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## Switchback 1.2

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2017-2018  
Senior Capstone Project

Designed by:  
Daniel Alderfer & Maximilian Munao





## Special Thanks

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# PROJECT BRIEF



Adventure photography is about going out and getting that shot that you can show people and blow them away.

Currently, there are no bags that address the needs of an adventure photographer in the rigorous setting that they encounter. The Wanderer focuses on accessibility, protection and weight distribution, and is designed so you can retrieve your camera, grab the quick shot, and stow the camera away, all without the hassle of digging through your bag.



# RESEARCH









# Adventure Photography





# What is Adventure Photography?



Surfing



Skiing



Backpacking



Mountaineering



Mountain Biking



Climbing

# Meet the Pro





*“My current painpoints are that all of these “adventure” photo backpacks are bricks. They have a flat surface that is supposed to fit on a curved back”*

-  
*Michael Clark*



Michael Clark is an internationally published outdoor photographer who has been a dominant force in adventure, sports, travel, and landscape photography. He brings back stunning images of athletes putting their life



on the line. Michael focuses on rock climbers, mountaineers, kayakers, big-wave surfers, and mountain bikers in remote locations around the world. This requires him to often go out for days at a time with only a small crew.



# Missed The Shot?



Adventure and Outdoor Photographers go out on extended trips for days at a time to get the perfect shot. Even though they are headed for a specific destination, there are always opportunities for a photographer to get a beautiful and unexpected shot.

Missing “the shot” can make or break an expedition for any adventure photographer. The idea of being able to quickly grab your camera and get the shot in any scenario is a crucial one.



Taking your pack off and putting it down while you are trekking is a strenuous task. Adventure photographer's bags usually weigh between 30-50 pounds depending on the person, and have a very specific way to be packed. There

is an order of operations for every item that goes in or comes out. Getting a camera out in a timely manner is both unrealistic and an extreme hassle. With the Switchback1.2, we eliminate this problem.



# SWITCHBACK1.2





ACCESSABILITY

WEIGHT DISTRIBUTION

PROTECTION





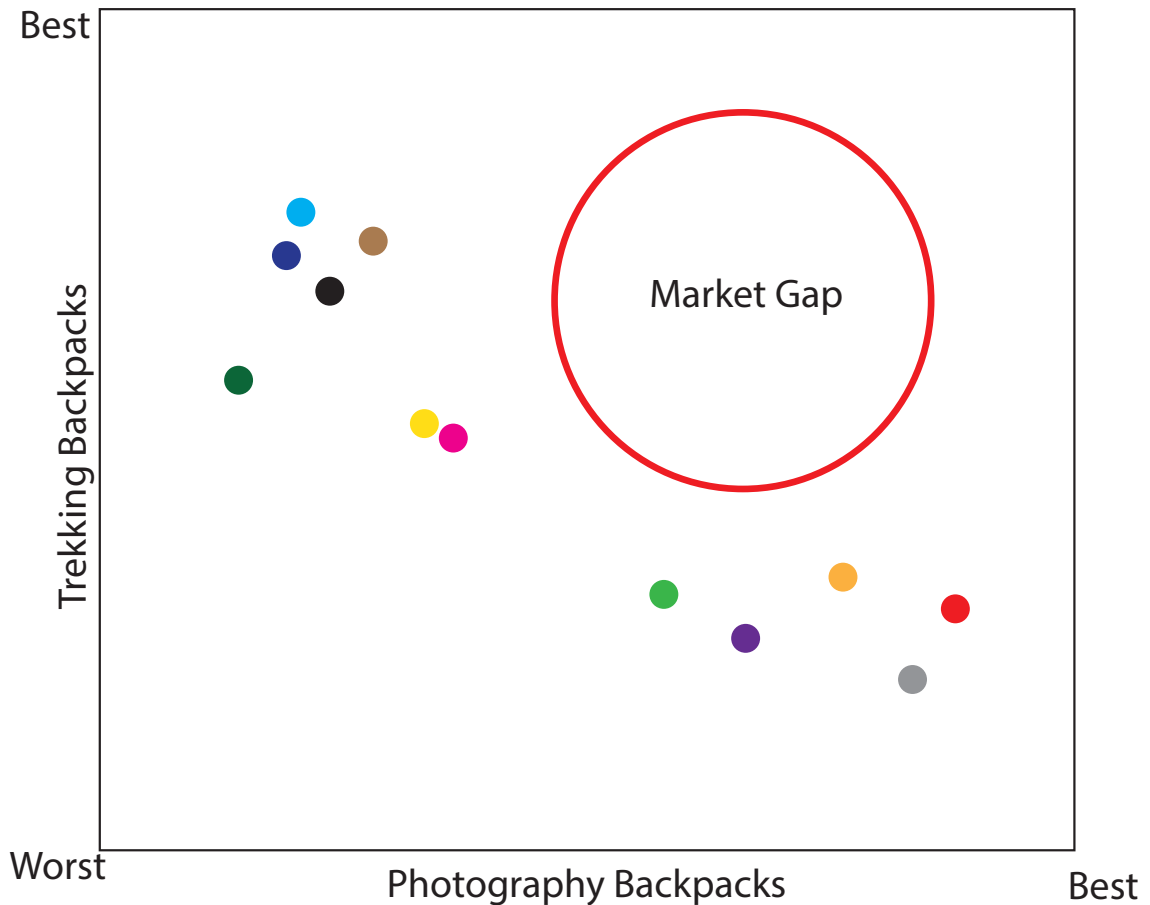
# Market Analysis



The photography market is an enormous ten billion dollar industry. Part of what has sparked this are the professional photographers that are getting out and creating astonishing pieces of work. The adventure photography business specifically relies on both print and digital sources, as well as social media to sustain such a beautiful field. Considering how large the adventure

photography market has become, we still are not seeing many companies breaking the market. Companies such as Lowepro, F-stop, Mindshift and Thule have gotten close, but they can't seem to produce at the level of the pros. This is why many photographers fall back to using standard trekking bags for their extended trips.





- Gregory Baltoro (75L)
- Osprey Atmos (65)
- Kelty Yukon (48)
- Lowepro Photosport 300 II
- Lowepro Flpside 300
- F-Stop Tipola
- Granite Gear Crown2
- Deuter Aircontact Lite 65
- Arc'teryx Bora AR 63 Pack
- South Col™ 70 OutDry
- Mindshift rotation180°
- Thule Perspektiv Daypack

This scatter plot diagram represents the competitors that we see in the market. We ranked each of these bags on a matrix in accordance to how the photography components balance with the backing components. The result shows an eye-opening gap in the market.

# Benchmarking



## ● Gregory Baltoro (75 L) ● 30in x 15in x 14in

### About:

This pack is a 75 liter high performance model designed for trekking and mountaineering. Its Adaptive Response A3 suspension features custom-designed reinforcements that allow you to take full advantage of the capacity, with a Matrix ventilated back panel that assures comfort in all four seasons.



### Pros:

- Response A3 suspension system
- Hydration sleeve
- Wishbone internal aluminum frame
- 3D AIR hipbelts and shoulder harnesses
- Panel Loader and top loader



### Cons:

- No designated camera compartment
- 5.15 lbs
- Not waterproof



## ● Kelty Yukon (48 L) ●

22.5 x 23 x 11 in



### About:

This 48 liter external frame Kelty model is designed for the weekender that is going backpacking/ camping. However, its adaptive capabilities with the external frame allow for a different style of backpacking. This slightly more old-school design may lack popularity among the masses but it definitely provides certain features that internal frame models cannot.



### Pros:

- External Frame
- Adaptability (attachment points, pockets, etc)
- One primary pocket to put everything in
- Rigid fit is preferred by some

### Cons:

- No designated camera compartment
- One primary pocket
- Rigid external frame fit
- Small volume



## ● F-stop Tilopa (50 L) ●

23.5inx14inx12in



### About:

The Tilopa is an all-rounder and the most rugged pack F-stop makes. The Tilopa works well for both multi-day trips and short day hikes off the beaten path. With H-frame ski straps and attachment points for backcountry equipment, the Tilopa is suitable for even the most hardcore of outdoor professionals.



### Pros:

- ICU camera compartment in back
- Customization of ICU size
- External gear attachment points
- Rugged material consideration and build



### Cons:

- Lack of suspension system
- Access to camera gear requires pack removal
- Limited capacity for trekking gear

## ● Lowepro Photo Sport 300 (30L) ●

10.63 x 9.45 x 22.05 in



### About:

Photo Sport BP 300 II AW is designed to protect your photo gear in the UltraCinch chamber, and all of your journey's essentials in the open space. This pack can hold a DSLR camera and one lens. This pack is designed to be lightweight for speed and comfort.



### Pros:

- UltraCinch chamber for camera is secure
- Lightweight
- Suspension system is light but rigid
- Ergonomic fit



### Cons:

- UltraCinch chamber is quite small
- Small capacity
- Designed for hobbyist/weekender

# Trend Analysis

## Ultralight Backpacking

Ultralight is a term that is defined by the extreme reduction of gear and weight in the context of backpacking or trekking. In the market, a very dominant trend of going ultralight has presented itself. This means adventurers are buying extremely lightweight packs, gear, clothes, as well as bringing significantly less gear on their trip in the first place.

Hyperlite Mountain Gear is a company that has revolutionized this industry using Dyneema (formerly Cuben fiber) to create a lightweight, water resistant, and durable pack that is reliable. They are primarily smaller, frameless/ minimal frame bags that cater to the needs of the the advnturer. This doesnt exactly fit into the market of the adventure



photographer. Although adventure photographers need to keep their weight down as much as possible, they carry far too much weight to fall into this category. This Ultralight movement however has opened many doors when it comes to the technology used in these packs as well as the materiality.







## DIY Backpacks

Sometimes adventurers don't always find what they want on the market. The solution for them is to create it themselves. In many cases these DIY projects resemble ultralight or frameless packs. High performance ultralight packs are sold at a very high price point, therefore it drives people to create their own version. One of the main factors

driving people to make their own bags is the minimalist mentality, many backpackers looking to lower their weight can get by with a stuffsack with straps sewn onto it. This mentality sacrifices a lot of comfort, but shaving off a few pounds can mean the difference of a few miles of trail, and usually means a more comfortable journey.

## Minimalists

Instead of a full tent with poles and a rain fly, a tarp and a trekking pole can be used to make a rain shelter. Alternatively a hammock or a bivysack can be used for a shelter. There are also quilts which are alternatives to sleeping bags which reduce the weight and size. Minimalist

backpacking really boils down to packing smart. Identifying items that can be used for multiple tasks and assigning them a value based on those tasks. This all factors in when packing to ensure the most value and functionality of each item



# DEVELOPMENT





# Criteria

## ACCESSIBILITY

It is crucial for an outdoor photographer to be able to quickly access their camera. The desired shot could disappear in the blink of an eye

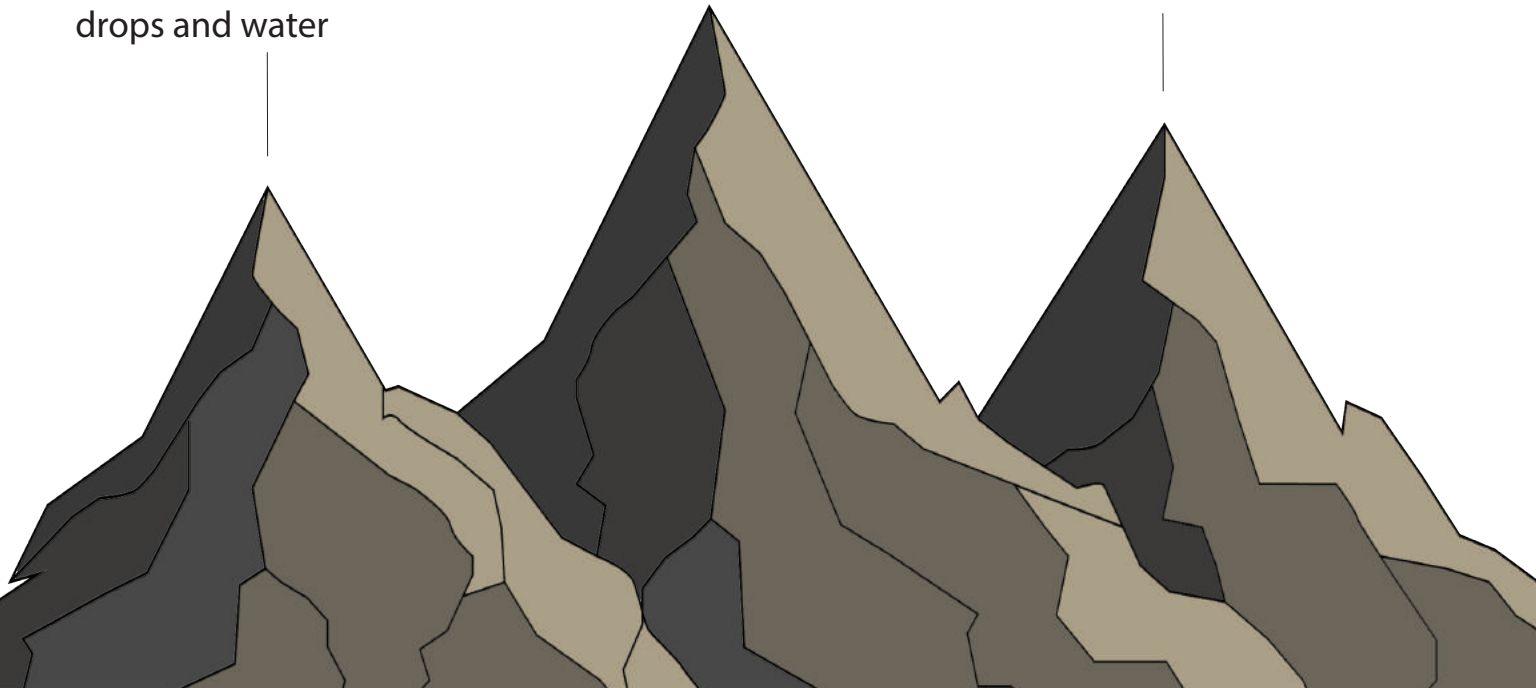
## WEIGHT

### DISTRIBUTION

Camera gear weighs a lot, and when paired with trekking gear, the distribution of the pack's weight becomes crucial to the user's comfort

## PROTECTION

When carrying thousands of dollars of delicate camera equipment, it is essential that the gear is protected from drops and water





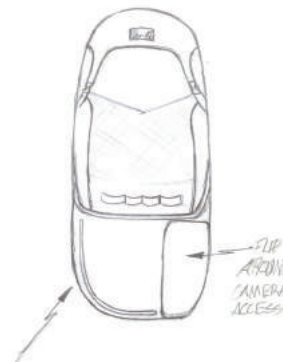
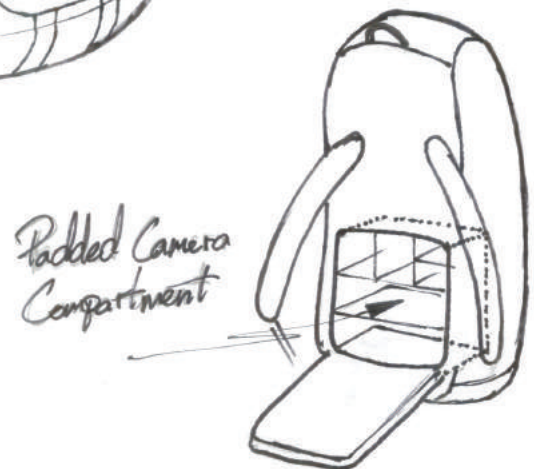
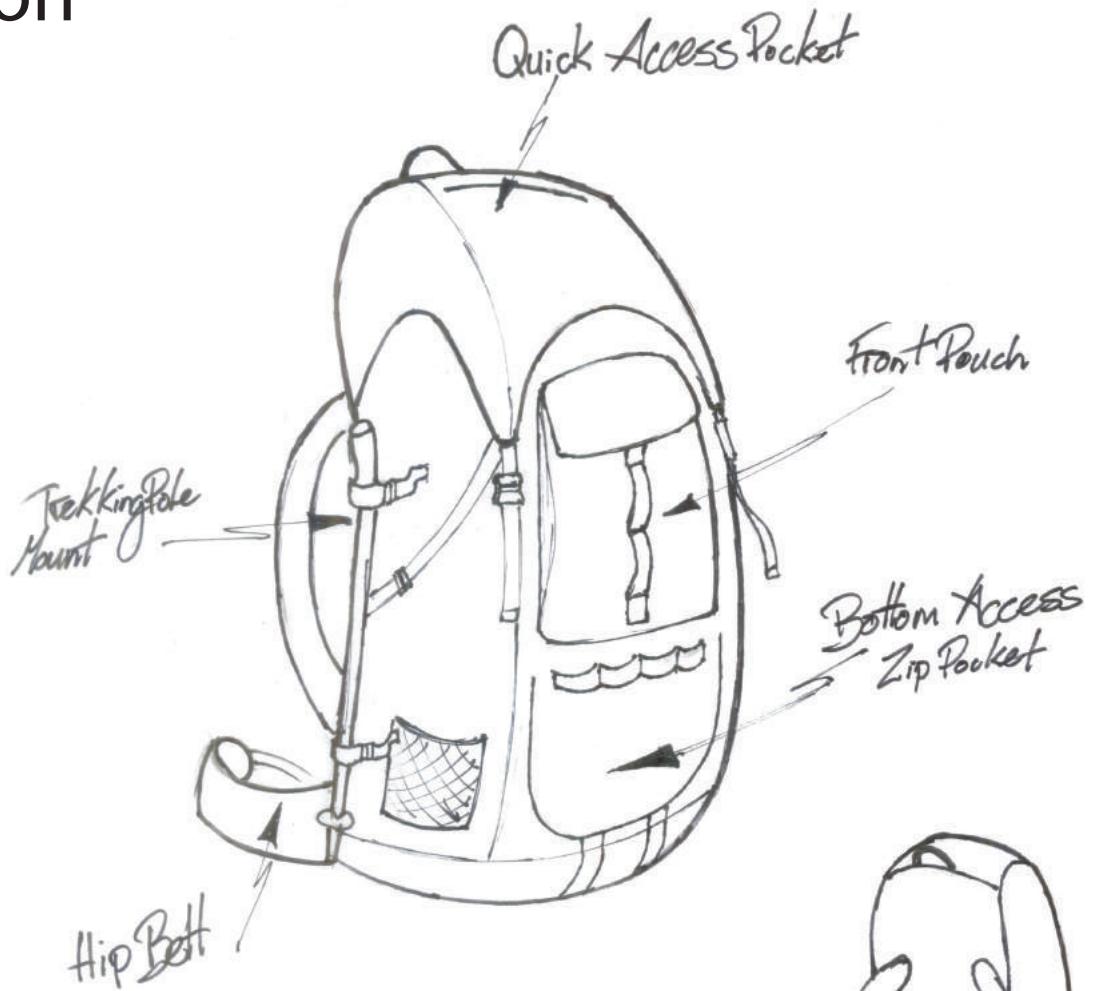
# Environment

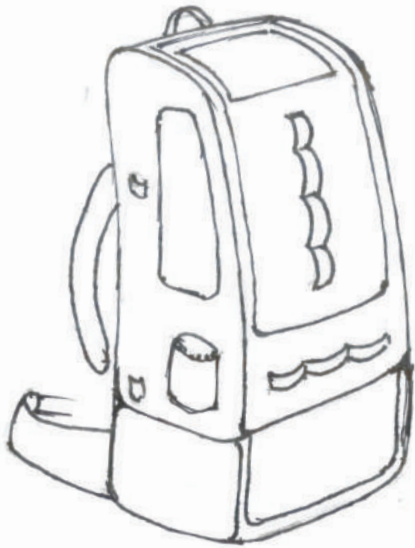
When doing a multi-day expedition, your pack is your home. You literally include everything you need for basic survival, whether it be for a day or a month, and live out of it. There is no room for mistakes and there is no room for non essential items.

This gear may vary for each adventurer, but the pack is the most important part of it all. The bag has to meet your needs, be protective, be durable, withstand the elements, and most importantly instill confidence in the user.



# Ideation





In order to start brainstorming, we utilized sketching as a tool to get some initial ideas flowing . In looking at the criteria that we created for ourselves and our research, it was clear that the camera component

needed to be the defining feature of this bag. The goal was to get the camera closer to the photographer's body so they could access it without taking the bag off. The question was, in what way is that done?



# Mock-Up 1



Store Lenses in Easy Slide Around Spot

◦

Never Miss a Shot

◦

Pack it up Without Taking The Bag Off



This mock-up was constructed simply by using an existing trekking backpack and packing materials that would represent the camera unit. The idea was that the camera unit would act as the hip belt and bottom of the suspension system in the bag. After creating the mock-up it was evident that the weight distribution and protection of this solution would not be ideal for the scenario that we are designing for. Mock up 1 was a simple

solution to the criteria that we proposed for ourselves. In that regard it was a success. The model made it clear that this was not the solution that we needed, but the camera coming around to the person's front side was indeed the desired motion. Our next steps were to keep ideating and improving our design until we had a viable solution that checked every box of the criteria we established.



# Mock-Up 2





## External Frame Construction

- 

## Full Size Mock-Up

- 

## Refinement of Quick Access Compartment

# Mock-Up 2 Takeaways

## PROS

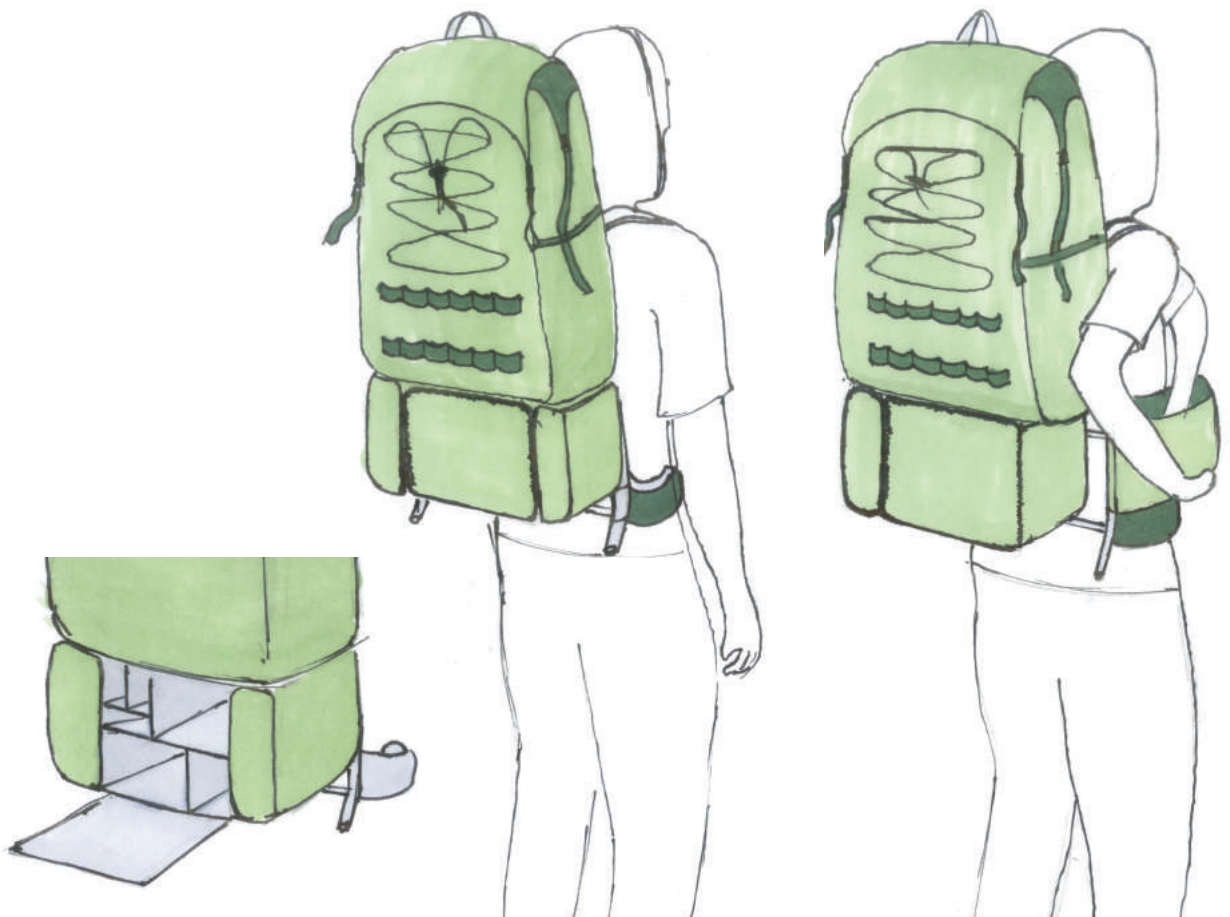
- Quick access worked well
- Camera unit for extra gear worked well
- Good hinge system

## CONS

- External Frame is outdated
- Mock-Up didn't reflect realistic weight distribution
- Material didnt allow for accurate construction

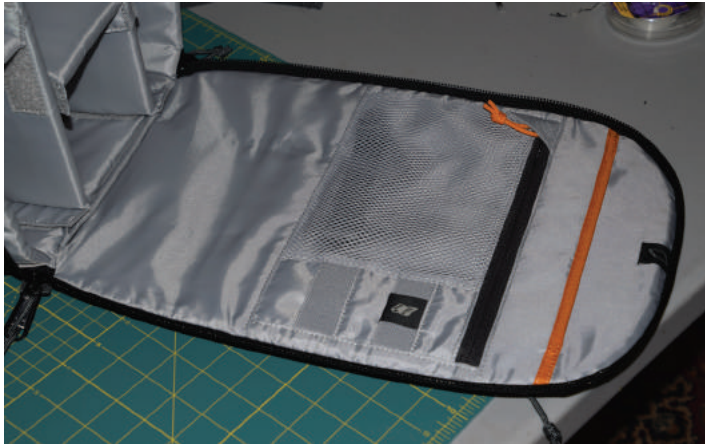
# MOVING FORWARD

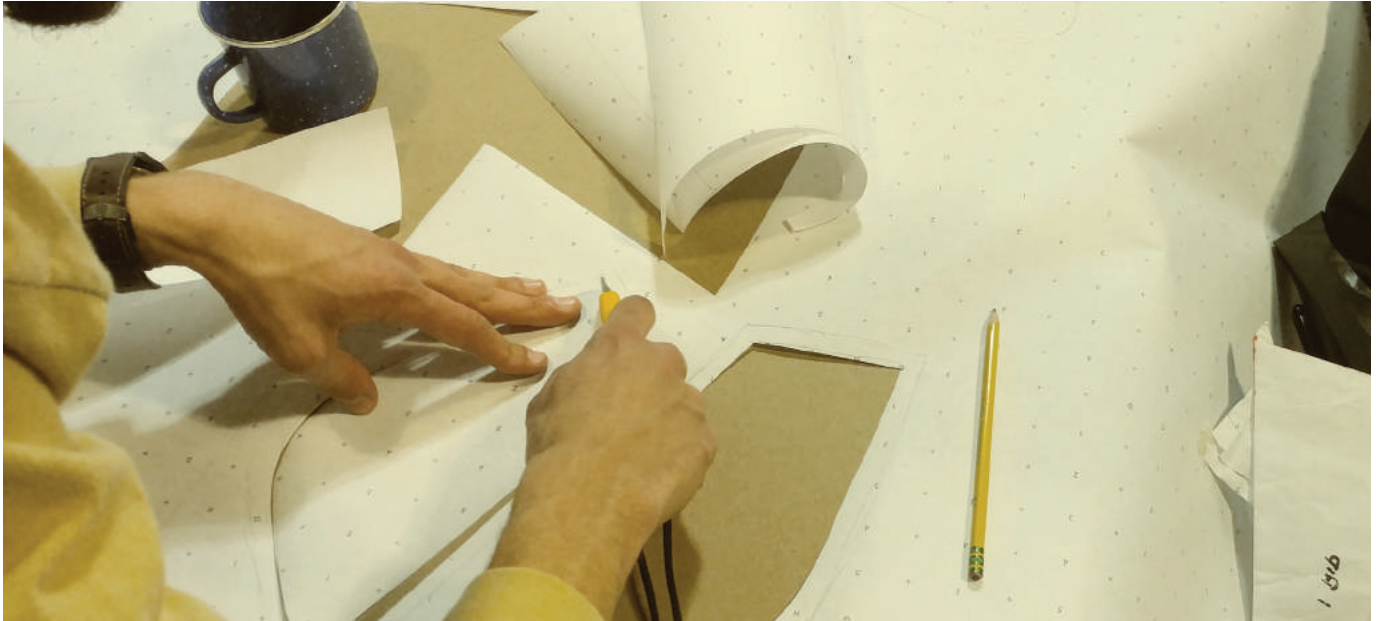
- Iterate upon the hinge system and quick access pocket
- Switch to internal frame
- Use realistic construction methods and materials





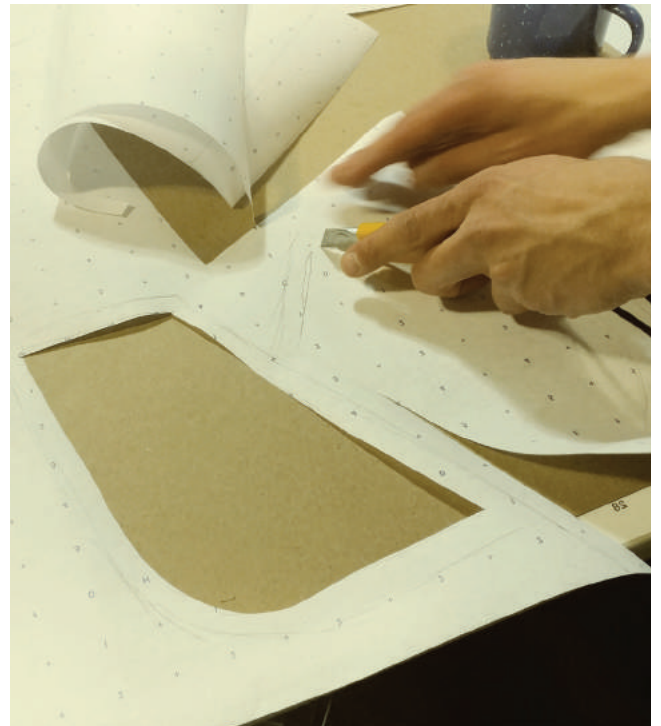
# Learning the Process





After getting in touch with a designer at Lowepro, we were lucky enough to receive two photo bags that we could use in our learning process. We utilized these bags by deconstructing them and learning how they were originally constructed, and how they used material in certain ways. This was key to our own development considering our lack of experience in sewing and bag design.

In addition to learning the actual construction methods of building a bag, we had to physically learn how to sew a bag together in a professional fashion. This meant learning techniques, stitch patterns, pattern making, etc.



# PROTOTYPING







# Quick Access Iteration

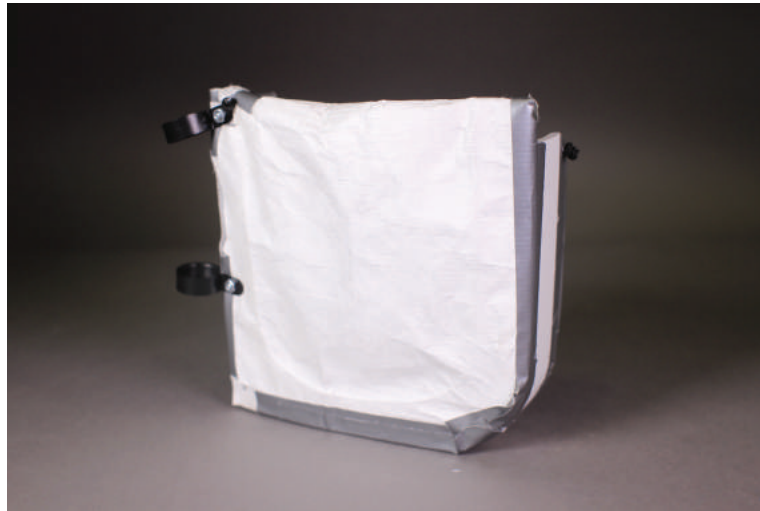
The aspect of the quick access camera compartment is arguably the most important feature of the Switchback 1.2. That being said, we had to ensure that it really functioned the way it needed to in order to perform on the professional level. In order to get the perfect design, we had to iterate.

Considering the purpose of the quick access feature, it was crucial that it worked flawlessly. Speed is key, so being able to simply and easily flip around the compartment is crucial. However, with the challenge of the user being strapped into a complex system of straps and belts in the suspension, it also needed to be easy

to pull the actual camera out. With this challenge, iteration on the actual enclosure system was necessary. Zippers, magnets, sinch cords. There were benefits and draw backs to each, but what really made the deciding factor was what was easiest for the user.

Through many iterations it was evident that what seemed easiest was a simple sinch cord enclosure. It was a one handed motion that made it easy to pull the camera out. Although this enclosure is not waterproof, we figured the design could take this into account by using a interior housing.





Designed for 1 camera body and 1 lense

○

Too Narrow for full setup

○

Rectilinear form wouldnt fit into bag ideally



Easy Access



Compartment too small

Zipper is hard  
to use one handed



○

Compartment not  
Structured Enough





# Prototype 1



Learned to sew



Constructed Bag with Realistic Materials



Add Desired Features





# Prototype 1 Development

This first full prototype we did was more about our skill development than anything else. Having not sewn a full bag together prior to this prototype, it was essential that we understand everything that went into it. We learned how much seam tolerance to allow, how some areas of the bag needed to be reinforced, as well as how this extremely thin material operated with the sewing machine.

This prototype was also a bit of a Frankenstein bag as it was put together with various components of other existing

bags. In addition, the material was not very high quality. Even though it was riptop nylon, it was not water resistant and very thin.

Prototype 1 also featured two quick access flip around compartments. This was an experiment that proved to be unnecessary as it was really too much space for gear that may be needed in the quick access compartment. The sizing of this pack was also slightly small for the target demographic, so from this point on the pack needed to be bigger.





## Quick Access Flip Around Camera Compartment

○

## Compression Straps and Bunjee

○

## Hip Belt for Support System



# Internal Camera Unit





The concept of the ICU (internal camera unit) is not an original idea. After analyzing the market, and talking with professionals such as Michael Clark, it is clear that this component is well liked by professionals in the field and provides a versatile solution for the user. This proved that we needed to include this feature in the Switchback 1.2.



# Prototype 2

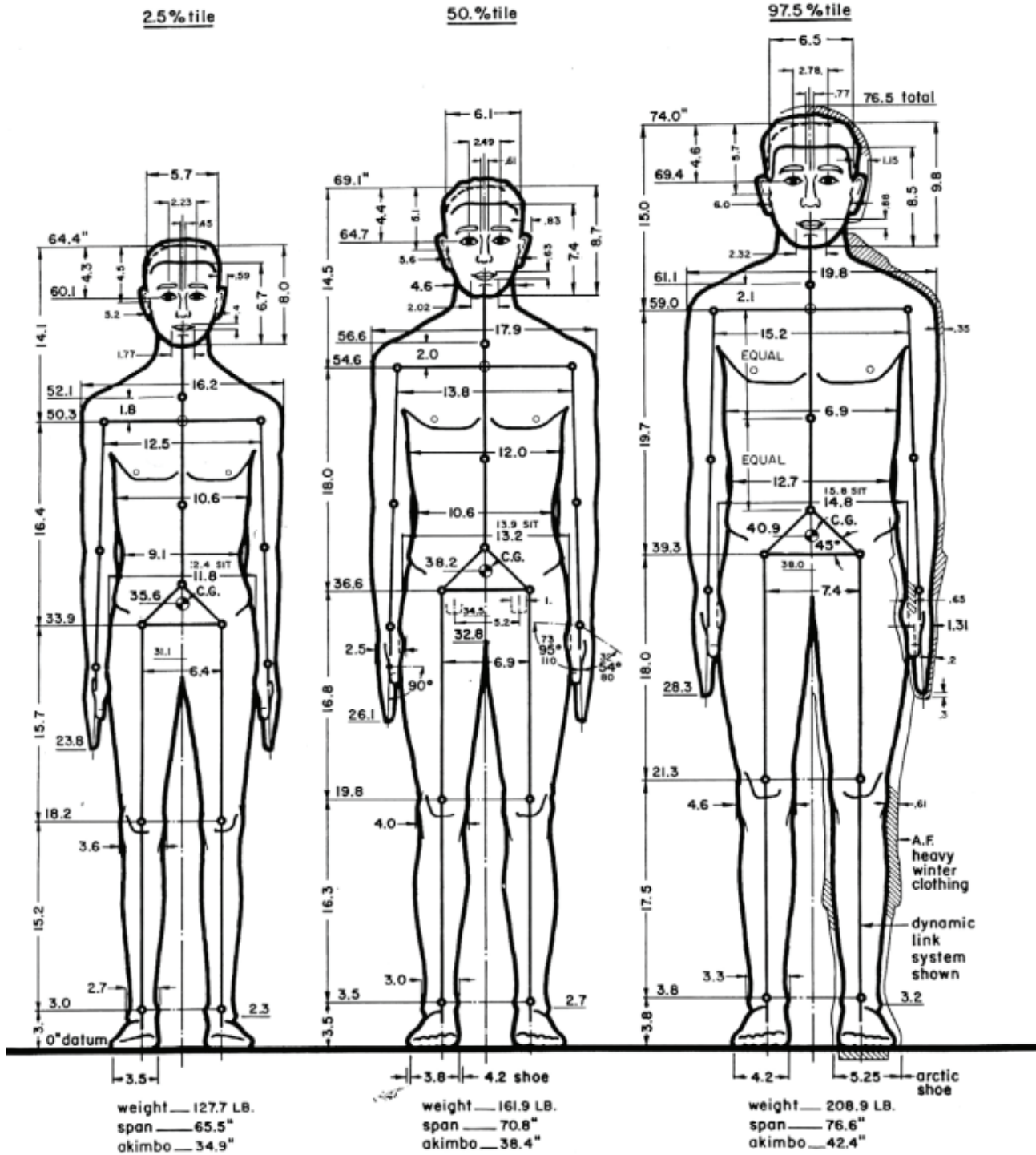
Prototype 2 was focused around implementing the quick access feature into the bag in a seamless manner. This bag was constructed from coated ripstop nylon and silnylon. It was the first full pack that we made after talking with Michael Clark about the internal camera unit. Although this bag was beneficial to understanding and better dimensioned the quick access compartment, there were obvious gaps in the weight distribution and ergonomic category.







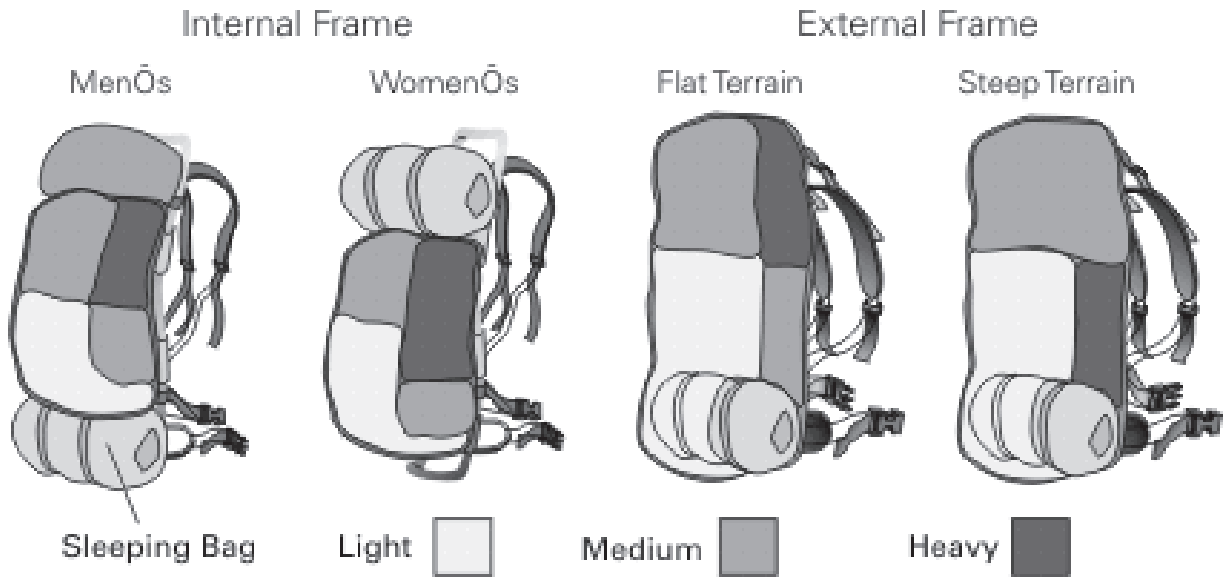
# Parameters



The Measure of Man and Woman was a useful resource for human factor consideration. We sourced the dimensions of various body sizes to ensure that the dimensions of our pack met the needs of as many body types as possible.



# Weight Distribution

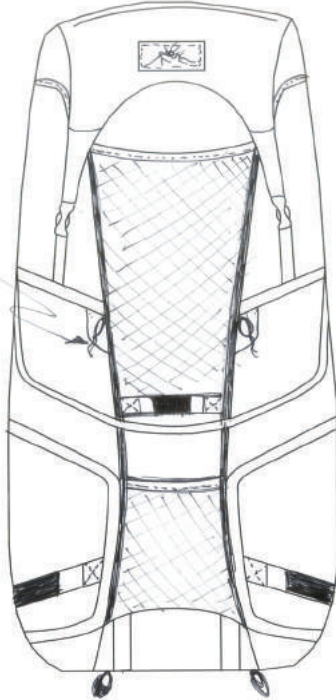
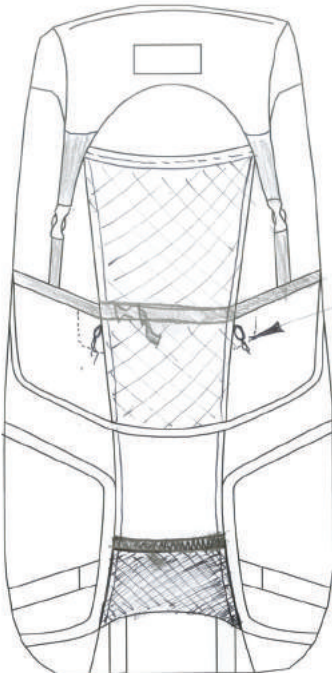
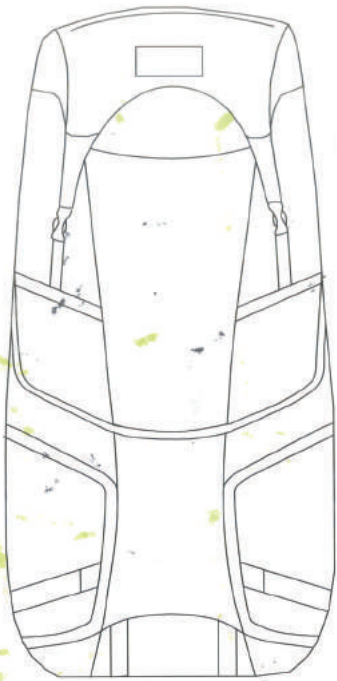
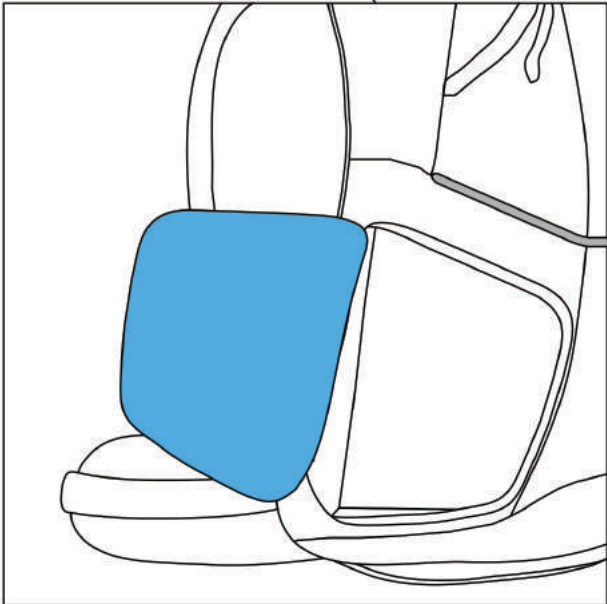
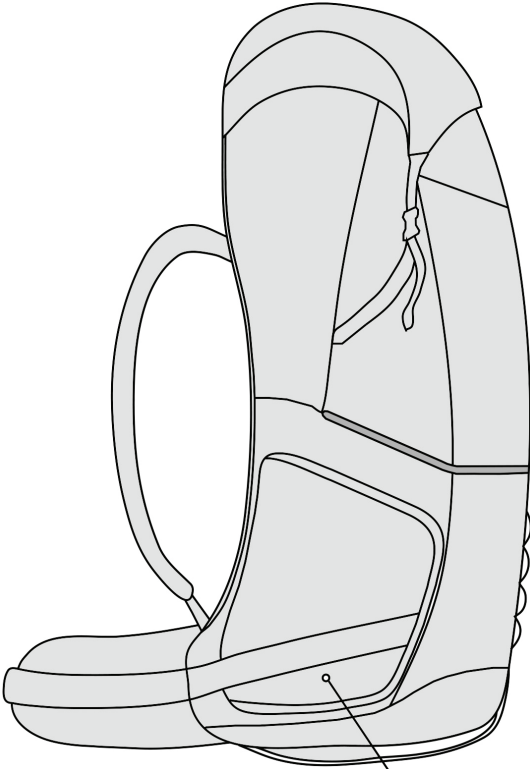


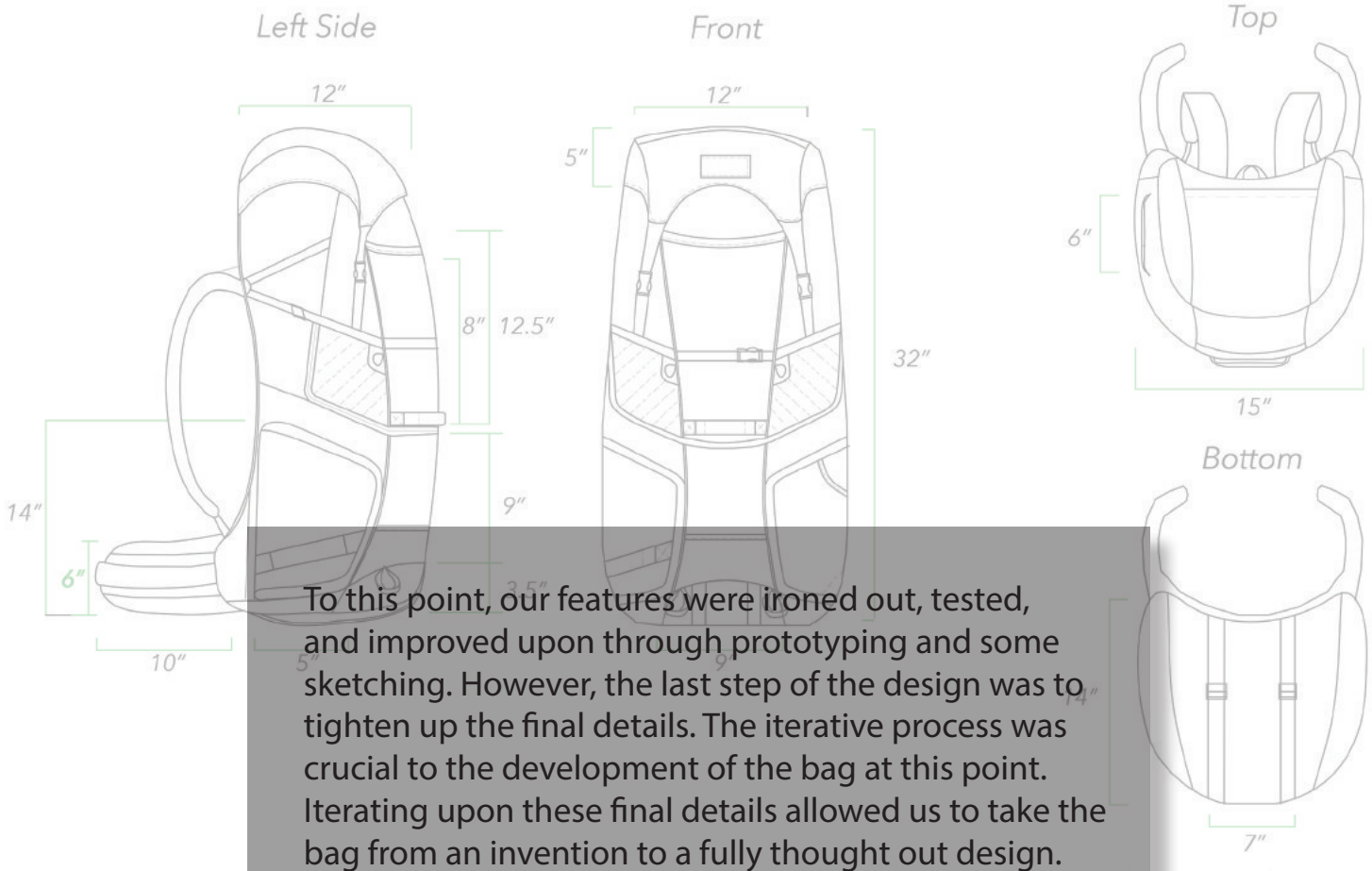
## Suspension

Suspension is a key feature of any trekking bag. It has to be ergonomic and ensure the user can carry large amounts of weight for extended periods of time. For this project we decided that using a frame and suspension system from an existing bag made the most sense. It would allow us to focus on our key goals for the bag. After doing extensive research the Gregory Baltoro seemed to be an excellent choice given its great reputation for comfort, adjustability and weight capacity

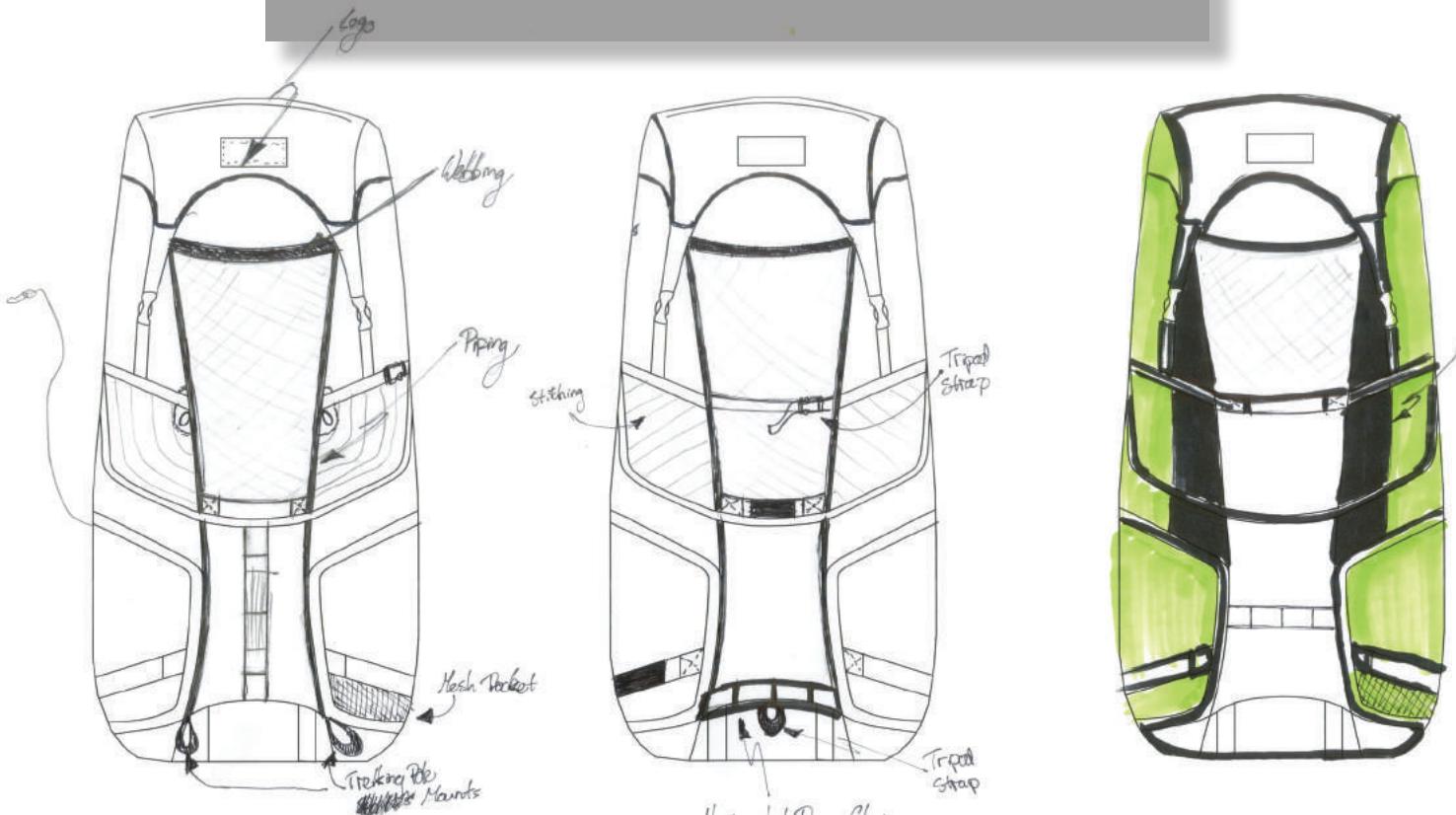


# Iteration of Final Design





To this point, our features were ironed out, tested, and improved upon through prototyping and some sketching. However, the last step of the design was to tighten up the final details. The iterative process was crucial to the development of the bag at this point. Iterating upon these final details allowed us to take the bag from an invention to a fully thought out design.





# Prototype 3









# Prototype 3 Testing



QUICK ACCESS FUNCTIONED SMOOTHLY

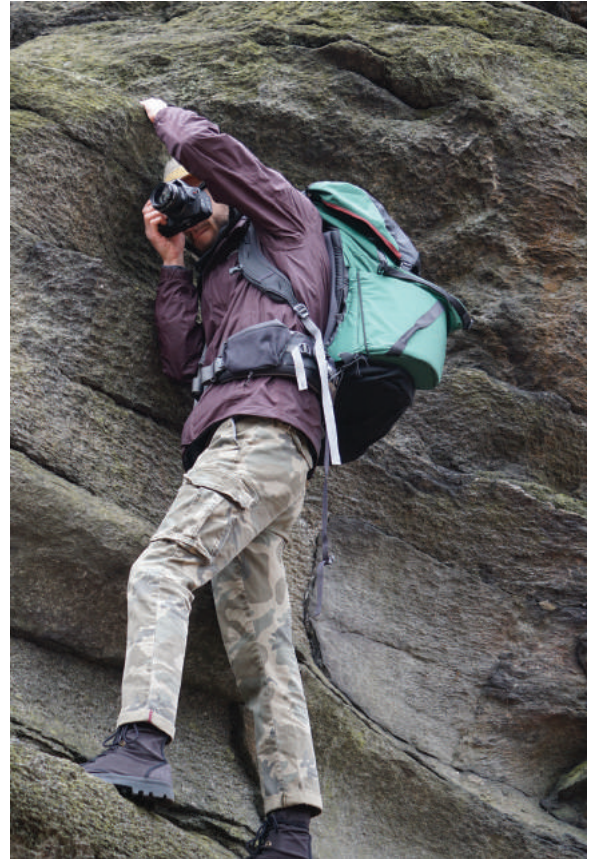
○

ERGONOMICS FELT GOOD AND WEIGHT WAS PROPERLY DISTRIBUTED

○

SIZING OF PACK WAS ADEQUATE FOR DESIRED SCENARIO



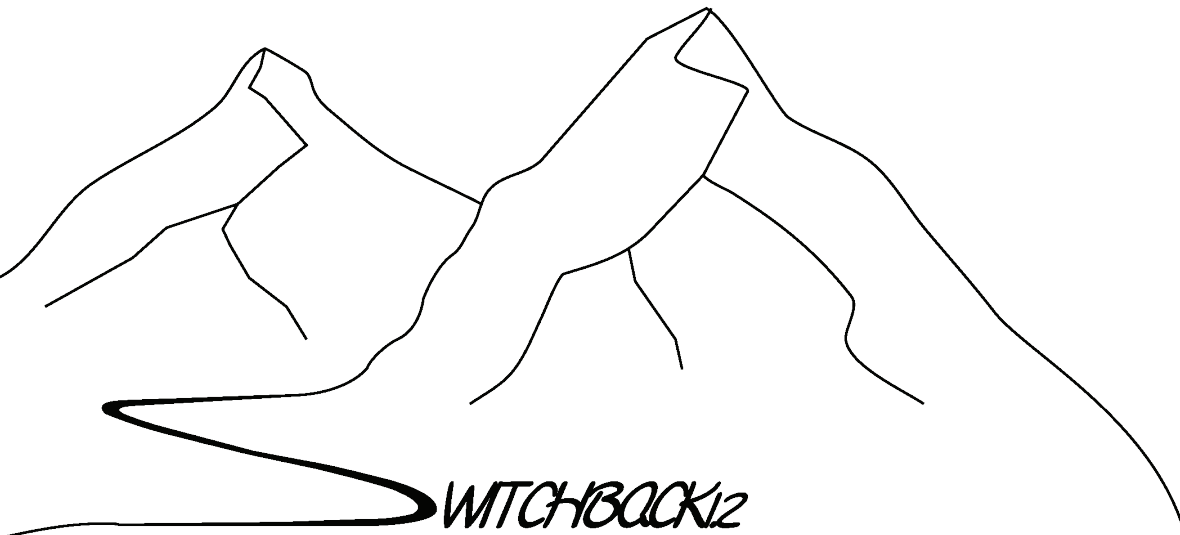


## MOVING FORWARD

This being the last prototype of the Switchback1.2 before the final version, it really needed to be close to professional quality. After doing the testing it was evident that a few things needed to be tightened up and refined. This prototype did not include the tensioning straps, water bottle pocket, trekking pole loops, and a few other minor details.

For further development we will ensure that those features are added to the bag and tested in the final model. Also the quick access compartment of the bag was slightly off in dimension so it made it a little difficult to reach inside to get the camera. This is something that will be ironed out in the final model

# SWITCHBACK1.2 Final Design















“Someone needs to come out with a photography backpack that fits like a high-end climbing backpack”

-

Michael Clark



# Quick Access



NEVER



MISS





ANOTHER



SHOT







The Quick Access feature was the primary driving force of this bag, so it was crucial that it functioned at a professional level. It needed to transport your camera from the back of your bag, to your hip where you could quickly and conveniently grab it.

The Quick Access feature can fit a full frame DSLR with a zoom lens which is standard for an adventure photographer. In addition, small accessories such as SD cards or an extra battery can be stowed in the compartment for easy access.

The outside of the compartment has a small loop handle so the user can easily

reach around and pull the Quick Access compartment around. This simple solution worked well in our testing and ensured the user had an ergonomic experience using this feature

The Quick Access feature fits into a padded and structured housing inside the bag. This ensures the gear fits well and doesn't get damaged by any hard objects inside the bag. On the outside of the bag a shock cord holds the compartment from swinging open. The shock cord gives the compartment a friction fit that ensures the feature will not come out in unwanted situations but only when it is pulled out.

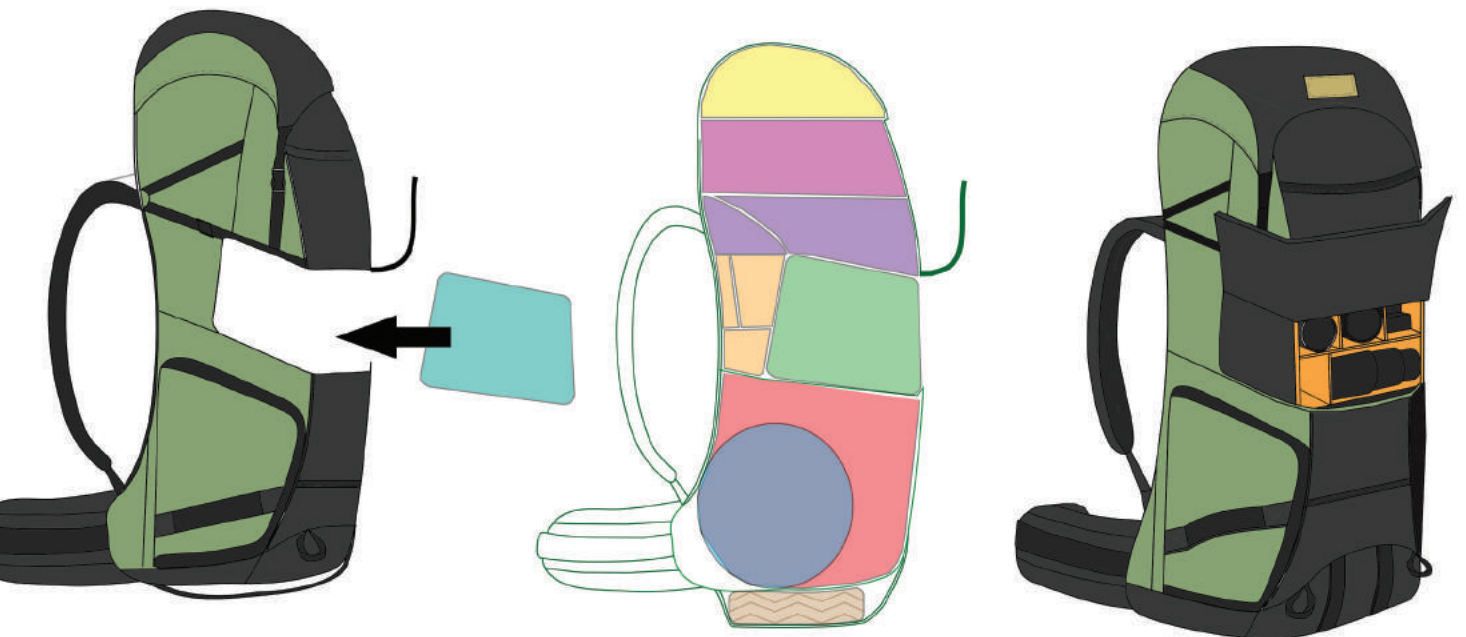
*Closed*



*Open*



# Internal Camera Unit





The internal camera compartment houses the rest of the gear needed for a professional photographer, its their office. When they decide to set up shop they can get to their more task oriented

lenses and really optimize for their desired shot. this compartment is meant to be open for the duration of the shoot from that spot, and would function like a desk space.



# Photography Features

## Camera Leash

Dropping is a huge issue, nobody wants to drop a delicate 3000+ dollars on a hard surface. There are also problems with neck straps, so in order to solve both of these problems we added a camera leash that stays attached to the camera while it's in the flip-around access. It's attached to the top of the bag and is made from durable 1/4 inch bungee cord. This encourages the user to use this safety feature and not their camera strap.



## Tripod Ballast

In order to get the full rigidity of a tripod it's important to have it weighed down. This feature ensures the tripod won't tip over and that you get the most steady shot possible.

## Tripod Mount

A tripod is an essential piece of equipment for any adventure photographer but the challenge is always where to put it. We managed to incorporate a specific tripod mount on the exterior of the Switchback1.2. The tripod legs simply slide into a small designated pocket. Then the top strap can easily be placed around the upper portion of the legs to make sure it is tight and will not move around while trekking.





Tan diamond-shaped patch on the top flap.

15 Liters  
MADE IN INDIA



# Trekking Features

A hydration bladder is important for long days of walking. Our philosophy is to streamline the workflow of backpacking photographers and minimize the times the back comes off your back. The hydration system had an opportunity for duality, that's why we padded it with closed cell foam so that it could function as a laptop

pocket or a pouch for a hydration bladder. We found that many photographers would make use of a feature like this. Under the lid, at the top of the bag there is a separate hole for the bladder to come through. This feature is hidden by the lid to impede rain water from coming in.

## Hydration Bladder/ Pocket





## Bottom Sleeping Pad Mounting Straps

Housing this bulky component on the bottom is a popular and smart feature that we wanted to incorporate into our final model. This feature comes standard on almost all trekking packs,

so to not include it, would have left users frustrated and confused. In addition, these bottom straps provide an attachment point for any other miscellaneous gear.



# Front Pocket and Water Bottle Pocket

This pocket provides access to the sleeping bag or other soft or lighter weight items. It sits in an accessible location while the pack is on your back.

We opted for the most capacity so you can keep a water bottle, fruit, maps or anything relatively small and still be able to access it while trekking



## Multi-Purpose Compression Straps (Pictured Right)

Compression straps are important for keeping the weight tight to the frame and tight to the back. This is necessary for the overall comfort of the bag as it will give

you a smoother ride. They also function as the trekking pole mounts, or mounting points for any other long piece of gear on the bag.





# Payload

## TREKKING COMPONENTS



x2

TREKKING POLES



MULTI DAY CLOTHING SUPPLY



MULTI DAY FOOD SUPPLY



TENT



SLEEPING BAG + SLEEPING PAD



WATER BLADDER



MISCELLANEOUS TREKKING GEAR

## CAMERA COMPONENTS



x2

CAMERA BODY - Canon blah blah blah



x4

LENSES - 18-120mm, 80-240mm, 50mm, 35mm



x4

LENS FILTERS



x4

BATTERIES



x1

TRIPOD



x3-6

SD CARDS



x1

REMOTE SHUTTER RELEASE

This bag is optimized for camera carry but we needed it to be able to accommodate for the other things that are typically carried on the outside and the inside. We have outfitted this bag with features that can be used to carry various big items. We have

compression straps on either side, bulcke straps on the bottom, and two sizable pockets on the bottom and middle of the bag for carrying frequently used smaller items. Also a pocket on the lid to separate small things and keep them secure.







# Camera Protection







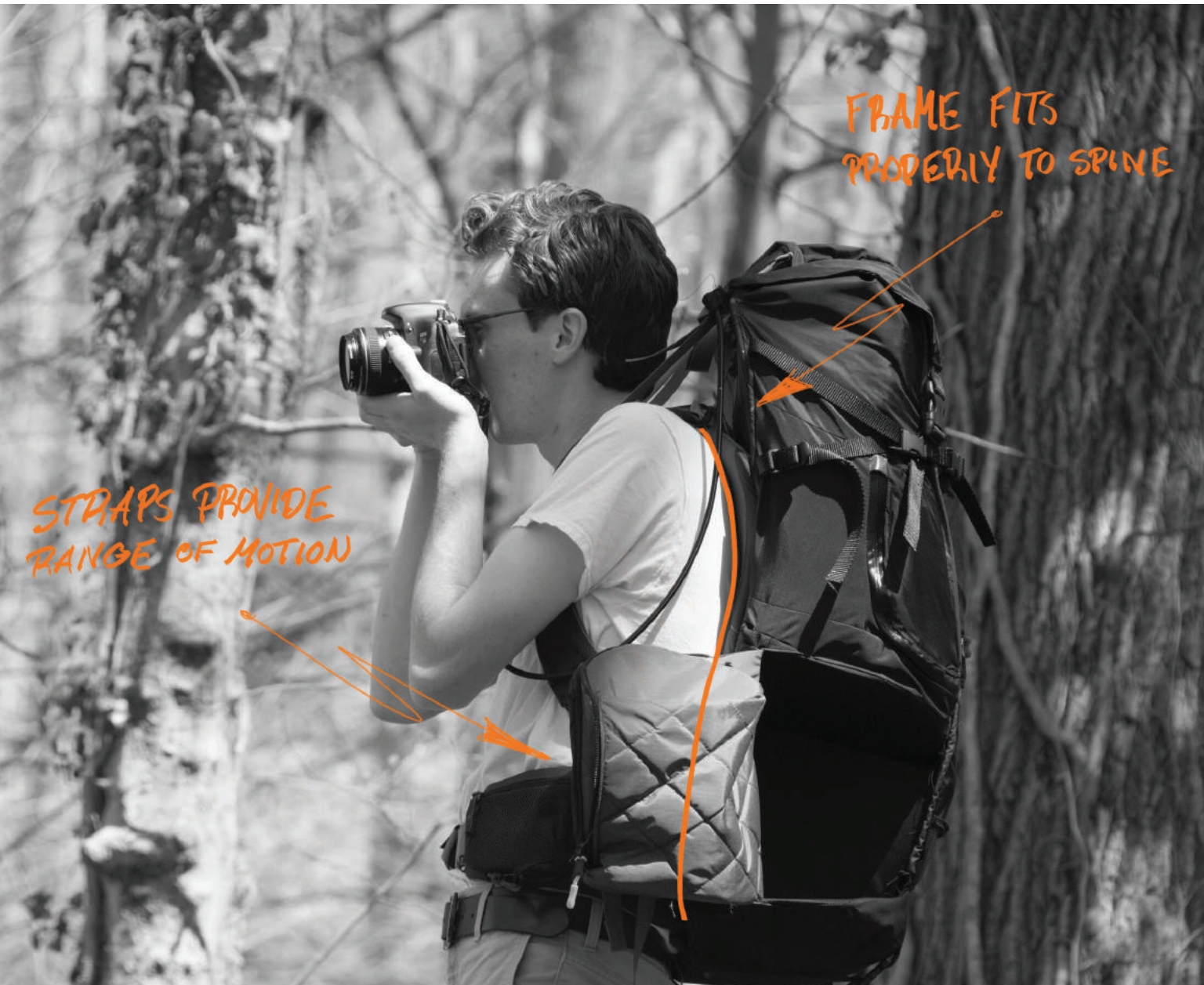
Materiality was an important consideration for this project. Since adventure photographers utilize such high performance equipment, they are sometimes carrying thousands of dollars worth of gear on their back. This makes it crucial that the bag that we design can ensure that the gear stays safe. Materiality is the key to this. We used a highly water resistant TPU coated Ripstop Nylon on the entirety of the outside, which ensured

the bag would not leak water into the camera components. The Internal Camera Unit, the Quick Access compartment, and the bottom portion of the bag were all constructed with plastic so these high impact zones stayed protected and secure. Lastly the components that house camera components such as the ICU and the Quick Access are lined with soft loop Tricot and closed cell foam, so the gear is protected from scratches and miscellaneous damage.

# Long Term Comfort

Internal frame bags hold the weight closer to your back than the external load haulers. We wanted our bag to have a rigid and supportive frame, as the rigidity is important for load hauling. When adding 10-20 pound of camera gear to your multiple days worth of trekking gear, a proper weight management system

becomes increasingly important. With all of this delicate gear, like camera lenses and filters, it needed to have its own compartment that keeps it accessible but also protected. This also helps with weight organization considering having a solid unit to pack among other solid units helps with organization and weight management.



FRAME FITS  
PROPERLY TO SPINE

STRAPS PROVIDE  
RANGE OF MOTION



# Weight Distribution

Most internal frame packs carry their heavier weight behind the shoulders which transfers the weight to the hips. Many packing diagrams account for the typical objects in a pack, but there is no weight diagram that accounts for the extra weight an adventure photographer needs to carry. This led us to create our own spec'd out diagram for the Switchback. We needed to organize this weight in the pack so that it was comfortable for the long-haul. We created an internal camera case and the flip

around access pocket, but had to be sure that this weight was tuned to the rest of the bag, and that it felt balanced. Stability and reliability is comfort, and we designed our bag to be both of those things. Strategic packing is important for a bag like this, and if you're an adventure photographer you are essentially a professional packer as well. We designed space for the camera gear, and the bag is left open for other gear and smart packing strategies in other places.

“My current pain points are that all of these “adventure” photo backpacks are bricks. They have a flat surface that is supposed to fit on a curved back”

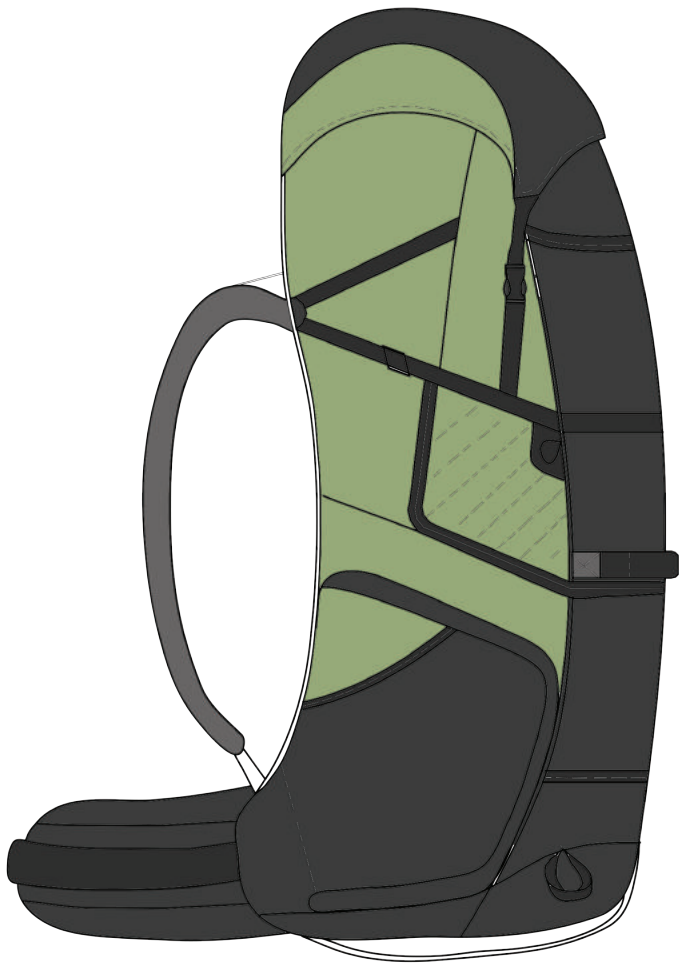
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Michael Clark

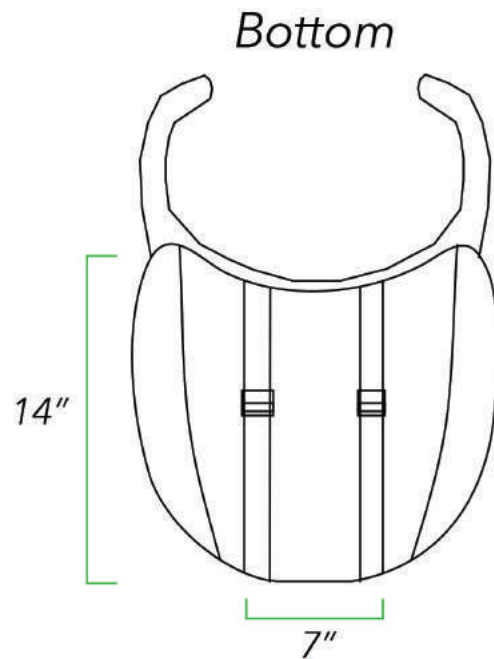
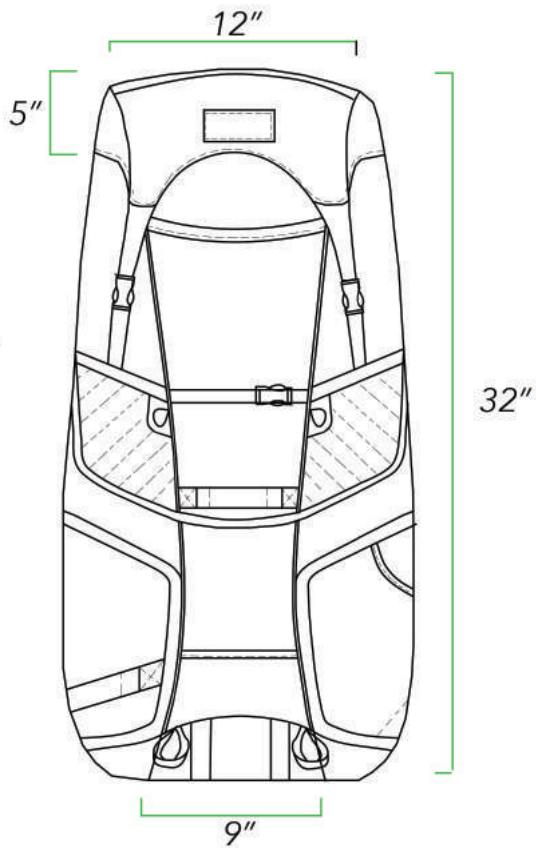
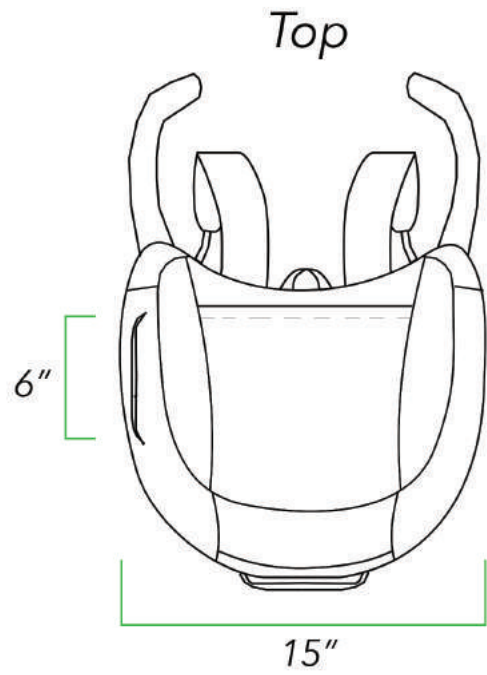
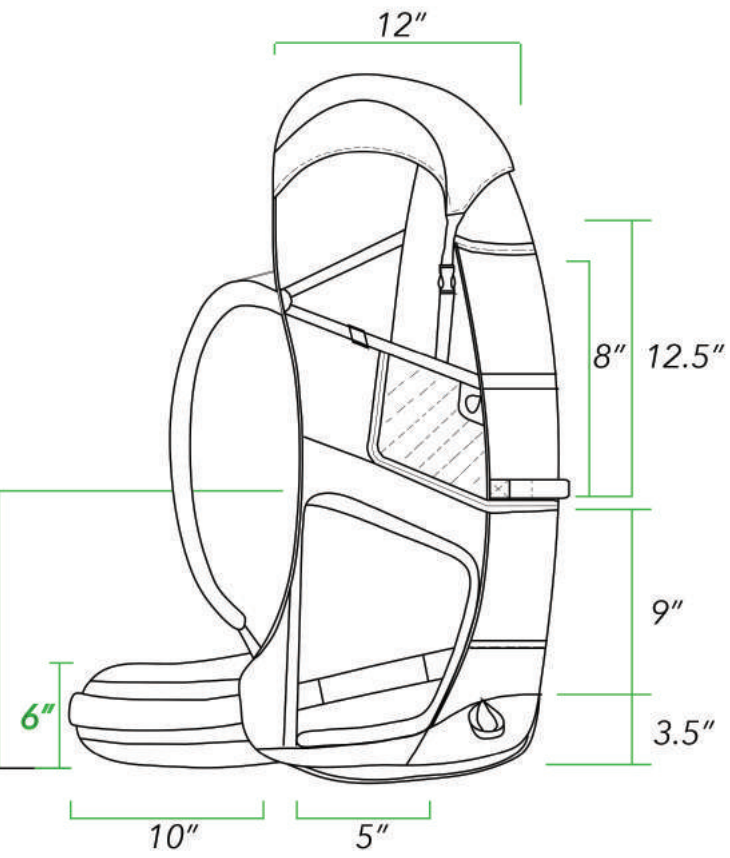


# Tech Pack



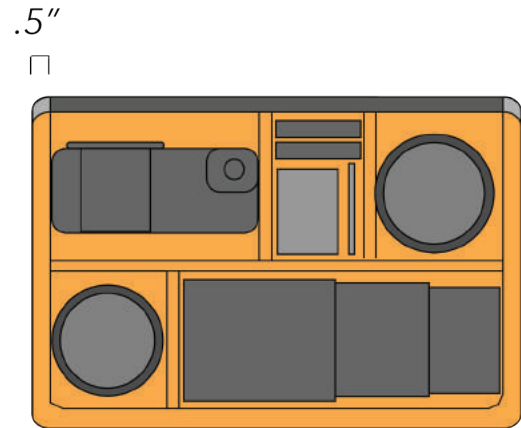
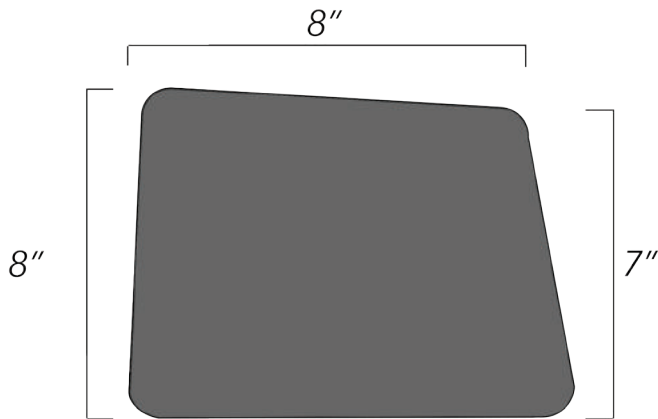
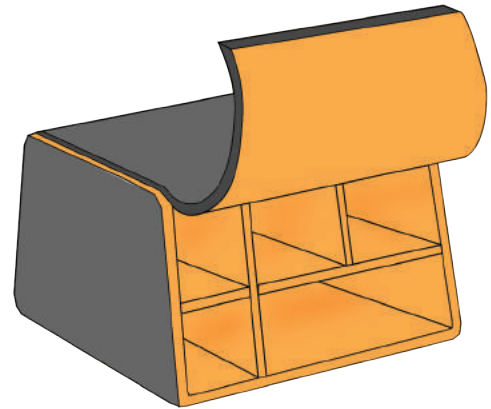
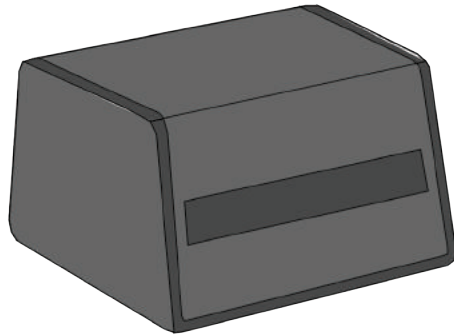




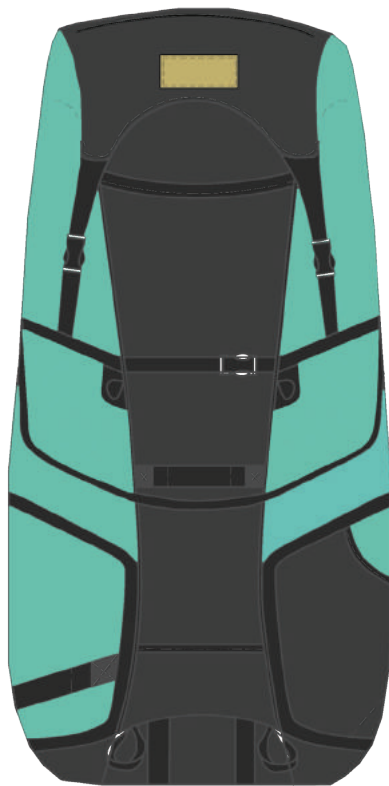
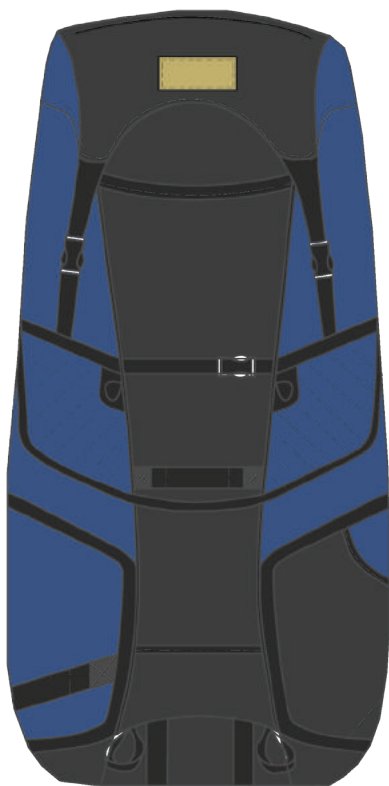




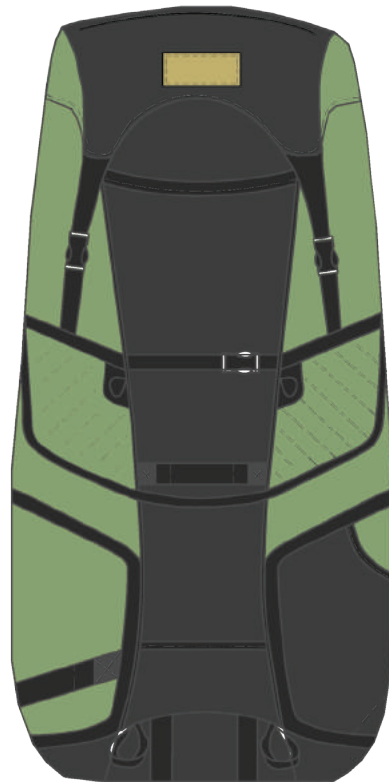
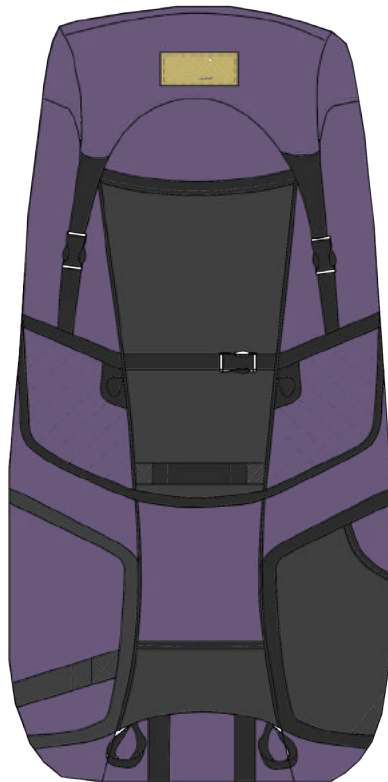
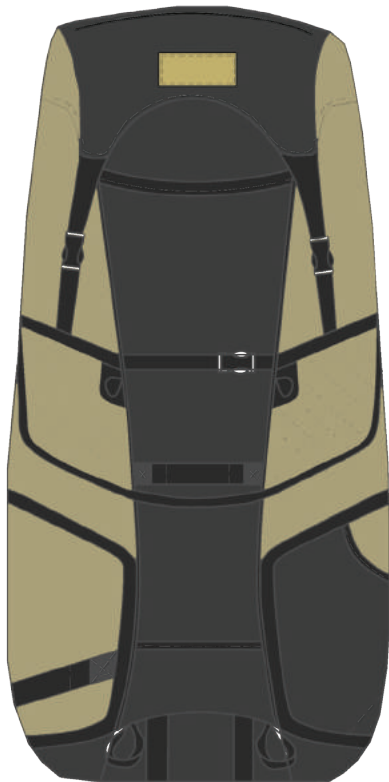
ICU Details



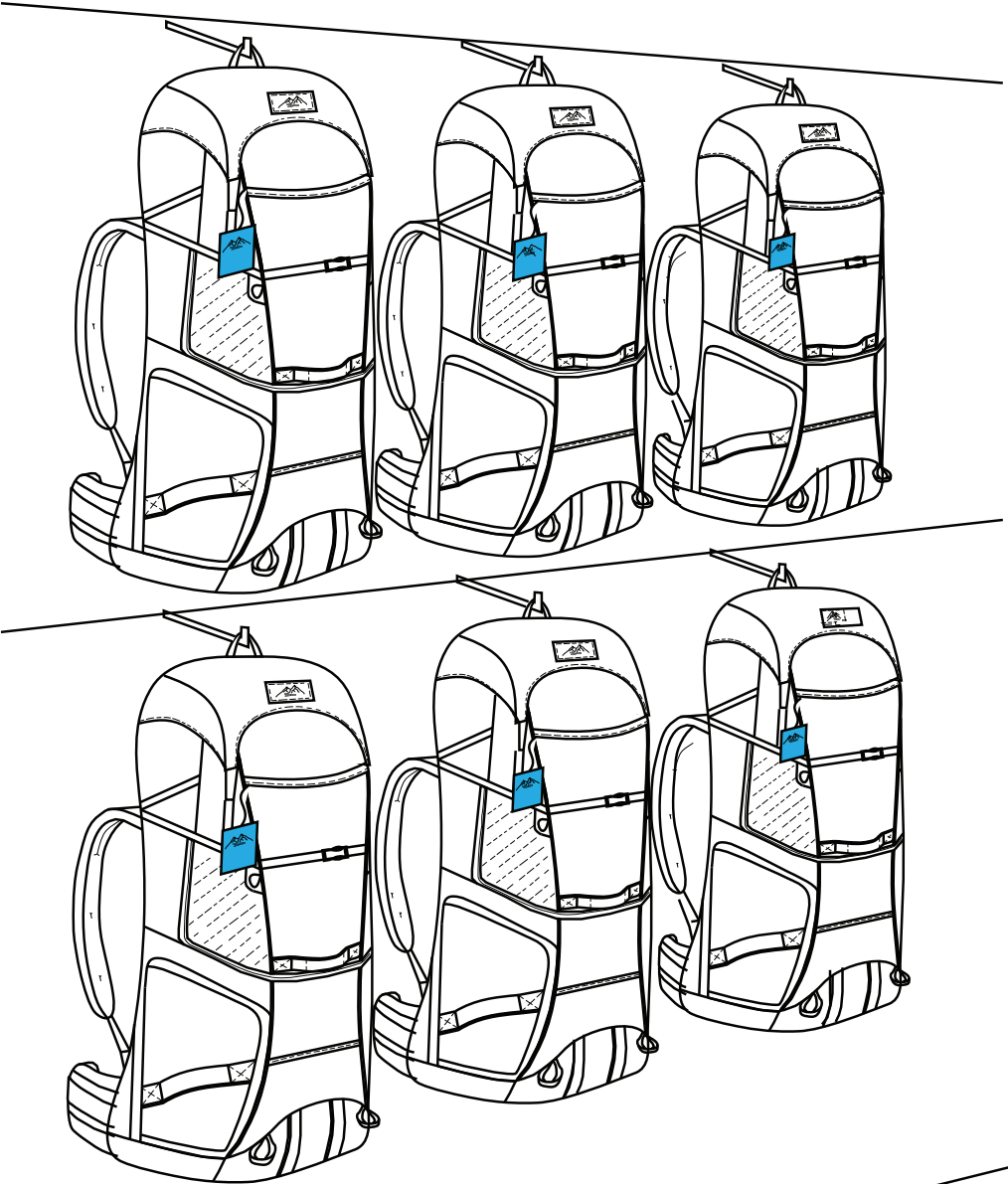
# Colorways







# Planagram







The Switchback1.2 is a professional adventure photography backpack, meaning that it could potentially be sold in outdoor stores such as REI and Campmor. In addition, it could also be sold in various photography stores, such as B&H Photography. In doing research, the

planagram to the left shows the current setup that REI uses to sell their bags in store. The Switchback could potentially also have a very high success rate being sold online, whether it be through a distributor or independantly

