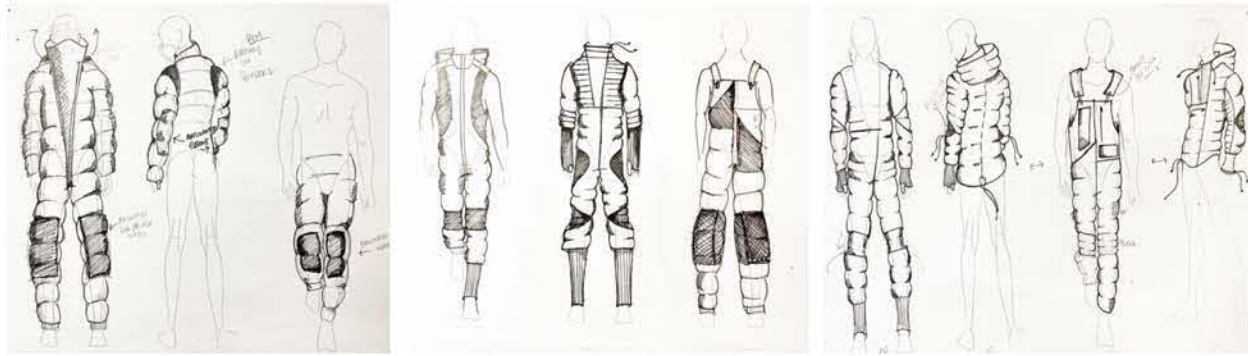


Figure 46 - First round sketch iterations

To develop a direction with sketching, I found two intersections that helped address my design priorities. The first, architectural deconstructivism; as this is my favorite form of architecture, developing the pack on the basis of postmodern architecture would help develop new forms. To define deconstructivism, it is a movement of postmodern architecture which started in the 1980's (Stouhi, 2018). It gives the impression of the fragmentation of the constructed building. It is characterized by an absence of harmony, continuity or symmetry (Stouhi, 2018). A favorite example of mine is Frank Gehry's home residence in Santa Monica, California.



Figure 47 - Frank Gehry's Santa Monica Home taken by ArchDaily

Gehry's design wrapped around three sides of a pre-existing house. Extending the house towards the street and leaving the exterior of the existing home almost

untouched (Perez, 2010). An interesting fact about the house: Gehry wanted to leave the house intact and build a new house around it because he was told there were ghosts that lived inside. The windows, angled up towards the sky, were to represent the ghosts crawling out. How did this inspire the newly named Makalu pack sketches? Deconstructivism is modular; it is made up of pieces or parts. The idea behind the pack is create something that's modular and expandable to make room for additional items, i.e. trash, human waste and oxygen canisters. With three sectional pieces on the pack, it will have the ability to expand, move and consolidate.



Figure 48 - Himalayan Jumping Spider taken by Debbie Hadley from the Toughtco.

My next intersection is the Himalayan Jumping Spider. Also known as *Euophrys omnisuperstes*, it lives at elevations of up to 22,000ft in the Himalayas, making it a candidate for the highest known permanent resident on Earth (Hadley, 2019). I found inspiration in their fuzzy, striped colored bodies. I used the Himalayan Jumping Spider to inspire the pant and jacket piece when sketching. A unique property of the Himalayan spider is its ability to increase the blood pressure in their legs, which causes the legs to extend and propel their bodies through the air (Hadley, 2019). They are able to mimic other insects and camouflage themselves to blend into their surroundings, helping them sneak up on prey. I found that what Sherpa mountain climbers is the complete opposite, where they don't need to camouflage in, but rather

stand out in the event of an emergency. This is where the importance of color comes into play. With the bright, beautiful colors we have available today – it makes it easier to help the climbers stand out. Their unique stripping and furry bodies the spiders have inspire the diverse patch work within the pant and jacket sketches. By layering the jacket with the pant, it creates a system of warmth similarly to the spider.

**UPDATE: Spring 2020**

My architectural intersection has not changed, yet the Himalayan jumping spider provided a different role. I focused on the architectural intersection for my pack, using harsh lines and shapes to build out the expansion pieces of the pack. The jumping spider provided inspiration towards the apparel pieces, directing the baffling and how it was constructed together. Through the struggles of all things done at home, I came out with products that represented all that was put into this paper and from the research done in Nepal.

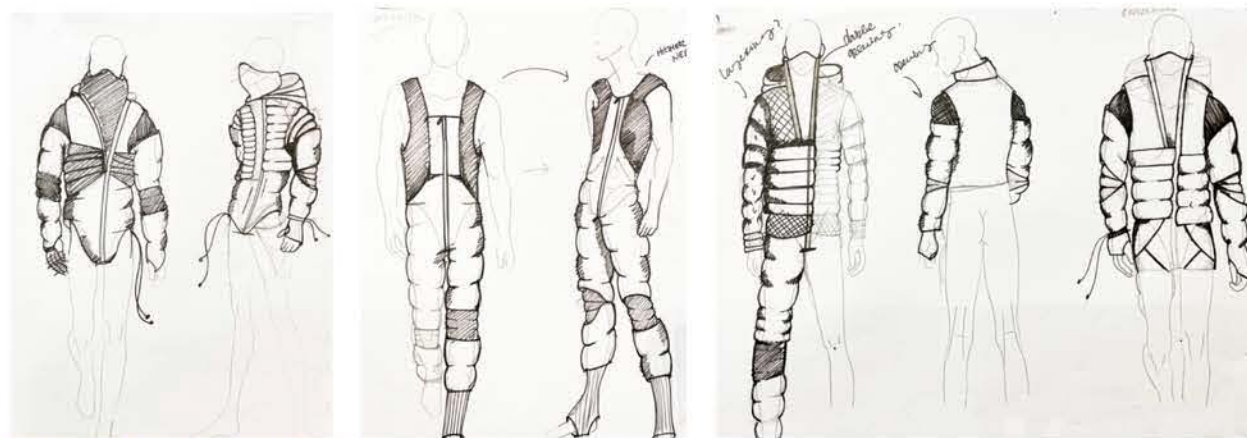


Figure 49 - Final Sketch direction

**Validation Plan:**

The validation plan will be to prove the design priorities.

- **Apparel:**
  - Mobility in elbows, shoulders and knees
  - Cold weather test

- Aesthetic/color that appeals to Sherpa community
- **Equipment:**
  - Accessible Storage
  - Adjustability (modular piecing)
  - Easily cleaned/Sanitation

These priorities will be validated by the Sherpa community through online communication. Due to how far travel is to Nepal, it's almost impossible to do a mobility test and cold weather test in that region. I will send a detailed survey to the Sherpa climbers to fill out and utilize this information to make any adjustments necessary to the product. I will utilize nearby mountain range such as Mount Rainier or Mount Hood to conduct the cold weather test. I will also be validating the modular pieces designed for the equipment by using 2-4 test subjects in testing accessible storage, adjustability with modular pieces and how easy it can be cleaned. I believe the most important aspect in validation is having more than one person test the product and how it's used. Through video, I will record the demonstrations done by the test subjects and make an 'advertisement' like video to be shown at the final on June 4<sup>th</sup>.

I would also like to conduct a test that could validate weight capacity within each modular piece of the pack. Sherpa Mountain Guides carry a lot of weight, in creating an expandable and modular piece, it's bound to get heavier. The weight of the pack should distribute weight to where it's sitting on the hips and up through the central part of the back and around the shoulders. The test will involve packing the Makalu pack with the average weight a Sherpa carries; with additional weight from trash that is discarded on mount Everest.

**UPDATE Spring 2020: Methods and validation:**

Because of COVID-19, methods of validation had to be done virtually through athlete feedback. Speaking to a few friends that have experience cold and warm weather climbing and Arun, who is one of my contacts in Nepal – they provided feedback through WhatsApp and Facetime.

**- Methods of validation**

- Repetitive motion (mobility test)
- Withstand cold weather
- Aesthetic that appeals to Sherpa community
- Accessible on body/off body

**- Layout validation testing**

- Subjects close to home
  - Inability in shipping product to Nepal
  - Beginning/middle of may testing (see schedule)
  - Surveys to Sherpa mountain climbers
    - Video showing product being used
      - Modular pack example
      - Expand/Condense

**UPDATE Spring 2020: Presentation Plan for spring term**

The presentation for spring 2020 will showcase the work done at home. As we finished up our making and moved into digital representation, I plan to convey the story through visual and video's to show the importance of cleaning up trash on Everest. Then, I'll move into the Makalu brand by showing the jacket, pant and then pack – I want to show that order because it starts with the apparel and moves into the equipment. The equipment piece

took longer than anticipated to develop and build. Motivation and at home sewing machines are that of a challenge to use when you're sewing through 500D Cordura.

**Presentation plans for Spring Term:**

I would like to display to product developed like companies do at Outdoor Retailer. Hanging the product, I designed around equipment that's used on the climb. As you can see in fig. 50, displaying the product so it can be viewed by walking around the entire display. I developed a floor plan to show exactly how I would like to present the work at final reviews on June 4<sup>th</sup>, see fig 51.

Marketing the work will require making a video on how the product functions in full, tags attached to the product that explain the importance of why the product works the way it does and a website thanking all of the individuals that helped me develop this product along the way.



Figure 51 - Example of how Carly would like to set up her final display

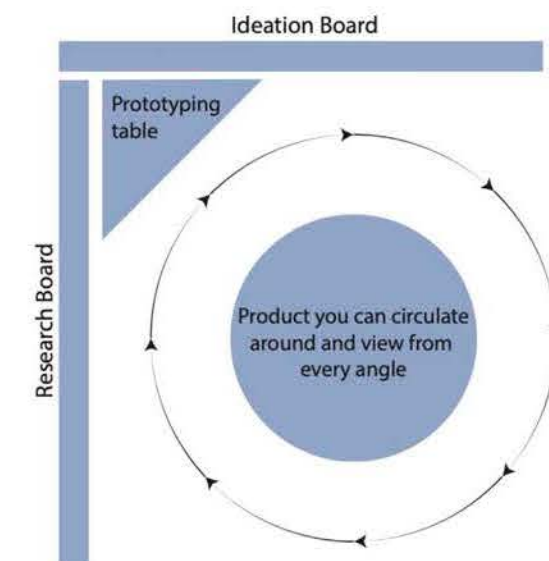


Figure 50 - Floor plan of final display

Plan & Dates	Prototyping	Validation	Presentation
<b>FINAL PLAN</b>			
<b>Spring Break</b>	Work on mobility in apparel pieces  Start prototyping pack components	In prototyping validate mobility in design	Refine sketches for final presentation in June – Have set direction
<b>Week 1 // March 29-April 5</b>	Prototype apparel pieces  Prototype pack pieces	Document prototyping process	Document prototyping process
<b>Week 2 // April 5 – April 12</b>	Start developing CAD pieces for Pack  Any other CAD pieces for apparel  Continue prototyping apparel and pack pieces	Document prototyping process	Document prototyping process
<b>Week 3 // April 12 – April 19</b>	Finish final direction for apparel and pack pieces  Start on final direction – final	Document prototyping process	Document prototyping process

	materials, final CAD pieces by April 19		
<b>Week 4 // April 19 – April 26</b>	Final direction – refine anything needed for the final product  continue making final apparel pieces and pack pieces	Document prototyping process	Document prototyping process  Start Presentation for final June 4 <sup>th</sup> - Maybe a little early, but figure out what you want to say to apply to website
<b>Week 5 // April 26 – May 3</b>	Final Direction // Final apparel pieces and pack pieces		Set up website  Design hang tags (print examples)
<b>Week 6 // May 3 – May 10</b>	Final Direction // Final Apparel and pack pieces	Start testing apparel and pack pieces	Continued from last week
<b>Week 7 // May 10 – May 17</b>	Wanted Design, NY	When not in NY, use additional days as buffer to create video for product	Gathering supplies for curation of product

<b>Week 8 // May 17 – May 24</b>	Start working on Final Presentation	Test product this week – create video	Gathering supplies for curation of product
<b>Week 9 // May 24 – May 31</b>	This week should be used as a buffer for any left-over pieces I may need to remake, refine or continue	Finish Video this week	Continued from last week  Finalize everything you need for finals on June 4 <sup>th</sup>
<b>Week 10 // FINALS WEEK</b>	Everything should be accomplished by June 1 <sup>st</sup>	Buffer days	

**Summary of work-from-home:**

Although this time was challenging, we came out on top with product we can be proud of. The day after mid-terms I lost two of my uncles, which then made at-home-work 10x harder than it had been originally. But I’m proud of finishing everything and coming out with decent (domestic machine made) product. The emotional rollercoaster of trying to pull yourself out of bed in the morning to spend yet another day, by yourself, making product that may or may not ever be seen in person. I will say, presenting this year and having panelist reviewing product that are actually in industry, was so incredible. Provides so many more opportunities for us to connect with industry professionals and get our names out in the industry!

**Bibliography:**

Beaton: Shame on faux Everest climbers. (2019). Retrieved from <https://www.aspentimes.com/search/11522264-113/everest-sherpa-westerners-western>.

Arnette, A. (2019, December 9). 2019/20 Winter Himalaya Climbs: K2, Broad Peak, Gasherbrum I/II. Retrieved from <http://www.alanarnette.com/blog/2019/12/09/2019-20-winter-himalaya-climbs-k2-broad-peak-gasherbrum-i-ii/>.

Sohn, E. (2017, May 28). The Science Behind The Super Abilities Of Sherpas. Retrieved from <https://www.npr.org/sections/goatsandsoda/2017/05/28/530204187/the-science-behind-the-super-abilities-of-sherpas>.

Sohn, E. (2017, March 12). How Does A Nepalese Porter Carry So Much Weight? Retrieved from <https://www.npr.org/sections/goatsandsoda/2017/03/12/517923490/how-does-a-nepalese-sherpa-carry-so-much-weight>.

Windridge, M. (2019, May 23). How Much Rubbish Is REALLY On Everest? And What Are We Doing About It? Retrieved from <https://www.forbes.com/sites/melaniewindridge/2019/05/20/how-much-rubbish-is-really-on-everest-and-what-are-we-doing-about-it/#6fc4c61934f6>.

The Climate of Mount Everest. (n.d.). Retrieved from <https://www.topchinatravel.com/mount-everest/the-climate-of-mount-everest.htm>.

Fellow climbers. (n.d.). Retrieved from <https://www.mounteverest.net/expguide/fellow.htm>.

Bell, T. (2015, April 16). Crushing normality on Everest. Retrieved from <https://www.aljazeera.com/indepth/opinion/2015/04/crushing-normality-everest-150415085628141.html>.

Bishop, B. (2019, July 10). How to Solve Everest's Feces Problem. Retrieved from <https://www.outsideonline.com/1965696/peak-poop-feces-problem-everest-needs-solution>.

Cleaning Up Mount Everest. (n.d.). Retrieved from <https://www.summitclimb.com/news/archive/cleaning-up-mount-everest-news-2013/>

MEF, Everest Expedition, Well Organized Professional Climb, Trek, Trekking Peaks, Everest, Nepal, Tibet, China, Himalaya, inexpensive, cheap, low budget, affordable, mountain climbing 2019, 2020 and 2021. (n.d.). Retrieved from <https://www.summitclimb.com/>

Rodgers, G. (2019, May 6). Fun Facts About Mount Everest. Retrieved from <https://www.tripsavvy.com/mount-everest-facts-1458258>.

Beaumont, P. (2019, August 14). Nepal sets new rules for Everest climbers after deadly season. Retrieved from <https://www.theguardian.com/world/2019/aug/14/nepal-sets-new-rules-for-everest-climbers-after-deadly-season>.

Apa Sherpa (2019, December 14). Interview with Apa Sherpa via email

Foreman, B. (2017, July 12). The Sherpa cheat sheet: 9 things to know. Retrieved from <https://www.cnn.com/travel/article/sherpa-facts/index.html>.

Gumbel, B. (2018, September 11). Retrieved December 16, 2019, from [https://www.youtube.com/watch?v=tcmH0\\_c7aw](https://www.youtube.com/watch?v=tcmH0_c7aw).

Bastien, G. J., Willems, P. A., Schepens, B., & Heglund, N. C. (2016). The mechanics of head-supported load carriage by Nepalese porters. *The Journal of Experimental Biology*, 219(22), 3626–3634. doi: 10.1242/jeb.143875

Huey, A. (2015, March 23). Unsung Heroes of Everest / Nat Geo Live  
Retrieved from: <https://www.youtube.com/watch?v=iHmfkdEcDyk&t=545s>

Avila, G. (2016, May 24). A lifelong enthusiast of Mt. Everest.  
Retrieved from: <https://www.quora.com/What-is-the-average-temperature-at-the-peak-of-Mount-Everest>

Calamur, K. (2014, April 22). Who Are Nepal's Sherpas? Retrieved from <https://www.npr.org/sections/parallels/2014/04/22/305954983/who-are-nepals-sherpas>.

Evans, J. (2019, May 15). Sherpa Climber Reaches Top of Mount Everest for Record 23rd Time. Retrieved from <https://learningenglish.voanews.com/a/sherpa-climber-reaches-top-of-mount-everest-for-record-23rd-time/4918550.html>.

Altitude, F. (2012, March 15). Everest Photo Gallery: The Wildest Dream -- National Geographic. Retrieved from <https://www.nationalgeographic.com/adventure/features/everest/1924-everest-gear/>.

Bisceglia, P. (2013, May 22). Sixty Years Ago, Edmund Hillary Reached the Top of the World. Hear Him Describe It. Retrieved from <https://www.smithsonianmag.com/smithsonian-institution/sixty-years-ago-edmund-hillary-reached-the-top-of-the-world-hear-him-describe-it-76861267/>.

Niswonger, M. (2013, Feb 11). Fiftieth Anniversary of Americans on Everest Retrieved from: <https://adventuresportsjournal.com/fiftieth-anniversary-of-americans-on-everest/>

Ghosh, P., & Sengupta, R. (2015, May 15). The first Indians on Everest. Retrieved from <https://www.livemint.com/Leisure/ZDIwIHEyFLl1y3lVvqtQ5J/The-first-Indians-on-Everest.html>.

Gambino, M. (2008, March 1). Conquering Everest. Retrieved from <https://www.smithsonianmag.com/history/conquering-everest-22118304/>.

Cranley, E. (2019, May 29). THEN AND NOW: Photos show how climbing Mount Everest has morphed into a big, dangerous business in 6 decades. Retrieved from <https://www.insider.com/mount-everest-history-in-photos-2019-5>.

Freire, O. (n.d.). Mount Everest. Retrieved from <http://www.mountainmadness.com/adventures/expeditions/asia/nepal/everest#trip-overview/description>.

Nuwer, R. (2015, October 9). Death in the clouds: The problem with Everest's 200 bodies. Retrieved from <https://www.bbc.com/future/article/20151008-the-graveyard-in-the-clouds-everests-200-dead-bodies>.

Groh, Z. M., & Laskorski, V. P. (2017, October 10). US6329051B1 Patent for PrimaLoft Inc. . Retrieved from <https://patents.google.com/?assignee=primaloft@&oq=primaloft@>.

Swenson, K. (2019, June 6). Mount Everest is full of garbage. A cleanup crew just hauled off 24,000 pounds of waste. Retrieved from <https://www.washingtonpost.com/nation/2019/06/06/mount-everest-garbage-pounds-waste-human-bodies/>.

Harris, G. (2015, April 25). Everest Climbers Are Killed as Nepal Quake Sets Off Avalanche. Retrieved from <https://www.nytimes.com/2015/04/26/world/asia/everest-climbers-killed-as-nepal-quake-sets-off-avalanche.html>.

Sth, R. (2019, December 10) Interview with Raj Sth via social media; Instagram @letscleanupnepal

World maps (2019, December 10) Free maps of Mt. Everest Retrieved from: <https://www.freeworldmaps.net/mountains/mteverest/>

Picheta, R. (2019, May 2). Tons of trash removed from Everest as cleanup unearths bodies. Retrieved from <https://www.cnn.com/2019/05/02/asia/mount-everest-trash-cleanup-scli-intl/index.html>.

*"डोको बुनेर आत्मनिर्भर". karobardaily.com (in Nepali). 28 June 2018. Retrieved 13 May 2019.*

Stouhi, D. (2018, August 12). What is Deconstructivism? Retrieved from <https://www.archdaily.com/899645/what-is-deconstructivism>

Perez, A. (2010, July 5). Gehry Residence / Gehry Partners. Retrieved from [https://www.archdaily.com/67321/gehry-residence-frank-gehry?ad\\_source=search&ad\\_medium=search\\_result\\_all](https://www.archdaily.com/67321/gehry-residence-frank-gehry?ad_source=search&ad_medium=search_result_all)

Hadley, D. (2019, June 22). Habits and Traits of Jumping Spiders. Retrieved from <https://www.thoughtco.com/jumping-spiders-family-salticidae-1968562>

**Winter Term 2020**  
**HW1-4**

Carly C. Anderson  
Process Book

# The Overlooked Heroes of Everest

“Clothing the Portable Environment”

Equipment and apparel that will assist in bringing waste off Mount Everest

Carly C. Anderson

University of Oregon  
Winter 2020  
Thesis Research

# History

## 1953

Sir Edmund Hillary and Sherpa Tenzing Norgay were the first people to summit Everest in 1953. Since then, mountaineers and adventurers have been following their footsteps up the 8,850-meter peak straddling the border of Nepal and Tibet.



# Mount Everest Elevation

Everest presents incredible physiological altitude sickness, weather, and wind, as well as significant hazards from avalanches and the Khumbu icefall (located just above Base Camp at 17,000ft). The terrain of Everest, itself, holds many dangerous climbing points. There are 3 total camps to help you acclimate to the elevation. It takes a total of 6 – 9 weeks to get to summit Everest.



# Physiological Demands

The Sherpas and other ethnic groups have lived on the high plateau of the Himalayas at an average of more than 14,700 feet going back at least 6,000 years (Sohn, 2017). An American study in 1976 concluded that Sherpas had undergone genetic adaptations after living in one of the world's highest regions for thousands of years (Foreman, 2017).



# Pollution

As the issue of trash and human waste is accelerating each year, I would like to create equipment and apparel that can work hand-in-hand to assist in the Everest clean-up initiative. The impact the garbage and human waste leaves is detrimental to surrounding communities. It affects the entire water table and drinking system as it pollutes the ice and glacier runoff that feeds rivers and lakes that are used for drinking water.



# Environmental Factors



High Elevation

Altitude sickness  
Oxygen deprivation  
Below zero temp



Tourism in Nepal

Over crowded Mountain



More permits acquired

As popularity in climbing Everest grows, so does the waste along with it



Everest Death zone

Rarely does one summit Everest

# Rolls as a Sherpa Guide



Set all courses before client moves through



Carries all your supplemental gear



Your personal mountain chef



Keeps you alive

# Field Research



Athlete insight

Meet local Sherpa and talk experience and gear



Gear in Nepal

How does it work? Where does it come from? Who uses it?



Sherpa communities

Trek to villages where Sherpa live. Meet and talk to as many people as I can.



What works and what doesn't.

Journal, document, everything and anything experienced.

# Travel Plan



Kathmandu, Nepal & Sagarmatha National Park  
January 7th - 21st

Participate in a trek - experience Sherpa communities. Talk to as many people as possible on the trek. When in Kathmandu, reach out to local Sherpa who have climbed Mount Everest. See if they'd be willing to talk about their experience and show the gear they use on the mountain. List of questions, etc.



# **HW3 Update**

## **Trekking through the Himalayas**

**Carly C. Anderson**

University of Oregon  
Winter 2020  
Thesis Research

# Kathmandu, Nepal



Kathmandu

Nepal is geographically diverse. From the Himalayas to the plains, tourism in this country is the main economic driver



Thamel Streets

The streets in Kathmandu are full of shops that run purely on tourism. Gifts, gear and food.



Religious Beliefs

Hinduism. Red is a very important color - persons who are charitable, brave & protective



Temples

Located all around Kathmandu, small to large temples are around every corner

# Trekking through the Himalayas



Off season is the month of January through March. As I traveled to Lukla, I managed to dodge a lot of really awful weather and have a beautiful 9 day trek.

# Trekking through the Himalayas



Many of my discoveries happening through the first week of the trek happened while talking to my guide and observances happening along the way.

Many trekking guides don't ever use the hip straps because they block jacket pockets - trekking guides also have superstitions with red as well. Always have some sort of red on them at all times.

# Trekking through the Himalayas



Tenzing Norgay Sherpa is a big role model for a lot of guides and Sherpa

Namche Bazaar is where the majority of Sherpa's grew up and lived. Now it's become a tourist destination where many Sherpa families run and own gear shops and 'tea houses'

The background image shows a mountainous region in Nepal. In the foreground, a stone wall made of dark, irregular stones runs across the frame. To the left, a small stream flows over rocks. In the middle ground, there are several tall, thin evergreen trees. In the background, snow-capped mountains rise against a clear blue sky with some light clouds. The overall scene is bright and clear, suggesting a sunny day.

# **HW4 Update**

## **Outdoor Gear in Nepal**

**Carly C. Anderson**

University of Oregon  
Winter 2020  
Thesis Research

# Outdoor Gear Throughout the Trek



## Off-Season

Pictures were difficult to take - people would ask me to stop. All gear was counterfeit in local shops - with Juki Machines in the back ready to make more if needed.



## Local Shops

Local shops would have everything from underwear to down jackets ready for purchase at a small price. Currency exchange definitely benefits the tourist more-so than trying to

# Outdoor Gear Throughout the Trek



# Outdoor Gear Comparison



Off-Season



On-Season

# Museum at Everest Base Camp



The First Ascent

Sherpa community and culture is incredibly prevalent within the communities to EBC.



Monasteries

Every city you pass through on your trekking journey, you'd run into a monastery.



Edmund Hillary

Their display of Edmund Hillary was very...



Sherpa Village Life

Located all around Kathmandu, small to large temples are around every corner

# Interview with Dawa Pasang Sherpa



## Most Important Take-aways:

Sherpa's carry all of clients gear the majority of the time

Red is a significant color in their climbing beliefs - Always have some sort of red on the Sherpa climbers at all times.

The harness is one of the most important pieces of equipment within the climbing gear

Sherpa's always wear La Sportiva boots

A small fraction of what clients pay outfitters is paid towards Sherpa services (approx. 4,000 USD)

Mobility is incredibly important in all aspects: Hands, knees, shoulders, hips.

Hands and feet get the coldest

Oxygen is usually put into a backpack

**Winter Term 2020**  
**Midterm**

Carly C. Anderson  
Process Book

# The Overlooked Heroes of Everest

A person wearing a dark, quilted jacket and yellow-tipped boots is sitting on a rocky mountain peak. They are holding a small container and feeding a bird that is perched on their hand. Several other birds are flying in the air around them. The background shows a vast, mountainous landscape with snow and a bright sun low on the horizon, creating a dramatic, high-contrast scene.

“Clothing the Portable Environment”

A system of dress for Sherpa Mountain Guides that will assist in bringing waste off Mount Everest

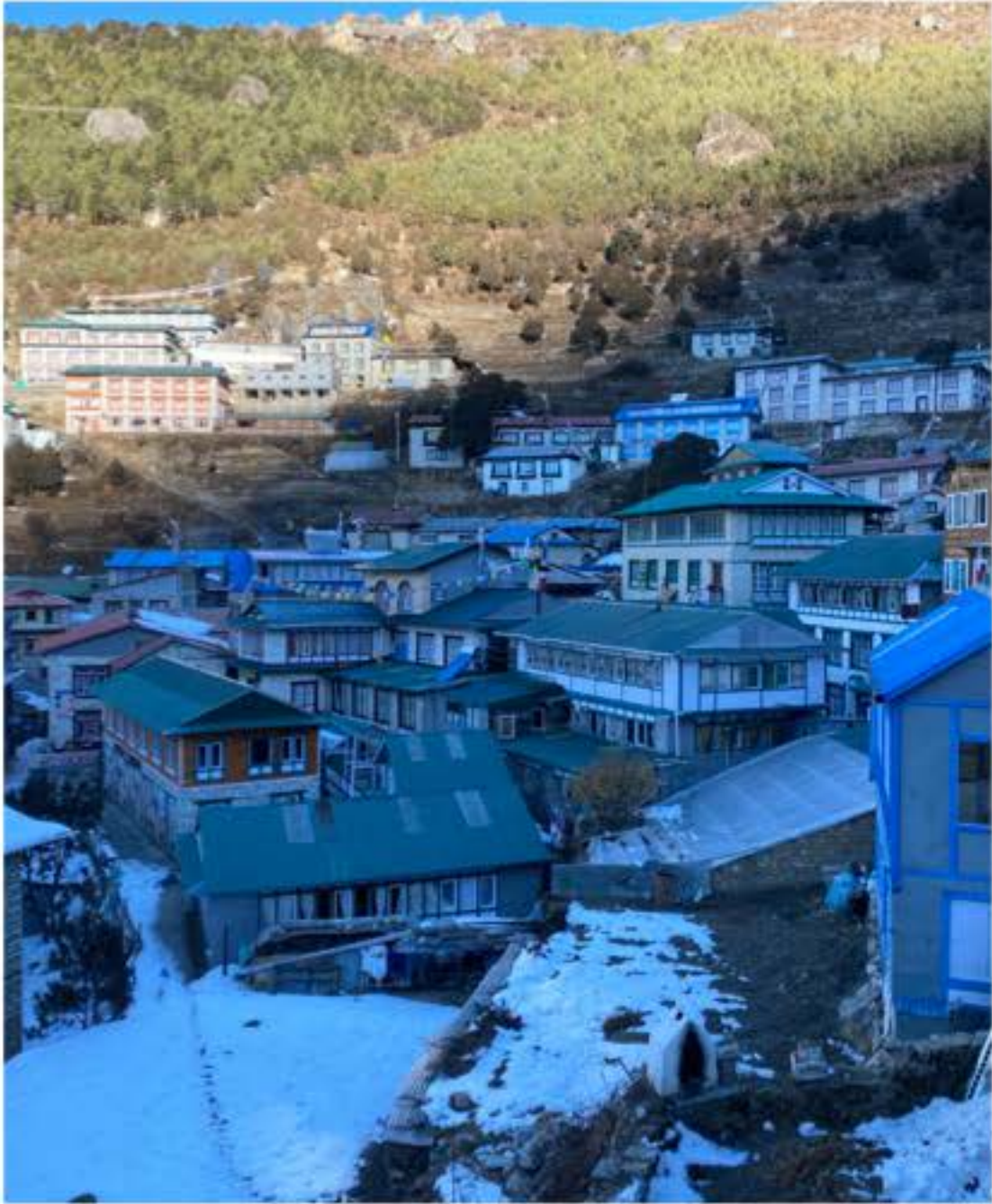
Carly C. Anderson  
University of Oregon  
Winter 2020

# My Experience **In Nepal**



## **Trekking**

Lukla to Tengboche



## **Sherpa Communities**

Namche Bazaar and Kumjung



## **Kathmandu**

Gear Located in Nepal



“We Climb For **Work**”

“We Climb For **Our Families**”

“We Climb Because We **Have To**”

**Sherpa Mountain Guides  
Reasons for Climbing**

## Pollution on **Mount Everest**



As more people ascent, more trash appears. The opportunity to develop and design a system for Sherpa Climbers to assist in bringing trash off the mountain presents a unique challenge in the outdoor industry

# Map of Mount Everest Climbing Route

And the trash along each camp



**Base Camp - 17,400ft**

5,000 lbs

**Camp 1 - 19,500ft**

12,000lbs

**Camp 2 - 21,350ft**

5,000lbs

**Camp 3 - 23,500ft**

2,000lbs

**Camp 4 - 26,000ft**

1,000lbs

**Summit - 29,035ft**

# Discarded on **Mount Everest**



## **Oxygen & Masks**

Sherpas carry their own gear and their clients gear. If they don't need a certain supply they leave it at Camp 1



## **Energy Snacks**

Providing energy for the climb is essential. To eliminate weight, a lot of the times garbage is discarded on the mountain



## **Human Waste**

As this is a normal human occurrence, this adds an extremely complicated weight issue to a person

# The Characterization of **Climbers on Everest**



**Trekking Porter**  
**50% of What a Climbing Sherpa Makes**  
Carrying the heavy loads from Lukla to Basecamp



**Sherpa Mountain Guide**  
**\$1,000 - \$4,000 USD**  
Carrying clients gear, food and supplies for a successful climb



**Town's Porter**  
**Local Pay (Not Outfitter Based)**  
Carrying food and supplies from town to town in trekking locations

# The **User**



## **Market Size - Male Sherpa Mountain Guides**

Sherpa Population: 120,000

Sherpa Mountain Guides: Approx. 4,000

20-50 Years Old

# The **Sport**



## **Climbing/Mountaineering**

Guiding Clients Up Mount Everest

# The **Environment**



High altitude : 28,700ft.

Lack of Oxygen : 12,000ft.

Below zero temperatures : 17,600ft.

## The **Why**



Aaron Huey Photography

There would be no Everest summit without a Sherpa mountain guide. They cook, they carry, they clean the mountain, a system that requires more than just an average bag and suit. A Sherpa system of dress that provides everything including bringing **additional** items off the mountain.

## The Economy **of Gear**



Many times Sherpa guides ask their guests or clients to bring clothing from their country for less expensive, branded gear. At the end of mountain trips, guests give climbing gear to their clients as a gift. The main source of climbing gear comes from gear being left behind.

# Sherpa Mountain Guides Current Dress

Gifted By Clients



## Full Body Warmth

The North Face  
Mountain Hardware



## Hand Protection

Black Diamond (thick)  
Outdoor Research (thin)



## Rucksack

55+ Liter Climbing Pack  
No Specific Brand

## Word of Mouth **Gold Standard**



Sherpa guides rely on word of mouth for what gear is best. Since there is no book on what you should and shouldn't use, they utilize their large community to communicate what gear is best

## The Importance of Ritual - Before the Climb



At the start of every expedition, guides do a puja ceremony with the entire expedition group at a monastery in a town located on the trek. This is for best possible success to the summit and good fortune.

## The Importance of Ritual - Color



The color red in Tibetan Buddhism symbolizes life force, preservation, and sacred things or places. Mount Everest specifically holds spiritual significance as a place to come closer to enlightenment. As a sign of respect, a lot of Sherpa climbers wear red or carry a piece of red

## The Current **Opportunity**



**Sherpa system of dress** will provides storage, hand protection and full body warmth to aid in bringing trash and human waste off the mountain

# Sherpa System **of Dress**



## **Clothing the Portable Environment**

This product will provide full body warmth, storage to take items up and expand to bring extra items down, and provide hand warmth. This system will require unique pocketing, mobility, warmth and the ability to expand

## **Season**

S/S 2024

## **Price**

Retail : \$800.00

FOB : \$200.00

## **Consumer**

Male Sherpa Mountain Guides

## **Environment**

Sub Zero Temperatures

Low Oxygen

# Outdoor Gear in Nepal



## **Shops on Thamel**

All the shops on thames had gear available at a fraction of normal pricing

## **Fake Gear**

Promised Down  
Given Poly-fill

## **Misleading Logos**

Many logo's stitched on to fake gear

# Manufacturing Opportunity in Nepal



### Available Space

So much space is used for selling gear, why not transform it to make gear



### Tourist & Sherpa Gear

Tourists and Sherpa guides would see fit to buy gear if it was reliable and locally made



### Nepal Gains It's Own Economy

There would no longer be a need to falsely make gear locally

## Athlete **Insight**



### **Dawa Pasang Sherpa**

“Sherpa carry everything for their clients. Their gear, their oxygen, their food. We make sure they have the climbing experience they pay for.”



### **Arun Karaki**

“As mountain guides, we want to make sure our clients have the best climbing experience. A lot of us still enjoying climbing as a career.”

# Proof of **Mentorship Team**



Waiting for a response from Dorothy at Columbia Sportswear



**Arun Karaki**

Nepalgram Owner  
Professional Trekking Guide



**Dawa Pasang Sherpa**

Sherpa Mountain Guide  
2x Everest Summit

# Calendar - Moving Forward : Next 5 Weeks

February - March 2020

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
2 Refine Midterm	3 Refine Midterm	4 Refine Midterm	5 Midterm Presentation 4:30	6 Midterm Revisions - Make Chart - Make Design Intentions Clear	7 Mood Board Materials/Color/Trends	8 Mood Board Materials/Color/Trends
9 Ideation/Modify 10 Paper Models	10 Ideation 5 Sketches 5 Paper Models	11 Ideation/Modify 10 Sketches (Item)	12 Ideation 10 Sketches (Item)	13 Ideation/Modify 10 Sketches (Item)	14 Ideation 10 Sketches (Item)	15 Ideation/Modify 10 Sketches (Item)
16 Ideation 10 Sketches (Item)	17 Important Cultural Needs Do your sketches reflect this?	18 Important Cultural Needs Does your ideation reflect this?	19 Start Mockup of Muslin Prototype Patterning	20 Patterning	21 Patterning	22 Patterning
23 Proto 1 (Muslin Prototype)	24 Proto 1 (50% Muslin Prototype Due)	25 Proto 1	26 Proto 1 (75% Muslin Prototype Due)	27 Proto 1 Finish first prototype For Monday March 2nd	28 Proto 1 Finish first prototype For Monday March 2nd	29 Proto 1 Finish first prototype For Monday March 2nd
MAR/1 Proto 1 Finish first prototype For Monday March 2nd	2 100% Proto 1 Due	3 Review with Dawa and Arun Revisions	4 Proto 2 Revisions Pattern making Final Presentation	5 Proto 2 Pattern Making Revisions Final Presentation	6 Proto 2 Pattern Making Revisions Final Presentation	7 Proto 2 Pattern Making Revisions Final Presentation
8 Proto 2 Revisions Pattern Making Final Presentation	9 Proto 1 & 2 Complete Revisions documented Final Presentation Ready	10 Prep for final presentation Use this day to get anything left over done	11 Finals	12	13	14

# Architectural **Background**



## **B.S. in Architecture**

Undergraduate degree in Architecture  
Design build project in Happy Valley, Oregon

# Professional **Aspirations**



## **PNW**

Where ever the Mountains are, I want to be  
Working in the outdoor industry

# How this Benefits **My Professional Aspirations**



## **The Outdoors**

My personal goal is to be a creator that lives for the outdoors. I want to create product that supports Sustainability and Active outdoor lifestyles



## **Developing Intersectional Ideas**

Proving that I can be an innovator and designer that has Passion for the outdoors and there is room for product Development for underserved outdoor communities

# Thank **You!**



Sherpa Mountain Guides from 1990 - 2018  
An Aaron Huey Photo Collage

**Winter Term 2020**  
**Final**

Carly C. Anderson  
Process Book

# The Overlooked Heroes of Everest

## Makalu Sherpa Gear Collection

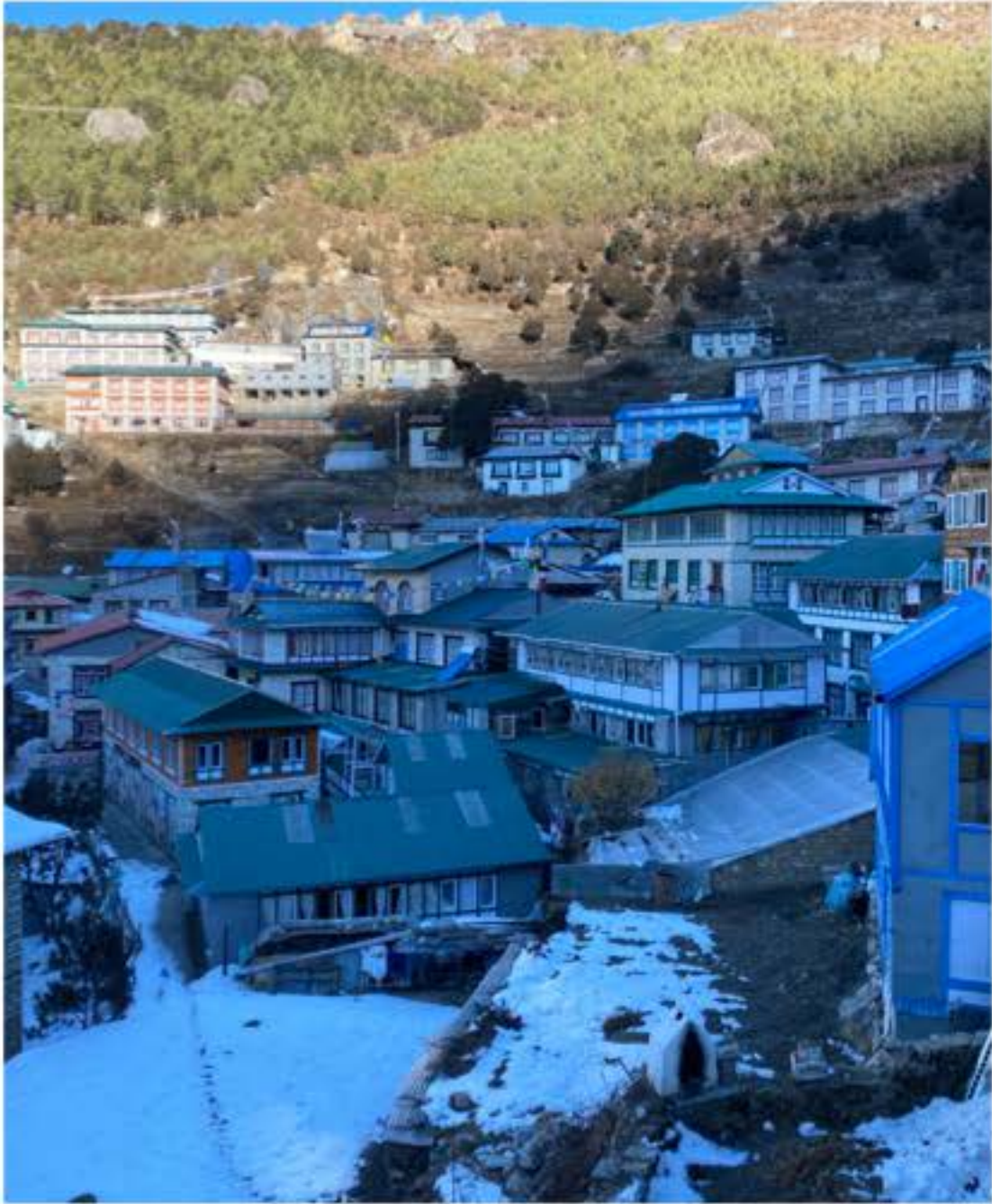
A collection focused on apparel and equipment for Sherpa Mountain Guides participating in the Mount Everest Clean-up Efforts

Carly C. Anderson  
University of Oregon  
MS Sports Product Design  
Winter 2020

# My Experience **In Nepal**



**Trekking**  
Lukla to Tengboche



**Sherpa Communities**  
Namche Bazaar and Kumjung



**Kathmandu**  
Gear Located in Nepal

# Project **Overview**



## **User**

Sherpa Mountain Guides  
20-50 Years Old



## **Sport**

Everest Mountain Climbing  
Trash and Waste Clean-Up



## **Environment**

Mountainous Terrain  
Elevation to 28,000ft

## **Challenge:** Pollution on Mount Everest



As more people ascent, more trash appears. The opportunity to develop and design a system for Sherpa Climbers to assist in bringing trash off the mountain presents a unique challenge in the outdoor industry

# Discarded on **Mount Everest**



## **Oxygen & Masks**

Sherpas carry their own gear and their clients gear. If they don't need a certain supply they leave it at Camp 1



## **Energy Snacks**

Providing energy for the climb is essential. To eliminate weight, a lot of the times garbage is discarded on the mountain



## **Human Waste**

As this is a normal human occurrence, this adds an extremely complicated weight issue to a person

## Athlete **Insight**



**Dawa Pasang Sherpa**

"Sherpa carry everything for their clients. Their gear, their oxygen, their food. We make sure they have the climbing experience they pay for."



**Arun Karaki**

"As mountain guides, we want to make sure our clients have the best climbing experience. A lot of us still enjoy climbing as a career."



**Gombu Sherpa**

"I've climbed Mount Everest two times over the past few years, trash gets worse as more people pay to climb."

## Problem **to Solve**



This year, Sherpa Mountain Climbers reached new heights for the cleanup - trekking up to 21,300ft to bring down waste in **trash bags**

## Problem **to Solve**



This provides an opportunity to develop a system specifically for Sherpas that will bring additional trash, human waste and oxygen canisters off the mountain.

# The Makalu **Collection**



The Makalu Collection is a system of dress including **a Jacket, Pant and Pack.**  
This will be designed specifically to the Everest clean-up efforts

# Issues with **Current Items**

Apparel and Equipment



## **Mobility**

Mobility is something Sherpa struggle with in their current apparel pieces

## **Storage Space**

Sherpa Mountain Guides don't have a specific pack designed to bring trash down

## **Sanitation**

There is not a pack specifically made for trash and human waste cleanup

## **Gear Access**

There is no access affordable, name brand gear in Nepal.

# Problems to Solve

Apparel Needs



## Versatile Storage

Easily accessible items that Sherpa Mountain Guides need immediately



## Mobility

Allow more movement climbing  
Mount Everest



## Thermoregulation

Pant and Jacket working together to keep  
Sherpa Mountain Guides warm on ascent

# Problems to Solve

## Equipment Needs



### Versatile Storage

Sherpa need space for carrying additional items off the mountain including trash, human waste and oxygen canisters



### Adjustability/Modularity

For the ease of don/doff of the pack, it should have the ability to remove pieces to adjust and expand where needed



### Sanitation

Having the pack modular creates an easier way of removing certain pieces and cleaning them



# MAKALU SHERPA GEAR

Equipment and Apparel to assist the Sherpa Mountain Guide in bringing trash off Mount Everest

# Makalu Jacket



## Goal

A Sherpa Mountain Guide specific jacket that is developed for mobility, storage, thermal regulation and don/doffing, specifically aiding in the trash clean up on Mount Everest

## Price

Retail: \$400.00 // FOB: \$80.00

Affordable to Sherpa Guides

## Season

Spring/Summer 2024

Locally Sourced & Manufactured

# Makalu **Pant**



**Goal**

A Sherpa Mountain Guide specific pant that is developed for mobility, storage, thermal regulation and don/doffing, specifically aiding in the trash clean up on Mount Everest

**Price**

Retail: \$450.00 // FOB: \$90.00

Affordable to Sherpa Guides

**Season**

Spring/Summer 2024

Locally Sourced & Manufactured

# Makalu Pack



## Goal

A Sherpa Mountain Guide specific pack that is developed for expandable storage, adjustability, sanitation and structure specifically aiding in the trash clean up on Mount Everest

## Price

Retail: \$250.00 // FOB: \$50.00

Affordable to Sherpa Guides

## Season

Spring/Summer 2024

Locally Sourced & Manufactured

# The Importance of Ritual - Color

Equipment and Apparel Needs



This was a key finding when traveling to Nepal - red representing life force and sacred places like Mount Everest



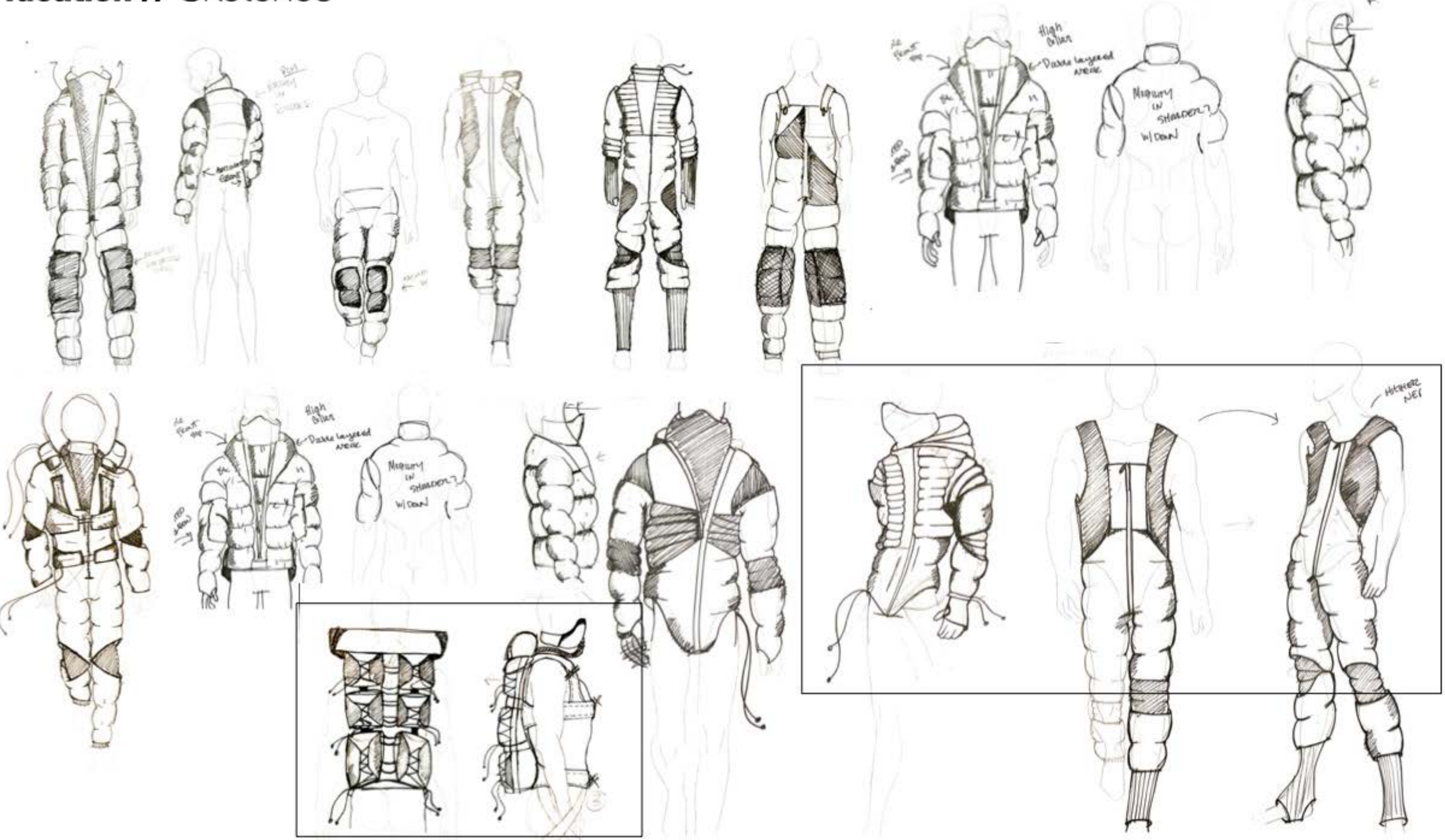
# Intersection **Architectural Deconstructivism**



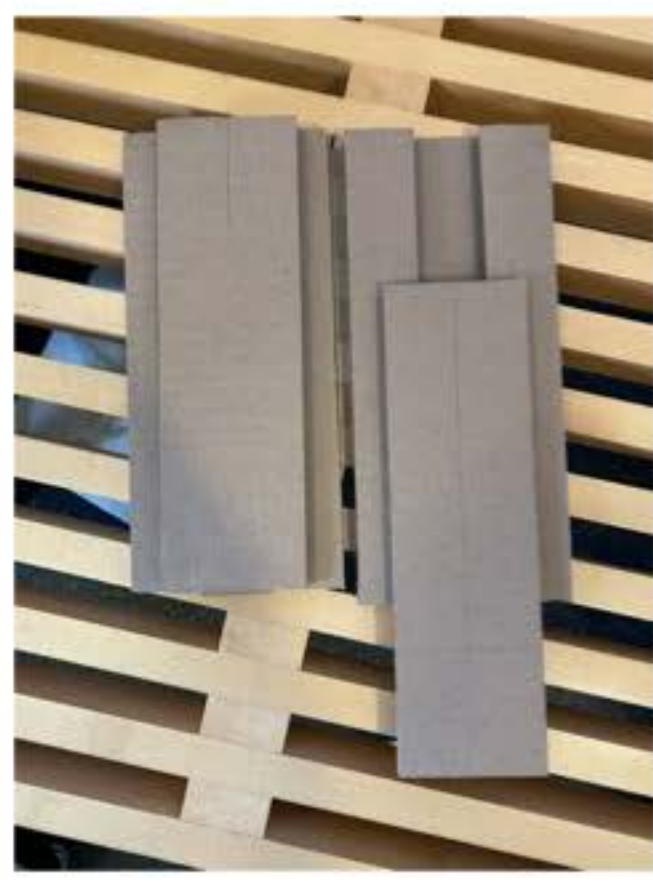
## **How this relates back to the Sherpa Culture, Community and Architecture**

Nature & Culture - described as corrupting and oppressive forces which have developed into a "statue of nature" in which humans exist in self-sufficient and peaceful isolation

# Ideation // Sketches



# Prototyping



## Next **Steps:**

- Final ideation for pant, jacket and pack
- Refine prototypes, nail down order of operation
- Makalu pack development
- Develop any 3D form needed for apparel and equipment
- Validate product with Sherpa Mountain Climbers

# Thank You!



Aaron Huey Photography

Sherpa Mountain Guides from 1990 - 2018  
An Aaron Huey Photo Collage

**Spring Term 2020**  
**Midterm**

Carly C. Anderson  
Process Book



# Makalu

Sherpa Gear Collection

Valiant. Adaptable. Resilient.

## **Problem Statement:** Pollution on Mount Everest



As more people ascent, more trash appears. The opportunity to develop and design a system for Sherpa Climbers to assist in bringing trash off the mountain presents a unique challenge in the outdoor industry

# Proof of Concept



The apparel and equipment within the Makalu Collection is developed specifically for Sherpa Climbers who are assisting in trash clean-up on Mount Everest. It provides a jacket and bib that allow mobility, versatile storage and thermoregulation; complemented by a pack with modular storage, expandability and easy sanitation

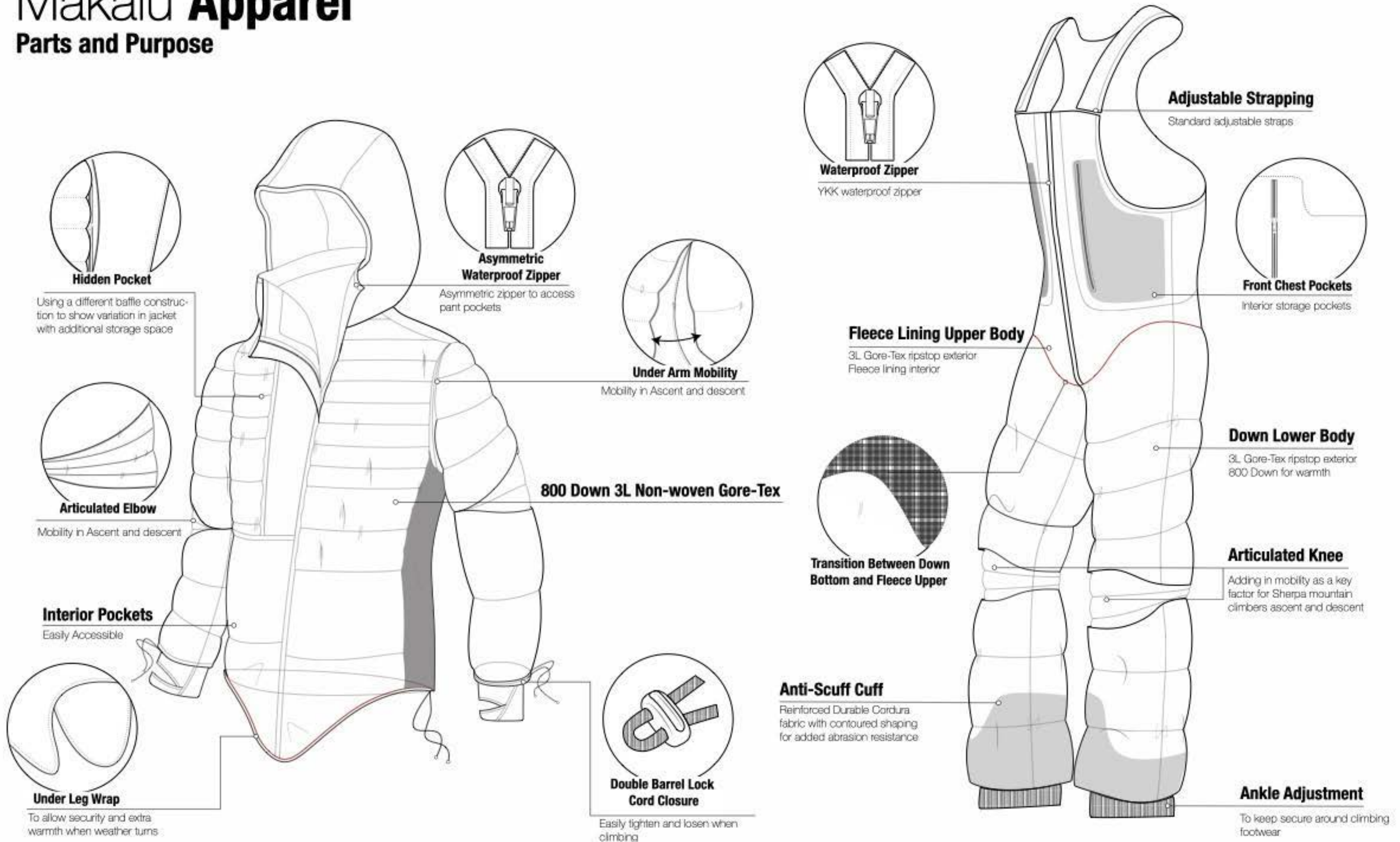
# Athlete Outcomes



This product will revolutionize what it means to sustainably pack out trash from the mountain. Eliminating single use trash bags and off-brand apparel and replacing it with high-quality gear that expands and performs when you need it to.

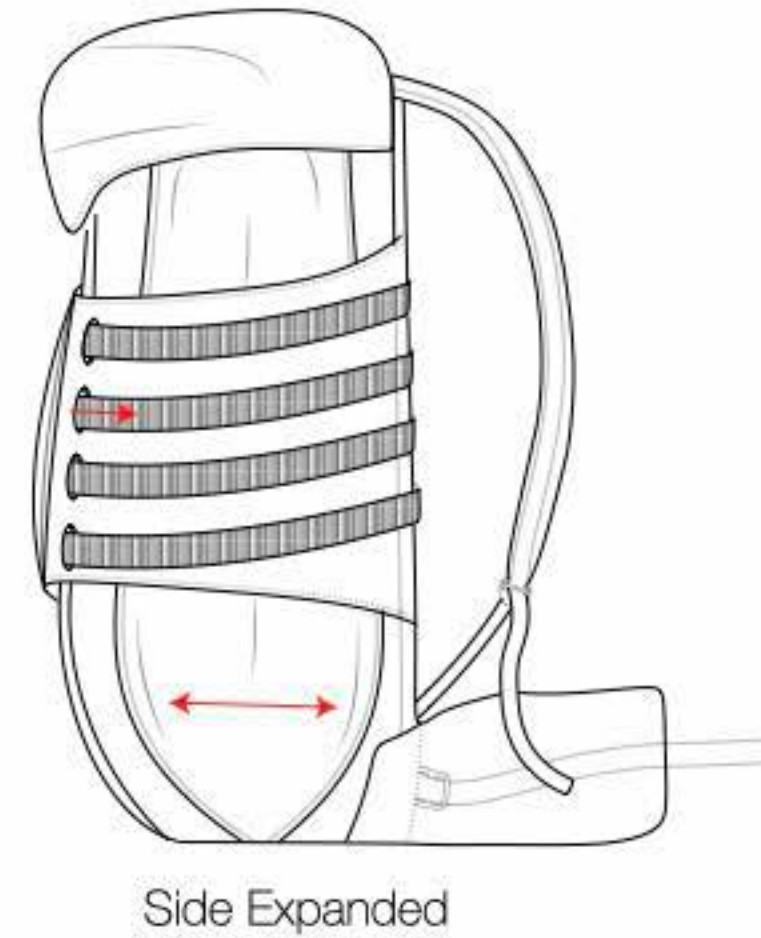
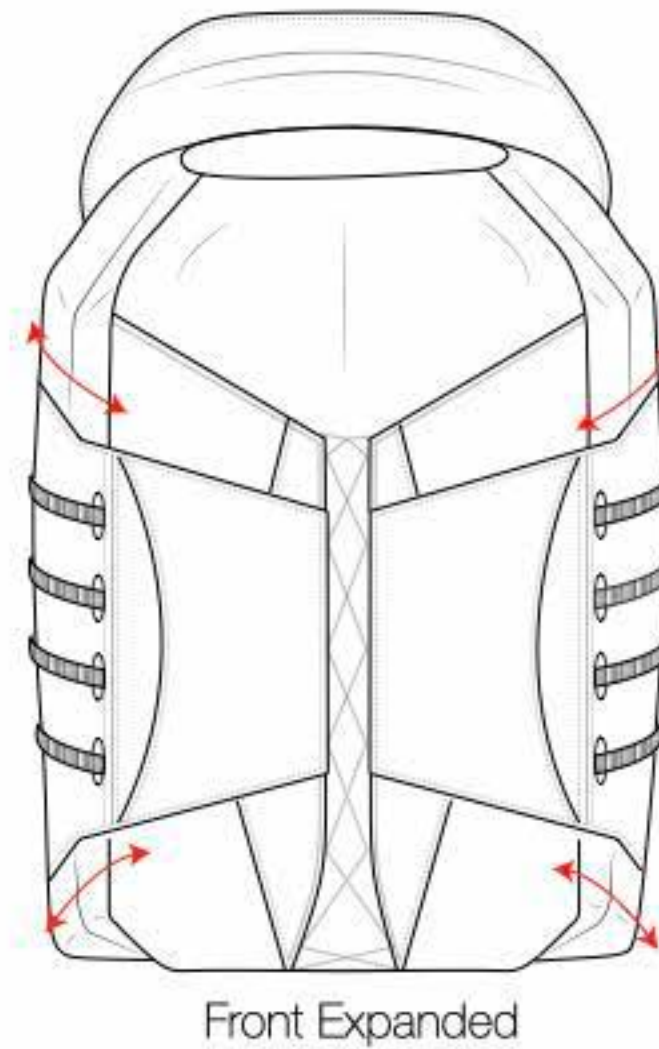
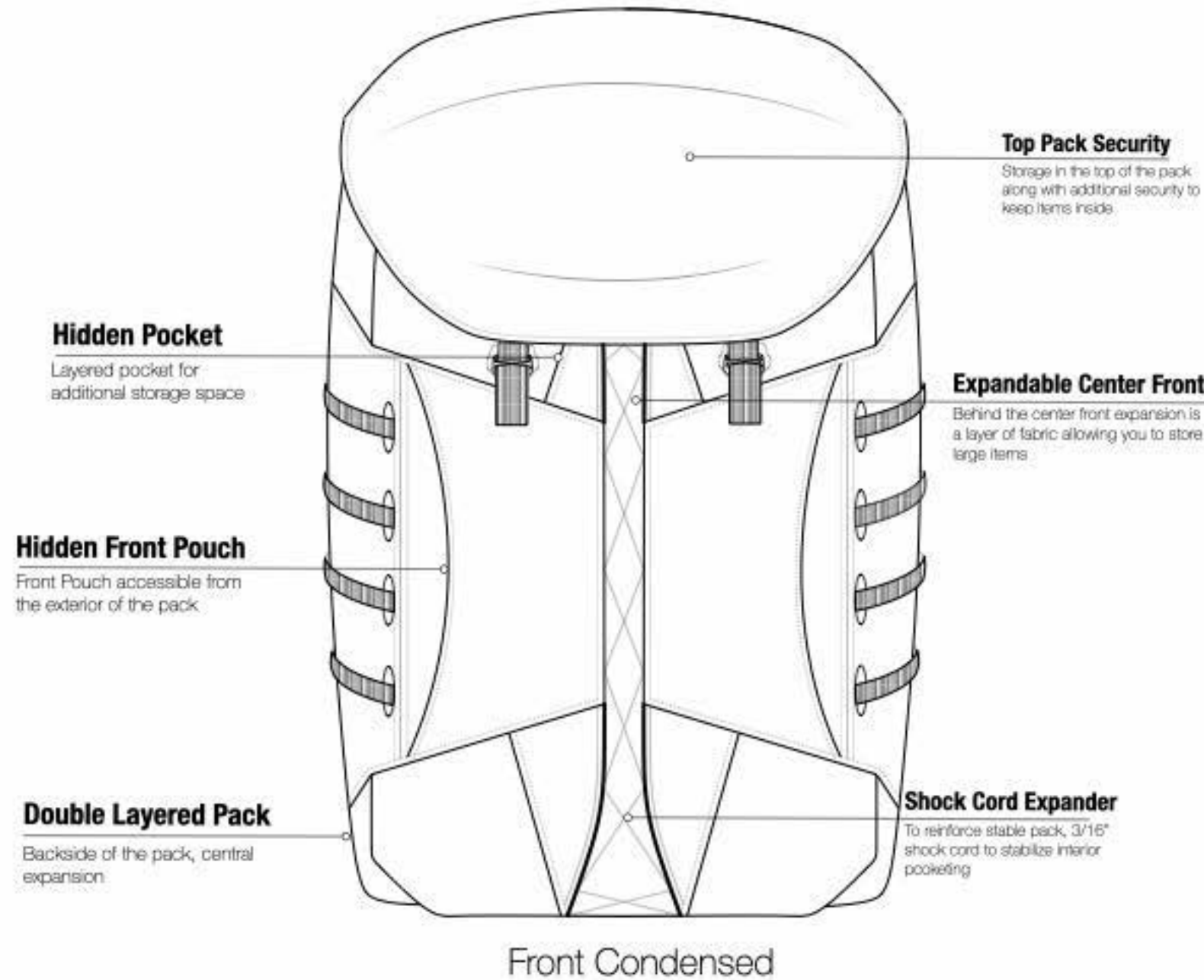
# Makalu Apparel

## Parts and Purpose



# Makalu Pack

## Parts and Purpose



# Prototype Video + **Current Progress**



Sewing together the Makalu Bib



Jacket Hidden Pockets



Prototyping the Makalu Pack



Articulated knee and back of bib detail

## Athlete **Feedback**

"It seems like some sort of venting should be included in the jacket and pant. Especially when so much energy being expended on the ascent"

---

"I'm mostly interested in the pack development. I really like how you're using origami to piece together complicated shapes and forms to create the geometry. You'll have to send me the final outcome when you get there"

---

"Materiality would be super important especially climbing in the cold climate."



**Rick Lee**

Climbing and trekking

## Athlete **Feedback**

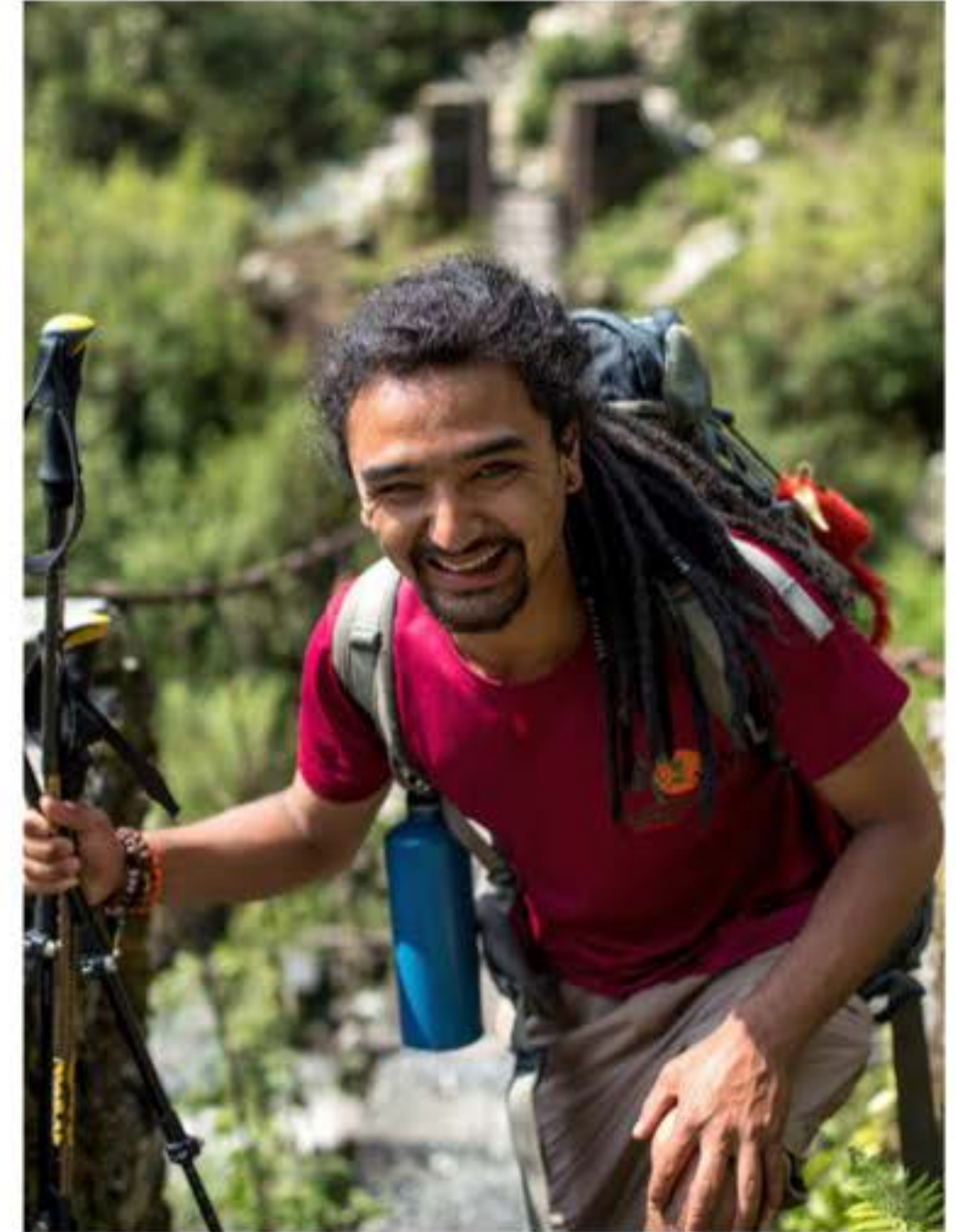
"on the pant you should make sure there is enough flexibility in-between legs for harness."

---

"I'm not sure you considered this, but putting pockets inside cloth might help keep people warmer"

---

"Using more pockets is a good idea, but make sure you airtight them."



**Arun Karaki**

Professional Mountaineer & Guide

# Validation + Prototyping Plan

## May

Week of May 4

- Midterms
- Final Bib Proto
- Final Jacket Proto
- Contact Athletes

Week of May 11

- Final Pack Proto
- Contact Athletes (if no response)
- Build website to display final work?

Week of May 18

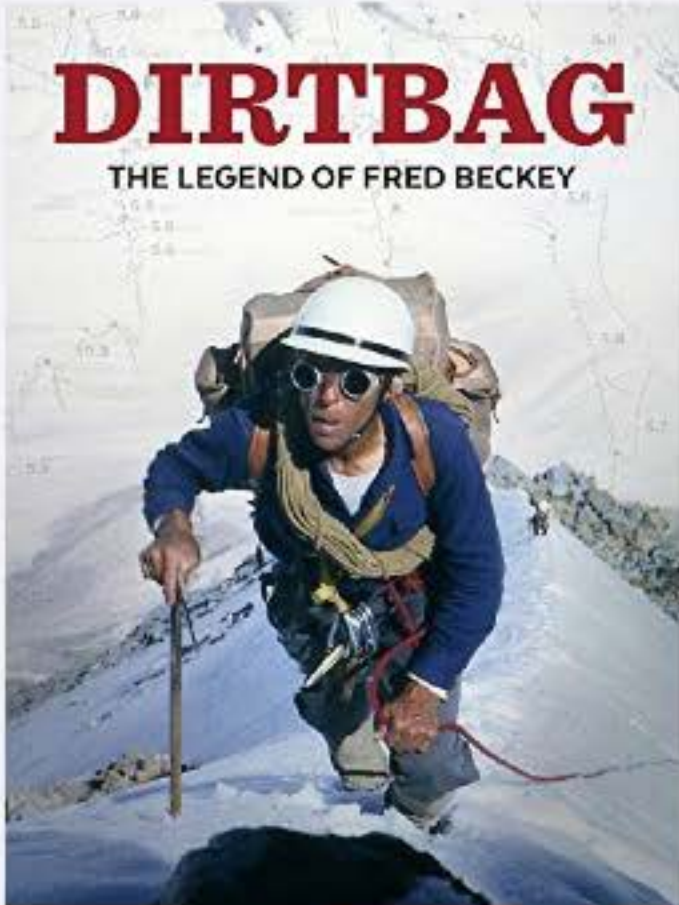
- Finalize hangtags and packaging iterations
- Final Validation via Facetime/Whatsapp with athletes
- Maybe find locals to analyze the product in person?

Week of May 25

- Use this last week as a buffer for anything that you may need to complete further
- Finalize presentation and athlete feedback

# Mood Board

## Mountain Inspiration



Main **Title**  
Subheading  
Body Text



# Mood Board

Aesthetic



## Inspiration

Asymmetry  
Added mobility  
Bright bold color

# Mood Board

## Materials



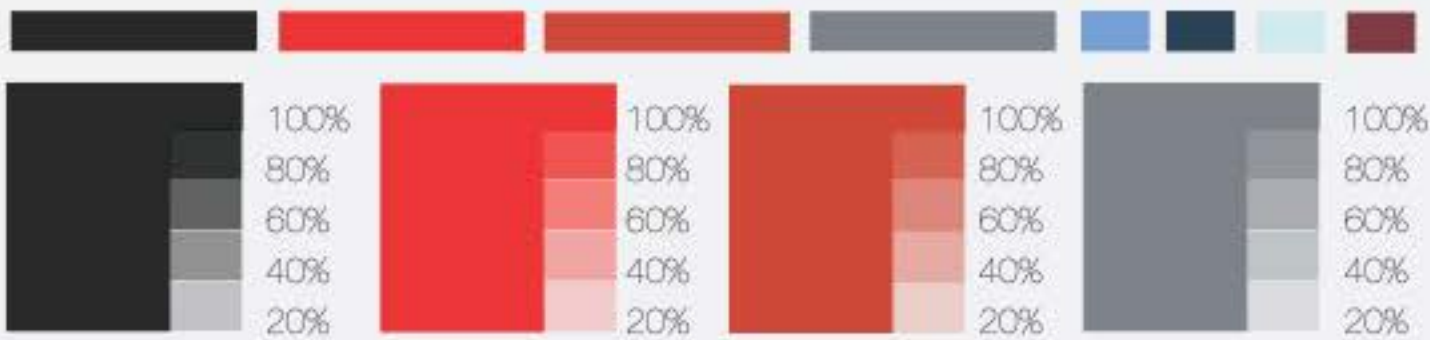
### Materials

- 1. 3L Blood-Orange DWR PU
- 2. 2L Black DWR PU
- 3. 500D Cordura®

# Color **Ways & Typeface**

## Color Palette

## Alternative



## Material Swatches

## Typography



Aa

Helvetica Neue  
UltraLight

ABCDEFGHIJKLMNOPQRSTUVWXYZ//abcdefghijklmnopqrstuvwxyz // 1  
234567890

Strength  
Fearless  
Bold

**Aa**

**Helvetica Neue  
Condensed Bold**

**ABCDEFGHIJKLMNOPQRSTUVWXYZ  
TUVWXYZ//abcdefghijkl  
mnopqrstuvwxyz //1234  
567890**

**Strength  
Fearless  
Bold**

Logo **Iterations**



Contextual **Examples**



# Packaging **Inspiration**

## **Tubular Pack Design**

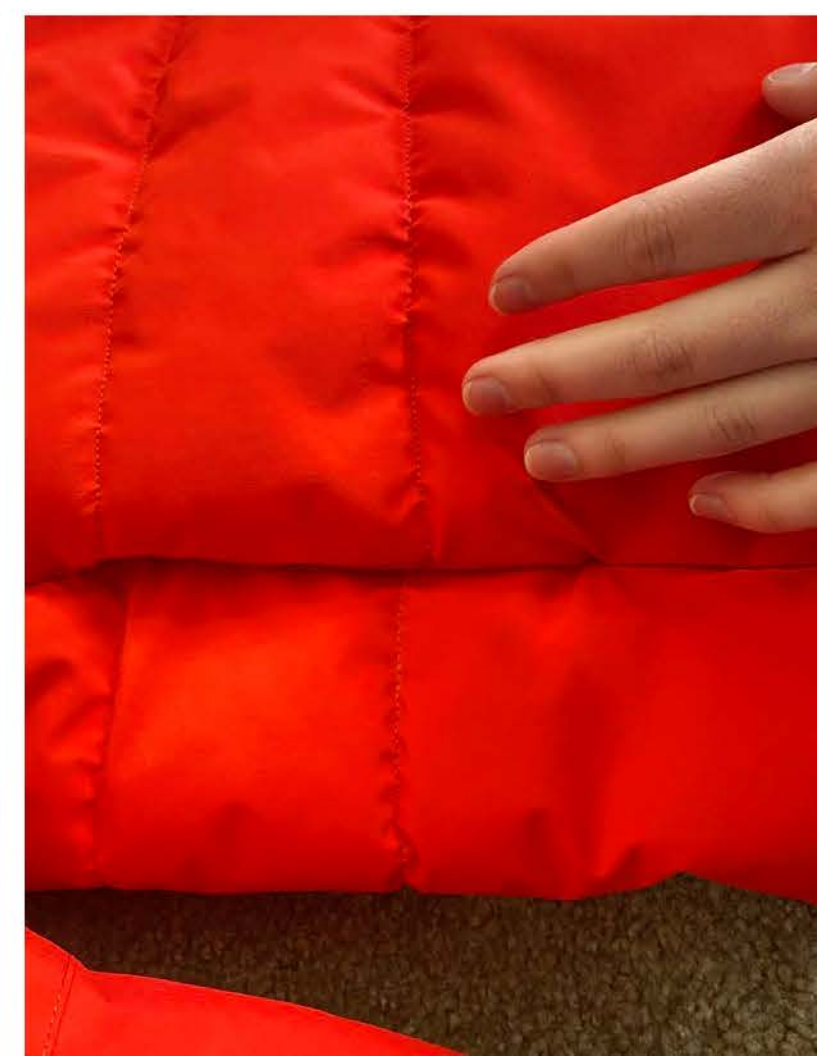
Easy storage for your Makalu Pack and Jacket

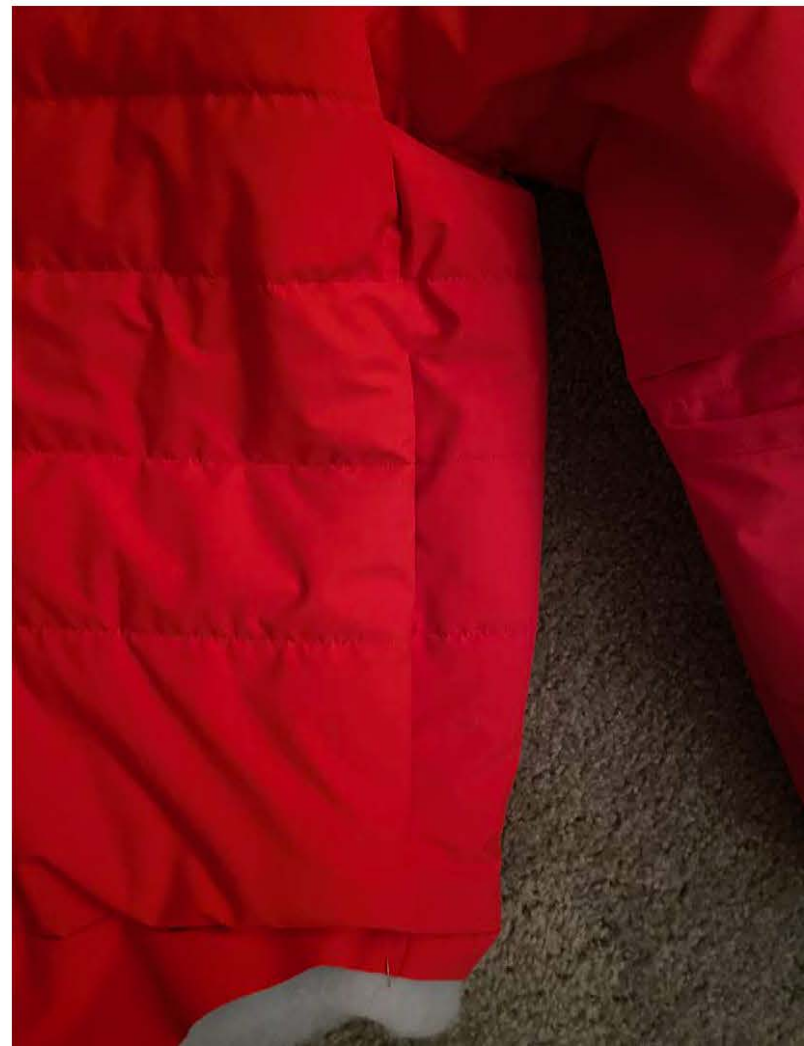
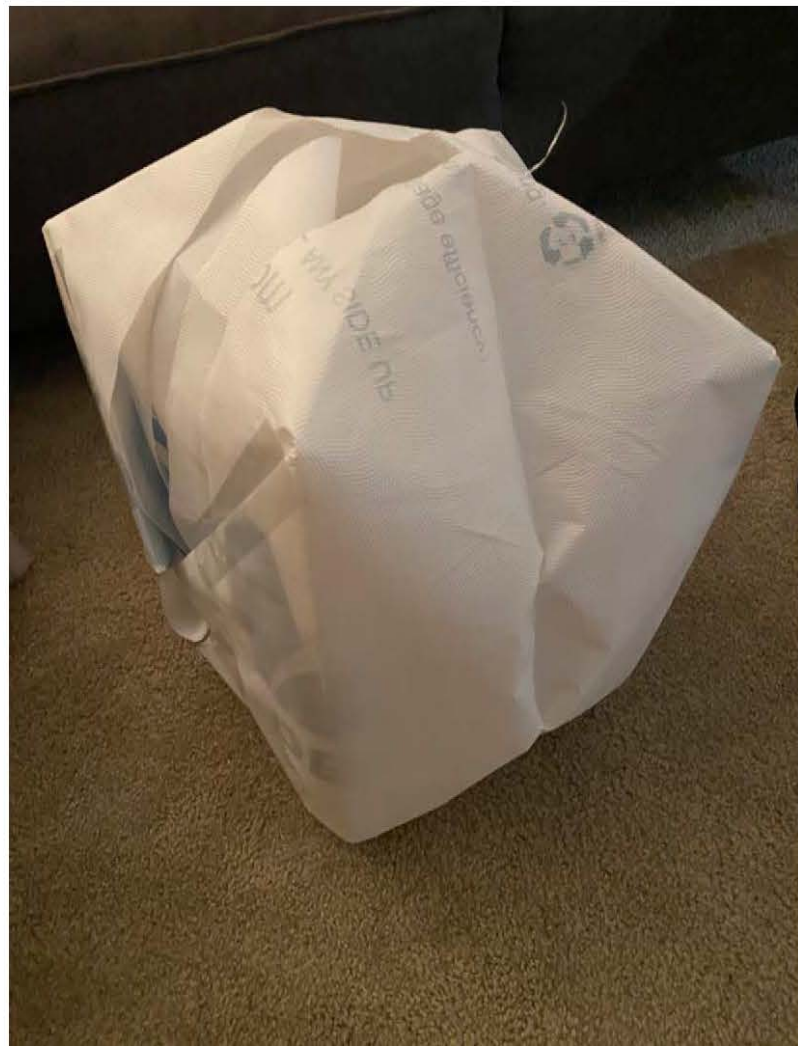
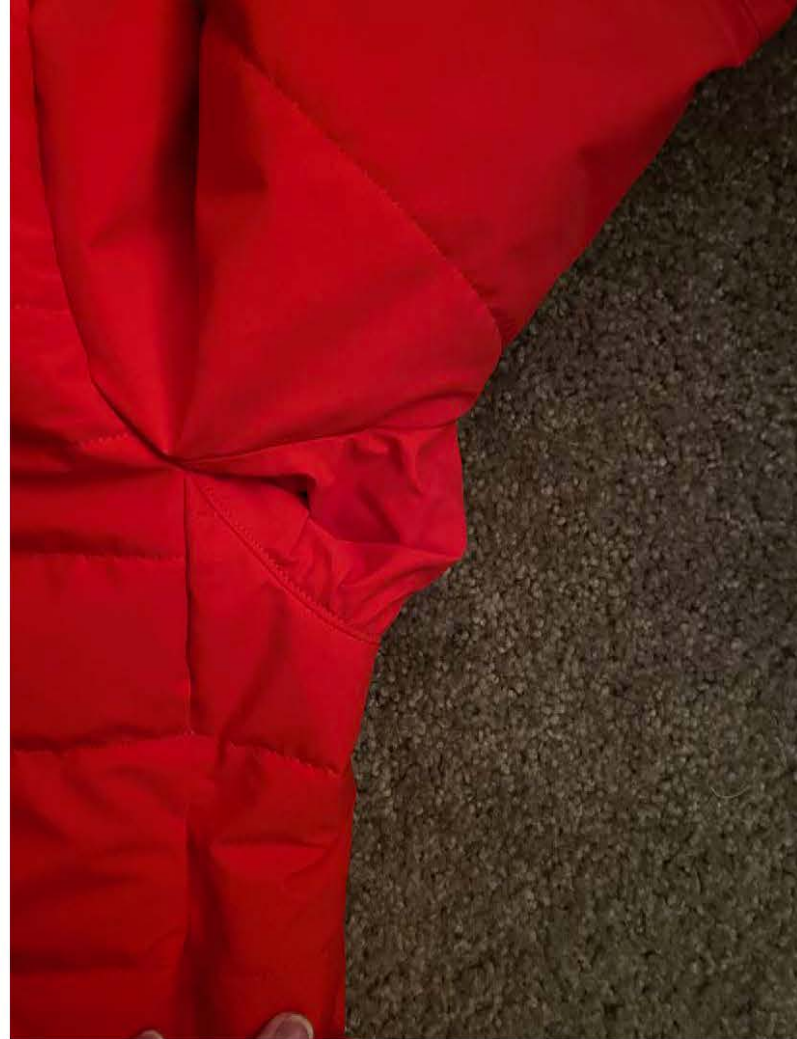


**20pt Recycled Kraft Board**  
Paper that's 100% post-consumer waste (PCW)  
uses about 75% less water in production



**Triangular Boxing**  
To stack your tubular storage pieces inside







**Spring Term 2020**  
**Final**

Carly C. Anderson  
Process Book



# Makalu

Sherpa Gear Collection

Valiant. Adaptable. Resilient.



## **Carly C. Anderson**

From Salt Lake City, Utah

I am an apparel and equipment designer, an outdoor enthusiast, and a lover of all adventure

I received my bachelors of science in architecture and a certificate in project management

My ultimate goal is to be working at a company designing apparel made for the outdoors!

A high-altitude mountain landscape. In the foreground, a village with colorful buildings (blue, green, red roofs) is nestled in a valley. The middle ground shows steep, rocky slopes with patches of snow. In the background, majestic snow-capped mountain peaks rise against a clear blue sky. The overall scene is a typical Himalayan mountain environment.


# Research In the Field

The majority of the research comes from speaking to journalists, Sherpa mountain guides, and first hand experience trekking through Sherpa communities in Nepal.



# The Issue on Mount Everest: **Pollution**

As more people ascent, more trash appears. The opportunity to develop and design a system for Sherpa Climbers to assist in bringing trash off the mountain presents a unique challenge in the outdoor industry.



# Discarded on **Mount Everest**

## **Oxygen & Masks**

Sherpas carry their own gear and their clients gear. If they don't need a certain supply the leave it at Camp 1

## **Energy Snacks**

Providing energy for the climb is essential. To eliminate weight, a lot of the times garbage is discarded on the mountain

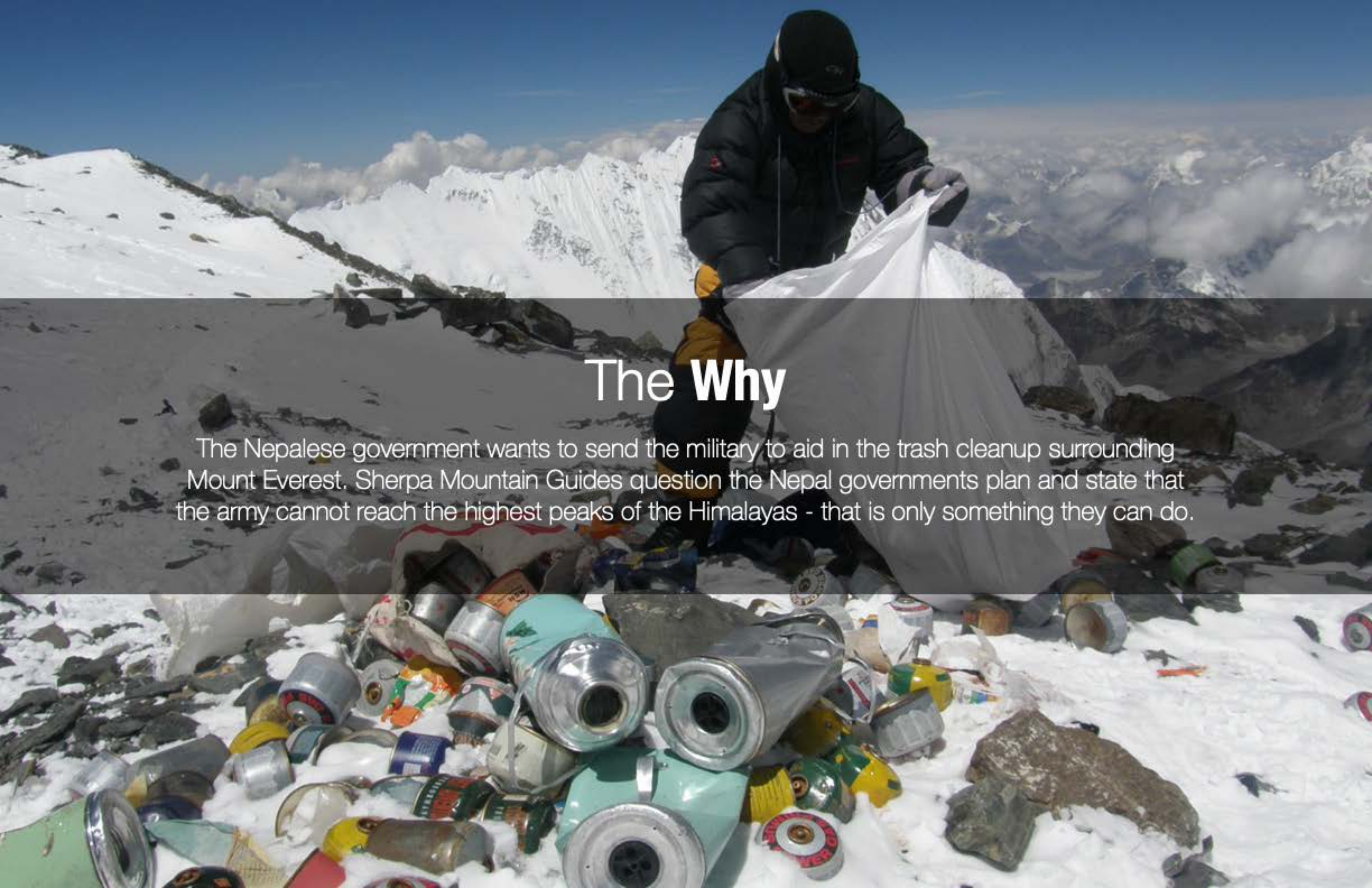
## **Human Waste**

As this is a normal human occurrence, this adds an extremely complicated weight issue to a person

A photograph of a mountain landscape with colorful prayer flags in the foreground. The flags are in various colors including yellow, red, blue, green, and orange. A semi-transparent dark grey box is overlaid on the image, containing text. The background shows a rugged mountain range under a cloudy sky.

# The Athletes: **Sherpa Mountain Guides**

There would be no summit without a Sherpa Mountain Guide. They are the deemed 'Superhuman Mountaineers' who have long served as guides and porters to foreigners attempting climbs at or around Mount Everest.



## The Why

The Nepalese government wants to send the military to aid in the trash cleanup surrounding Mount Everest. Sherpa Mountain Guides question the Nepal governments plan and state that the army cannot reach the highest peaks of the Himalayas - that is only something they can do.

# Athlete **Insight**



**Dawa Pasang Sherpa**

"Sherpa carry everything for their clients. Their gear, their oxygen, their food. We make sure they have the climbing experience they pay for."



**Arun Karaki**

"As mountain guides, we want to make sure our clients have the best climbing experience. A lot of us still enjoy climbing as a career."



**Gombu Sherpa**

"I've climbed Mount Everest two times over the past few years, trash gets worse as more people pay to climb."



## Issues with **Current Items**

Apparel and Equipment

### **Mobility**

Mobility is something Sherpa struggle with in their current apparel pieces

### **Sanitation**

There is not a pack specifically made for trash and human waste cleanup

### **Storage Space**

Sherpa Mountain Guides don't have a specific pack designed to bring trash down

A person is shown from the chest up, wearing a bright red quilted jacket with a hood. The jacket has a black zipper and a small black logo on the left chest that reads "Makalu". The background is a solid dark grey.

## The **Opportunity**

The apparel and equipment within the Makalu Collection is developed specifically for Sherpa Climbers who are assisting in trash clean-up on Mount Everest. It provides a jacket and bib that allow mobility, versatile storage and thermoregulation; complemented by a pack with modular storage, expandability and easy sanitation

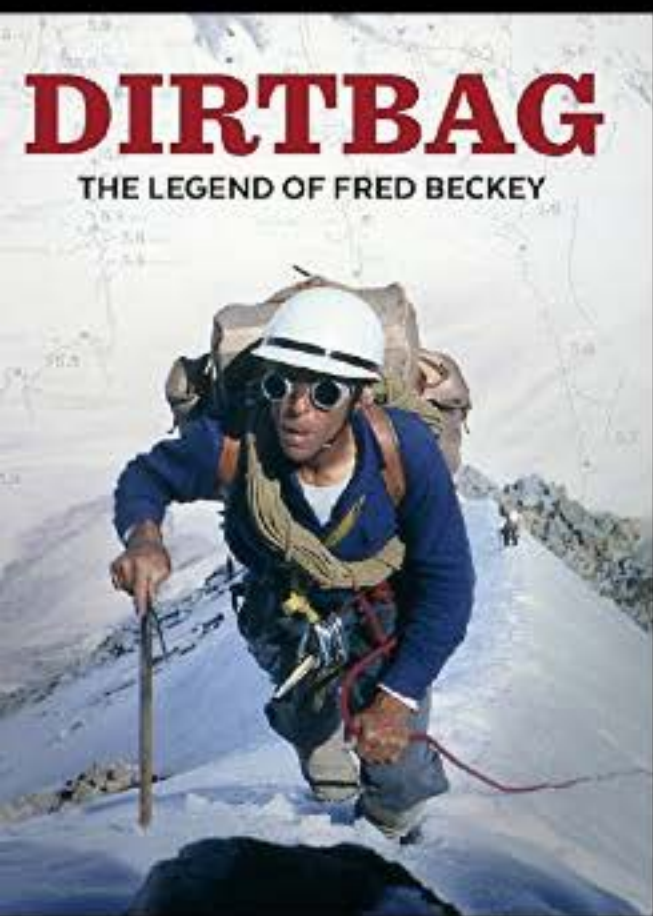
# Athlete **Outcomes**

This product will revolutionize what it means to sustainably bring trash off the mountain. Eliminating single use trash bags and off-brand apparel and replacing it with high-quality gear that expands and performs when you need it to



# Mood Board

Mountain Inspiration



# Mood Board

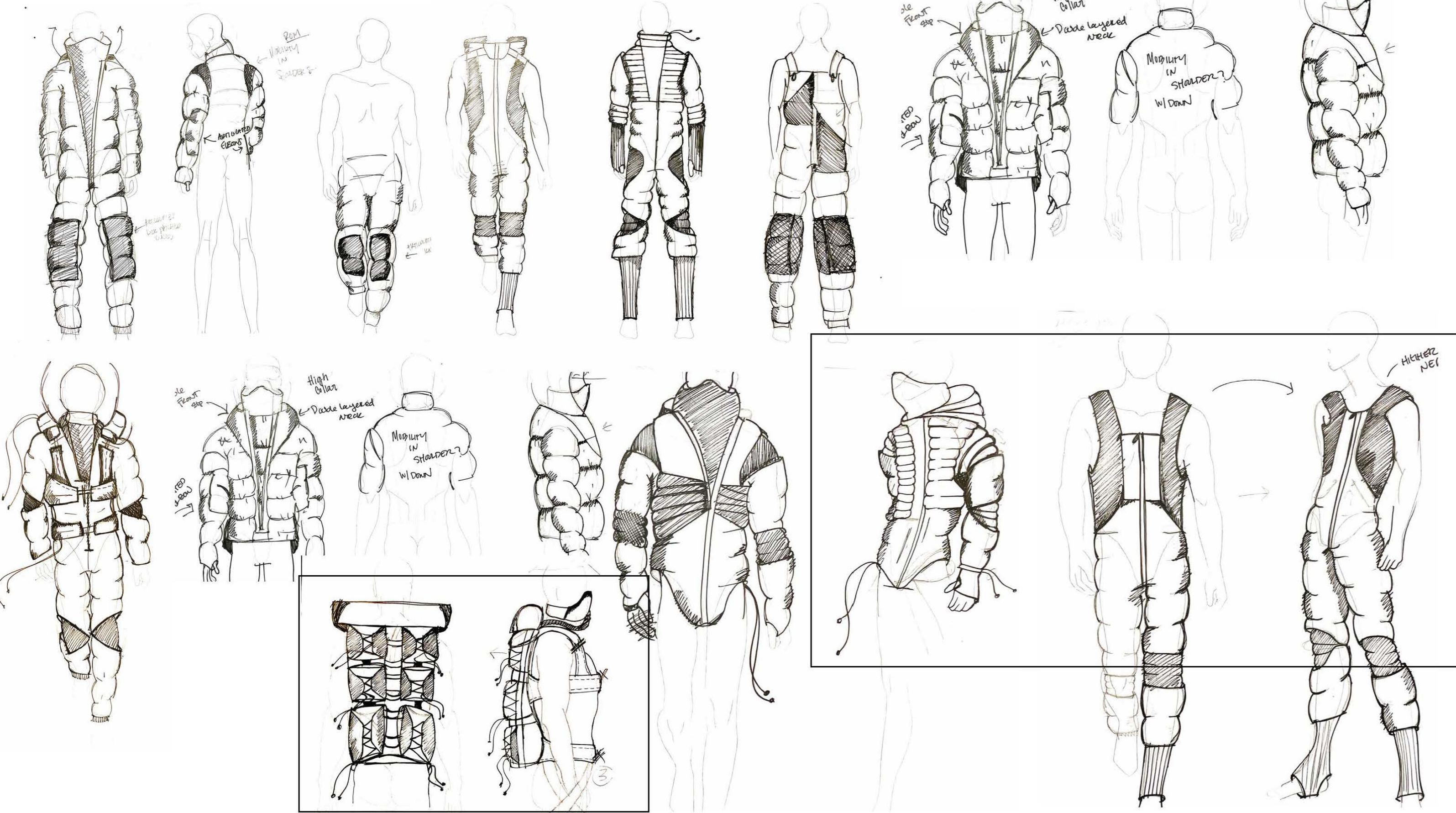
Aesthetic



## Inspiration

Asymmetry  
Added mobility  
Bright Bold Color

# Ideation // Sketches





# Makalu

---

Sherpa Gear Collection

Valiant. Adaptable. Resilient.

# Makalu

Jacket



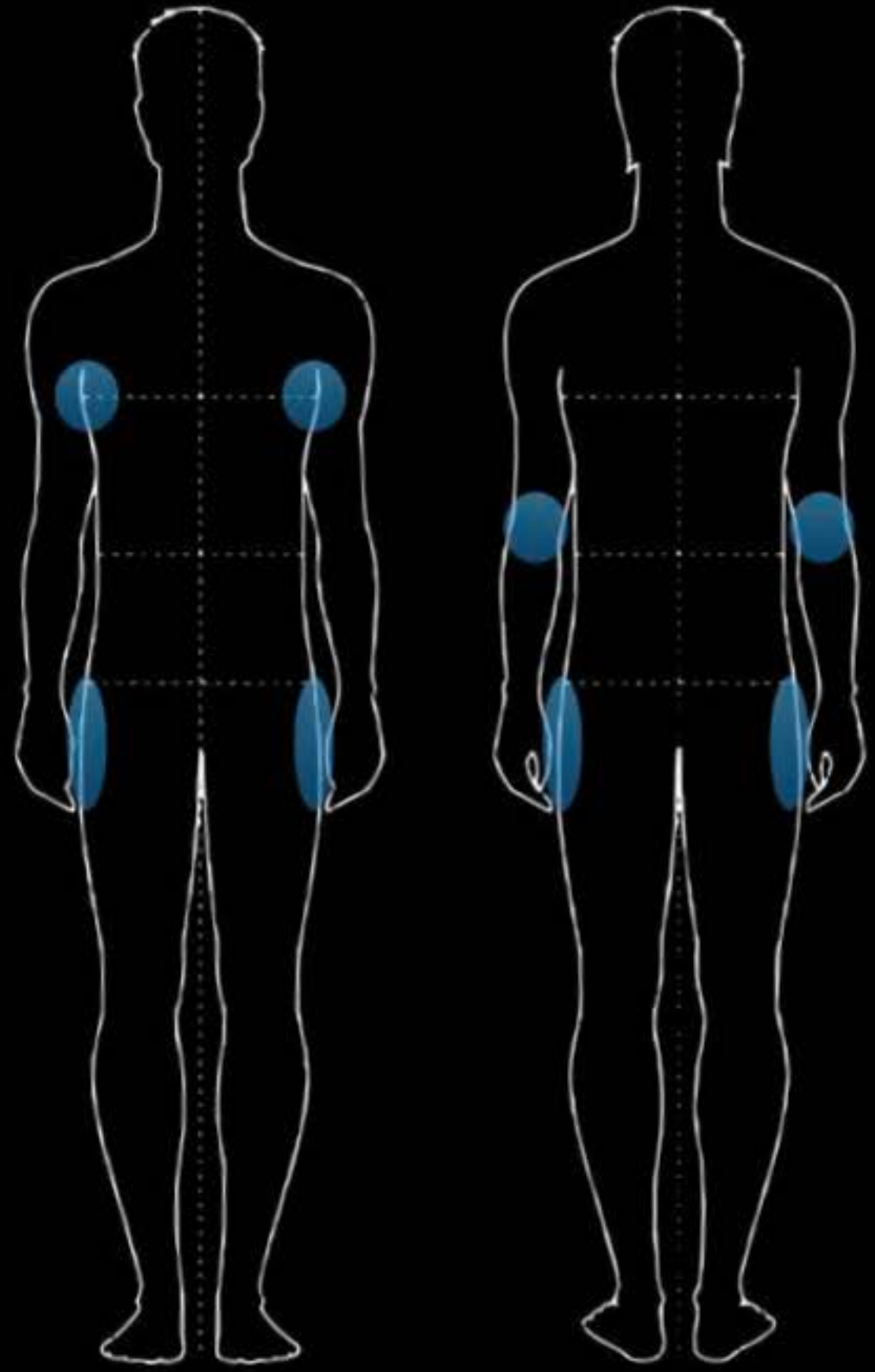
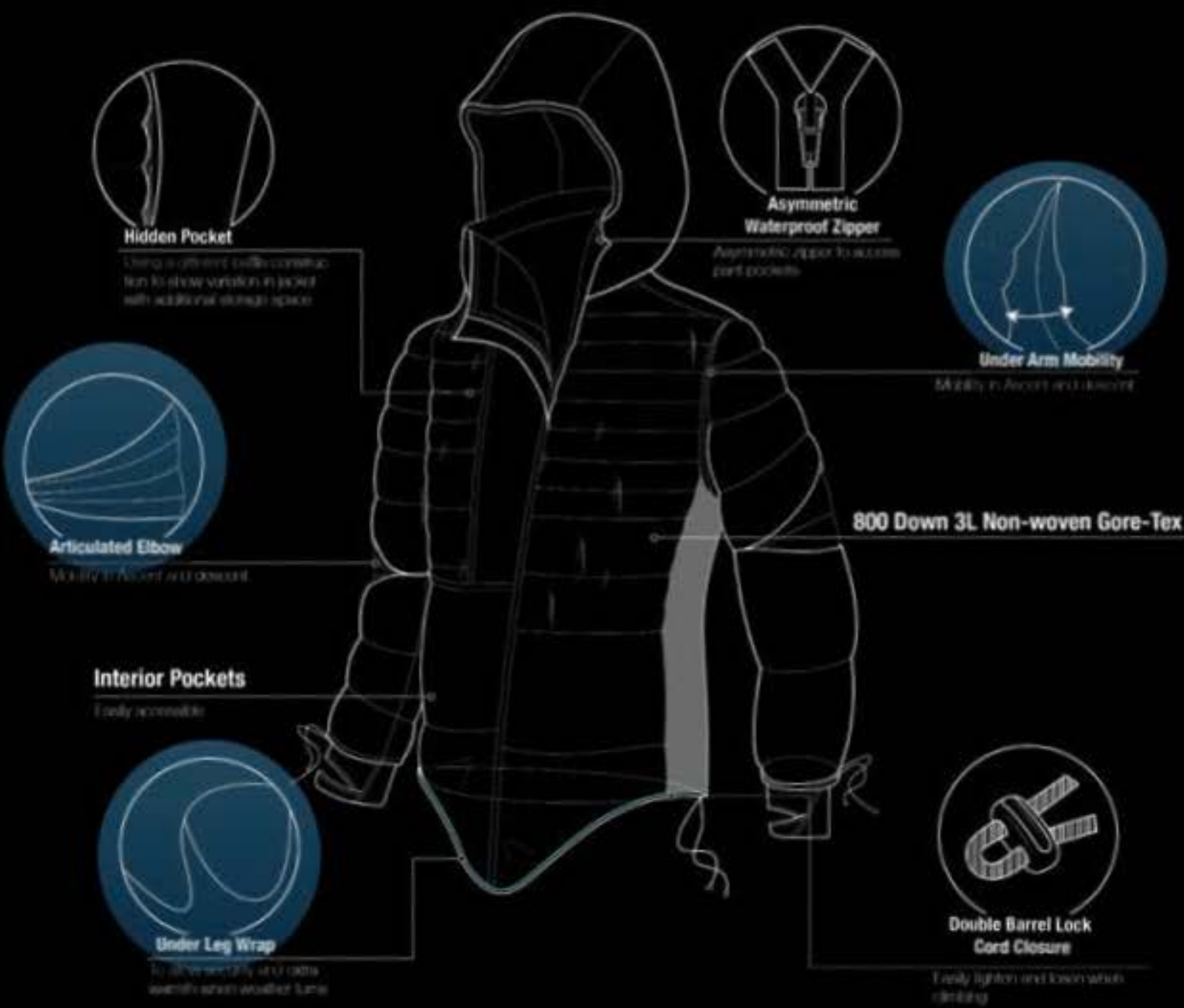
## Features

- Asymmetric Zipper
- Hidden Front Pockets
- Articulated Elbows
- Hidden Wrist Cuff
- Arched Hip Design

## Benefits

- Mobility in Shoulders
- Mobility in Elbows
- Hip Mobility
- Easy to Access Pockets
- Longer in Front and Back

# Mobility Zones



# Makalu

Pant



## Features

Center Front Zipper

Side Pockets

Under Leg Expansion

Utility Shoulder Straps

Ankle Cuff

## Benefits

Mobility in Hips

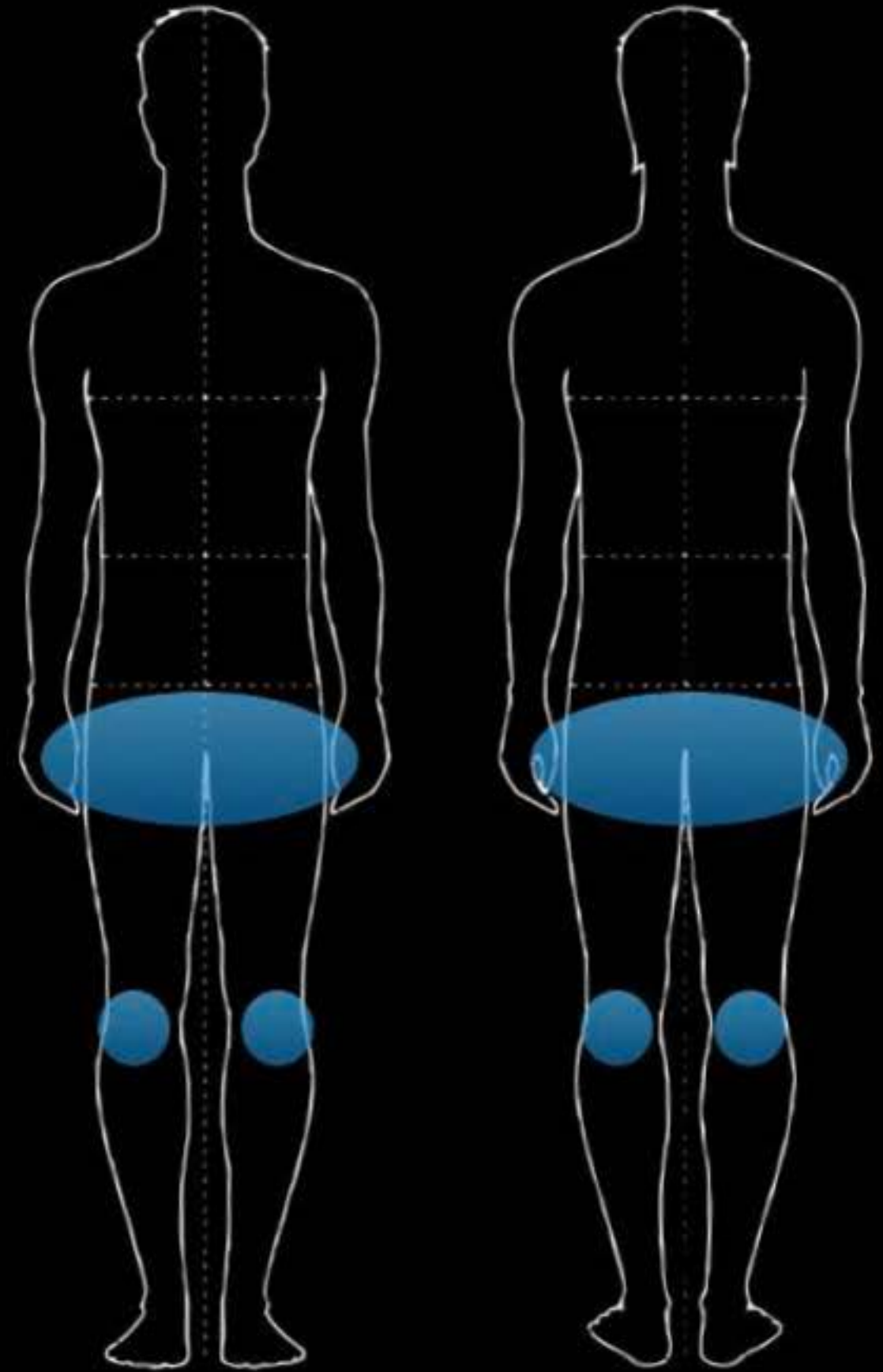
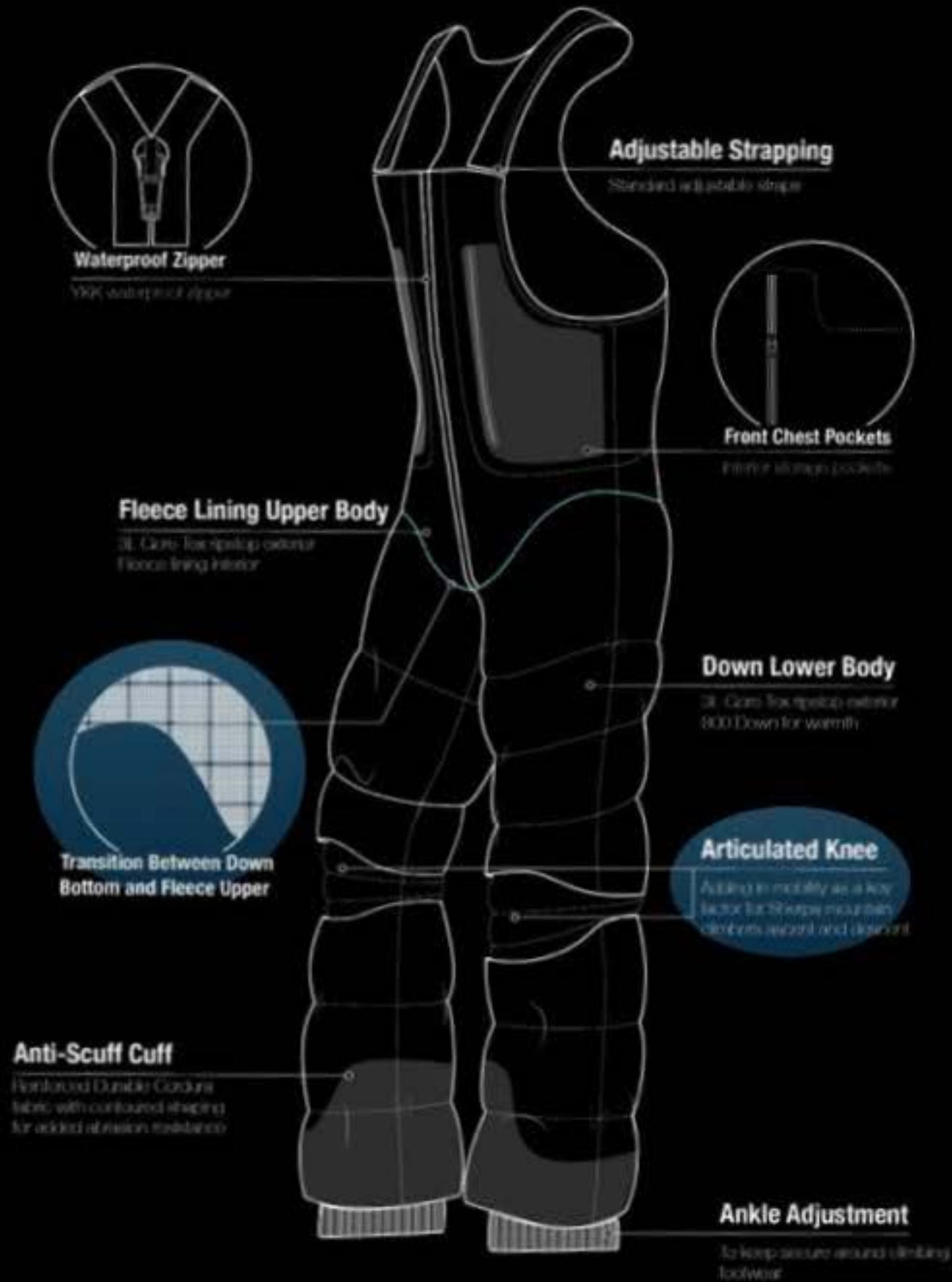
Pockets to Rest Hands

Mobility in Knees

Easy to Adjust Strapping



# Mobility Zones



**Primary Expansion**

Extra security for front expansion

**Center Pocket Expansion**

Shock Cord Security

**Secondary Expansion YKK Lock**

**Secondary Expansion Pocket**

2nd layer that extends out for additional storage

**Primary Expansion**

Front triangular expansion piece

**Utility Hooks**

External Storage

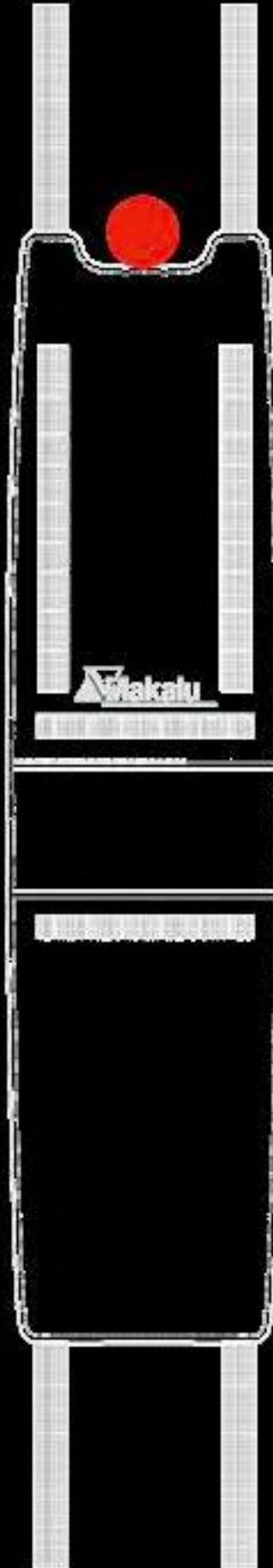
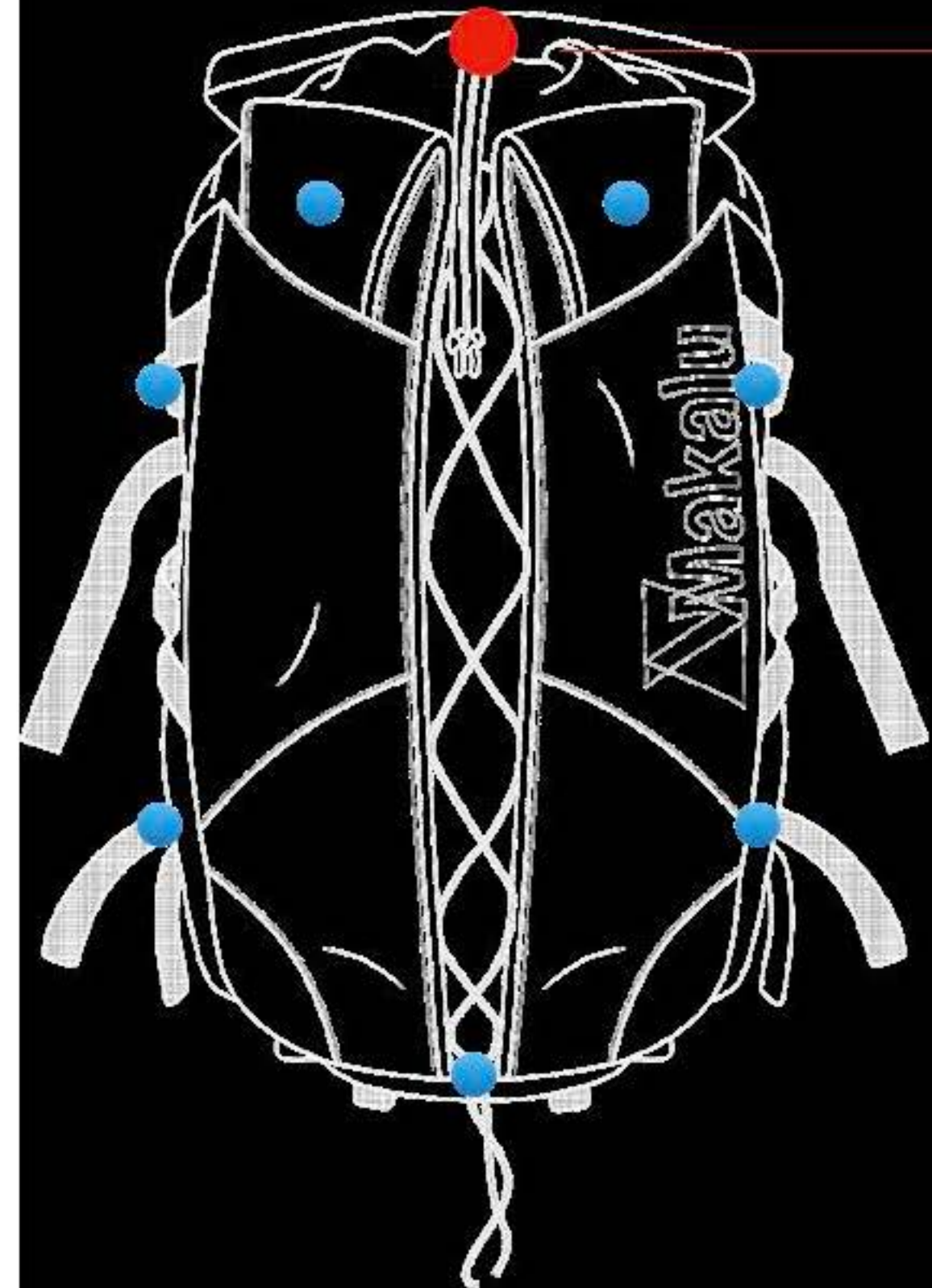
**Lower Primary Expansion**



# Expansion Zones

● Primary

● Secondary





**Makalu Pack at Full Capacity**

## Athlete **Feedback**

"It seems like some sort of venting should be included in the jacket and pant. Especially when so much energy being expended on the ascent"

---

"I'm mostly interested in the pack development. I really like how you're using origami to piece together complicated shapes and forms to create the geometry. You'll have to send me the final outcome when you get there"

---

"Materiality would be super important especially climbing in the cold climate."



**Rick Lee**

## Athlete **Feedback**

"On the pant you should make sure there is enough flexibility in-between legs for harness."

---

"I'm not sure you considered this, but putting pockets inside cloth might help keep people warmer"

---

"Using more pockets is a good idea, but make sure you airtight them."



**Arun Karaki**

Professional Mountaineer & Guide

# Brand Identity



# Packaging Design

## Tubular Pack Design

Easy storage for your Makalu Pack and Jacket



## 20pt Recycled Kraft Board

Paper that's 100% post-consumer waste (PCW)  
uses about 75% less water in production



## Triangular Boxing

To stack your tubular storage pieces inside



 **Makalu**

---

Sherpa Gear Collection

Valiant. Adaptable. Resilient.

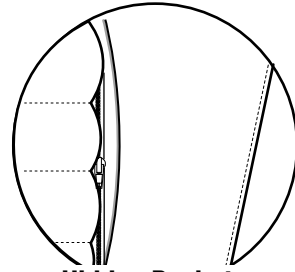
# Thank You!



Sherpa Mountain Guides from 1990 - 2018  
An Aaron Huey Photo Collage

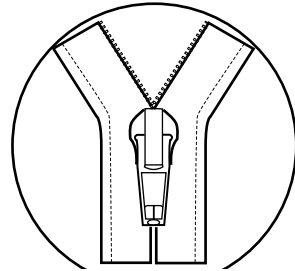
**Additional Items for Process Book**  
**Process book 2020**

Carly C. Anderson  
Spring 2020



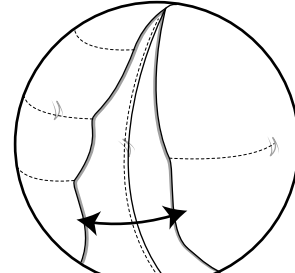
**Hidden Pocket**

Using a different baffle construction to show variation in jacket with additional storage space



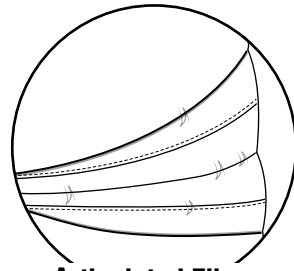
**Asymmetric Waterproof Zipper**

Asymmetric zipper to access pant pockets



**Under Arm Mobility**

Mobility in Ascent and descent

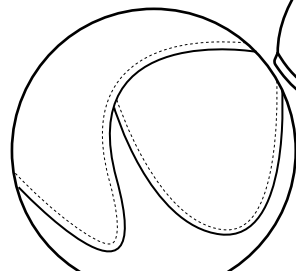


**Articulated Elbow**

Mobility in Ascent and descent

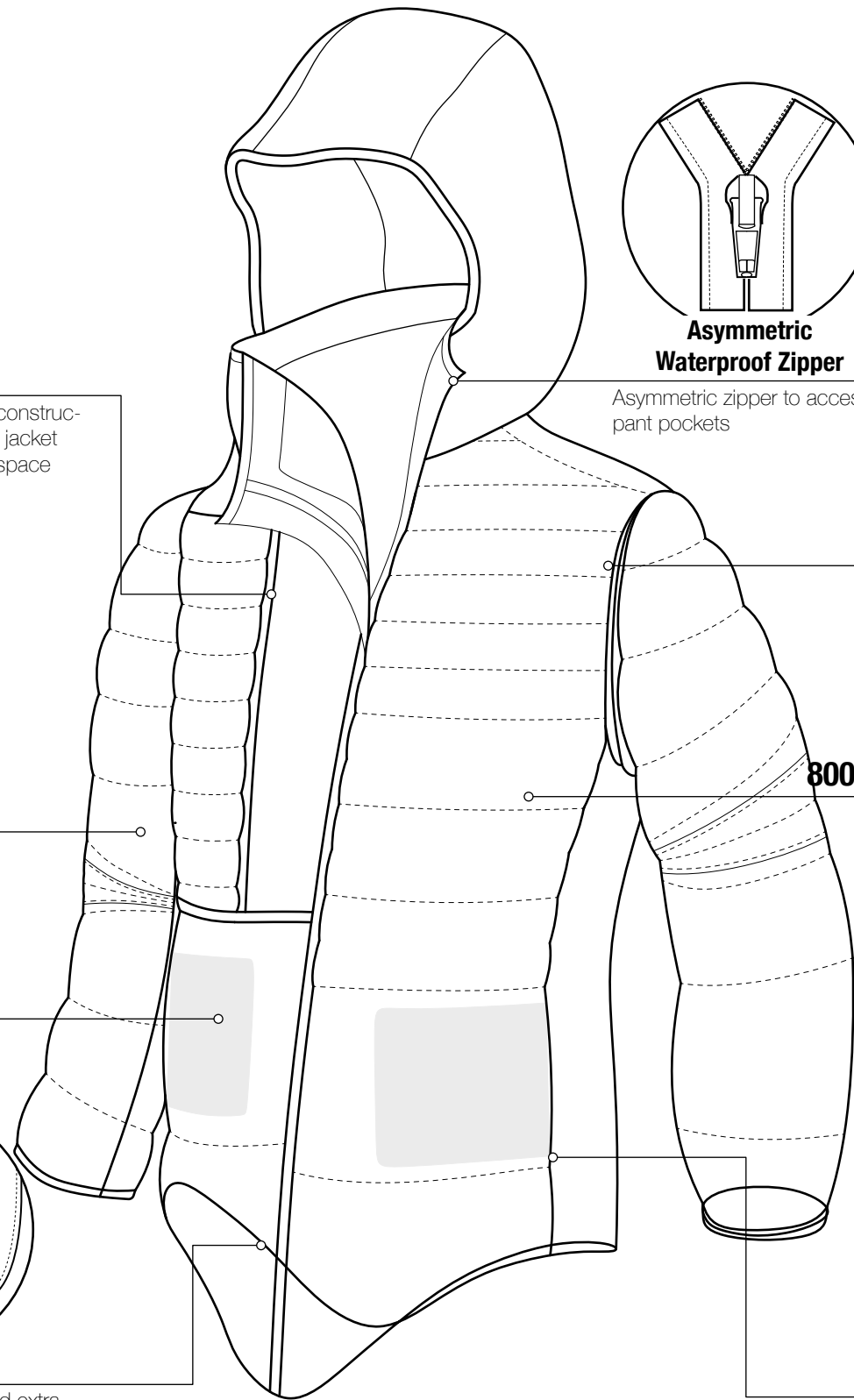
**Interior Pockets**

Easily accessible



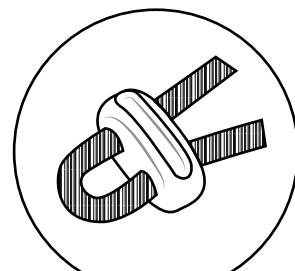
**Under Leg Wrap**

To allow security and extra warmth when weather turns



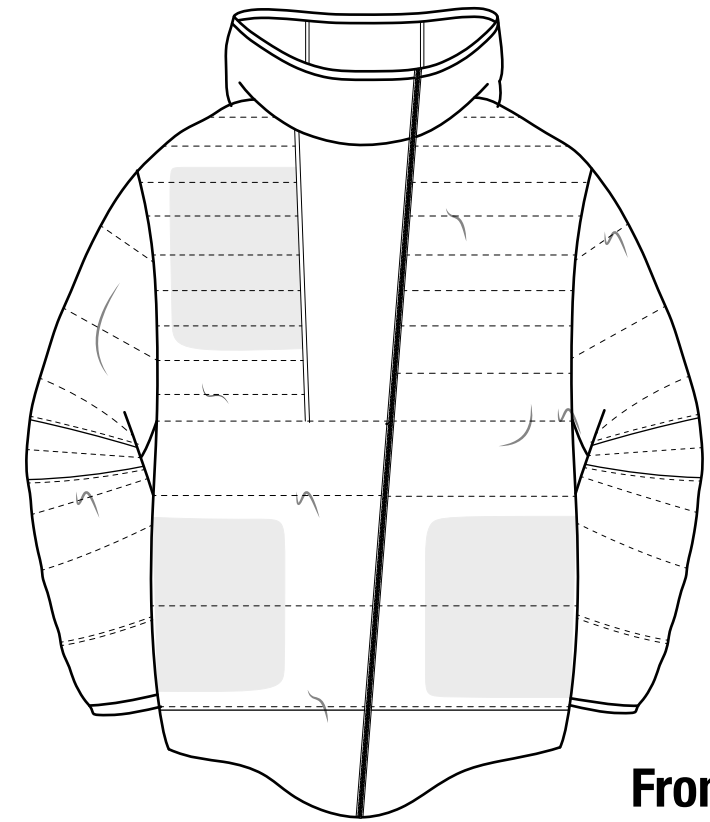
**3/4 View**

**800 Down 3L Non-woven Gore-Tex**

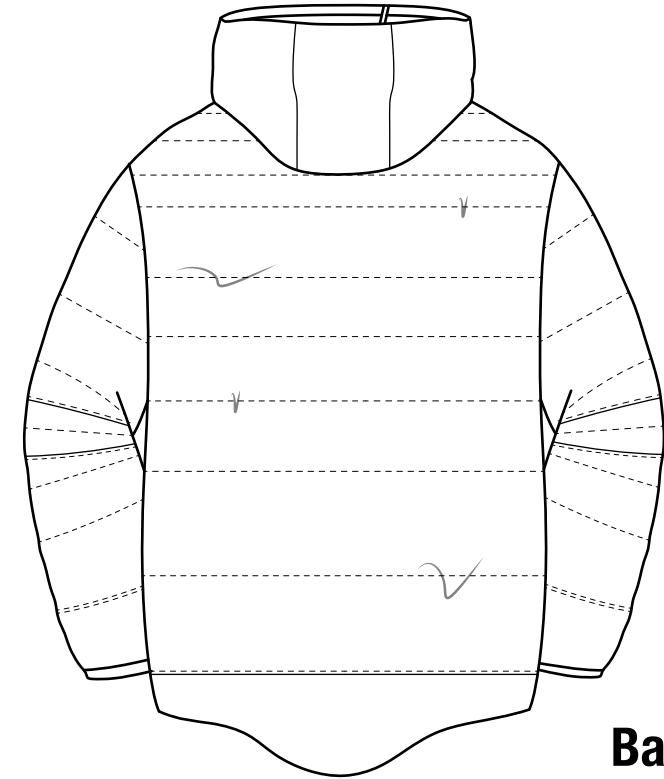


**Double Barrel Lock Cord Closure**

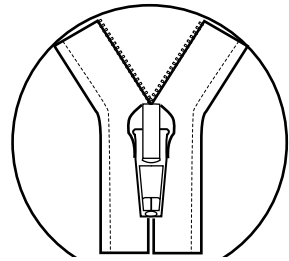
Easily tighten and loosen when climbing



**Front**

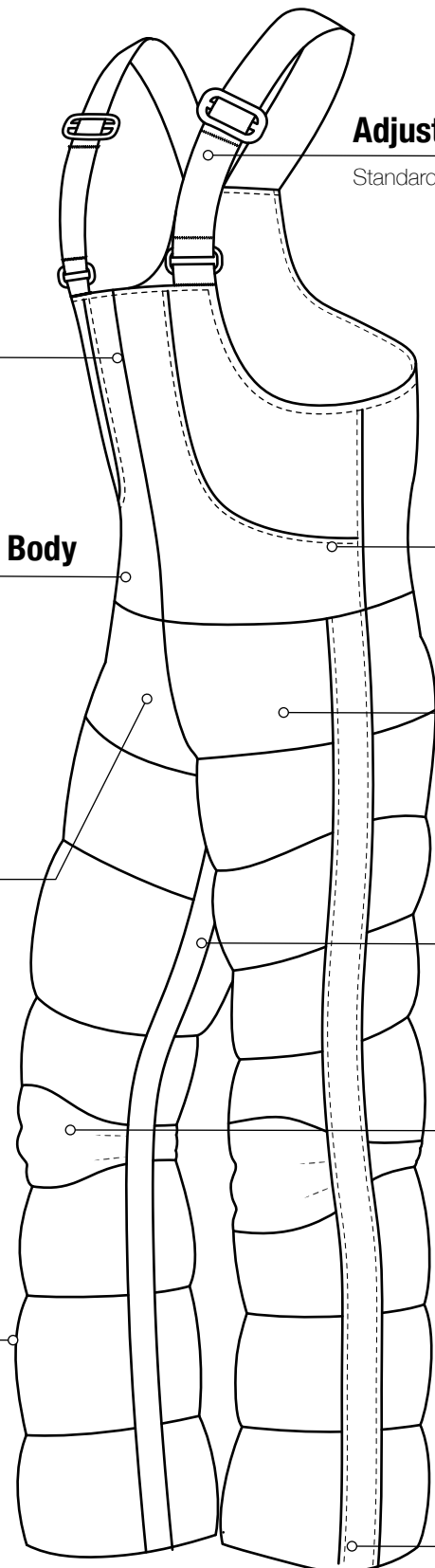


**Back**



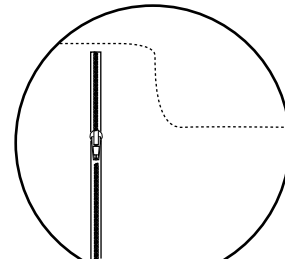
**Waterproof Zipper**

YKK waterproof zipper



**Adjustable Strapping**

Standard adjustable straps



**Front Chest Pockets**

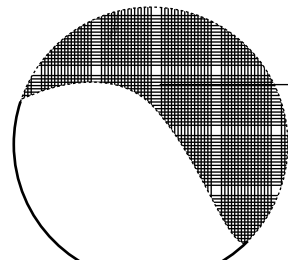
Interior storage pockets

**Fleece Lining Upper Body**

3L Gore-Tex ripstop exterior  
Fleece lining interior

**Down Lower Body**

3L Gore-Tex ripstop exterior  
800 Down for warmth



**Transition Between Down Bottom and Fleece Upper**

**Extra room for movement**

Pannel added in for extra space

**Articulated Knee**

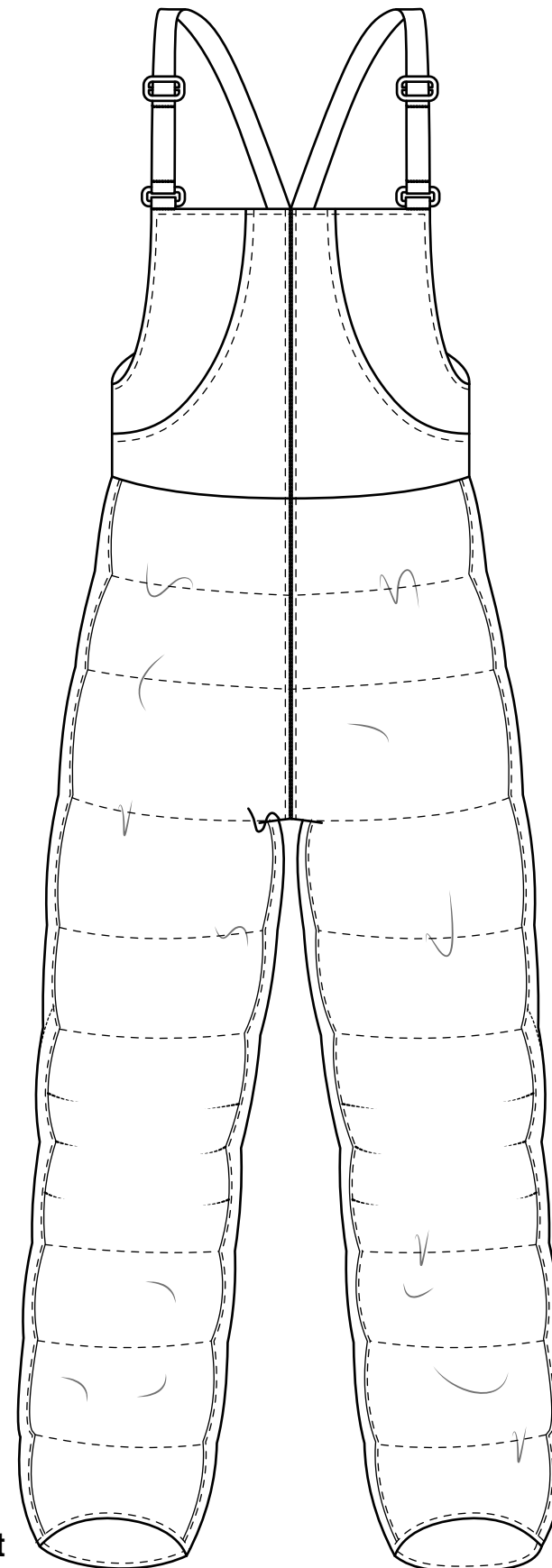
Adding in mobility as a key factor for Sherpa mountain climbers ascent and descent

**Anti-Scuff Cuff**

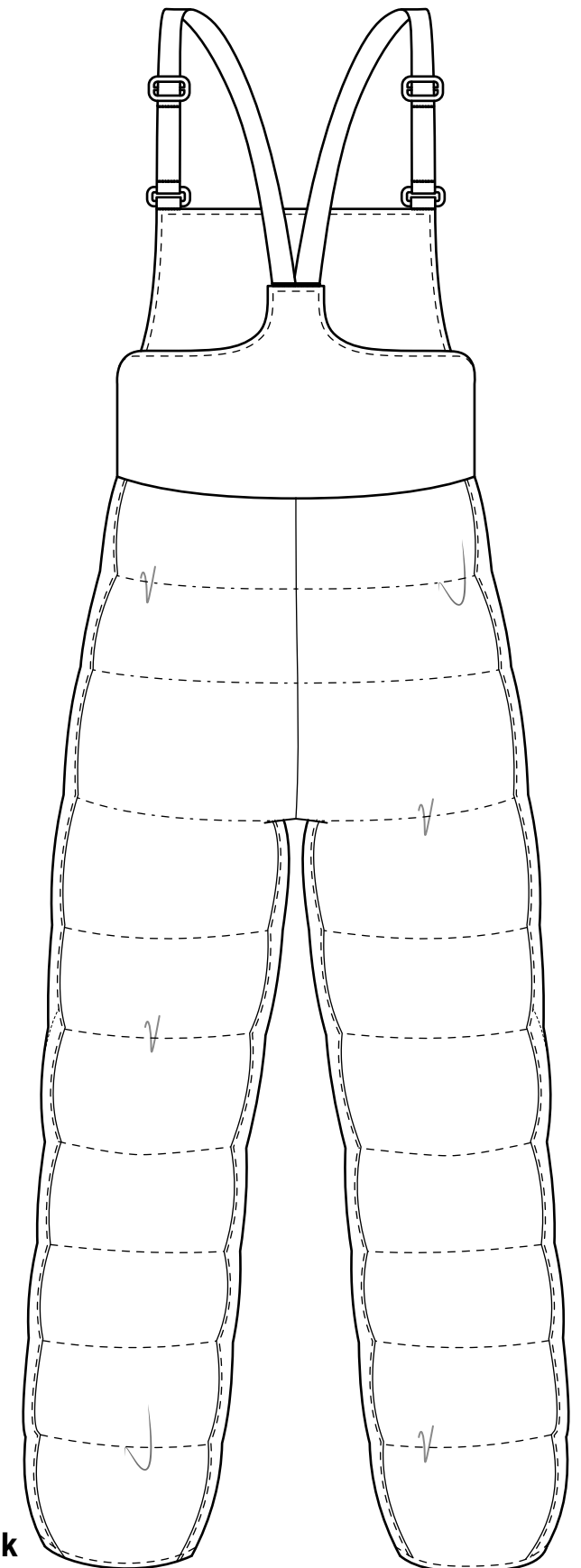
Reinforced Durable Cordura fabric with contoured shaping for added abrasion resistance

**Curved Ankle Placement**

To keep secure around climbing footwear



**Front**



**Back**



Carly C. Anderson

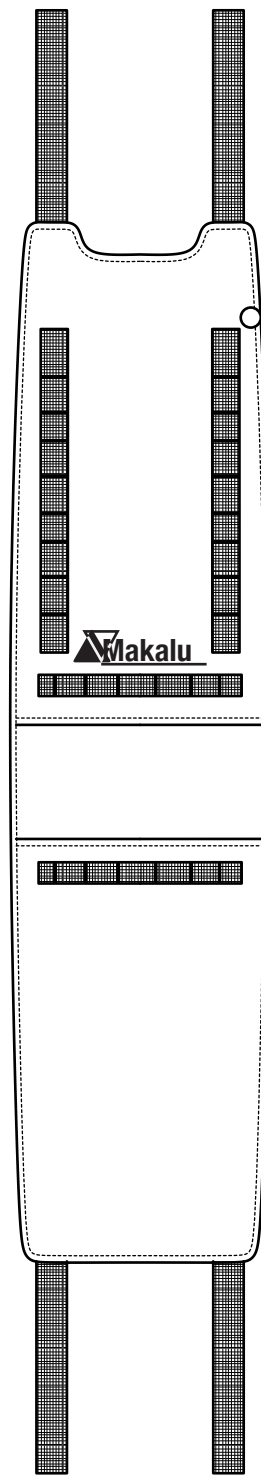
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Pant Tech

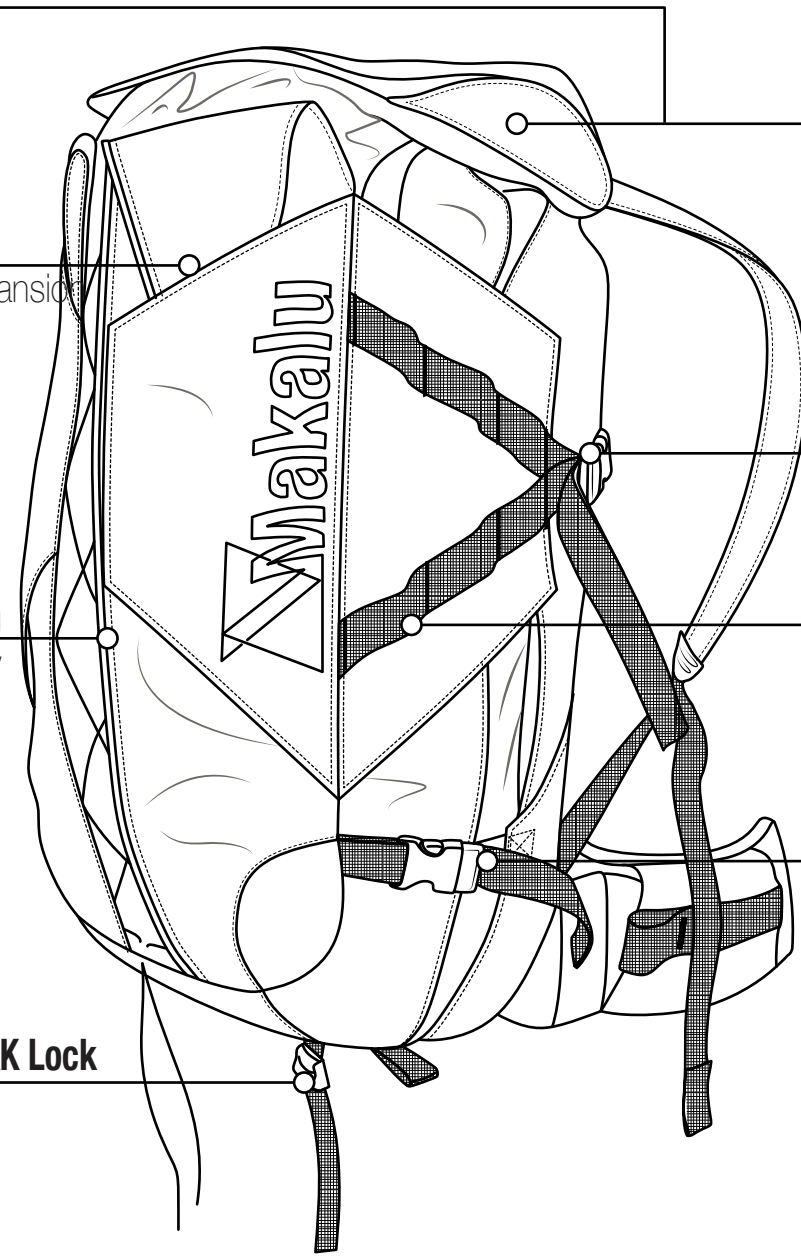
Illustrator

Rhino 3D

Page 1



**Secondary Expansion Piece**



**Primary Expansion**

Extra security for front expansion

**Center Pocket Expansion**

Shock Cord Security

**Secondary Expansion YKK Lock**

**Secondary Expansion Pocket**

2nd layer that extends out for additional storage

**Primary Expansion**

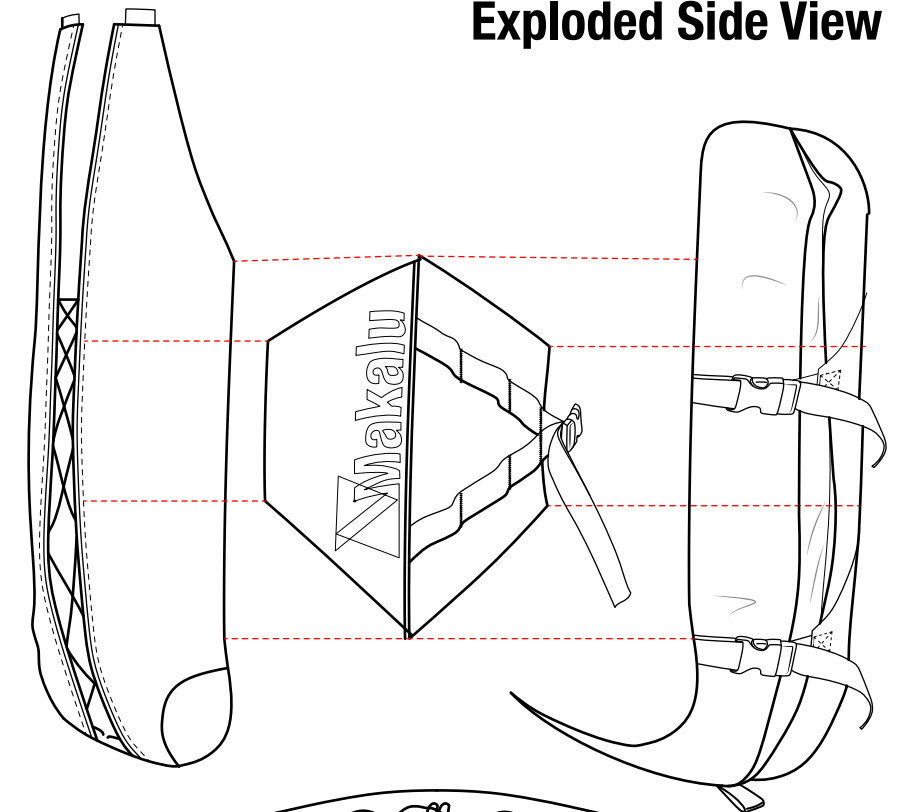
Front triangular expansion piece

**Utility Hooks**

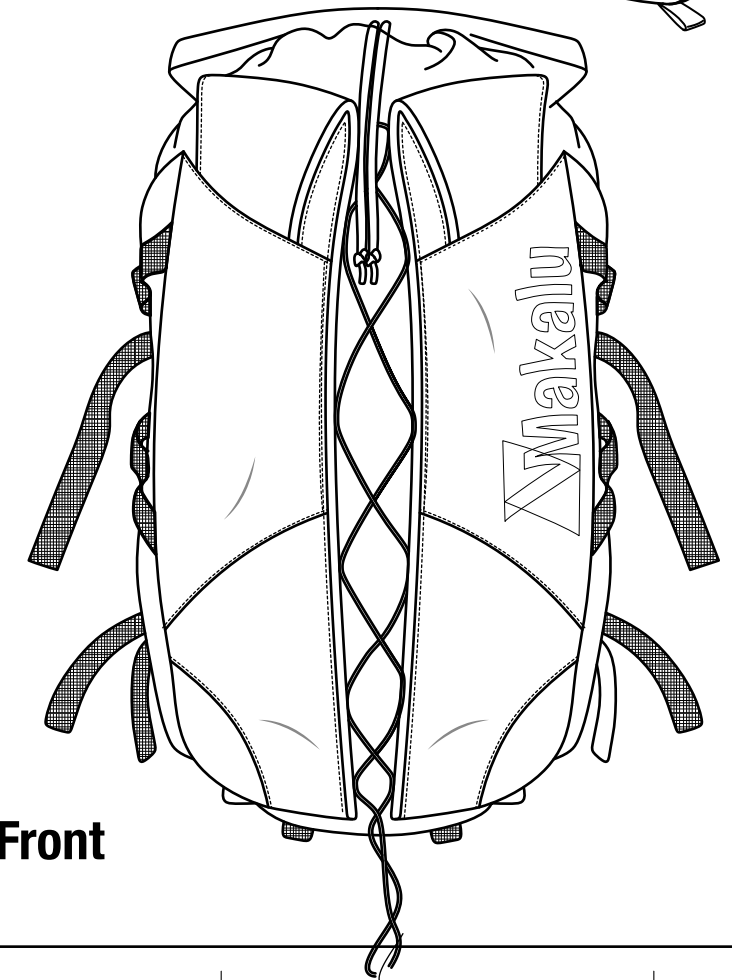
External Storage

**Lower Primary Expansion**

**Exploded Side View**



**Front**



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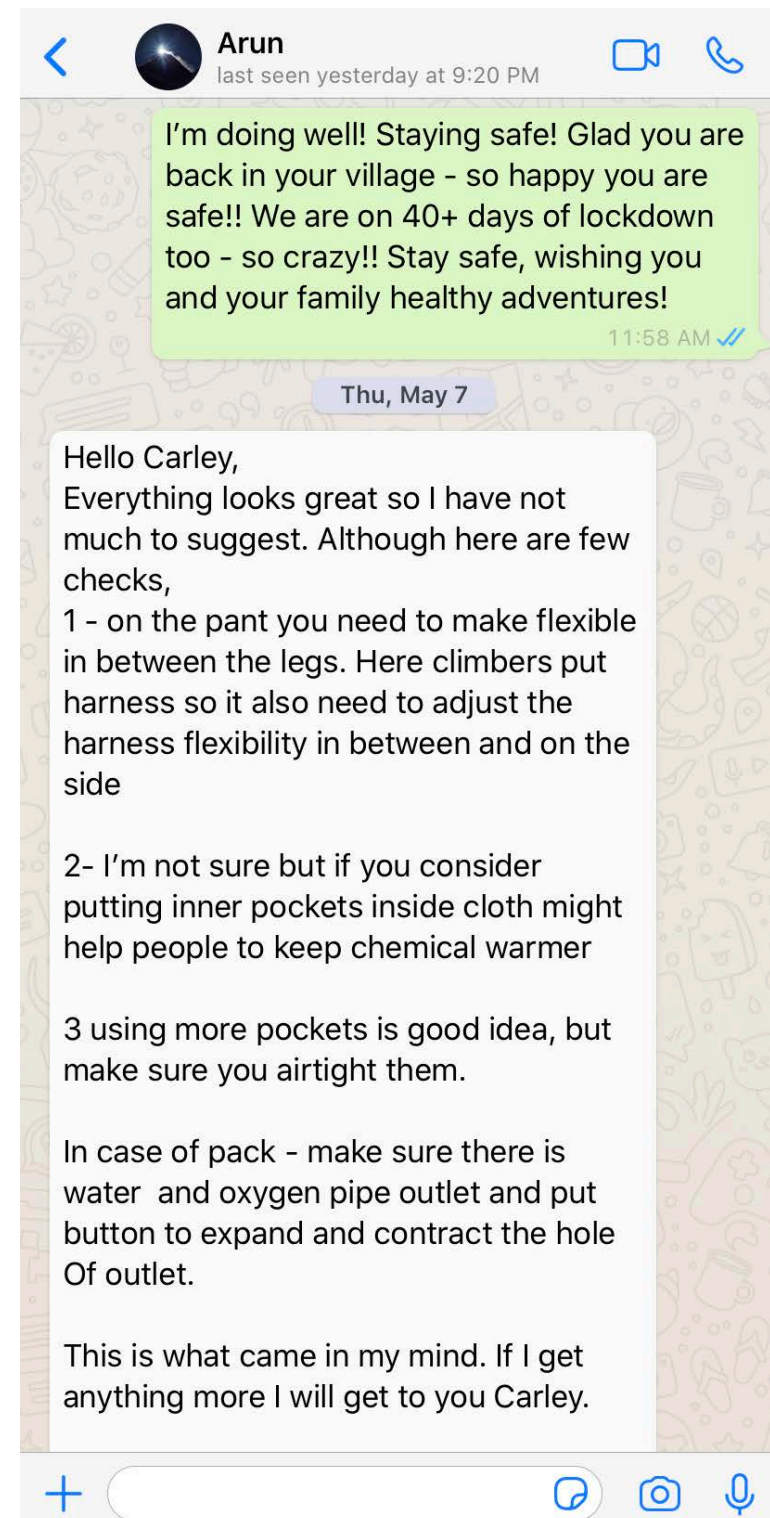
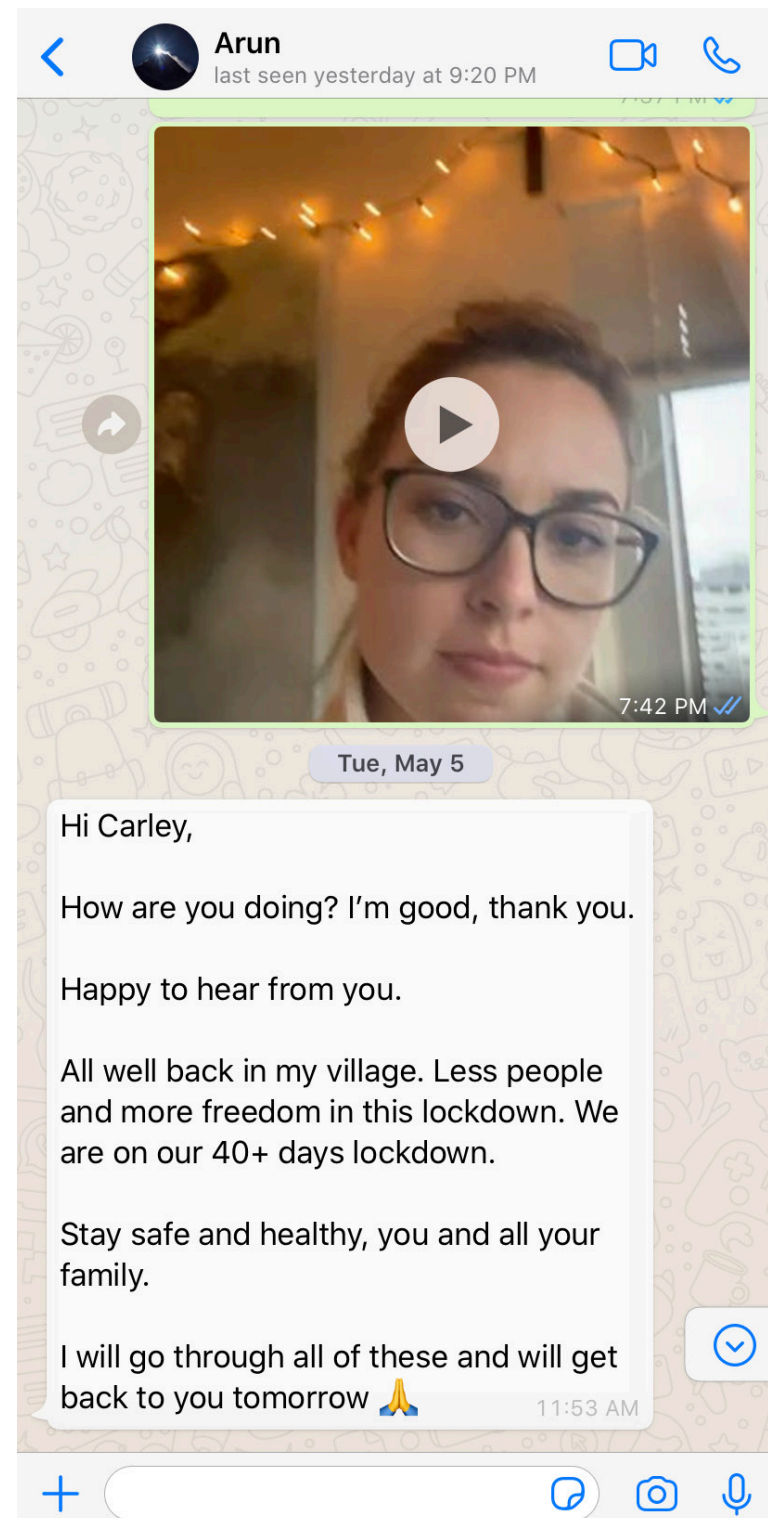
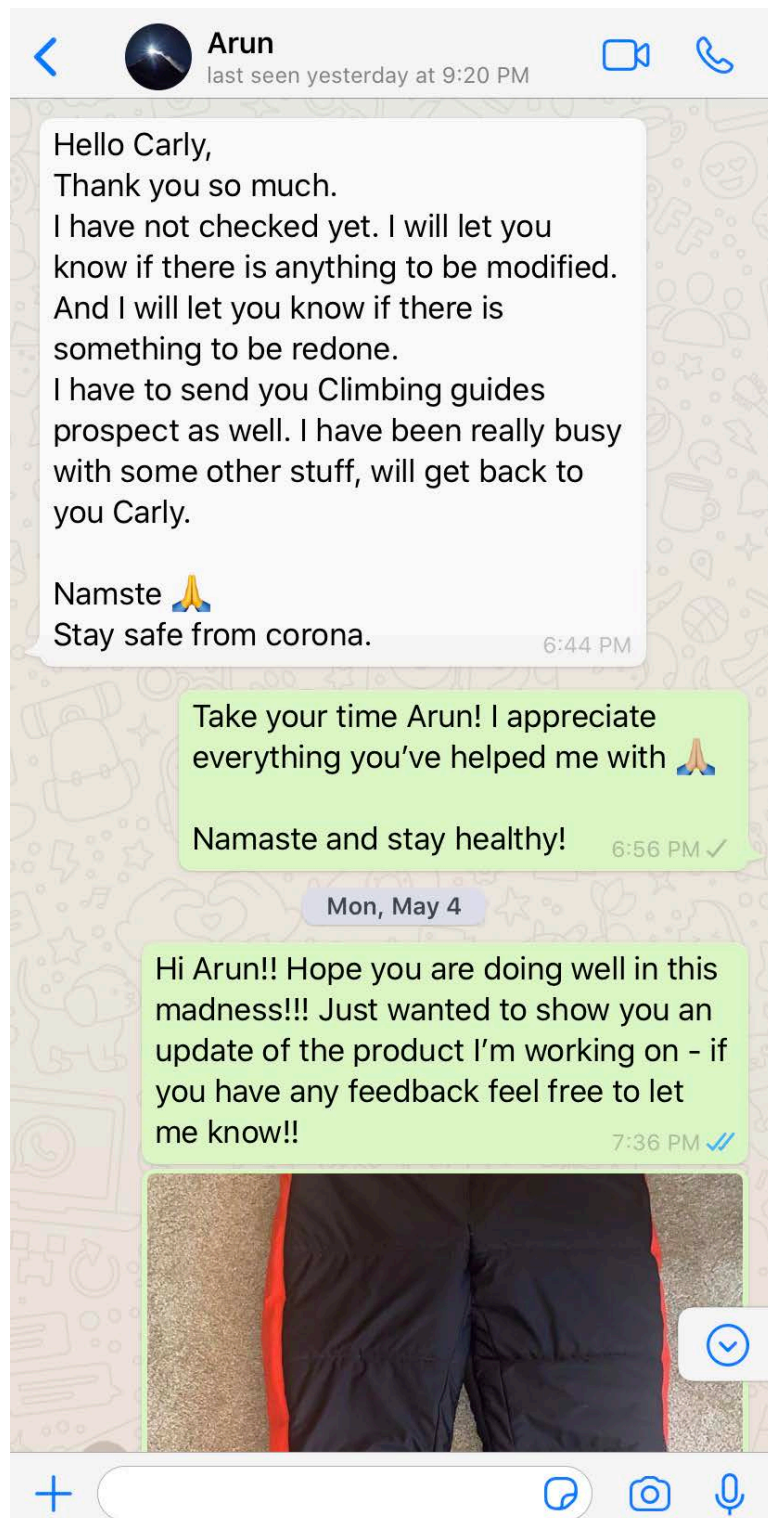
Pack Tech

Illustrator

Rhino 3D

Page 2

# Athlete Feedback



Questions	Feedback/Answers
<b>What are you carrying when you're climbing mount everest? and what are you carrying when you come back? Do you pick up anything extra? Including trash, waste, etc?</b>	We carry our belongings, clients belongings, tents, oxygen cylinder, first Aid kit and food. When we come back we carry everything same we have carried on the way up. On the way down, if we are able to carry (or if we do not have enough waste to show to SPCC) extra we collect the trash on the way and make 8kg to give it to SPCC. This is how we get money from the Operating company as well. Yes we carry down our own trash back to the base camp.
<b>What do you normally wear?</b>	Well, wearing outfit depends from person to person. In general Nepali guides and Sherpa wears mountain gears like "La Sportiva" and foreign climbers wears various brands like Addidas, Mountain Hardwear etc. We wear clothes like jacket, pants, boot as outer. All of these outer except boot are made with down. We use inner warmcloths like Thermals and windstopper.
<b>What physiological differences happen from base camp to camp 4? Do you wear different clothing from base camp to camp 4?</b>	From Base camp to camp 4 a lot changes. It is really hard to climb to the camp 1 from the everest base camp as it. From Base camp to camp 4 we do change the type of cloths. Interestingly we use less cloth once we get higher. Outfit we use to climb from the base camp of everest to the camp 1 is mostly thick and bulky as we have to walk in the narrow section in between Nuptse and Lhola mountains before hitting Mount Lotse.
<b>Options for oxygen or no oxygen? Where do you usually put oxygen for climbs? In a bag? Is there a specific harness to hold oxygen?</b>	Oxygen will be supplied by the company and are stored in different place and as Sherpa we carry one cylinder with us. We put oxygen in the Bag side and the regulation and pipe connects to our face to inhale if needed. Some bag are designed to adjust cylinder and we use those.
<b>What are the apparel pieces from skin up? Favorite Brands?</b>	As Sherpa we use normal brand but warm and light apparel. No any specific brand but they must be warm and tested by our friend climber in their previous climb. Basically we use the stuff recommended rather than choosing any specific brand.
<b>Is gloves or mittens preferred?</b>	For nights and the morning we use thick gloves and in the daylight we use thin gloves. Gloves are like mandatory thing to wear in mount everest expedition.
<b>Superstitions? - on equipment or apparel: color, where it came from, how it's put on, any traditions or good luck things you do at base camp or on Mount Everest?</b>	Superstition or a call for good luck - whatever it is called; we organise puja ceremony before starting any of the expedition. We do puja ceremony at our own home with family lama and then entire expedition group will do one in any of the monastery and lastly we do offering at the base camp with lama and mantra. This is for a best possible success to the summit and good fortune. When we do offering means, we worship our gears at the same time; specially rope and ice axe. As a good luck thing, lama who performs ceremony for good luck gives us good luck thread or a knot with thread, which we tie on our
<b>Where do you get your clothing? - donated, store, making it, westerners leave it, handed down?</b>	We buy clothing in Kathmandu, sometimes we ask our guest to bring clothes from their country for better quality and cheap but branded gears. At the end of the trip guest gives climbing gears. Climbers leaving gears behind are main source of our climbing gear.
<b>Where do you get your gear to climb mount everest? Online? The Shops on Thamel? Where specifically?</b>	If we need to buy gears ourselves, we buy them at Thamel. We do not use online but ask our clients coming from different countries to bring some gears for us. When we buy at Thamel we buy from branded shops at Durbar Marg than from Thamel.
<b>What do Sherpa Mountain Guides spend on gear? How much do Sherpa mountain guides make in a season?</b>	Earning depends on the tip we get and if we do not consider the tip the earning is around 1000 USD to 4000 USD per season. And for everest there is only one season "spring". We make our more earning from climbing to other peaks in Nepal or we go to work in western countries like Norway, Sweden, Colorado, New Zealand etc.
<b>Do you get paid to bring trash down off the mountain? Your own trash? Waste?</b>	As a rule of Nepal government or SPCC; every climber needs to bring 8 kg of waste with them. In this case we bring our 8kg and most of the time we need to bring in the name of our clients as well. When we submit the trash to the SPCC committee we get paid. We do carry down our human waste like sewer as well; in this case we are paid extra. Some sherpa just carry those human faeces waste only, they are not paid.
<b>What pockets do you use for specific things? Do you wish there was anything designed differently on your climbing gear?</b>	We use pockets from camera battery, phone, carabiners, extra gloves and cap, sunglasses. All of these things are kept in the random pockets whichever is adjustable. Most of the pockets are on the jacket.
<b>Hood or no hood? Do you have a preference on your down suit or jacket?</b>	We use hood. Use of the down suit varies with morning vs dunny day. We use warmer in cold and light down for warm day like sunny day and while we are walking/climbing.
<b>Mask/face guard? Do you have a preference on whether or not you have a mask or faceguard for climbing?</b>	As sherpa we rarely use mask but our guests who climb very slow must use it even during the sunny day. We use mask mostly when there is no sunlight. We prefer to have mask or face guard for climbing.
<b>How important is mobility in your apparel? Shoulders, knees, hips, ankles.</b>	To keep ourselves warm we need thick down jacket and most of the inner apparel we use are also thick. Thickness is unavoidable but this blocks easy mobility, this is annoying sometime. We need more mobility in knee, ankle, fingers and neck. However as a sherpa helping climbers we need wider mobility in all body part.

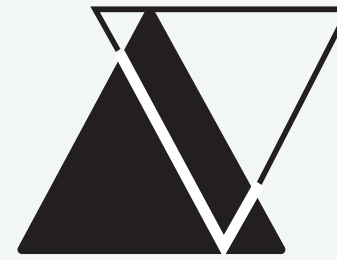
Questions	Feedback/Answers
<b>What are you carrying when you're climbing mount everest? and what are you carrying when you come back? Do you pick up anything extra? Including trash, waste, etc?</b>	I carry my personal gear and personal first aid kit and oxygen, water, rope, personal tent, sleeping bag, clothing (changeable). Coming back - we carry trash and everything we carry up. If we see any garbage on the way which is technically a hurdle on the way we take it back to the base camp to trash, if possible.
<b>What do you normally wear?</b>	Normally, we wear climbing suit, climbing shoes, harness, gloves and goggles.
<b>What physiological differences happen from base camp to camp 4? Do you wear different clothing from base camp to camp 4?</b>	Base camp to camp 4 we feel tiredness, loss of appetite, dizzy, weaker everyday. In case we do not feel comfortable in down suit we change gloves, socks, windstoppers etc. Basically weather determines what to wear.
<b>Options for oxygen or no oxygen? Where do you usually put oxygen for climbs? In a bag? Is there a specific harness to hold oxygen?</b>	Normally we don't need oxygen till camp 2 but above that we carry our own, and if finished there are oxygen deposit centers at different camps. We put oxygen inside our bag pack. No there is no special harness to put oxygen. Oxygen is 3-8 liters, we carry it inside the bag back.
<b>What are the apparel pieces from skin up? Favorite Brands?</b>	I use mountain Hardware, northface, kailash, or.
<b>Is gloves or mittens preferred?</b>	Mittens is compulsory.
<b>Superstitions? - on equipment or apparel: color, where it came from, how it's put on, any traditions or good luck things you do at base camp or on Mount Everest?</b>	We do not specifically worship equipments and apparels. We just pray for success and if we have prayer flag to carry to the top we worship them as well. Everything is in backpack so no any specific things.
<b>Where do you get your clothing? - donated, store, making it, westerners leave it, handed down?</b>	We buy them from trekking shops in Kathmandu. Yes all is possible.
<b>Where do you get your gear to climb mount everest? Online? The Shops on Thamel? Where specifically?</b>	Gear is same as cloth. We consult with office at Thamel and we decide one to buy. We also consult with the climbing guide (he means western climbing guide)
<b>What do Sherpa Mountain Guides spend on gear? How much do Sherpa mountain guides make in a season?</b>	We spend normally USD 2000 or more per season. In a season we earn 5-8 thousand dollars.
<b>Do you get paid to bring trash down off the mountain? Your own trash? Waste?</b>	Yes we get as per kilo but not more than £ kilo.
<b>What pockets do you use for specific things? Do you wish there was anything designed differently on your climbing gear?</b>	We use pocket of bag, hanger of bag, hanger harness and pocket of suit inside. If there is pocket in the chest part of the mountain gear would be great. But lots of stuff in the front might imbalance.
<b>Hood or no hood? Do you have a preference on your down suit or jacket?</b>	Yes, all the time in general. Down suit - mountain hardware and kailash
<b>Mask/face guard? Do you have a preference on whether or not you have a mask or faceguard for climbing?</b>	It depends on wind and weather.
<b>How important is mobility in your apparel? Shoulders, knees, hips, ankles.</b>	It is very important in the high altitude and tough climbs.

Primary Logos

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# Alternative Logos



# Color Palette

# Alternative



100%  
80%  
60%  
40%  
20%



100%  
80%  
60%  
40%  
20%



100%  
80%  
60%  
40%  
20%

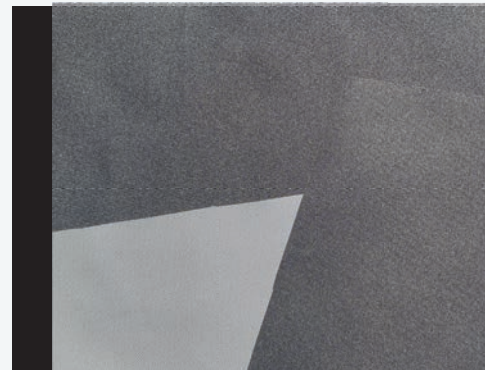


100%  
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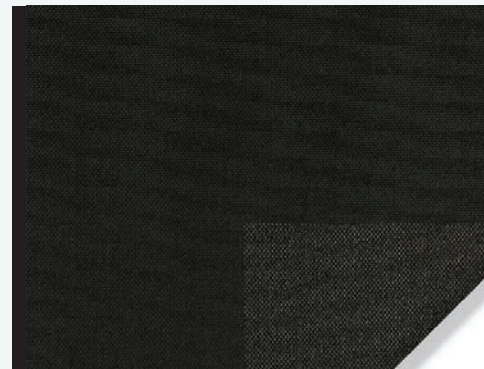
## Material Swatches



3L Blood-Orange DWR



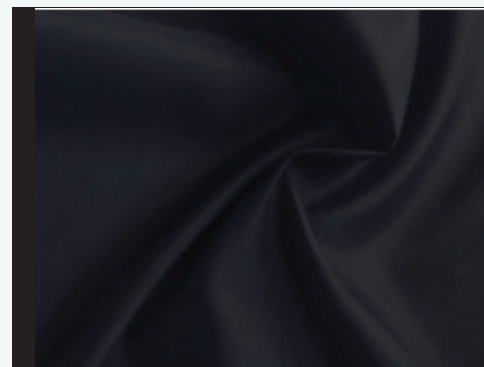
2L Black DWR



Cordura Classic 500D



Webbing Nylon 1.0 Black



Polyester Lining Black

## Typography

Aa

Helvetica Neue

UltraLight

A B C D E F G H I J K L M N O

P Q R S T U V W X Y Z // a b

c d e f g h i j k l m n o p q r s t

Strength

Fearless

Bold

Aa

Helvetica Neue

Condensed Bold

A B C D E F G H I J K L M N O P

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g h i j k l m n o p q r s t u v w x

Strength

Fearless

Bold

Contextual Examples

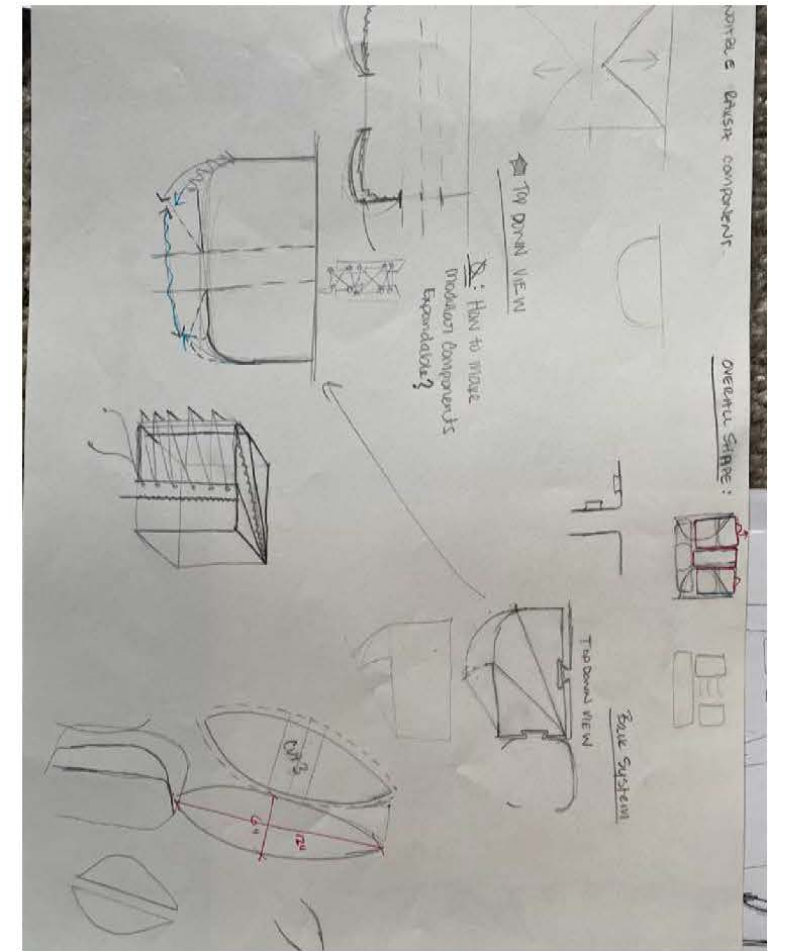
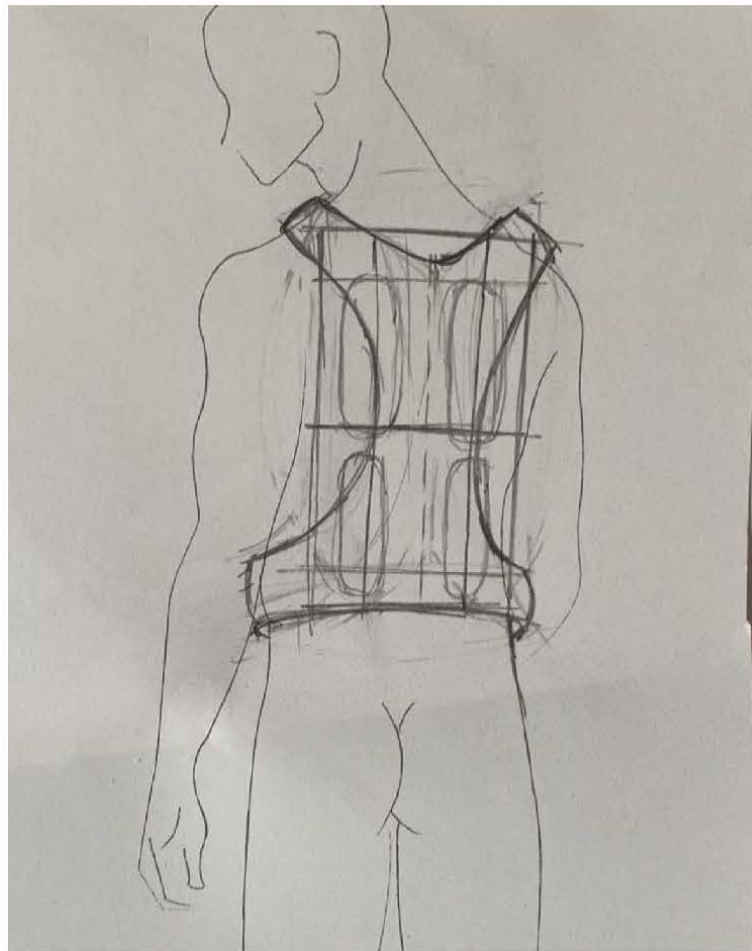
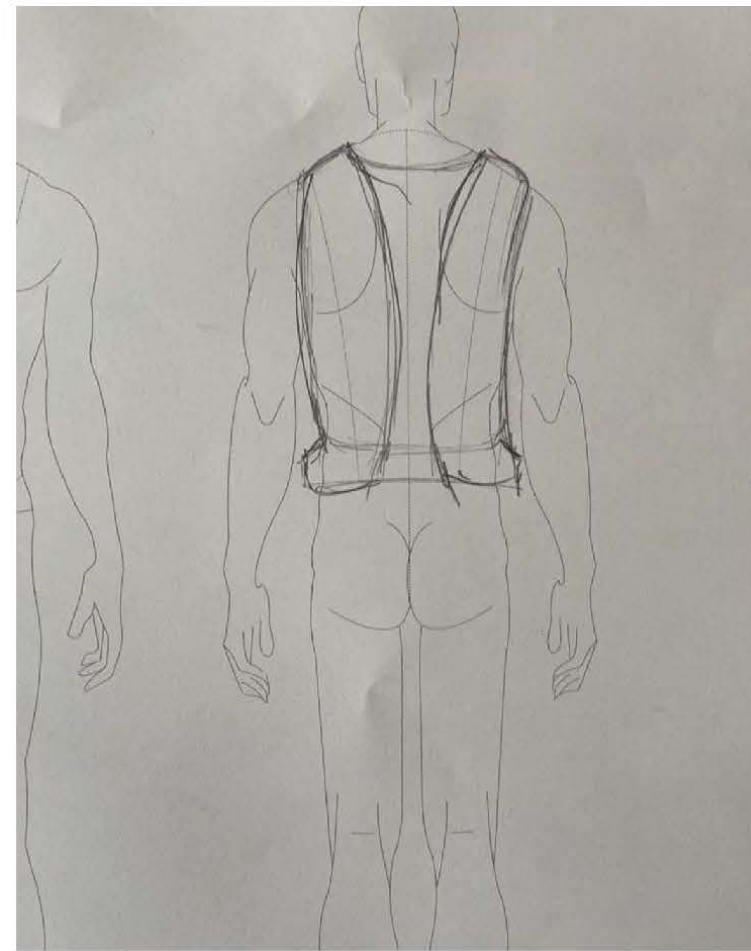
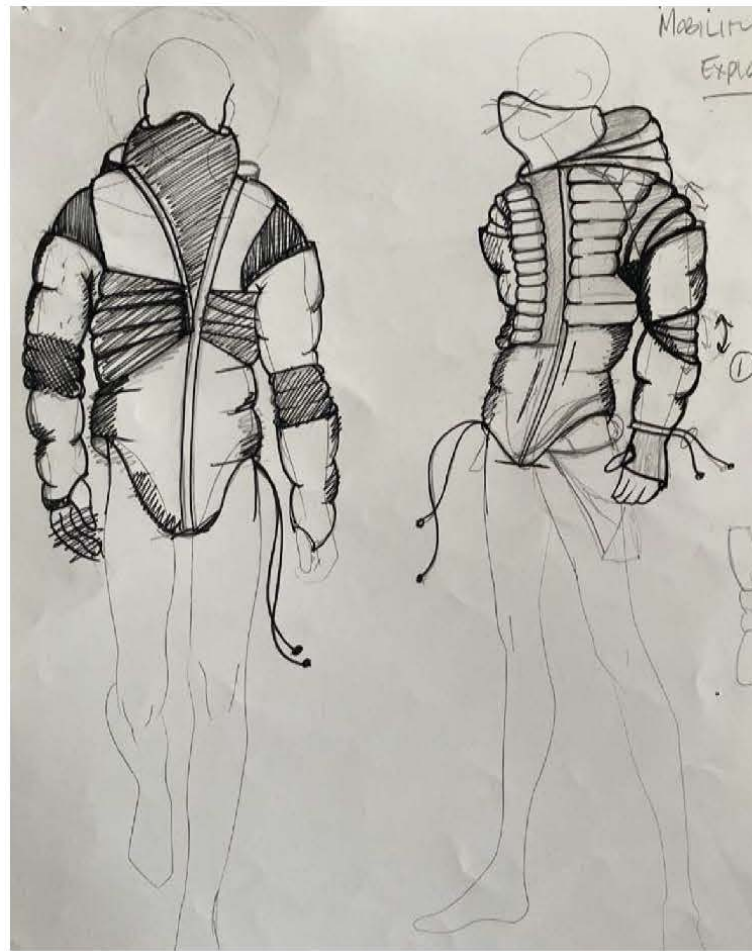


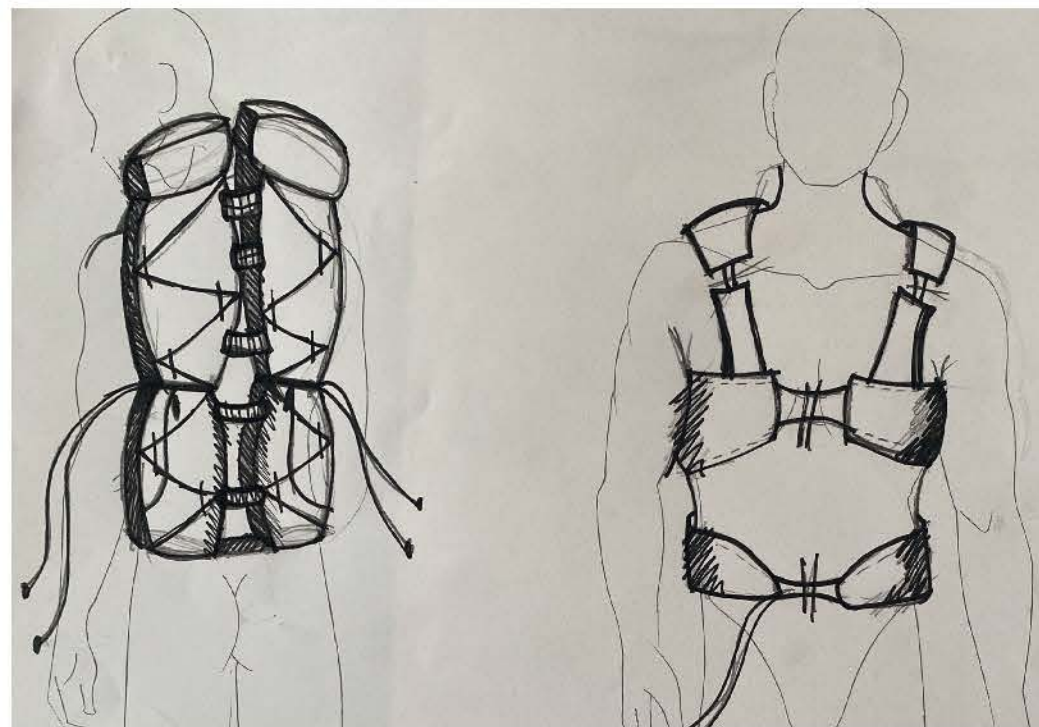
# **Product Look Book**

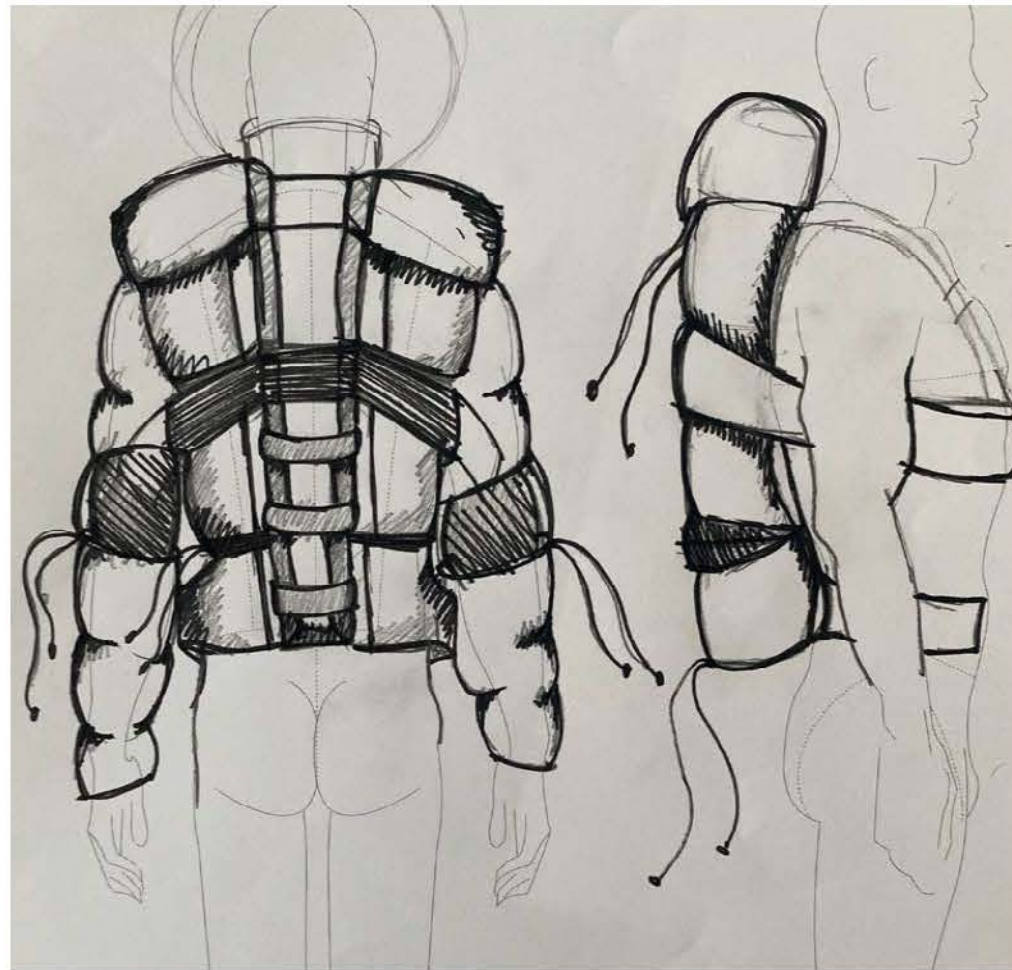
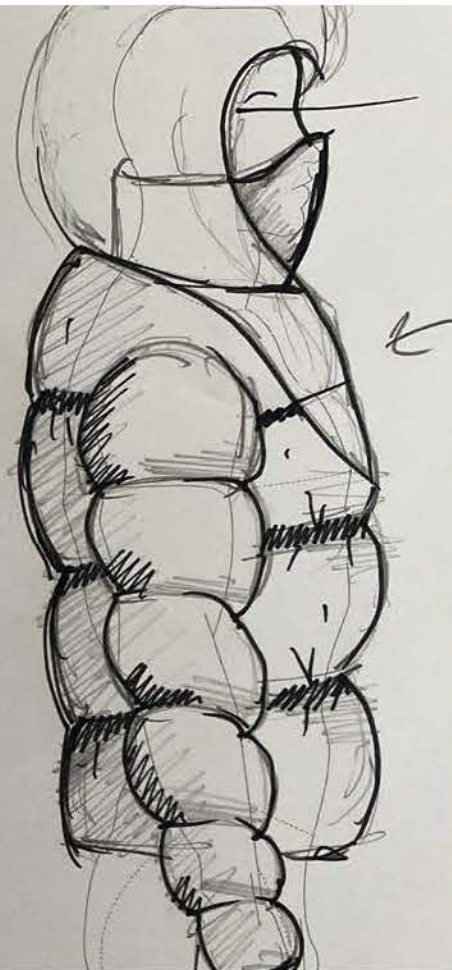
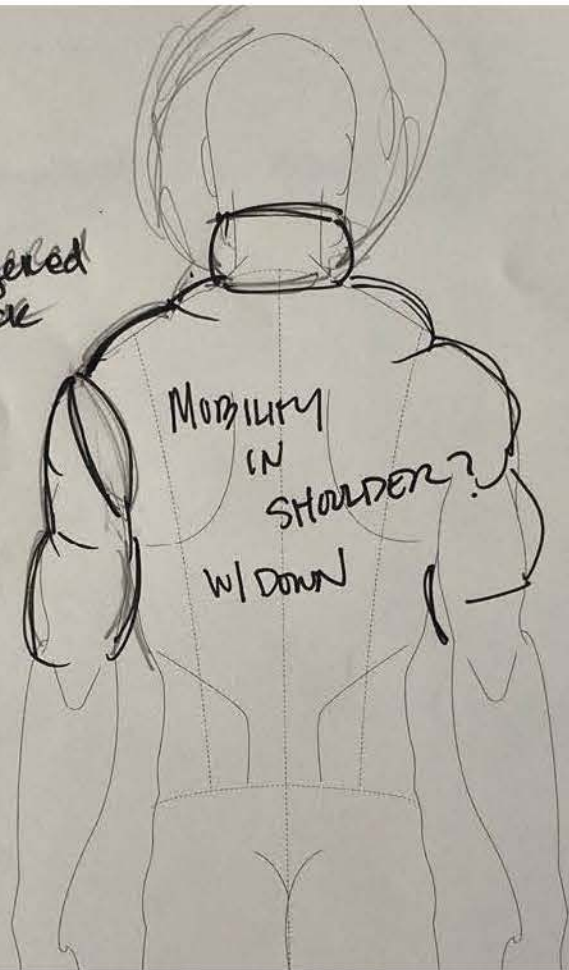
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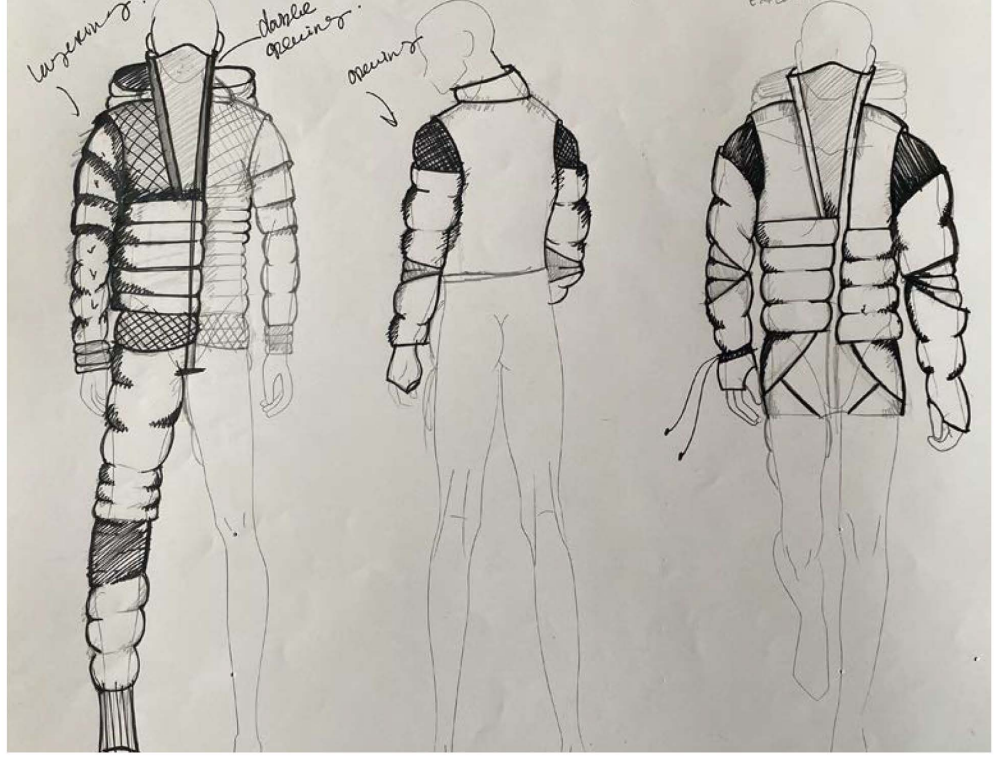
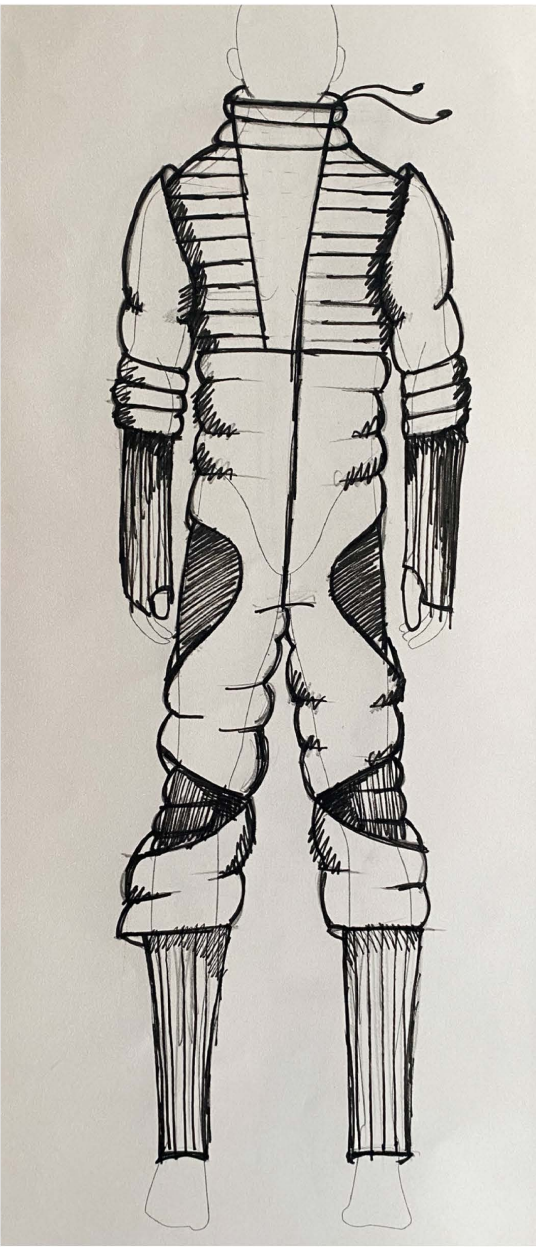
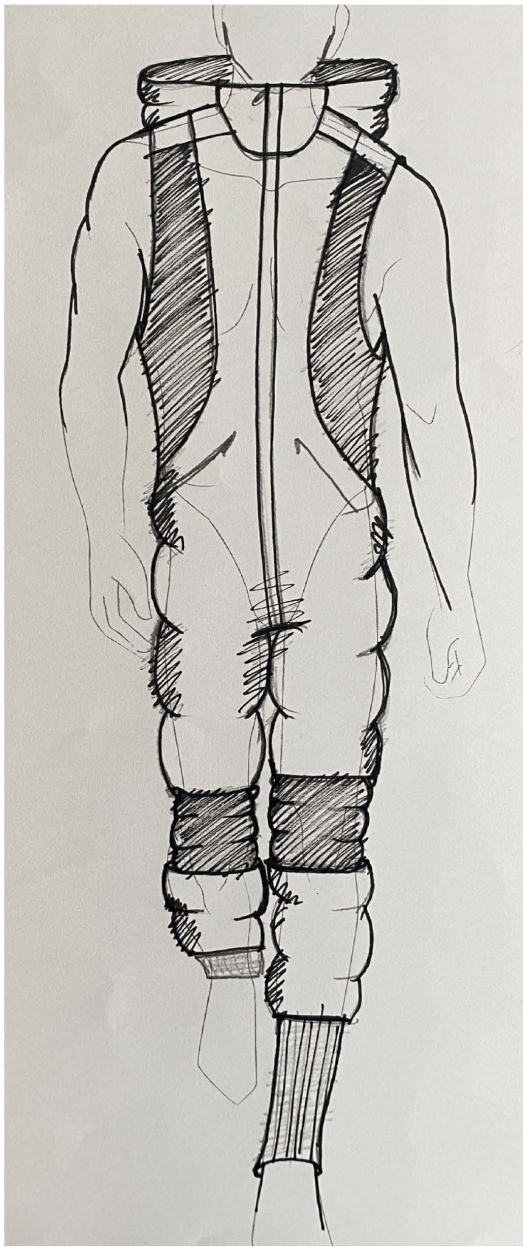
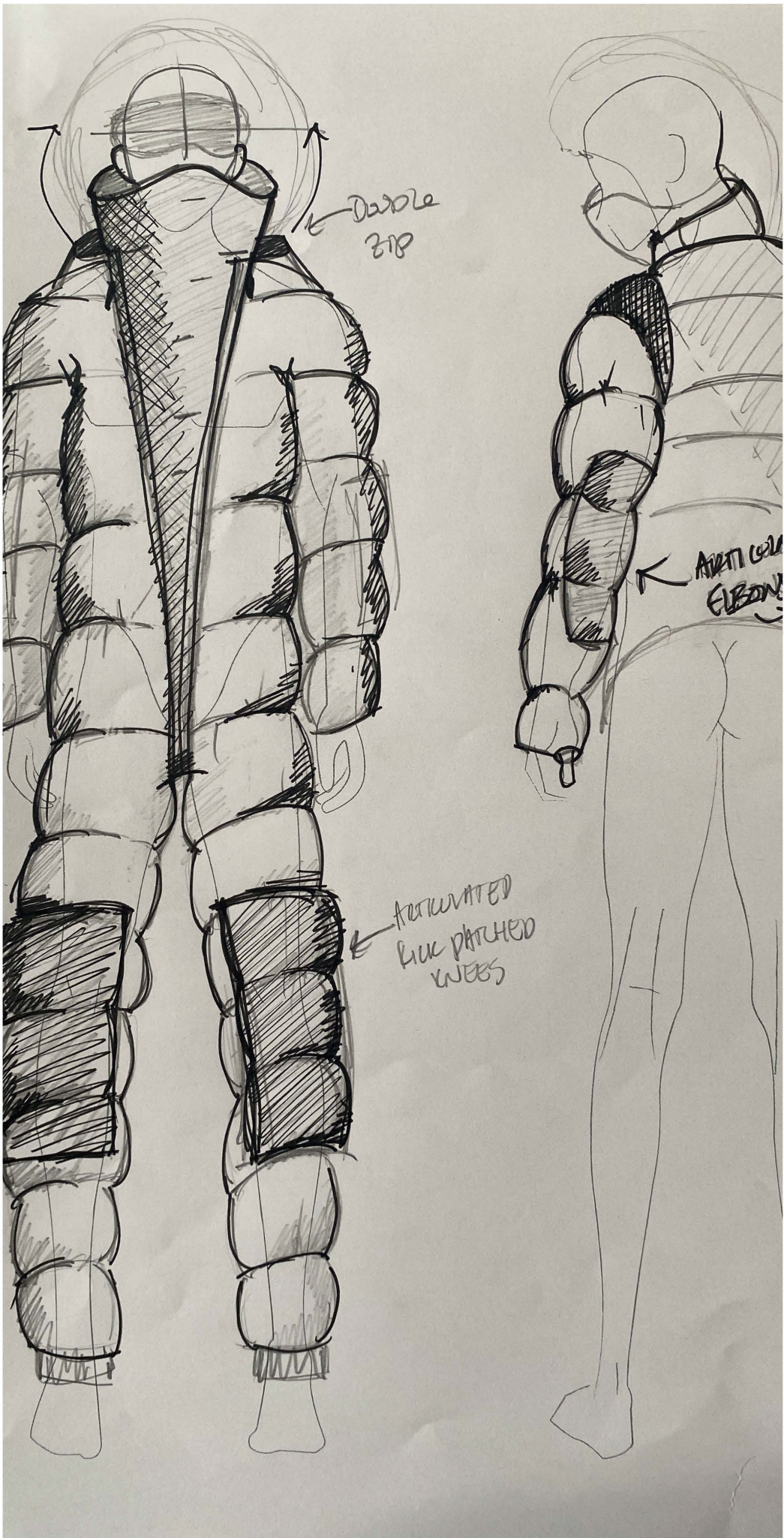
# **Product Look Book Sketches**

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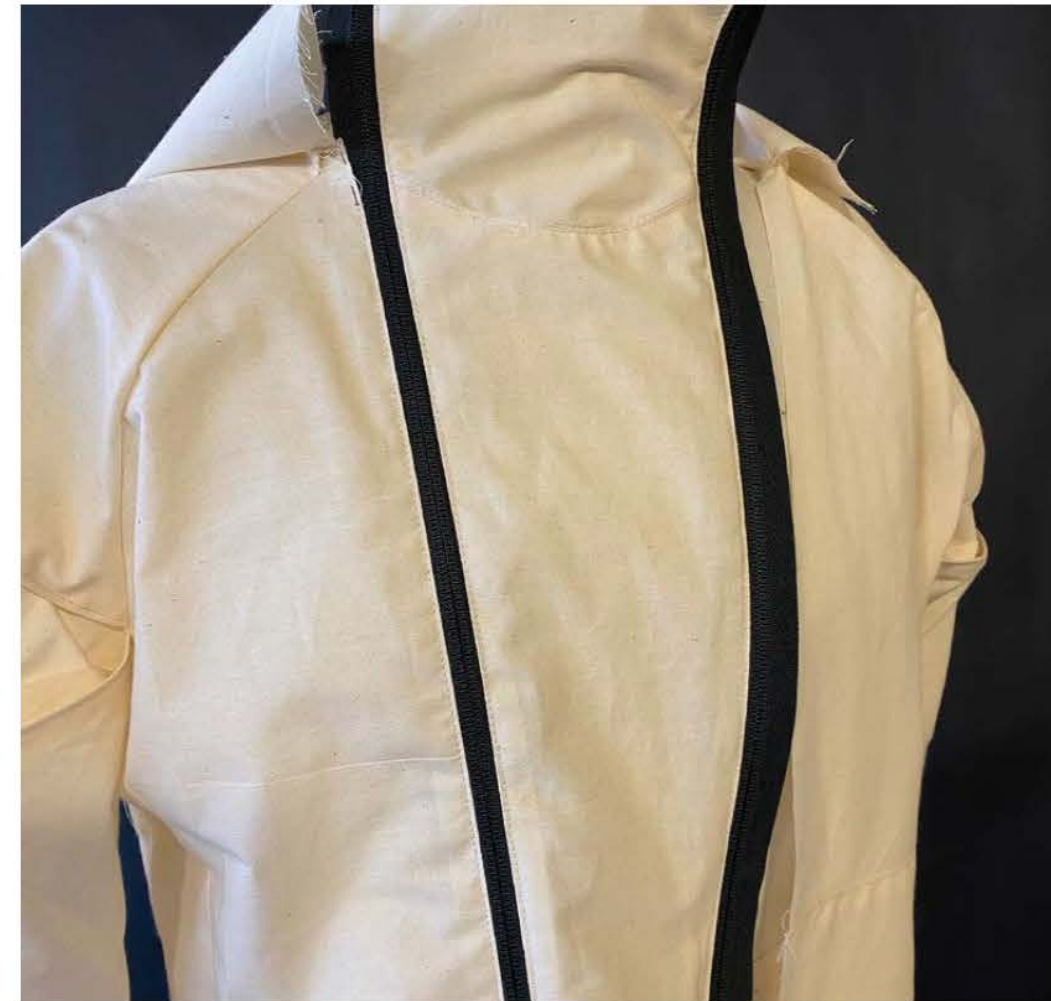


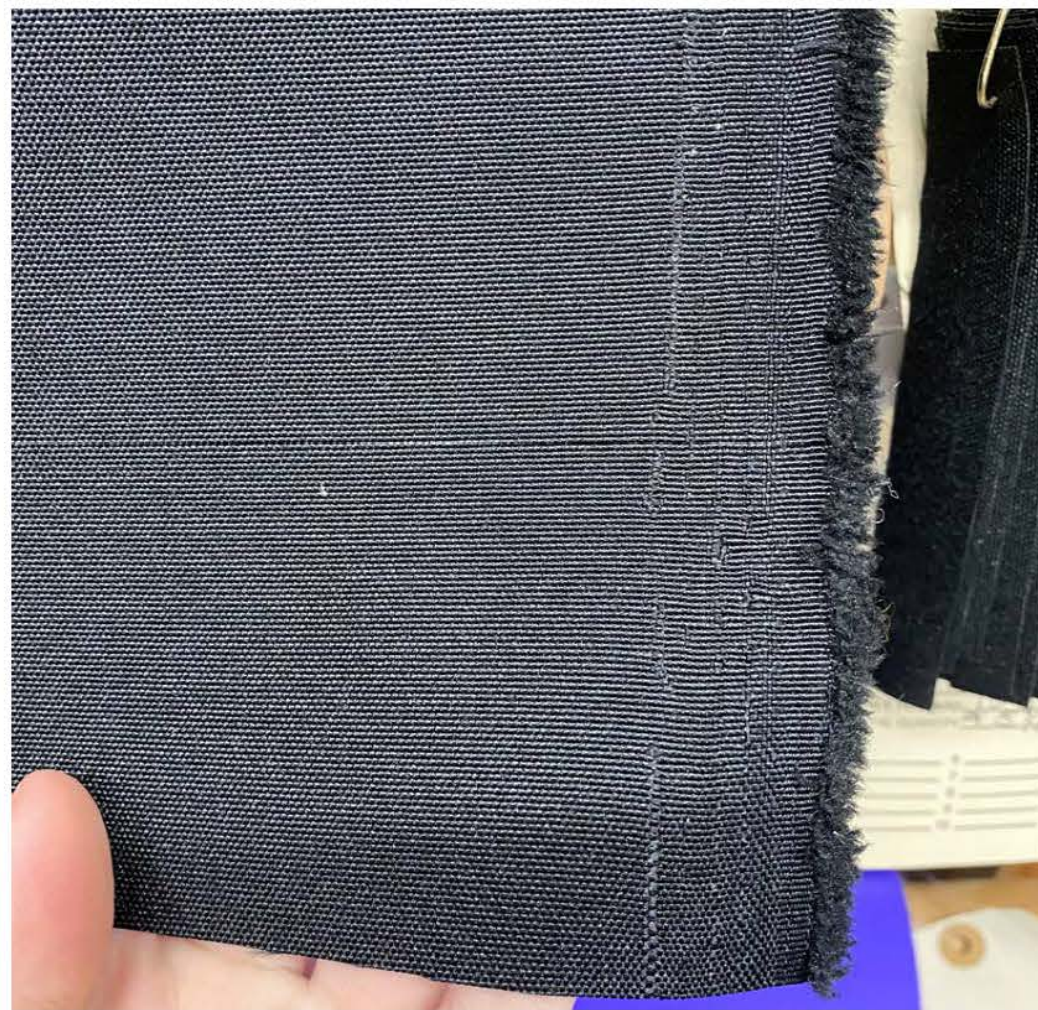


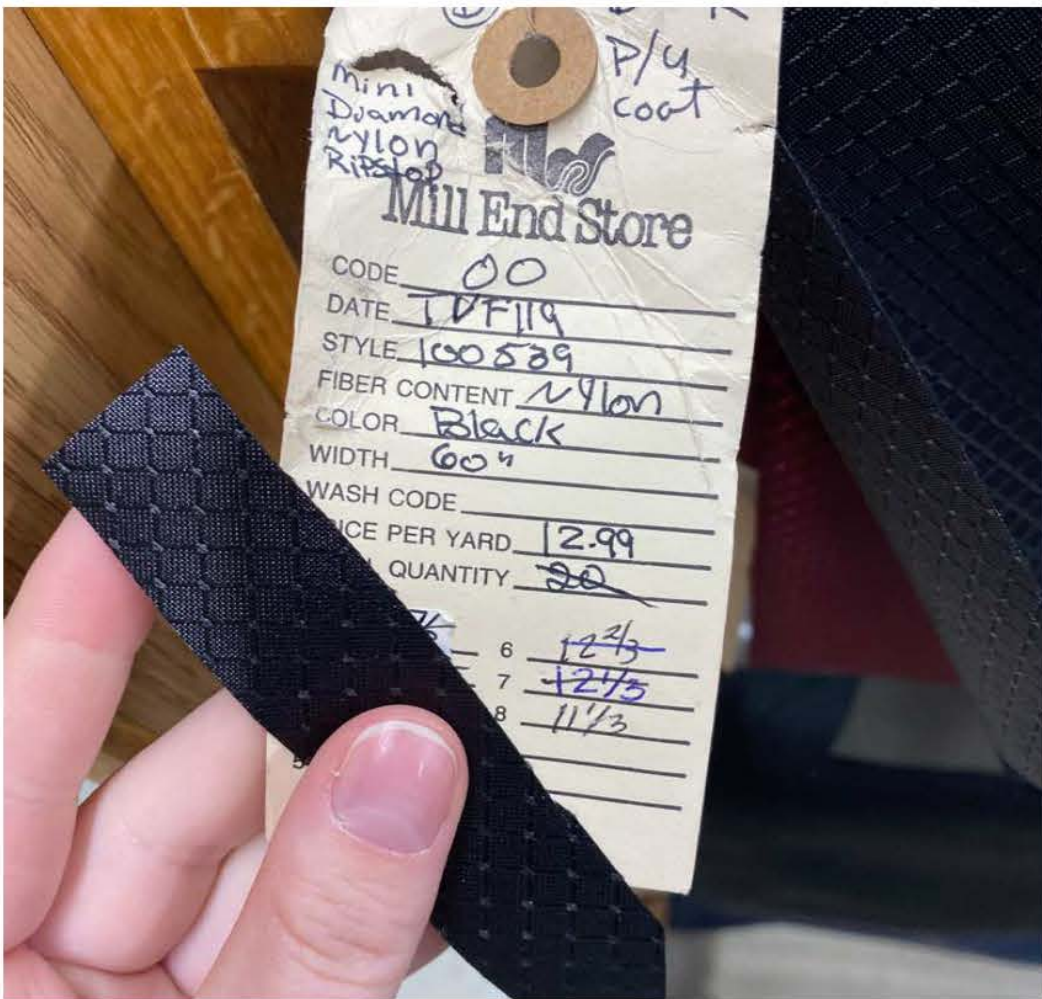
# **Product Look Book**

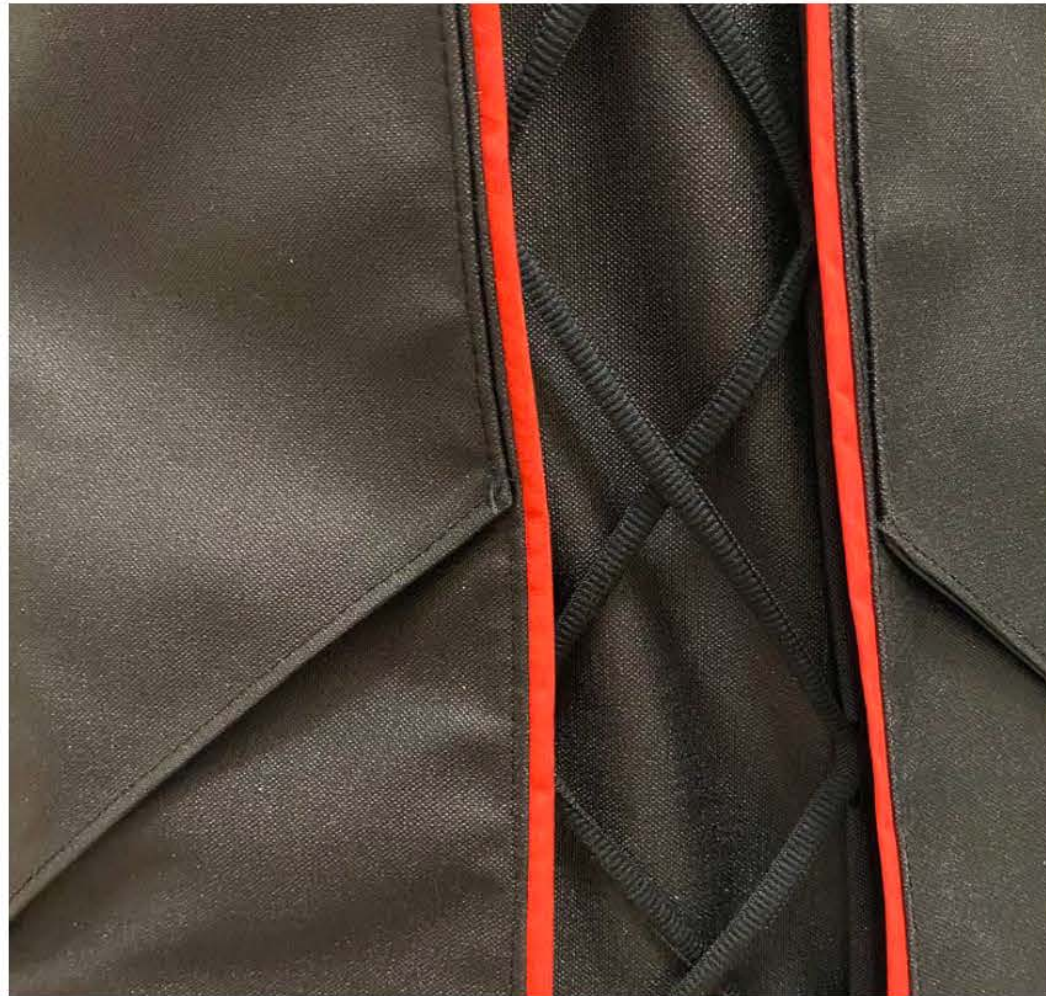
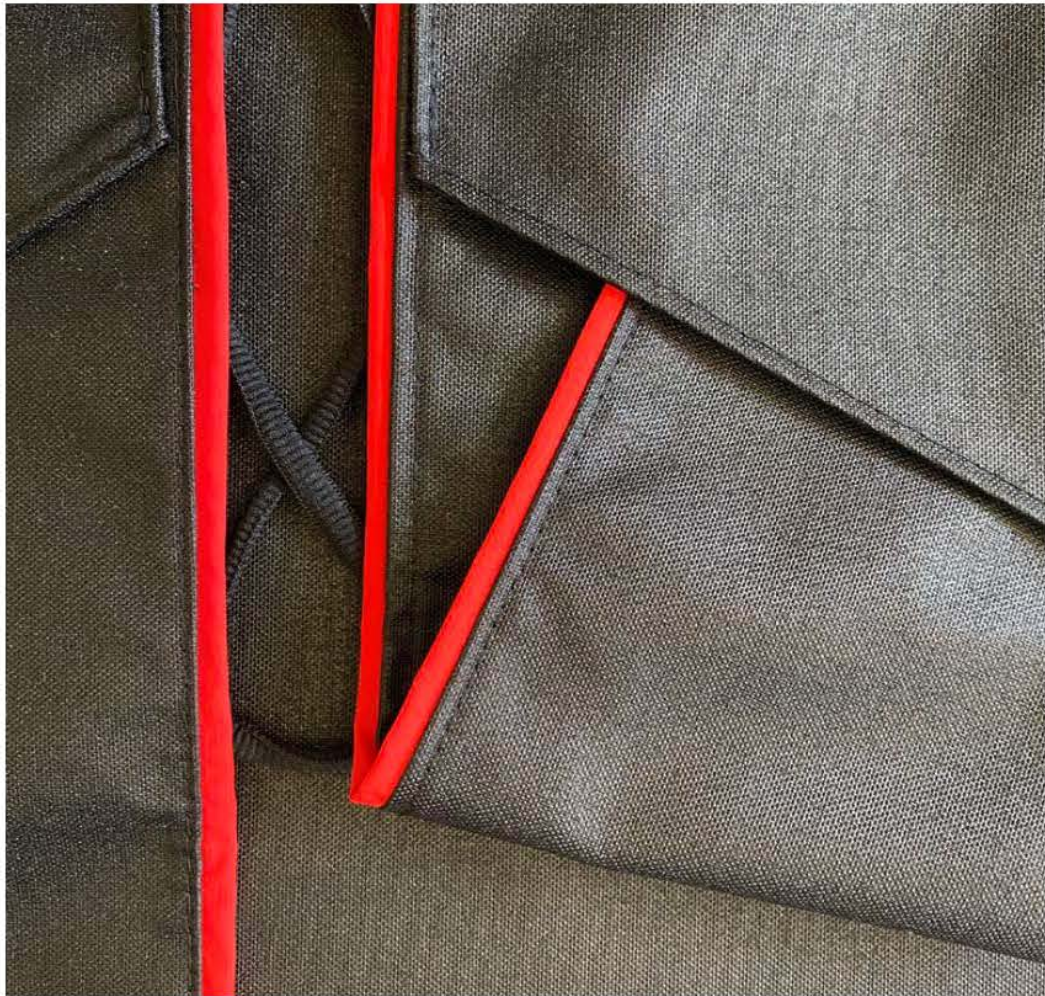
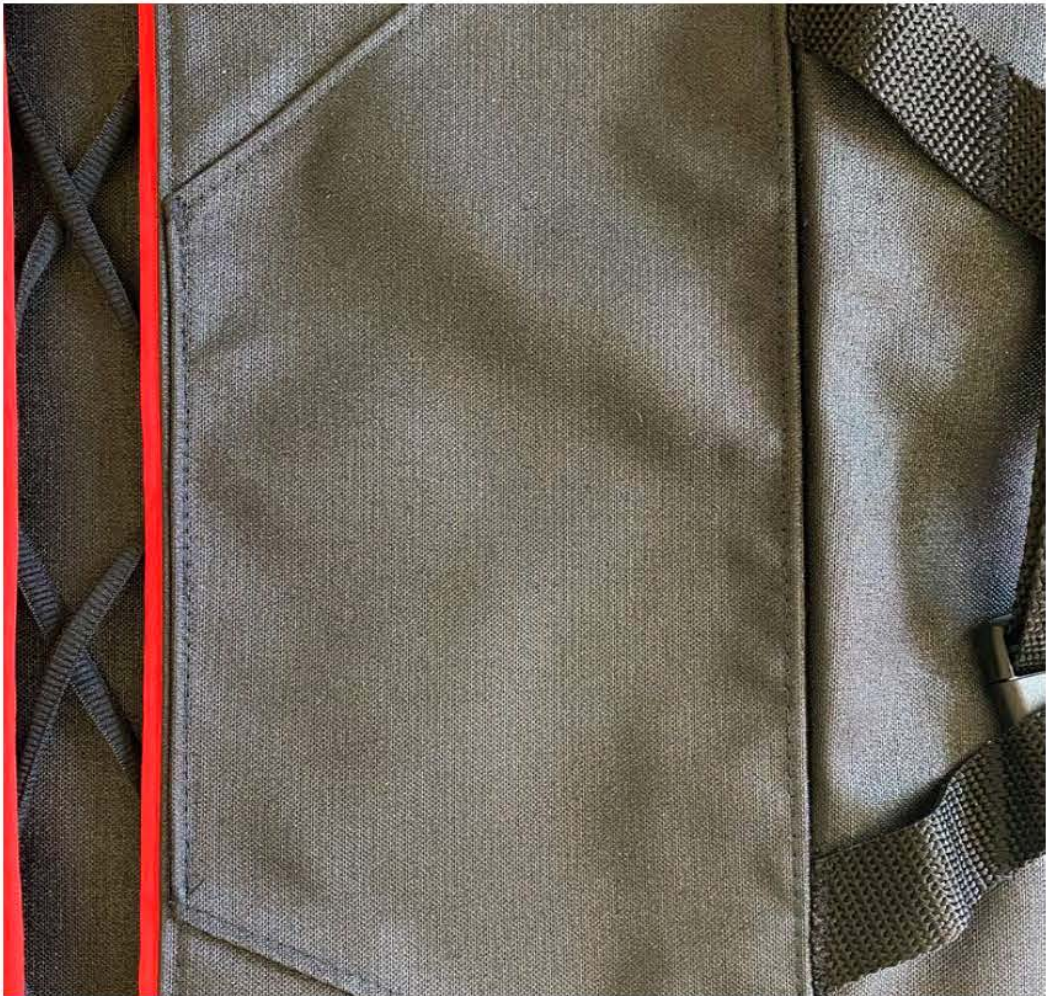
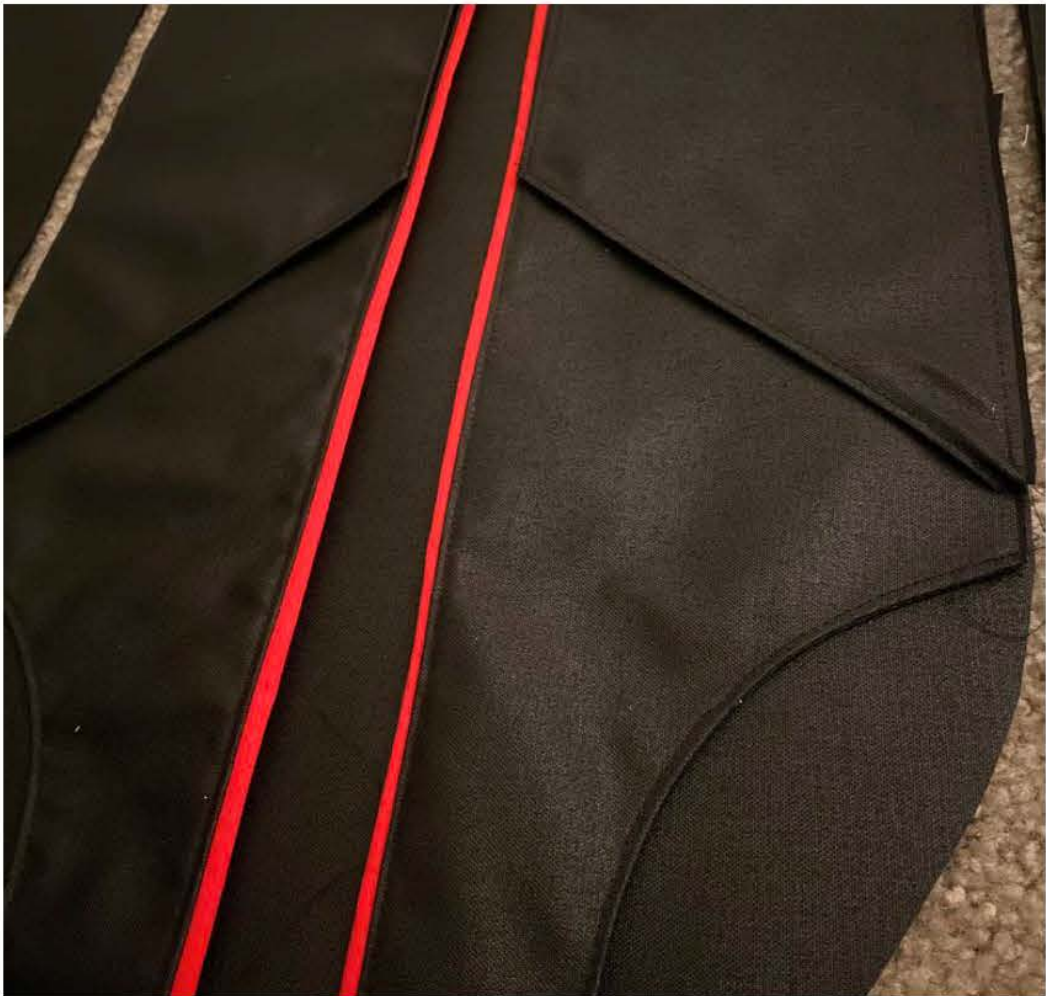
## **Prototyping**

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**Product Look Book**  
**Final Images**

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Sherpa Gear Collection

Valiant. Adaptable. Resilient.







 Makalu









