



ANY BODY

PROCESS BOOK

Capstone Project
University of Oregon, MS Sports Product Design
Chrissy Bettencourt

A woman in athletic gear, including a pink cap, sunglasses, and a hydration pack, is running outdoors. She is smiling and looking to her right. The background consists of dense green trees under a clear blue sky. The image has a dark blue overlay.

**SPD 688: INNOVATIVE PROJECT
STRATEGY DEVELOPMENT STUDIO**
WINTER 2020



ANY BODY

FOOTWEAR FOR THE PLUS-SIZE FEMALE RUNNER

Chrissy Bettencourt
Capstone Final Paper

PART 1

BACKGROUND RESEARCH

PROJECT OVERVIEW

"Inclusivity is the future in fashion. You can either get on board or fade into irrelevance."

- Nicolette Mason (2019), *Glamour Magazine*.

"I think that people are really having trouble grappling with the idea that fit comes in many forms and that people can still participate in athletics no matter what kind of body they have. I want to continue sticking my big ass into places where people think I don't belong. That has been the nature of my life—I'm going to do it and I'm going to do it proudly."

- Mirna Valerio, *Ultrarunner (Khan, 2018)*.

Size inclusivity has jumped to the forefront of the apparel industry over the past few years. Women are tired of not being able to find clothing that fits, tired of not seeing people who look like themselves in media and advertising, and tired of being fat-shamed either directly or through microaggressions on a daily basis. Led by a group of outspoken plus-size bloggers, a community has formed that is challenging the fashion industry (Meltzer, 2012). Today, it is common to see unretouched plus-sized models and women with cellulite in Instagram ads, with new startup brands like Outdoor Voices leading the way in promoting body positive advertising (Figure 1).

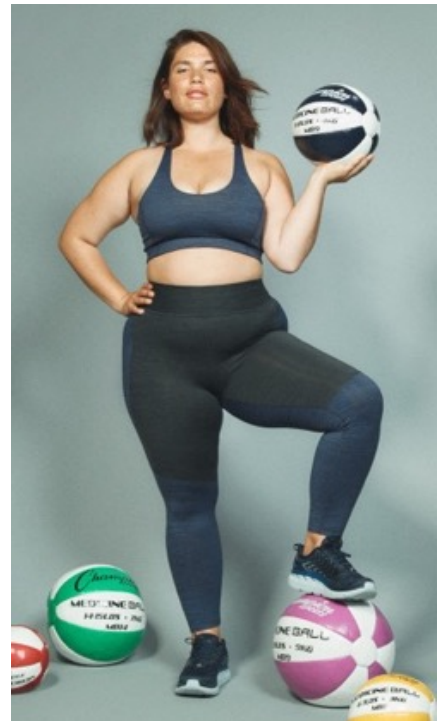


Fig. 1 Outdoor Voices (2018) frequently uses plus size women in their advertising.

Oftentimes, however, the effort to include plus-size women is superficial. Several activewear companies, such as Lululemon, have tried to capitalize on the body positivity movement by featuring plus-size models, while not actually providing plus-sized clothing (Peters, 2018). Furthermore, many activewear brands do not carry sizes beyond size 14, partly due to the common misconception that larger women do not exercise (Nittle, 2018). If they are offered at all, plus-size sections are often hidden in a dark, back corner, next to the maternity section, or “online-only” (Howland, 2019). A study by Christel, O’Donnell, and Bradley (2016) found that 37% of women wear men’s clothing for exercise because they are unable to find products that better accommodate their needs, and 81% feel they have no choice over what to wear for exercise because it is the only thing they can find that fits.



Fig. 2 Nike launched a line of plus-size mannequins in its London flagship store (Taylor, 2019b).

In 2017, Nike launched a plus-size collection, including a series of plus-sized mannequins, as seen in Figure 2 (Taylor, 2019b). The mannequins helped bring awareness to Nike’s plus-size product line, resulting in a 387% growth in searches for “Nike” and “plus size” and a 200% increase in sales of the featured tights for one online retailer (Taylor, 2019b). Despite one reporter’s claim that “[t]he obese Nike athlete is just another lie” (Gold, 2019), the response to the mannequins was overwhelmingly positive. Critics of Gold’s article rightly pointed out the paradox of

telling people to exercise and lose weight while criticizing Nike for advertising athletic clothes to plus-sized women (Taylor, 2019a). Many athletes stepped up to point out the amazing things they have done as plus-sized women (Figure 3). Plus-size women do exercise, and they need clothing to wear when they do. Women feel empowered and inspired knowing that Nike supports them and their plus-sized bodies. A study by Lou Watkins, Ebbeck, and Levy (2014) shows that having appropriate and desired clothing for exercising promotes physical activity. It is clear that when brands invest in the plus-size market, the consumer will respond.

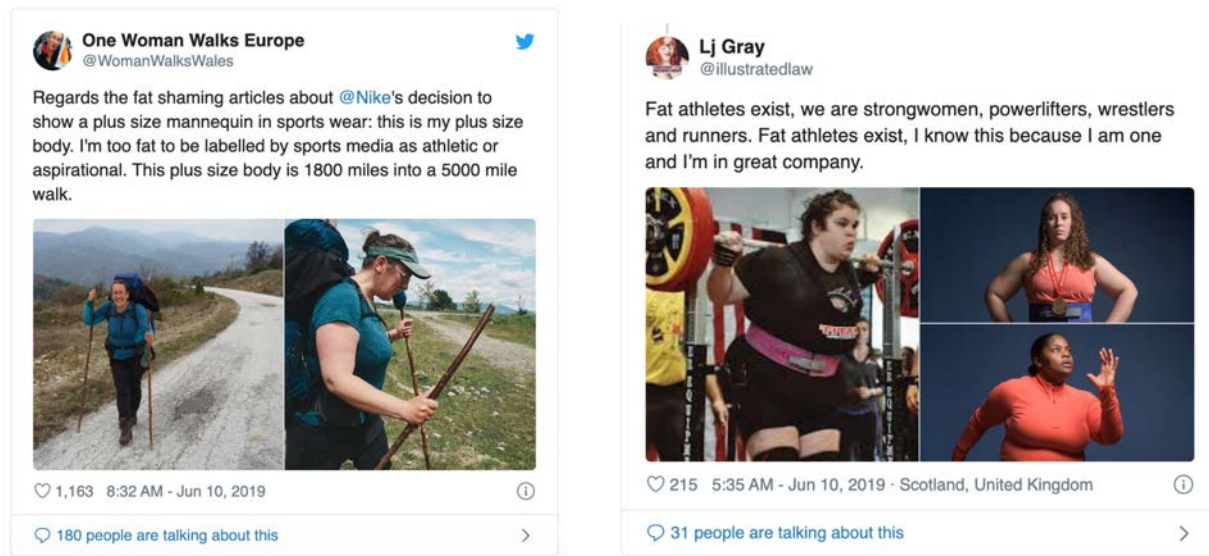


Fig. 3 Twitter responses to Tanya Gold's article in *The Telegraph* (Taylor, 2019a).

While there is still a lot of work to be done to revolutionize the activewear industry, steps are being made in the right direction to ensure that plus-sized women are included. However, the same needs are not being met for plus-sized women when it comes to their footwear. The struggles that plus-sized women have finding clothes also continues into their footwear. Plus-sized ultrarunner Mirna Valerio (2016) describes being laughed at by a sales associate when she tried to buy her first pair of running shoes, an experience she describes as,

“one of many daily indignities that I would experience as a runner because I didn't fit into that young man's perception of *runner*.” Mirna (Figure 4) is an accomplished ultrarunner who started running in 2008 after a health scare and has not looked back since (Pattee, 2019). She has been told by doctors that she is obese and needs to exercise, but her body has carried her through races up to 120 miles (Mack, 2019). Mirna started her blog *Fat Girl Running* in 2012, and from there, she has continued to build a community of people dedicated to promoting body positivity and diverse representations of athletes (Khan, 2018). Her Facebook community, also called *FATGIRLRUNNING*, has over 15,000 members (FATGIRLRUNNING, 2018). Women often post success stories about their first races or ask for advice about gear or dealing with being “DFL”, or “dead fucking last” in a race (FATGIRLRUNNING, 2018).



Fig. 4 Ultrarunner Mirna Valerio (Garmin, 2019).

The challenges plus-size women have finding footwear go beyond snickering store employees. Carrying more weight results in a greater amount of stress on the bones and skin of the feet (Spectrum Foot Clinics, 2016). The greater stress can also physically alter the feet overtime, resulting in fallen arches and often excessive pronation (Spectrum Foot Clinics, 2016). The excess weight stretches out the connective tissues in the foot, wears down the fat pads that cushion the foot, and may cause plantar fasciitis or heel pain (Boldt, n.d.). A study by Dufour et al. (2017) shows that women with a higher BMI are more likely to have foot pain. Dufour et al. concludes that this association is likely due to a combination of mechanical reasons—flat feet, less range of motion, and greater forces on the foot—and metabolic reasons related to tissue composition. When plus-size women wear shoes designed for straight-sized women, the unique concerns about their feet are not addressed.

Another concern for plus-size women when buying footwear is fit. Plus-size women’s feet are typically flatter and fuller. A study by Tománková et al. (2015), found that obesity affects all aspects of the foot—heel, longitudinal arch, and forefoot—not just a generic width. However, the only fit variation currently found in running footwear is wider width. While wide shoes may work for some, it only goes so far.

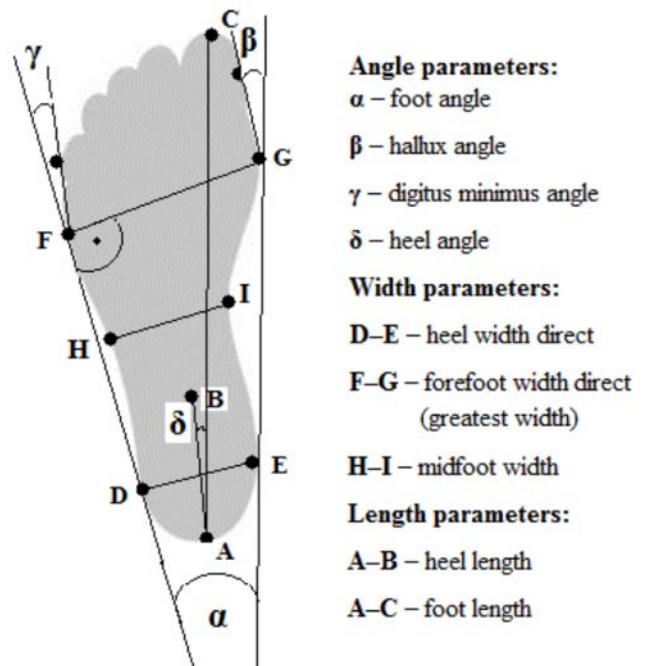


Fig 5. Measured foot parameters used to determine the impact of obesity on foot morphology (Tománková et al., 2015).

The goal of this project is to design road and trail running shoes for plus-size women. The three main focus points for the project will be on fit, underfoot cushioning, and aesthetic appearance. The research will begin with a thorough analysis of plus-size foot scans. The scans will be measured at various cross-sections to collect data about a variety of foot sizes and shapes. Potential areas to explore in regard to the foot scans are proportions and girth of the foot, location of the malleolus, and arch structure. The data will then be compared to that of a medium width shoe last to determine the common problem areas using data comparison and visual inspection of foot scan and last overlays. One of the 3D foot scans will then be used to design a new last. Once a new last has been created, special design considerations will be made to create a shoe that is specifically tuned to a plus-size foot for underfoot cushioning and upper design. Cushioning will be designed considering the unique needs of a woman who carries more weight than a straight-sized woman. Typically, no consideration is taken into the way the shoe grades when designing a wide shoe. Furthermore, when creating a more anatomical last, proportions are usually skewed such that the shoe no longer looks ideal when compared to

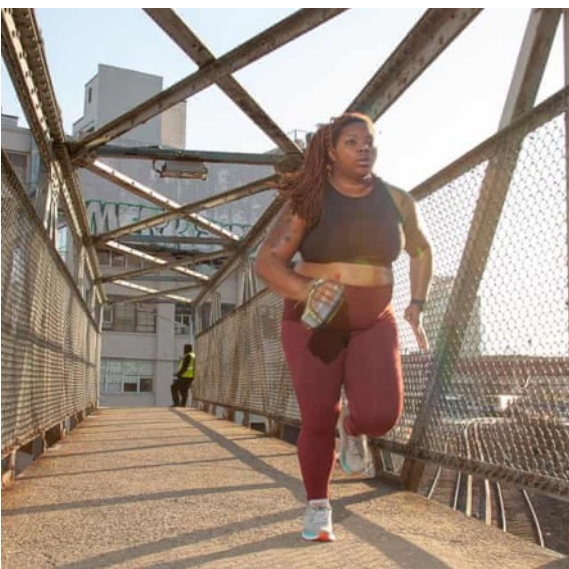


Fig 6. Marathon runner and activist Latoya Shauntay Snell (Snell, 2019).

traditionally designed shoes. This project will attempt to create a shoe for the wider, flatter foot of a plus-size runner that is aesthetically pleasing. The goal is to design a road shoe and a trail shoe that plus-size women want to wear—shoes that women ask for when they look for running shoes, and not just the only thing that fits.

PRODUCT CLASSIFICATION

Footwear, Running

SPORT HISTORY

The first marathon was contested in 1896 at the first modern Olympic games, loosely inspired by the dramatic and fatal run of a Greek messenger from Marathon to Athens (Nix, 2018). While the original Olympic marathons were closer to 25 miles, the distance was lengthened in 1908 to allow the British royal family to watch the start of the London Olympics (Nix, 2018). In 1921, the marathon distance was then standardized at this longer distance, 26.2 miles, the distance that is still run in marathons today (Nix, 2018). The first official women's marathon was completed by Violet Percy in London in 1926, finishing in 3:40:22 (Douglas & Fuehrer, 2014). In 1928, women were allowed to compete in the Olympic Games for the first time but were then banned from competing in any races longer than 200 meters due to false accounts of women collapsing after the 800-meter race (Carroll, 2019). After a 32-year ban, women were finally allowed to run the 800 and four other shorter running events at the 1960 Olympics in Rome (Sebor, n.d.). In 1967, Kathrine Switzer was the first woman to run the Boston Marathon after registering under the pseudonym K.V. Switzer (Sebor, n.d.). As seen in Figure 7, Race official Jock



Fig. 7 Kathrine Switzer is the first woman to run the Boston Marathon in 1967 (Connell, 1967).

Semple noticed her and tried to forcibly remove her from the race (Collins, 1967). Women were officially allowed to enter the Boston Marathon in 1972 (Scholtz, 2017). After decades of false narratives about the negative affect of long distance running on a woman's body, a 1980 study by American College of Sports Medicine found that there is no medical reason that women should be prohibited from running marathons, and four years later the women's Olympic marathon was introduced (Keklak, 2018). In 1984, Joan Benoit won the gold medal for the inaugural women's marathon at the Los Angeles Olympics (Sebor, n.d.). Women's running experienced a boom in the early '90s, sparked by Oprah Winfrey's running of the Marine Corps Marathon in 1994 (Pattillo, Pilkington, and Polachek, 2014). Today, 45 percent of marathon runners in the US are women, more than any other country in the world (Brar, 2019).

ENVIRONMENT

The environment is separated into two categories: road and trail. While many runners choose to run on the treadmill or track, this project will focus on road, for a walk/run half marathon shoe, and trail, for a trail running/hiking shoe.

Road will consist of asphalt and concrete. Trail will mean packed or loose dirt, mud, roots, rocks, leaves, gravel, and grass. While the temperature in the US may range from below freezing to over 100 degrees, this project will focus on moderate temperatures, 40-70 degrees, since this is the range at which most runners prefer to run. Similarly, the focus will be on clear, dry days rather than wind, rain, sleet, snow, or ice. Since the goal for this project is to empower more plus-size women to run, the focus is on ideal running conditions.

RULES

Rules related to women's recreational running include obeying city, state, and federal laws, especially traffic laws when running in the street (New York Road Runners, n.d.).

Individual races may set their own rules, or they may be governed by a larger organizing body such as USATF. Runners must follow the designated race course on foot without any outside assistance, follow all directions from race officials, behave in a sportsmanlike manner, and display an official race entry number or bib (New York Road Runners, n.d.). Many races have course time limits and failing to finish within a certain time may mean disqualification from official race results or potentially removal from the course.

SUCCESS

Success in women's recreational running comes in many different forms. A woman's goal for running may come in the form of one of three categories: time-based, distance-based, or lifestyle-based. Time-based goals may be to set a personal record, or PR, meaning to run a race faster than she ever has before. Other time-based goals include breaking a certain barrier, such as breaking 5 hours in the marathon, or running a sub-30-minute 5K. Distance-based goals may include running at least a mile every day or finishing a 5K or marathon. Lifestyle-based goals may include wanting to stay active and healthy, enjoy the outdoors, lose weight, or possibly just have fun.

ATHLETE EXPERIENCE NEEDS

Athletes must run regularly to safely participate in recreational road or trail races. They must be healthy and able to comfortably walk and/or run the race distance they are aiming to

run. One exception would be for women training to run a marathon. Many novice marathon runners will not have run the full 26.2 miles prior to the race itself. Their longest run prior to the race may be 18 to 20 miles.

ATHLETE DEMOGRAPHIC

The athlete is a plus-size woman, 30-60 years old, living in the US. She may have just started running regularly or would like to start. Her motivation is to stay active and live a healthy lifestyle, not necessarily lose weight. She runs with friends, a few miles per week at first, and is training to run her first half marathon.

MARKET SIZE

65% of women in the US wear plus-size clothing, meaning size 14 or above (Christel et al., 2016). The average woman in the US weighs 170.6 pounds and is 5 feet 3 inches tall, or a BMI of 29.6, which is just under the category “Obese”, classified as a BMI of 30 or over (Strapagiel, 2018).

In the US, nearly 60 million people participated in running or jogging in 2017, about 24 percent of whom reported doing so for exercise (Gough, 2018). About 59% of participants in road races in the US are women (Shortsleeve, 2018).

The potential market size for plus-size women’s footwear is approximately 41 million people, estimated as 65% of the 64 million women in the US age 20-50 years old (US Census Bureau, 2019, as cited by Duffin, 2019). While all of these women may not be runners or may not be interested in running, they are still part of the demographic that could benefit from footwear designed for their needs. Based on the percentage of people in the US who run or jog,

it can be deduced that 22% of these plus-size women are potential runners, or approximately 9 million people (Kunst, 2019).

BIOMECHANICAL NEEDS

The biomechanical and physiological concerns for runners include the gait cycle, running form, and running economy. The running gait cycle can be categorized into two phases: the stance phase, when the runner's feet are in contact with the ground, and the swing phase, when the runner's feet are not on the ground (Casanova, 2018). Figure 8 shows an example of the full gait cycle. Casanova describes these phases as being made up of sub-phases: braking, when one foot makes initial contact with the ground, and the knee and ankle flex to absorb impact; mid stance, when the runner's leg is under their hips; and propulsion, when the runner's hips extend forward and drive the runner forward until the leg makes contact with the ground to begin the cycle again. While there is much discussion in the running community about running with perfect form, coaches suggest that the most efficient gait pattern may look different for everyone (Casanova, 2018). Exercise physiologist and running coach Janet Hamilton argues that, "the overall goal is to get the foot on the ground in such a way that the

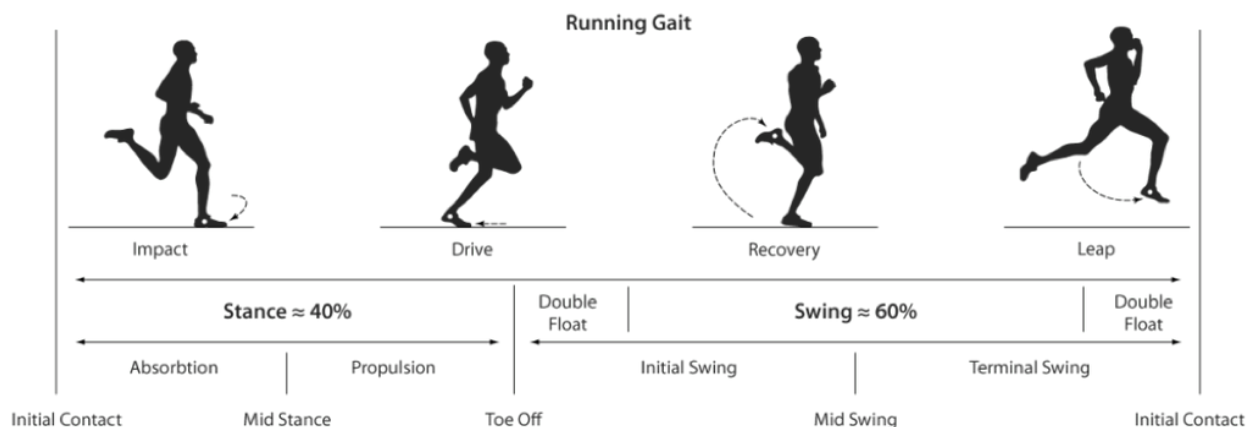


Fig. 8 The running gait cycle, composed of the stance and swing phases ("The run centre: the 4-point run analysis", 2016).

whole kinetic chain (of your foot and leg) can successfully absorb impact and adapt to any uneven terrain and then transition successfully to a position where it can stabilize and propel you forward” (Casanova, 2018).

Ground contact is also an important aspect of the biomechanics of running. Ground reaction force (GRF) is the force exerted on a body as a result of coming in contact with the ground (Richards, 2013). A study by Cavanagh and LaFortune (1980, as cited in Kirby, 2017) found that vertical GRF was approximately 2.8 times body weight, and the shape of the GRF varied depending on the runner’s strike pattern. For example, the average woman in the US 5 feet 3 inches tall and weighs 170.6 pounds would have a vGRF of approximately 477 pounds, or 2120 Newtons. In comparison, a woman who is 5 feet 3 inches tall and weighs 130 pounds, a healthy BMI, would have a vGRF of approximately 364 pounds, or 1620 Newtons. To illustrate the ground reaction force, Figure 9 shows a simplified free body diagram of running.

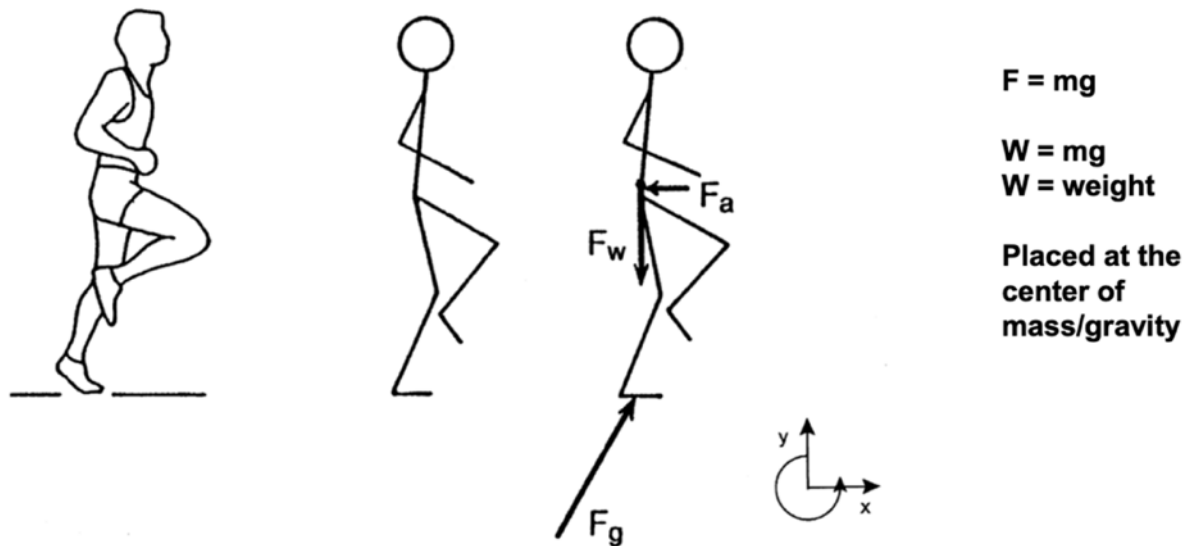


Fig. 9 A free body diagram of running, where F_g is the ground reaction force (Pomeroy, 2019).

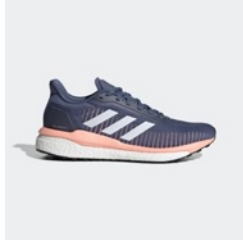
A physiological concern for runners in relation to footwear is running economy. Running economy is defined as the oxygen uptake needed to run at a given velocity (Bassett and Howley, 2000). An important factor related to running economy and energy expenditure is the weight of running shoes. Oxygen consumption increases by 1 percent for every 100g of added weight (Kirby, 2017). Increased oxygen consumption means that it requires more oxygen and more energy, to run at the same velocity, and so running economy is decreased (Kirby, 2018).

COMPETITOR ANALYSIS

Many running shoes are available for women with varying price points and features. Below is a selected list of road and trail running shoes for women that have been identified as valid options for plus-size women. These shoes range in price from \$120 to \$160. While there are many other options to choose from, this list presents an overview of the options available and selected technologies that may be beneficial to the plus-size athlete. Solereview (2019b) offers a guide for plus-size female runners which encourages athletes to look for a stable, durable midsole that is not too soft and a secure upper fit. Solereview cautions plus-size runners to avoid pillowy soft shoes, such as the Hoka One One Clifton 6, or shoes with biased midsoles, where the lateral side of the midsole is softer than the medial side to discourage pronation, such as the ASICS Gel-Kayano 26. However, these shoes are still included in this list as some plus-sized runners have reported success with these shoes because of their wide width options, extra support, and stability. Using the Solereview guide, footwear reviews from plus-size athlete Mirna Valerio's "Let's Talk Running Shoes" (2016), the "Best Trail-Running Shoes for Women – in 2019" guide (Paige, 2019), and results from a footwear survey of the FATGIRLRUNNING Facebook group, the following shoes were identified as appropriate choices

for plus-size runners for a variety of characteristics, such as wide widths available, anatomical women's-specific fit, and a stable base that is not too soft.

ROAD



adidas Solar Drive 19

MSRP: \$120

Heel-to-toe drop: 10mm

Wide: No

Features and Benefits:

- Boost and Energy Rail midsole for guided, responsive cushioning
- Breathable air mesh upper to keep feet cool with reinforced zones for targeted support
- Adiwear outsole for durable traction
- Solar Propulsion Rail guides the foot through the gait cycle

(Adidas, n.d.)

ASICS Gel-Kayano 26 (D)



MSRP: \$160

Heel-to-toe drop: Not reported

Wide: Yes

Features and Benefits:

- Spevafoam 45 for a soft feel and improved comfort
- Flytefoam Propel midsole for lightweight cushioning for a lightweight, bouncy feel
- AHAR outsole for abrasion resistance and durability
- Duomax dual density midsole for enhanced support and stability
- Gel technology for shock absorption
- Guidance Trusstic system to enhance the natural gait cycle

(Asics, n.d.)

Brooks Ghost 12



MSRP: \$130

Heel-to-toe drop: 12mm

Wide: Yes

Features and Benefits:

- BioMoGo DNA and DNA LOFT for a soft, responsive feel
- Segmented Crash Pad zones for a smooth transition from heel to toe.
- Flex grooves for forefoot flexibility
- 3D Fit Print technology for a plush, secure fit around the foot
- Engineered double jacquard mesh for breathability, flexibility, structure

(Brooks, n.d.)

Hoka One One Clifton 6

MSRP: \$130

Heel-to-toe drop: 5mm

Wide: Yes

Features and Benefits:

- Full compression EVA midsole for cushioning
- Early stage Meta-Rocker and moderate heel bevel for a smooth ride and transition
- High-abrasion rubber zones to reduce weight
- Reinforced eyestay for added durability



(Hoka One One, n.d.-b)

Mizuno Wave Rider 23

MSRP: \$120

Heel-to-toe drop: 12mm

Wide: No

Features and Benefits:

- Engineered mesh upper for durability and breathability
- U4ic midsole for lightweight, responsive durable cushioning
- U4icX strobels lasting board for added underfoot cushioning
- X10 carbon rubber outsole for durable traction



(Mizuno, n.d.)

New Balance 880v9

MSRP: \$124.99

Heel-to-toe drop: 10mm

Wide: Yes

Features and Benefits:

- Engineered mesh upper for a comfortable, breathable fit
- Durable, responsive cushioning



(New Balance, n.d.)

Nike Epic React Flyknit 2

MSRP: \$150

Heel-to-toe drop: 9mm

Wide: No

Features and Benefits:

- Flyknit constructed upper for a breathable, minimal, supportive fit that conforms to and stretches with the foot
- React foam for a lightweight, soft, springy cushioning
- Heel molding for improved foot stability



(Nike, n.d.-b)

Saucony Triumph 17 Wide



MSRP: \$150

Heel-to-toe drop: 8mm

Wide: Yes

Features and Benefits:

- PWRRUN+ for springy, responsive underfoot feel
- FORMFIT technology for a secure fit that adapts to the shape and motion of the foot
- Breathable mesh upper to keep feet cool

(Saucony, n.d.-b)

TRAIL

Altra Lone Peak 4.5



MSRP: \$120

Heel-to-toe drop: 0mm

Wide: No

Features and Benefits:

- Zero-drop, balanced cushioning encourages proper, low-impact form
- Footshape toe box allows toes to spread out naturally
- Maxtrac rubber with Trailclaw canted lugs are positioned strategically under the metatarsals to provide traction at toe off
- A-Bound with Stoneguard Dual-layer EVA midsole for lightweight rock protection and cushioning
- Air mesh upper is durable and quick drying

(Altra, n.d.)

Columbia Caldorado III



MSRP: \$120

Heel-to-toe drop: 8mm

Wide: Yes

Features and Benefits:

- FluidFoam midsole for a cushioning, flexibility, and support
- Seamless, abrasion-resistant upper with a reinforced toe cap for comfort and protection
- TrailShield protection plate with forefoot flex grooves for flexible protection
- Full length rubber outsole with 4mm multi-directional lugs for traction on varied terrain

(Columbia, n.d.)

Hoka One One Challenger ATR 5

MSRP: \$130



Heel-to-toe drop: 5mm

Wide: Yes

Features and Benefits:

- Dual-layer mesh upper with a TPU toe reinforcement for support, durability, and breathability
 - Early stage Meta-Rocker for a smooth ride
 - CMEVA foam midsole for lightweight, stable impact absorption
 - 4mm lugs for all-terrain traction
- (Hoka One One, n.d.-a)

Merrell Agility Peak Flex 3

MSRP: \$130



Heel-to-toe drop: 6mm

Wide: No

Features and Benefits:

- EVA foam midsole with FLEXconnect dual-directional flex-grooves for enhanced ground connection, responsive comfort, and energy return
 - Rock plate for underfoot protection
 - Vibram Megagrip for traction
 - Jacquard upper with TPU film heel counter for security
- (Merrell, n.d.)

Nike Air Zoom Pegasus 36 Trail

MSRP: \$130



Heel-to-toe drop: Not reported

Wide: No

Features and Benefits:

- Perforated mesh upper for breathability
 - Zoom Air units in heel and forefoot and Cushlon foam midsole for supportive cushioning
 - Outsole lugs for traction on road and trail
 - Wider forefoot for a roomier fit
- (Nike, n.d.-a)

Salomon Sense Ride 2



MSRP: \$120

Heel-to-toe drop: 8mm

Wide: No

Features and Benefits:

- Contagrip MA outsole for durable traction on wet, dry, loose surfaces
- Vibe midsole combines EnergyCell and Opal technologies reduces vibrations and load to deliver a responsive ride
- 3D open mesh welded upper for a breathable, smooth fit
- SensiFit cradles the foot from midsole to lacing for a secure fit
- Quicklace lacing system for one-pull tightening

(Salomon, n.d.)

Saucony Peregrine 10 Wide



MSRP: \$120

Heel-to-toe drop: 8mm

Wide: Yes

Features and Benefits:

- PWRRUN midsole for responsive yet protective cushioning
- PWRTRAC outsole for grip and traction on multiple surfaces
- Trail-specific FORMFIT for secure fit

(Saucony, n.d.-a)

Topo Athletic Ultraventure



MSRP: \$130

Heel-to-toe drop: 5mm

Wide: No

Features and Benefits:

- Anatomical toe box allows toes to spread naturally
- Vibram XS Trek outsole for durable grip and traction
- Three-piece, multi-density EVA midsole for lightweight stability
- Ortholite footbed for anti-microbial underfoot comfort
- Drainage gills for water release and quick drying
- Engineered mesh upper for breathability and abrasion-resistance

(Topo Athletic, n.d.)

SWOT ANALYSIS

On the following four pages is a SWOT analysis of the current competitor market landscape for women's road and trail shoes. This information was gathered from customer reviews on product websites and the Solereview (2019b) guide for plus-size runners.

ROAD

Product	Strengths	Weaknesses	Opportunities	Threats
adidas Solar Drive 19	Lower volume midsole has a firmer feel (Solereview, 2019b) Breathable air mesh upper with targeted zones for support (Adidas, n.d.) Spacious upper (Solereview, 2018)	No wide widths Stiff bottom Slightly narrow fit (Adidas, n.d.) Overpriced Stiff eyelet panel Bad outsole design (Solereview, 2018)	Build on artist collaborations and athleisure focus	Not known for focus on fit or extended sizing
ASICS Gel-Kayano 26 (D)	Comes in wide Good for low to normal arches and for neutral or overpronation Good support and stability Works well with custom orthotics (Asics, n.d.) Sturdy Good for flat feet (Valerio, 2016)	Biased midsole may not work as intended for plus-size runners (Solereview, 2019b) Short in the heel with too much padding, may cause heel slipping (Asics, n.d.) Heavy Not engaging to run in (Solereview, 2019e)	Known for focusing on extended sizes and overpronation. Could expand on pronation with a focus on plus-size bodies	Customers may think they are too aggressive or clunky
Brooks Ghost 12	Comes in wide Supportive, secure (Brooks, n.d.) Plush upper Cushioned, smooth ride Good traction (Solereview, 2019d)	Heavy Not very responsive (Solereview, 2019d) Runs small/narrow Breaks down easily Not breathable (Brooks, n.d.)	Loyal customers, use word of mouth to expand customer base Focus on upper and underfoot comfort	Design changes from model to model upset the loyal fan base
Hoka One One Clifton 6	Comes in wide Lightweight (Hoka One One, n.d.-b)	Too soft (Solereview, 2019b) Poor arch support Wears out easily Upper causes blisters and rubbing on foot (Hoka One One, n.d.-b)	Adapt cushioning story to focus on plus-size consumer Determine how to keep the cushy feeling without packing out so easily	Maximal cushioning may be a passing fad

Mizuno Wave Rider 23	Firm and stable (Solereview, 2019b) Comfortable upper Lightweight (Mizuno, n.d.) Flared midsole offers good stability Plush insole (Solereview, 2019c)	No wide widths Narrow toe box (Mizuno, n.d.) Clunky outsole Stitched logos (Solereview, 2019c)	Focus on stable cushioning	Design changes from model to model upset the loyal fan base
New Balance 880v9	Comes in wide and extra-wide Lightweight Breathable upper Wide toe box Good cushioning and support without sacrificing ground feel Stable (New Balance, n.d.)	Heavy Width varies between shoes, even of the same size (New Balance, n.d.)	Capitalize on loyal wide and extra-wide customers New Balance customers know that they focus on fit and extended sizes	Design changes from model to model upset the loyal fan base
Nike Epic React Flyknit 2	Dense cushioning Secure Flyknit upper with stabilizing heel Lightweight Flared forefoot offers greater support (Solereview, 2019b) Spongy comfortable cushioning Comfortable upper (Nike, n.d.-b)	No wide widths (Nike, n.d.-b) Midsole stiffens in freezing temperatures Expensive (Solereview, 2019a)	Convert plus-size apparel customers. Capitalize on brand loyalty and NSW customers	Aesthetic of a wide foot does not fit with the typical Nike “fast” silhouette look
Saucony Triumph 17 Wide	Comfortable on feet all day (Saucony, n.d.-b) Responsive cushioning, smooth ride Durable outsole Plush upper (Solereview, 2019b)	Not as light as other shoes Stiff in the forefoot (Langelier, 2019)	Focus on stable cushioning	Design changes from model to model upset the loyal fan base

TRAIL

Product	Strengths	Weaknesses	Opportunities	Threats
Altra Lone Peak 4.5	Anatomical shape is good for wide feet Zero-drop is good for barefoot runners Good for lightweight day treks or off-road runs (Paige, 2019)	No wide widths (Altra, n.d.) Not a lot of cushioning, not good for sensitive feet (Paige, 2019)	Capitalize on anatomical fit story and expand customer base into plus-size market	Zero-drop can be hard to adapt to. Small, niche brand may be hard to discover for women just getting into running
Columbia Caldorado III	Comes in wide Lightweight Good on road and trail (Columbia, n.d.) Abrasion-resistant upper Reinforced toe cap protects without adding bulk Good stability and support Comes in a waterproof version for wet weather Good for hiking and running (Paige, 2019)	Not very cushioned (Columbia, n.d.)	Work on cushioning to give a plusher feel. Focus on hike/run	Customer base is loyal, but non-runners may not look here for their needs
Hoka One One Challenger ATR 5	Comes in wide (Hoka One One, n.d.-a) Lots of protection from the overly cushioned midsole Breathable upper Easy transition from road to trail Extended toe cap protects toes (Paige, 2019)	Poor arch support/stability Wears out easily (Hoka One One, n.d.-a) Runs large (Paige, 2019)	Adapt cushioning story to focus on plus-size consumer Determine how to keep the cushy feeling without packing out so easily	Maximal cushioning may be a passing fad
Merrell Agility Peak Flex 3	Good for rugged terrain Feels good on asphalt too Soft yet agile	No wide widths (Merrell, n.d.) On the heavier side	Focus on run/hike and more technical terrain	Customer base is loyal, but non-runners may not

	Comfortable lacing system Responsive ground feel (Dixon, 2019)	Not a lot of toe protection (Dixon, 2019)		look here for their needs
Nike Air Zoom Pegasus 36 Trail	Great colors Comfortable and lightweight Good on varied terrain and roads Uphill grip and forefoot cushioning for downhill (Nike, n.d.-a) Good for long, slow training runs Very flexible (Howard, n.d.)	No wide widths Get wet very easily (Nike, n.d.-a) Traction is not great No toe protection Not very durable Not good for technical terrain Not very stable (Howard, n.d.)	Convert plus-size apparel customers. Capitalize on brand loyalty and NSW customers	Aesthetic of a wide foot does not fit with the typical Nike “fast” silhouette look
Salomon Sense Rise 2	Lightweight with enough cushioning Quick-laces do not come undone Breathable Good for ultras (Paige, 2019)	No wide widths (Salomon, n.d.) Runs narrow (Paige, 2019)	Focus on upper fit and comfort	Customer base is loyal, but non-runners may not look here for their needs
Saucony Peregrine 10 Wide	Energetic and protective feeling underfoot Upper cradles the foot for a secure fit (Metzler, 2020)	Tread is too aggressive (Metzler, 2020)	Focus on underfoot cushioning	Design changes from model to model upset the loyal fan base
Topo Athletic Ultraventure	Extra-wide toe box Still snug enough to provide support while providing ample room for toes Good on slick terrain Enough cushion without feeling “overly stacked” (Paige, 2019)	Doesn’t come in wide (Topo Athletic, n.d.) Not good for rocky terrain (Paige, 2019) Upper stretches too much so foot slides around (Topo Athletic, n.d.)	Capitalize on anatomical fit story and expand customer base into plus-size market	Small, niche brand may be hard to discover for women just getting into running

STATE OF THE ART

PRODUCT ANATOMY

The state-of-the-art running shoe is comprised of three main components: the upper, midsole, and outsole. The upper is the fabric part of the shoe that interfaces with the foot. The function of the upper is to protect the foot from debris and keep the foot secure and stable. State-of-the-art uppers are lightweight and breathable. They may include reinforcement for durability and abrasion resistance, especially around the toe. Many brands have proprietary upper technology, such as Nike Flyknit or Brooks 3D Fit Print, which improves the fit and stability with minimized seams and zoned structure for a secure fit. The upper has many parts which may vary by style, but a typical running shoe has a vamp, quarters, collar, heel counter, toe cap, lining, tongue, overlays, eyerow, and laces. Many modern uppers do not include overlays or external toe caps, and instead structure is built into the upper with TPU films called hot melts or knitted directly into the fabric.

The next, and arguably most important, component of a running shoe is the midsole. The midsole is the main cushioning element of the shoe. Most running shoes use either EVA or proprietary foam such as adidas Boost or Nike React. Many midsoles also include other proprietary encapsulated technologies for stability, cushioning, flexibility, or protection, such as a rock plate, medial post, or Nike Air units. Underfoot cushioning may also be influenced by sockliners and the strobel construction (Sokolowski, 2019).

The final main component of a running shoe is the outsole. The outsole is the interface between the shoe and the ground, providing traction for the runner. Outsoles are usually made of rubber, and often are comprised of branded compounds, like Vibram Megagrip, or special

geometries, like Altra Trailclaw. Outsoles may vary depending on the terrain, with more aggressive lugs on trail shoes and more minimal, zoned traction on road shoes.

MATERIALS

Materials in running shoe uppers include synthetic engineered knits, air mesh, TPU films and hot melts such as Bemis, and synthetic leather. Midsoles are made of proprietary foam compounds or EVA. Some midsoles may also include TPU components for stability or cushioning inserts such as gel, air bags, or mechanical cushioning systems. Outsoles are made of blown or solid rubber.

MANUFACTURING

Materials are die cut and stitched together into an upper shell. Alternatively, the upper is fabricated in one piece with a CNC knitting machine (Motawi, 2017). The upper is then assembled to the lining and any reinforcements, padding, or overlays, and then attached to the strobol. The completed upper and strobol are heated and slipped onto the last to take form (Motawi, 2019). The midsole is compression molded, and any encapsulated units are glued into place. Rubber outsole components are injection molded. The upper is glued to the midsole, and the outsole is glued to the midsole. Finally, the laces and sockliner are put in place.

GRAPHICS, LOGO, COLOR

Macro applications for women's athletic running shoes include the upper silhouette, manufacturer's logos, color, graphics, and technology (Sokolowski, 2018). The silhouette is usually a classic running silhouette, with a trend towards more minimal, sock-like silhouettes,

such as with the Nike Epic React Flyknit 2. Classic features of the silhouette include a prominent Achilles tendon protection along the back of the heel, padded collars, and a one-piece upper with minimal overlays. External molded heel counters are also common for added stability. The primary logo application is usually along the lateral side of the shoe, with secondary logo applications on the medial side, tongue, and outsole. The model name of the shoe is also usually present on the shoe, as well as technology callouts such as cushioning systems. Color application varies greatly across brand and shoe models. Companies like Nike and Hoka One One are embracing retro '90s inspired color palettes of bright pink and yellow with many outlandish, contrasting colors, whereas more traditional brands like New Balance and Brooks keep their color palettes fairly subdued, with only one or two accent colors per colorway, and base colors of black, grey, or blue. While many colors are available in medium width sizes, filtering by Wide results in much more limited color options, and typically only black and white (Fig. 10).



Fig. 10 Running shoes often come in bright and bold '90s inspired colors (left) or more muted and feminine colors (center). However, when filtered by size, all that is left is boring black and white colorways (right) (Brooks, n.d., Hoka One One, n.d.-b, Merrell, n.d., New Balance, n.d., Nike, n.d.-a, Saucony, n.d.-a).

PATENT LANDSCAPE

Relevant utility patents in this space include those related to adjustable fit and sizing for footwear, as well as cushioning systems, as outlined below.

ADJUSTABLE SIZING

- Athletic shoe with an adjustable sizing system (U.S. Patent No. 6,442,874 B1, 2002)
- Adjustable footbed assembly for an article of footwear (U.S. Patent No. 2011/0185600 A1, 2011).
- Custom fit system with adjustable last and method for custom fitting athletic shoes (U.S. Patent No. 7,992,243 B2, 2011).

CUSHIONING SYSTEMS

- Running shoe with differential cushioning (U.S. Patent No. 4,364,189, 1982).
- Footwear with adjustable viscoelastic unit (U.S. Patent No. 4,817,304, 1989).
- Cushion wedge for custom control of impact and pronation upon heel-strike in various weights of wearers (U.S. Patent No. 4,882,856, 1989).
- Shoe comprising liquid cushioning element (U.S. Patent No. 5,155,927 A, 1992).
- Footwear cushioning spring (U.S. Patent No. 5,279,051, 1994).
- Article of footwear with a motion control device (U.S. Patent No. 6,457,262 B1, 2002).
- Shoe with tunable cushioning system (U.S. Patent No. 6,807,753 B2, 2004).
- Energy return sole for footwear (U.S. Patent No. 6,860,034 B2, 2005).
- Shoe cushioning system and related method of manufacture (U.S. Patent No. US 7,225,491 B2, 2007).

- Air-circulating shock absorbing shoes (U.S. Patent No. 2008/0184600 A1, 2008).
- Article of footwear having a fluid-filled chamber with flexion zones (U.S. Patent No. 7,752,772 B2, 2010).
- Mechanical cushioning system for footwear (U.S. Patent No. 7,793,432 B2, 2010).
- Article of footwear with heel cushioning system (U.S. Patent No. 8,181,364 B2, 2012).
- Footwear with dynamic arch system (U.S. Patent No. US 9,204,687 B1, 2015).
- Cushioning assembly for an article of footwear (U.S. Patent No. 2017/003514.6 A1, 2017).

PROJECT ALIGNMENT

This project is aligned with Chrissy's skills because of her experience working as a professional footwear designer for the kids' brand, PLAE. She has experience working on the entire footwear design process, from concept to final product and will be able to execute the same process here as if she were working directly for a company. Designing kids shoes specifically sets her up well to be able to design for the plus-size market, since kids typically have wider, thicker feet. She has been able to successfully design shoes for kids that grade from size 5 toddler up through size 4.5 youth, keeping in mind how the design will be affected by different proportions.

Chrissy also has experience working with plus-size body scan data through her work as an intern for WARE Labs. She has analyzed plus-size bodies, taken anthropometric measurements using Anthroscan, and organized the data. She is very detail-oriented and will be able to use her past experience to determine a new methodology for analyzing plus-sized foot scans to develop a shoe last.

Chrissy's core strengths as a product innovator are storytelling, problem framing, and design research. She is able to take a vast amount of research and distill it down to communicate a design story to which the audience can relate. While not a plus-sized athlete herself, Chrissy comes at this project as a passionate ally of the plus community who will advocate for their needs with empathy and enthusiasm. Her experience as an athlete with foot trouble sets her up well to relate to the needs of the plus-size runner.

This project will support Chrissy's career as a footwear designer because it highlights many parts of the research and development process that she would like to tackle in the future. The topic is in line with her interest in injury prevention without being overly ambitious to the point of being unachievable without a team of researchers. Living an active lifestyle and specifically running is such an important part of her life. It is stress-relieving, inspiring, and freeing. Her main goal as a designer is for more people to feel empowered and able to run.

CONCLUSION

In an Outside Magazine podcast with Mirna Valerio, she describes a visit to a new doctor in which he took one look at her and said, "you're obese," without knowing anything about her or who she is as a person; he only saw her size (Mack, 2019). Unfortunately, plus-size women are frequently seen as unhealthy or unfit because of their size or weight. Nearly 35 percent of adults in the US, or 78.6 million people, are obese, a problem that the Centers for Disease Control and Prevention call a national epidemic (Gonzales-Campoy, 2019). While many will be quick to jump to medical intervention to tackle this issue and focus on a systemic need to encourage weight loss, a study by Penney and Kirk (2015) looks at the efficacy of the Health at Every Size (HAES) approach, which challenges the assumption that weight loss is the only way

for people with obesity to improve their health and instead encourages body acceptance and developing a healthy lifestyle. Penney and Kirk discuss how the HAES approach is shown to improve quality of life and even showed weight reduction without specific effort to lose weight. By shifting the focus away from weight loss instead to the promotion of the idea that every body is an athlete's body, no matter the shape or size, more women will be encouraged and confident to live active, healthy lifestyles. Products designed for the particular needs of plus-sized runners can help achieve this goal by supporting these athletes as they begin or continue along on their journey towards becoming happier, healthier humans.

PART 2

PROJECT DEVELOPMENT

FIELD WORK

Field research for this project was conducted over the course of two field research trips and several individual interviews with athletes in the local Portland area. The first research trip was to New York, Massachusetts, and Colorado, and the second was to the United Kingdom.

The main research questions for the field work were the following:

- What does the plus-size runner’s gait look like, and how does it differ than the “average” runner?
- What are the main frustrations plus-size women have with their current footwear?
- What is most important to plus-size women when choosing footwear?
- What is the current last making process, and how can it be adapted to meet the needs of plus-size runners?
- What are the current trends in the outdoor industry in regard to materials, silhouette/form, and footwear construction?

The first part of field work was centered around athlete insight research. Athlete insight was conducted through a meeting with Mirna Valerio at her physical therapist and sport performance sponsor, Custom Performance, located at 295 Madison Ave, New York, NY. The meeting consisted of interviewing, shoe analysis, and gait analysis. During the interview, Mirna

reiterated comments she had mentioned in an earlier phone interview about her footwear frustrations and preferences. She said that her feet are proportional to her height and weight, and they are not particularly wide in a traditional sense, which is in line with the study by Tománková et al. (2015) about the effect of obesity on the foot shape and size. She looks for shoes that are stable yet lightweight and give a “feeling of stability while still being neutral”. She prefers shoes with traction that is not too aggressive, since she often wears trail shoes on the road or treadmill. Her current shoes were analyzed, and excessive wear was noticed to have developed on the medial collar of the shoe, despite the shoes being relatively new. The excessive wear is likely a result of kicking herself as her form breaks as she tires out on long runs. She said her shoes typically wear down after around 200 miles. Her gait was analyzed while walking and running on a treadmill (Fig. 11). While walking, she has a prominent heel strike, whereas while running, she lands flat-footed with a midfoot strike. Her run gait is very compact, almost like a shuffle, with minimal dorsiflexion, kick back, or knee drive. She takes very short steps and has almost no float time, such that her front foot is on the ground at the same time or before her back foot is in the air.



Fig. 11 Mirna's walking gait (left) was compared to her running gait (right).

While not directly related to the field work in New York, more athlete insight research was conducted through Mirna’s Facebook group, FATGIRLRUNNING. A survey was conducted through this Facebook group, resulting in 93 responses and enthusiastic support for this project. Key takeaways from the survey were about plus-size women’s footwear preferences and frustrations (Fig. 12). The preferred brand of running shoes is Brooks, and the most popular model is the Brooks Ghost. Wide fit, wide toe boxes, and overall fit were the most reported reasons for choosing their current shoes. “Comfortable” or “felt good” were also popular

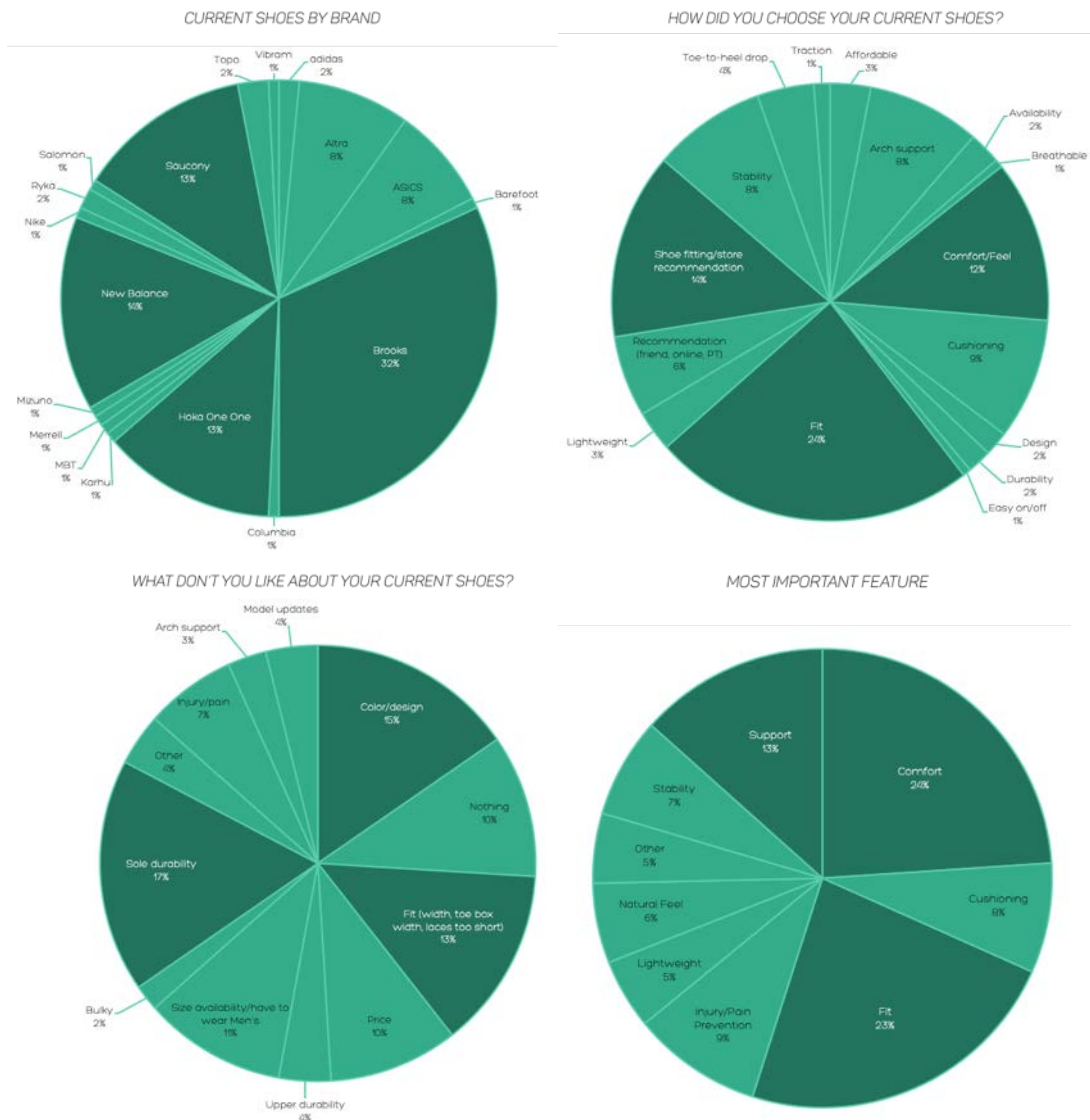


Fig. 12 Results from a survey sent to the FATGIRLRUNNING Facebook group.

reasons for choosing shoes. Many women chose their shoes based on a recommendation from a specialty running shoe store after a fitting. Sole durability was the most common frustration reported about their current running shoes. Women reported their shoes wearing down after around 150 miles, rather than the typical 300-400 miles for the “average” runner. A woman named Erika said, “I have gained significant weight and the cushioning breaks down very quickly. When I weighed less this wasn't an issue.” There was also frustration regarding the limited color and design availability in wider and bigger sizes. The most important features reported were fit, comfort, and support. Many of the comments mentioning “comfort” referred to the shoes being wide enough to fit their feet, such as Heather who said, “If they don't fit comfortably, I can't wear them. Finding them wide enough. I tried on 6 pairs before these.” Other comments about comfort referenced finding the “goldilocks cushion level,” with the correct balance of underfoot cushioning comfort and ground feel. Similarly, comfort was defined by shoes with the right amount of arch support. Responders ranked footwear features on a scale of 1 to 5, where 1 is the least important and 5 is the most important (Fig. 13).

Comfort was rated very high, with the vast majority of responders ranking it as a 5. Other high-

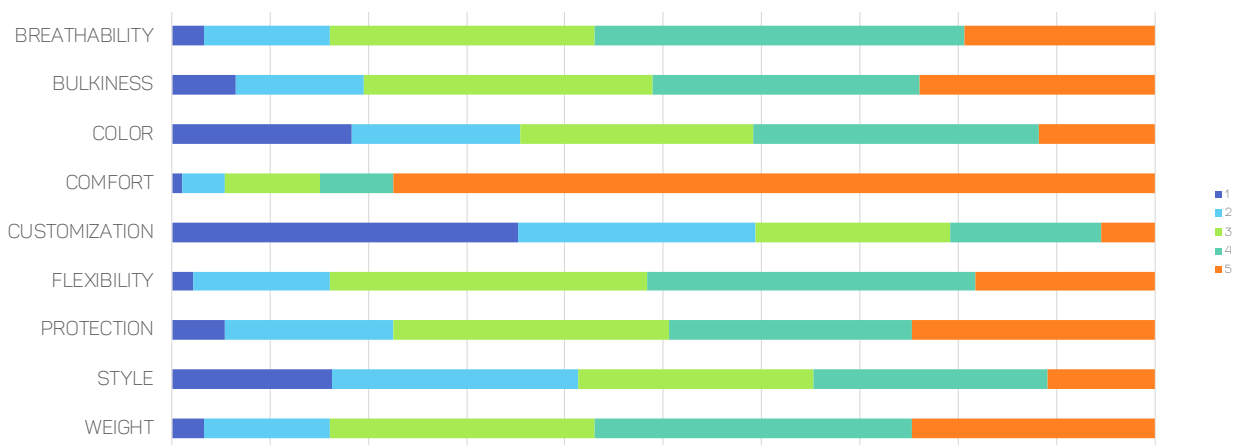


Fig. 13 Footwear features, rated from 1-5, where 1 is the least important and 5 is the most important.

ranking features were breathability, bulkiness, and weight. Style and color rankings were less consistent, likely because it is less important to the athletes than the performance of the shoe. Since performance is their priority, they are choosing shoes that fit or feel good, but then are frustrated with the way they look.

Further interviews were conducted in the Portland Metro area with women contacted through the FATGIRLRUNNING Facebook group. Interviews were conducted with Eleanor from Molalla, OR, Jessica from Portland, OR, and Robin from Sherwood, OR. Their shoes were analyzed, measurements and arch prints were taken, and their feet were 3D scanned using the Structure 3D scanner (Fig. 14). Many of the key takeaways from these interviews reiterated



Fig. 14 3D foot scans were taken of the three women, Eleanor, Jessica, and Robin (right). Their shoes were also analyzed (center) and their feet were measured on a Brannock device (left).

feedback from the FATGIRLRUNNING survey, such as preference for the brand Brooks. Robin described how she feels like Brooks cares about women like her, especially over brands like Nike, which she felt did not care about everyday athletes like her, since most of their imagery and marketing focuses on elite athletes. Jessica described her ideal shoe as being flexible and moving with her foot. Eleanor described comfort as “difficult to define – you know it when you feel it.” She further described comfort as having, “the right amount of squishiness in the insole, the right amount of wiggle room for my toes, the ability for the shoe to stay in place snugly

without slipping on the heel or being tied so tightly that it risks cutting off circulation.” Robin’s feet, which she reported as being size 8 medium, were selected for use in developing a last. Her 3D foot scans were 3D printed with PLA on an FMD printer.

The second part of field work was centered around last development. The first part of last development research was a tour of the Jones and Vining development office in West Bridgewater, MA. Bob Albert and Tomas Arzeno gave a tour of their office, including their work bench and last making tools (Fig. 15), lathe, 3D scanner with specialty last scanning robotic arm, and archive of lasts. A key finding from this visit was that given the high cost of midsole tooling, companies will use the same tooling for A, B, and D width shoes. The result is a wider last which is then just hanging over the edge of the tooling. Other key findings were about the measuring techniques for last making. Measurements are taken non-weight bearing. The last must also measure smaller than the foot, since it is assumed that the shoe will tighten around the foot once the wearer steps in it. However, both of these facts seem to be assumptions that are not founded in science, but more traditional last making techniques developed for leather dress shoes.



Fig. 15 Bob Albert’s work bench at Jones and Vining in West Bridgewater, MA.

Further last making research was conducted through the Lastmaker House four day last making workshop in Eastbourne, UK (Fig. 16). Using traditional last making measurements and wood working techniques, a pair of wooden lasts were created over the course of four days under the instruction of Steven Lowe, a last maker who trained at John Lobb St. James' Street (Lowe, n.d.). The first day started with measurements, which include drawing the outline of the foot and measuring the straight ball girth, diagonal ball girth, instep girth, back instep girth, and heel girth. The workshop is designed to have the participant make a pair of custom lasts based on the participants own measurements, but the coursework was modified in order to accommodate the needs of this project, and Robin's 3D printed feet were used to take the foot



Fig. 16 Photos from the last making workshop.

measurements. While typically a bespoke pair of lasts is made using the unique measurements of each of the wearers' feet, which are not usually the same, the wider and longer measurements were used in order to develop a pair of identical lasts. Consideration was also given to accommodate the thickness of an insole, which is not typically included when developing a dress shoe last. Once the measurements were established, the filing began, starting with an oversized pre-turned last. The pre-turned last was checked for adequate ratio of heel height to toe spring, as lowering the heel height increases the toe spring, and raising the heel height decreases the toe spring. Work began at the heel, removing material with a file, checking the outline, and repeating the process (Fig. 17). Once the heel was shaped and matched the outline



Fig. 17 The last was frequently compared to the outline and measurements to work towards the correct shape and size.

of the foot, the toe was shaped in a similar process. Using Robin's measurements, the right last was shaped and sized. Once the right last was complete, work began on the left last. An insole



Fig. 18 A tool used to match curvature from one last to the other.

pattern was taken from the bottom of the right last using masking tape in order to determine the shape need to create the left last. Once the bottom of the left last was shaped to match the right, the top left last was shaped to match the exact curvature, shape, and measurements of the right (Fig. 18).

Finally, once the left and right lasts were shaped and sized as desired, the lasts were sanded to smooth and fine tune and bumps or inconsistencies. The result was a pair of nearly identical wooden lasts based on the measurements taken from Robin's 3D foot scan (Fig. 19).



Fig. 19 Robin's 3D printed feet and the finished lasts.

A final goal for field research was trend research at Outdoor Retailer in Denver, CO. Trend research was gathered and used for inspiration in the design process. Research included visiting material suppliers such as San Fang and Huntsman for material inspiration and sourcing; brands such as Vibram and adidas for trim, silhouette, and construction inspiration; and technology companies like Pulse Fit System, who use 3D scanning to create custom ski boots.

DESIGN BRIEFS

Any Body is a collection of two shoes designed for plus-sized women. Any Body celebrates the back-of-the-packers and the too-fat-to-runners with road and trail running shoes they want to wear, not just the only thing that fits. On the next four pages are the design briefs for these two shoes. Both shoes are for the serious runner who is looking to train for longer distance races such as the half marathon. The top four problems to solve for both shoes are:

1. Fit – actually fits a plus-sized woman’s foot, and accommodates a wide range of foot girths and widths
2. Durable cushioning – outlasts their current shoes with the right amount of cushion and ground feel
3. Arch support – neutral arch support that moves with the foot for a secure, supported ride
4. Style – looks good, taking into account a wide/anatomical shape.

In addition to these design priorities, the road shoe will also emphasize flexibility, with a dynamic and flexible sole that moves with the foot, and breathability, promoting airflow to keep feet cool. The trail shoe will also prioritize traction with a stable and grippy outsole for confidence on uneven terrain, and protection from debris, mud, water, and rocks.



GOAL

A women's road running shoe that is finely tuned to the needs of the serious plus-size runner who is ready to train for a half marathon and wants a shoe with the comfort, style, and durability to go the distance.

PRICE

MSRP \$120 | FOB \$30

SEASON

F/W 2022



FEATURES + BENEFITS

ACTUALLY FITS

Proportioned to fit a plus-size woman's foot with a natural foot shape

DURABLE CUSHIONING

Outlasts current shoes with the right amount of cushion and ground feel

PERFECT SUPPORT

Arch support and stability that moves with the foot for a secure, supported ride

DYNAMIC TRACTION

Lightweight and flexible outsole grips the road for a smooth, reliable foot strike



ANY BODY'S TRAIL

WOMEN'S TRAIL RUNNING SHOES

GOAL

A women's trail running shoe that is finely tuned to the needs of the serious plus-size runner who is ready to tackle more vert and mileage on the trail and wants a shoe with the comfort, style, and durability to go the distance.

PRICE

MSRP \$120 | FOB \$30

SEASON

F/W 2022



FEATURES + BENEFITS

ACTUALLY FITS

Proportioned to fit a plus-size woman's foot with a natural foot shape

DURABLE CUSHIONING

The right amount of enduring cushion, protection, and ground feel

PERFECT SUPPORT

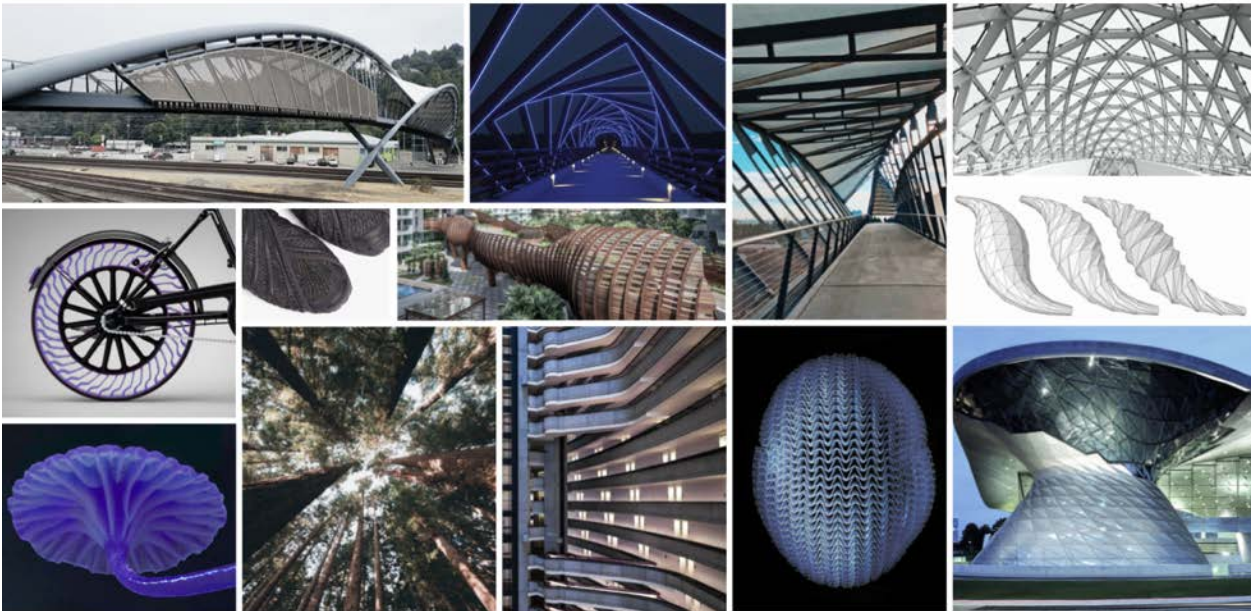
The same secure, supported ride found in her road shoes

TOUGH TRACTION

Provides a stable and grippy base to move confidently across variable terrain

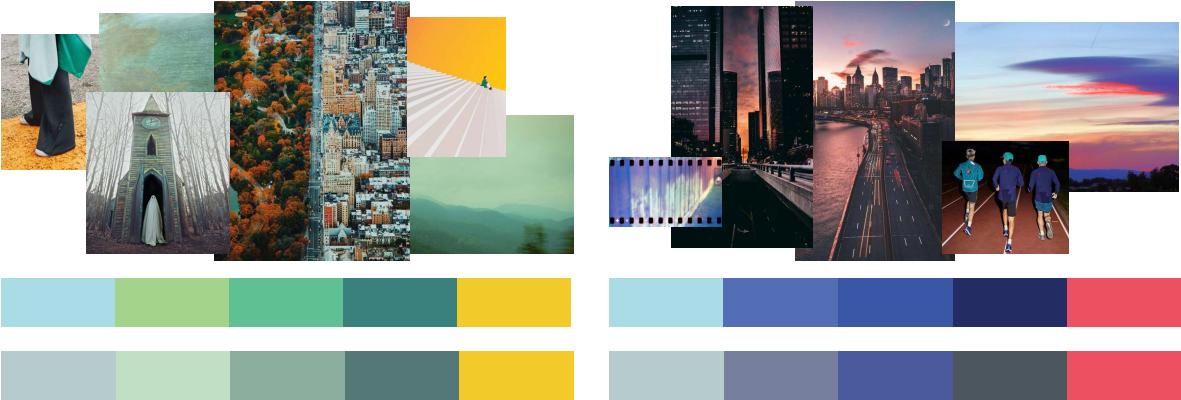
GRAPHIC, FORM, AND STYLE DIRECTION

The graphic, form, and style direction is inspired by triangulation in architecture, as well as other instances where curved and rectilinear lines combine to create dynamic forms.



COLOR DIRECTION

The color direction was inspired by Central Park in New York City. The cool, artificial tones of the city combine with the more natural tones to create a sense of calm amongst chaos.



IDEATION PROCESS

The ideation process began initially with sketching using Autodesk SketchBook (Fig. 20). However, with so many design priorities and no systematic process to approach solving the problems, the sketches were not very focused or interesting.

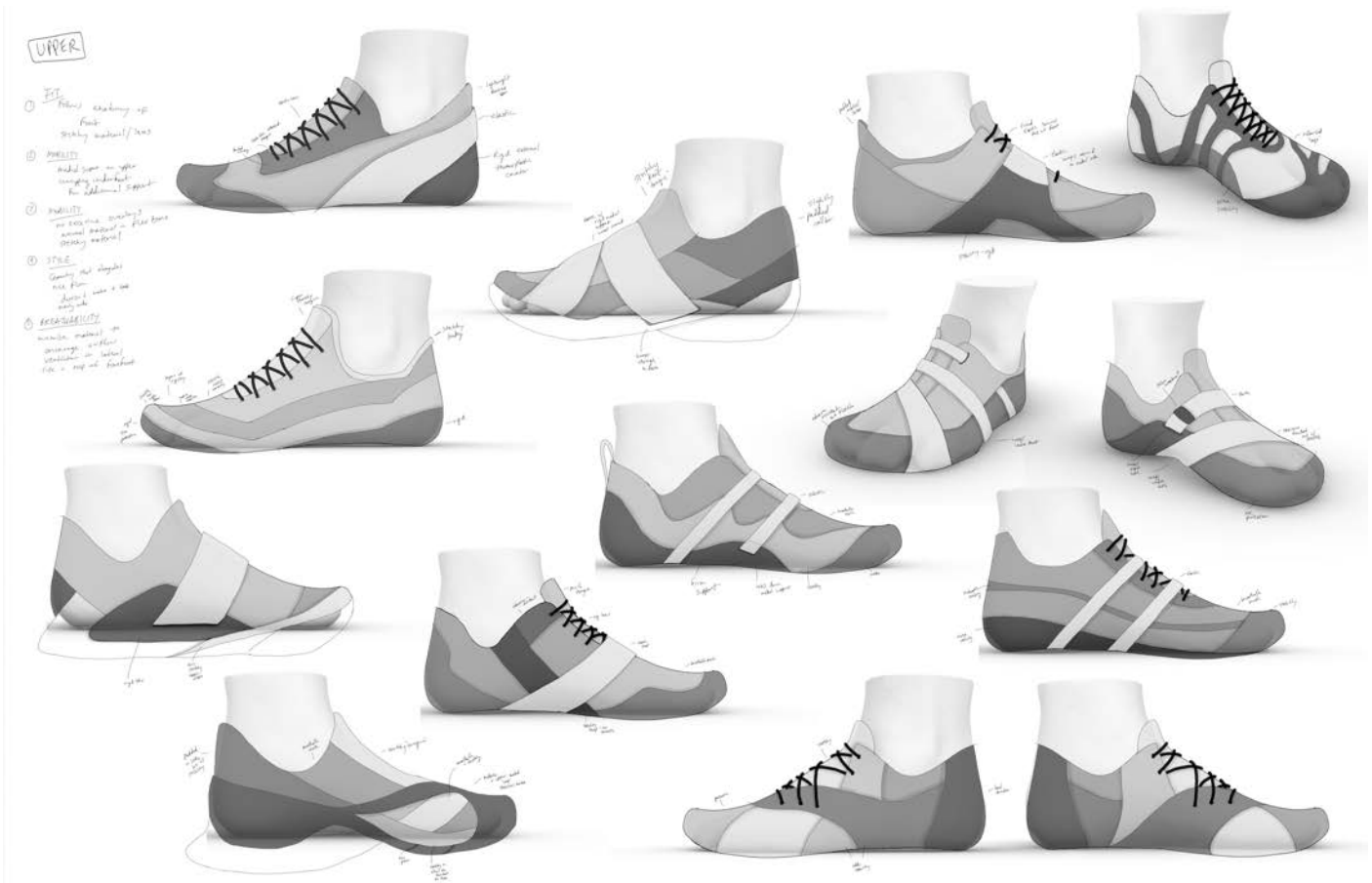


Fig. 20 The first round of sketching was not very focused.

To take a step back, mind mapping was used to analyze each problem to solve individually against each of the elements of the shoe—last, upper, sockliner, midsole, and outsole (Fig. 21 and 22). With the mind maps as a guide, more sketching was done with a clearer focus, looking at each of the problems to solve individually.

ROAD	LAST	UPPER	SOCK LINER	MIDSOLE	OUTSOLE
1. FIT Proportional/anatomical fit for plus-sized feet	Last based on plus-size foot Appropriate toe box height and girth - anatomical No forefoot inflare (2deg max)	Pattern follows anatomical landmarks (MTP joint, metatarsals, toes, achilles tendon) Stretchy material/faces to accommodate variations in foot shape	Sock liner follows curvature of arch and width of foot (not too narrow) Adjustable arch location?		
2. CUSHIONING Durable cushioning with the right amount of ground feel	Reduce size of last to accommodate thicker sock liner		Use the sockliner as a primary softness/cushioning mechanism instead of only relying on the midsole.	Overly soft foam should be minimized in place of firmer foam Use resilient, dynamic geometry to absorb impact.	Minimal rubber to reduce weight and encourage ground feel
3. SUPPORT Neutral arch support	6mm heel drop for a little added support but not excessive	Medial support on the upper using firmer materials to add stiffness Wrapping under the foot to create additional support	Built-in arch support in the sock liner (not flat) to support the foot as close to the foot as possible Movable and/or removable arch support? Two options?	Moderate medial heel flare to slightly adjust over pronation No biased midsole	
4. MOBILITY Dynamic/flexible for a smooth ride that moves with the foot	Uses mean heel to ball ratio measurements to account for variation in arch length and give proper flex zone Right amount of toe spring	No excessive overlays or materials to inhibit movement Minimal material in the flex zone Stretchy material	Flex grooves in sock liner for added mobility	Midsole should be super flexible to allow the foot to move naturally Minimize material where possible	Flexible outsole allows for free range of motion
5. STYLE Looks good, even in wide/anatomical	Uses the 3D scan to create an anatomical last, but takes into account how that proportionally will affect the way the shoe looks	Use geometry that elongates the foot and gives it a nice flow so it doesn't look overly wide		Shouldn't be overly bulbous or teched out, clean lines	Should be a fun/cool graphic treatment that isn't overly techy or aggressive
6. BREATHABILITY Has adequate airflow to keep the foot from overheating or sweating excessively		Minimize materials where possible to encourage airflow Ventilation on the lateral side and top of forefoot	Ventilation/perforations in sock liner	Ventilation in midsole to allow air to escape from under the sock liner?	

TRAIL	LAST	UPPER	SOCK LINER	MIDSOLE	OUTSOLE
1. FIT Proportional/anatomical fit for plus-sized feet	Last based on plus-size foot Appropriate toe box height and girth - anatomical No forefoot inflare (2deg max)	Pattern follows anatomical landmarks (MTP joint, metatarsals, toes, achilles tendon) Stretchy material/faces to accommodate variations in foot shape	Sock liner follows curvature of arch and width of foot (not too narrow) Adjustable arch location?		
2. CUSHIONING Durable cushioning with the right amount of ground feel and flexibility	Reduce size of last to accommodate thicker sock liner		Use the sockliner as a primary softness/cushioning mechanism instead of only relying on the midsole	Overly soft foam should be minimized in place of firmer foam Use resilient, dynamic geometry to absorb impact.	Minimal rubber to reduce weight and encourage ground feel
3. SUPPORT Neutral arch support	6mm heel drop for a little added support but not excessive	Medial support on the upper using firmer materials to add stiffness Wrapping under the foot to create additional support	Built-in arch support in the sock liner (not flat) to support the foot as close to the foot as possible Movable and/or removable arch support? Two options?	Moderate medial heel flare to slightly adjust over pronation No biased midsole	
4. TRACTION Stable and grippy for confidence on variable terrain (uphill and downhill) without being overly aggressive		Keeps foot securely in place	Texture on bottom of sock liner to keep it in place since the firmer bottom may be more slippery than foam.		3-4mm lugs Geometry shouldn't be too angular or sharp Follows the movement of the foot anatomically
5. STYLE Looks good, even in wide/anatomical	Uses the 3D scan to create an anatomical last, but takes into account how that proportionally will affect the way the shoe looks	Use geometry that elongates the foot and gives it a nice flow so it doesn't look overly wide		Shouldn't be overly bulbous or teched out, clean lines	Should be a fun/cool graphic treatment that isn't overly techy or aggressive
6. PROTECTION Protection from debris/mud/water (but still breathable) and underfoot from rocks		Waterproof membrane/barrier construction and/or water repellent lining Lightweight tongue gusset or other top-of-foot protection to keep out debris	Firm bottom on sock liner for rock protection (but that is still flexible) - mostly under forefoot, since cushioning under heel will protect.	Extra heel cushioning to protect from rocks/sharp objects	Durable rubber so it doesn't get too beat up from rough terrain

Fig. 21 Each part of the shoe was examined for ways that aspect could affect the problems to solve.



Fig. 22 Each combination was then mind mapped to explore potential solutions.

In addition of the mind maps, intersections were found and used for inspiration. For example, the problem to solve of fit was explored through the lens of dog harnesses, which must fit a variety of dog shapes and sizes and fit securely (Fig. 23).



Fig. 23 The second round of sketching was more successful using mind maps for focus and intersections for inspiration.

Clay modeling was also used to generate unique forms. However, the forms were limited by the clay's ability to be transformed into precise geometry, and thus were a little too organic, rounded, and generic to be useful for ideation (Fig. 24).

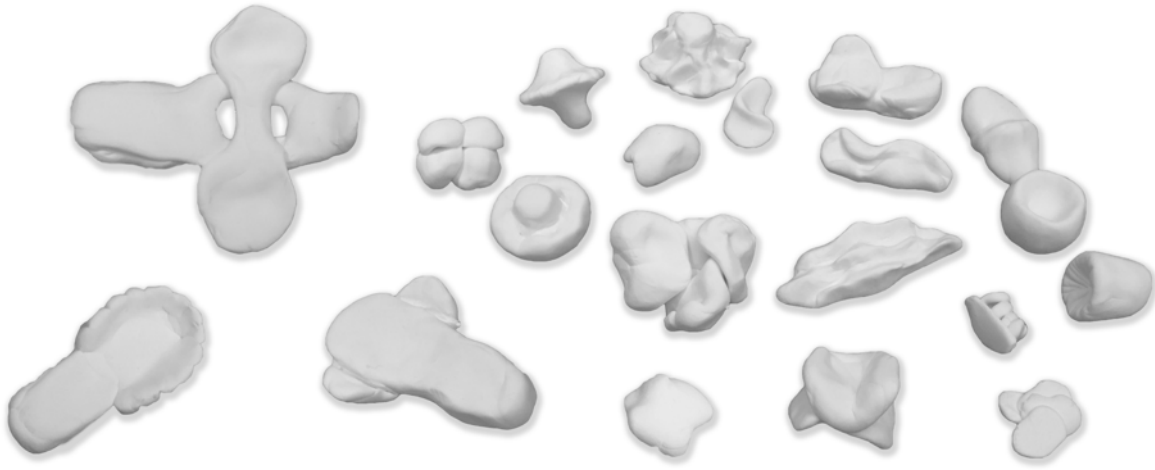


Fig. 24 Clay ideation.

Once an upper concept was established and refined in Adobe Illustrator, prototyping began, starting with a standard width running last. After the last making course, the pattern was converted over to the new lasts. From there, more prototypes were made to work through construction details, such as the gusset, and the pattern for fit and proportion (Fig. 25).



Fig. 25 Many rounds of prototypes.

More sketching and prototyping was done to explore the best options and address concerns expressed by Mirna about the side lacing (Fig. 26). Mirna said, “in thinking about the possible mentality/thought process of folks who just want to fit in and not look any different from other athletes than they already look, it might be a turn off.”

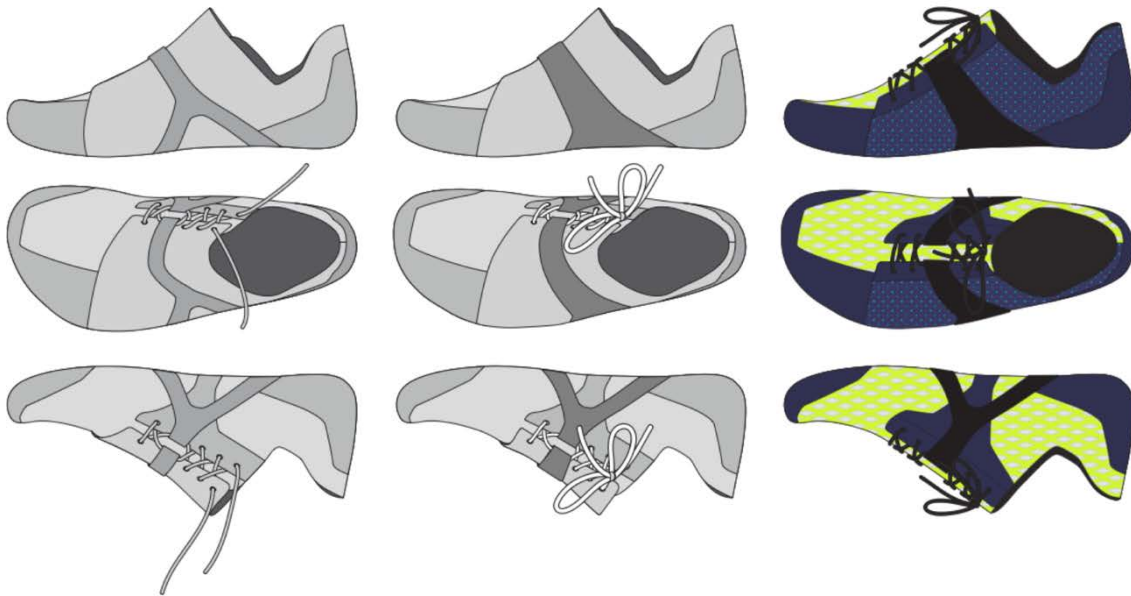


Fig. 26 Upper refinements

With an upper design in mind, sketching for the midsole was done, keeping in mind the same process used for the upper (Fig. 27 and 28). The design was then refined using Adobe Illustrator to achieve a final direction for the upper, midsole, and outsole (Fig. 29).

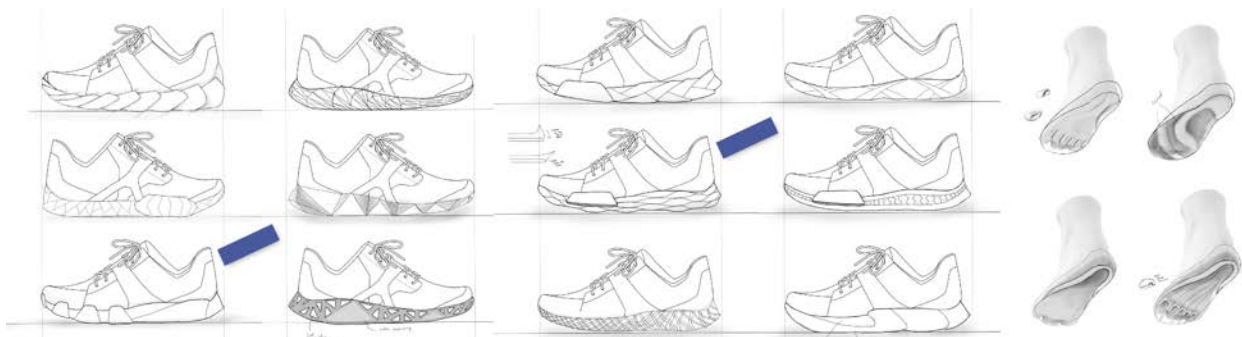


Fig. 27 Midsole sketching

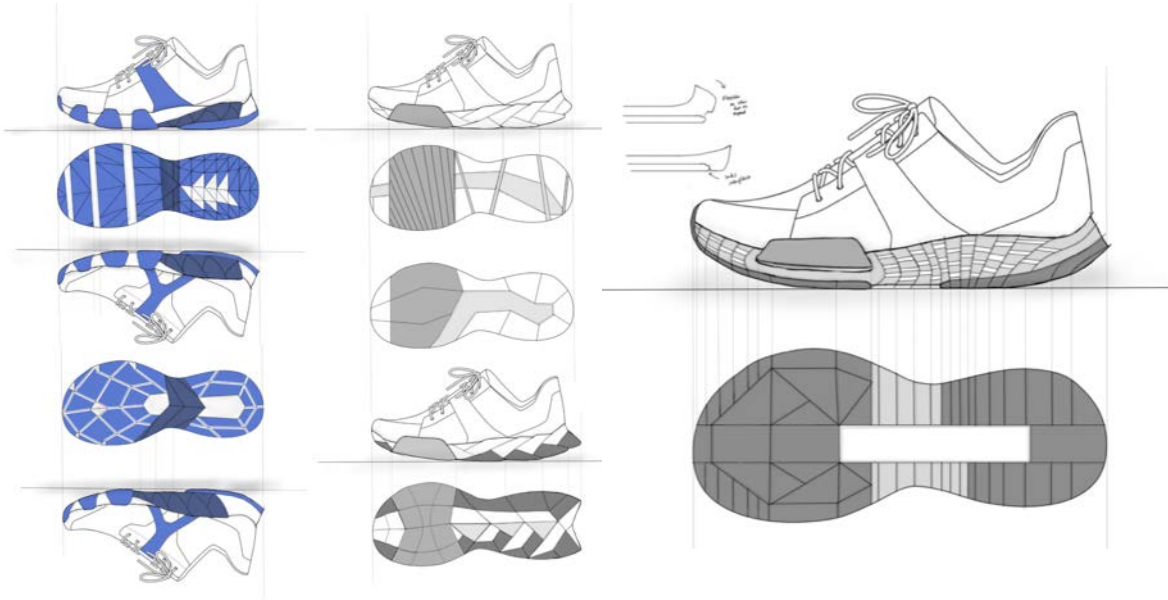


Fig. 28 More midsole and outsole sketching

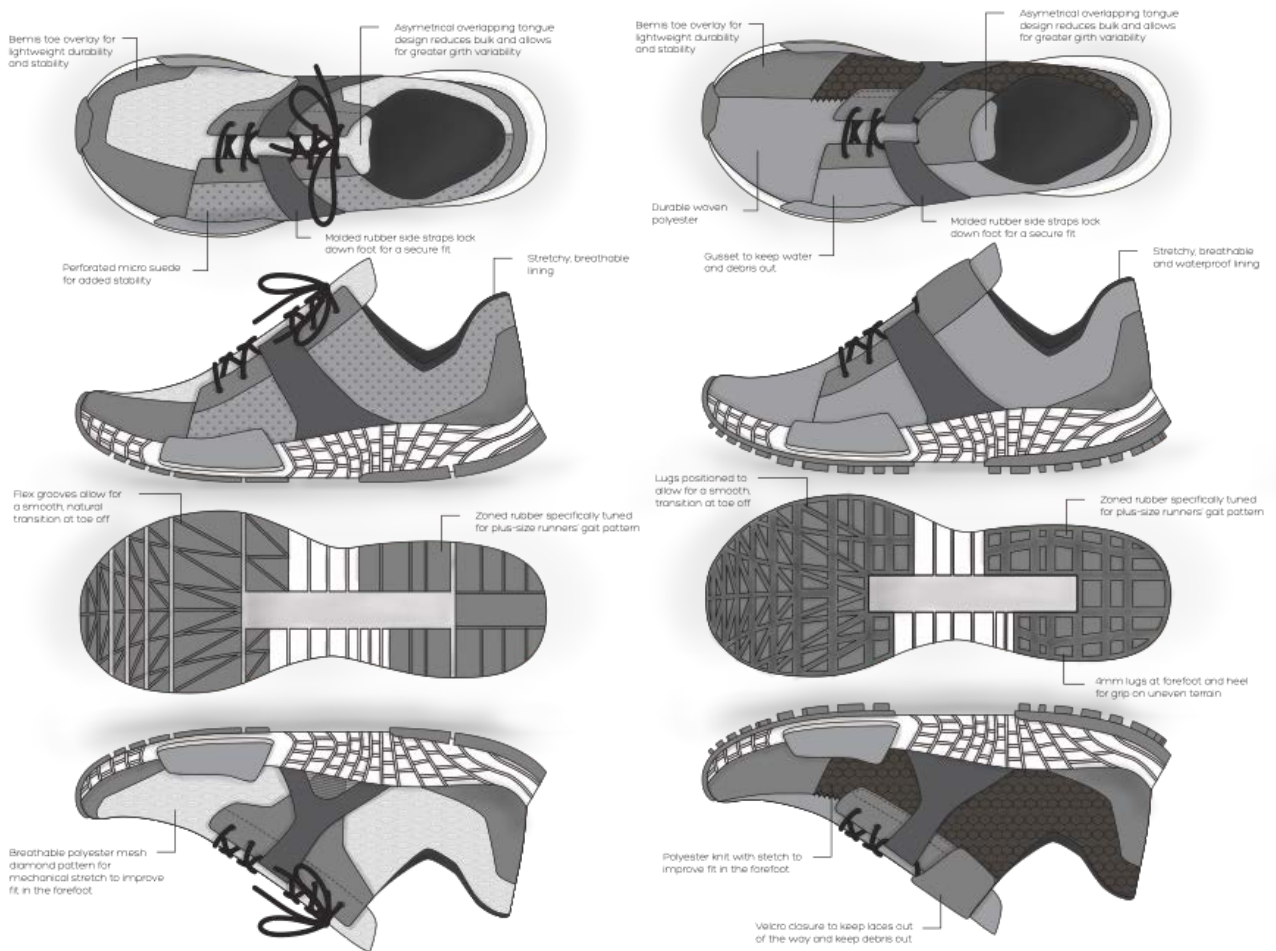


Fig. 29 Final design direction.

More sketching and 3D work will be done over Spring Break and into Spring term to examine details, reduce bulk, and refine the overall aesthetic.

VALIDATION PLAN

The validation plan for this project must prove that both shoes do the following:

- Fit a plus-size woman's foot
- Provide a more durable cushioning system than the state-of-the-art
- Provide arch support for a secure and stable feel
- Have an aesthetic that is desired by the athlete
- Are breathable and flexible (road only)
- Are protective (trail only)
- Provide stable traction on uneven, varied terrain (trail only)

Many of these will be evaluated through qualitative or theoretical methods. Robin will be used as a fit test subject, since the last was designed based off her foot. A one-on-one fit test and interview will be conducted with Robin. Two to five other plus-sized athletes with size 8 feet will also be contacted to verify fit on a variety of feet. These other women will be contacted through local plus-size advocates Andrea Kelly, who manages plus-size product at Columbia, and Rebecca Taylor, who created a review app for plus-size people. The fit of the shoes will be evaluated, as well as the perception of arch support, style, breathability, flexibility, protection, and traction. Since so much of the feedback and frustration reported centered around comfort, the perception of comfort through the lens of support, cushioning, breathability, and flexibility will be important in evaluating the success of the shoes. Further

style testing will be conducted through the FATGIRLRUNNING Facebook group. Images and drawings of the designs will be presented to the group for feedback and validation. The durable cushioning and fit systems will be evaluated theoretically by bio-mechanical engineer and footwear innovation expert Nathan Ghabour.

PRESENTATION PLAN

At the end of Spring term, the work will be displayed as part of a plus-size fashion show and social gathering put on in coordination with Andrea Kelly and Mirna Valerio. The intention will be to bring together local women to celebrate them and the other amazing women like themselves who are doing great things in the outdoors and athletic spaces. Images showing notable plus-size women's accomplishments will be on display, such as Kara Richardson Whitely, who climbed Mount Kilimanjaro at 300 pounds (Chang and Sintay, 2015). The show will also highlight other athletic and outdoor brands that create high performance gear for plus-size women.

The work will also be accompanied by a website, including an endorsement video from Mirna. While product will not be for sale on the website, there will be a link to indicate interest in the product, which will then display for future viewers to have an indication that demonstrates an unmet need for innovation in this space by major running brands.

SPRING TERM WORK PLAN

- Spring Break - 3/16-3/27
 - Modify and 3D print new lasts
 - Sketching/prototyping to refine details

- Week 1 – 3/30-4/3
 - Prototyping uppers
 - CAD for midsole/outsole
- Week 2 – 4/6-4/10
 - Theoretical evaluation of CAD rendering midsole/outsole design
 - Revise CAD based on feedback
 - 3D print midsole/outsole
- Week 3 – 4/13-4/17
 - Create mold
 - Cast midsole/outsole
- Week 4 - 4/20-4/24
 - Testing part 1 – fit/perception testing, expert validation, style survey, traction and water testing
- Week 5 - 4/27-5/1
 - Prototype revisions
- Week 6 - 5/4-5/8
 - Testing part 2 – fit/perception testing, expert validation, traction and water testing
 - Prototype revisions
 - Final prototypes done by 5/8
- Week 7 - 5/11-15
 - Gone for Wanted Design

- Week 8 - 5/18-22
 - Final presentation prep
 - Photography, marketing, branding, etc.
- Week 9 – 5/25-5/29
 - Buffer week
- Week 10 6/1-6/5
 - Prepare for final presentations

REVISED SPRING TERM VALIDATION AND PRESENTATION

With the COVID-19 pandemic and the ensuing social distancing and shelter-in-place guidelines, the validation and presentation plans were revised. The revised validation plan included Zoom perception testing, fit testing, and expert concept review in place of in-person evaluation.

Robin was still used as a fit test subject, but instead of a one-on-one fit test and interview, the works-like prototypes were mailed to Robin to try on. A Zoom interview was conducted to review the concepts for fit, comfort, aesthetic appearance, and perception. Initially other athletes were to be contacted for similar testing. However, given time and social distancing constraints, other athletes were not included in the fit testing at this time. In place of online style perception testing, a more thorough perception test was performed with Mirna Valerio through Zoom. Similarly, theoretical validation was performed with expert Nathan Ghabour via Zoom rather than in person.

The in-person presentation plan was also not possible and was instead replaced by a Zoom webinar-style presentation. While an in-person display and celebration would have been ideal, the online format allowed for viewers from across the country to participate and evaluate the project and designs. The work was presented with heart-felt empathy. The reviewers and members of the audience were able to see how important it is that these women are cared about, treated as serious athletes, and have their needs met.

BIBLIOGRAPHY

Adidas. (n.d.) *Solar Drive 19 shoes*. Retrieved from <https://www.adidas.com/us/solar-drive-19-shoes/EF1419.html>

Altra. (n.d.). *Women's Lone Peak 4.5*. Retrieved from <https://www.altrarunning.com/shop/womens-shoes-trail/womens-lone-peak-45-al0a4qtx?variationId=446>

Asics. (n.d.). *Gel-Kayano 26 (D)*. Retrieved from https://www.asics.com/us/en-us/gel-kayano-26-d/p/ANA_1012A459-001.html?width=Wide

Bassett, D. R. & Howley, E.T. (2000) Limiting factors for maximum oxygen uptake and determinants of endurance performance. *Medicine & Science in Sports & Exercise*, 32(1).

Bates, B. T. (1982). *U.S. Patent No. 4,364,189*. Retrieved from <https://patents.google.com/patent/US4364189>

Bates, B., & Gross, A. (1992). *U.S. Patent No. 5,155,927*. Retrieved from <https://patents.google.com/patent/US5155927>

Bauer, A. (2019). *Mirna Valerio is reshaping the ultrarunning world, one step at a time* [Digital image]. Retrieved from <https://www.outsideonline.com/2400658/mirna-valerio-ultrarunning-podcast>

Boldt, A. (n.d.). *When you lose weight do your feet get smaller?* Retrieved from <https://www.livestrong.com/article/405511-when-you-lose-weight-do-your-feet-get-smaller/>

- Brar, F. (n.d.). *Nearly half the people running the Boston Marathon are women*. Retrieved from <https://www.shape.com/fitness/cardio/nearly-half-people-running-boston-marathon-are-women>
- Brooks. (n.d.). *Ghost 12*. Retrieved from https://www.brooksrunning.com/en_us/ghost-12-womens-road-running-shoe/120305.html
- Casanova, A. (2018, April 24). *How much do biomechanics really have to do with running well?* Retrieved from https://www.podiumrunner.com/the-biomechanics-of-running-well_170487
- Chan, M. L., Choe, P. Y., Dirsa, D. J., Harmon-Weiss, E., & Murphy, S. B. (2010). *U.S. Patent No. US 7.793,432 B2*. Retrieved from <https://patents.google.com/patent/US7793432>
- Chang, J. and Sintay, L. (2016, August 19). *Woman recounts climbing Mt. Kilimanjaro at 300 pounds in new book*. Retrieved from <https://abcnews.go.com/US/woman-recounts-climbing-mt-kilimanjaro-300-pounds-book/story?id=33167552>
- Christel, D. A., O'Donnell, N. H., & Bradley, L.A. (2016). Coping by crossdressing: an exploration of exercise clothing for obese heterosexual women. *Fashion and Textiles*, 3(11), doi:10.1186/s40691-016-0063-z
- Collins, B. (1967, April 21). The gals bless 'em; let 'em in. *The Boston Globe*. Retrieved from <https://www.bostonglobe.com/news/special-reports/1967/04/21/the-gals-bless-let/LU9E4RH1VacMhOAsqsYO/story.html>
- Columbia. (n.d.). *Women's Caldorado™ III trail running shoe*. Retrieved from <https://www.columbia.com/womens-caldorado-iii-trail-running-shoe-1826711.html>

Cook, C. S., Kilgore, B. J., & Meschter, J. C. (2011). *U.S. Patent No. 7,992,243 B2*. Retrieved from <https://patents.google.com/patent/US7992243>

Dixon, A. (2019, November 27). *Merrell Agility Peak Flex 3 review 2019 – Trail shoes for rugged terrain*. Retrieved from <https://www.trailandkale.com/gear/merrell-agility-peak-flex-3-review/>

Duffin, E. (2019). *Population of the United States by sex and age 2018*. Retrieved from <https://www-statista-com.libproxy.uoregon.edu/statistics/241488/population-of-the-us-by-sex-and-age/>

Dufour, A. B., Losina, E., Menz, H. B., LaValley, M. P., & Hannan, M. T. (2017). Obesity, foot pain and foot disorders in older men and women. *Obesity research & clinical practice*, 11(4), 445–453. doi:10.1016/j.orcp.2016.11.001

FATGIRLRUNNING (2018, February 7). Retrieved from <https://www.facebook.com/groups/fatgirlrunning/>

Garmin. (2019). *Ultrarunner Mirna Valerio* [Digital image]. Retrieved from <https://www.womenshealthmag.com/fitness/a29628423/ultrarunner-mirna-valerio-on-size-and-fitness/>

Glancy, J. J. (1989). *U.S. Patent No. 4,882,856*. Retrieved from <https://patents.google.com/patent/US4882856A>

Gough, C. (2018, October 18). *Running & jogging - Statistics & facts*. Retrieved from <https://www.statista.com/topics/1743/running-and-jogging/>

Hatfield, T. D., & Hazenberg, K. P. (2010). *U.S. Patent No. US 7,752,772 B2*. Retrieved from <https://patents.google.com/patent/US7752772>

Hoka One One. (n.d.-a). *Women's Challenger ATR 5*. Retrieved from

<https://www.hokaoneone.com/womens-trail/challenger-atr-5/1104094.html>

Hoka One One. (n.d.-b). *Women's Clifton 6*. Retrieved from

<https://www.hokaoneone.com/womens-road/clifton-6/1102873.html>

Howard, H. (n.d.) *Review: Nike Zoom Pegasus 36 Trail*. Retrieved from

<https://www.runningshoesguru.com/review/nike-zoom-pegasus-36-trail-review/>

Howland, D. (2019, February 11). *The plus-size era is over before it began*. Retrieved from

<https://www.retaildive.com/news/the-plus-size-era-is-over-before-it-began/547938/>

Keklak, A. (2018, March 8). *A brief timeline of all the bullshit female runners have overcome*.

Retrieved from <http://citiusmag.com/timeline-female-runners-history/>

Kirby, B. (2018, October 2). *Lecture 2 – Work and energy* [PowerPoint slides]. Retrieved from

<https://canvas.uoregon.edu/courses/120433/files>

Kirby, K. A. (2017, September). *The biomechanics of running shoes*. Retrieved from

https://www.podiatrym.com/cme/CME1_917.pdf

Khan, G. (2018, March 1). *This ultramarathon runner is redefining what an athlete looks like*.

Retrieved from <https://www.nationalgeographic.com/adventure/features/adventurers-of-the-year/2018/mirna-valerio-ultramarathon-runner/>

Kunst, A. (2019, June 25). *Share of Americans who went jogging or running in the last 12*

months in 2018, by age. Retrieved from [https://www-statista-](https://www-statista-com.libproxy.uoregon.edu/statistics/227423/number-of-joggers-and-runners-usa/)

[com.libproxy.uoregon.edu/statistics/227423/number-of-joggers-and-runners-usa/](https://www-statista-com.libproxy.uoregon.edu/statistics/227423/number-of-joggers-and-runners-usa/)

- Langelier, A. (2019). *Saucony Triumph 17 performance review*. Retrieved from <https://www.believeintherun.com/2019/10/29/saucony-triumph-17-performance-review/>
- Long, B. S. (2002). *U.S. Patent No. 6,442,874 B1*. Retrieved from <https://patents.google.com/patent/US6442874>
- Lou Watkins, P., Ebbeck, V., & Levy, S. (2014). Overcoming weight bias: promoting physical activity and psychosocial health. *Ethnicity and Inequalities in Health and Social Care*, 7(4), 187–197. doi: 10.1108/EIHSC-11-2013-0043
- Lowe, S. (n.d.). *About*. Retrieved from <https://www.lastmakerhouse.com/about.html>
- Mack, J. (Producer). (2019, August 8). *Mirna Valerio is the runner you never expected* [Audio podcast]. Retrieved from <https://www.outsideonline.com/2400658/mirna-valerio-ultrarunning-podcast>
- Malek, D. (2011). *U.S. Patent No. 2011/0185600 A1*. Retrieved from <https://patents.google.com/patent/US20110185600>
- Mason, N. (2019, August 26). *The new supers*. <https://www.glamour.com/story/the-new-supers>
- Mayden, J. C., & Nomi, C. A. (2012). *U.S. Patent No. 8,181,364 B2*. Retrieved from <https://patents.google.com/patent/US8181364>
- Meltzer, M. (2012, November 7). *Plus-size and blazing a new path*. Retrieved from <https://www.nytimes.com/2012/11/08/fashion/plus-size-fashion-bloggers-are-role-models.html?auth=login-email>
- Merrell. (n.d.). *Women's Agility Peak Flex 3*. Retrieved from <https://www.merrell.com/US/en/agility-peak-flex-3/36361W.html>

- Mizuno. (n.d.). *Women's Wave Rider 23 running shoe*. Retrieved from <https://www.mizunousa.com/product/running-wave-rider-23-womens.do?sortby=ourPicksAscend&refType=&from=fn&ecList=7&ecCategory=100355>
- Motawi, W. (2017, October 24). *4D knit Flyknit™ shoe construction*. Retrieved from <https://sneakerfactory.net/sneakers/2017/10/4d-knitting-flyknit-shoe-construction/>
- Motawi, W. (2019, October 22). *Shoe lasting constructions*. Retrieved from <https://sneakerfactory.net/sneakers/2019/10/shoe-lasting/>
- New Balance. (n.d.). *Women's 880v9*. Retrieved from <https://www.newbalance.com/pd/880v9/W880-V9.html>
- New York Road Runners. (n.d.). *Rules of competition*. Retrieved from <https://www.nyrr.org/run/guidelines-and-procedures/rules-of-competition>
- Nike. (n.d.-a). *Nike Air Zoom Pegasus 36 Trail*. Retrieved from <https://www.nike.com/t/air-zoom-pegasus-36-trail-womens-trail-running-shoe-vF7D4W/AR5676-301>
- Nike. (n.d.-b). *Nike Epic React Flyknit 2*. Retrieved from <https://www.nike.com/t/epic-react-flyknit-2-womens-running-shoe-5ZJ3Wx>
- Nittle, N. (2018, July 10). *Activewear brands are ignoring plus-size women*. Retrieved from <https://www.racked.com/2018/7/10/17550018/activewear-brands-plus-size-women>
- Nix, E. (2018, August 22). *Why is a marathon 26.2 miles?* Retrieved from <https://www.history.com/news/why-is-a-marathon-26-2-miles>
- Paige, M. (2019, March 28). *Best trail-running shoes for women in 2019*. Retrieved from <https://gearjunkie.com/best-trail-running-shoes-for-women>

Parker, M. G., Forland, D. M., Lee, L. Q., McGuirk, T., Potter, D. R., & Potter, S. F. (1989). *U.S.*

Patent No. 4,817,304. Retrieved from <https://patents.google.com/patent/US4817304A>

Pattillo, A., Pilkington, C., & Polachek, E. *Timeline: women's running through the years*.

Retrieved from https://www.podiumrunner.com/timeline-womens-running-years_116043

Penney, T. L., & Kirk, S. F. (2015). The Health at Every Size paradigm and obesity: missing empirical evidence may help push the reframing obesity debate forward. *American journal of public health, 105*(5), e38–e42. doi:10.2105/AJPH.2015.302552

Peters, L. D. (2018, June 5). *When brands use plus-size models and don't make plus-size clothes*.

Retrieved from <https://www.vox.com/2018/6/5/17236466/size-appropriation-brands-clothes-plus-size>

Peyton, L. D. (2017). *U.S. Patent No. 2017/0035146 A1*. Retrieved from

<https://patents.google.com/patent/US20170035146>

Piontkowski, S., & Piontkowski, S. (2015). *U.S. Patent No. US 9,204,687 B1*. Retrieved from

<https://patents.google.com/patent/US9204687B1>

Pomeroy, S. (2019, January 8). *Week 2 – Newton's laws of motion [PowerPoint slides]*. Retrieved

from <https://canvas.uoregon.edu/courses/123018/files>

Reed, K. A., Fountain, G. G., & McClelland, L. W. (2007). *U.S. Patent No. 7,225,491 B2*. Retrieved

from <https://patents.google.com/patent/US7225491>

Richards, J., Chochan, A., & Erande, R. (2013). Biomechanics. In S. B. Porter (Ed.), *Tidy's*

Physiotherapy (pp. 331-368). doi: 10.1016/B978-0-7020-4344-4.00015-8

“The run centre: 4-point run analysis”. (2016). *Running gait* [Digital image]. Retrieved from <https://www.kintec.net/blog/the-run-centre-4-point-run-analysis/>

Salomon. (n.d.). *Sense Rise 2 W*. Retrieved from <https://www.salomon.com/en-us/shop/product/sense-ride-2-w.html#color=12573>

Saucony. (n.d.-a). *Women’s Peregrine 10 wide*. Retrieved from <https://www.saucony.com/en/peregrine-10-wide/43087W.html>

Saucony. (n.d.-b). *Women’s Triumph 17 wide*. Retrieved from <https://www.saucony.com/en/triumph-17-wide/42951W.html>

Schmid, R. K. (2005). *U.S. Patent No. 6,860,034 B2*. Retrieved from <https://patents.google.com/patent/US6860034>

Shortsleeve, C. (2018, August 28). *Women have started to claim the once male-dominated sport of road racing*. Retrieved from <https://furthermore.equinox.com/articles/2018/08/men-are-running-less>

Snell, W. (Photographer). (2018). *Latoya Shauntay Snell* [Digital image]. Retrieved from <https://www.theguardian.com/lifeandstyle/2019/may/12/insults-projectiles-well-intentioned-fat-shaming-the-perils-of-being-a-plus-size-runner>

Solereview (2018). *Adidas Solar Drive review*. Retrieved from <https://www.solereview.com/adidas-solar-drive-review/>

Solereview (2019a, April 25). *Nike Epic React Flyknit 2 review*. Retrieved from <https://www.solereview.com/nike-epic-react-flyknit-2-review/>

Solereview (2019b, August 18). *Best running shoes for heavy female runners – 2019*. Retrieved from <https://www.solereview.com/best-running-shoes-for-heavy-female-runners/>

Solereview (2019c, September 9). *Mizuno Wave Rider 23 review*. Retrieved from

<https://www.solereview.com/mizuno-wave-rider-23-review/>

Solereview (2019d, September 13). *Brooks Ghost 12 review*. Retrieved from

<https://www.solereview.com/brooks-ghost-12-review/>

Solereview (2019e, September 27). *Asics Gel-Kayano 26 review*. Retrieved from

<https://www.solereview.com/asics-gel-kayano-26-review/>

Solereview (2019f, December 1). *Saucony Triumph 17 review*. Retrieved from

<https://www.solereview.com/saucony-triumph-17-review/>

Sokolowski, S. (2018). Product branding + sport performance footwear design: a model and case study of macro to micro brand marks. In A. Sundar (Ed.), *Brand Touchpoints* (pp. 141-158). Eugene, OR: Nova.

Sokolowski, S. (2019, April 1). *SPD 686 – Footwear basics [PowerPoint slides]*. Retrieved from

<https://canvas.uoregon.edu/courses/132184/files/>

Spectrum Foot Clinics. (2016, February 26). *The impact of obesity on your feet*. Retrieved from

<https://www.spectrumfootclinics.ie/blog/the-impact-of-obesity-on-your-feet>

Steszyn, M., Lussier, M., Acevedo, J., Nigg, S. R., Orzeck, T. P. B., Wilday, R. L., & Gordon, J.R.

(2004). *U.S. Patent No. 6,807,753 B2*. Retrieved from

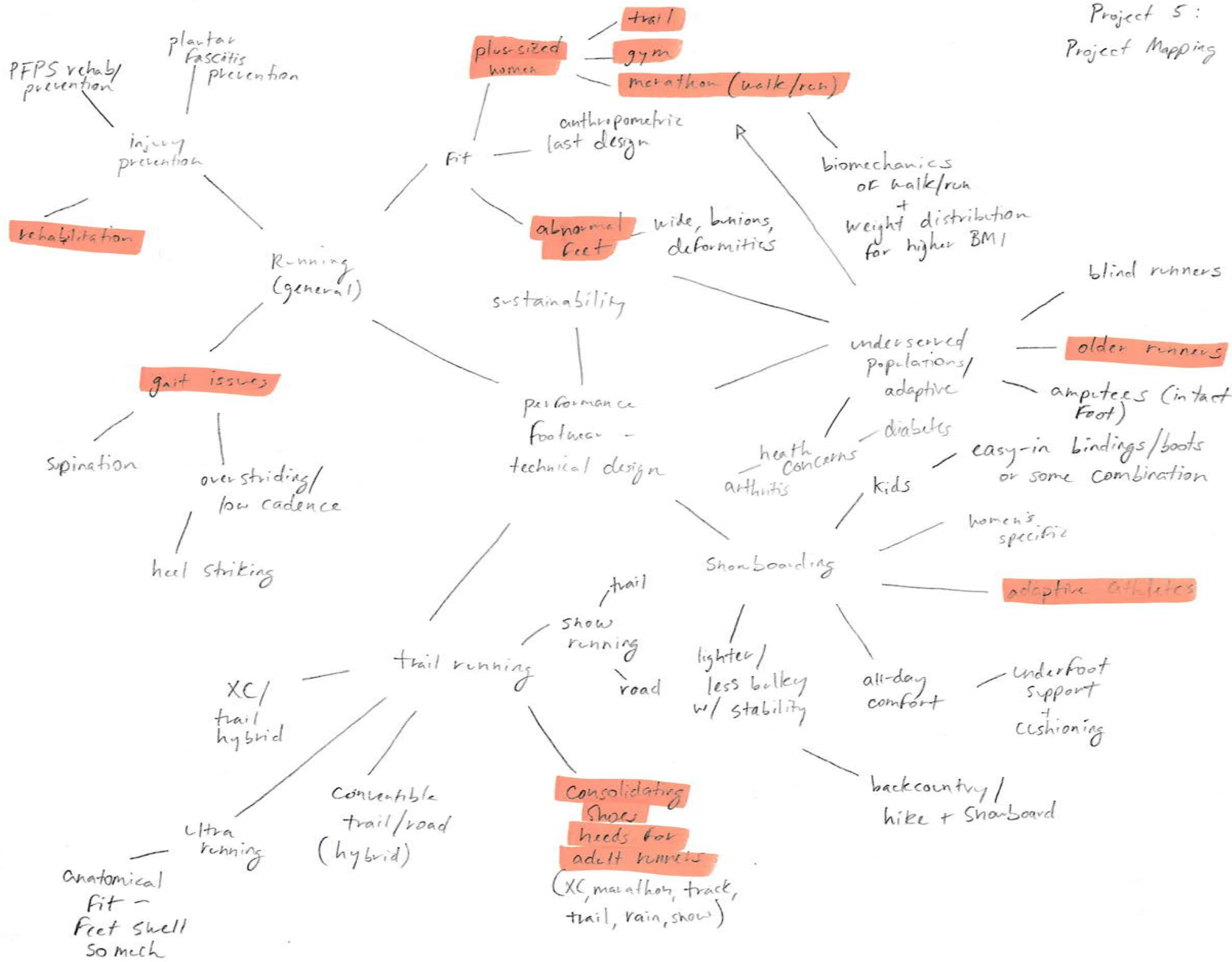
<https://patents.google.com/patent/US6807753>

Swigart, J. (2002). *U.S. Patent No. 6,457,262 B1*. Retrieved from

<https://patents.google.com/patent/US6457262B1>

- Taylor, K. (2019a, June 11). *People are defending Nike after a journalist slammed the sportswear brand for an 'immense, gargantuan' plus-size mannequin*. Retrieved from <https://www.businessinsider.com/nikes-plus-sized-mannequin-sparks-backlash-2019-6>
- Taylor, K. (2019b, June 12). *Nike's controversial plus-size mannequin is a brilliant business decision*. Retrieved from <https://www.businessinsider.com/nikes-plus-size-mannequin-is-a-brilliant-business-decision-2019-6>
- Tománková, K., Přidalová M., & Gába, A. (2015). The impact of obesity on foot morphology in women aged 48 years or older. *Acta Gymnica*, 45(2), 69-75. doi: 10.5507/ag.2015.010
- Topo Athletic. (n.d.). *Ultraventure*. Retrieved from <https://www.topoathletic.com/womens-ultraventure?color=72>
- Valerio, M. (2016, February 14). *Let's talk running shoes* [Blog post]. Retrieved from <https://fatgirlrunning-fatrunner.blogspot.com/2016/02/lets-talk-running-shoes.html>
- Weber, E. (2017, May 23). *Women share their experiences being plus-sized in a running world*. Retrieved from https://www.womensrunning.com/2017/05/health-wellness/women-plus-sized-running_75217
- Whatley, I. (1994). *U.S. Patent No. 5,279,051*. Retrieved from <https://patents.google.com/patent/US5279051>
- Yang, H.W. (2008). *U.S. Patent No. 2008/0184600 A1*. Retrieved from <https://patents.google.com/patent/US20080184600A1>

PROJECT TOPIC MAPPING



Project 5:
Project Mapping

Date: May 6th, 2017 at 1:49pm

Subject: Running

TO: MIRNA VALERIO

You are a liar and a fraud. F* you!** You

never once revealed any actual time completion
marathons you run. I have seen your few videos
to run. What a joke! You are moving no faster than
expect people to actually be stupid enough to be
professional runner is not overweight which is w



GOAL

Design a road running shoe and a trail running shoe for plus-size women
Use foot scan data to develop a new last
Focus on fit, underfoot cushioning, and aesthetic appearance



thefatgirlsguidetorunn • Following

without my running friends, and without the amazing support you find in organisations like Great Run Local and Parkrun and my local Run Together group. If you want to start running, it's my number one tip: find a community and a support network! 🙌

19w 1 like Reply
— View replies (1)



eve_jen86 Just waiting to get clearance at my 6 week post partum check and I'll be back at running, haven't run in a good year.....

19w 1 like Reply
— View replies (1)



Liked by heatherywaring and others

AUGUST 20, 2019

Add a comment...

PLUS-SIZE COMMUNITY

65% of women wear plus-size clothing

Plus-size women run, and not necessarily to lose weight

Size inclusivity is in style, led by a group of outspoken bloggers



PLUS-SIZE FOOTWEAR NEEDS

Carrying more weight = more stress on the bones and skin of the feet (vGRF = 2.8x body weight)

Often fallen arches, excessive pronation

Higher BMI = more likely to have foot pain

Flatter, fuller feet, but not necessarily "wide"

Super soft and cushioned or biased midsoles are not ideal

COMPETITOR ANALYSIS - ROAD



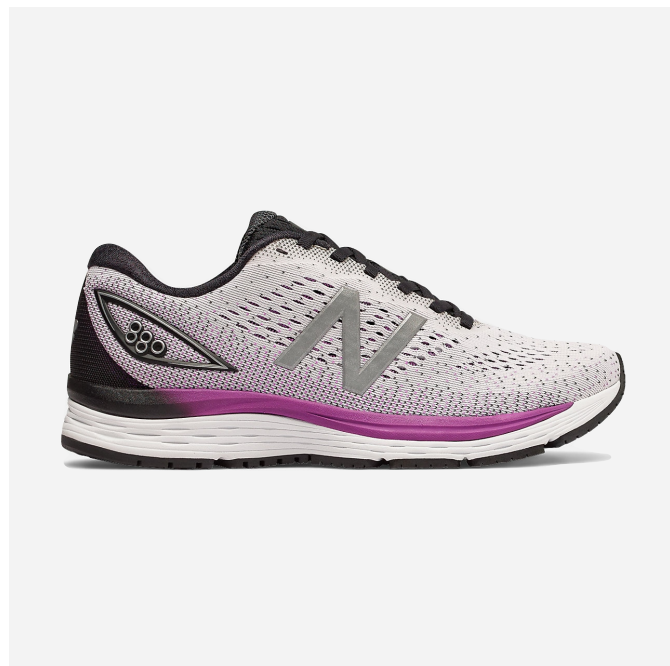
BROOKS GHOST 12
MSRP \$130

- + Comes in wide
- + Soft underfoot feel, smooth transition
- + Breathable engineered mesh upper for a soft, secure fit
- Narrow toe box
- Heavy
- Not very responsive



HOKA ONE ONE CLIFTON 6
MSRP \$130

- + Comes in wide
- + Rocker and heel bevel for a smooth ride
- + Zoned outsole to reduce weight
- Too soft
- Poor arch support
- Wears out easily



NEW BALANCE 880V9
MSRP \$125

- + Comes in wide and extra-wide
- + Stable, durable, responsive cushioning
- + Breathable engineered mesh upper for a comfortable fit
- + Wide toe box
- Heavy



SAUCONY TRIUMPH 17 WIDE
MSRP \$150

- + Comes in wide
- + Springy, responsive cushioning
- + Secure upper fit
- Heavy
- Stiff in the forefoot
- Expensive

COMPETITOR ANALYSIS - TRAIL



ALTRA LONE PEAK 4.5
MSRP \$120

- + Zero-drop, balanced cushioning
- + Footshape toe box allows toes to splay
- + Canted lugs for traction at toe-off
- + Durable, quick-drying air mesh upper
- No wide widths
- Not cushioned enough for sensitive feet



HOKA ONE ONE CHALLENGER ATR 5
MSRP \$130

- + Comes in wide
- + Breathable mesh upper with a TPU toe reinforcement for support and durability
- + Rocker for a smooth ride
- + Lightweight, stable impact absorption
- + 4mm lugs for all-terrain traction
- Poor arch support
- Wears out easily



MERRELL AGILITY PEAK FLEX 3
MSRP \$130

- + Responsive cushioning
- + Rock plate for underfoot protection
- + Vibram Megagrip for traction
- + Jacquard upper with TPU film heel counter for stability
- No wide widths
- Heavy
- Not a lot of protection



SAUCONY PEREGRINE 10
MSRP \$120

- + Comes in wide
- + Responsive, protective cushioning
- + Rock plate for underfoot protection
- + Grip and traction on multiple surfaces
- + Trail-specific upper design for a secure fit
- Heavy
- Too firm
- Stiff, overbuilt upper

COLOR TRENDS



BRIGHT AND BOLD

Goes beyond the typical pinks and purples for “women” with fun, bright, '90s-inspired colors



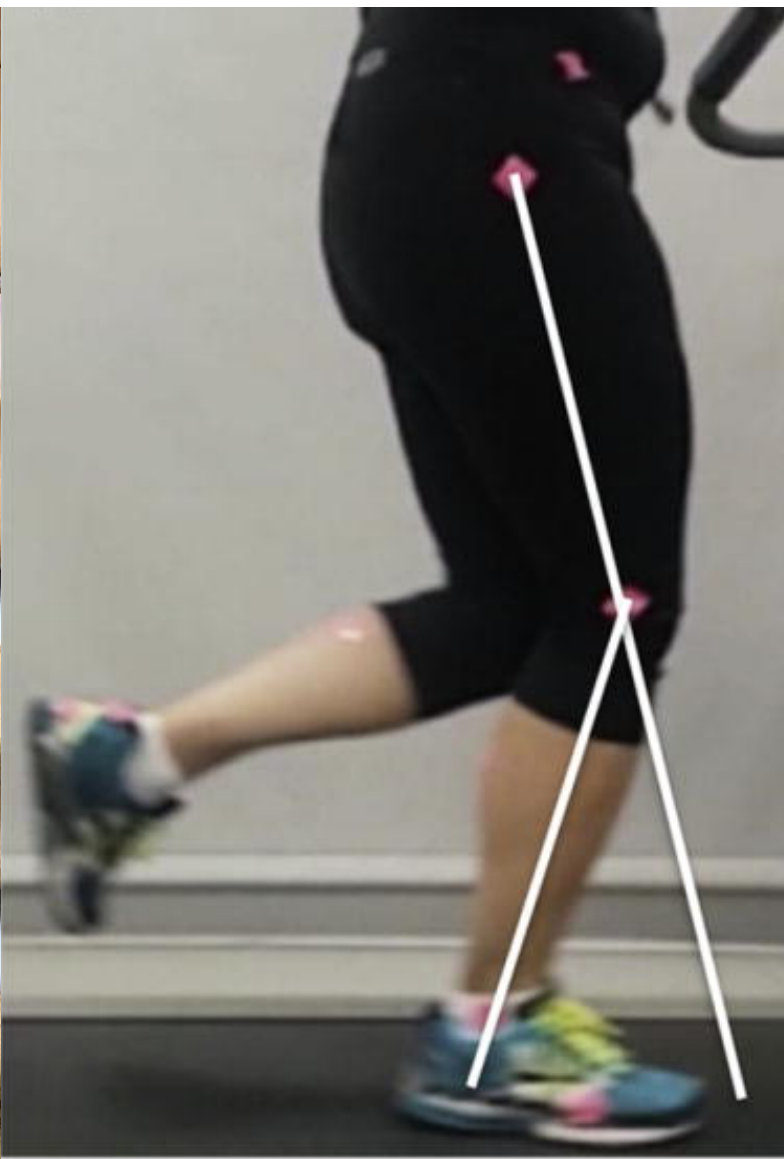
SOFT AND MUTED

Light pastels offer a more feminine take on a sporty silhouette



WIDE = BORING

The same colors are not available in wide widths



FUTURE RESEARCH NEEDS

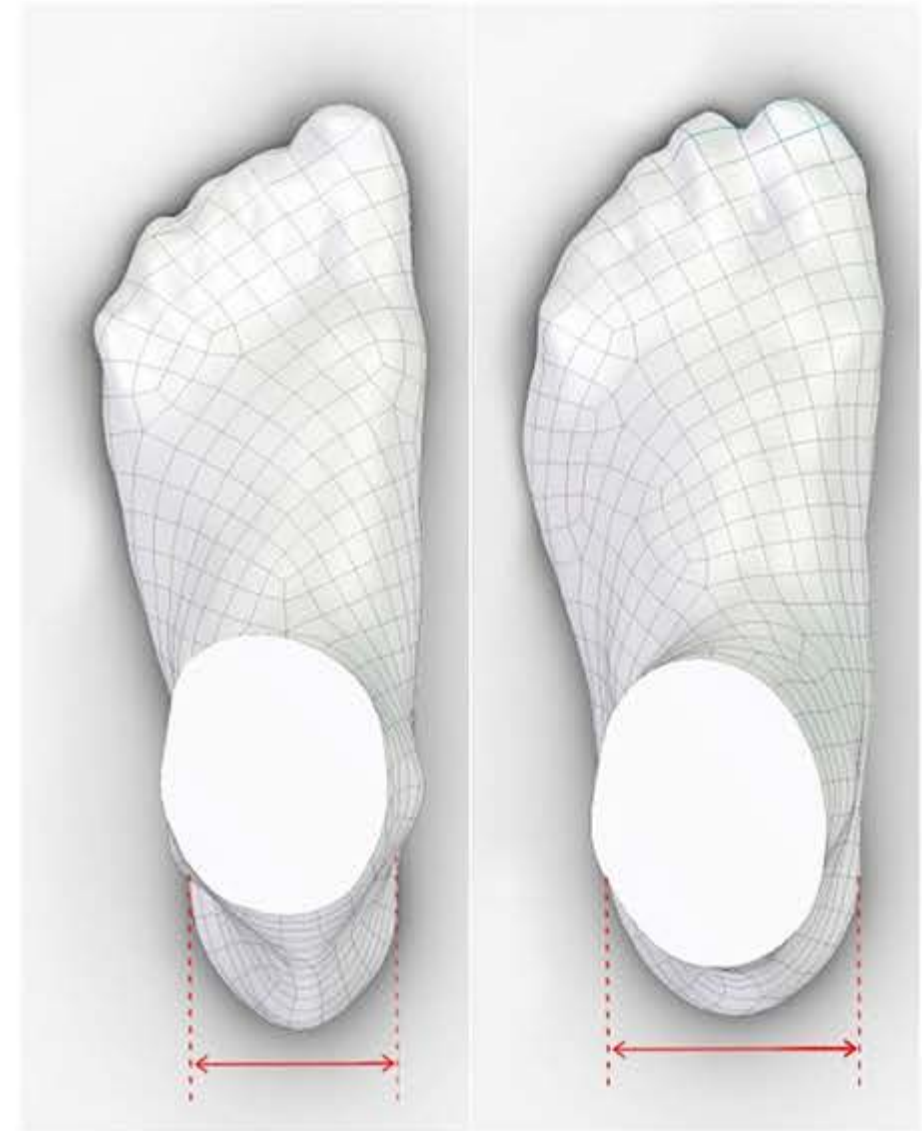
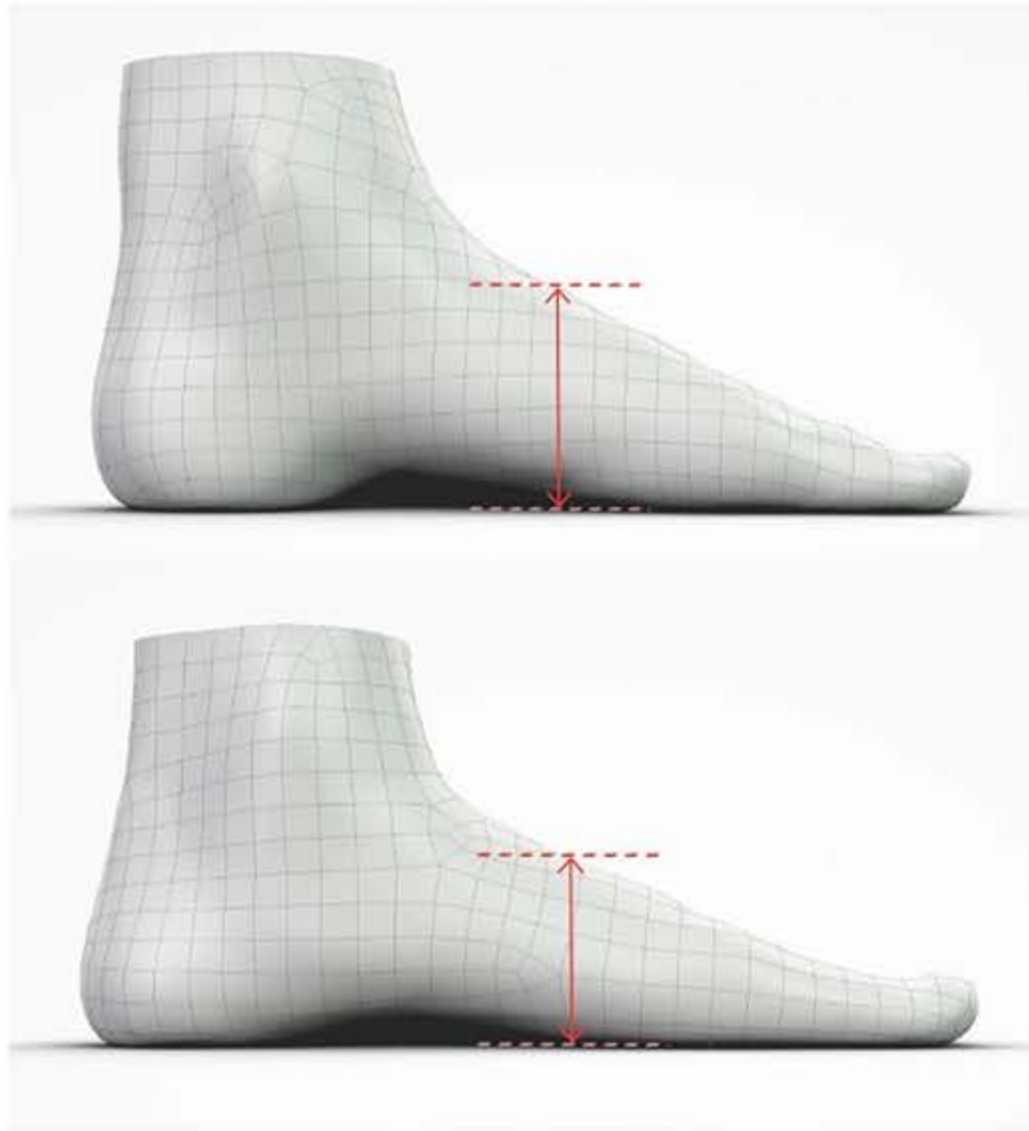
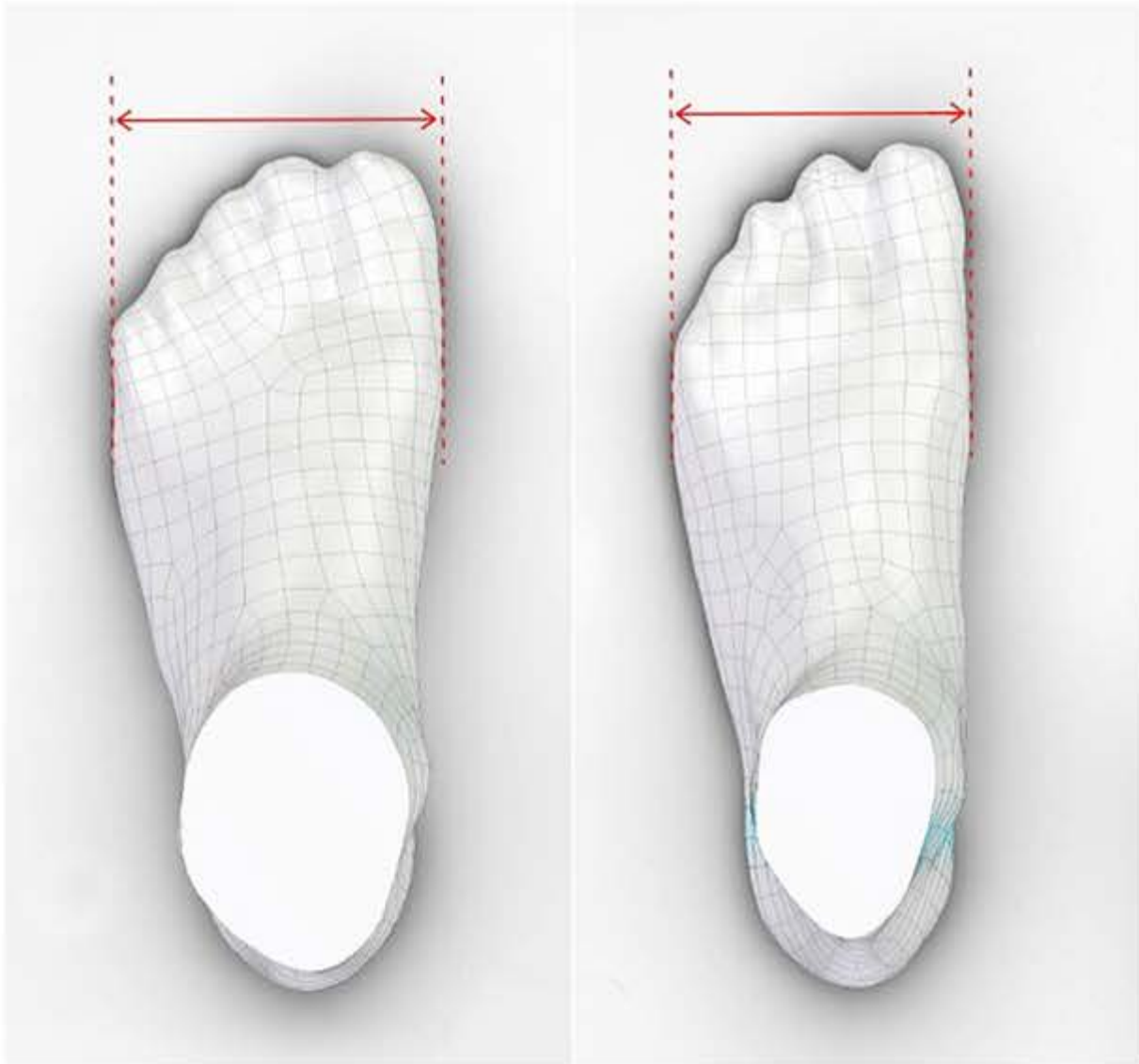
Athlete insights - determine needs of plus-size athlete

Athlete performance - biomechanics analysis of plus-size athlete

Anthropometric - determine shape and proportion of plus-size women's feet, compare to current last

Manufacturing - learn how to create a last

Sustainability, Materials - cushioning technology



FUTURE RESEARCH METHODOLOGY

Athlete insights - survey/interview with Mirna and her Fat Girl Running community (14k+ members)

Athlete performance - gait analysis of Mirna, reading Clinical Biomechanics of the Lower Extremities

Anthropometric - 3D foot scan analysis, create an aggregate last

Manufacturing - visiting a last maker

Sustainability, Materials - NW Materials Show, Outdoor Retailer



FUTURE RESEARCH TRAVEL PLAN

Athlete insights - meeting Mirna in NYC

Athlete performance - Custom Performance in NYC

Anthropometric - N/A

Manufacturing - Jones + Vining in West Bridgewater, MA, Lastmaker House in Eastbourne, UK

Sustainability, Materials - Outdoor Retailer in Denver, CO

TRAVEL PLAN

DATE	LOCATION	GOALS	PEOPLE TO MEET
1/22-1/24 (or 1/26-1/27)	New York, NY	Athlete insight/performance research	Mirna Valerio Custom Performance PT
1/24-1/30	Boston, MA	Last making research	Bob Albert Jones + Vining
1/30-1/31	Denver, CO	Networking Materials/Sustainability research	TBD
2/22-2/28	Eastbourne, UK	Last making course	Steven Lowe and Dominic Casey

FATGIRLRUNNING

Private group

About

Discussion

Mentorship

Announcements

Members

Events

Videos

Photos

Files

Recommendations

Watch Party



Joined ▾

✓ Notifications

↪ Share

⋮ More

About This Group

Description

This group is one of the safest, most joyful, and most badass-est groups on FB. We run, we run-walk, we walk-run, we walk, and we celebrate everyone who does it, but this is a special place for those who have felt left out of the

HISTORY

📅 Group created on February 7, 2018

[See More](#)

GROUP BY



ATHLETE INSIGHT

Joined Mirna's Facebook group, FATGIRLRUNNING, with 14k members

Footwear Survey

What brand and model of shoes are you currently wearing for walking/running?

If you wear multiple pairs, you can include any/all of them! Please note if one is for trails, one is for easy days, one is for long walks/runs, etc.

Your answer



Why did you choose this particular model/brand?

Your answer

What is the most important feature about the shoes you currently wear for walking/running?

Questions Responses **93**

Have you ever worn walking/running shoes that made you really annoyed? What was wrong with them?

89 responses

Yes - my previous shoes wore through the lining of the heel

Too cushy, felt like running in marshmallows

I had some New Balance shoes that made my back hurt.

Adidas- shin splints every time I wear them

Weren't wide enough and made my stride off enough that I got runners knee

Yes! When I added the arch support, heel slipped

Altra - straight across the top of the toe box which means my long second toe keeps me from wearing them.

Too narrow

Too narrow and squeezed my feet

ATHLETE INSIGHT

Sent out a footwear survey

Response was quick and super positive

8 people responded that are local and want to get their foot scanned/be product testers (only 3 are **actually** willing)

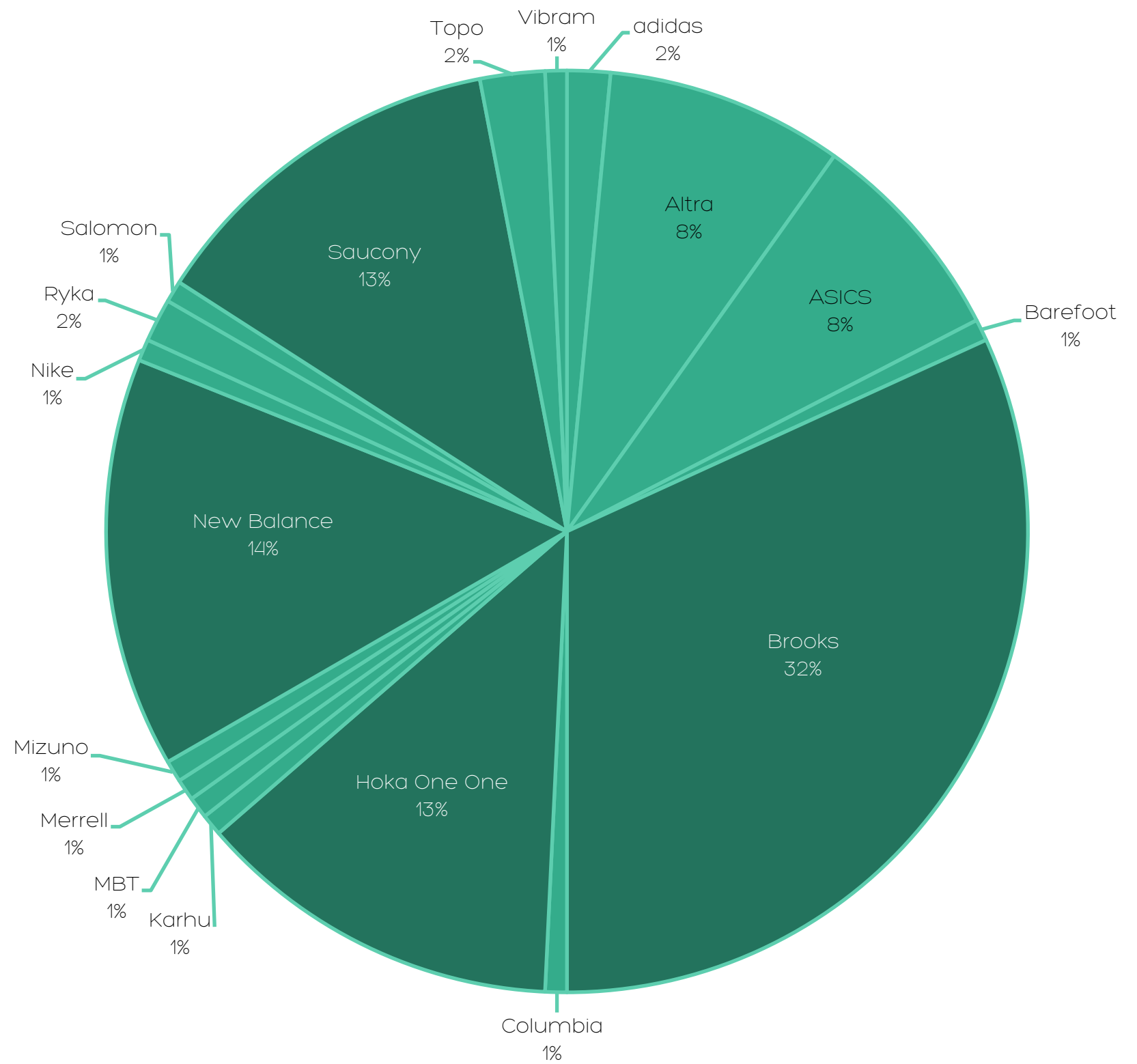
Planning to meet those 3 to scan, collect arch prints, analyze current shoes, interview more in depth

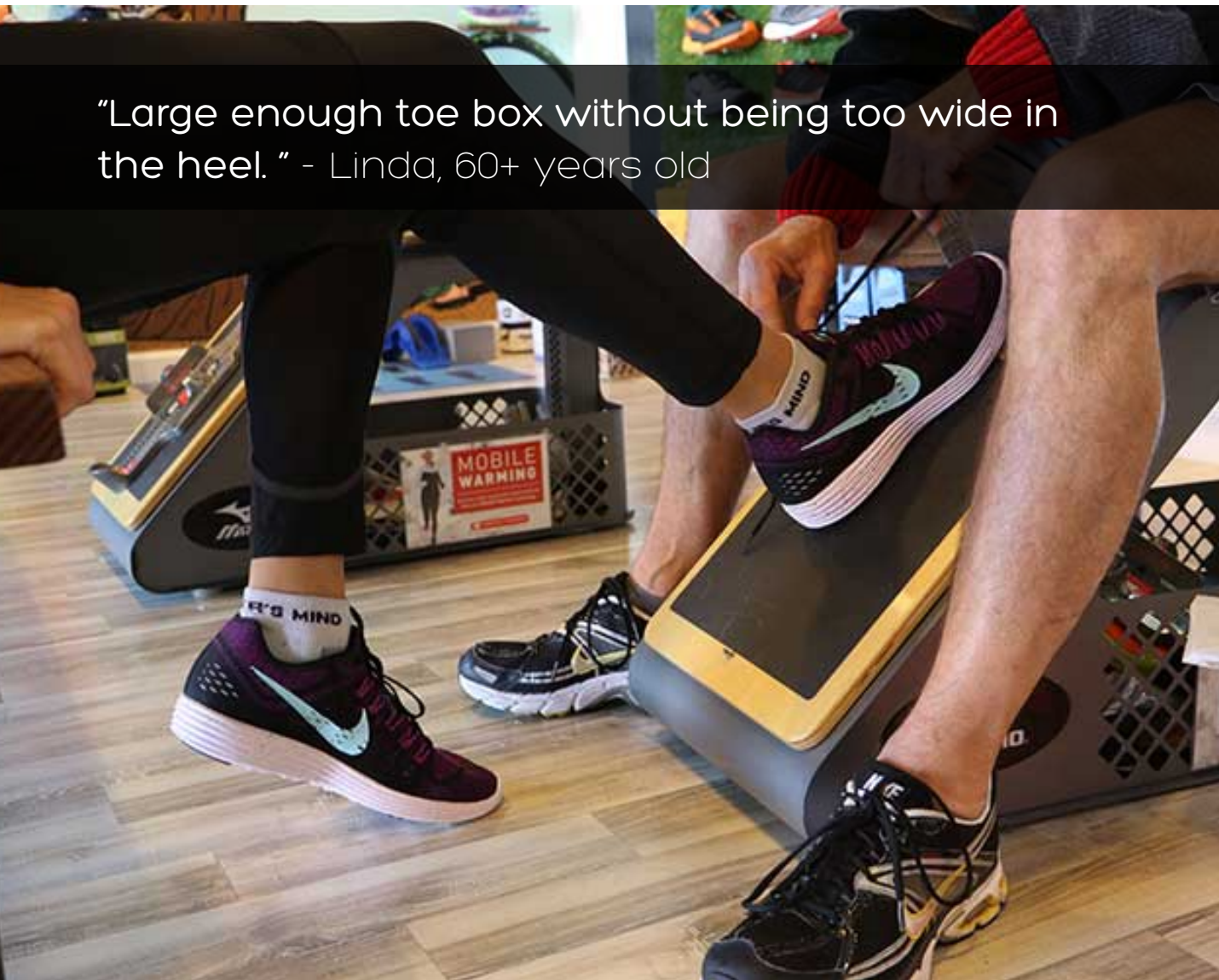


ATHLETE INSIGHT

Brooks, Saucony, New Balance, and Hoka One One are popular choices
Brooks Ghost most popular model mentioned

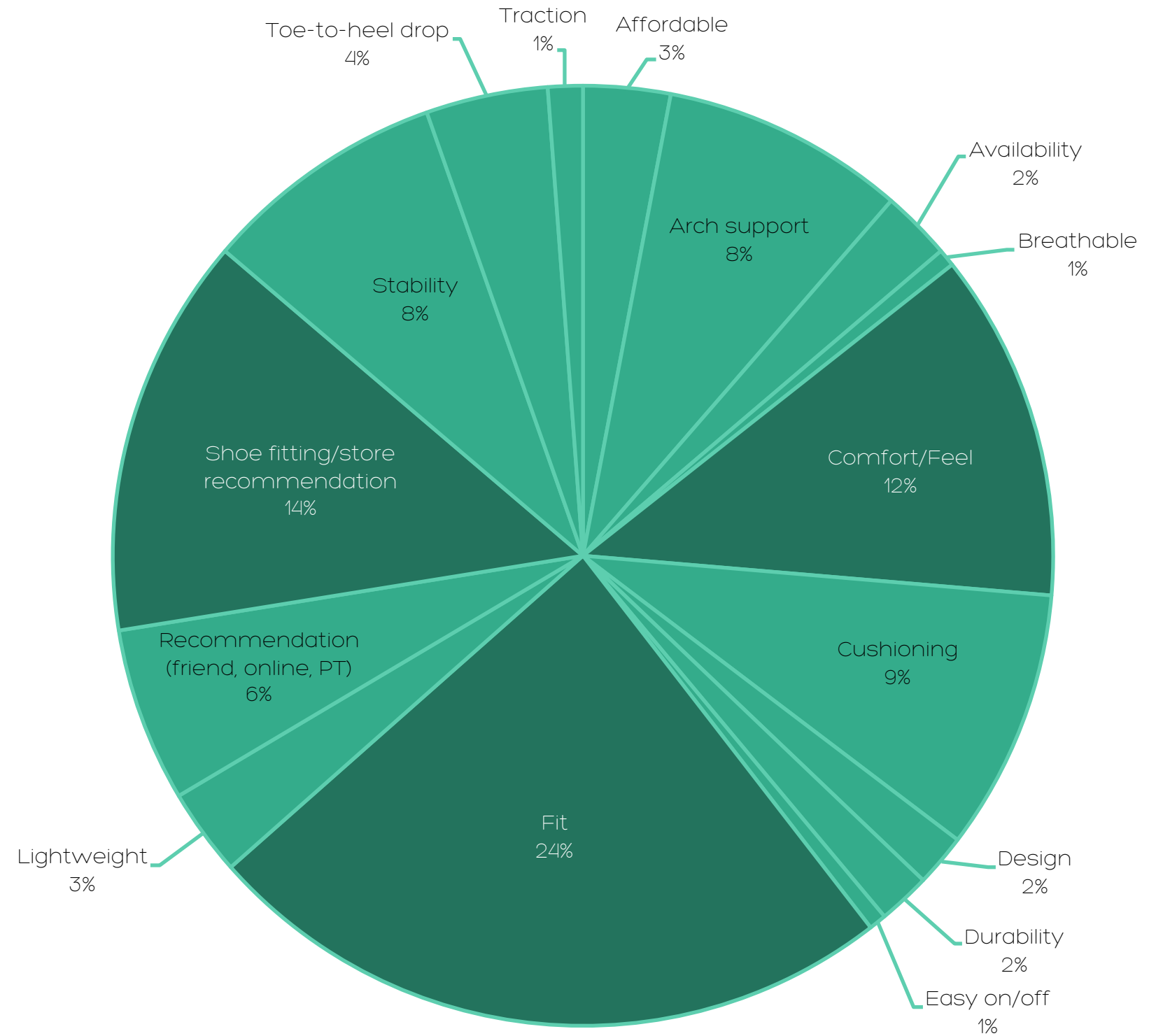
CURRENT SHOES BY BRAND





“Large enough toe box without being too wide in the heel.” - Linda, 60+ years old

HOW DID YOU CHOOSE YOUR CURRENT SHOES?



ATHLETE INSIGHT

Wide fit, wide toe boxes, and overall fit were primary reasons for buying shoes
 Many people were fitted in a running shoe store
 “Comfortable” or “Felt good” also popular reasons

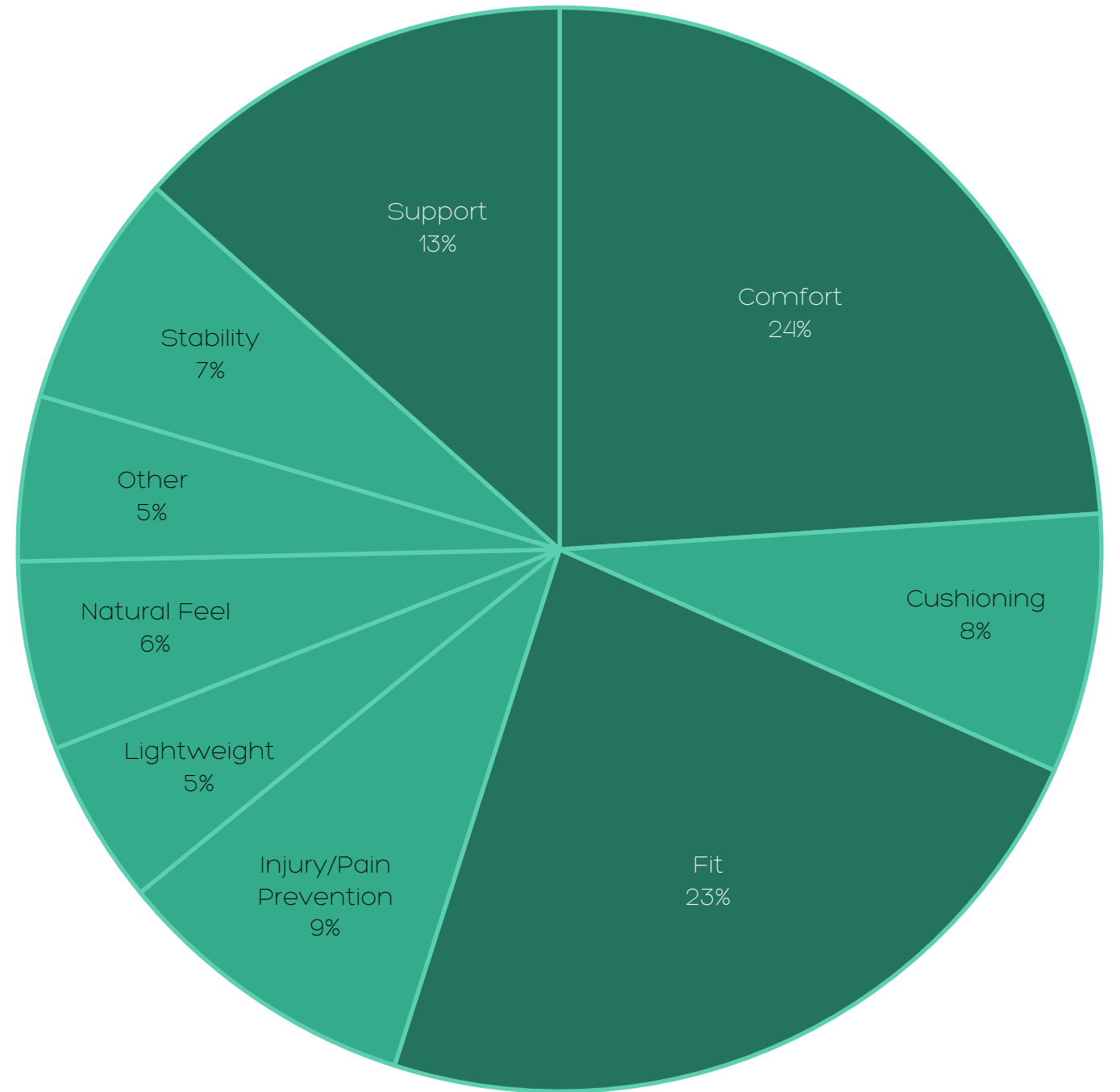
"Goldlocks cushion level" - Laura, 50-59 years old



ATHLETE INSIGHT

Fit, comfort, and support were most important

MOST IMPORTANT FEATURE



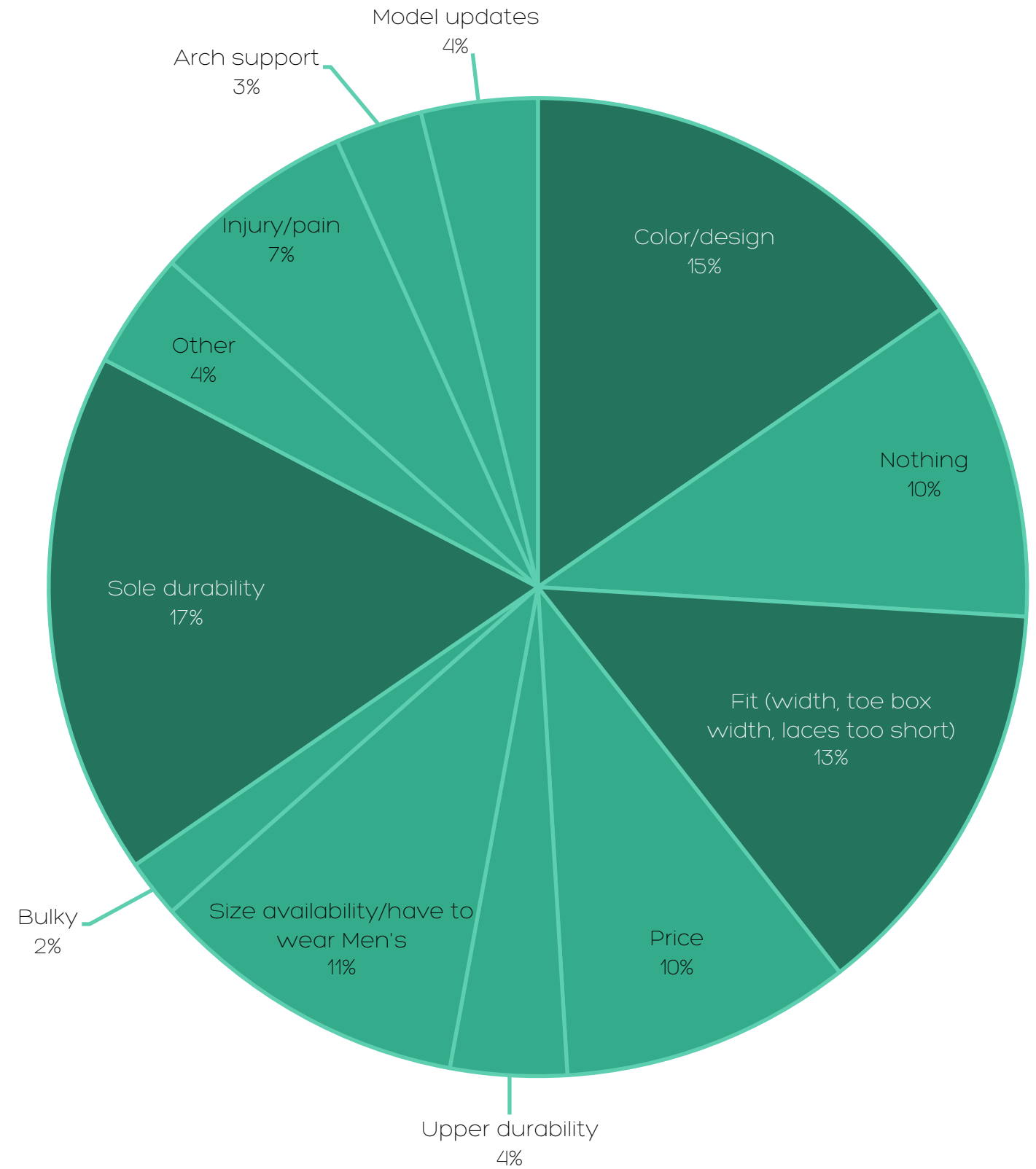
"I have gained significant weight and the cushioning breaks down very quickly. When I weighed less this wasn't an issue". - Erika, 40-49 years old



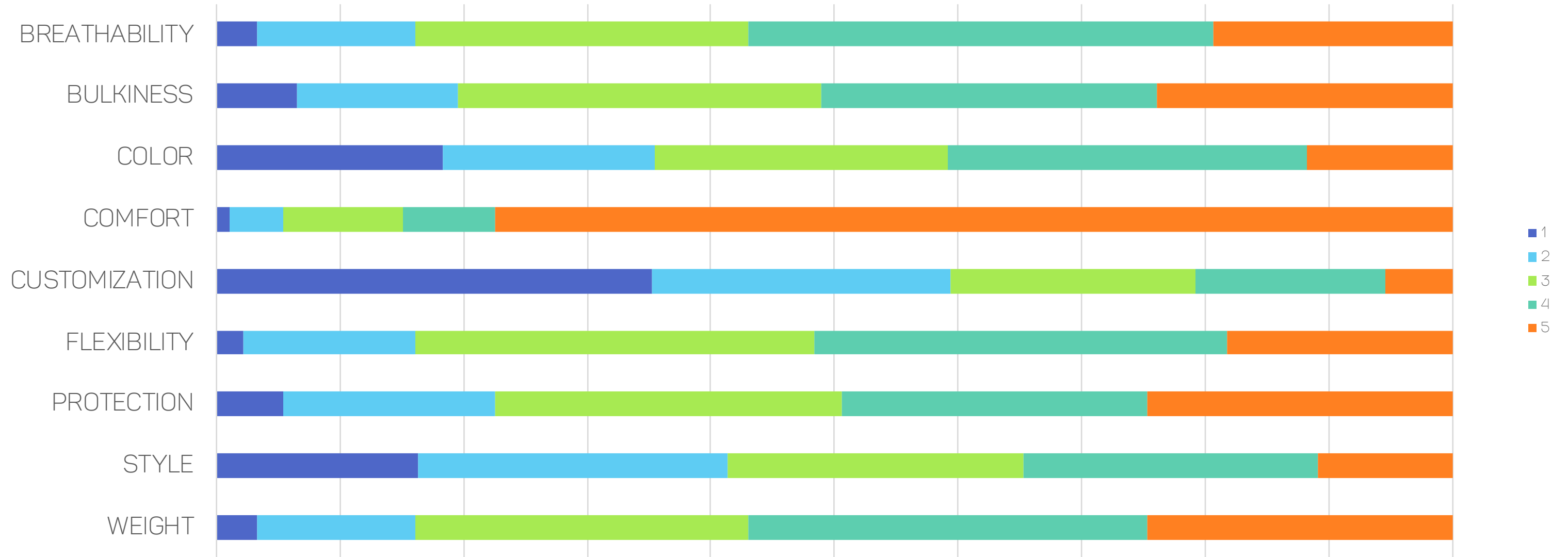
ATHLETE INSIGHT

Wide fit, wide toe boxes, and overall fit were also a common frustration
Sole durability - heavier weight = wears down faster (~150mi instead of 300-400mi)
Limited color/design options in wide/bigger sizes

WHAT DON'T YOU LIKE ABOUT YOUR CURRENT SHOES?



FEATURE IMPORTANCE



ATHLETE INSIGHT

Rated the features on a scale of 1-5, 1 = not important, 5 = very important

Customization rated low, comfort rated very high

Breathability, bulkiness, and weight also rated pretty high

Style and color all over the place

WHAT DOES "COMFORT" MEAN?

"Comfort involves the **right amount of squishiness** in the insole, the right amount of **wiggle room for my toes**, the ability for the shoe to **stay in place snugly without slipping** on the heel or being tied so tightly that it **risks cutting off circulation.**"

"COMFORT IN SHOES IS DIFFICULT TO DEFINE - YOU KNOW IT WHEN YOU FEEL IT."

- Eleanor, 40-49 years old

FIT

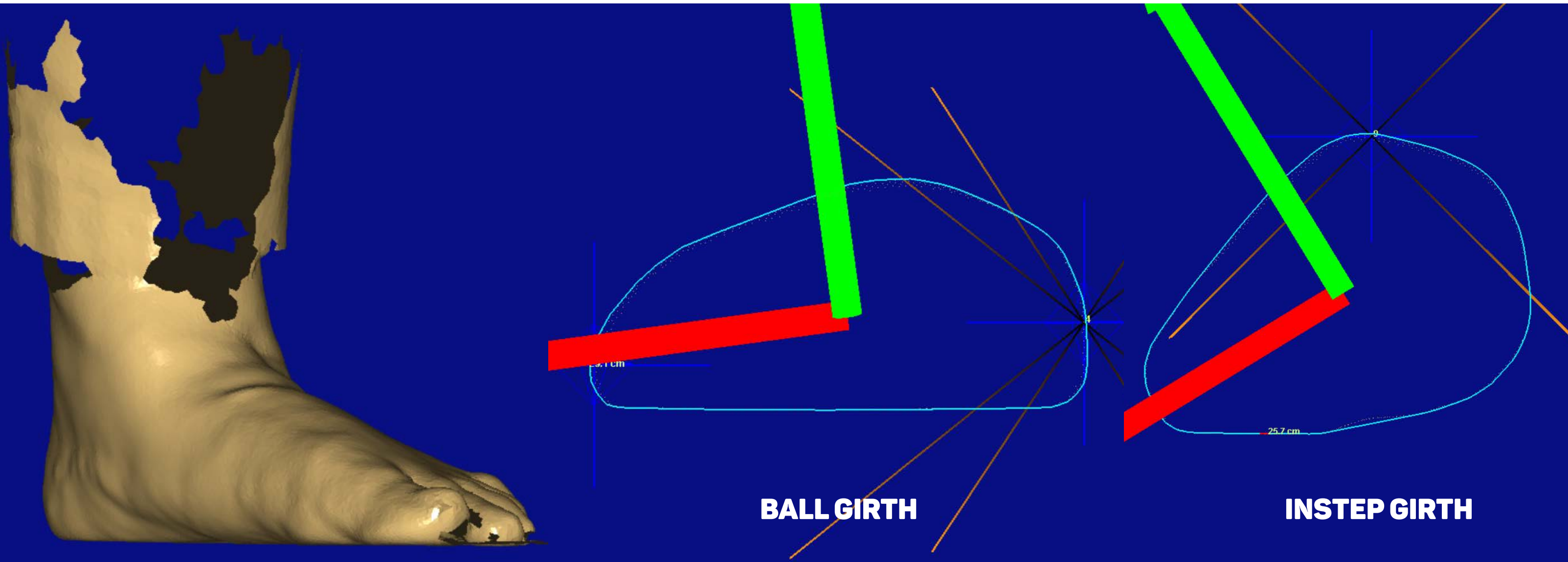


"If they don't fit comfortably, I can't wear them. Finding them wide enough. I tried on 6 pairs before these."
- Heather, 30-39 years old

CUSHIONING + SUPPORT



"Arch support. Many shoes gave me blisters or had little cushion."
- Heather, 40-49 years old

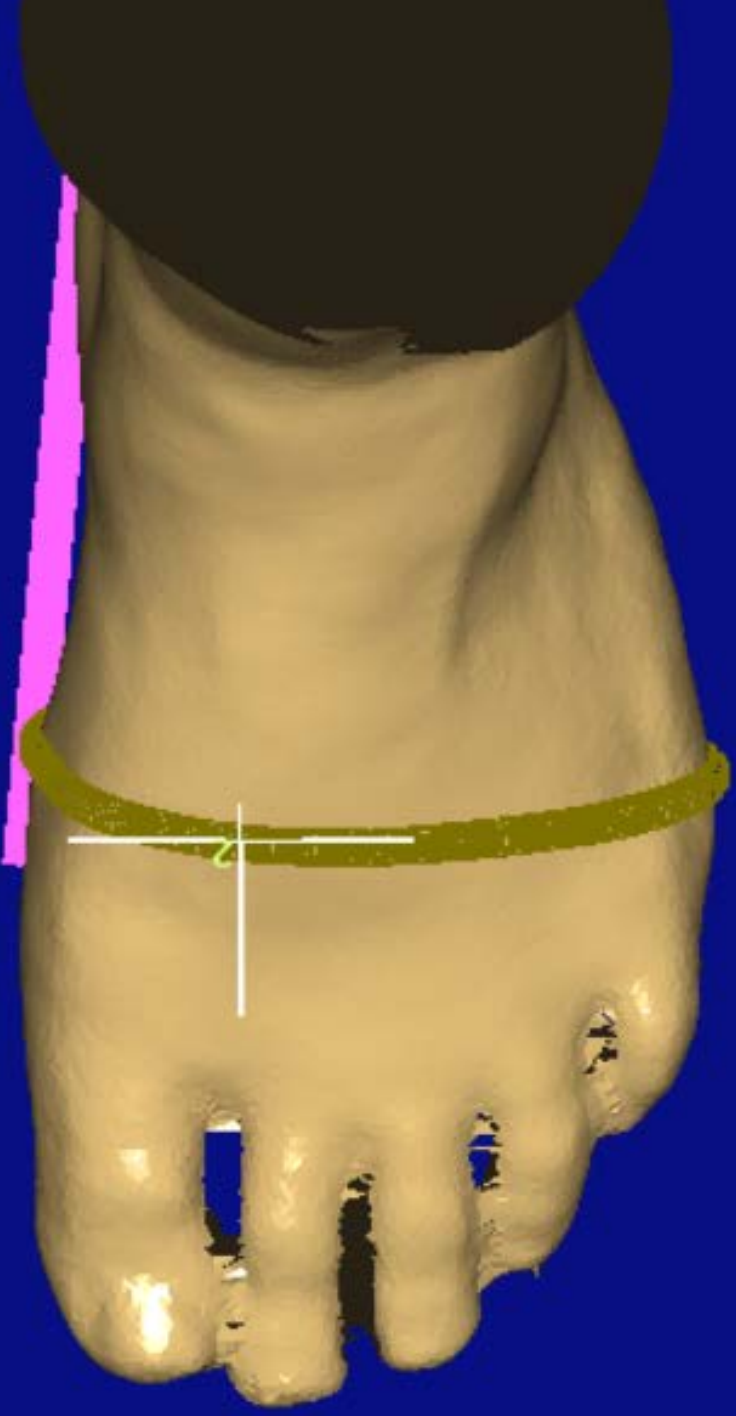


ANTHROPOMETRIC RESEARCH

Sorted through the body scans, found all the plus-size women that have foot scans - **24 total**
Determined that the best course of action is to use a local woman's scan to create a last in the UK class
Use that as a case study and the 24 other scans to compare to a Jones + Vining traditional last

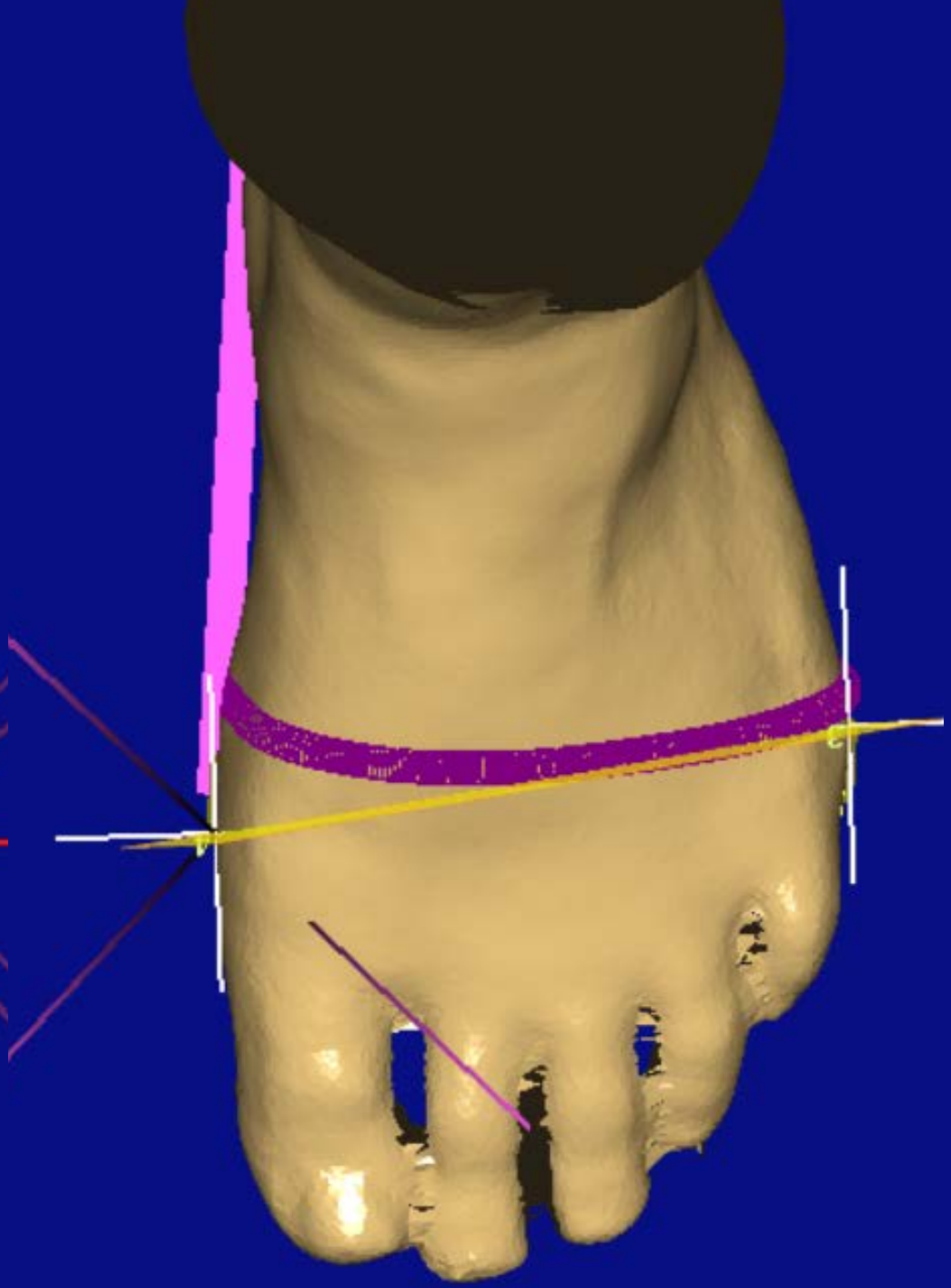
BALL GIRTH

Automatic



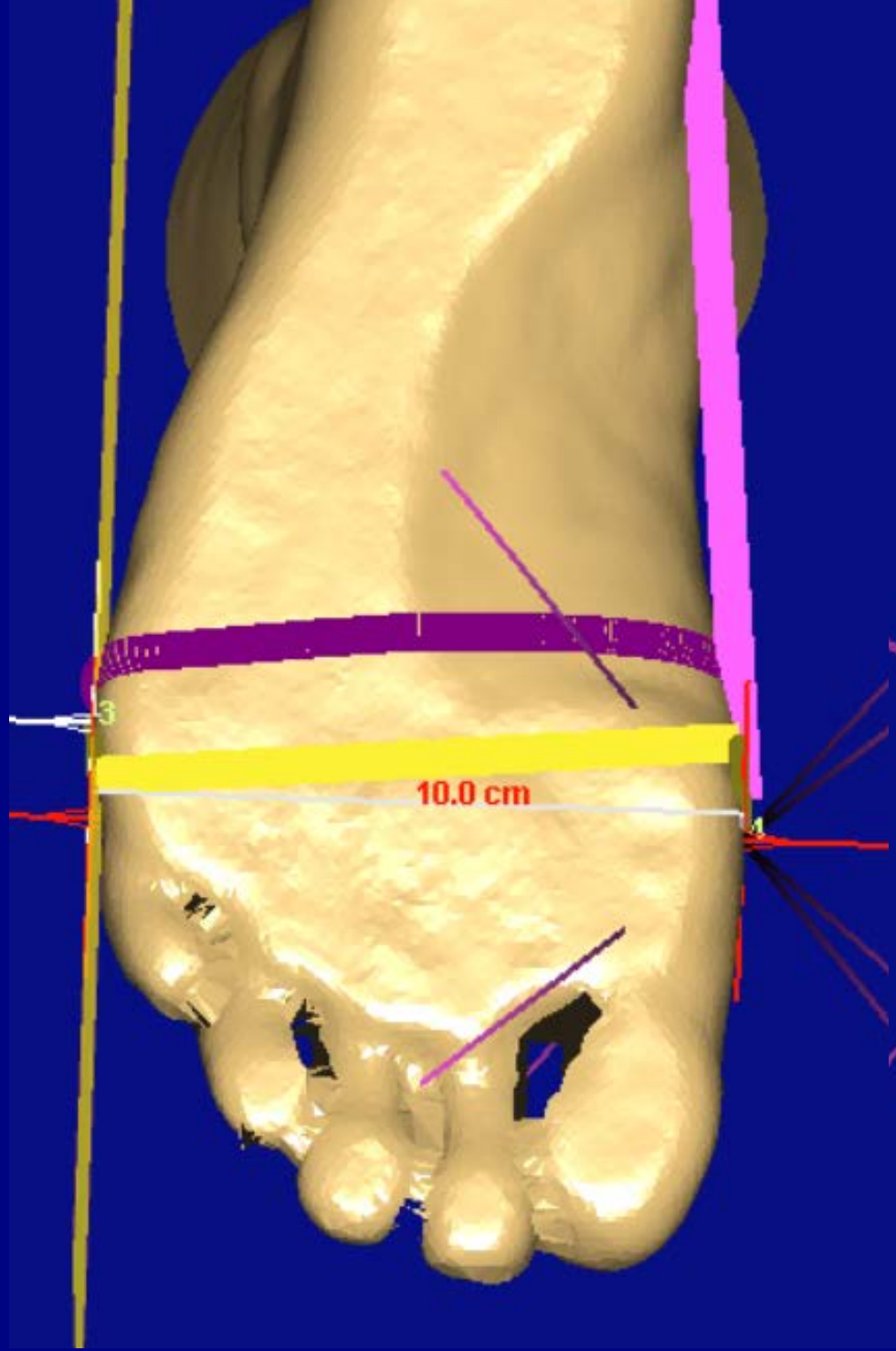
Repositioned - cut a plane through widest part of forefoot

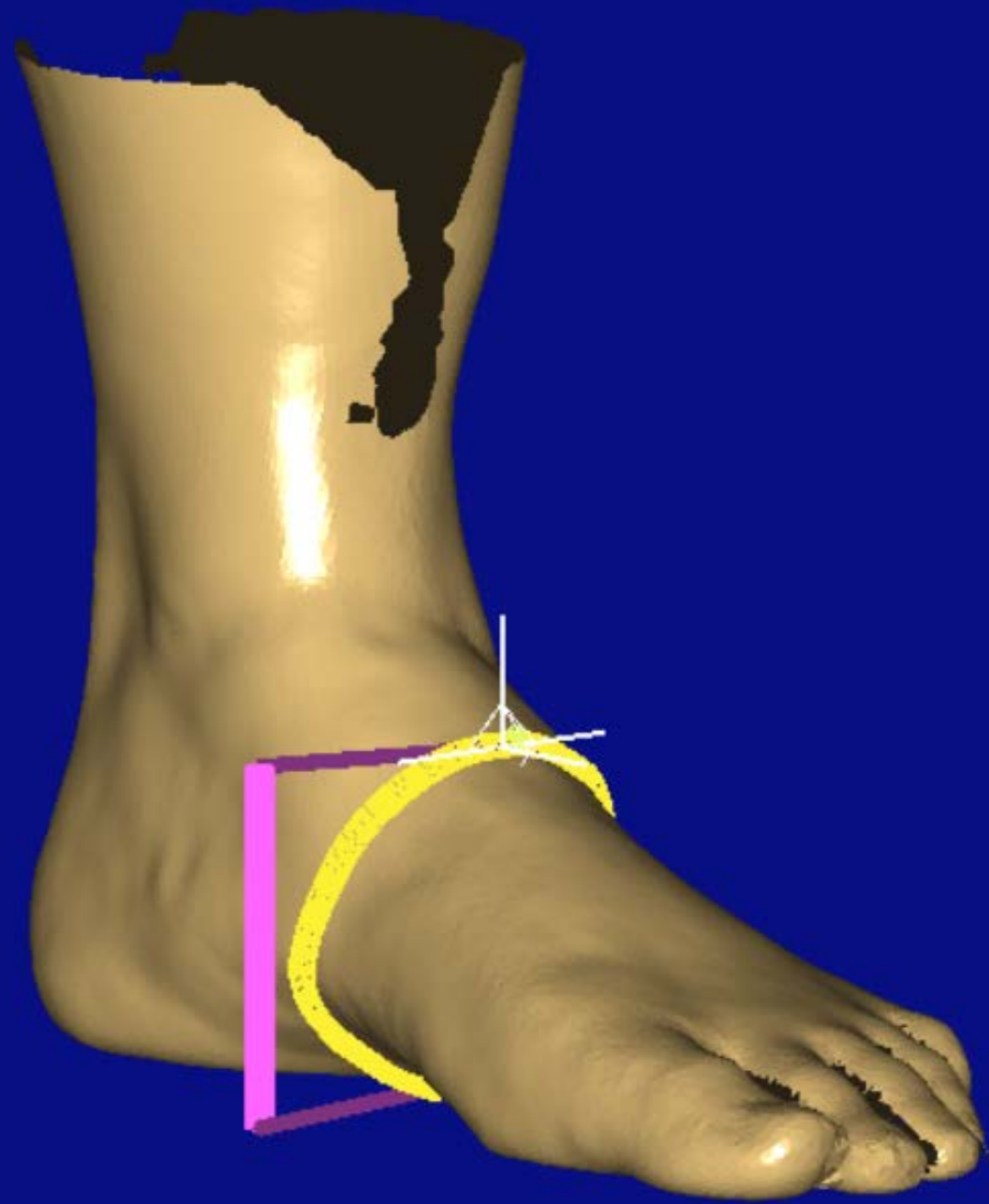
BALL GIRTH



Horizontal distance between two widest points

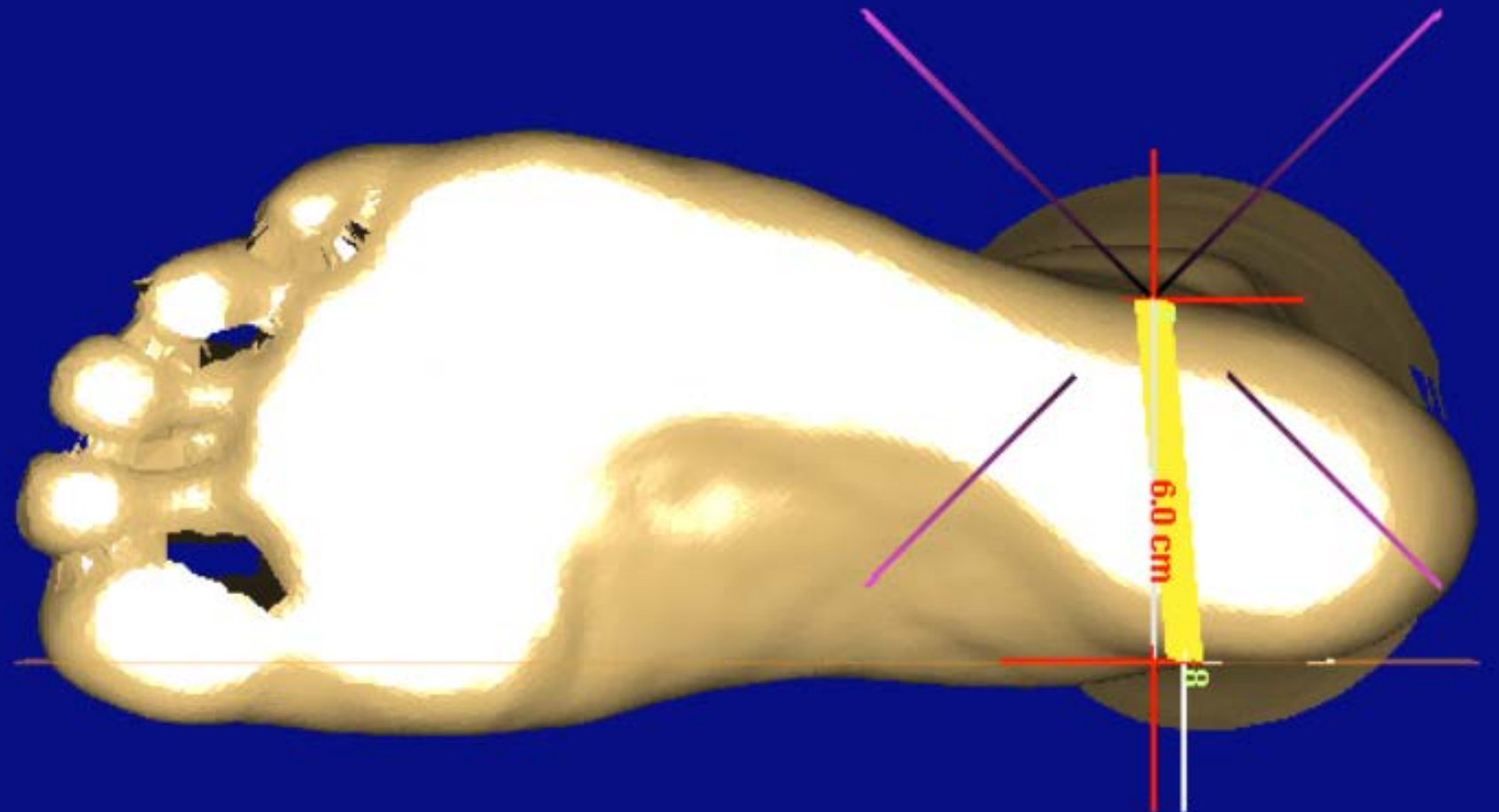
BALL WIDTH





INSTEP GIRTH + HEIGHT

Automatic



BALL HEEL WIDTH

Automatic, but remeasured
straight across



ELEANOR (ELLIE)

40-49 years old
Size 10 Wide or Men's 8.5

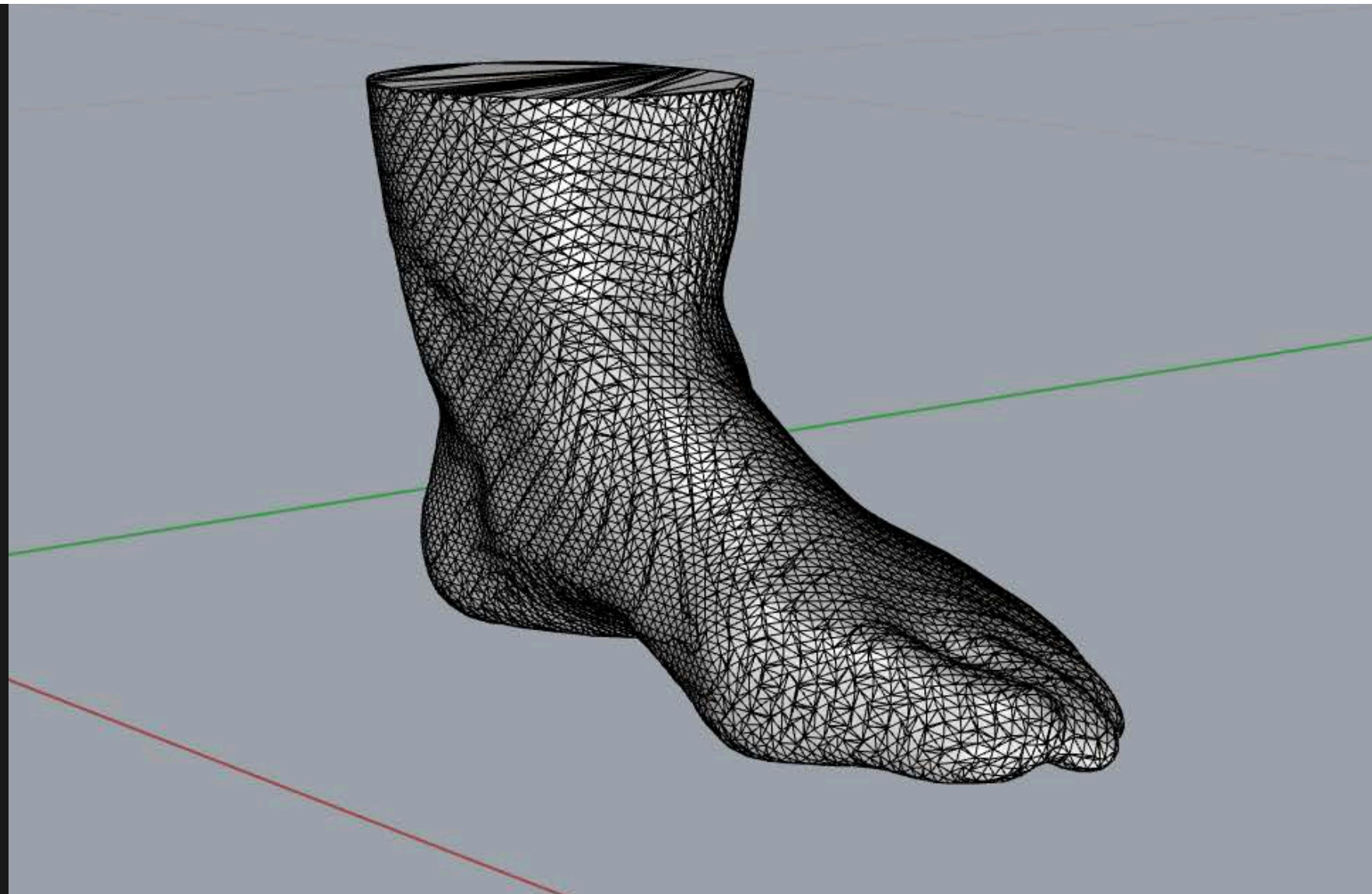
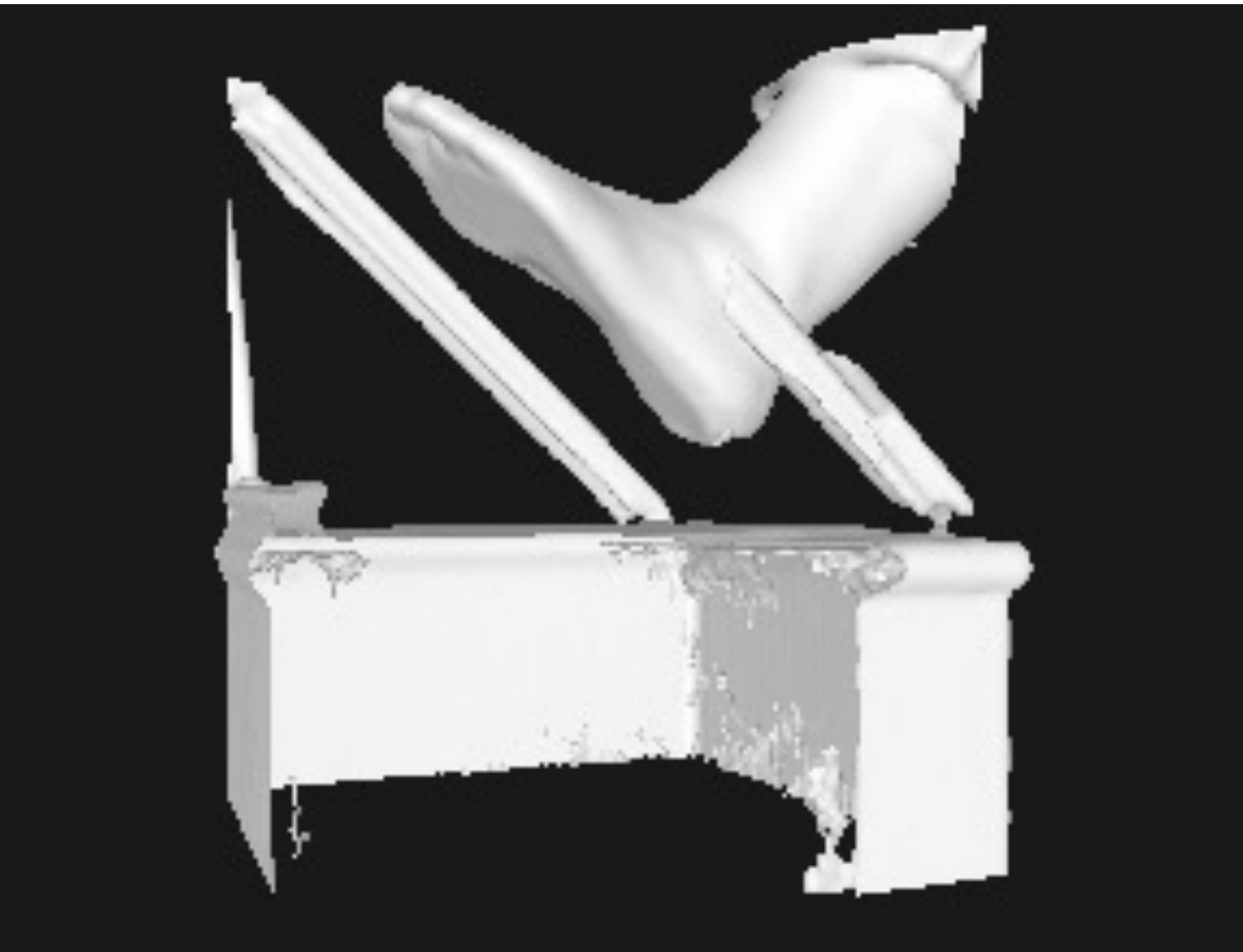
Runs/walks
Road and trail
Half marathons
Long distance relays

Left: Revel Mt. Hood Half
Marathon, 2018

Right: Cascade Lakes
Relay, 2017

ANTHROPOMETRIC

Met up with 2 local women (one more tonight - probably the one I want to print because of size)



ANTHROPOMETRIC

Scanned both of their feet - no socks



ANTHROPOMETRIC

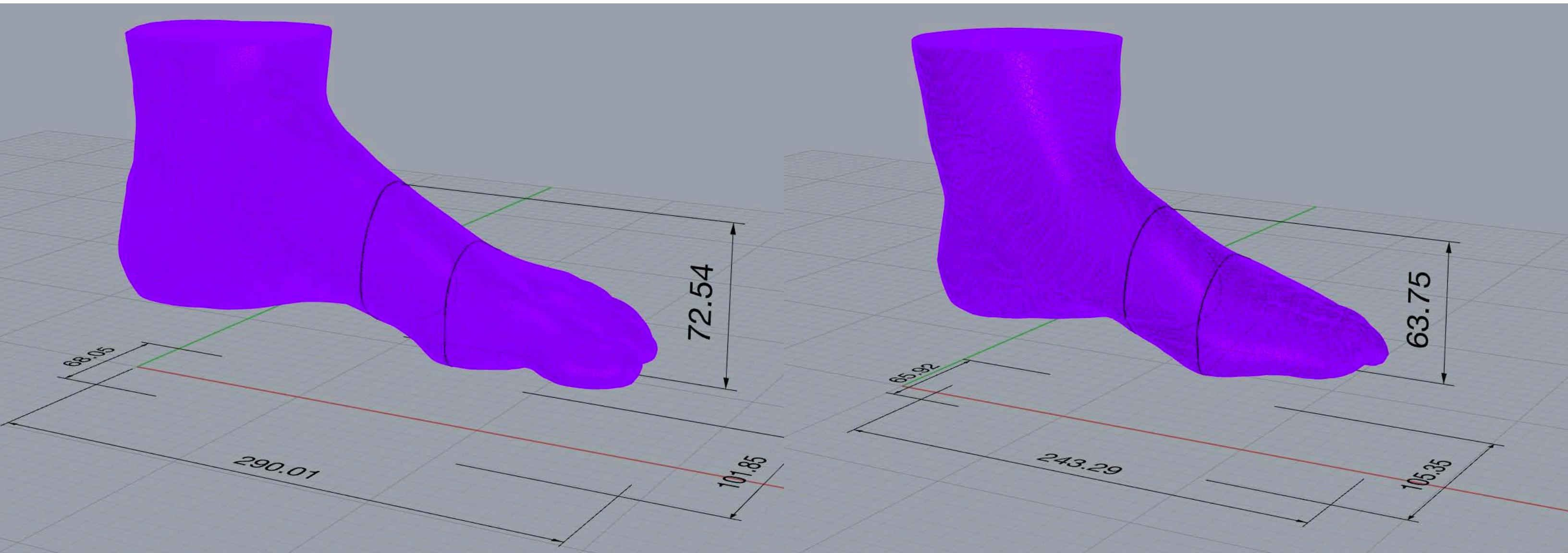
Look at their current running shoes
Asked about them in more detail and their running motivations/history



ANTHROPOMETRIC

Measured on the Brannock, took their arch prints

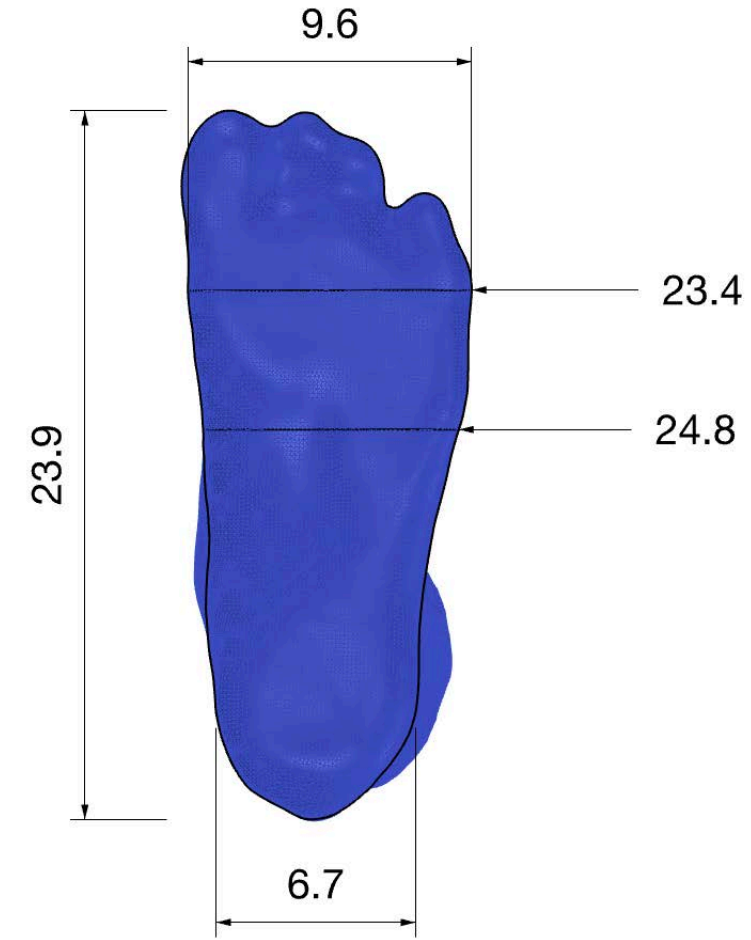
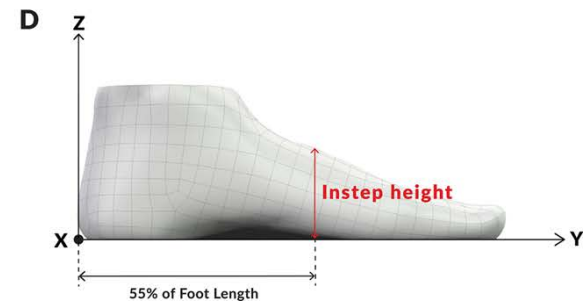
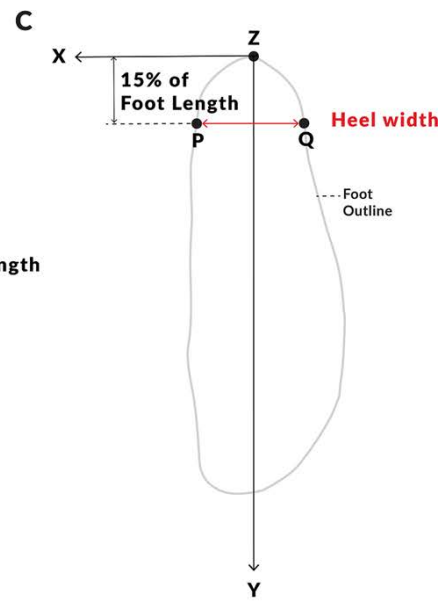
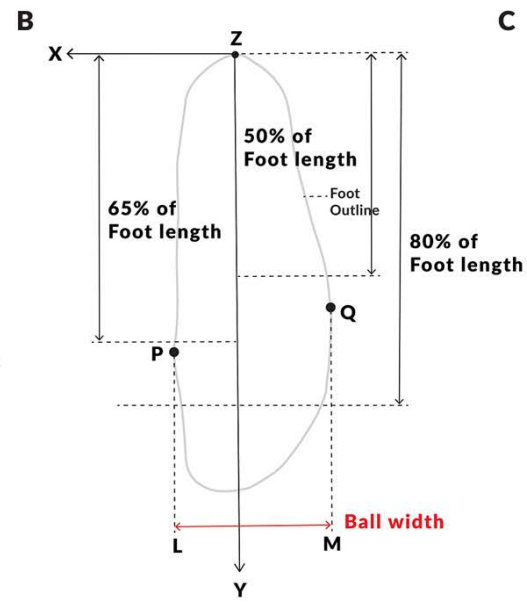
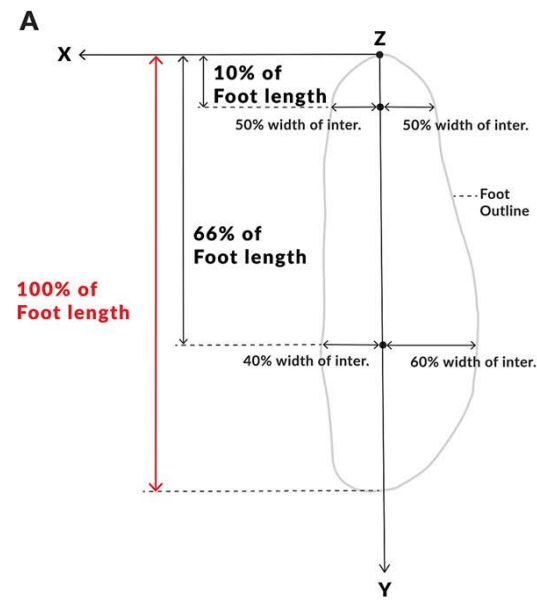
She wears a size 10 Wide, but measured an 8.5C on the left and 9C on the right



ANTHROPOMETRIC

Measured in Rhino (can't get it to work in Anthroscan)

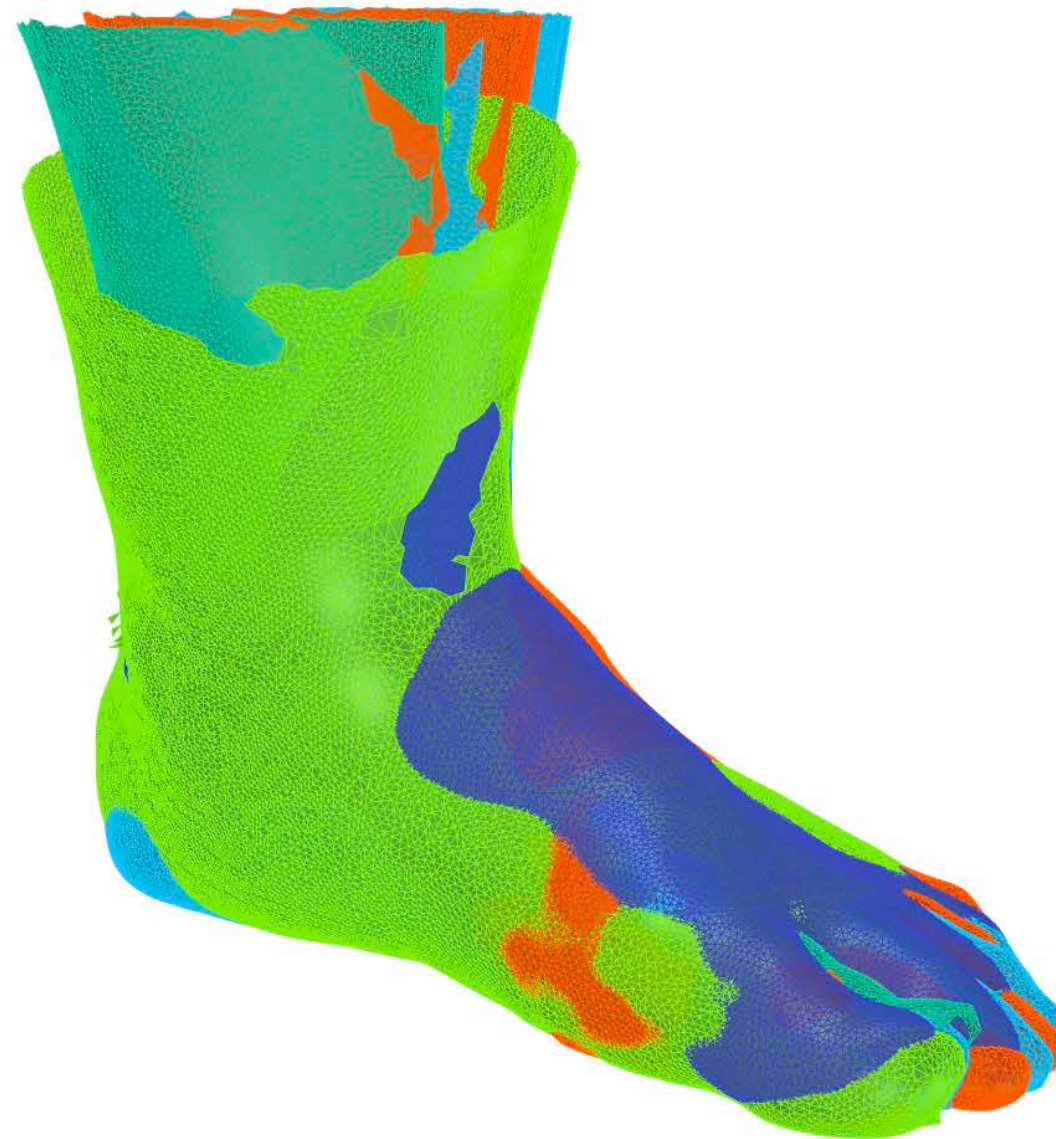
Scan Number	Left Foot Length	Ball girth	Ball girth (x-section)	Ball width	Heel width	Instep girth	Instep girth (x-section)	Instep height	Shoe Size	Shoe Width
007-20180329-014	23.5	23.2	23.8	9.7	6.8	23.9	24.0	6.9	7	Wide (D)
007-20180409-010	23.4	25.1	26.6	10.1	7.5	26.5	26.8	6.8	7	Extra Wide (EE)
007-20180415-002	23.5	23.5	23.9	9.3	7.0	25.9	25.9	7.4	7	Wide (D)
007-20180413-018	23.6	22.9	23.6	8.8	6.5	23.8	24.2	7.0	7.5	Medium (B)
007-20180330-017	24.0	22.1	21.6	9.0	6.2	23.7	23.8	7.3	8	Medium (B)
007-20180406-016	24.1	24.9	25.9	9.8	7.7	27.1	27.1	6.9	8	Wide (D)
007-20180419-022	24.1	24.1	24.9	10.0	6.0	24.0	24.6	6.9	8	Wide (D)
007-20180420-030	23.9	24.1	23.8	9.6	7.3	25.8	25.5	6.7	8	Wide (D)
007-20180406-015	24.2	24.5	26.0	10.2	7.0	25.6	26.2	7.5	8.5	Extra Wide (EE)
007-20180407-034	24.3	25.1	25.8	9.7	7.8	27.2	26.8	7.2	8.5	Wide (D)
007-20180407-043	24.2	25.2	26.0	9.8	7.6	27.6	27.7	7.8	8.5	Wide (D)
007-20180413-002	24.6	23.2	24.0	9.3	6.5	24.7	24.9	7.3	8.5	Wide (D)
007-20180406-012	24.9	23.0	25.1	9.7	6.7	25.2	24.7	6.5	9	Wide (D)
007-20180420-031	25.1	23.7	25.1	9.5	6.9	25.7	25.7	7.0	9	Wide (D)
007-20180414-008	25.4	23.1	23.5	9.5	6.1	24.3	24.3	6.1	9.5	Medium (B)
007-20180419-008	25.4	24.5	25.8	9.6	7.0	25.7	26.1	7.2	9.5	Wide (D)
007-20180412-019	25.6	23.9	25.2	10.2	6.7	25.4	25.1	7.1	10	Wide (D)
007-20180413-017	26.0	22.6	23.3	9.1	6.7	24.6	24.5	6.9	10	Medium (B)
007-20180419-005	25.8	23.6	24.0	9.5	6.9	25.2	25.2	7.2	10	Medium (B)
007-20180407-037	26.1	25.8	26.7	10.0	7.5	27.2	27.1	7.2	10.5	Wide (D)
007-20180414-022	26.1	23.8	25.8	10.2	6.9	24.7	24.7	6.8	10.5	Wide (D)
007-20180423-008	26.2	25.3	26.8	10.3	7.9	27.2	27.1	7.2	10.5	Wide (D)
007-20180420-005	26.1	23.7	23.4	9.1	7.0	24.8	25.5	6.4	11	Medium (B)
007-20180330-022	28.2	27.0	27.1	10.6	8.8	29.5	29.0	7.4	13	Medium (D) - Men's
AVERAGE	24.9	24.1	24.9	9.7	7.0	25.6	25.7	7.0	9.0	
MIN	23.4	22.1	21.6	8.8	6.0	23.7	23.8	6.1	7.0	
MAX	28.2	27.0	27.1	10.6	8.8	29.5	29.0	7.8	13.0	



ANTHROPOMETRIC RESEARCH

Measured the scans

SUBJECT	FOOT LENGTH	BALL GIRTH	BALL WIDTH	HEEL WIDTH	INSTEP GIRTH	INSTEP HEIGHT
RC	23.9	23.4	9.6	6.7	24.8	7.1
007-20180330-017	24.1	23.2	9.0	6.0	22.8	6.5
007-20180406-016	24.1	25.6	10.1	6.9	25.3	5.9
007-20180419-022	24.2	24.7	10.1	5.8	24.3	6.2
007-20180420-030	24.0	26.1	9.7	6.9	24.8	6.0
AVERAGE	24.1	24.6	9.7	6.5	24.4	6.3



ANTHROPOMETRIC RESEARCH

Overlays of foot scans in size 8

ATHLETE INSIGHT



MIRNA VALERIO

Wears size 11, not particularly "wide"
"Feeling of stability but neutral"
Not overly aggressive traction
Most trail shoes are neutral

**"HARD TO SELF-ACTUALIZE WHEN
YOU DON'T HAVE PRODUCT THAT
WORKS FOR YOU."**

GAIT ANALYSIS



MIRNA VALERIO

Shoes wear down around ~200 miles
Excessive wear on the medial collar

GAIT ANALYSIS



WALK

Prominent heel strike
Longer steps



RUN

Midfoot/flat strike - barely any dorsiflexion
Minimal float time, short steps



PROJECT ALIGNMENT



DESIGN + DEVELOPMENT

Highlights aspects of the design process that I wish to tackle in the future—problem identification, research, and storytelling

UNDERSERVED DEMOGRAPHIC

In line with interest in injury prevention, everyday athletes rather than elites, and getting more people to live healthy, active lives

FOCUS ON FIT

Using 3D scans to design better product rather than relying on existing lasts based on outdated measurements and techniques

MENTORSHIP



SOLS

**BODY
LABS**



NATHAN GHABOUR

Bio-mechanical Engineer/Digital Innovation Product Director - NXT
Advising on how to deal with 3D scan data and present the work

IDEATION CALENDAR

WEEK	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
5				2/5	2/6	2/7	2/8
				MIDTERM PRESENTATION	INSPIRATION Create mood board Find intersection(s)	IDEATION - RND1 10-15 sketches	IDEATION - RND1 10-15 sketches
6	2/9	2/10	2/11	2/12	2/13	2/14	2/15
	IDEATION - RND1 10-15 sketches	IDEATION - RND1 Review 1st round	IDEATION - RND2 10 sketches Knitted footwear session	IDEATION - RND2 Review 2nd round	IDEATION - RND3 10 sketches	IDEATION - RND3 10 sketches 1 rough proto (scrap fabric/foam)	IDEATION - RND3 10 sketches 1 rough proto (scrap fabric/foam)
7	2/16	2/17	2/18	2/19	2/20	2/21	2/22
	IDEATION - FINAL Final sketch/direction Get athlete feedback	IDEATION - FINAL Review final sketch/direction	CAD Initial work to prep for midsole/outsole in Rhino	CAD Midsole/outsole work in Rhino	CAD Midsole/outsole work in Rhino	CAD Midsole/outsole work in Rhino	LAST MAKING Fly to UK Work on validation plan
8	2/23	2/24	2/25	2/26	2/27	2/28	2/29
	LAST MAKING Fly to UK Work on validation plan	LAST MAKING Workshop Validation plan finalized	LAST MAKING Workshop	LAST MAKING Workshop	LAST MAKING Workshop	LAST MAKING Fly home	UPPER PATTERN 3D scan new last Upper patternmaking in Shoemaster/taping
9	3/1	3/2	3/3	3/4	3/5	3/6	3/7
	CAD Create shell pattern to 3D scan, Updates midsole	CAD Finalizing midsole/outsole	CAD Midsole/outsole ready for 3D printing	UPPER PROTOS 1st round upper prototype Get athlete feedback	UPPER PROTOS 2nd round upper prototype	UPPER PROTOS 3rd round upper prototype	FINAL PROTO Final proto built Get athlete feedback
10	3/8	3/9	3/10	3/11			
	PRESENTATION Photography Presentation building	PRESENTATION Final presentation ready	PRESENTATION Practice presentation	FINAL REVIEW			



DESIGN/MANUFACTURING RESEARCH

Met Mike Friton - former Bowerman Lab/Nike designer/innovator

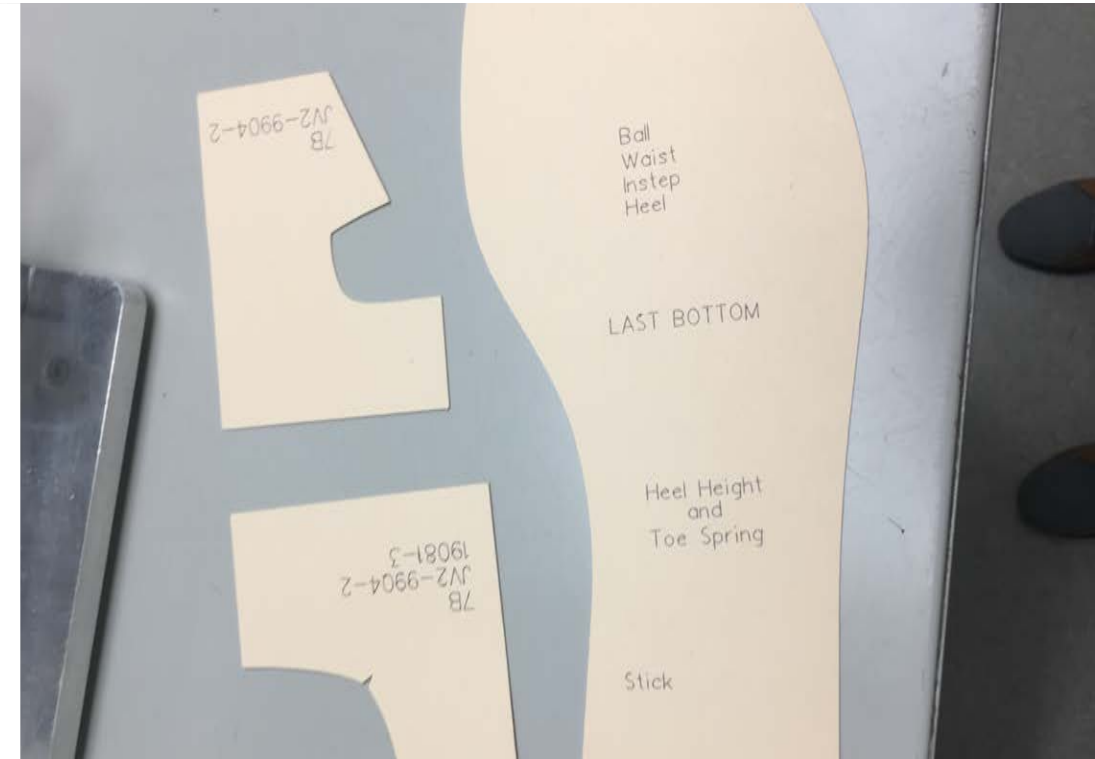
Advised **minimal** (zero drop), **sock-like**, one (or only a few) size fits all, break out of the rigid midsole mold
Questioned **"why?"** when I said women want to feel secure/stable - because their shoes are rigid and don't move with the foot - messing with the proper mechanics of the foot



LAST MAKING RESEARCH

Companies use the same tooling for A, B, and D widths
Measure foot not weight bearing
Foot must measure bigger than the last

LAST MAKING RESEARCH



Photos from visit to Jones & Vining in West Bridgewater, MA

LAST MAKING RESEARCH



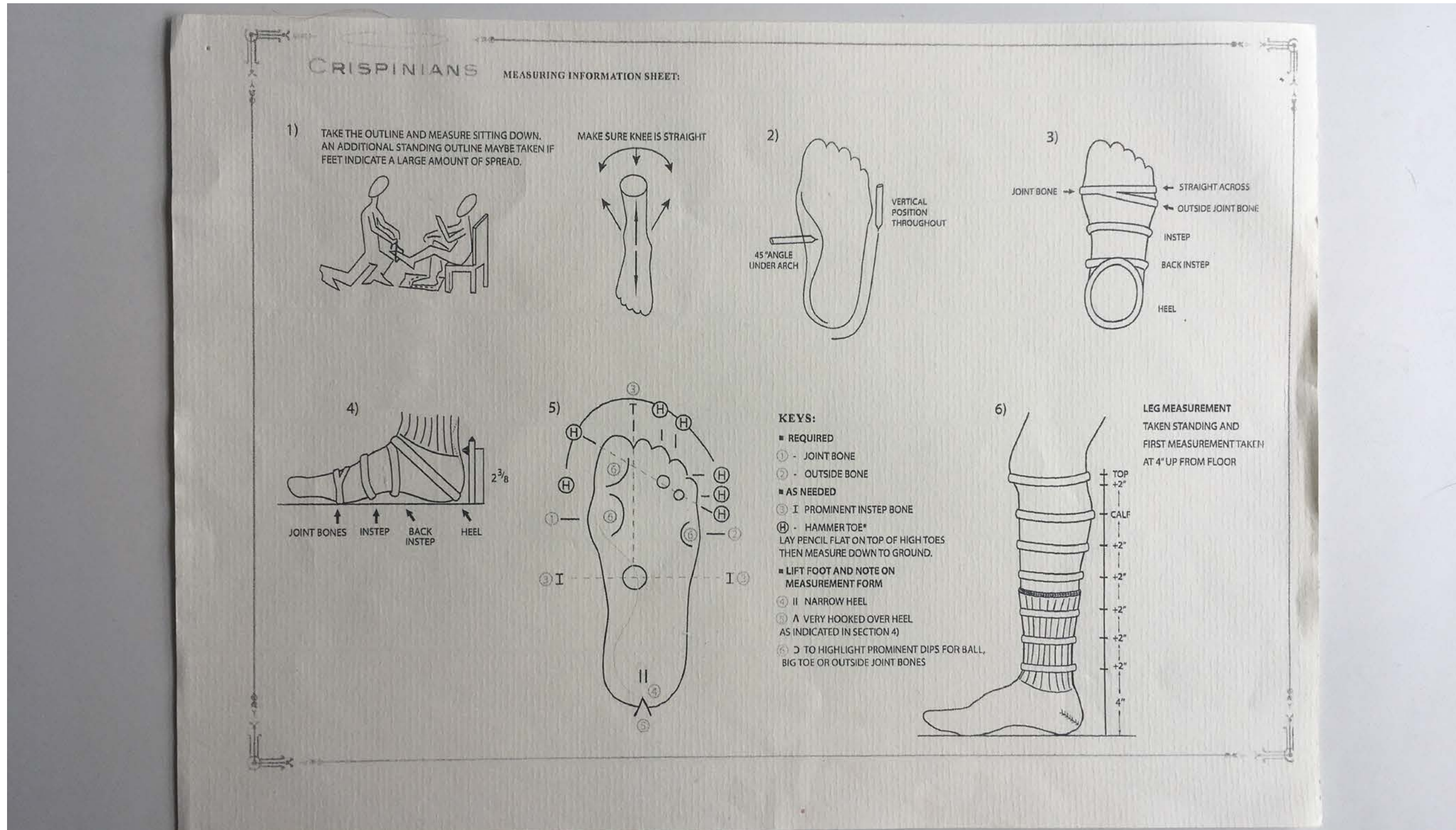
Photos from the Last Maker House in Eastbourne, UK

LAST MAKING RESEARCH



Photos from the Last Maker House in Eastbourne, UK

LAST MAKING RESEARCH



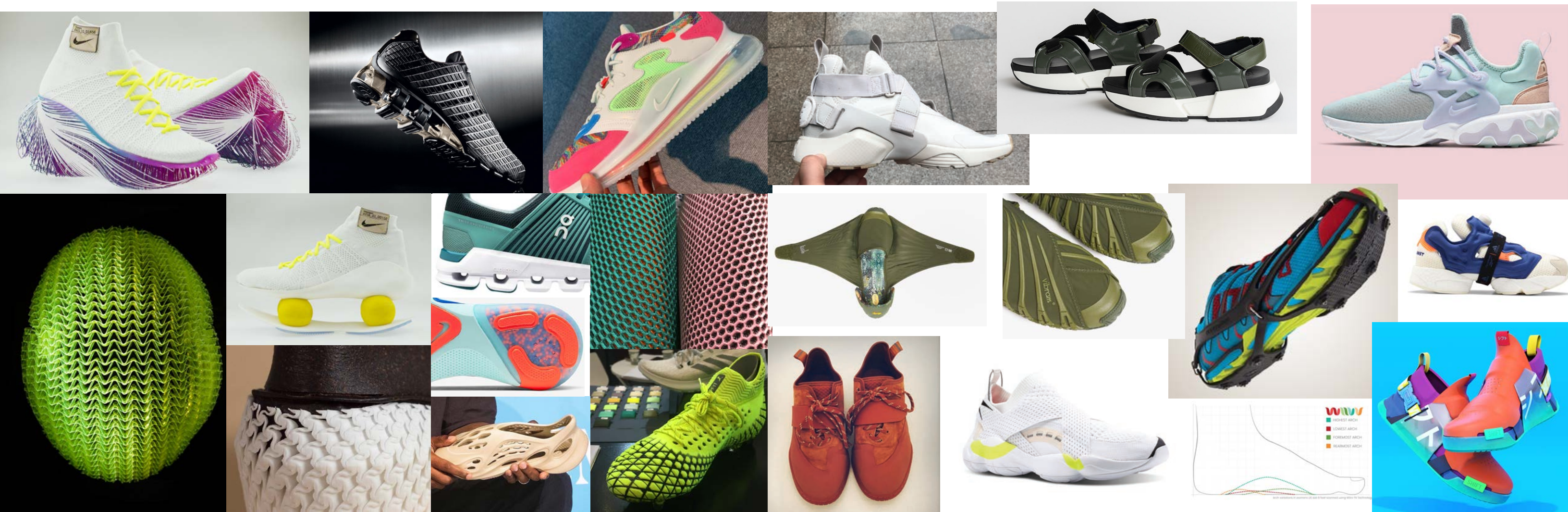
Last making measurement guide

INSPIRATION



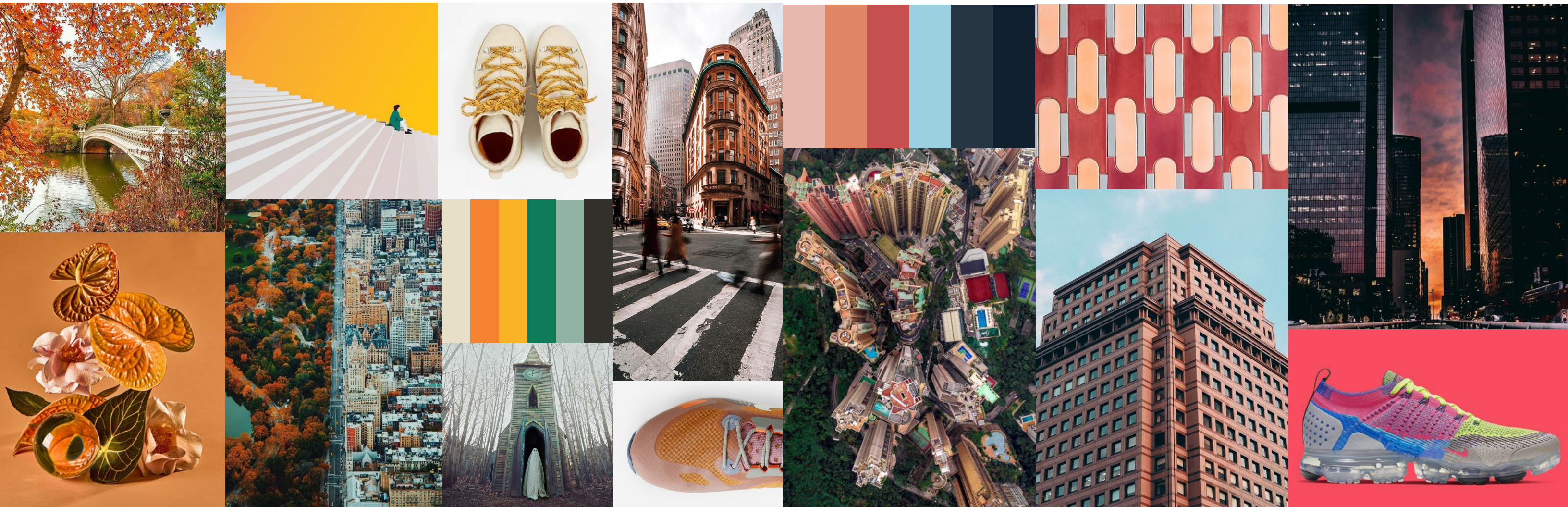
Early mood board

INSPIRATION



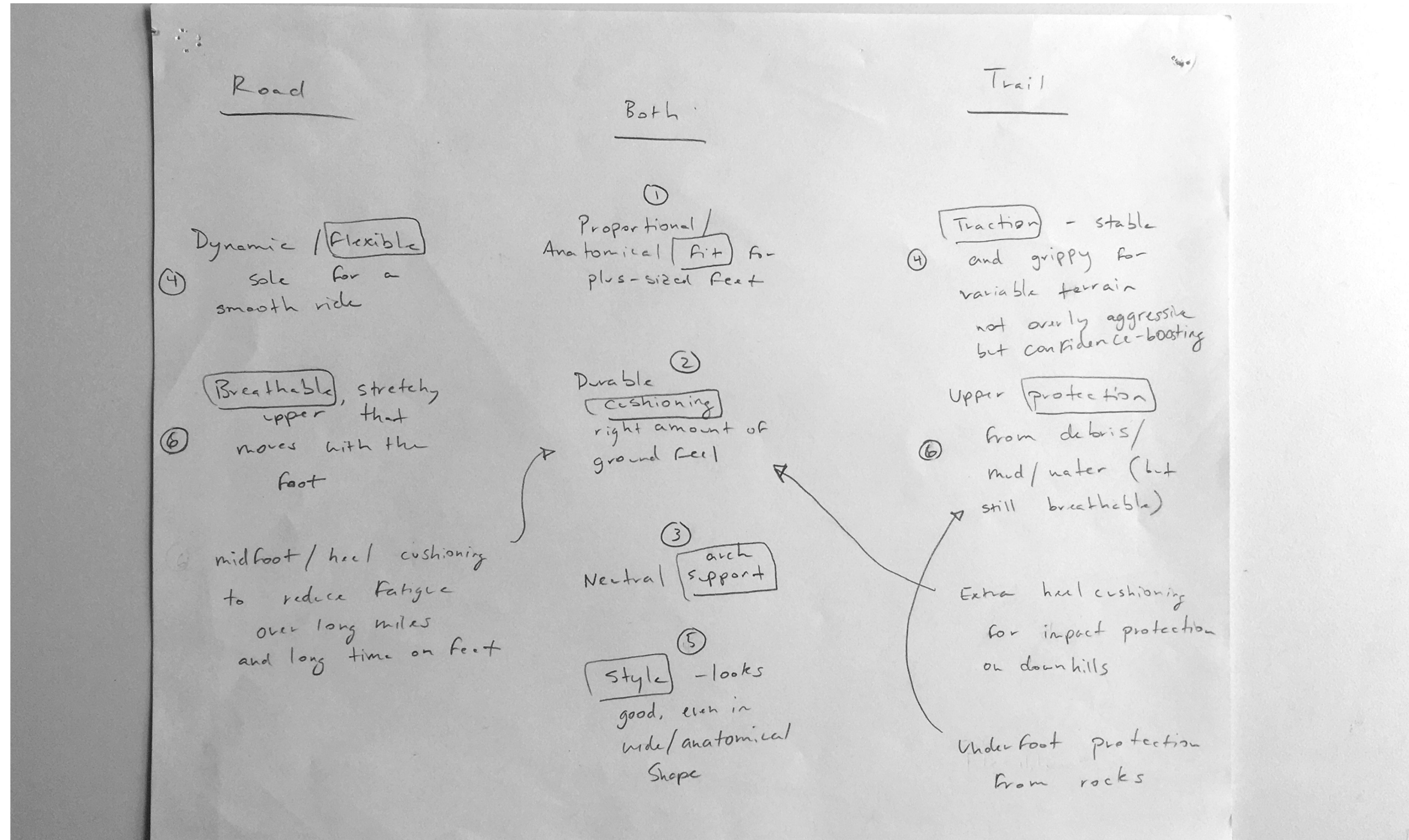
Inspiration for details, materials, and graphics

INSPIRATION



Early color exploration

IDEATION



Prioritizing the problems to solve

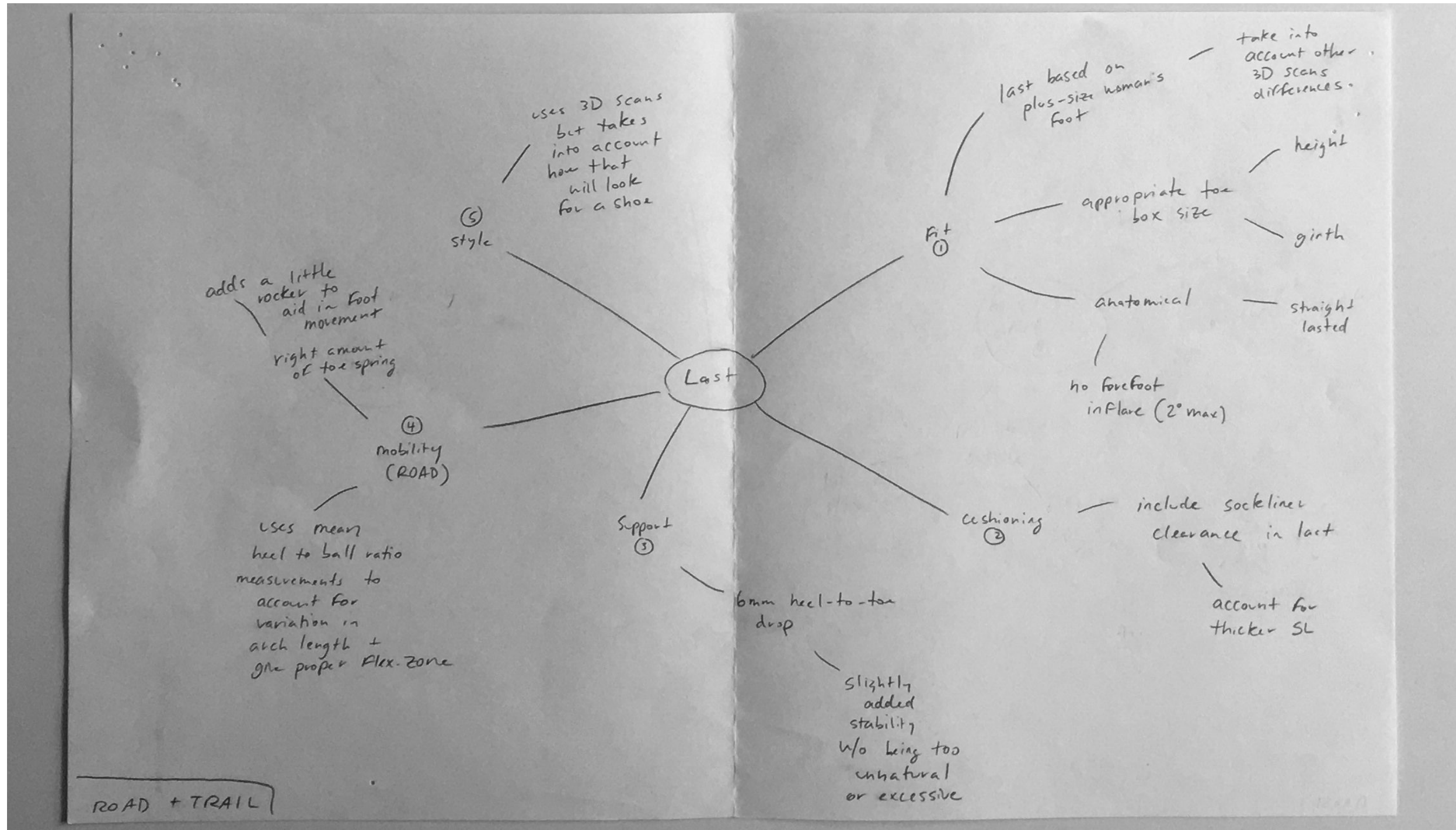
IDEATION

ROAD	LAST	UPPER	SOCK LINER	MIDSOLE	OUTSOLE
1. FIT Proportional/anatomical fit for plus-sized feet	Last based on plus-size foot Appropriate toe box height and girth - anatomical No forefoot inflare (2deg max)	Pattern follows anatomical landmarks (MTP joint, malleolus, toes, achilles tendon) Stretchy material/laces to accomodate variations in foot shape	Sock liner follows curvature of arch and width of foot (not too narrow) Adjustable arch location?		
2. CUSHIONING Durable cushioning with the right amount of ground feel	Reduce size of last to accommodate thicker sock liner		Use the sockliner as a primary softness/cushioning mechanism instead of only relying on the midsole	Overly soft foam should be minimized in place of firmer foam Use resilient, dynamic geometry to absorb impact	Minimal rubber to reduce weight and encourage ground feel
3. SUPPORT Neutral arch support	6mm heel drop for a little added support but not excessive	Medial support on the upper using firmer materials to add stiffness Wrapping under the foot to create additional support	Built-in arch support in the sock liner (not flat) to support the foot as close to the foot as possible Movable and/or removable arch support? Two options?	Moderate medial heel flare to slightly adjust over pronation No biased midsole	
4. MOBILITY Dynamic/flexible for a smooth ride that moves with the foot	Uses mean heel to ball ratio measurements to account for variation in arch length and give proper flex zone Right amount of toe spring	No excessive overlays or materials to inhibit movement Minimal material in the flex zone Stretchy material	Flex grooves in sock liner for added mobility	Midsole should be super flexible to allow the foot to move naturally Minimize material where possible	Flexible outsole allows for free range of motion
5. STYLE Looks good, even in wide/anatomical	Uses the 3D scan to create an anatomical last, but takes into account how that proportionally will affect the way the shoe looks	Use geometry that elongates the foot and gives it a nice flow so it doesn't look overly wide		Shouldn't be overly bulbous or teched out, clean lines	Should be a fun/cool graphic treatment that isn't overly techy or aggressive
6. BREATHABILITY Has adequate airflow to keep the foot from overheating or sweating excessively		Minimize materials where possible to encourage airflow Ventilation on the lateral side and top of forefoot	Ventilation/perforations in sock liner	Ventilation in midsole to allow air to escape from under the sock liner?	

IDEATION

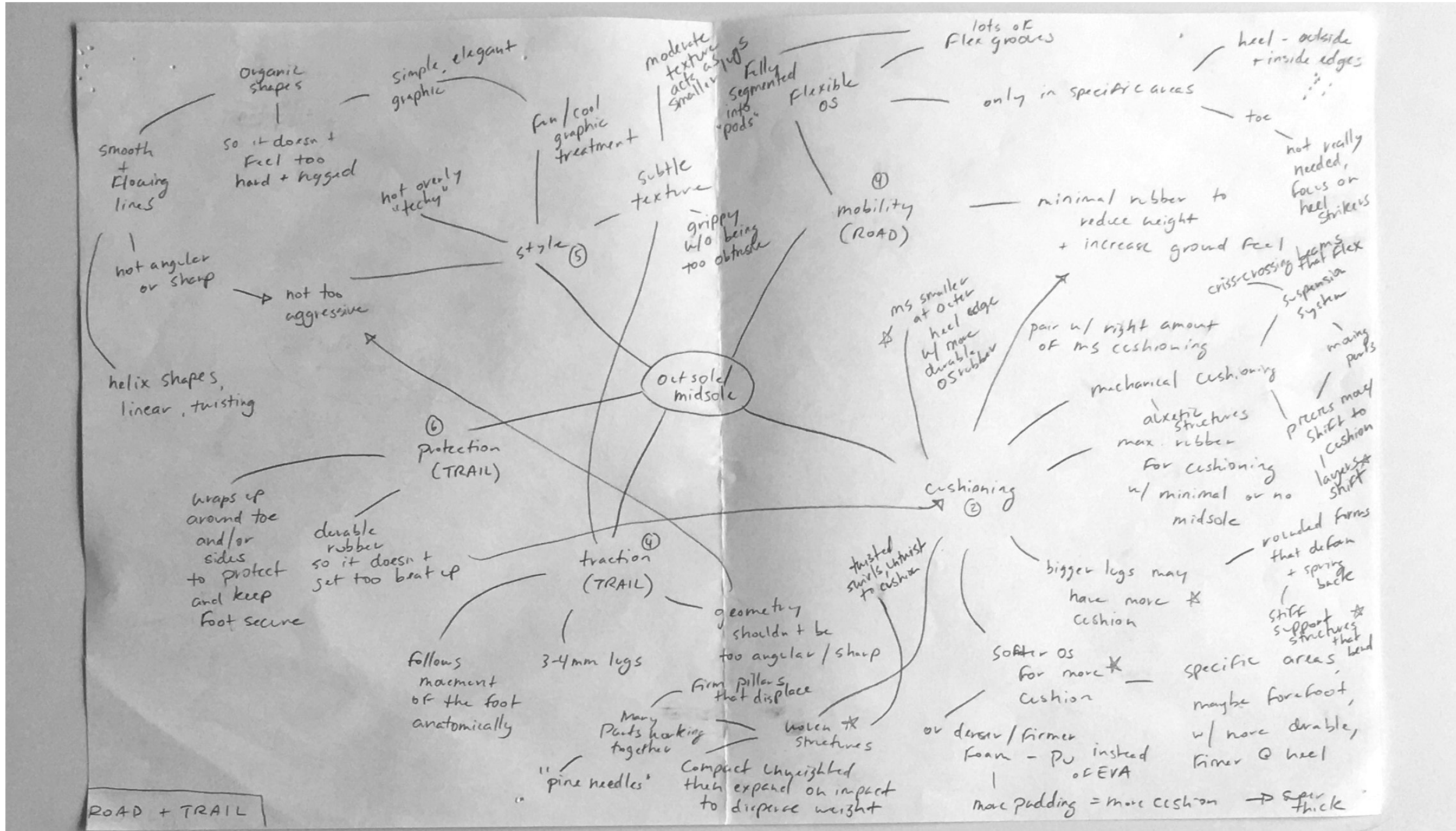
TRAIL	LAST	UPPER	SOCK LINER	MIDSOLE	OUTSOLE
1. FIT Proportional/anatomical fit for plus-sized feet	Last based on plus-size foot Appropriate toe box height and girth - anatomical No forefoot inflare (2deg max)	Pattern follows anatomical landmarks (MTP joint, malleolus, toes, achilles tendon) Stretchy material/laces to accomodate variations in foot shape	Sock liner follows curvature of arch and width of foot (not too narrow) Adjustable arch location?		
2. CUSHIONING Durable cushioning with the right amount of ground feel and flexibility	Reduce size of last to accomodate thicker sock liner		Use the sockliner as a primary softness/cushioning mechanism instead of only relying on the midsole	Overly soft foam should be minimized in place of firmer foam Use resilient, dynamic geometry to absorb impact	Minimal rubber to reduce weight and encourage ground feel
3. SUPPORT Neutral arch support	6mm heel drop for a little added support but not excessive	Medial support on the upper using firmer materials to add stiffness Wrapping under the foot to create additional support	Built-in arch support in the sock liner (not flat) to support the foot as close to the foot as possible Movable and/or removable arch support? Two options?	Moderate medial heel flare to slightly adjust over pronation No biased midsole	
4. TRACTION Stable and grippy for confidence on variable terrain (uphill and downhill) without being overly aggressive		Keeps foot securely in place	Texture on bottom of sock liner to keep it place since the firmer bottom may be more slippery than foam		3-4mm lugs Geometry shouldn't be too angular or sharp Follows the movement of the foot anatomically
5. STYLE Looks good, even in wide/anatomical	Uses the 3D scan to create an anatomical last, but takes into account how that proportionally will affect the way the shoe looks	Use geometry that elongates the foot and gives it a nice flow so it doesn't look overly wide		Shouldn't be overly bulbous or teched out, clean lines	Should be a fun/cool graphic treatment that isn't overly techy or aggressive
6. PROTECTION Protection from debris/mud/water (but still breathable) and underfoot from rocks		Waterproof membrane/bootee construction and/or water repellent lining Lightweight tongue gusset or other top-of-foot protection to keep out debris	Firm bottom on sock liner for rock protection (but that is still flexible) - mostly under forefoot, since cushioning under heel will protect	Extra heel cushioning to protect from rocks/sharp objects	Durable rubber so it doesn't get too beat up from rough terrain

IDEATION



Mind mapping - Last

IDEATION



ROAD + TRAIL

Mind mapping - Outsole/Midsole

IDEATION

UPPER

Initial Exploration

- ① FIT
Follows anatomy of foot
Stretchy material/leaves
- ② MOBILITY
Medial support on upper
wrapping underfoot
for additional support
- ③ MOBILITY
no excessive overlays
minimal material in flex zone
stretchy material
- ④ STYLE
Geometry that elongates
nice flow
doesn't make it look
overly wide
- ⑤ BREATHABILITY
minimize material to
encourage airflow
ventilation on lateral
side + top of forefoot



Early sketches

IDEATION

UPPER Support

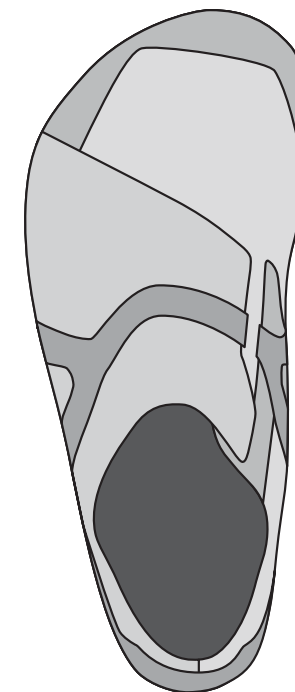
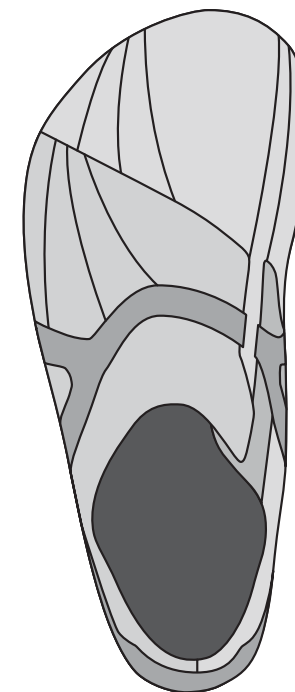
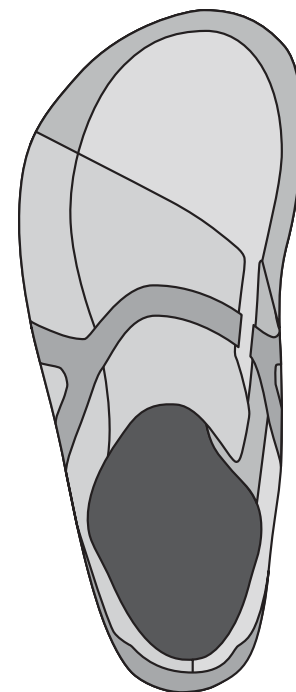
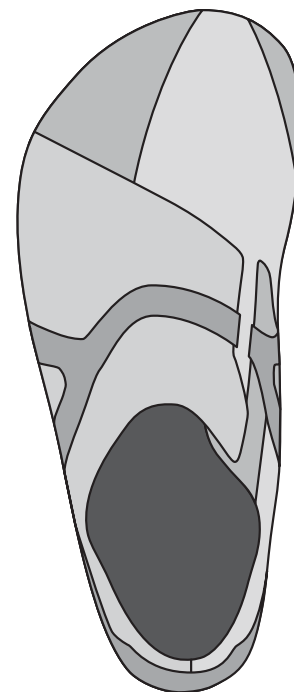
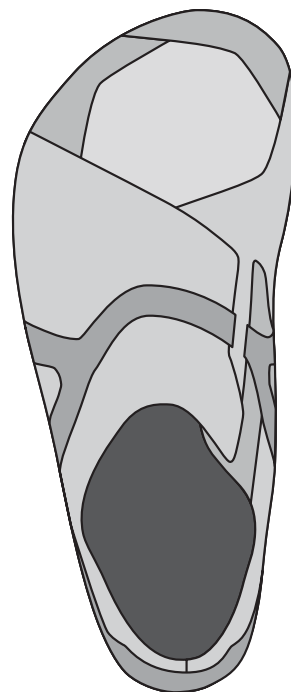
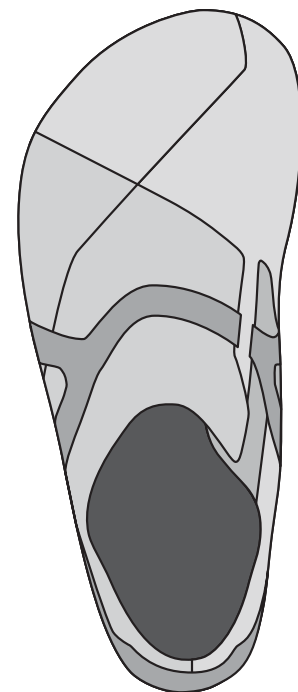
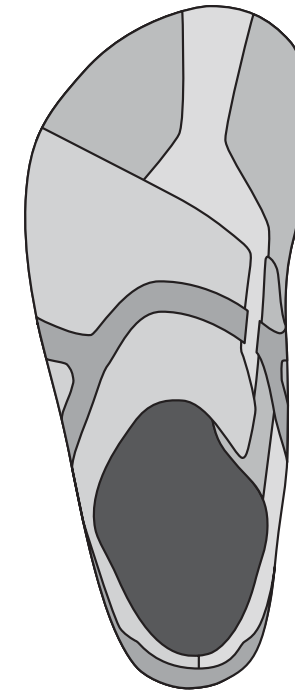
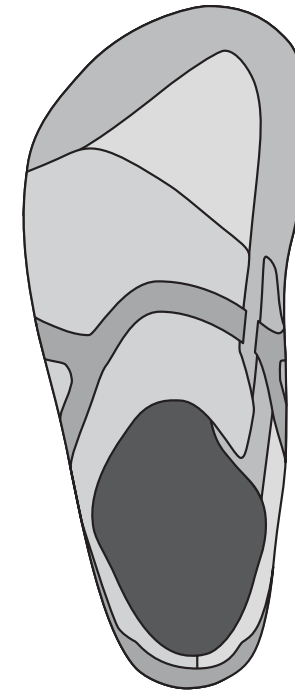
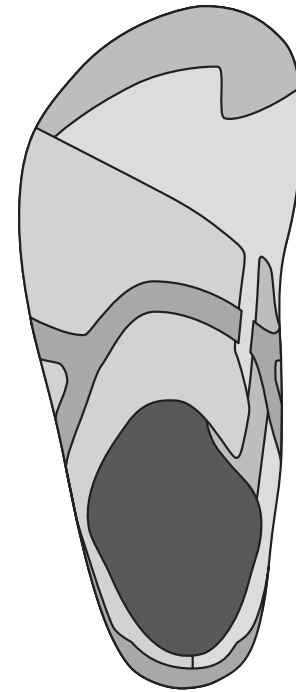
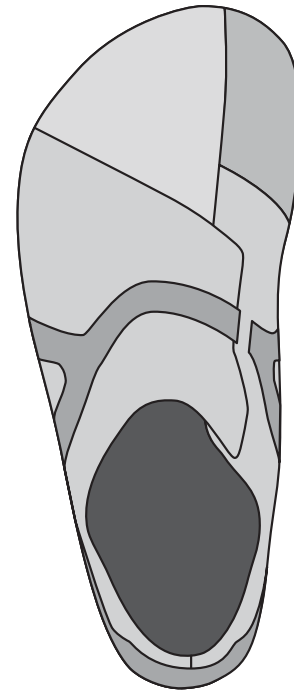
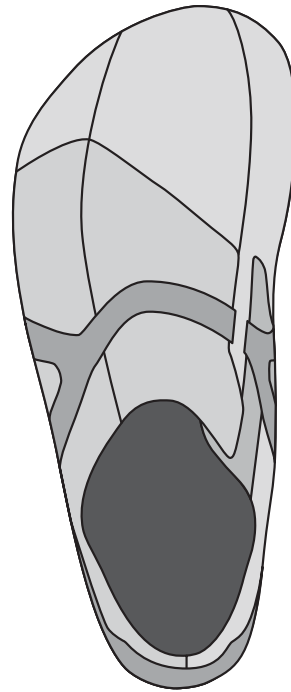
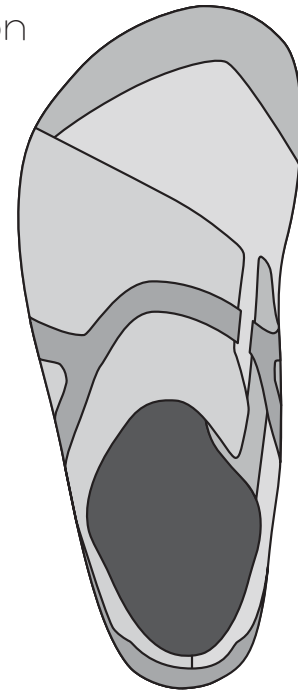
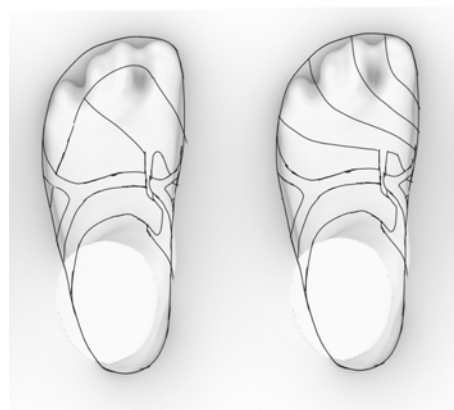
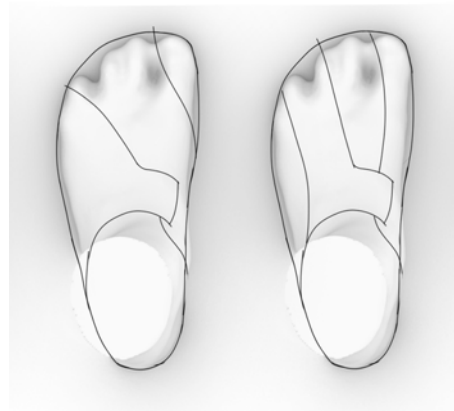


Early sketches - focus on support

IDEATION

UPPER

Top Down - Line Exploration

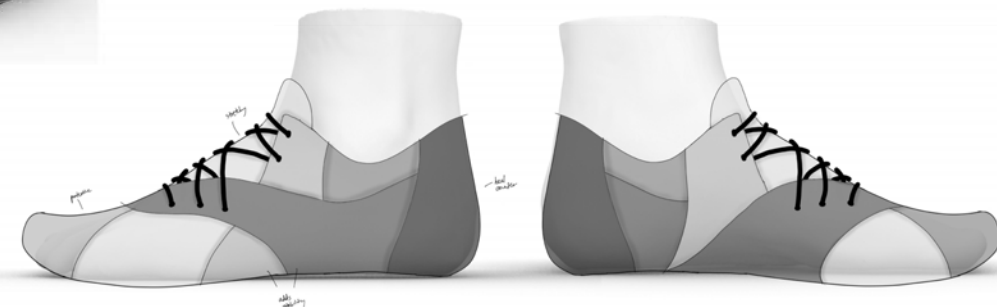
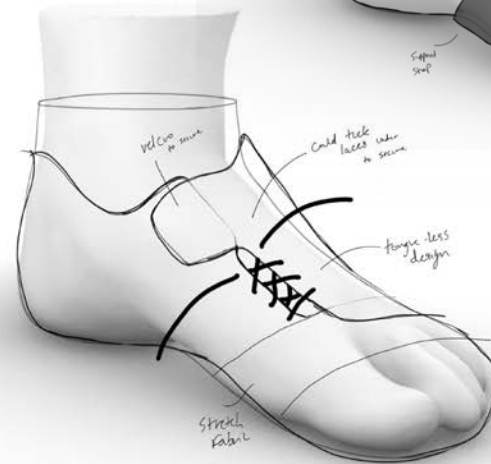
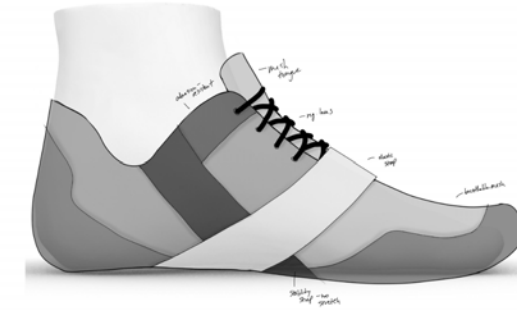
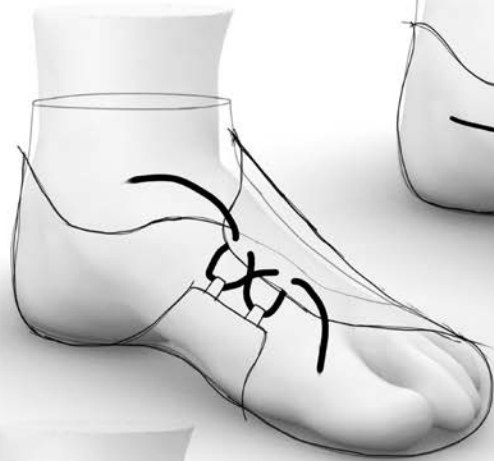
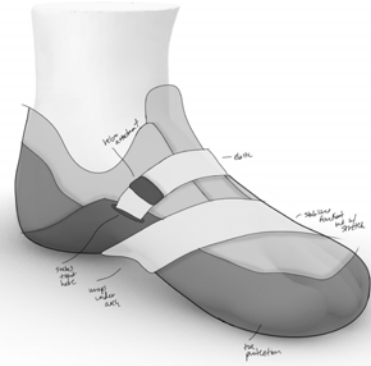


Early sketches - focus on top down style lines

IDEATION

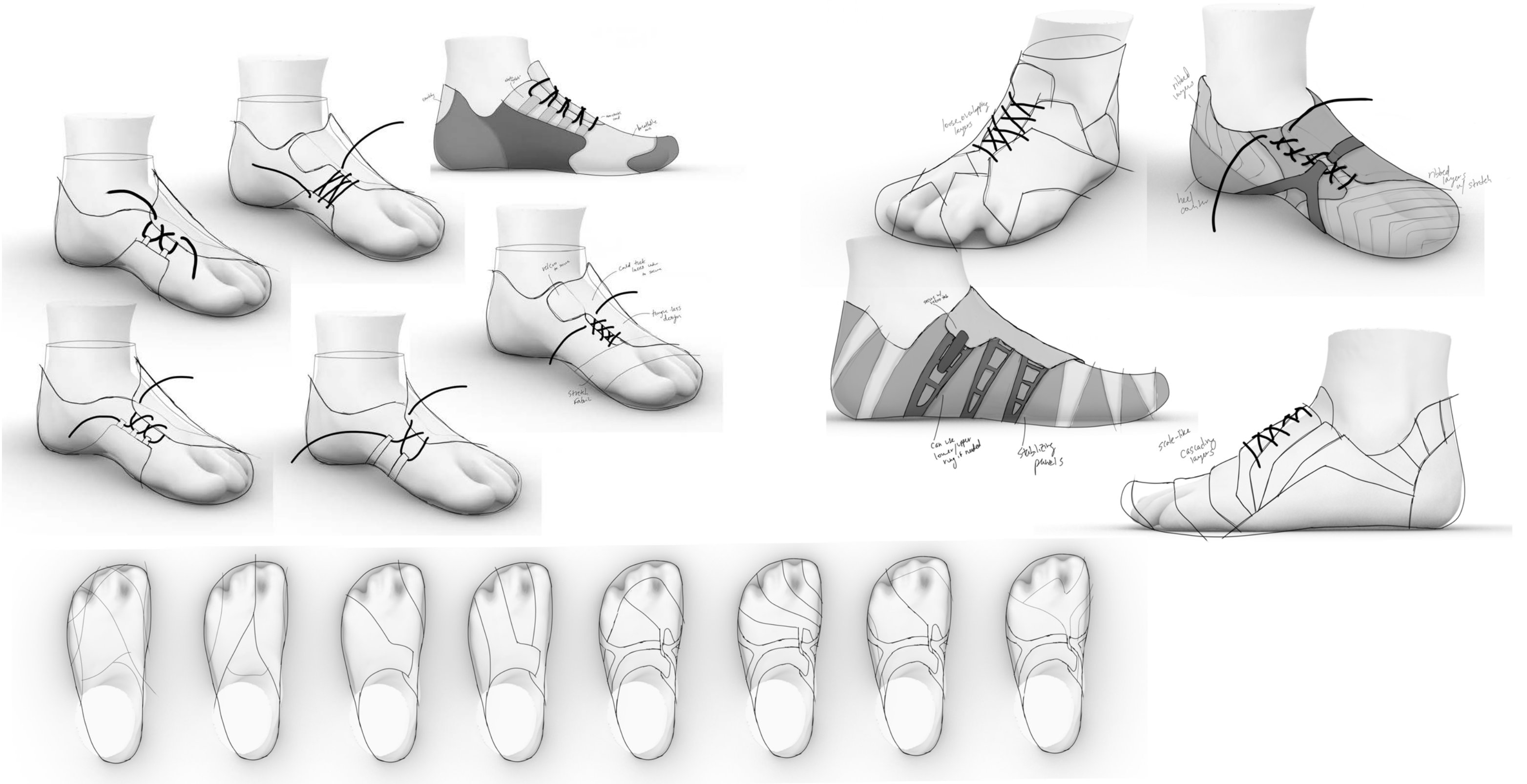
UPPER

Fit



Early sketches - focus on fit

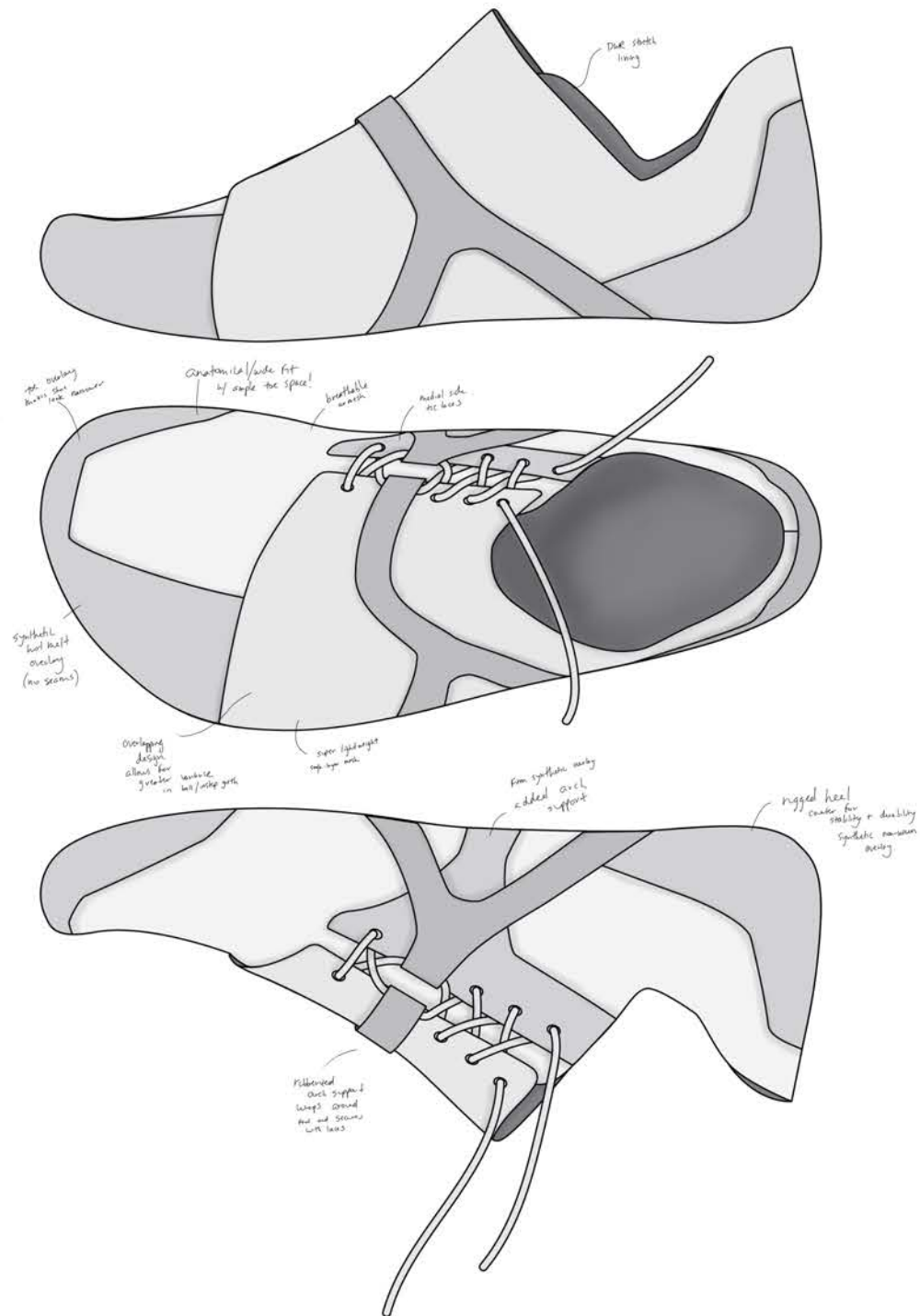
IDEATION



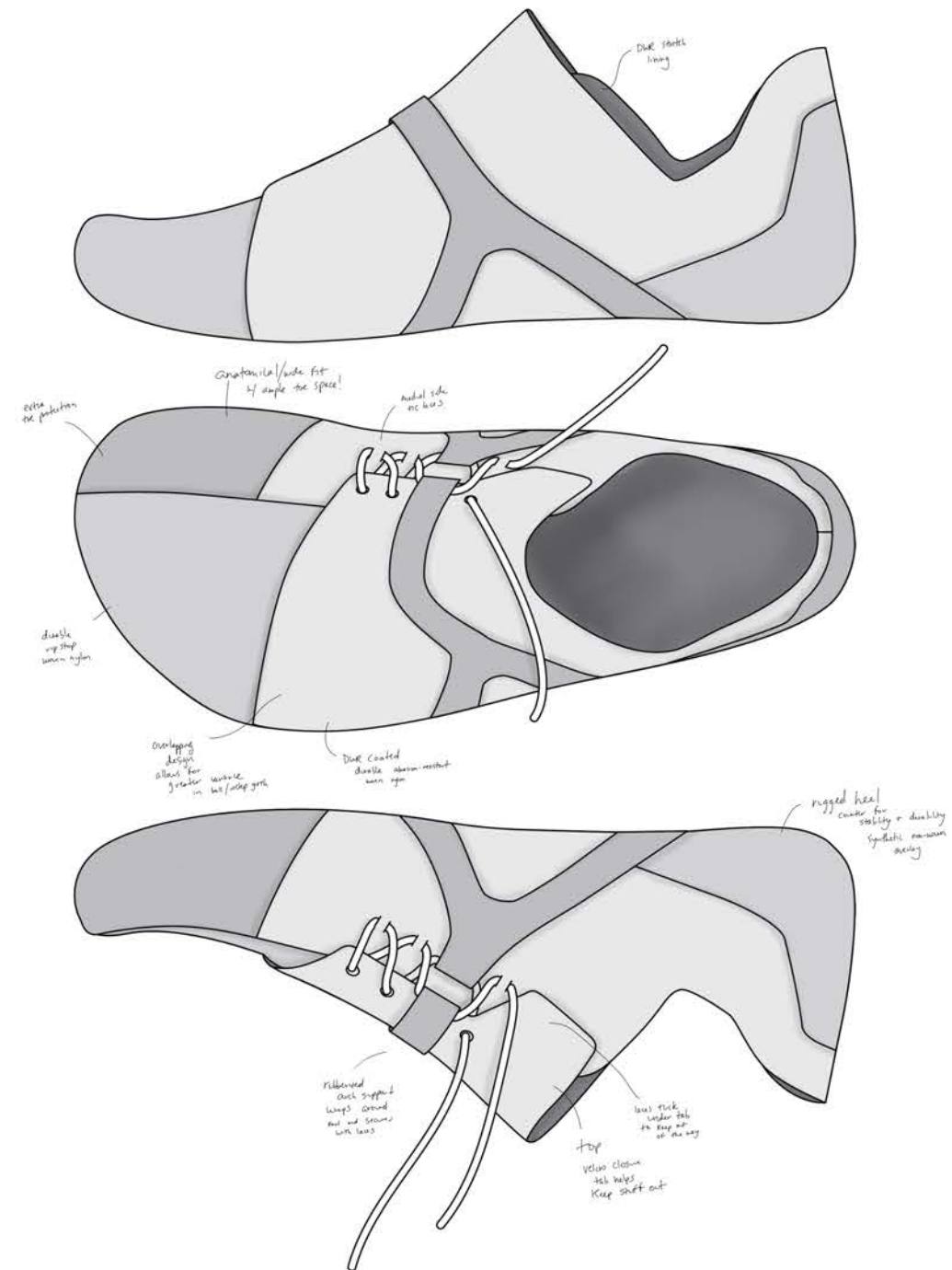
Early sketches - focus on fit, mobility, and style lines

IDEATION

ANY BODY'S ROAD



ANY BODY'S TRAIL

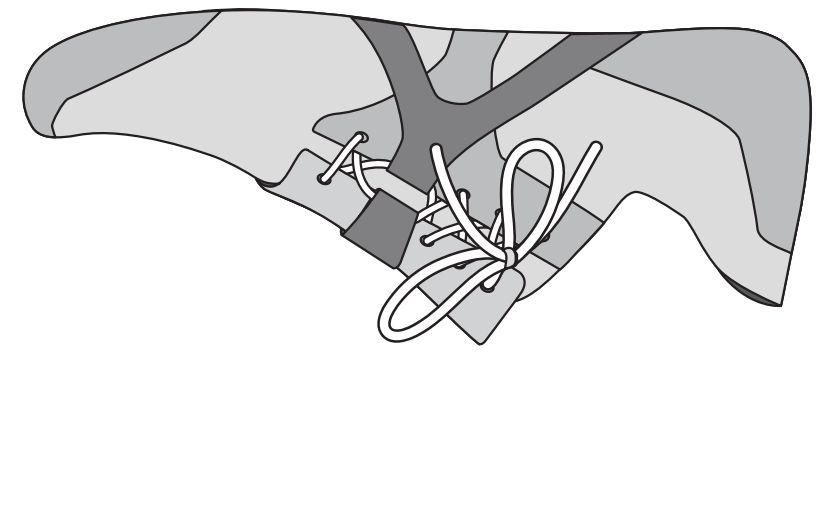
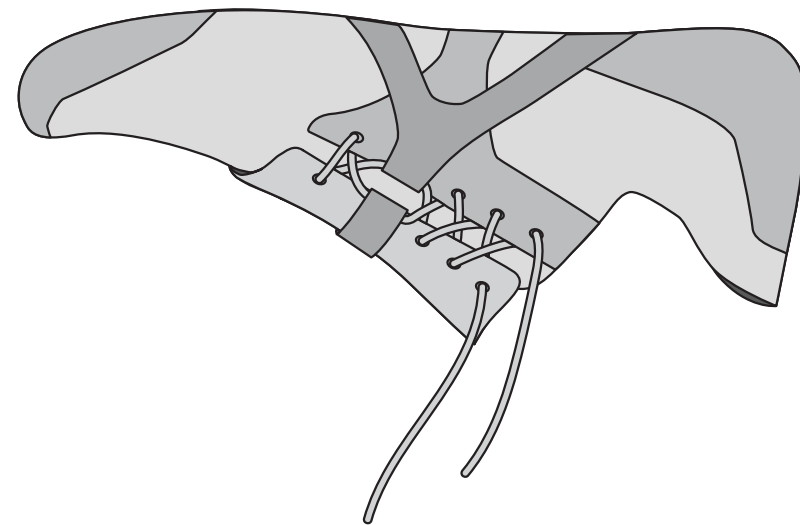
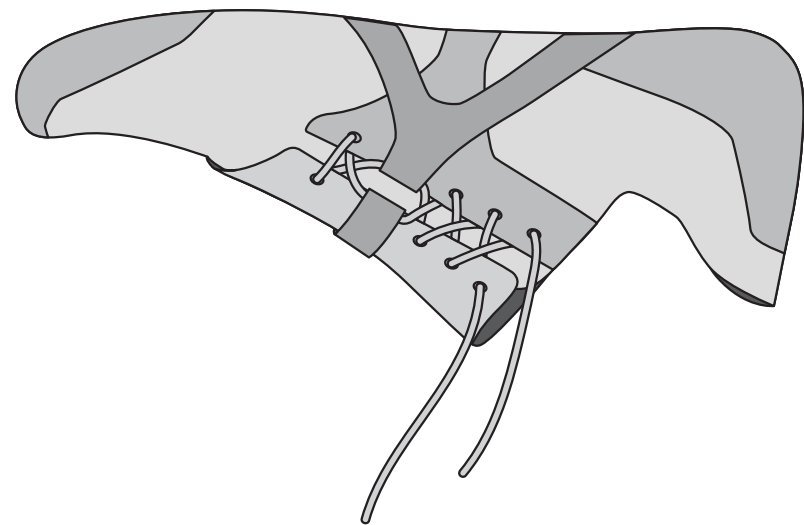
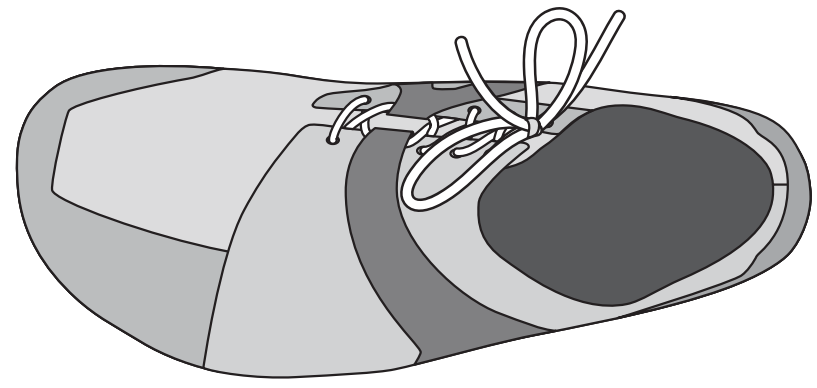
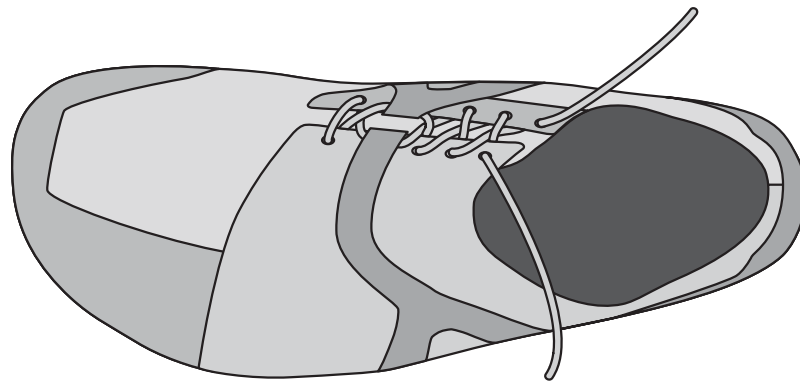
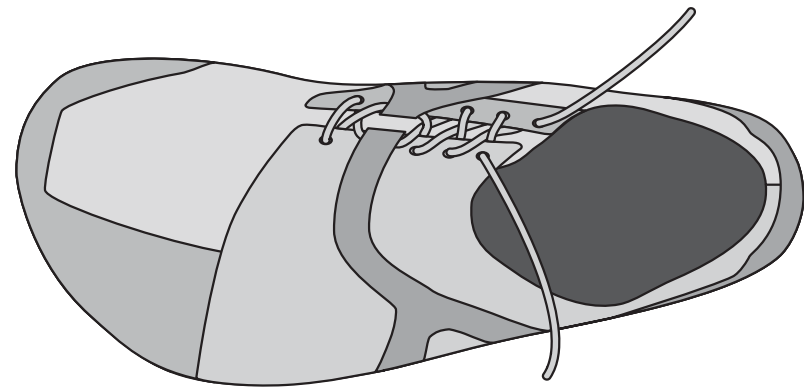
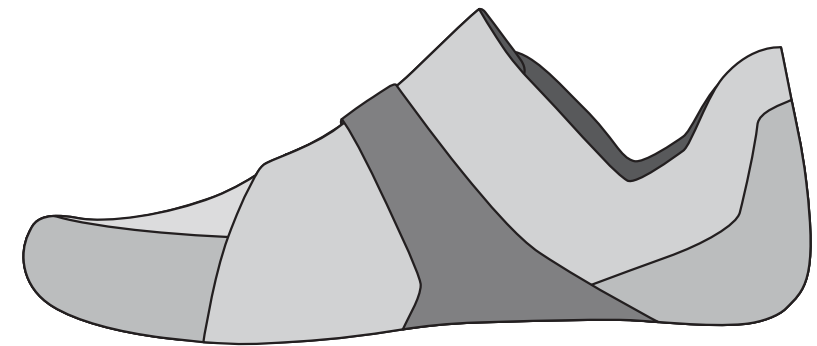
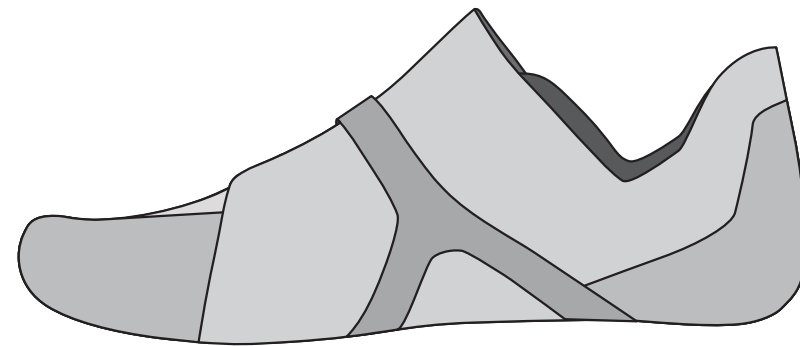
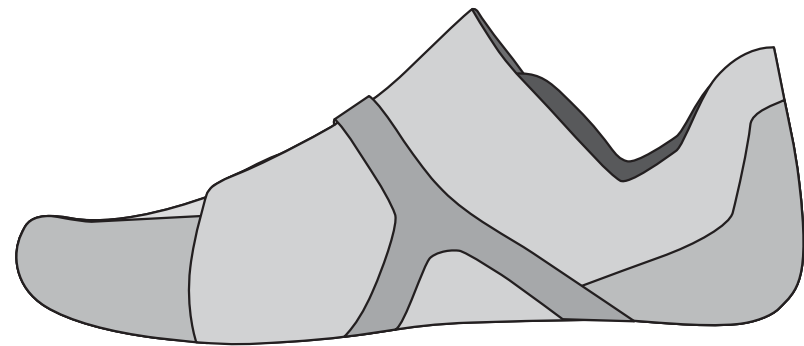


Refining the proof of concept details

IDEATION

ANY BODY'S ROAD

Refinements

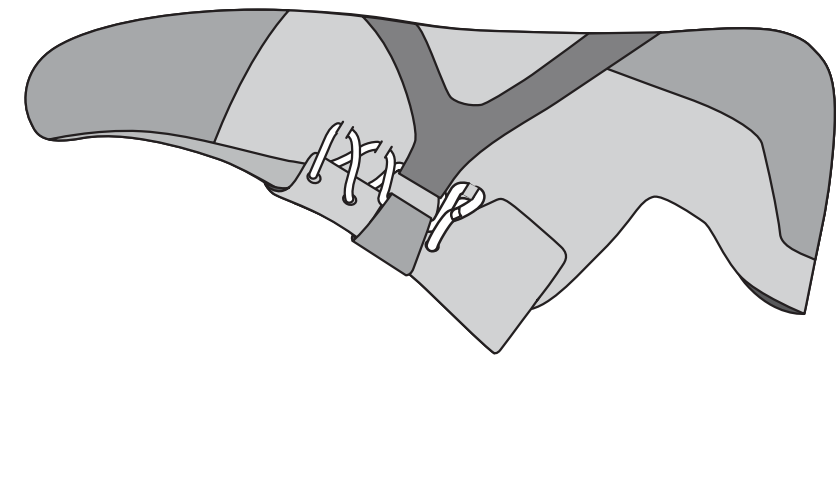
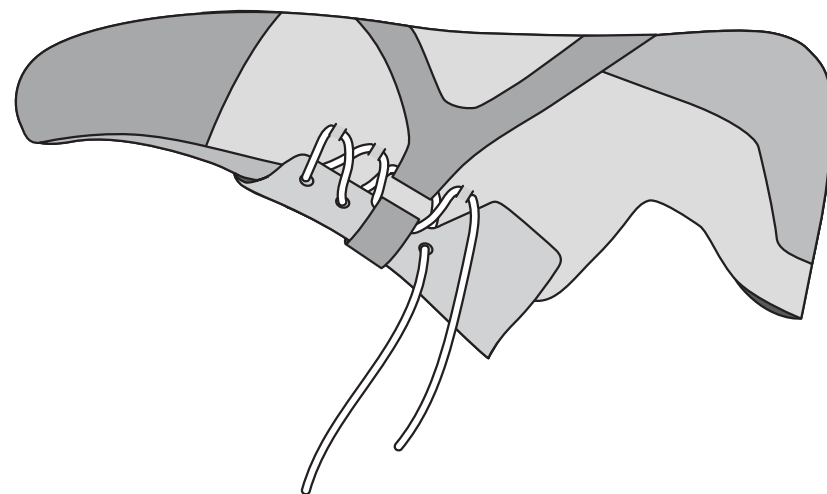
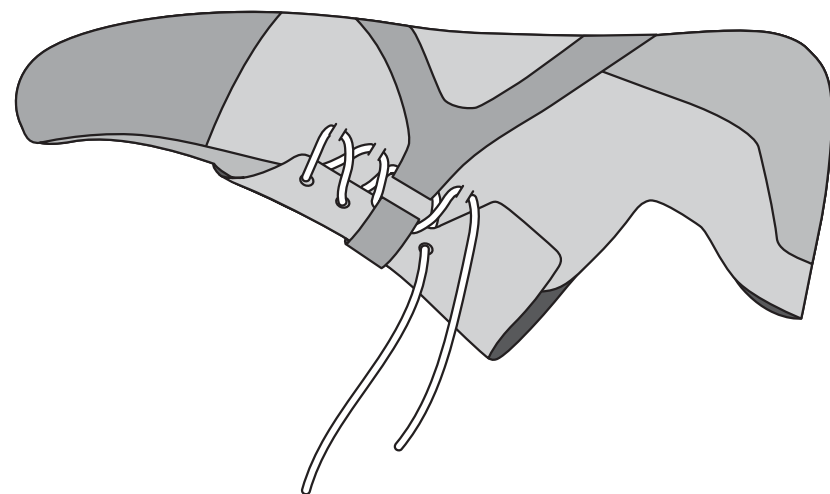
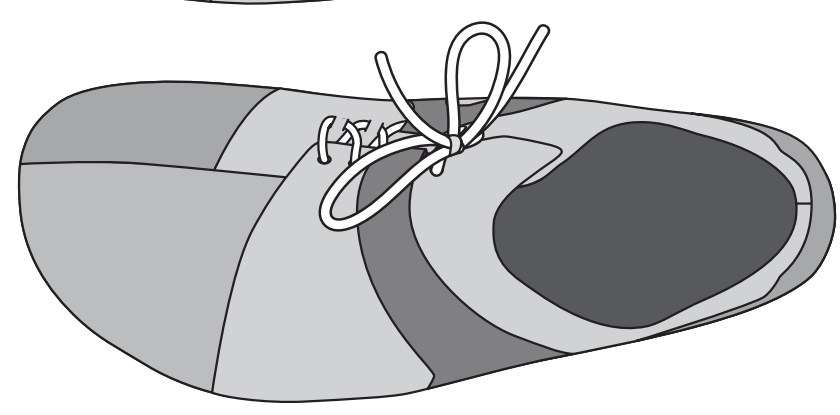
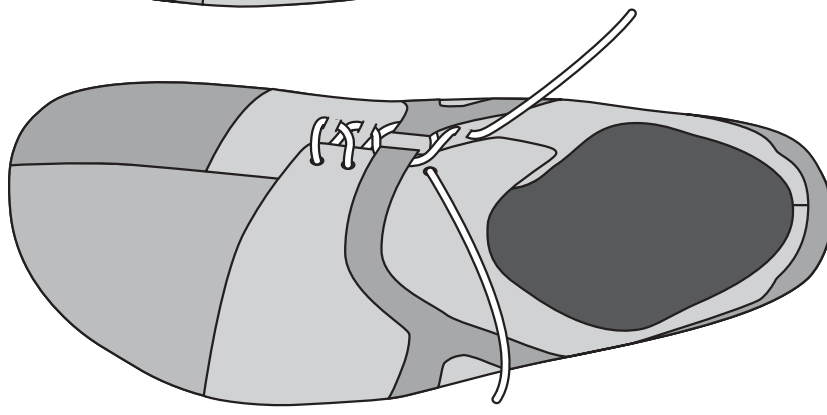
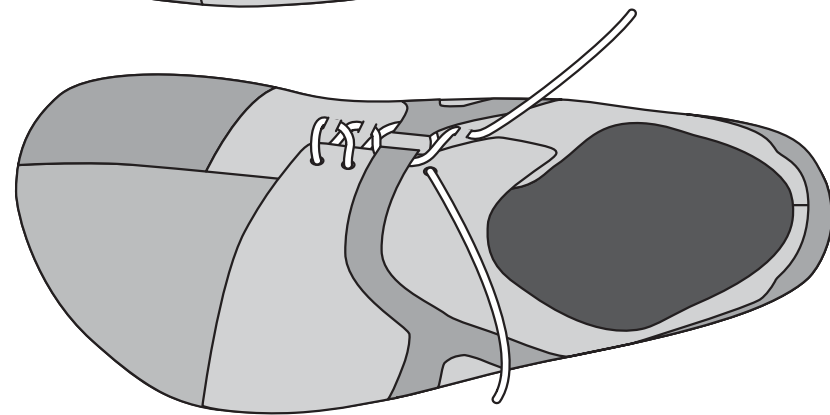
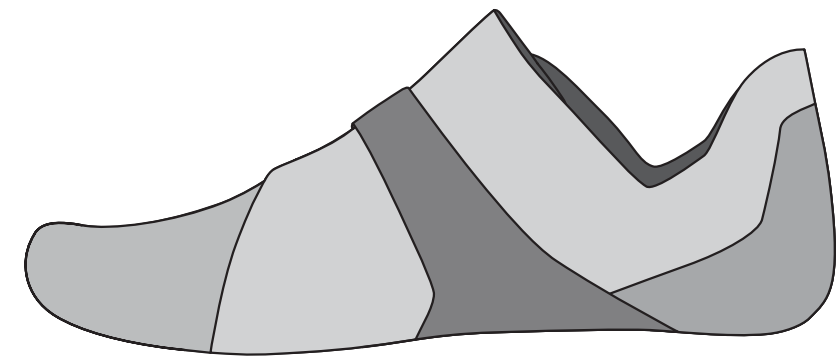
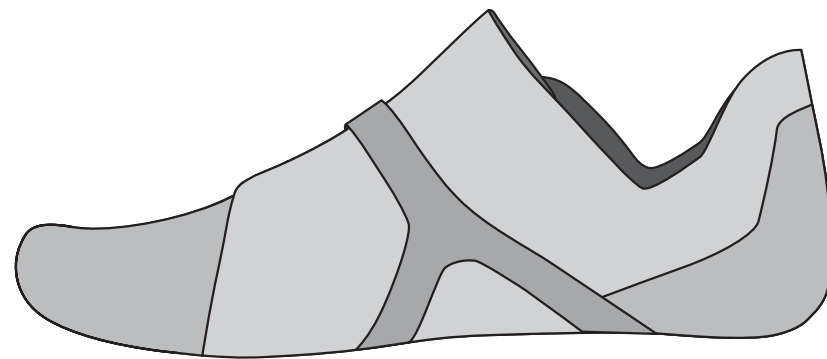
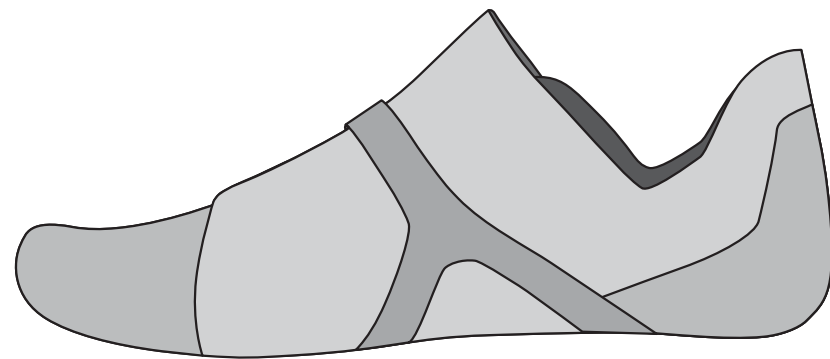


Revising the details and shapes

IDEATION

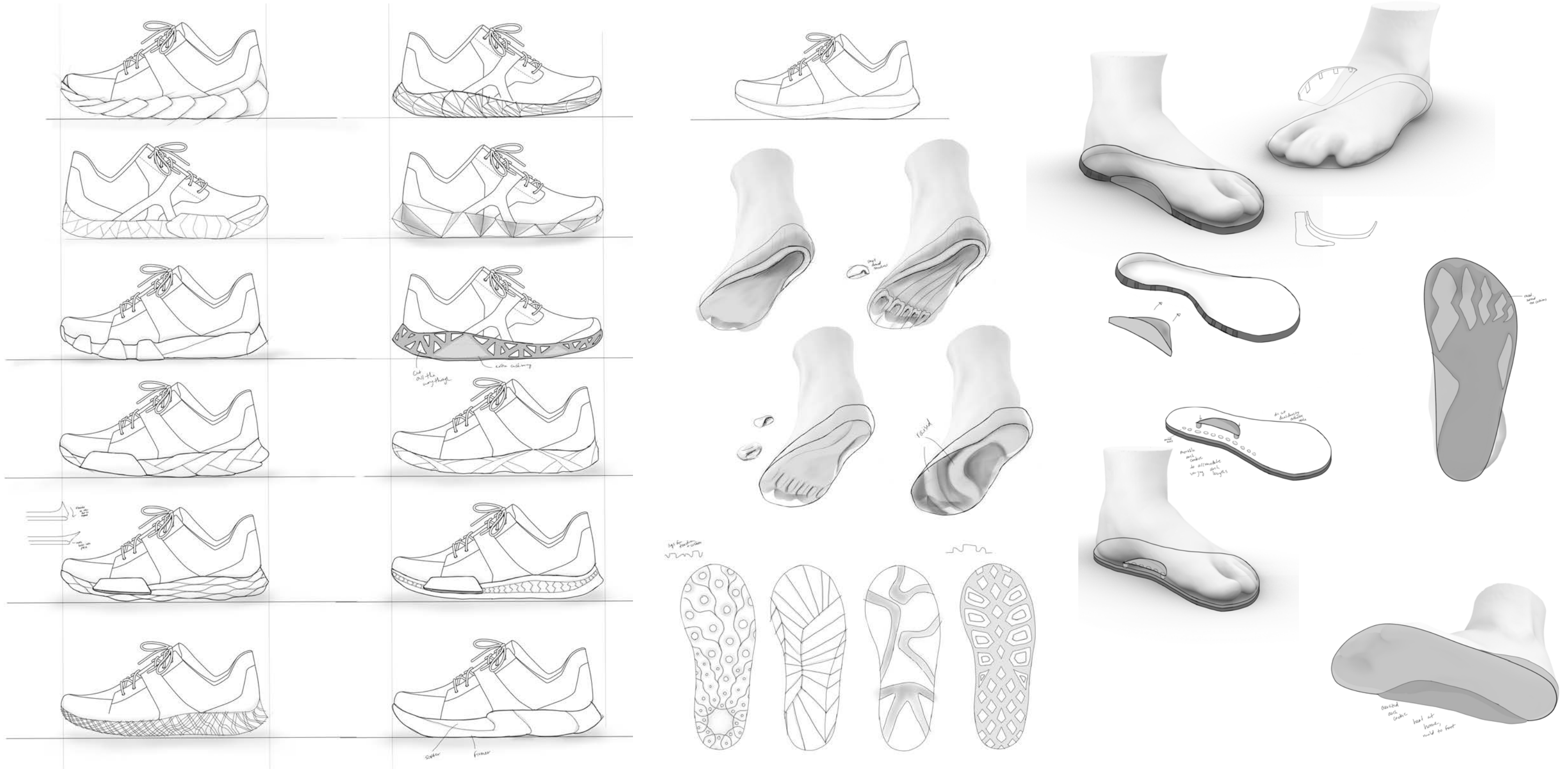
ANY BODY'S TRAIL

Refinements



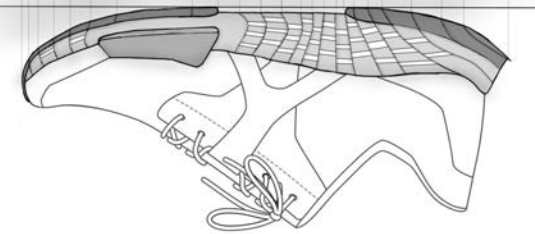
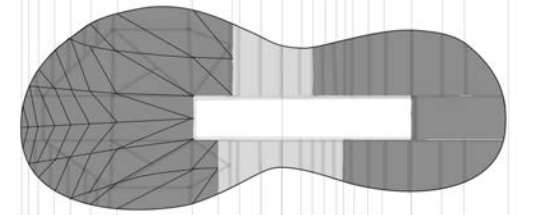
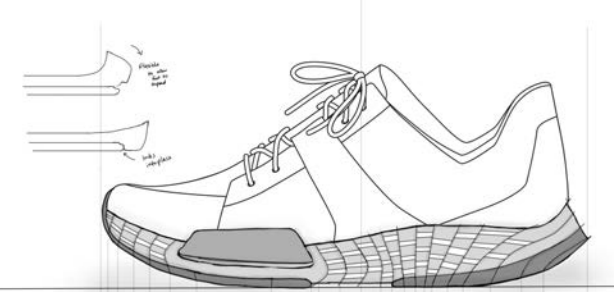
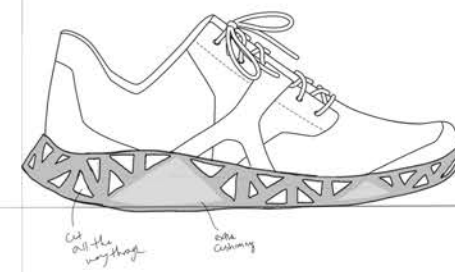
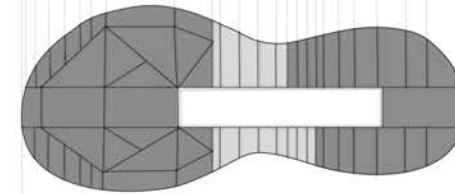
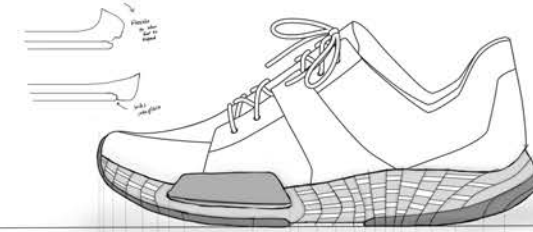
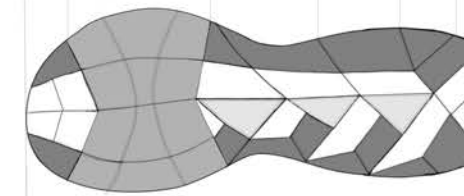
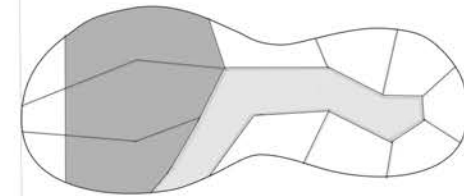
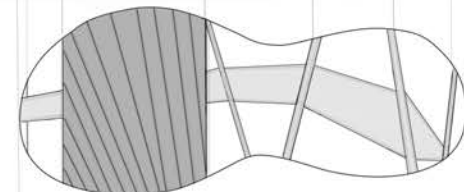
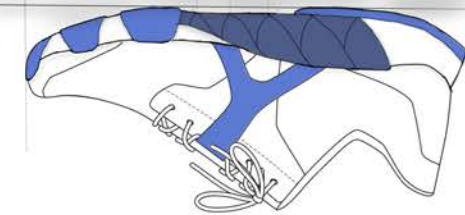
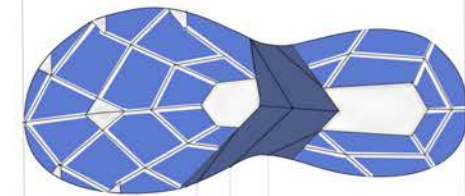
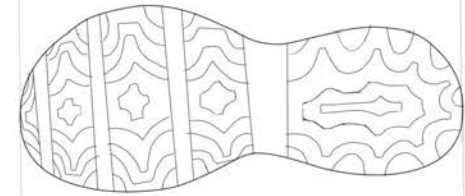
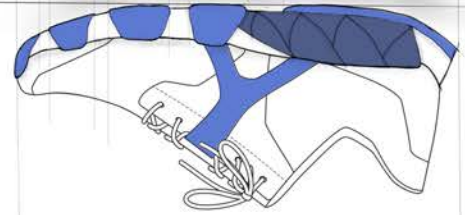
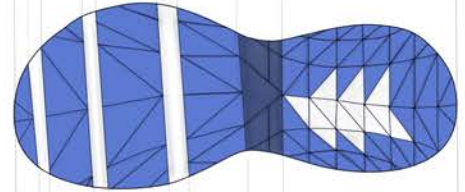
Revising the details and shapes

IDEATION



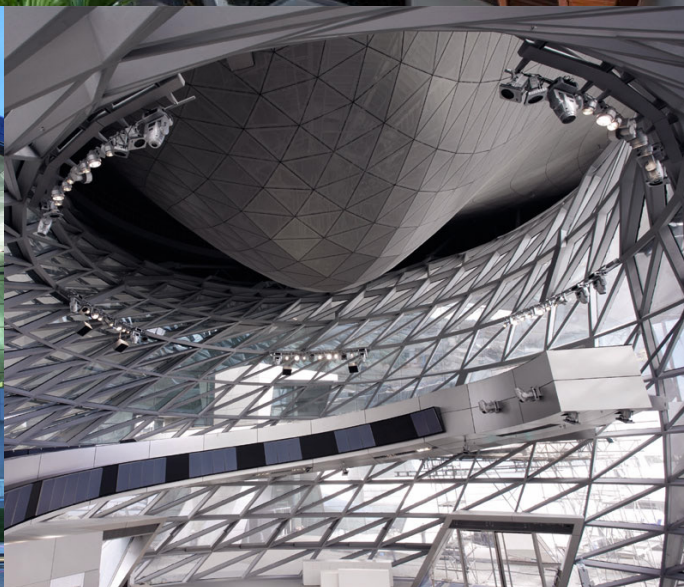
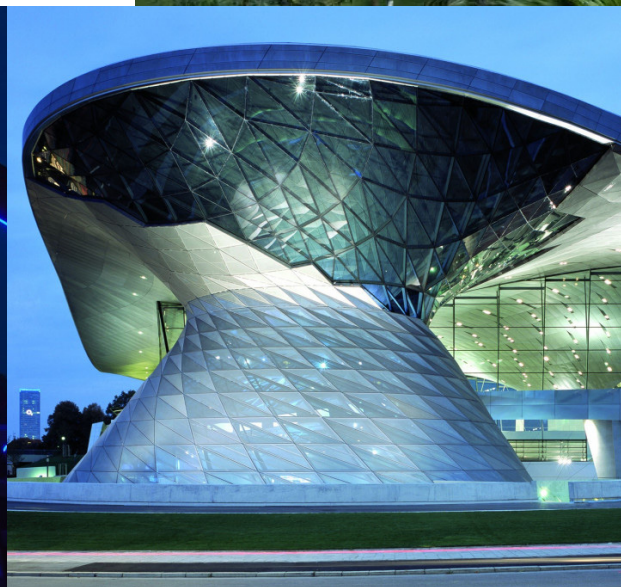
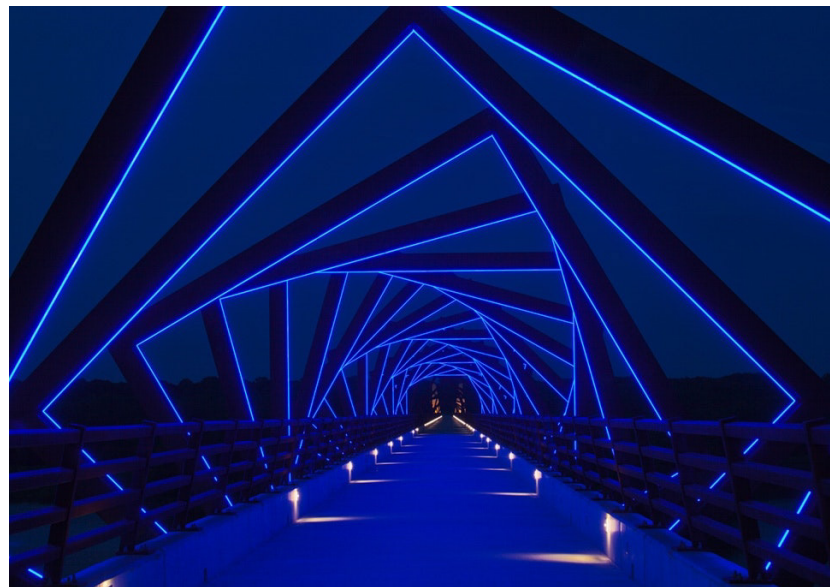
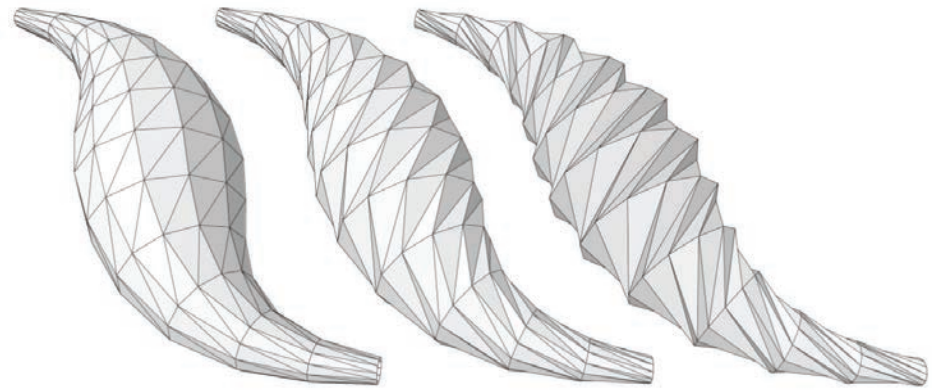
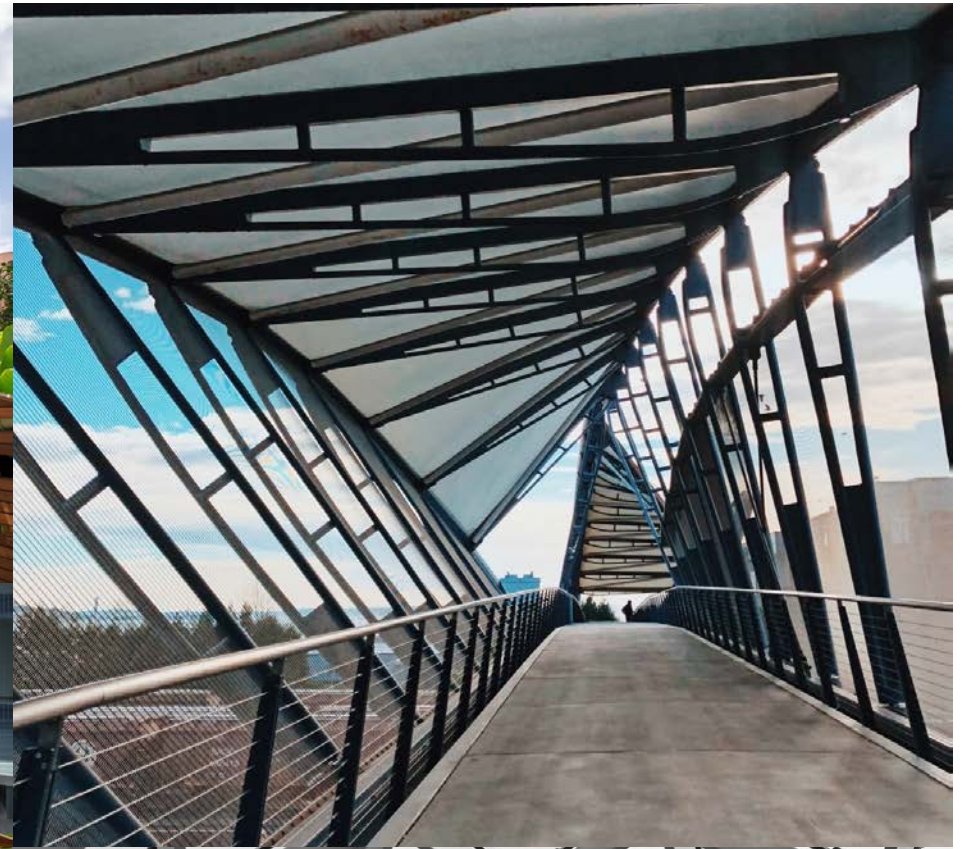
Midsole and insole ideation

IDEATION

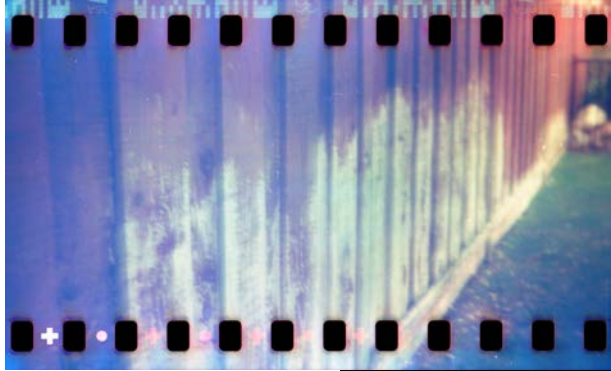


Midsole ideation

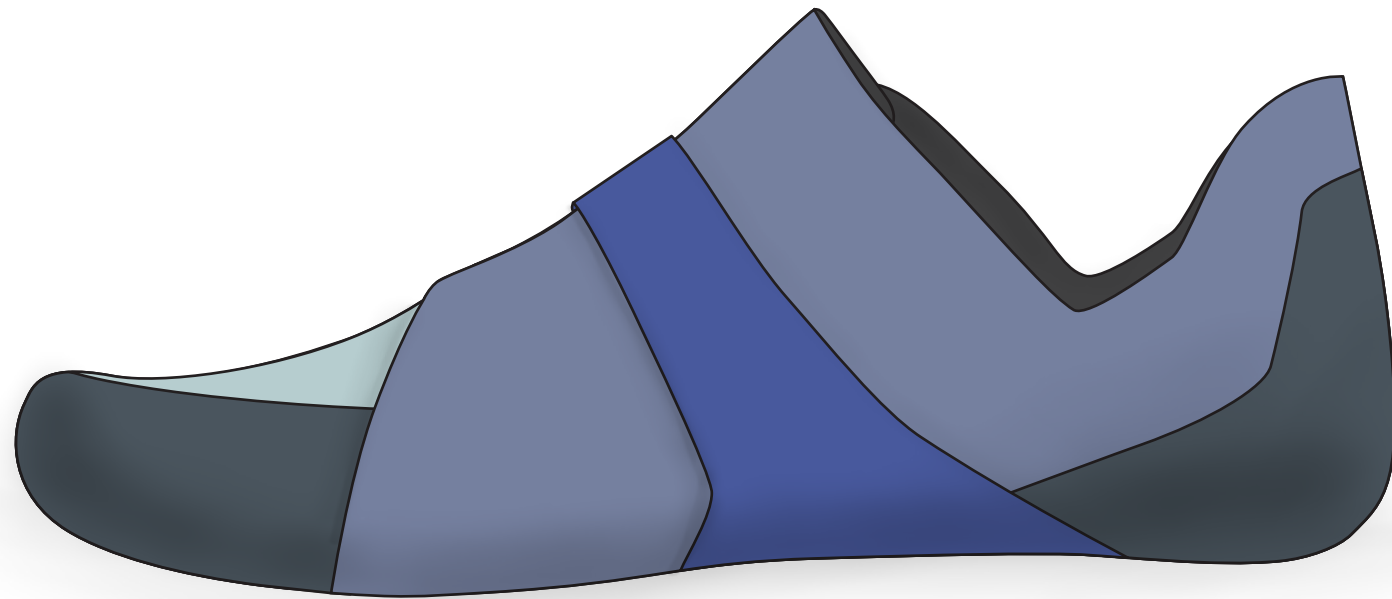
INSPIRATION



ANY BODY'S ROAD



ANY BODY'S ROAD

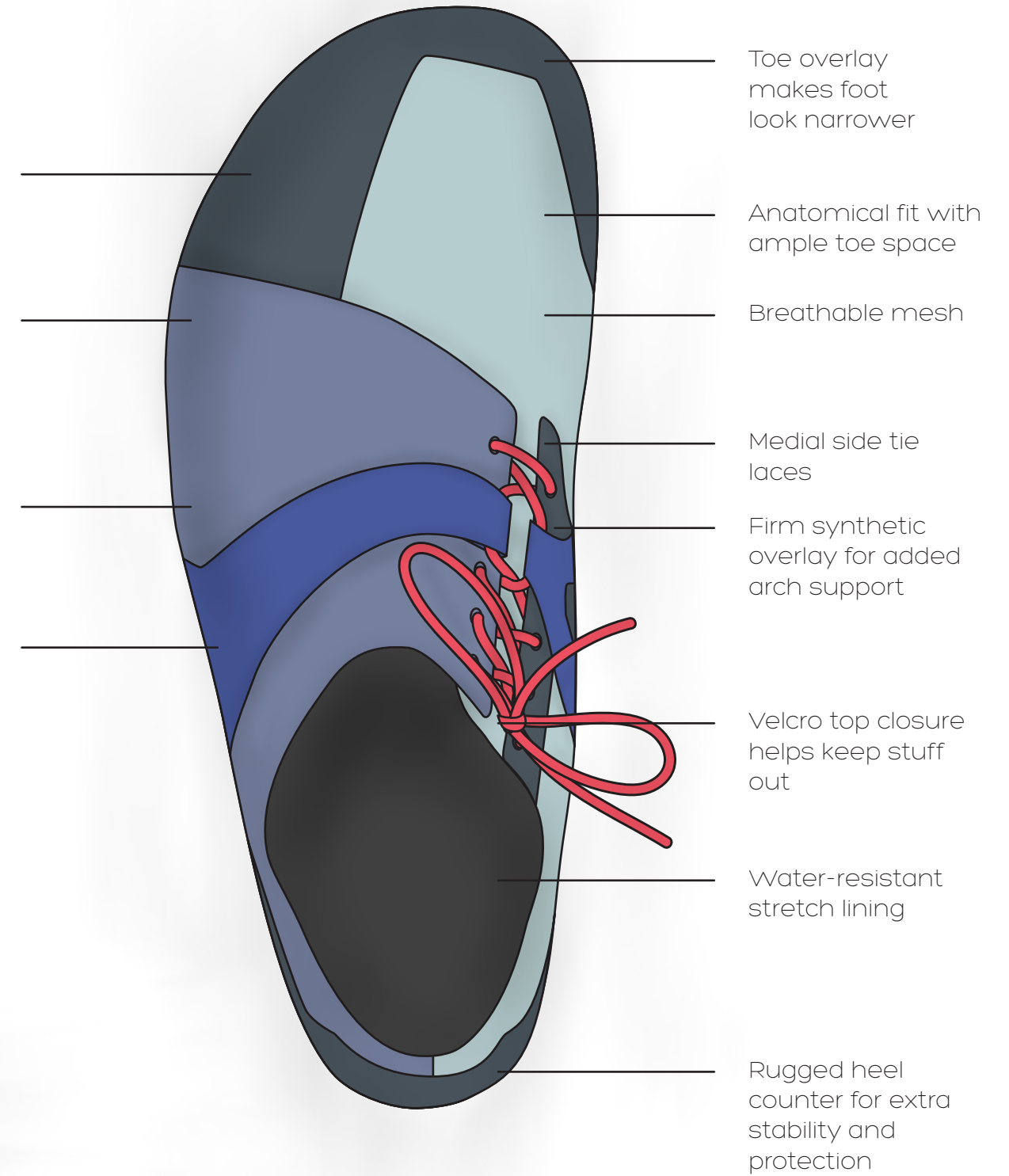
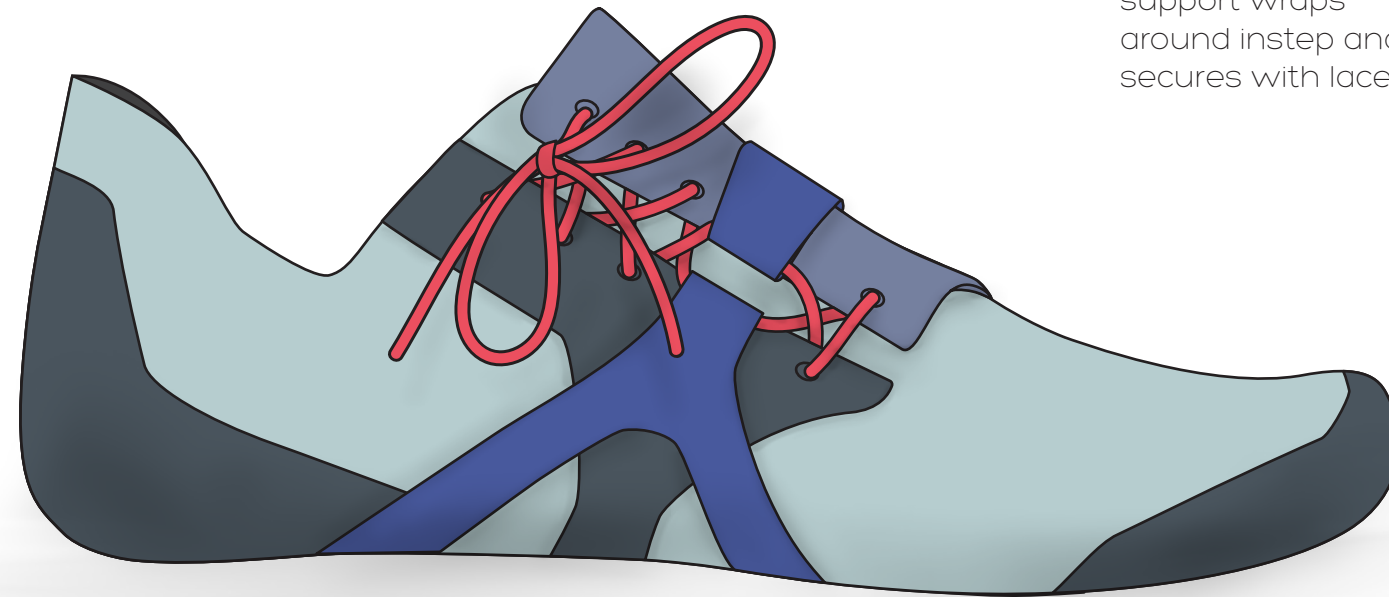


Synthetic hot melt overlay (no seams)

Overlapping design allows for greater variance in ball/instep girth

Super lightweight single layer mesh

Rubberized arch support wraps around instep and secures with laces



Toe overlay makes foot look narrower

Anatomical fit with ample toe space

Breathable mesh

Medial side tie laces

Firm synthetic overlay for added arch support

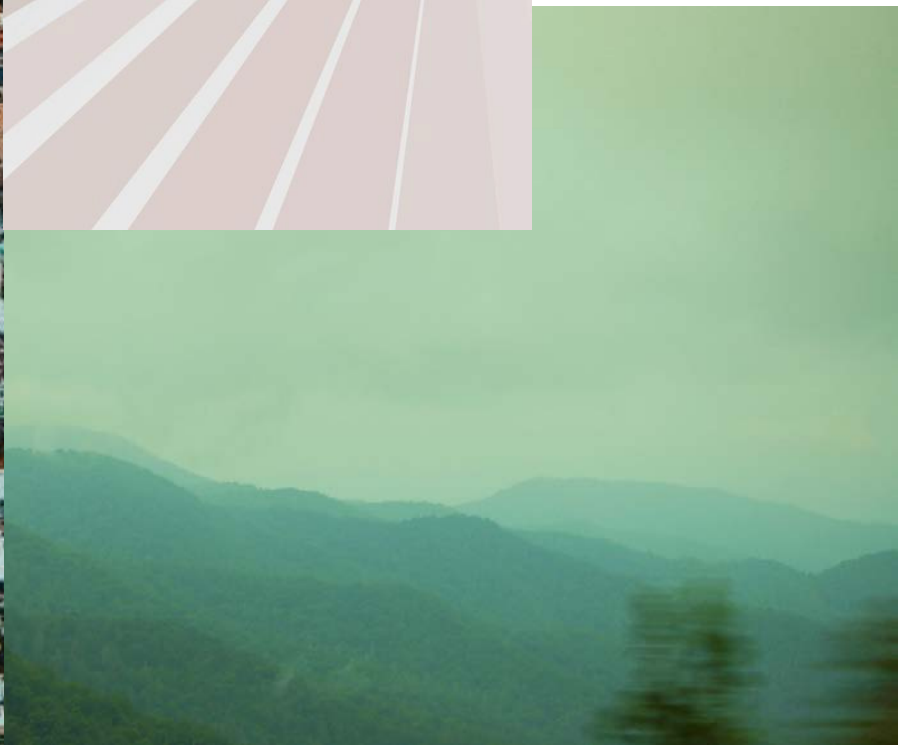
Velcro top closure helps keep stuff out

Water-resistant stretch lining

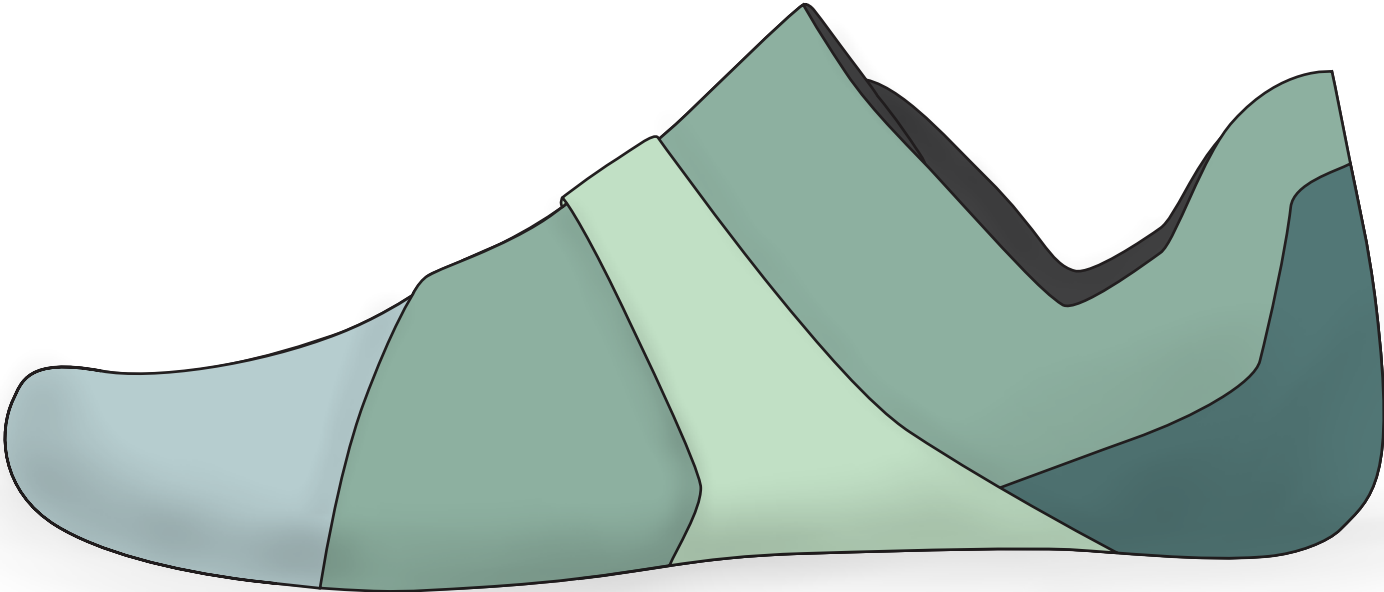
Rugged heel counter for extra stability and protection



ANY BODY'S TRAIL



ANY BODY'S TRAIL

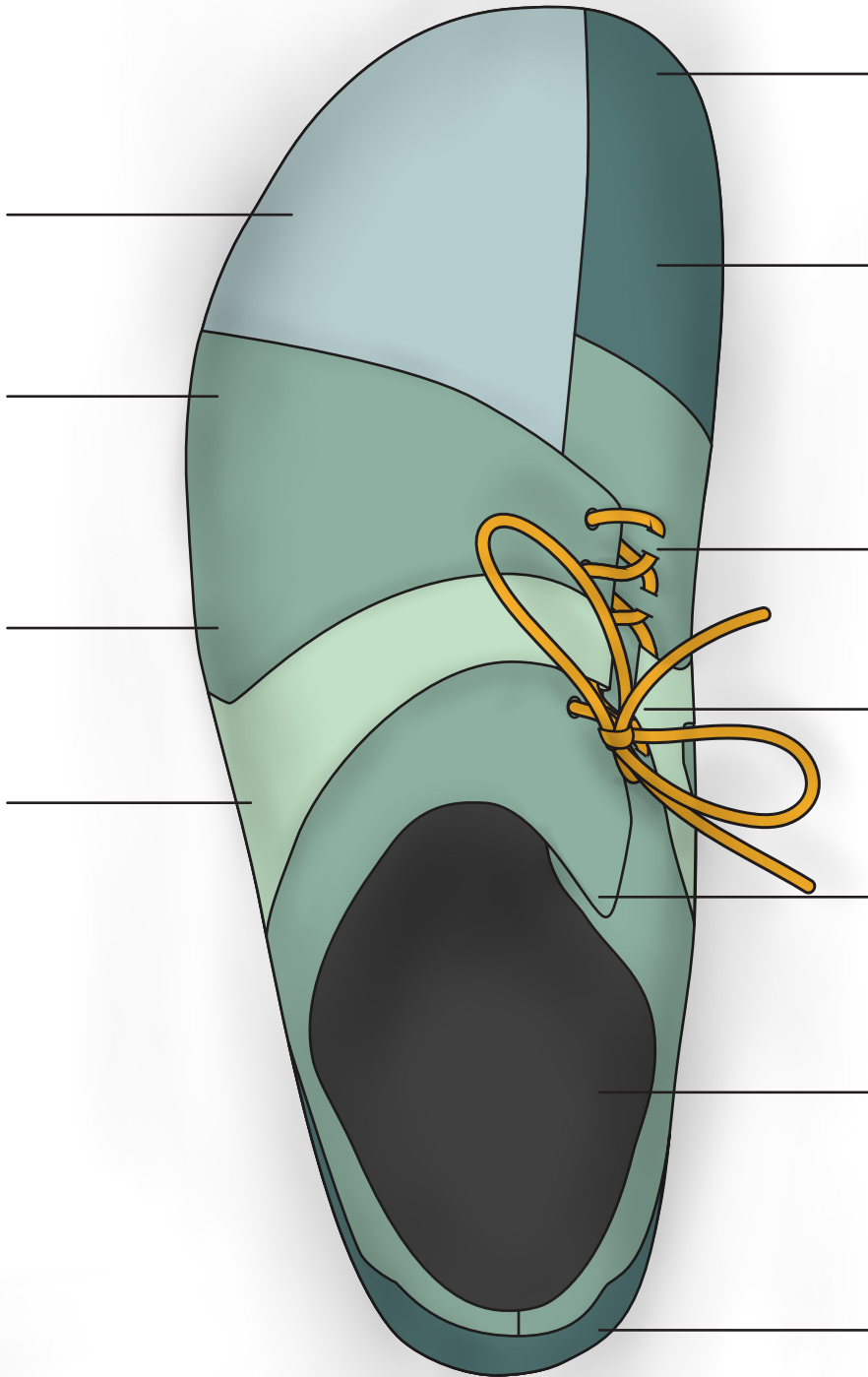
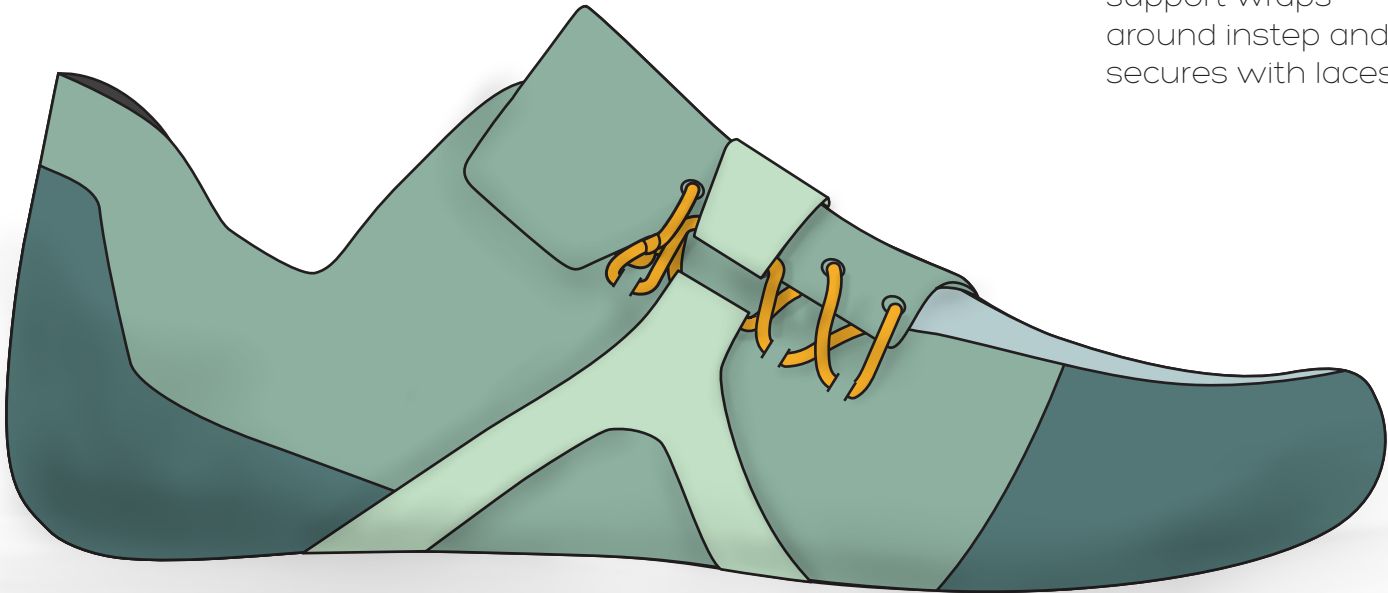


Durable rip stop woven nylon

Overlapping design allows for greater variance in ball/instep girth

DWR coated durable abrasion-resistant woven nylon

Rubberized arch support wraps around instep and secures with laces



Extra toe protection

Anatomical fit with ample toe space

Medial side tie laces

Laces can tuck under tab to secure

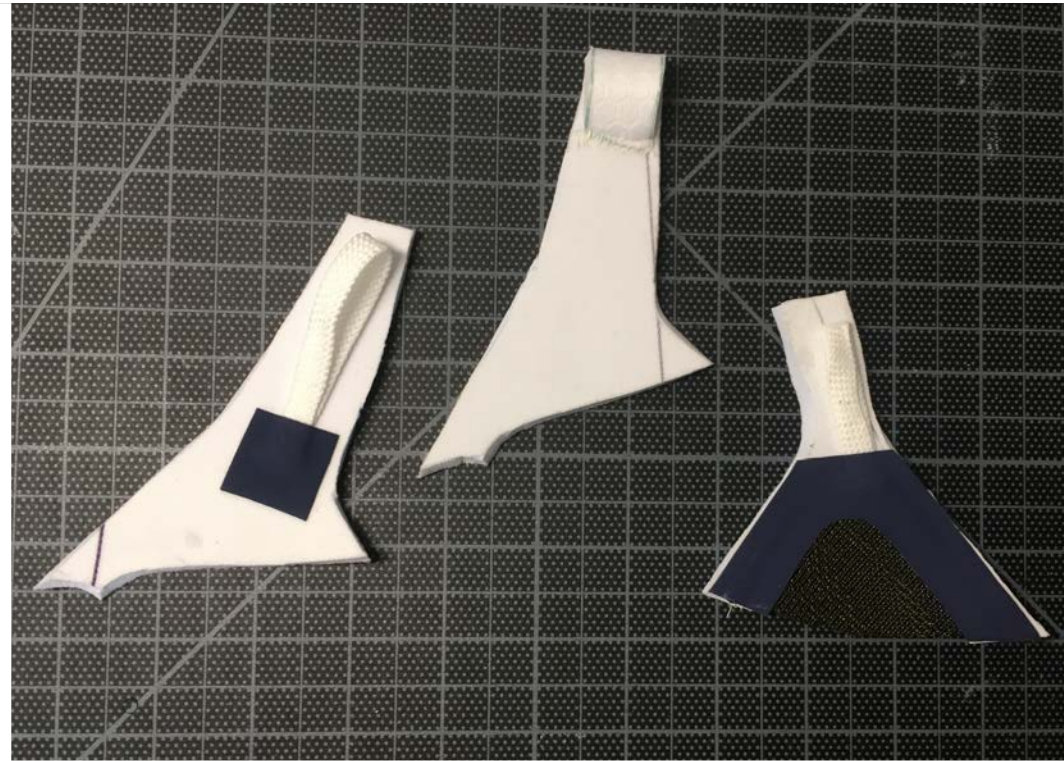
Velcro top closure helps keep stuff out

Water-resistant stretch lining

Rugged heel counter for extra stability and protection

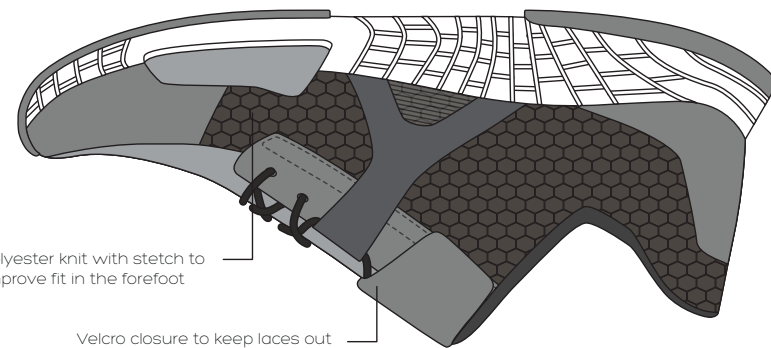
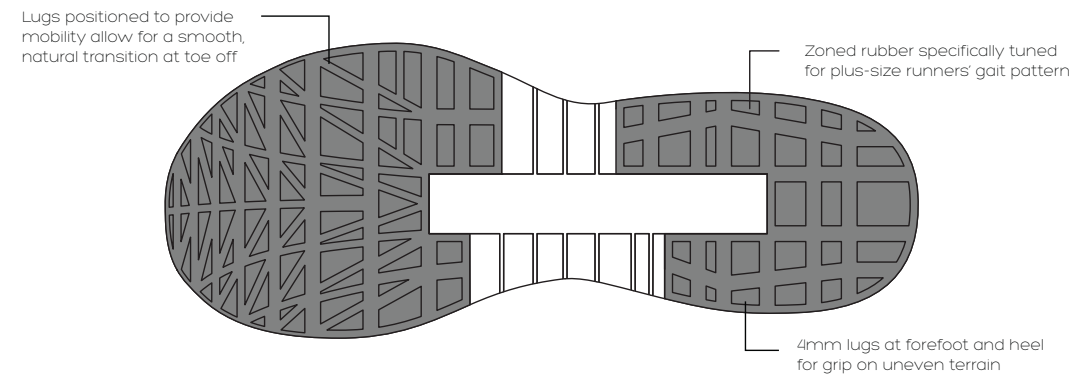
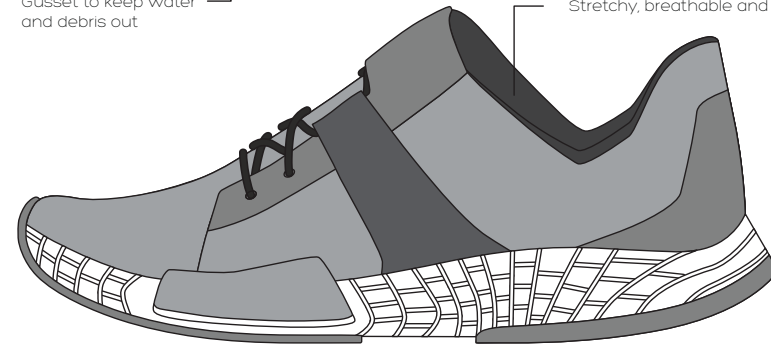
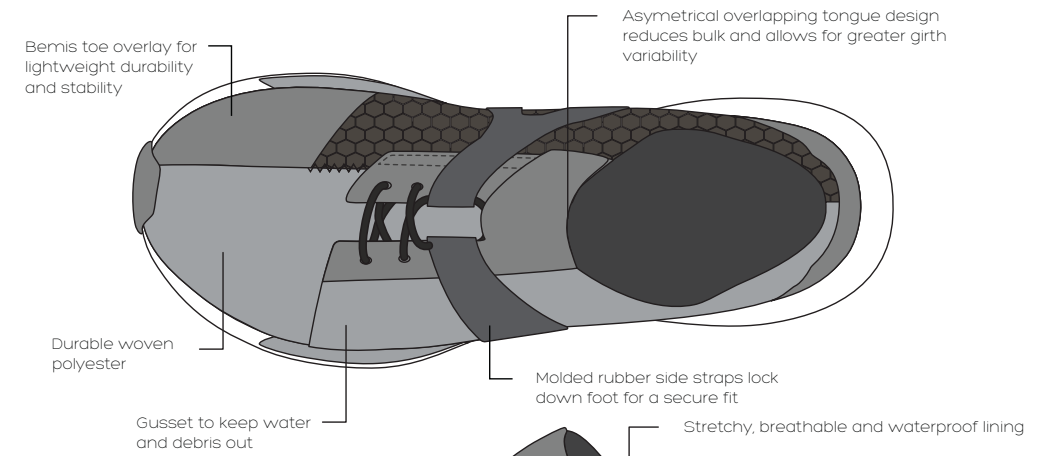
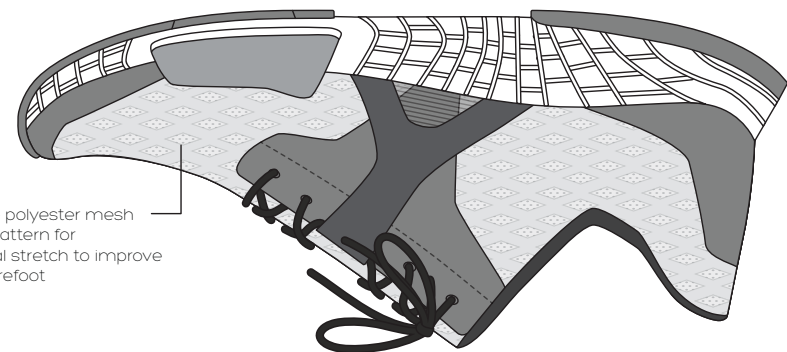
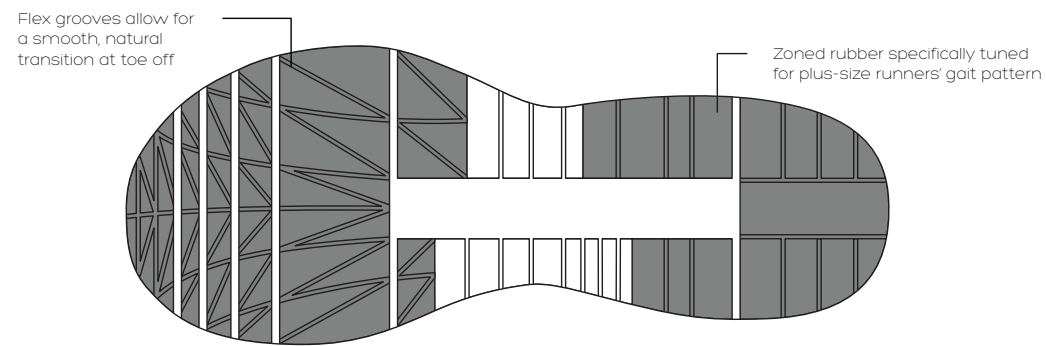
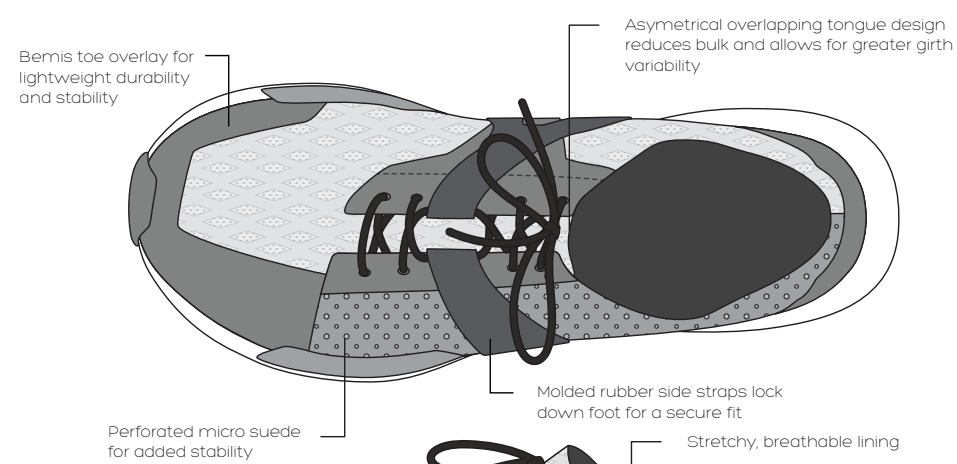


PROTOTYPING



Many rounds of prototypes to work through the construction, fit, and details

DESIGN DIRECTION



Final proof of concept design direction

DESIGN DIRECTION



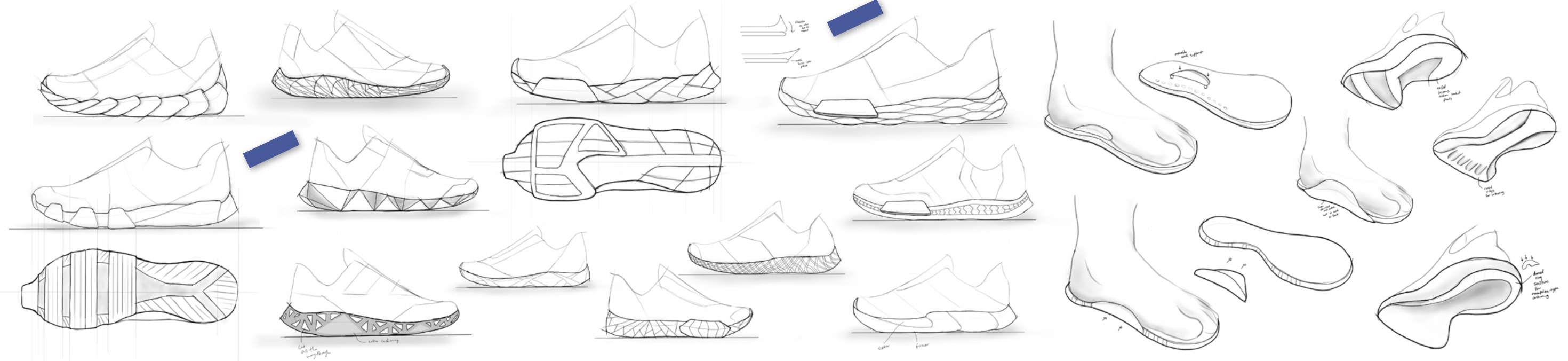
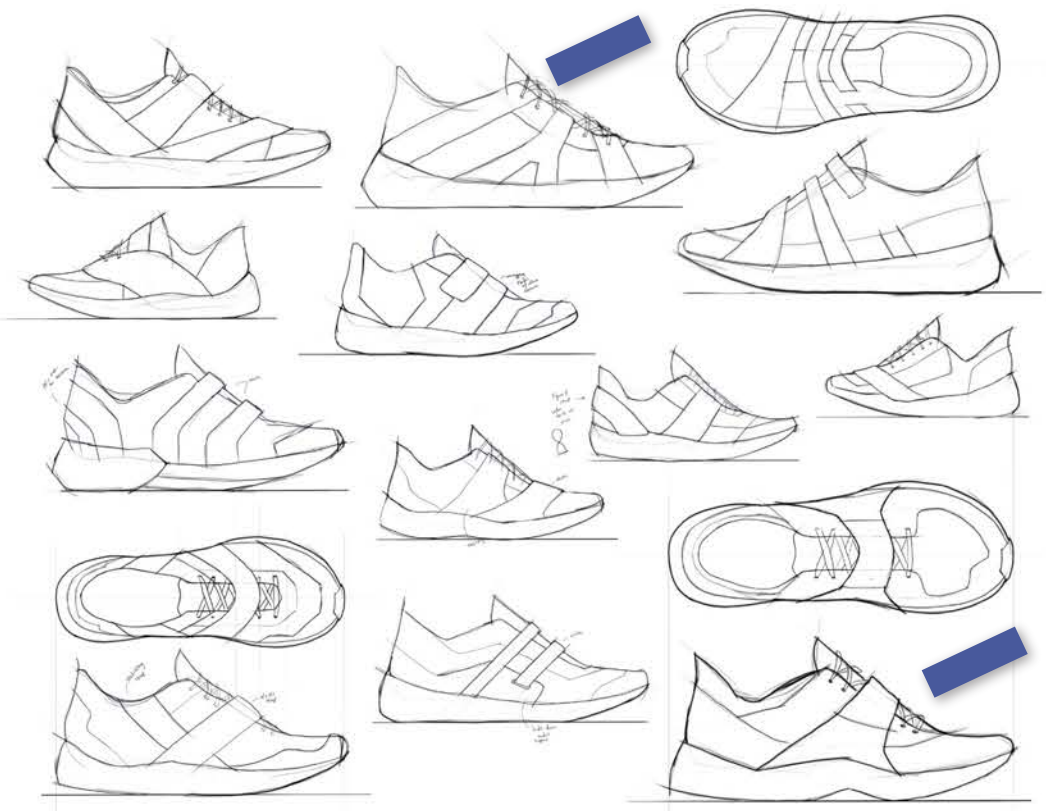
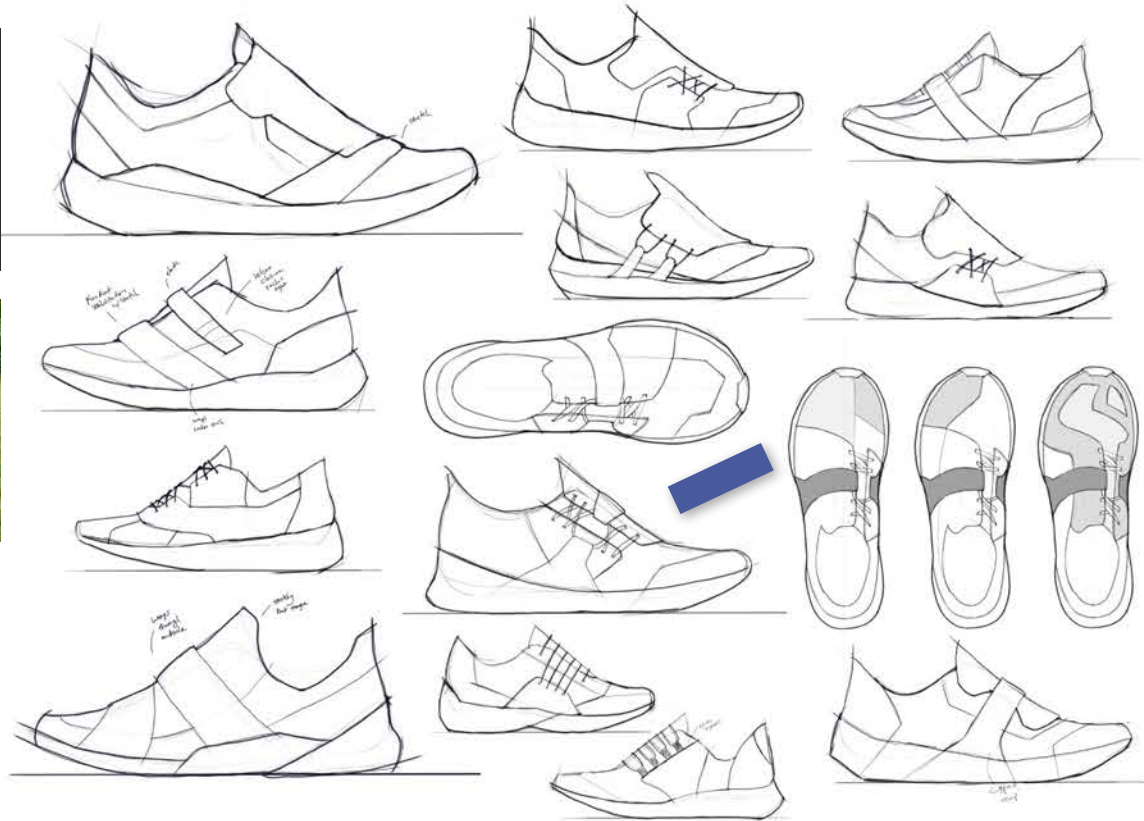
Color direction - road

DESIGN DIRECTION



Color direction - trail

IDEATION



Further design exploration



ANY BODY

FOOTWEAR FOR THE PLUS-SIZED FEMALE RUNNER

University of Oregon, MS Sports Product Design
Capstone Thesis Project
Chrissy Bettencourt

PROJECT TOPIC



USER

Plus-size women (wears size 14+)
30-60 years old
Motivated to live an active and healthy lifestyle, not necessarily lose weight

SPORT

Run/walk/run
Goal: Half marathon
Runs with friends a few times a week, has done a few 5Ks, but wants to train for longer races

ENVIRONMENT

Road
Trail



MARKET SIZE

64 million women 30-60 years old X 65% of women wear plus-size clothing = **41 million plus-size women, 30-60 years old**
41 million plus-size women, 30-60 years old X 22% of people who run = **9 million potential plus-size runners**

FOOTWEAR NEEDS



MORE STRESS + FOOT PAIN

More weight = more stress on the bones and skin of the feet (vGRF = 2.8x body weight)
Higher BMI = more likely to have foot pain

FOOT SHAPE

Flatter, fuller feet, but not necessarily "wide"
Often fallen arches, excessive pronation

CUSHIONING + STABILITY

Super soft and cushioned or biased midsoles are not ideal

COLOR TRENDS



BRIGHT AND BOLD

Goes beyond the typical pinks and purples for “women” with fun, bright, '90s-inspired colors



SOFT AND MUTED

Light pastels offer a more feminine take on a sporty silhouette



WIDE = BORING

The same colors are not available in wide widths

ATHLETE INSIGHT



MIRNA VALERIO

Founded Fat Girl Running

"Feeling of stability but neutral"
Not overly aggressive traction

GAIT ANALYSIS



WALK

Prominent heel strike
Longer steps



RUN

Midfoot/flat strike - barely any dorsiflexion
Minimal float time, short steps

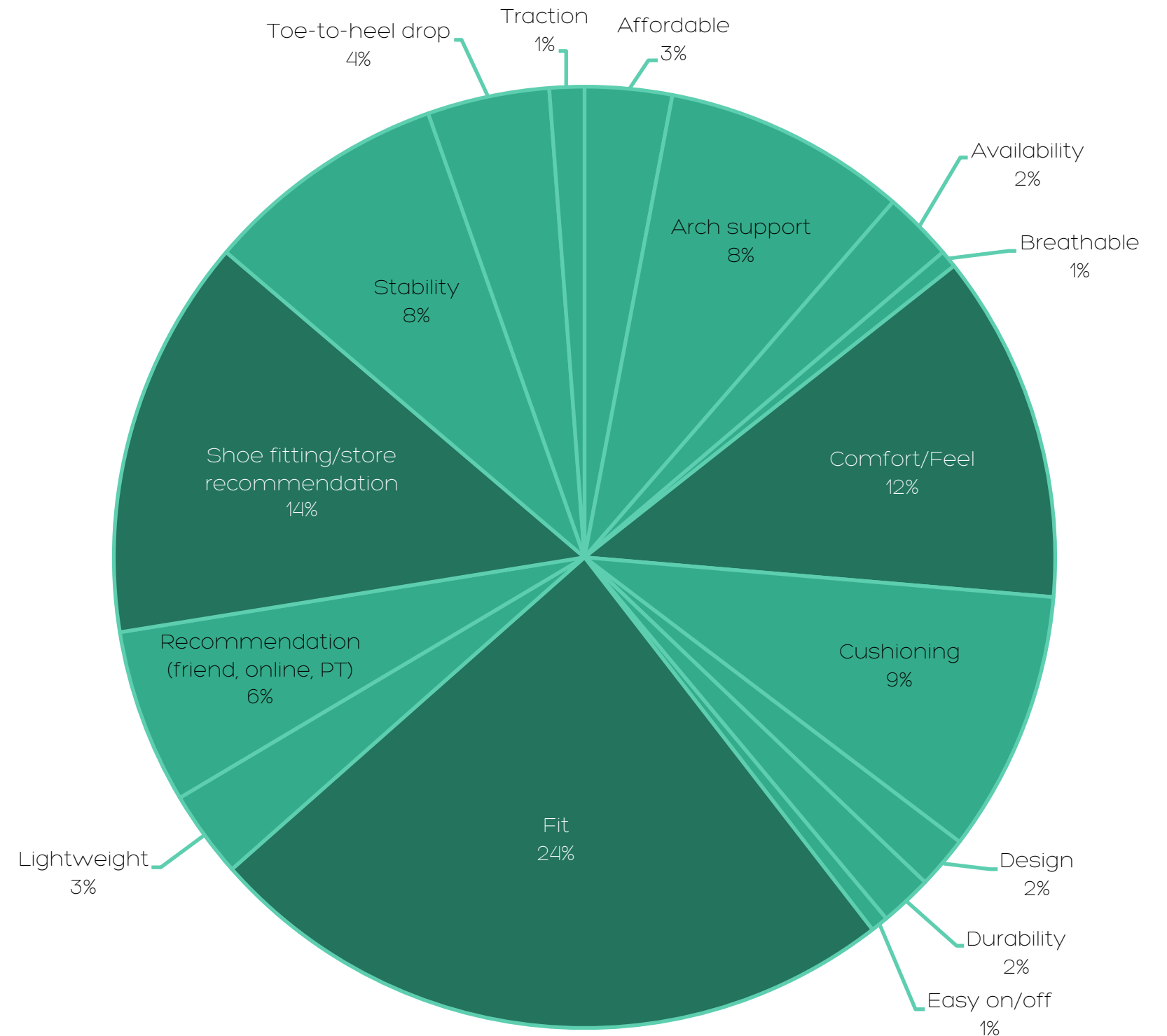
ATHLETE INSIGHT



HOW DID YOU CHOOSE YOUR CURRENT SHOES?

"Large enough toe box without being too wide in the heel."

- Linda, 60+ years old



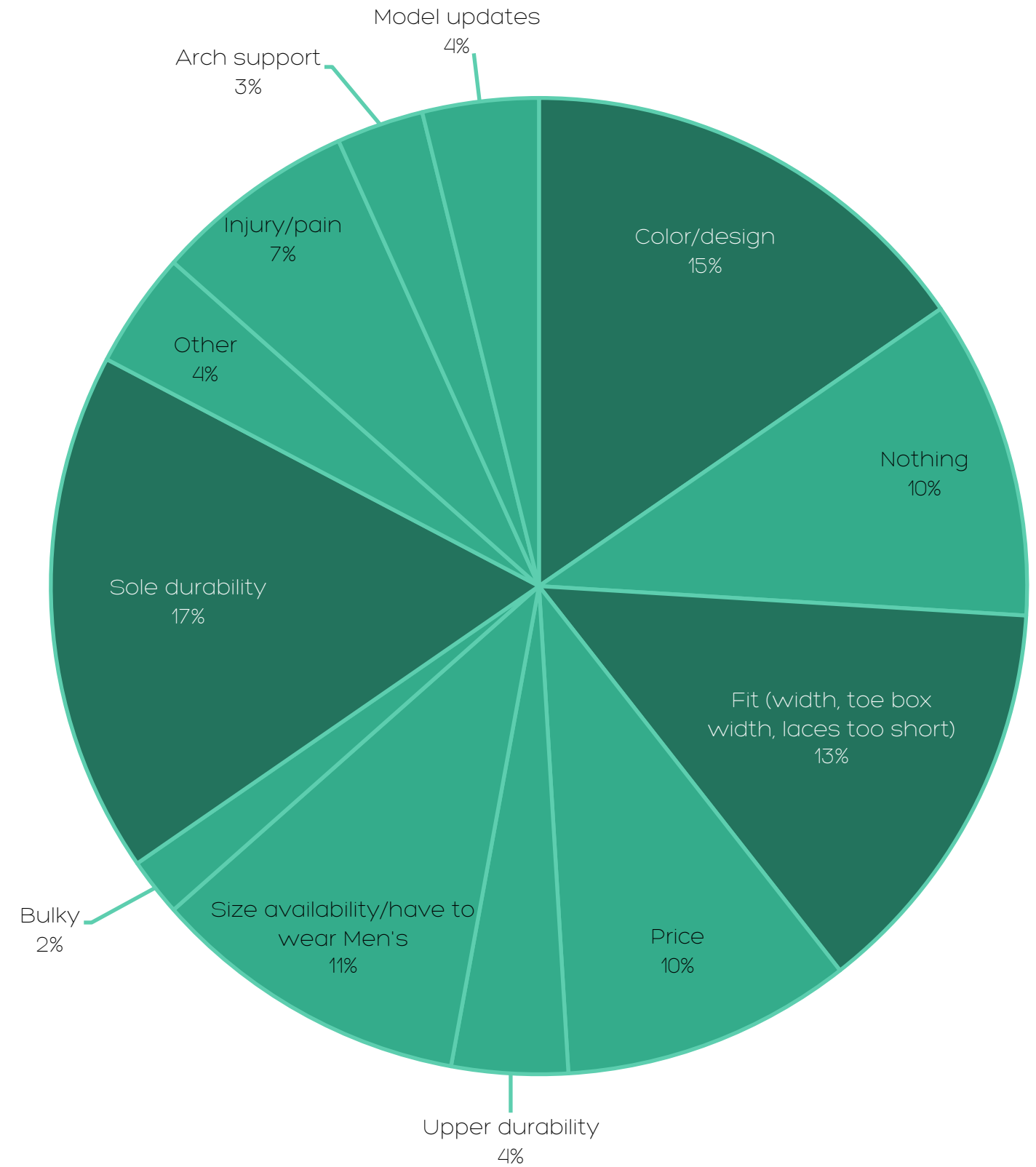
ATHLETE INSIGHT



WHAT DON'T YOU LIKE ABOUT YOUR CURRENT SHOES?

"I have gained significant weight and the cushioning breaks down very quickly. When I weighed less this wasn't an issue".

- Erika, 40-49 years old



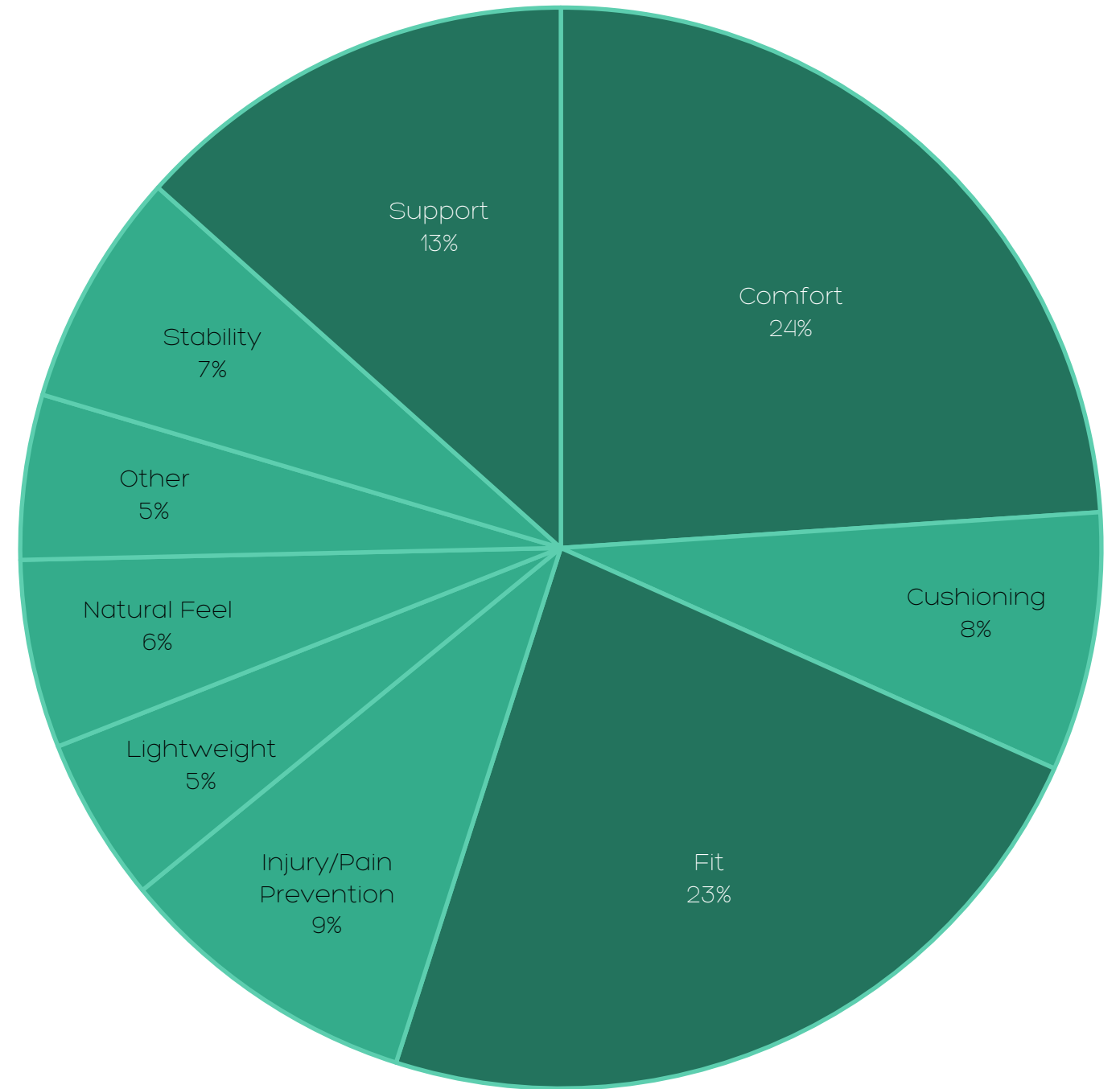
ATHLETE INSIGHT



MOST IMPORTANT FEATURE

"Goldilocks cushion level."

- Laura, 50-59 years old



WHAT DOES “COMFORT” MEAN?

“Comfort involves the **right amount of squishiness** in the insole, the right amount of **wiggle room for my toes**, the ability for the shoe to **stay in place snugly without slipping** on the heel or being tied so tightly that it **risks cutting off circulation.**”

“COMFORT IN SHOES IS DIFFICULT TO DEFINE - YOU KNOW IT WHEN YOU FEEL IT.”

- Eleanor, 40-49 years old

FIT



CUSHIONING + SUPPORT



ATHLETE INSIGHT



ABOUT ROBIN

50-59 years old
Size 8 Medium

Road, half marathons
Loves Disney races



SHOE ANALYSIS

Looked at her current running shoes for wear patterns on the outsole, insole, and upper



SCANNED FEET

Structure 3D scanner
Both feet, without socks

ANY BODY

FOOTWEAR FOR THE PLUS-SIZED FEMALE RUNNER



Celebrating the too-fat-to-runners, the back-of-the-packers, and the run/walk/runners.
Shoes that women want to wear, not just the only thing that fits.

ANY BODY'S ROAD

WOMEN'S ROAD RUNNING SHOES



GOAL

A women's road running shoe that is finely tuned to the needs of the serious plus-size runner who is ready to train for a half marathon and wants a shoe with the comfort, style, and durability to go the distance.

PRICE

MSRP \$120 | FOB \$30

SEASON

F/W 2022

ANY BODY'S TRAIL

WOMEN'S TRAIL RUNNING SHOES



GOAL

A women's trail running shoe that is finely tuned to the needs of the serious plus-size runner who is ready to tackle more vert and mileage on the trail and wants a shoe with the comfort, style, and durability to go the distance.

PRICE

MSRP \$120 | FOB \$30

SEASON

F/W 2022

PROBLEMS TO SOLVE

BOTH

1. FIT

Actually fits a plus-sized woman's foot, accommodates a wide range of foot girths and widths

2. CUSHIONING

Outlasts current shoes with the right amount of cushion and ground feel

3. SUPPORT

Neutral arch support that moves with the foot for a secure, supported ride

4. STYLE

Looks good, even in wide/ anatomical shape

ROAD



5. FLEXIBILITY

Dynamic and flexible sole for a smooth ride

6. BREATHABILITY

Promotes airflow to keep feet cool

TRAIL



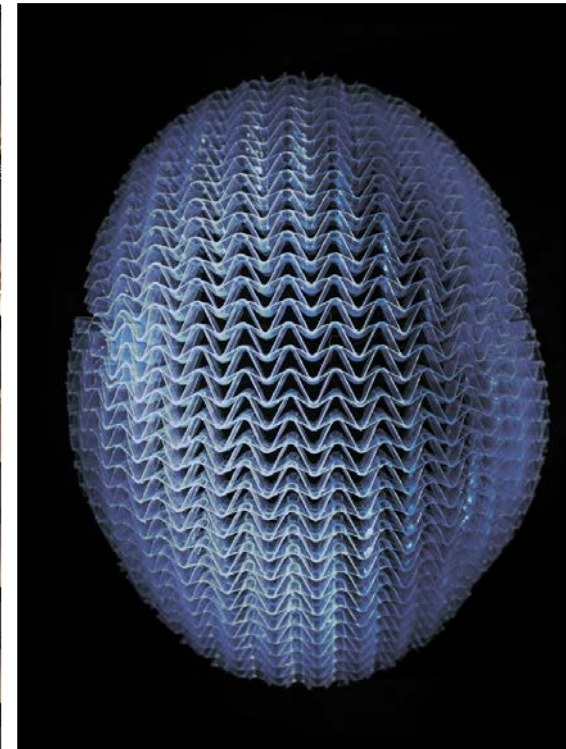
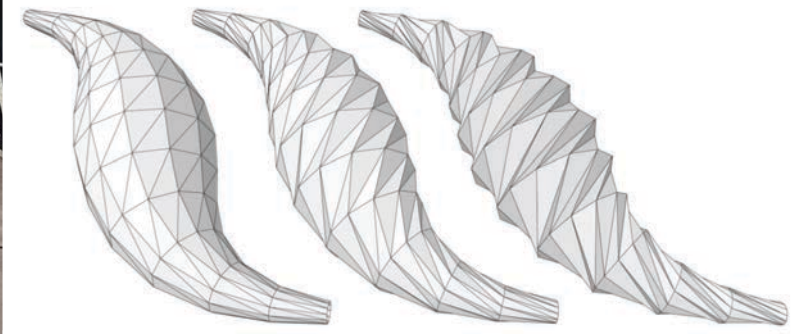
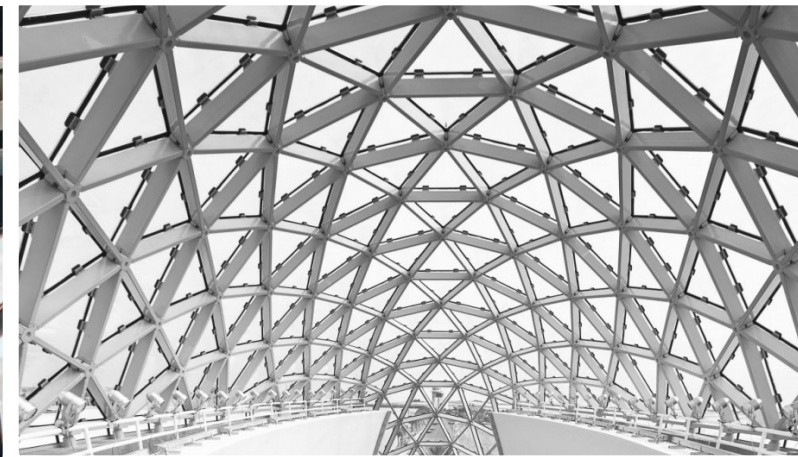
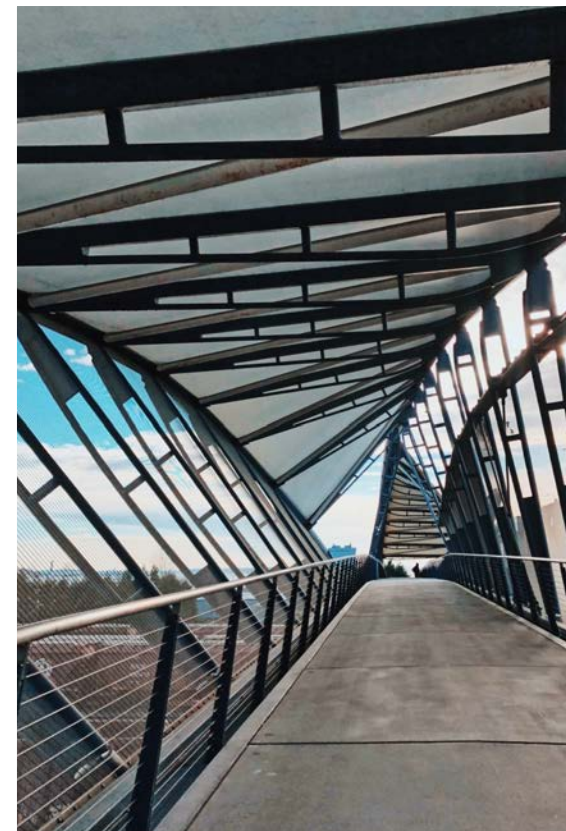
5. TRACTION

Stable and grippy for confidence on variable terrain

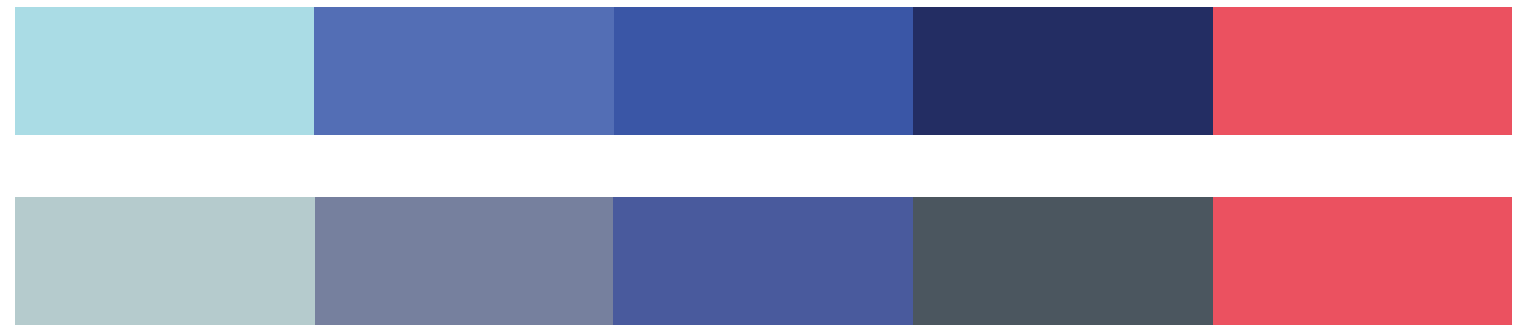
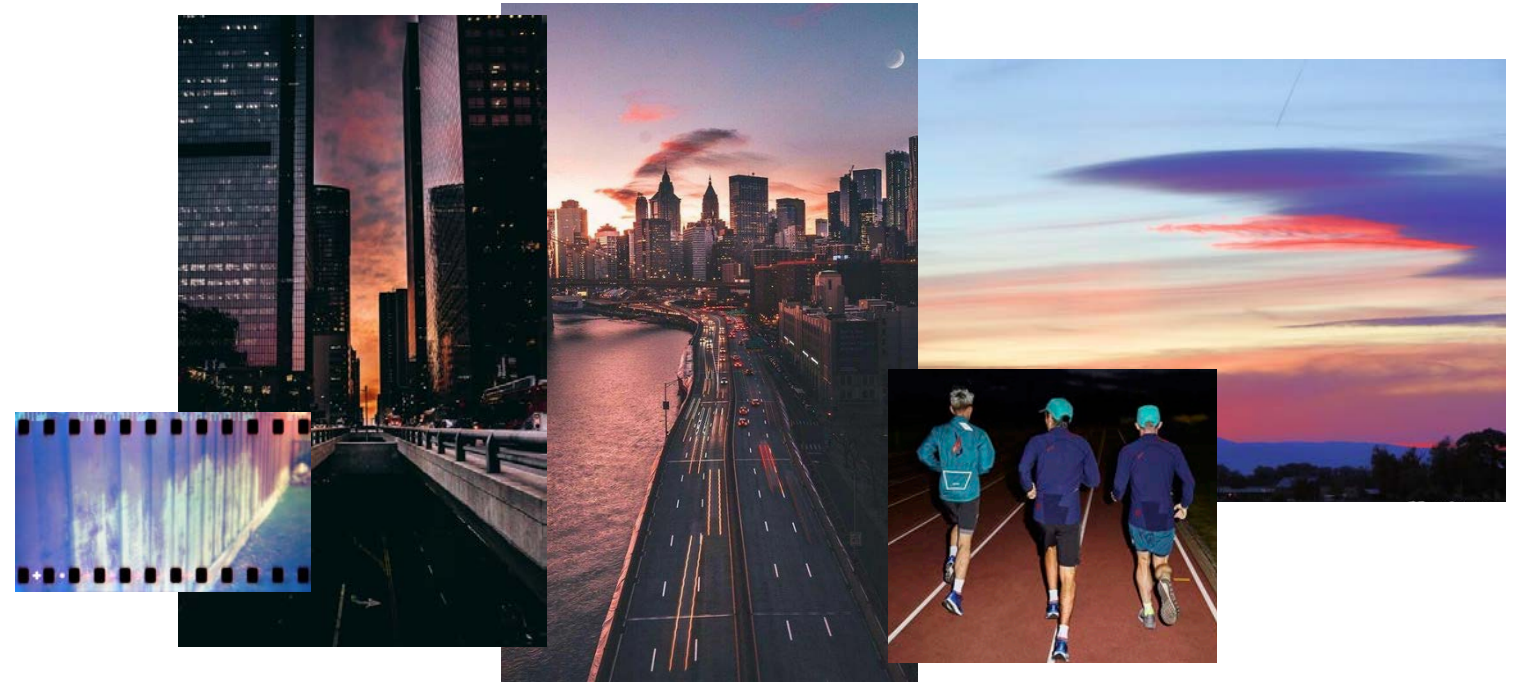
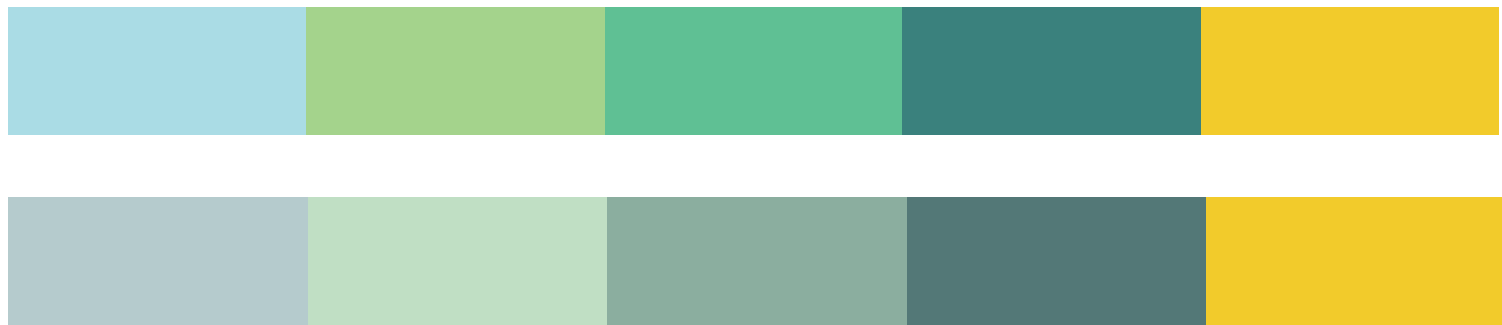
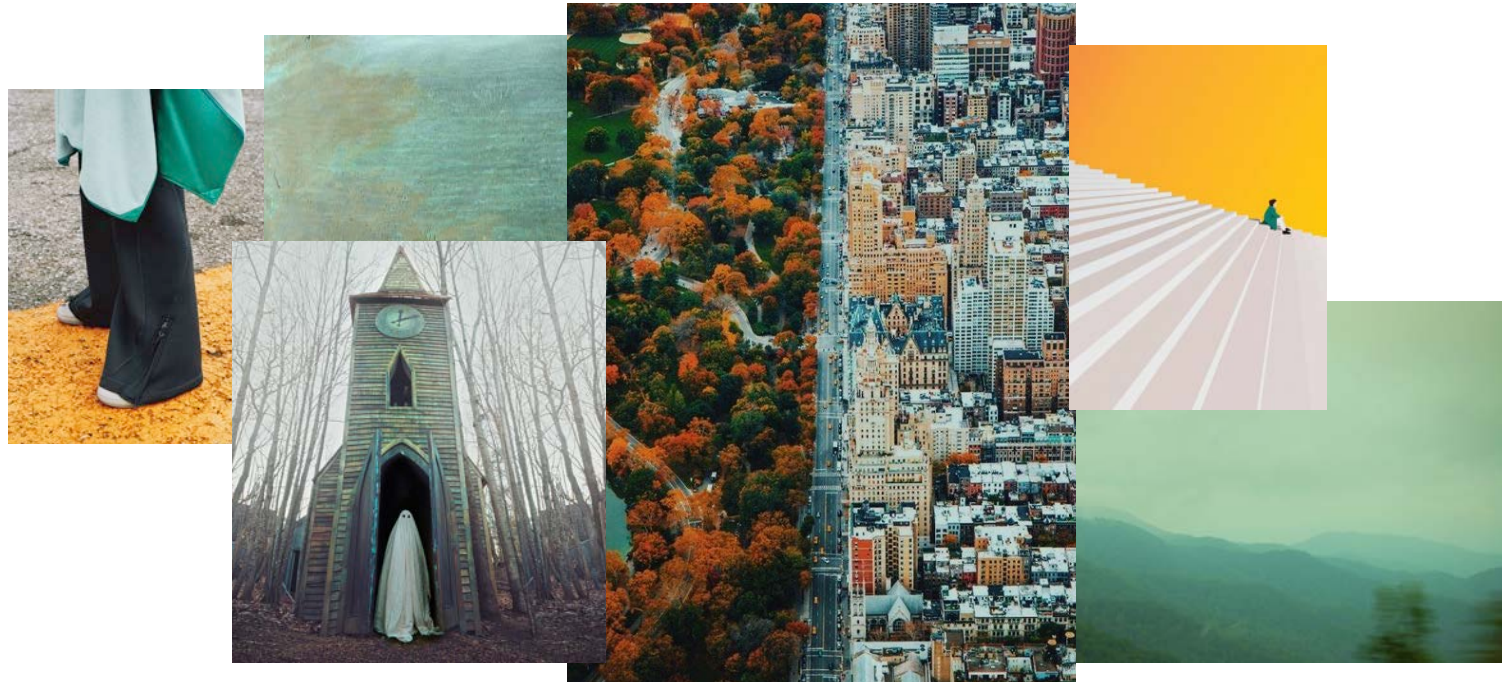
6. PROTECTION

Upper/underfoot protection from debris, mud/water/rocks

INSPIRATION GRAPHIC | FORM | STYLE



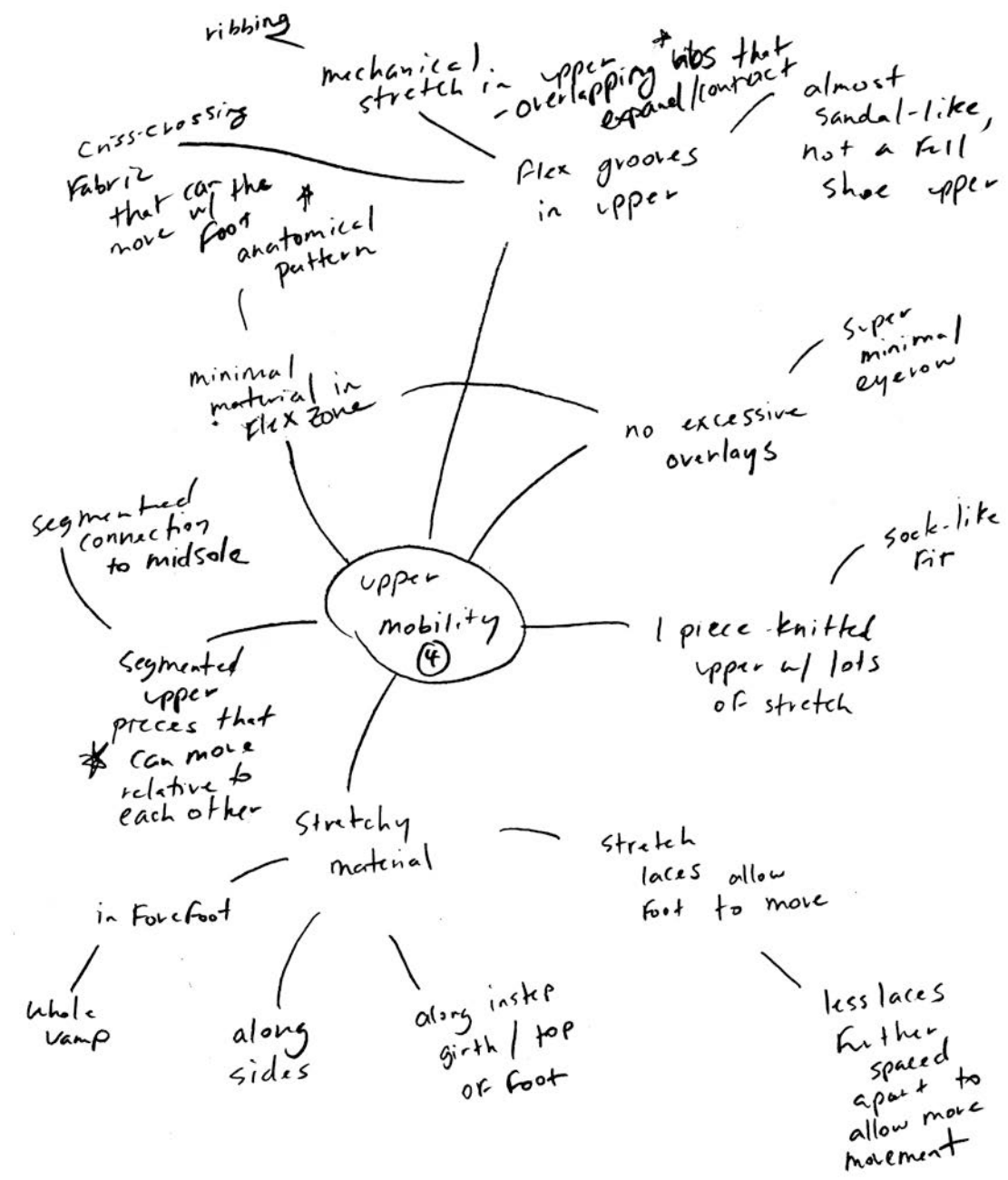
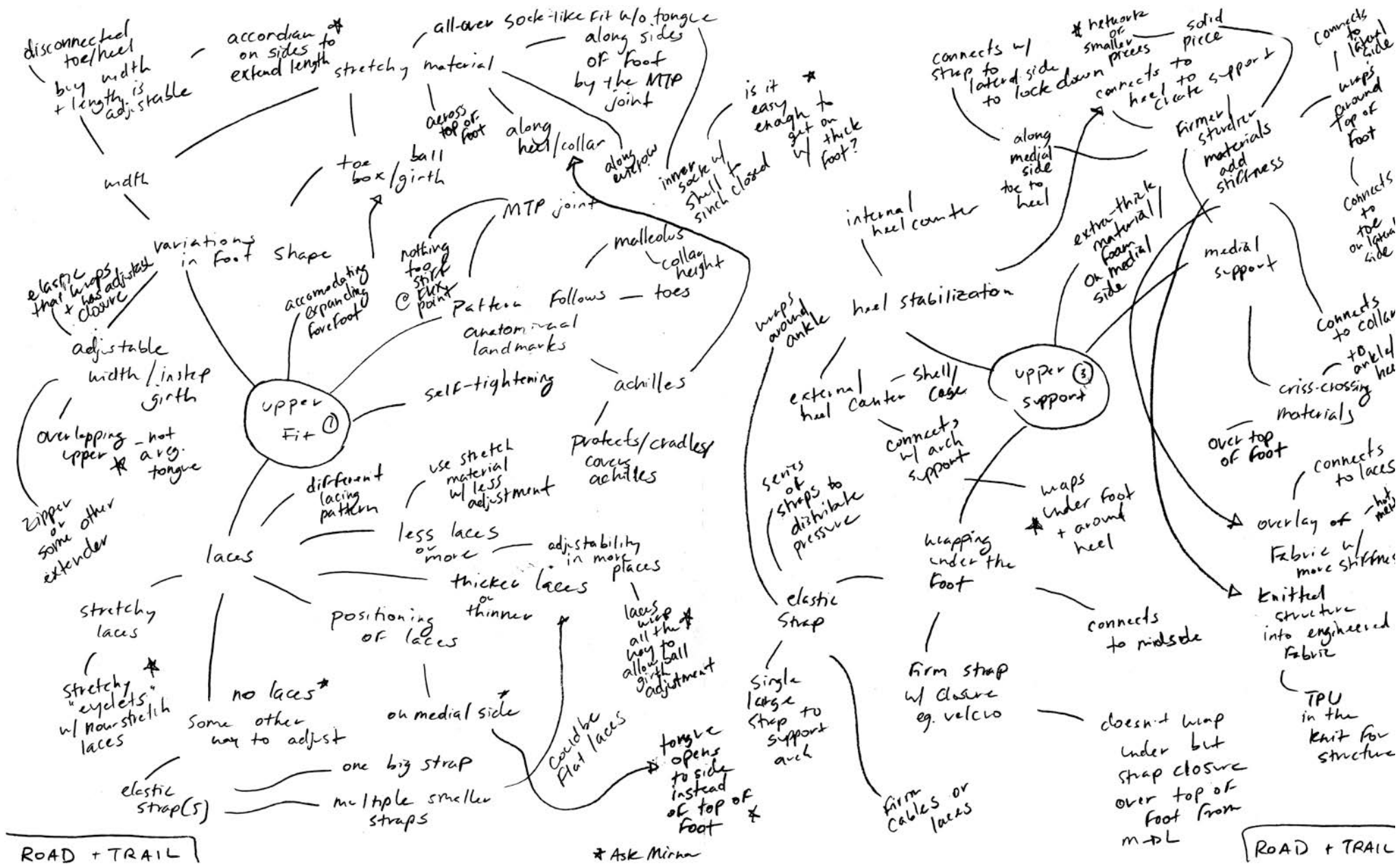
INSPIRATION COLOR



LAST DEVELOPMENT EASTBOURNE, UK



IDEATION MIND MAPPING



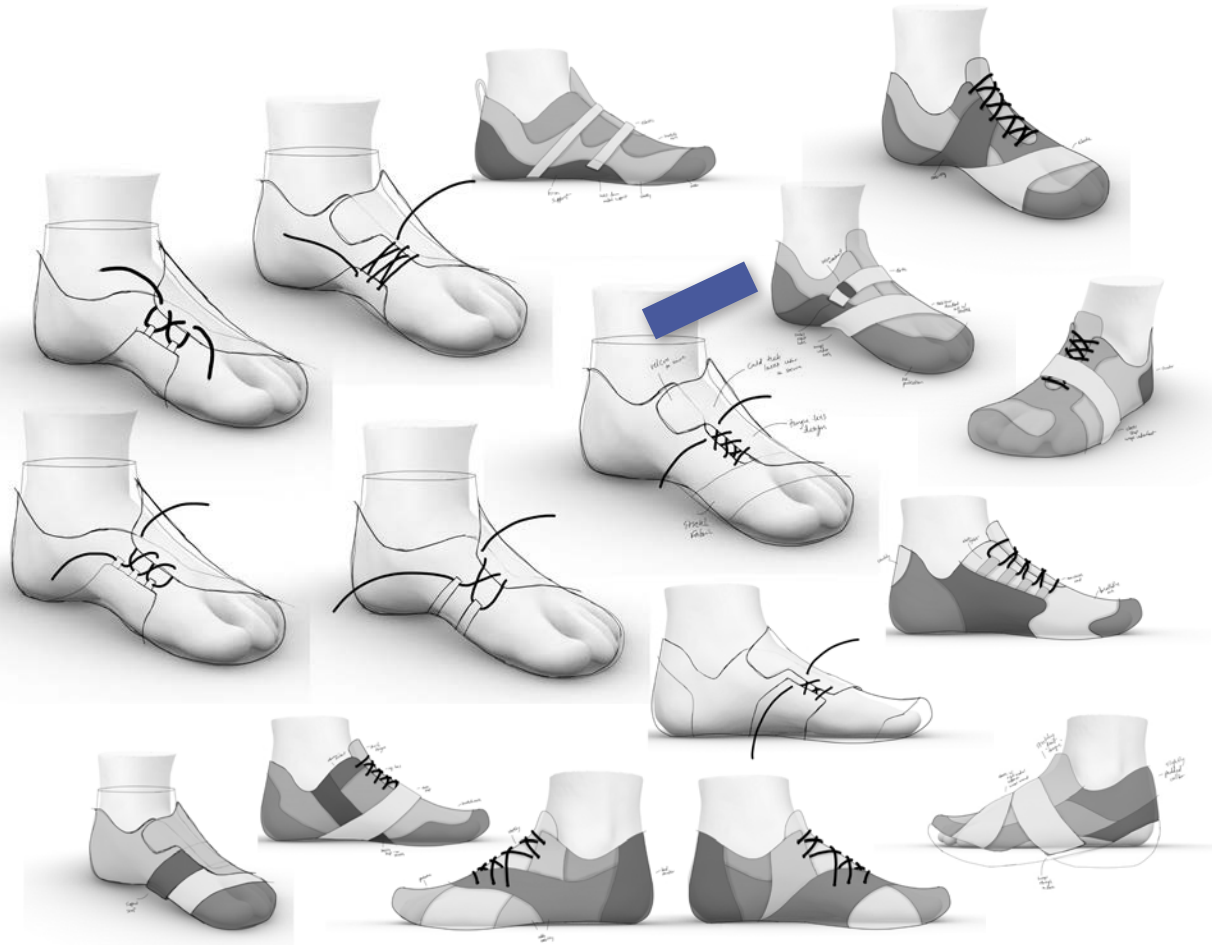
ROAD + TRAIL

ROAD + TRAIL

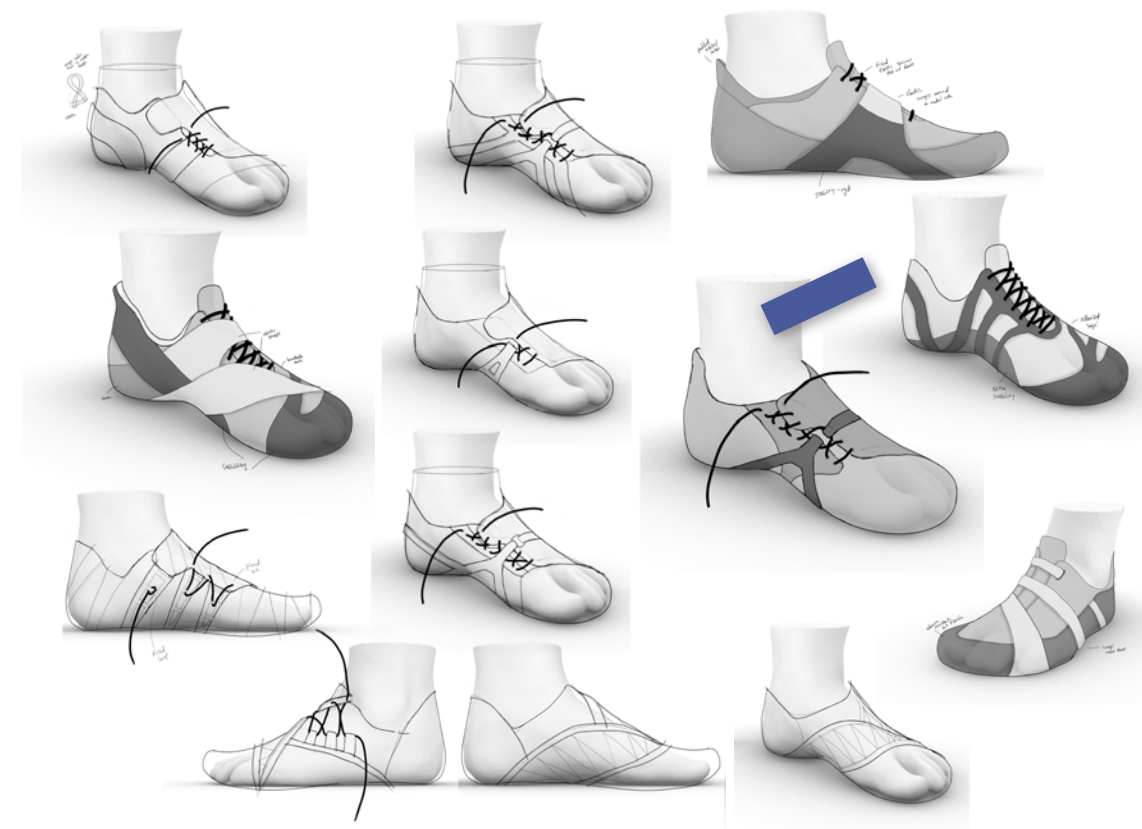
* Ask Mirna

IDEATION INITIAL EXPLORATION

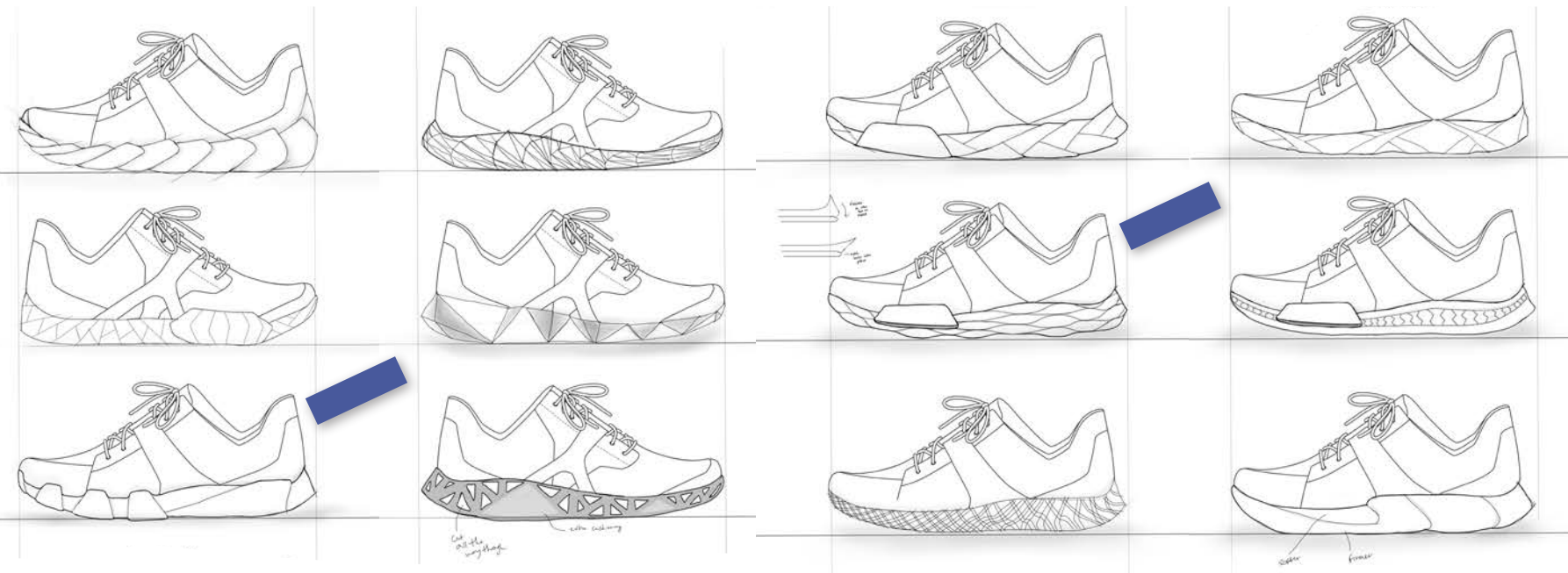
FIT



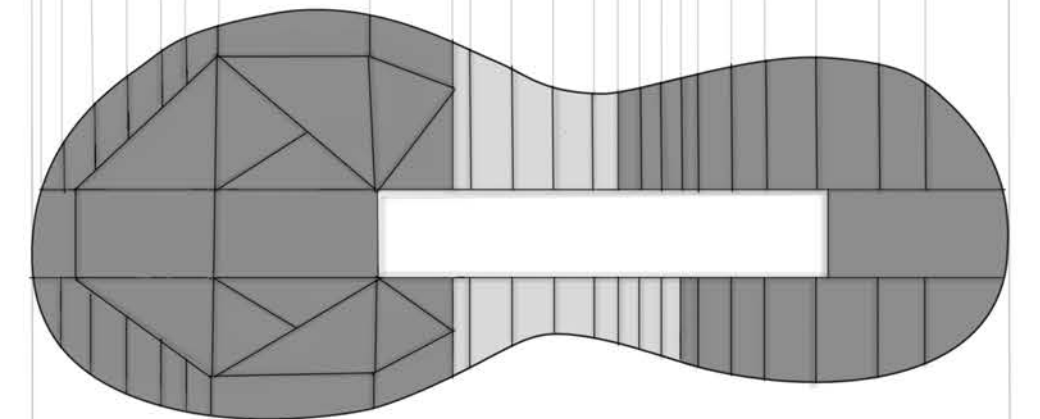
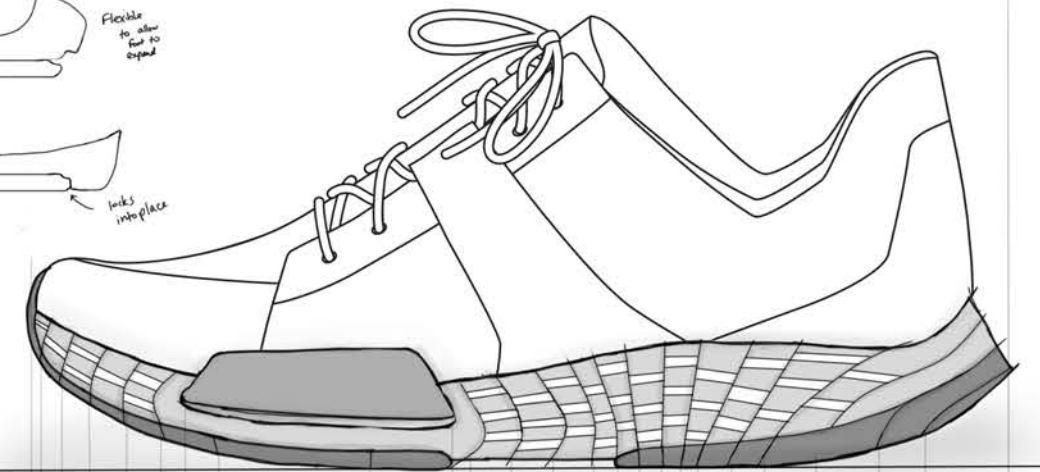
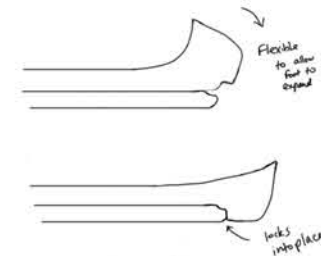
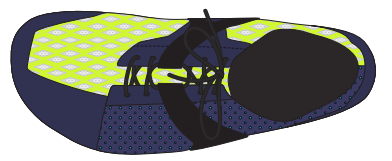
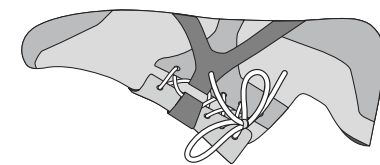
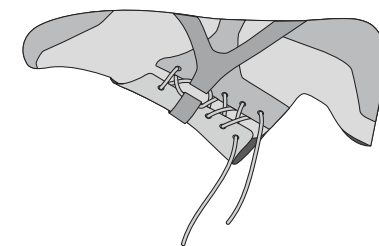
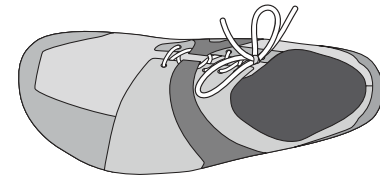
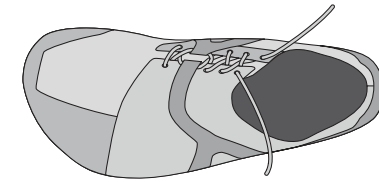
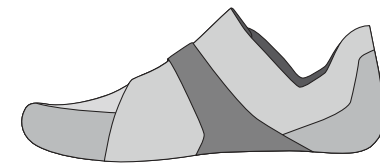
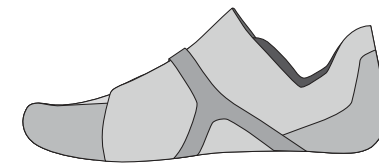
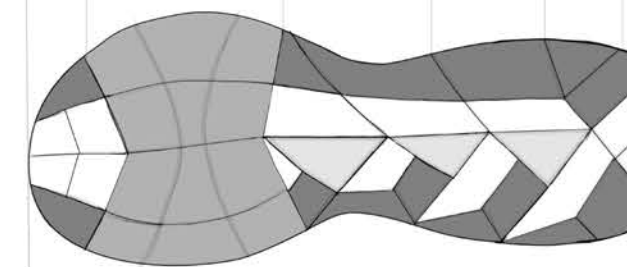
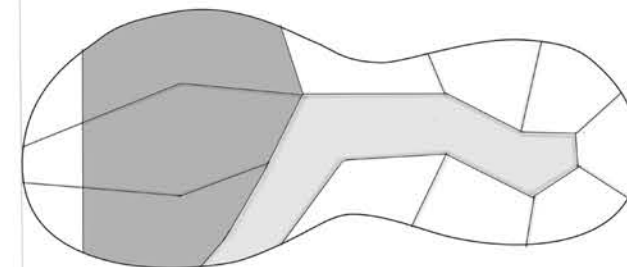
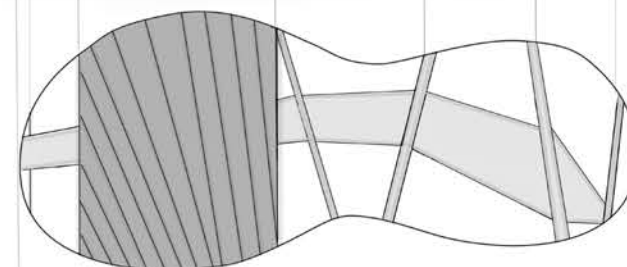
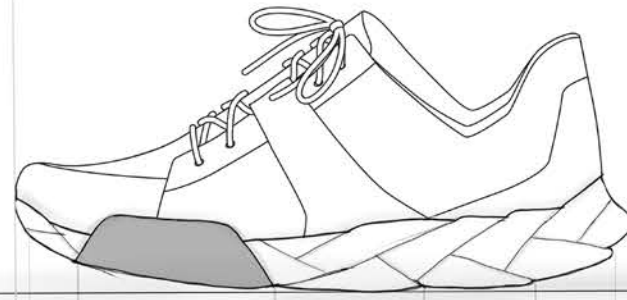
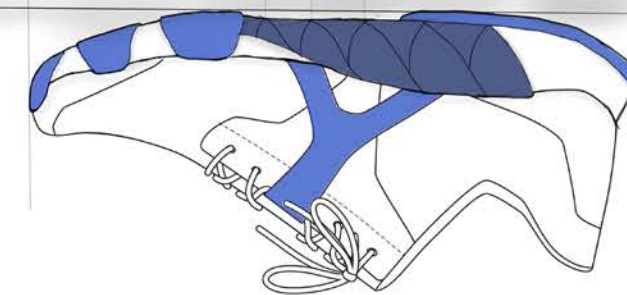
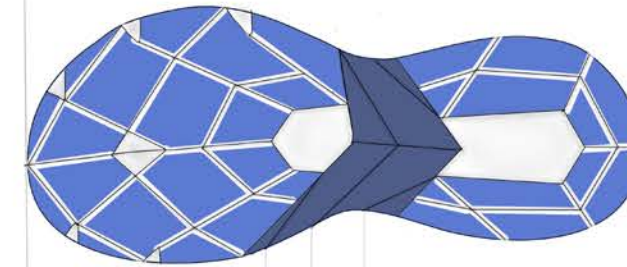
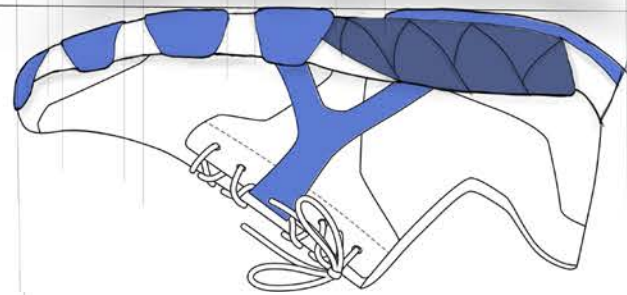
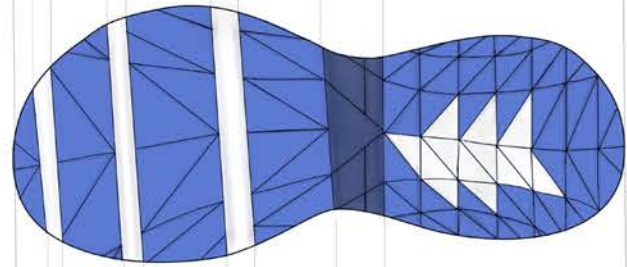
SUPPORT



CUSHIONING



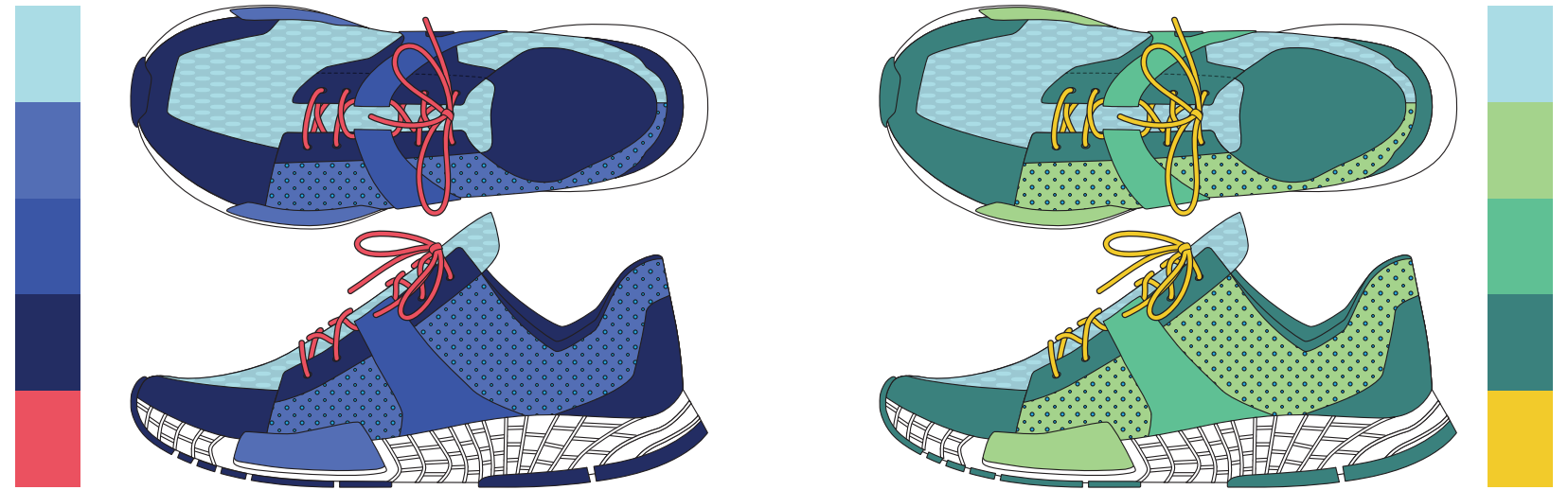
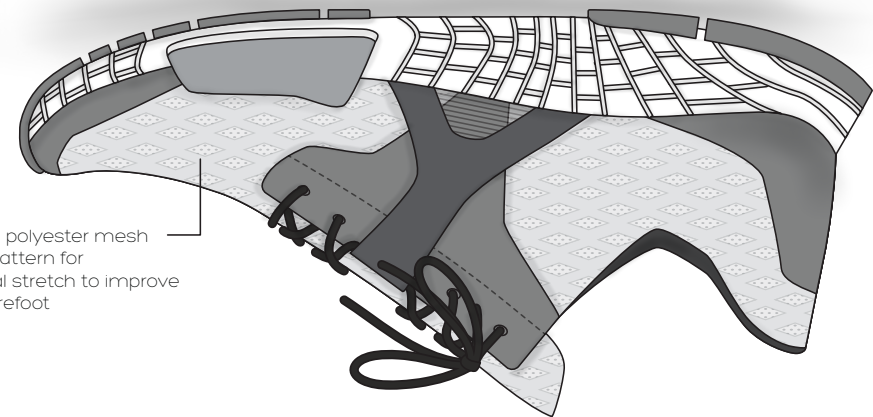
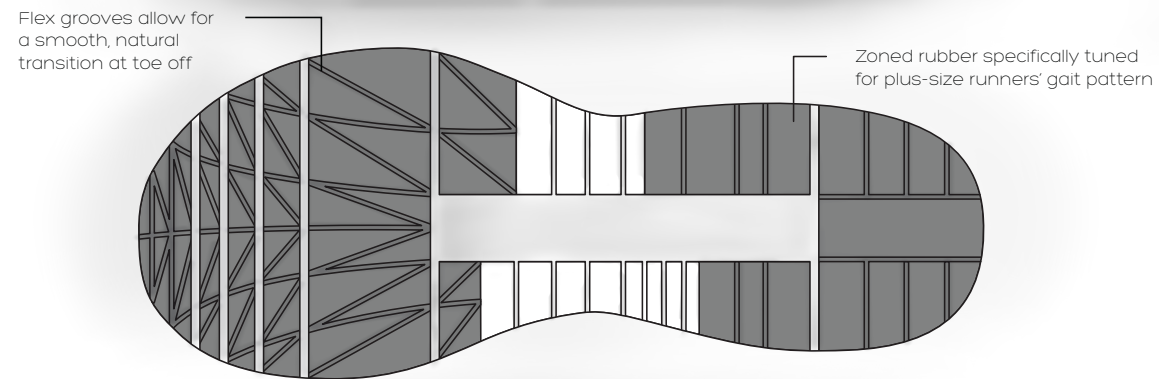
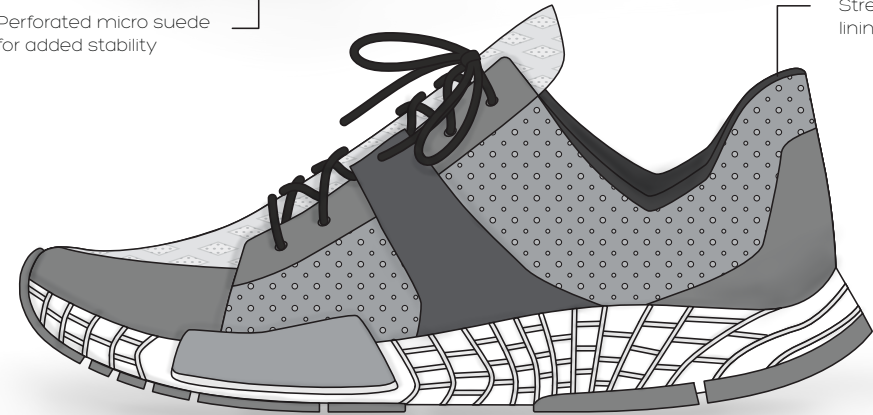
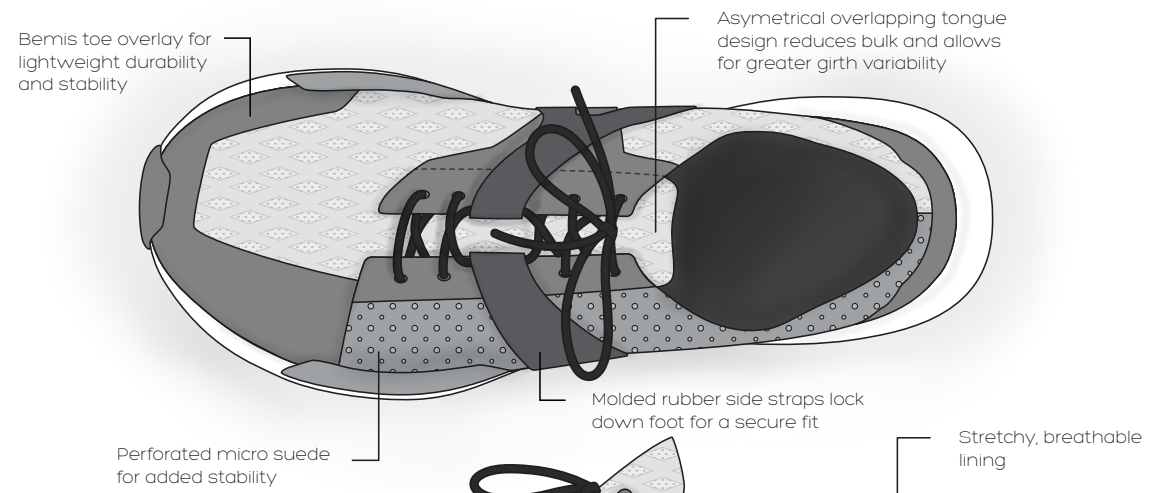
IDEATION REFINEMENTS



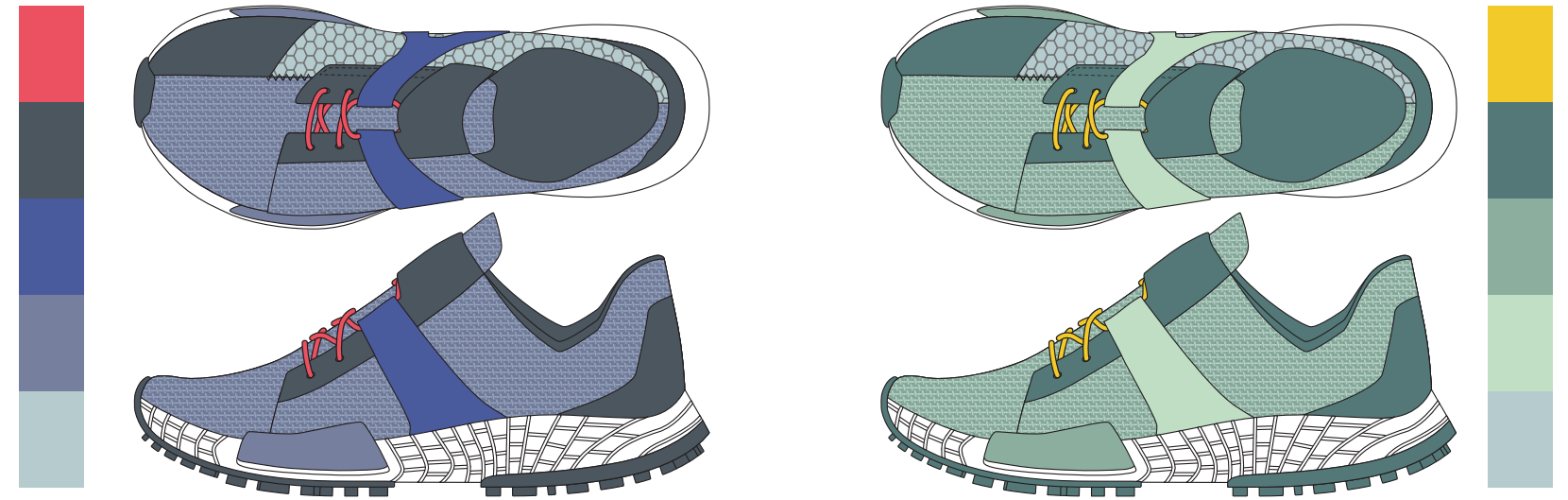
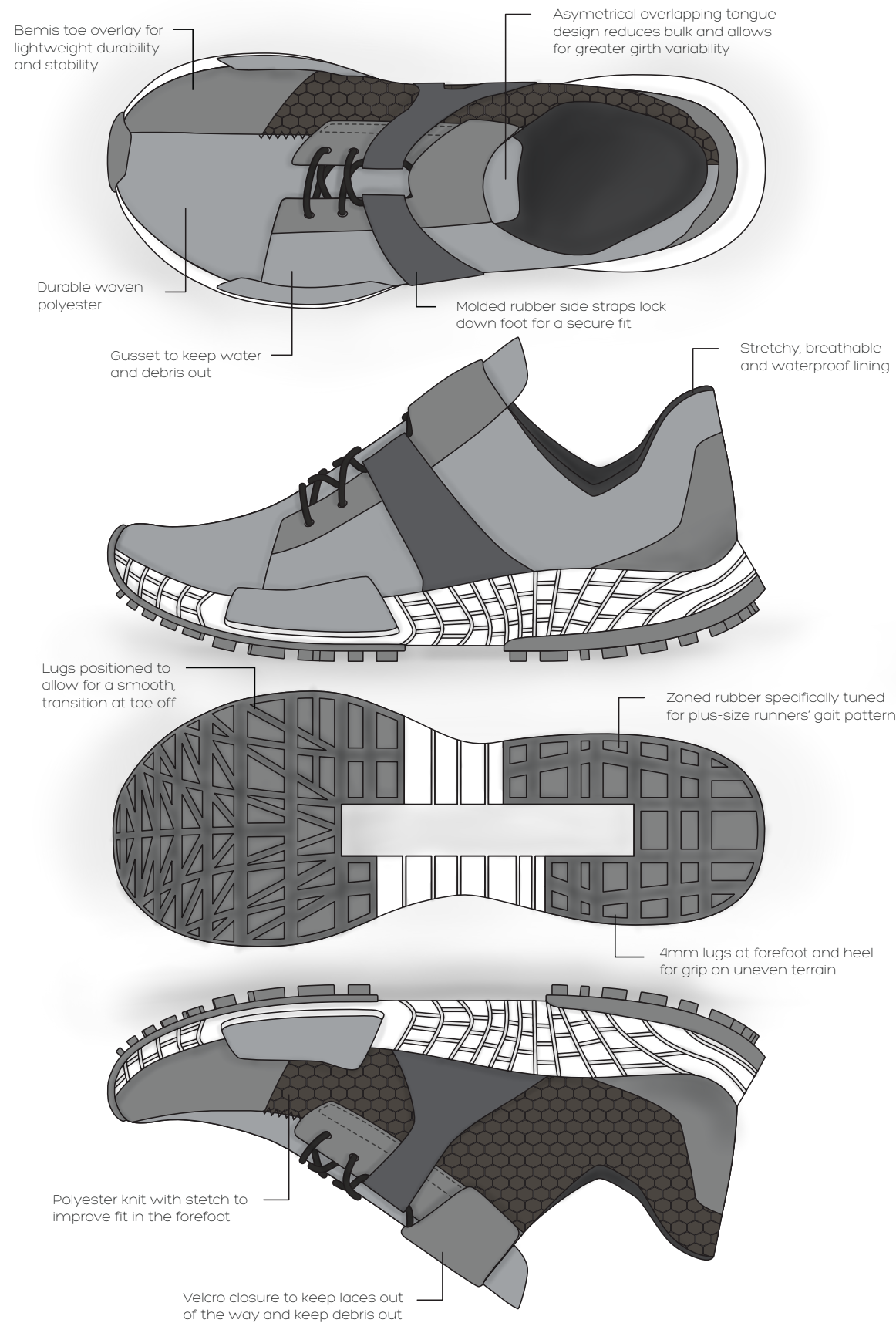
IDEATION PROTOTYPING



FINAL DIRECTION ANY BODY'S ROAD



FINAL DIRECTION ANY BODY'S TRAIL





NEXT STEPS

IDEATION - lots of more sketching to explore form. Look at every aspect of the shoe in detail

PROTOTYPING - refine construction to reduce bulk

FURTHER LAST DEVELOPMENT - 3D scan wooden last, refine toe spring, 3D print 2 new sets of lasts

ATHLETE FEEDBACK - meet up with Robin for fit testing and feedback, review concepts with Mirna



ANY BODY

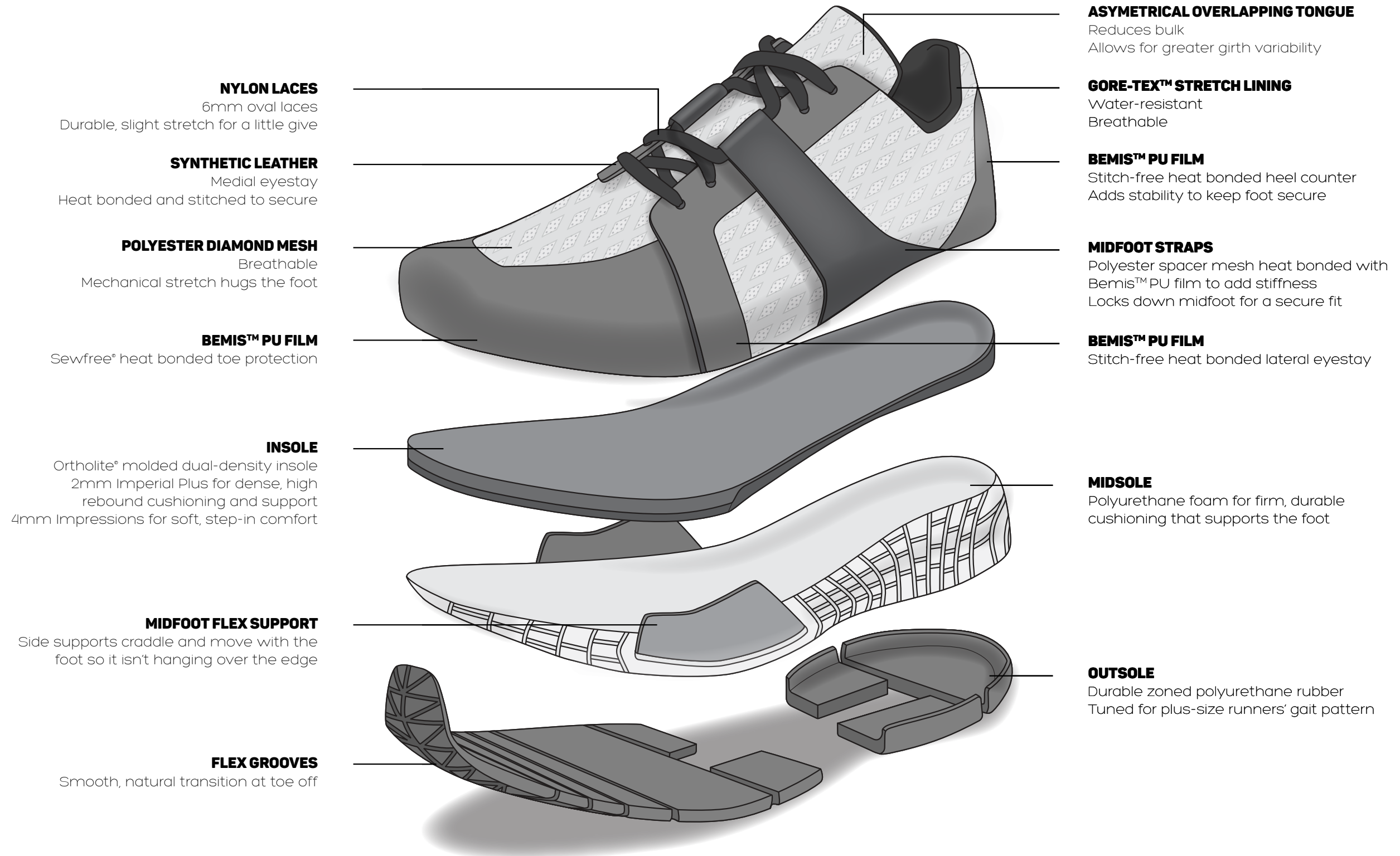
FOOTWEAR FOR THE PLUS-SIZED FEMALE RUNNER

THANKS!

A pair of dark blue and green athletic sneakers is shown from a side profile, resting on a white surface. The sneakers feature a textured knit upper and black laces. The background is a blurred, natural setting with brown and tan tones. A dark, semi-transparent overlay covers the entire image, and white text is centered over the sneakers.

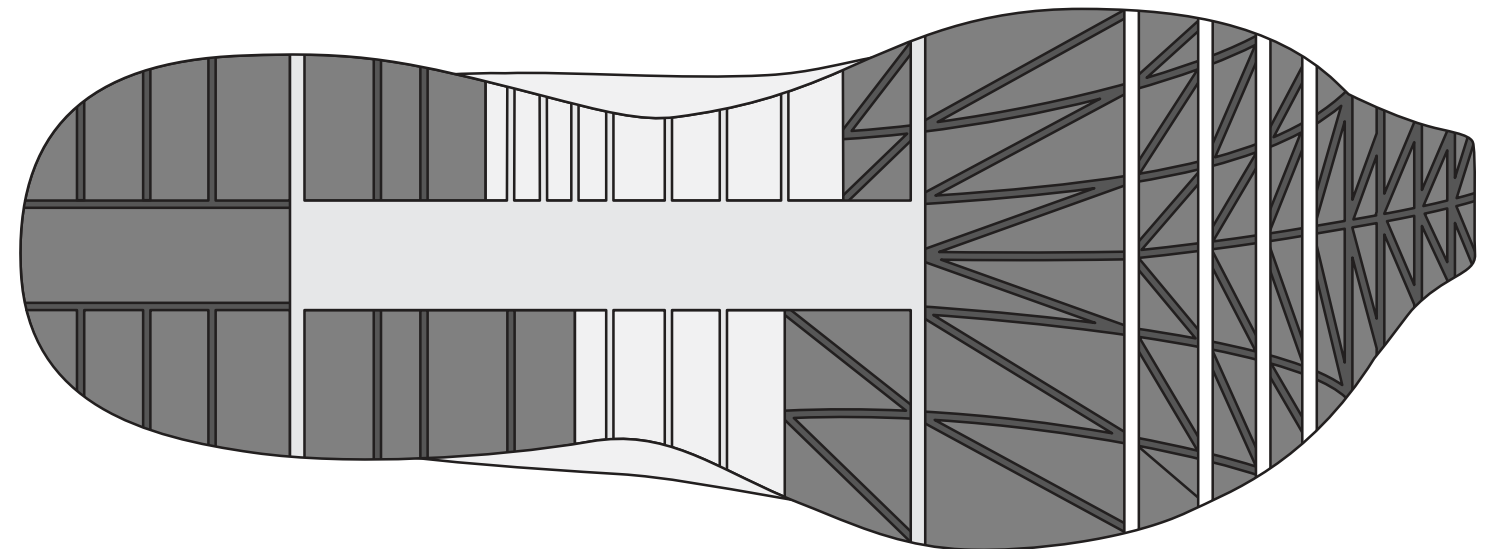
**SPD 689: COLLABORATIVE CREATION
& LAUNCH STUDIO**
SPRING 2020

PARTS + PURPOSE VERSION 1



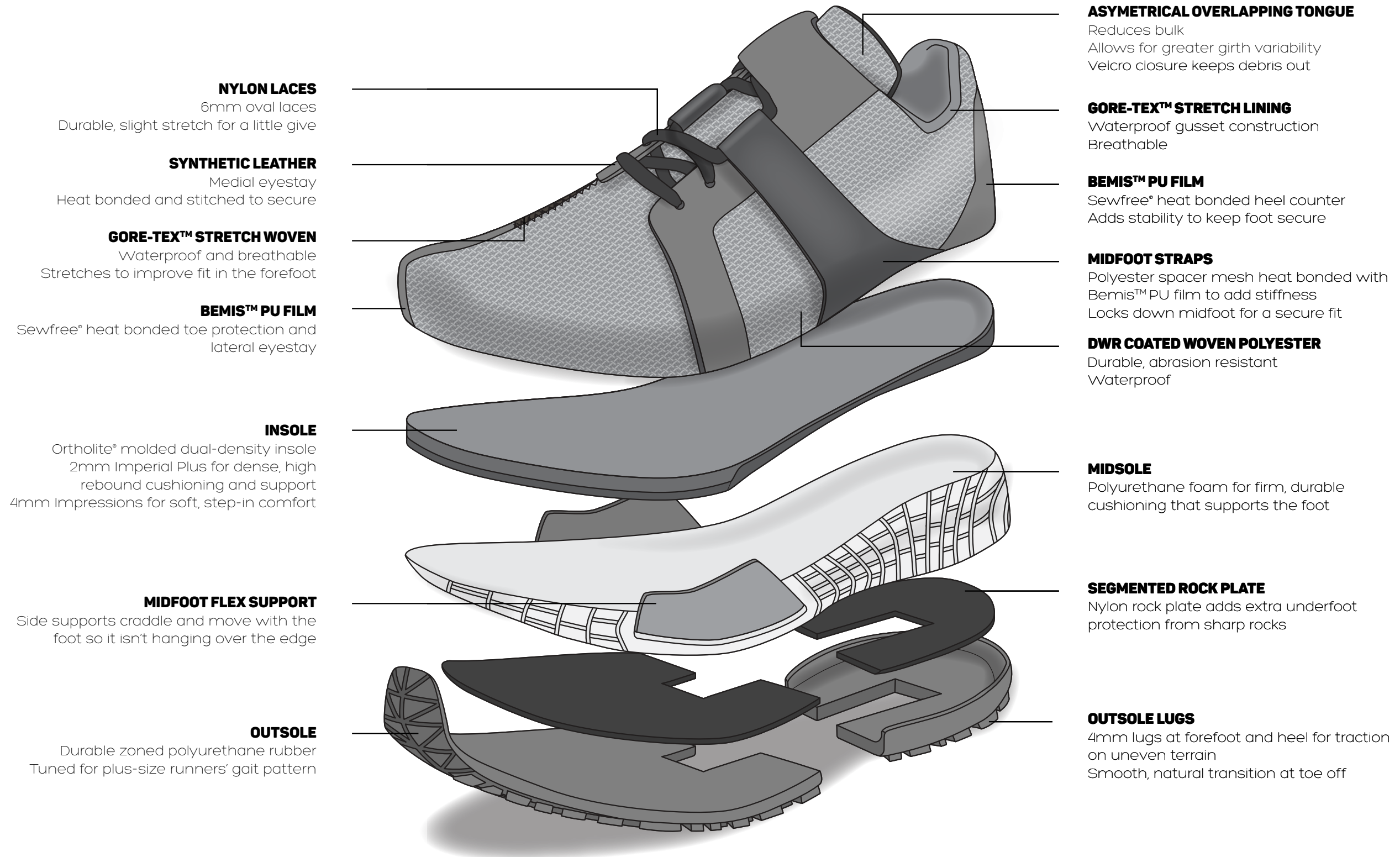
Initial Parts + Purpose diagram based on Winter term Proof of Concept design

PARTS + PURPOSE VERSION 1



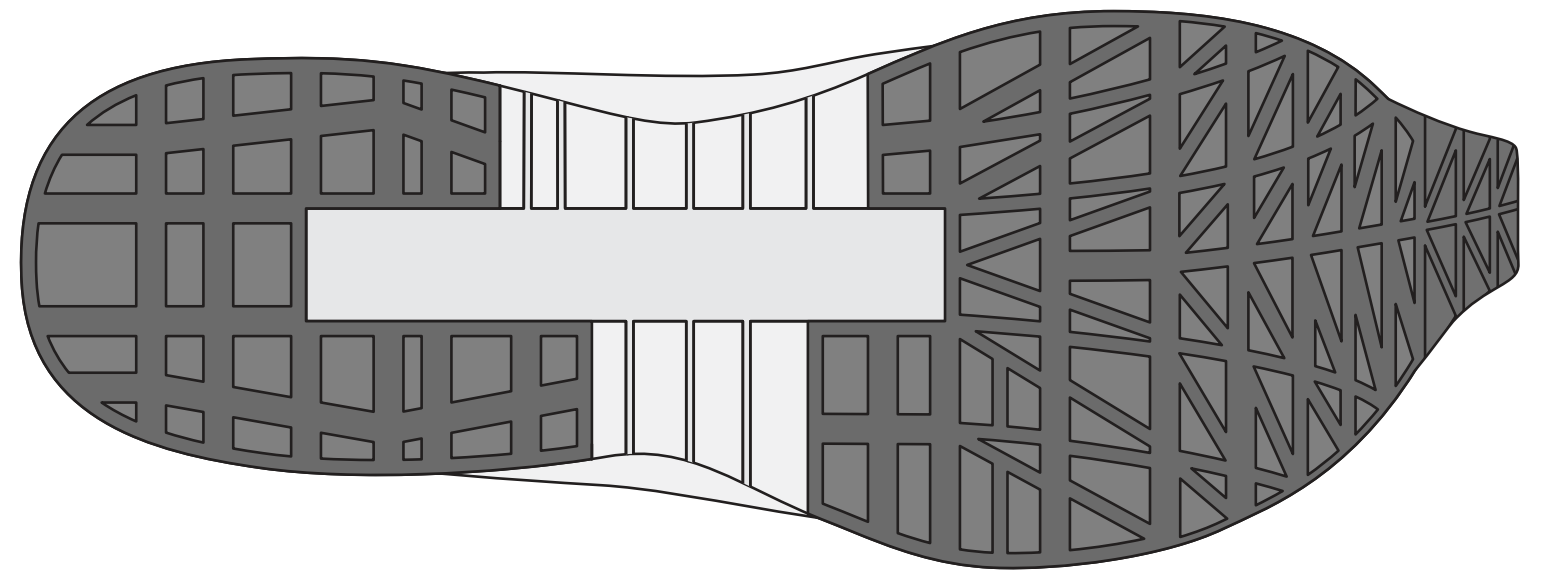
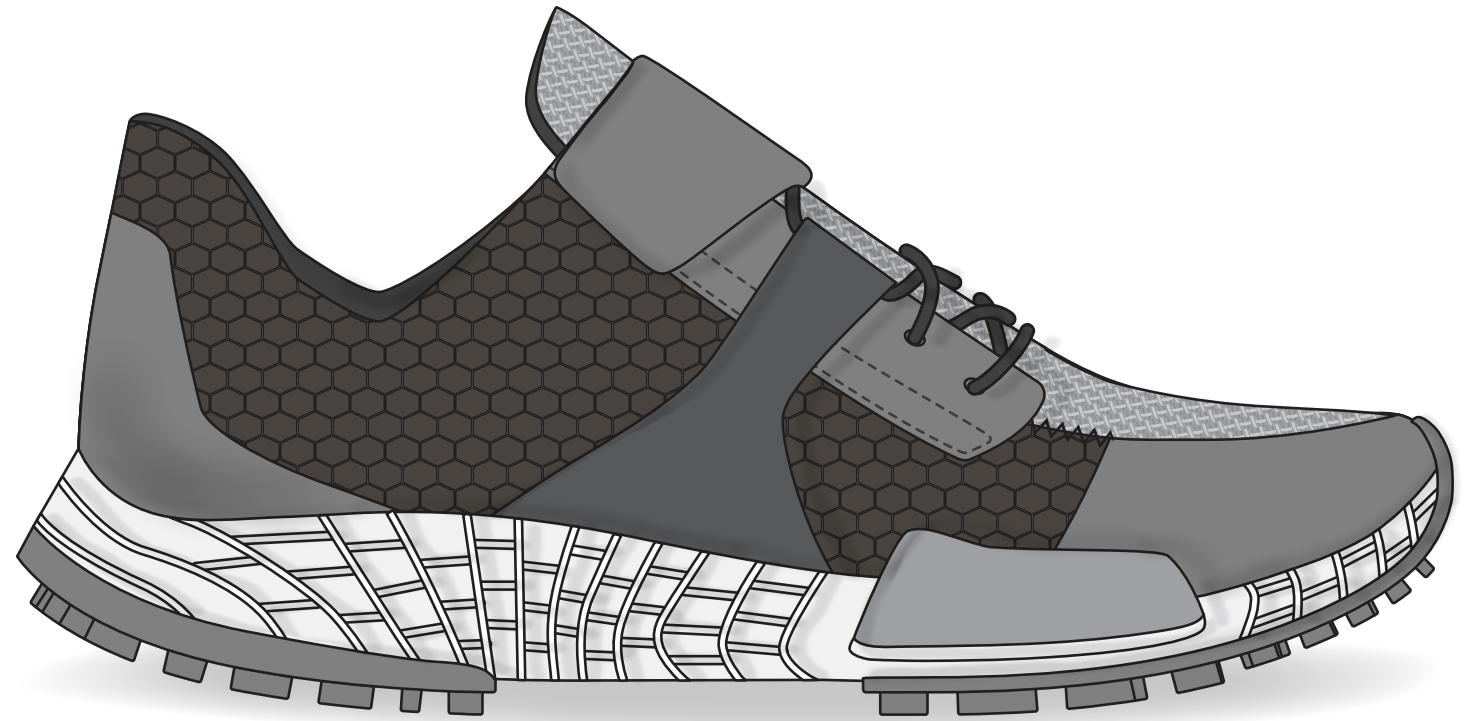
Line art of Winter term Proof of Concept design

PARTS + PURPOSE VERSION 1



Initial Parts + Purpose diagram based on Winter term Proof of Concept design

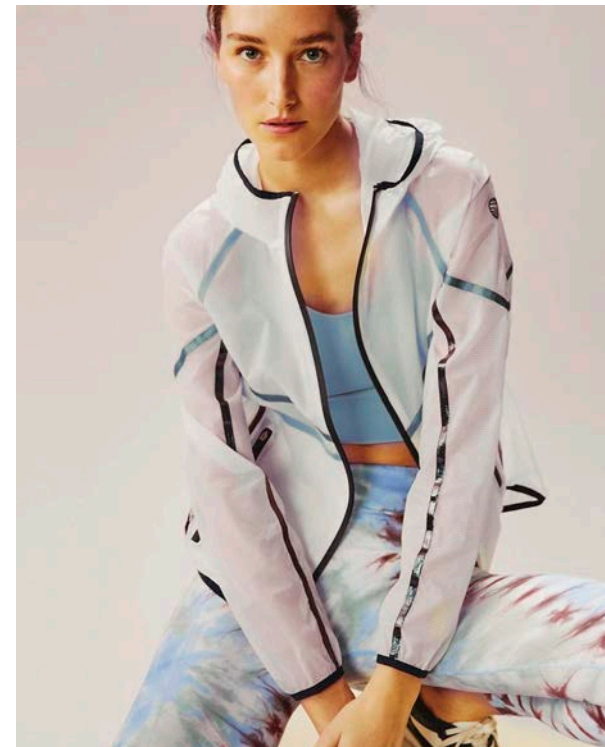
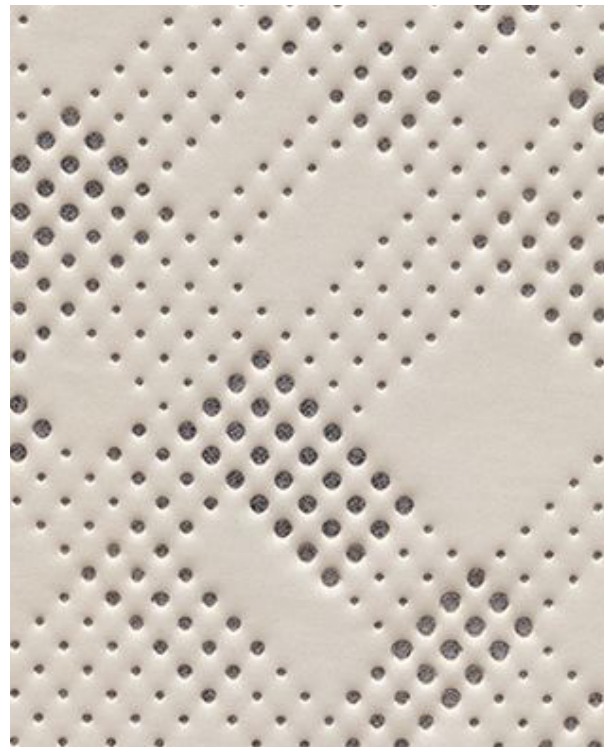
PARTS + PURPOSE VERSION 1



Line art of Winter term Proof of Concept design

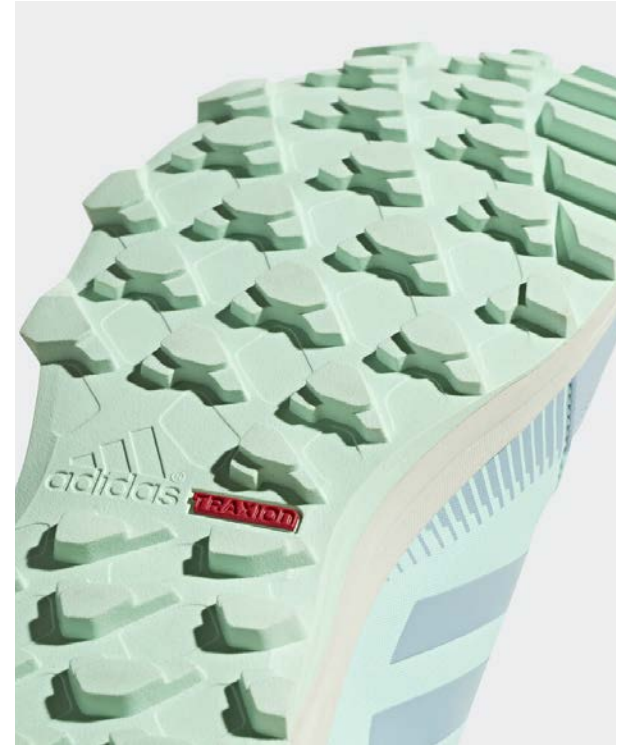
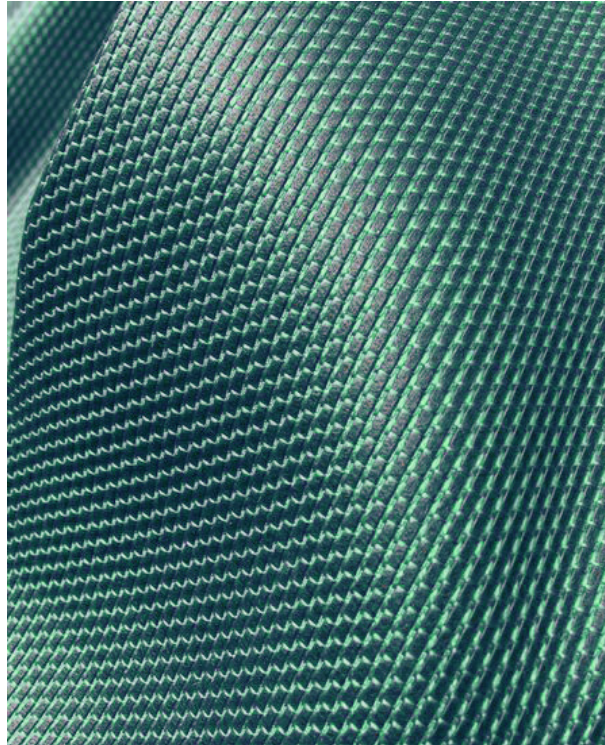
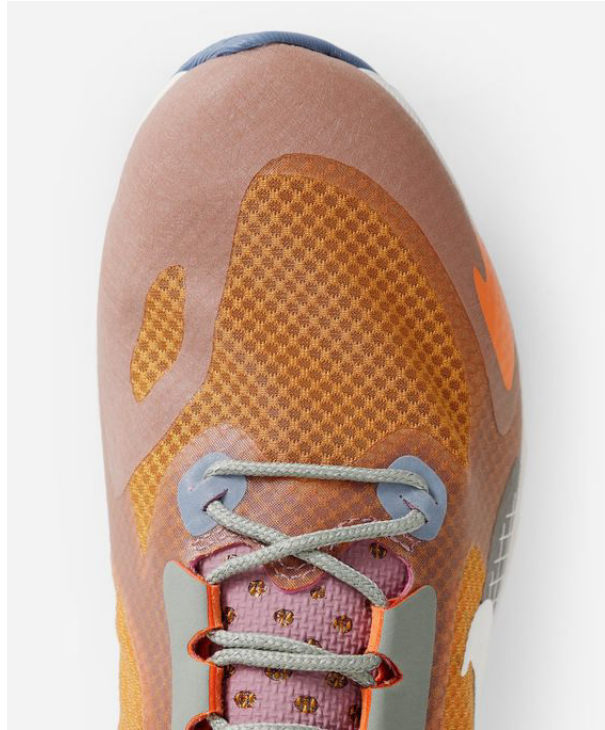
MOOD ABR

BREATHABLE | FLEXIBLE | LIGHTWEIGHT

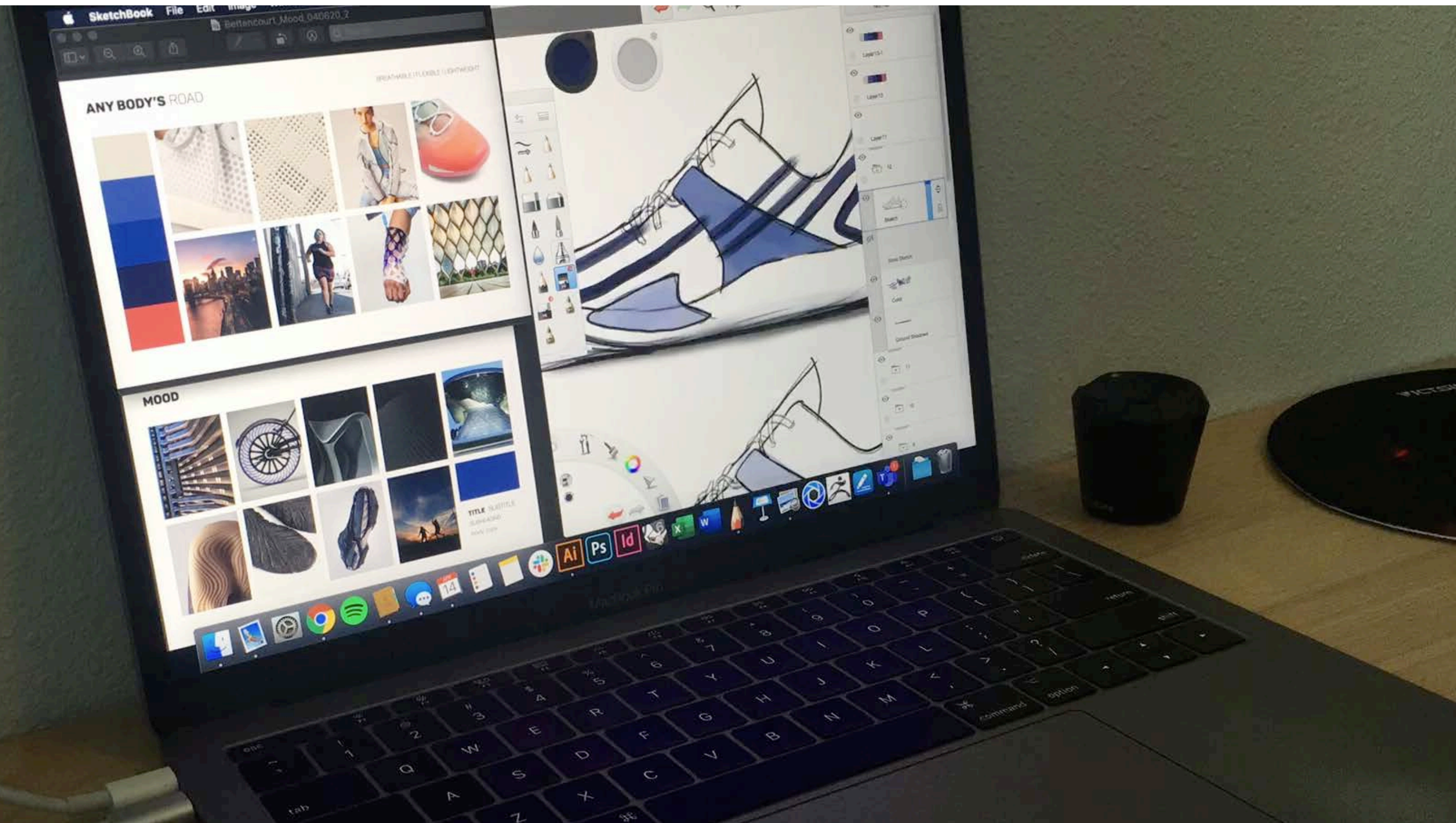


MOOD ABT

PROTECTION | TRACTION | DURABILITY

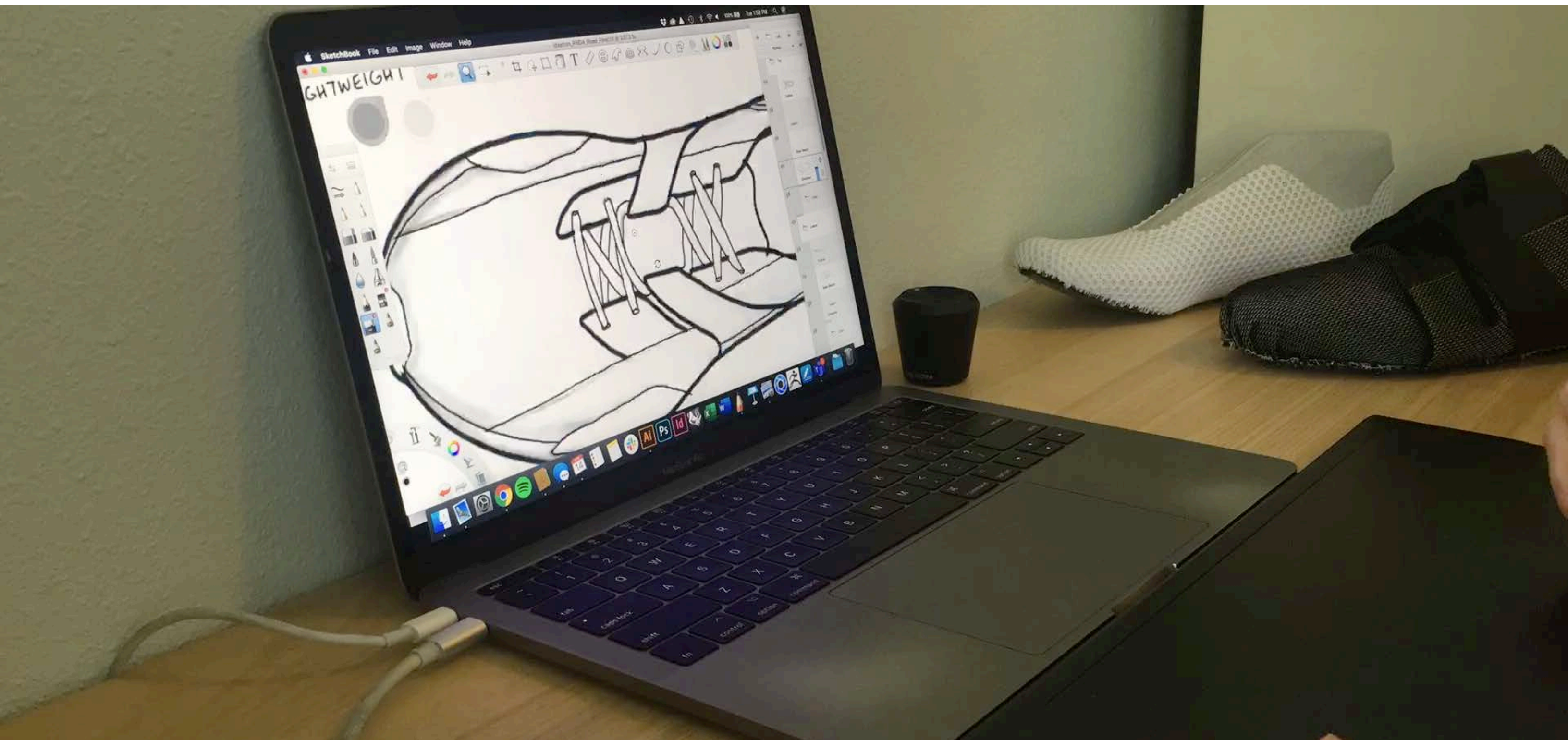


IDEATION REFINEMENT



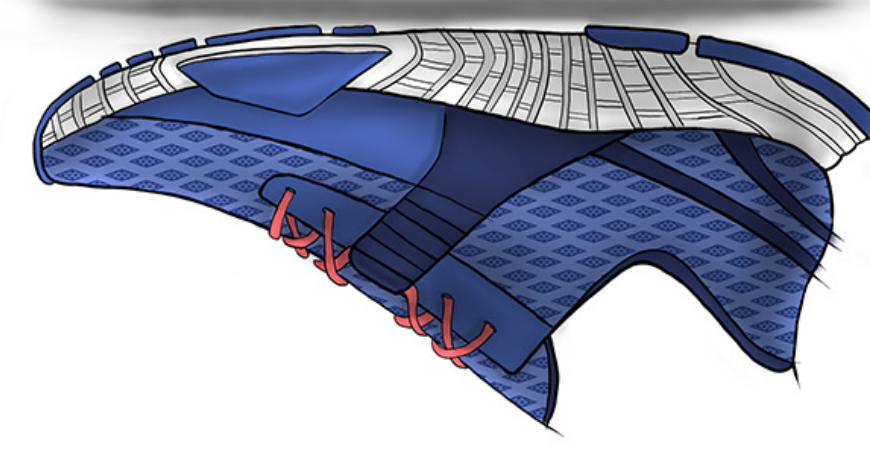
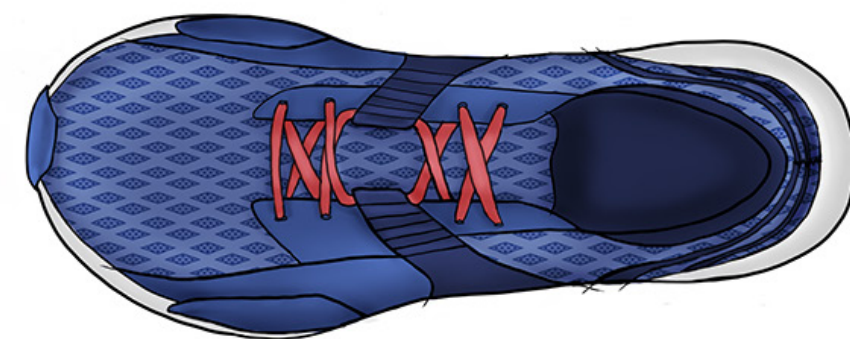
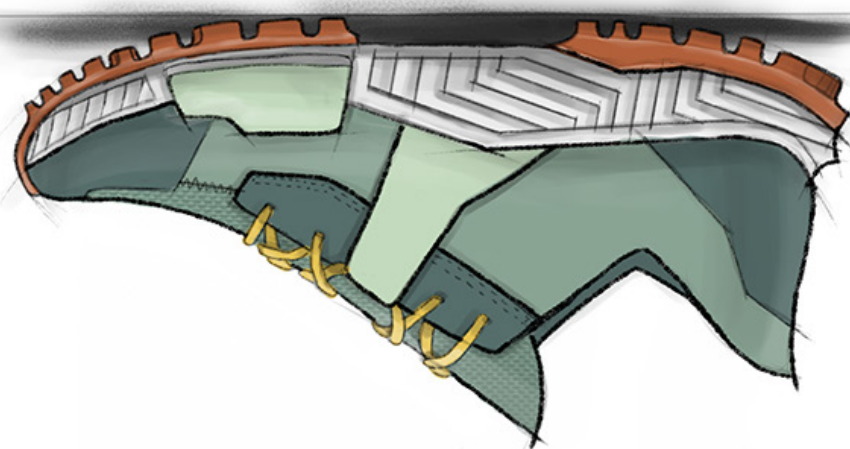
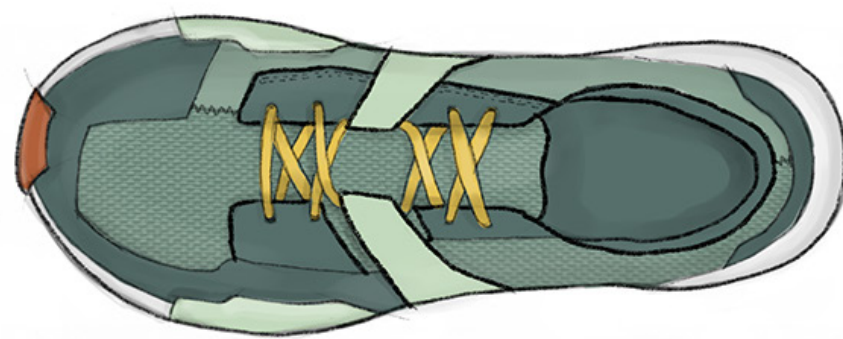
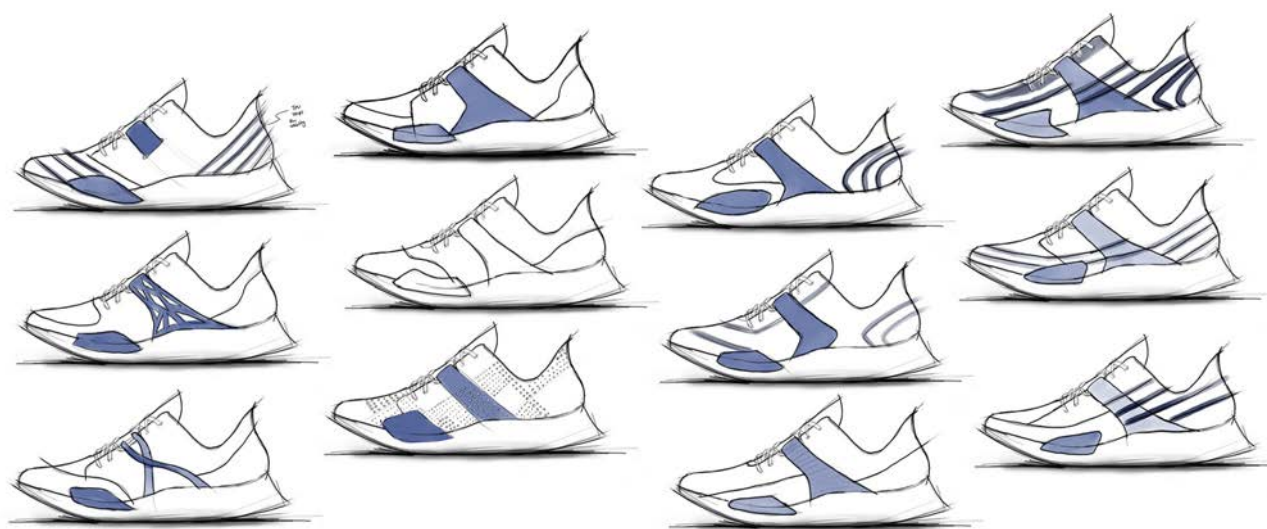
Ideation style lines for Any Body's Road to make it look fast

IDEATION REFINEMENT

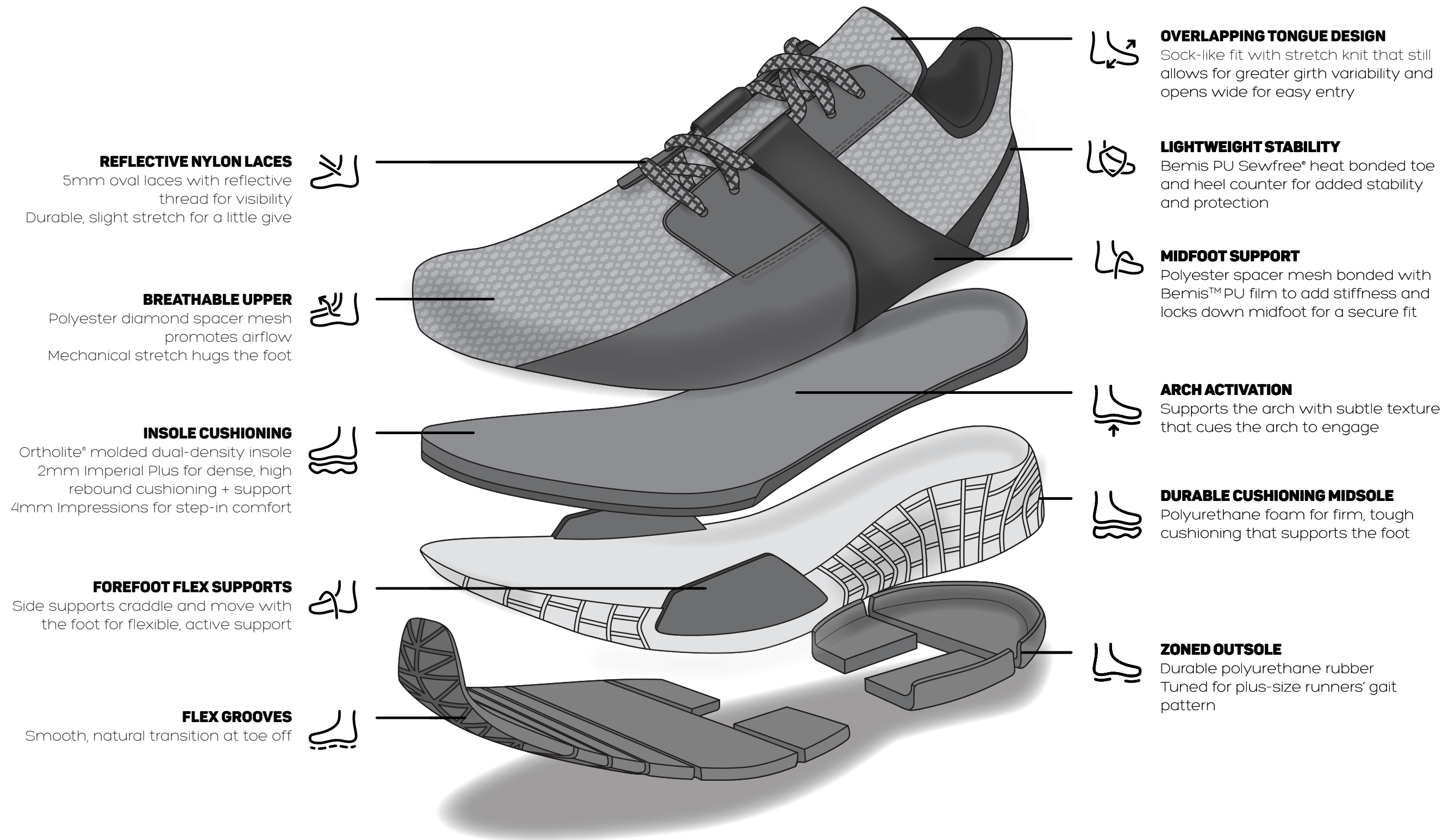


Working on giving sketches a distinct style for each shoe

IDEATION REFINEMENT

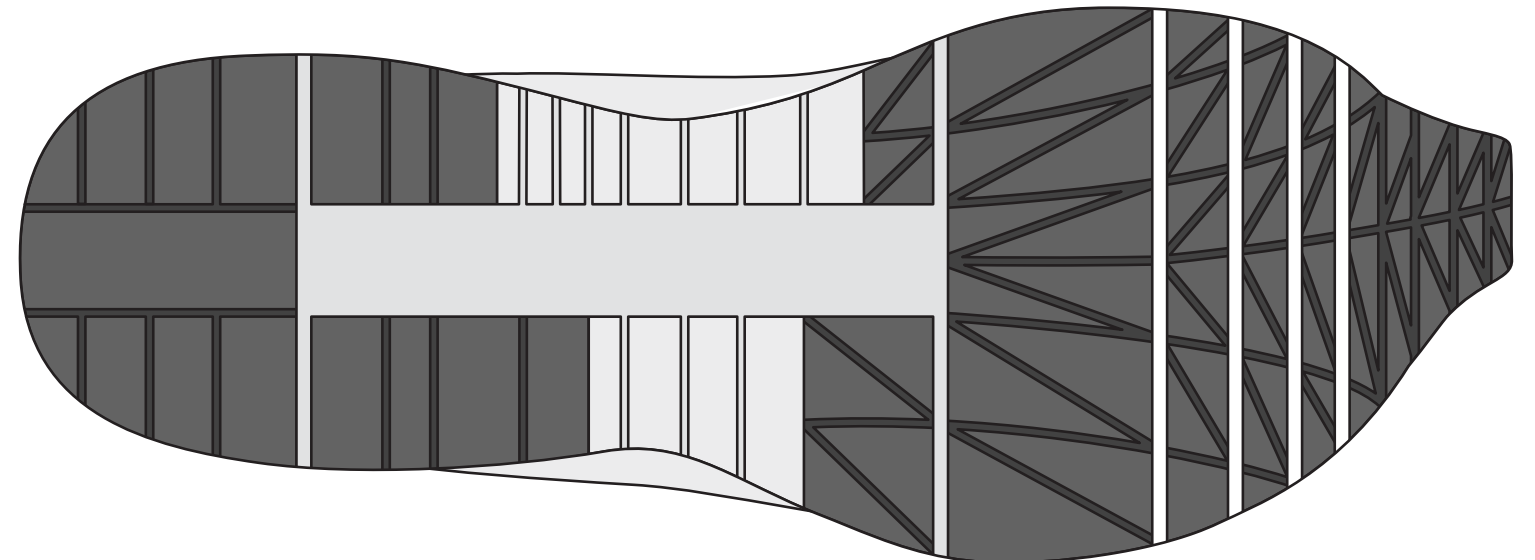
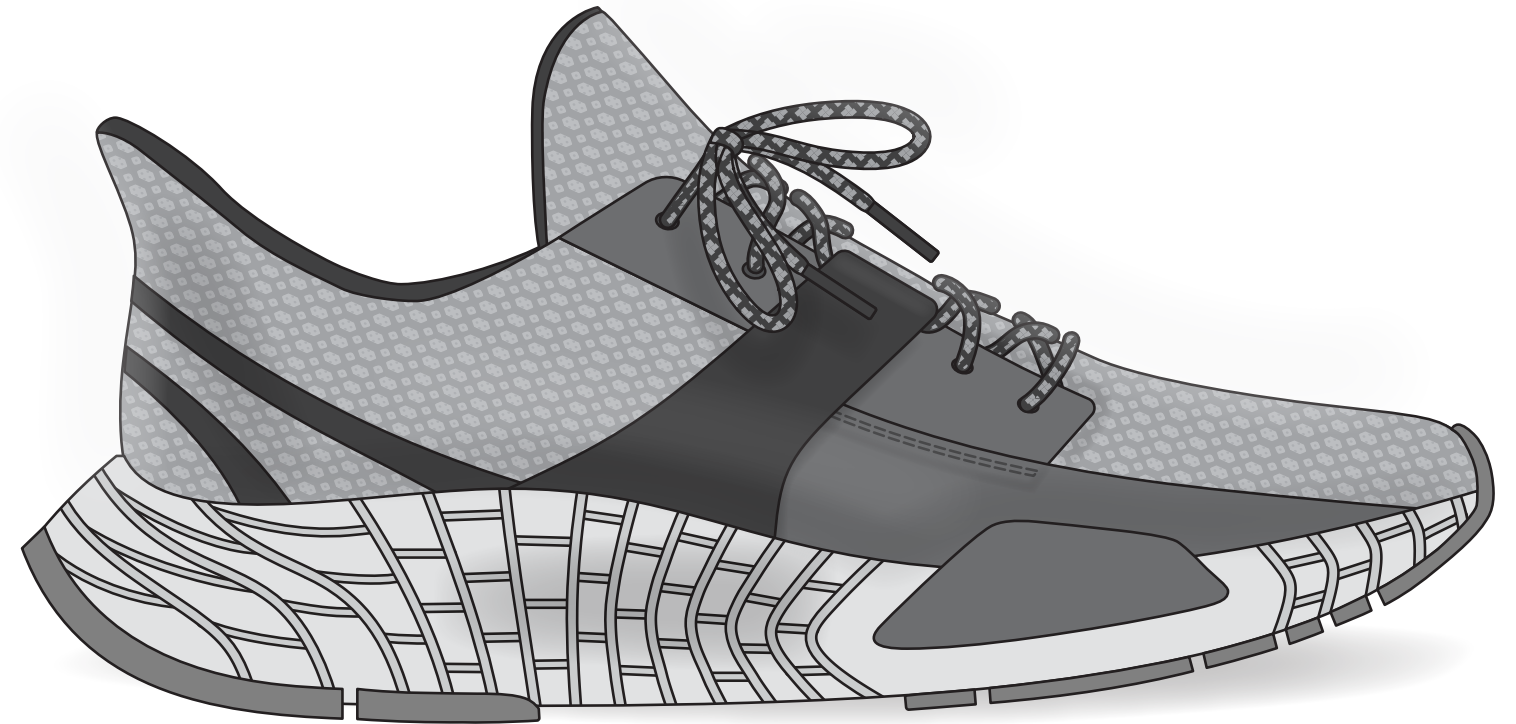


PARTS + PURPOSE REVISED



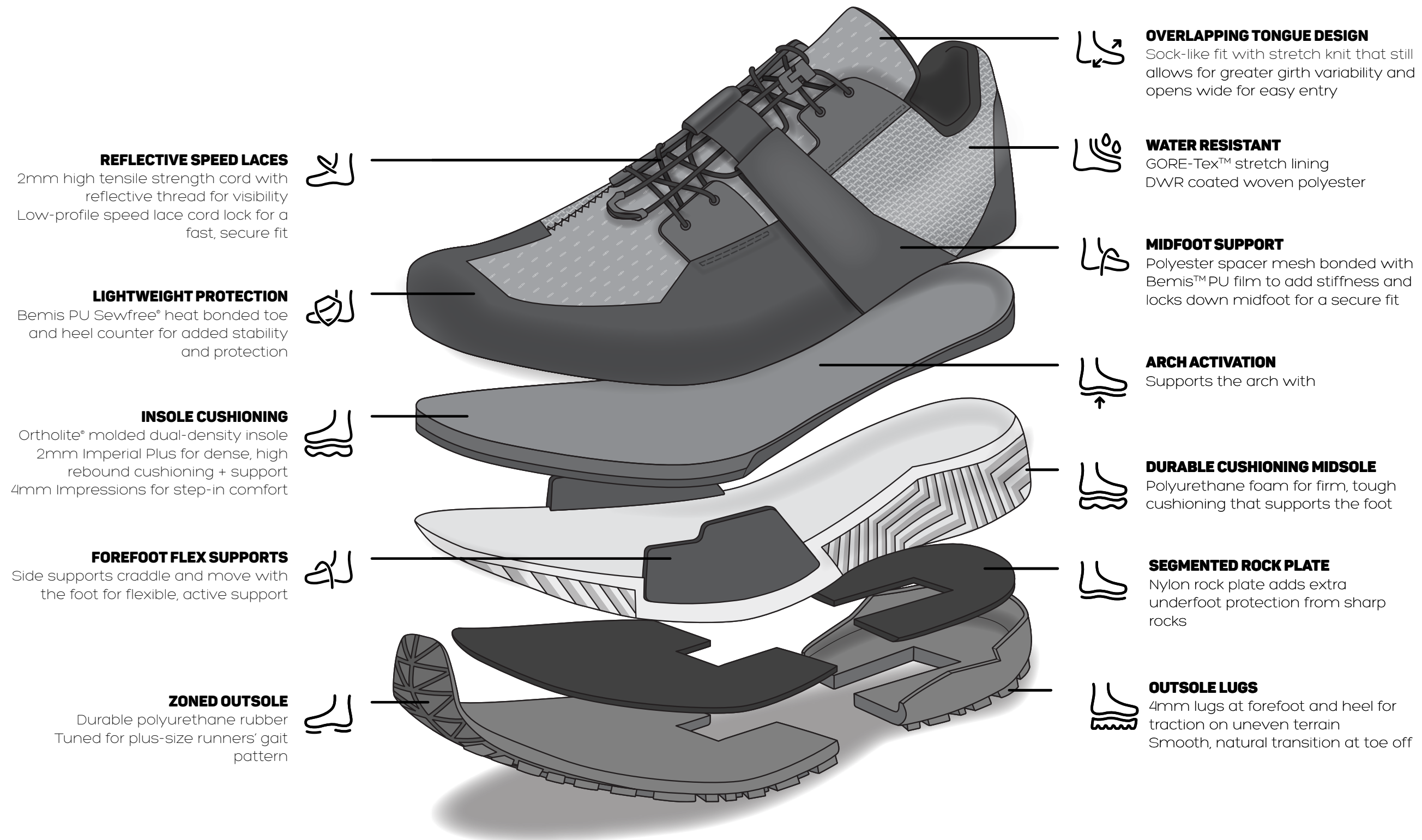
Revised Parts + Purpose diagram after sketch refinements

PARTS + PURPOSE REVISED



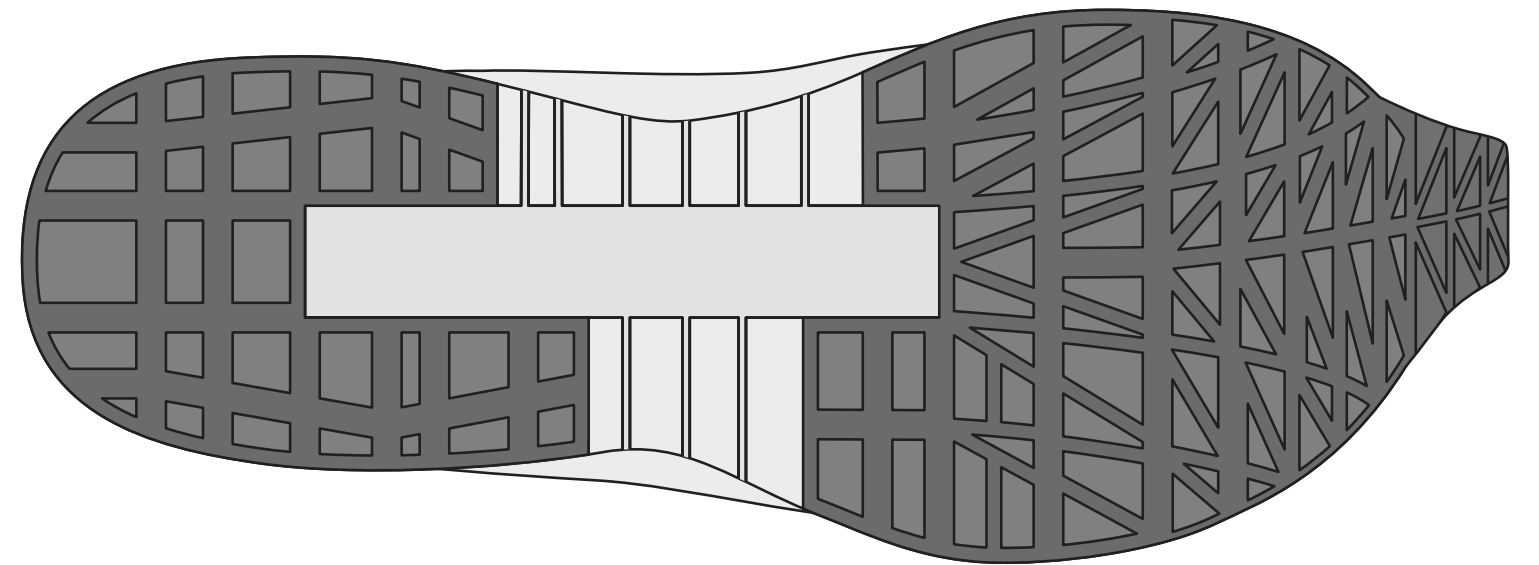
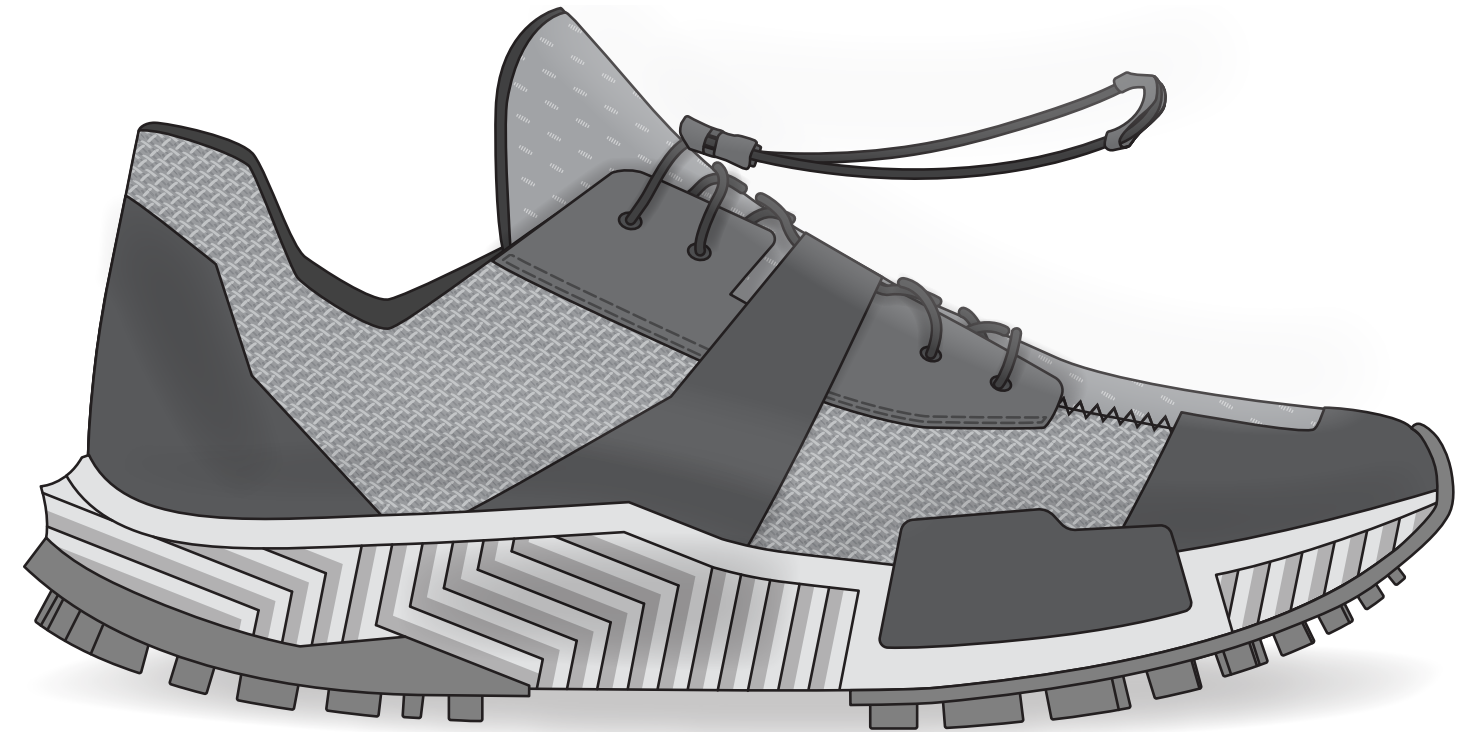
Revised line art after sketch refinements

PARTS + PURPOSE REVISED



Revised Parts + Purpose diagram after sketch refinements

PARTS + PURPOSE REVISED



Revised line art after sketch refinements

MESSAGING DEVELOPMENT

ANY BODY OVERVIEW

Any Body shoes use a last tuned to the proportions of a plus-size runner's foot with ample room in the toe box and instep girth for a wider, thicker foot. The midsole and upper design accommodate many foot widths and girths, with an overlapping tongue design, textiles with stretch in key areas, and midfoot flex supports to allow the foot to move freely while still being supported. The overlapping tongue design opens up wide for easy entry, even for runners with a high instep or thicker foot. The midfoot arch straps on the upper lock the foot in place for a stable, secure fit that can still move.

Any Body empowers women at the back of the pack with product that's made especially for them. It doesn't have all the flashy features meant to propel runners and magically transform them into 2- or 3-hour marathoners. Instead, Any Body provides technical running shoes that plus-size women need and want—shoes that support their bodies, fit comfortably, and look great.

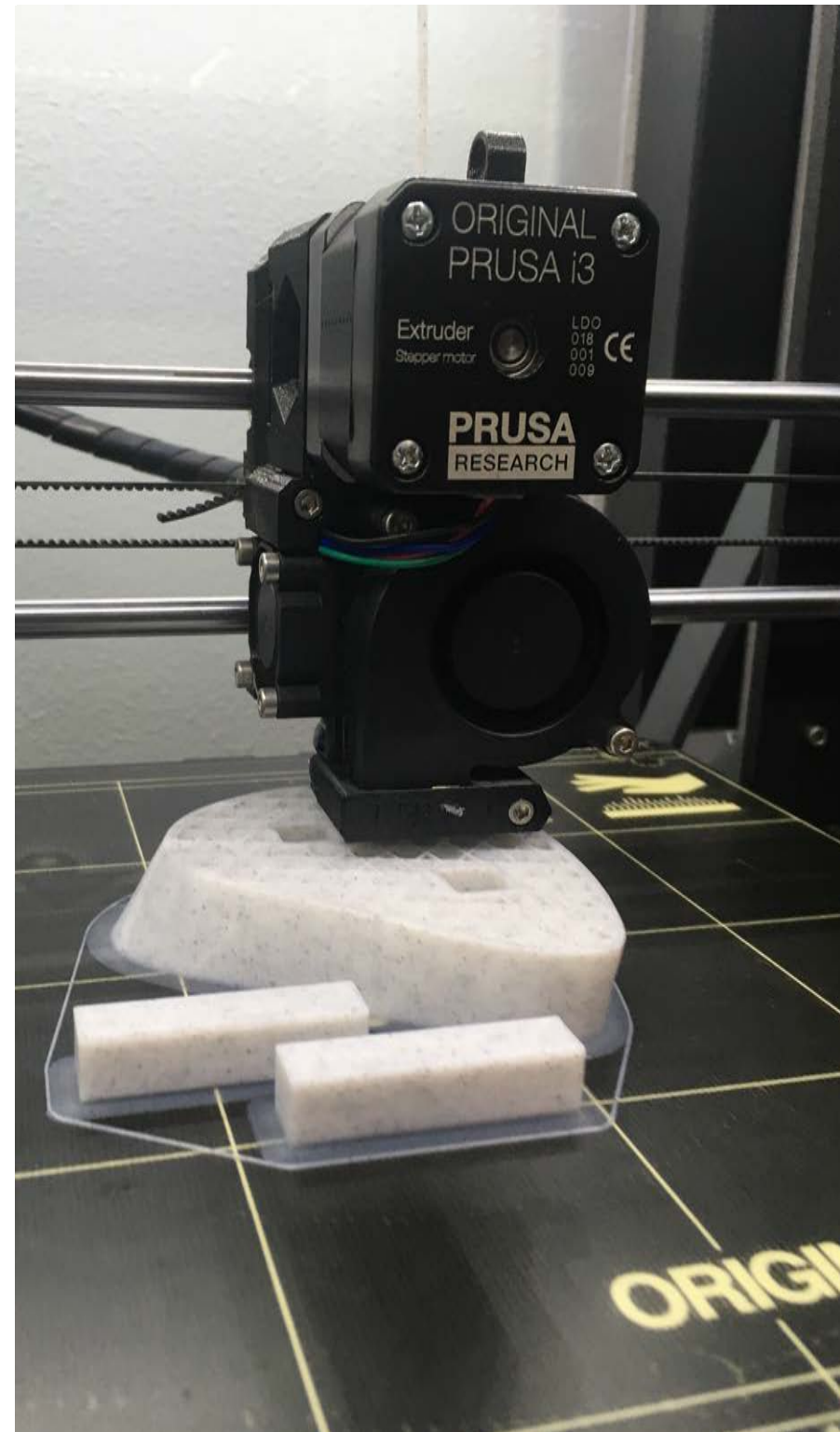
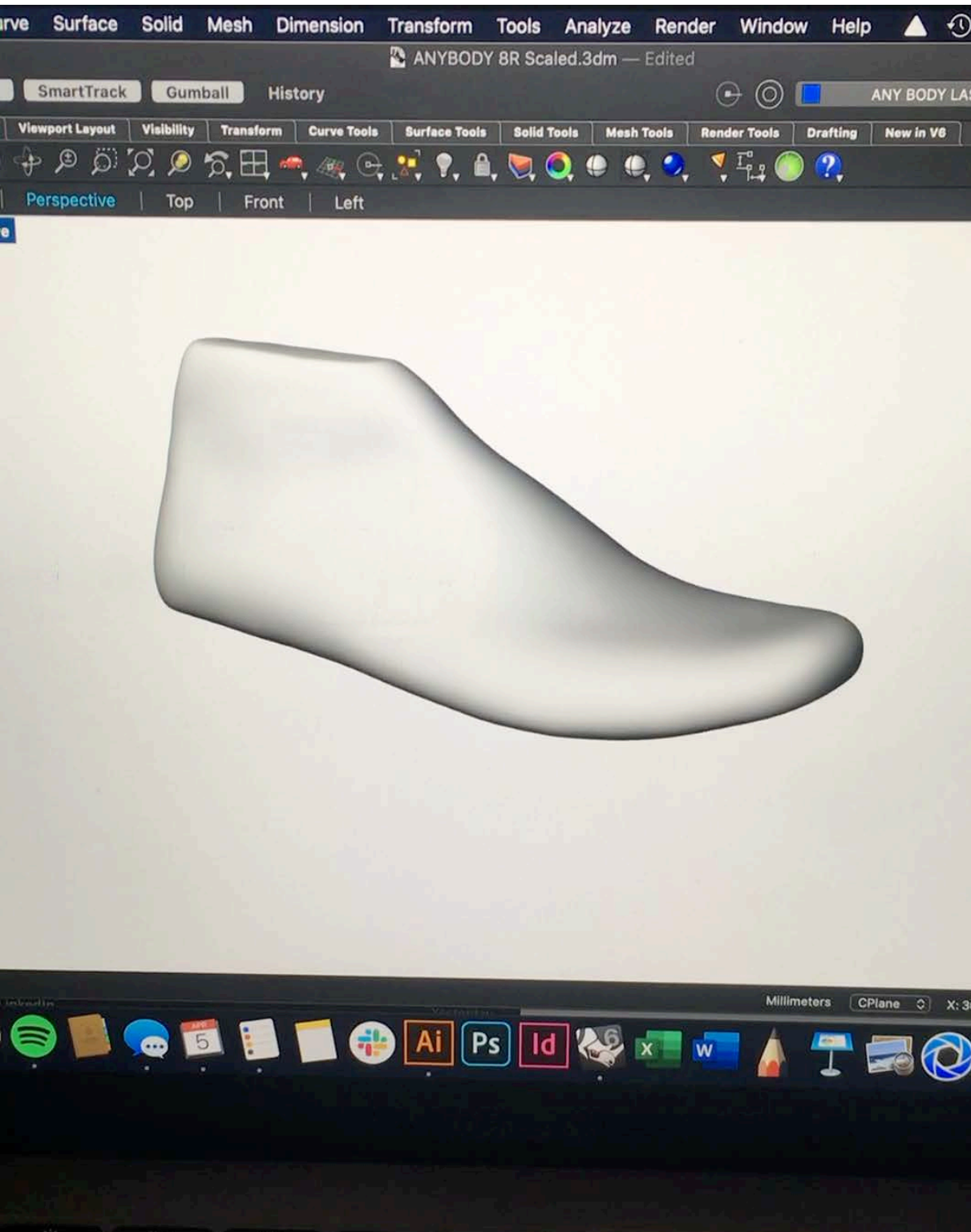


Initial technology overview and athlete outcomes write-up

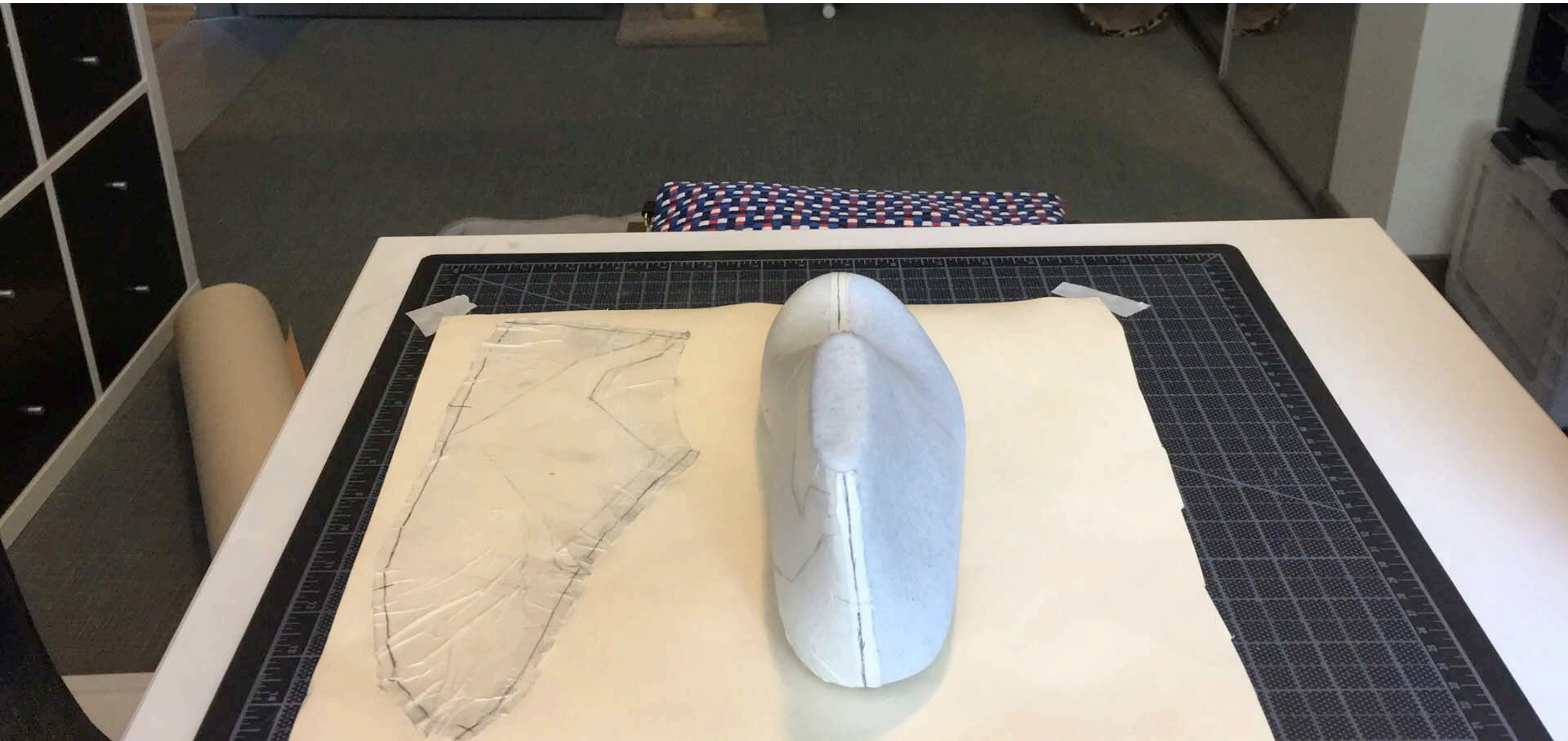
HOME STUDIO SET UP



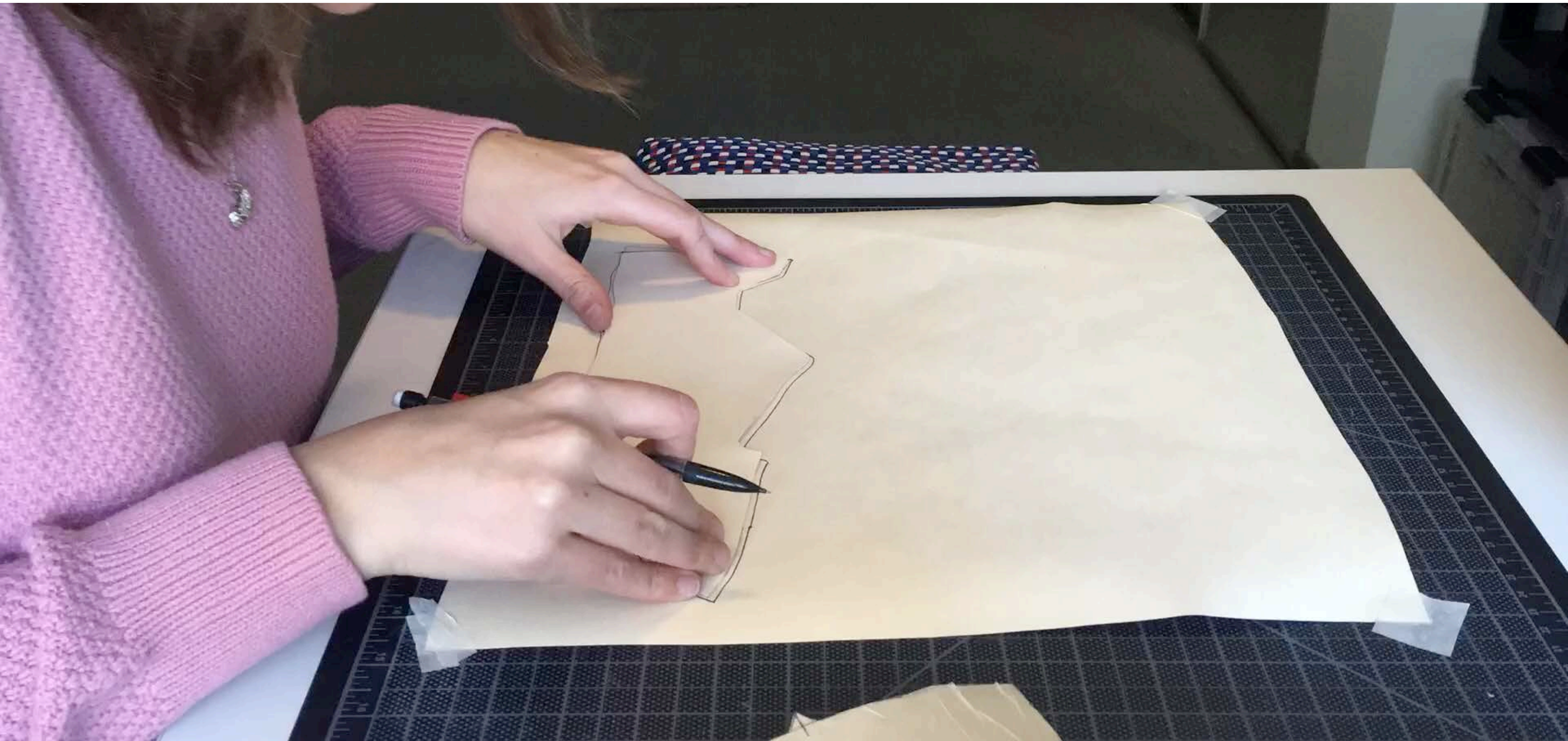
LAST DEVELOPMENT



PATTERN MAKING



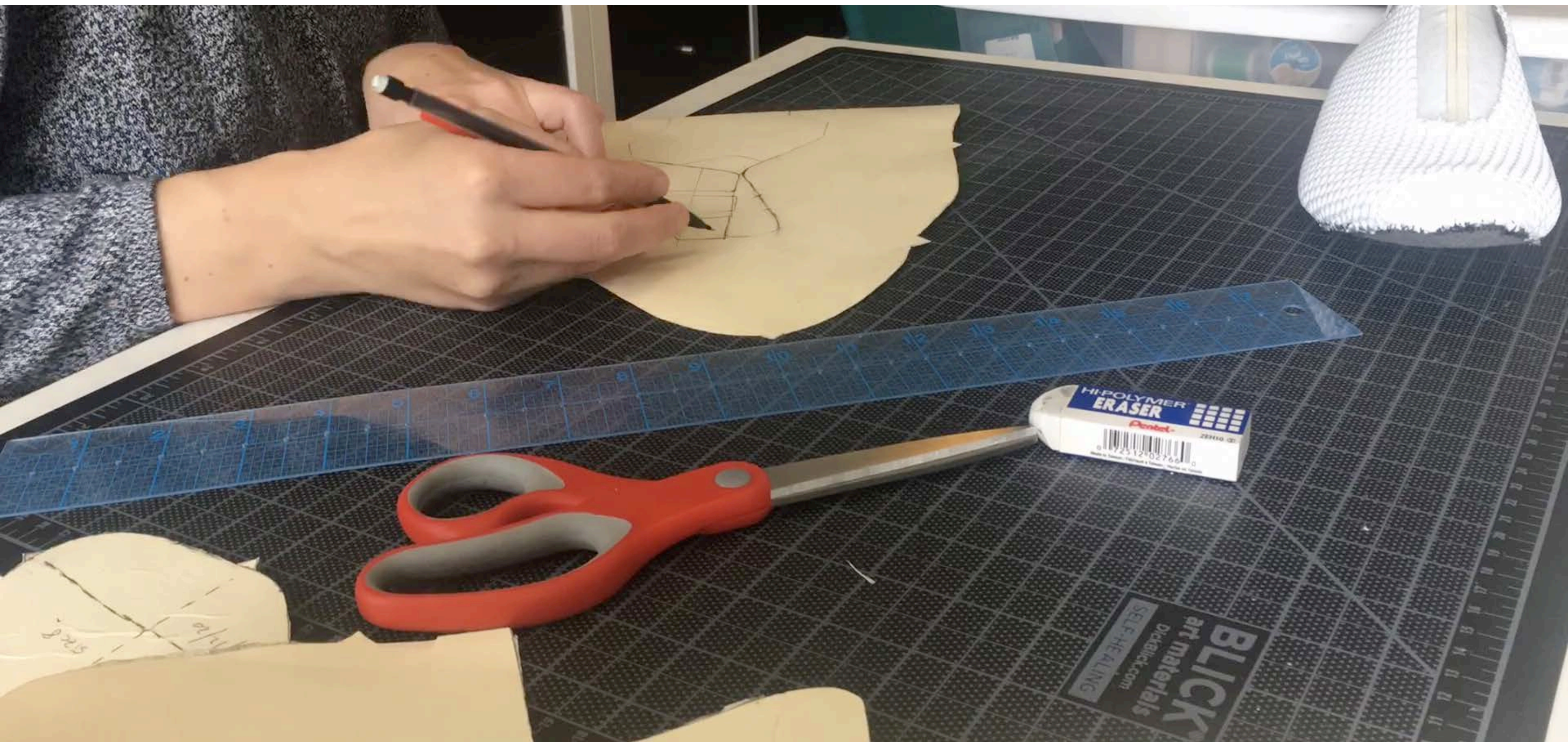
PATTERN MAKING



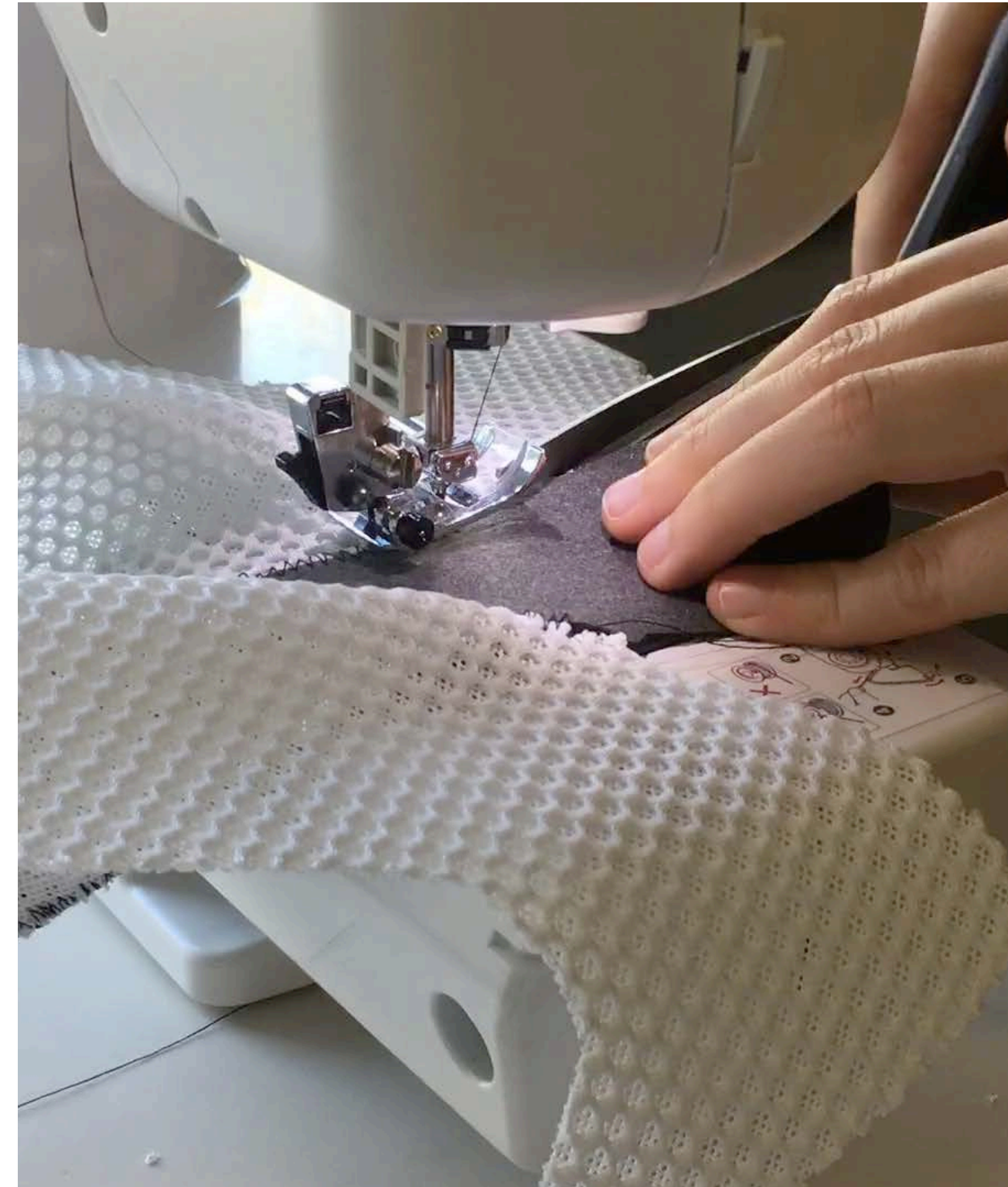
PATTERN MAKING



PATTERN MAKING



PROTOTYPING



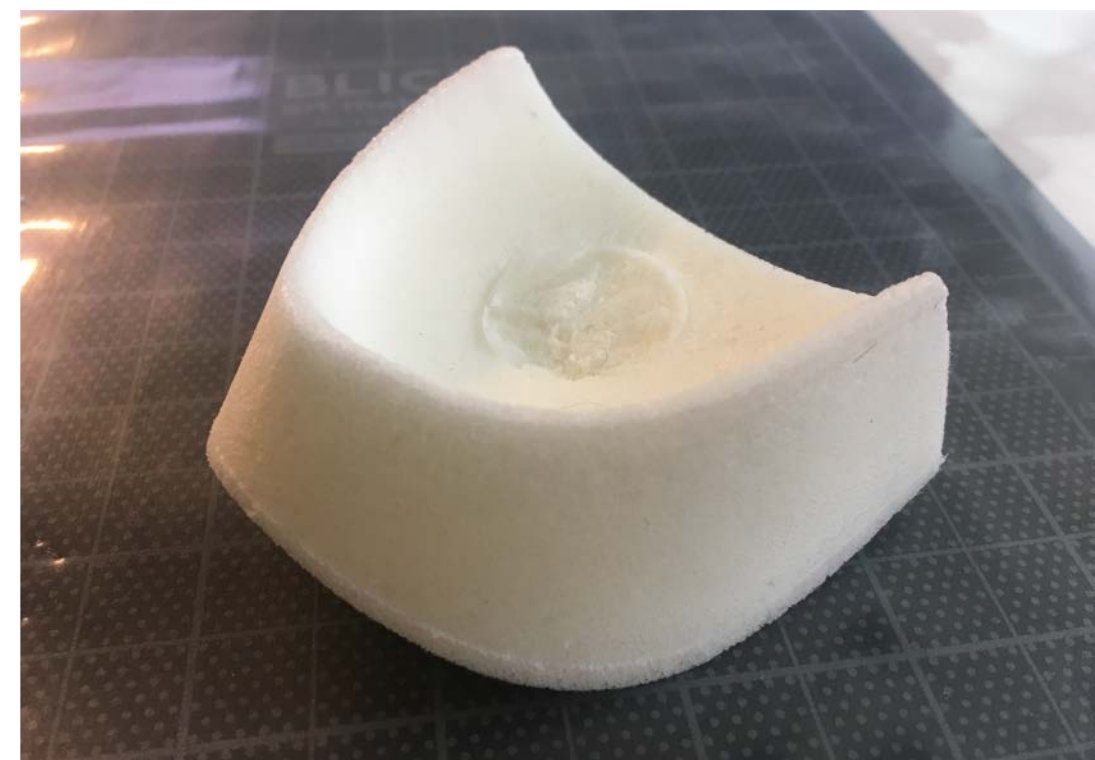
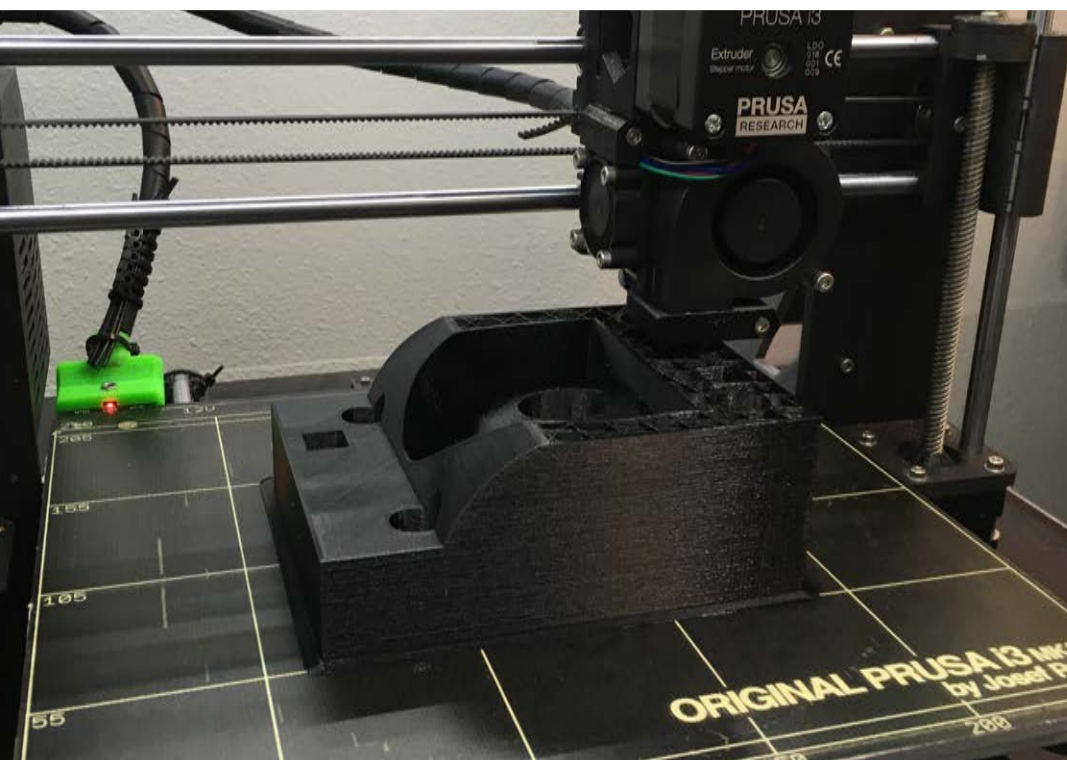
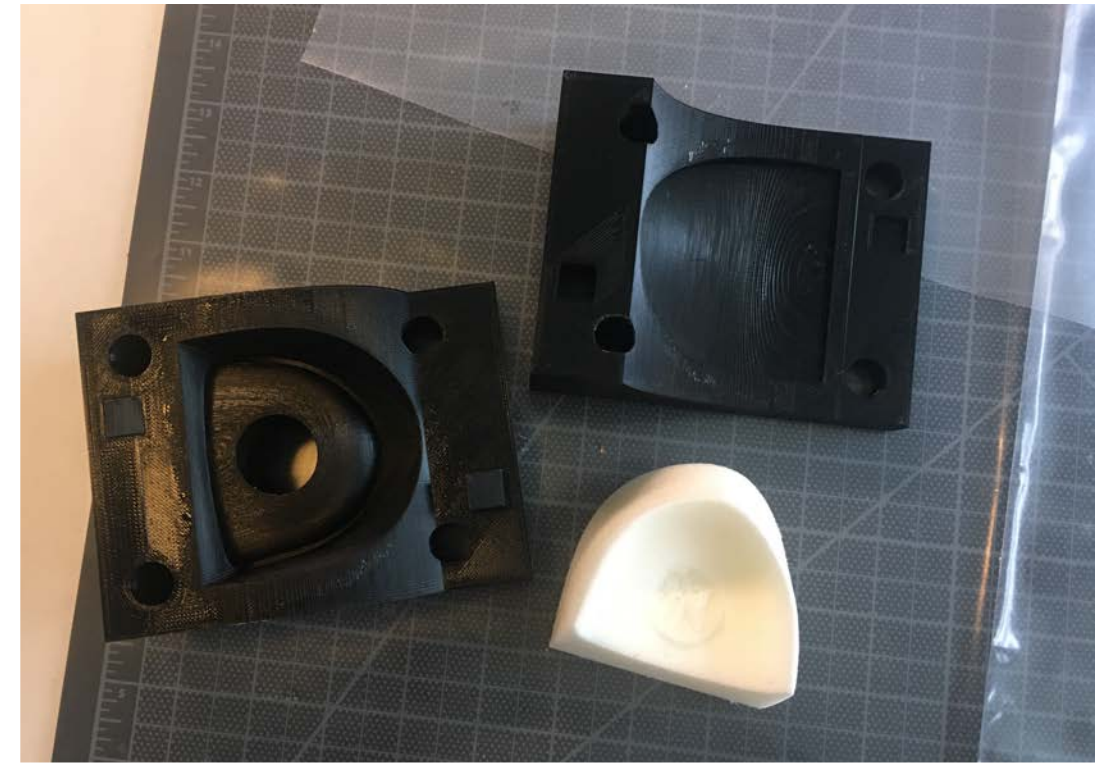
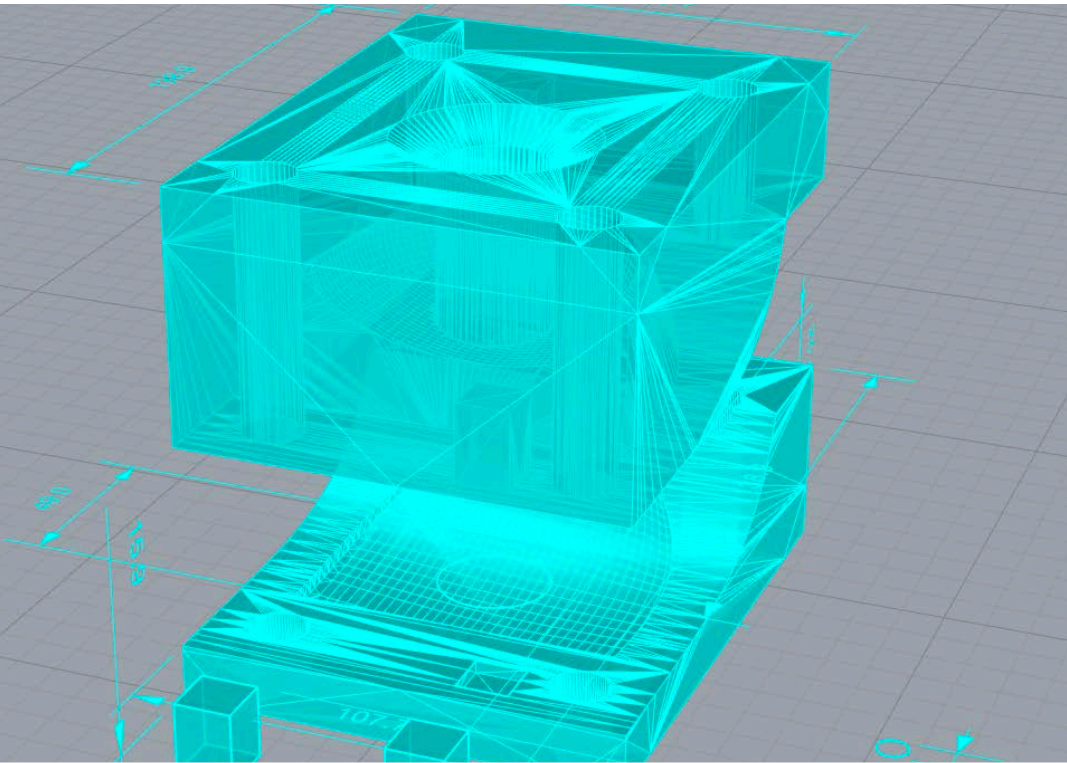
Learning how to make uppers on a domestic sewing machine

PROTOTYPING



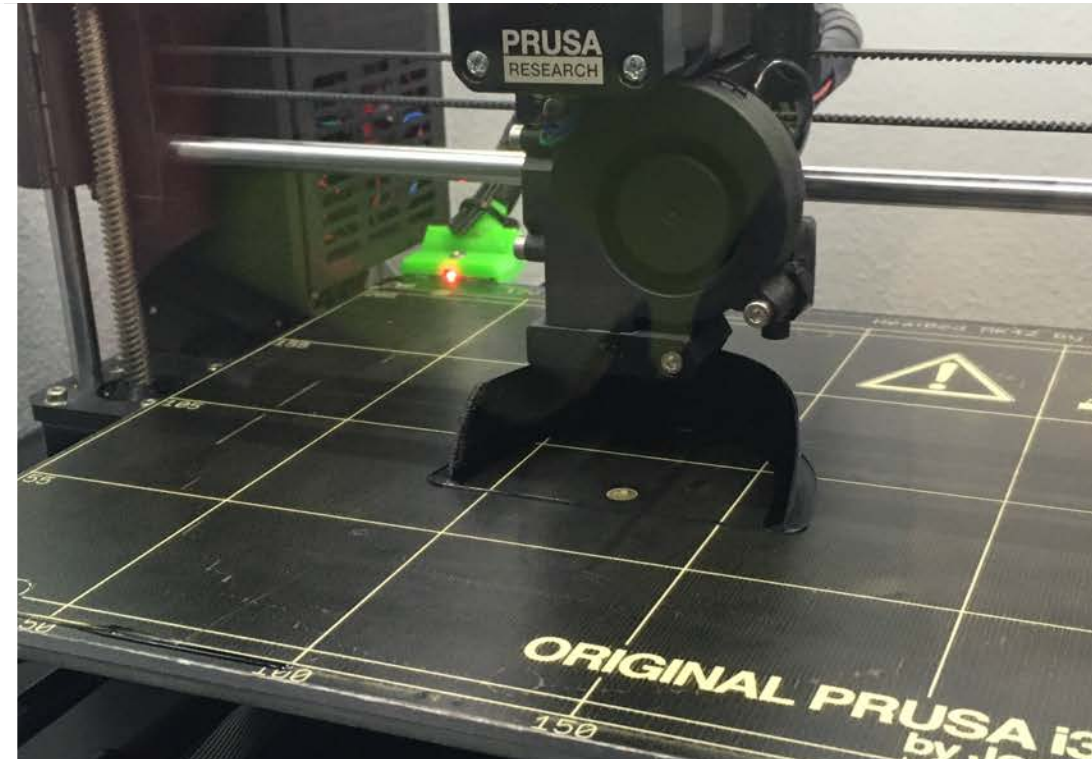
Figuring out how to gather the fabric

PROTOTYPING



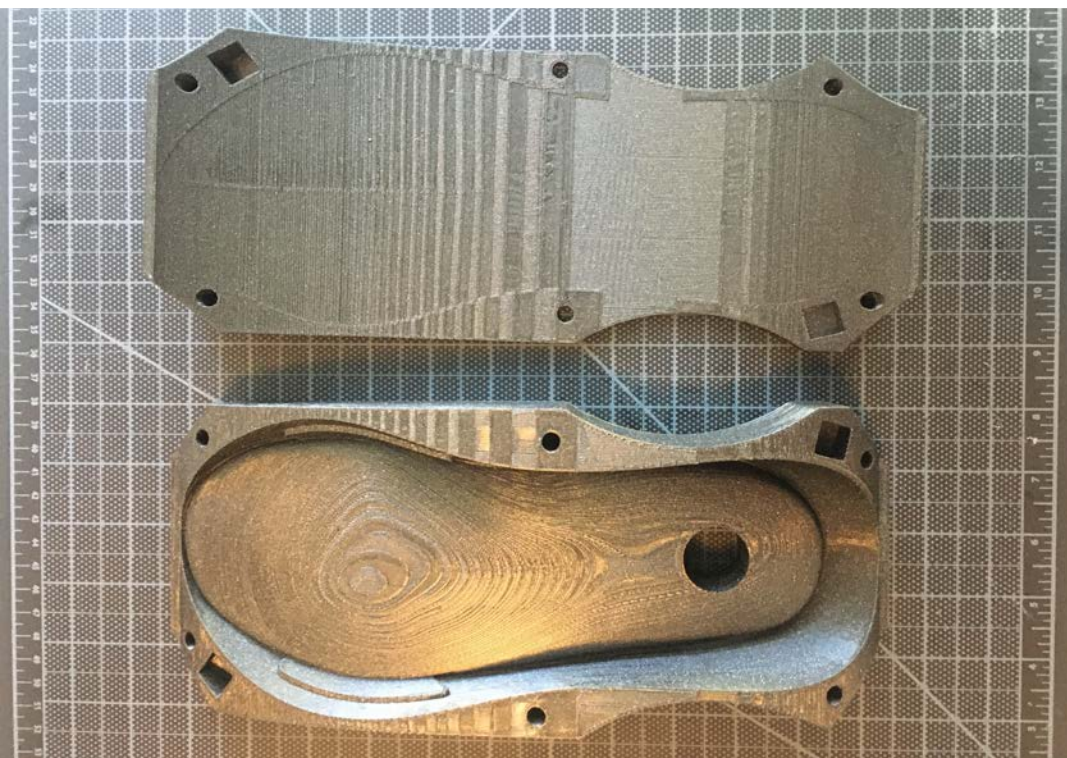
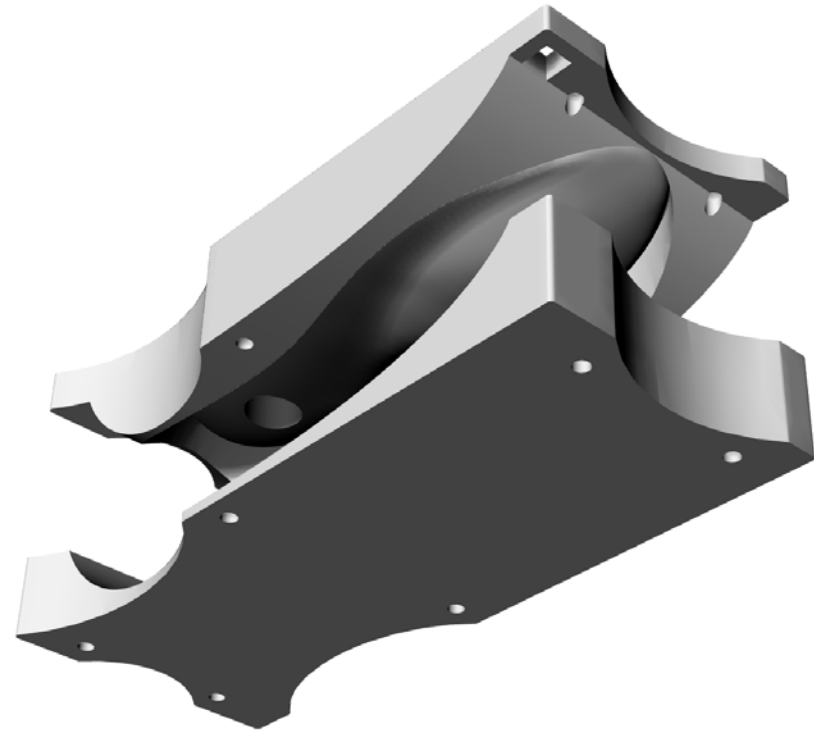
Testing out a 3D printed mold with Smooth-on casting

PROTOTYPING



Refining pattern, 3D printed a heel counter

PROTOTYPING



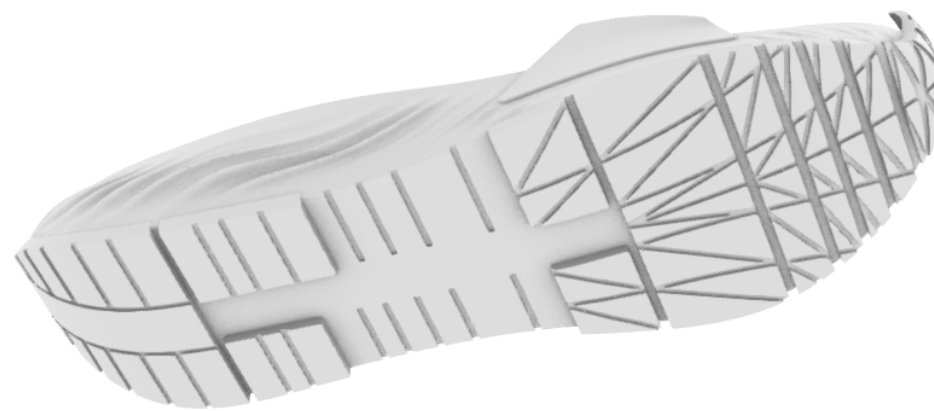
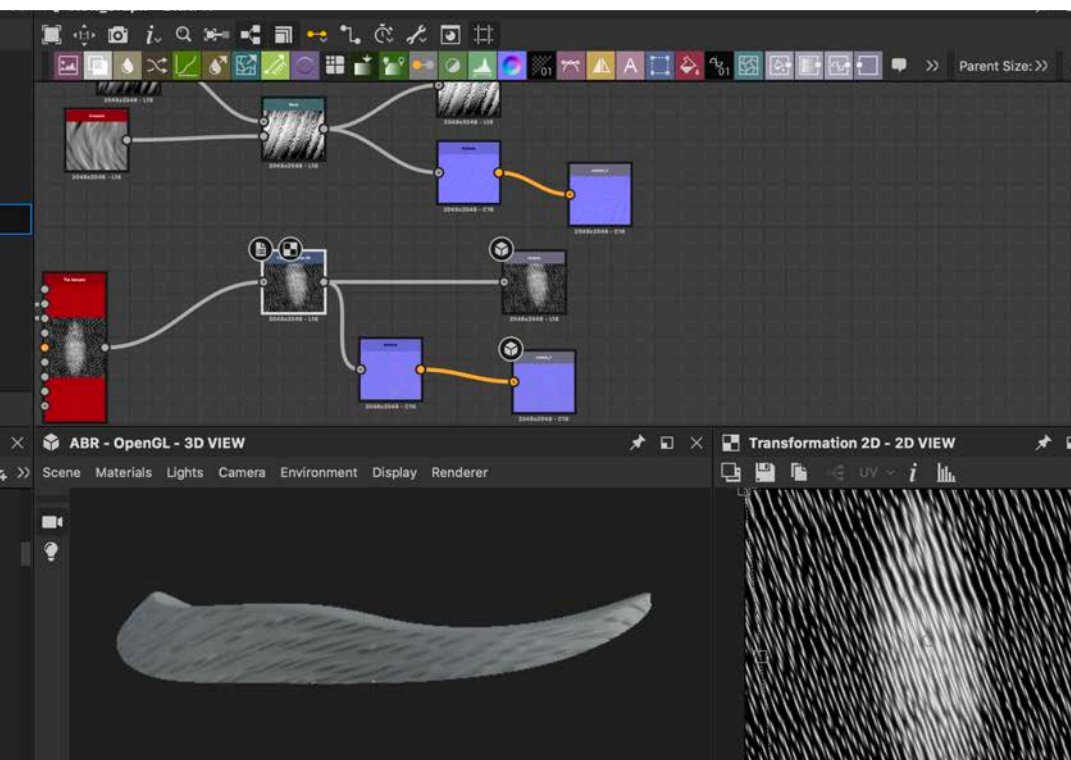
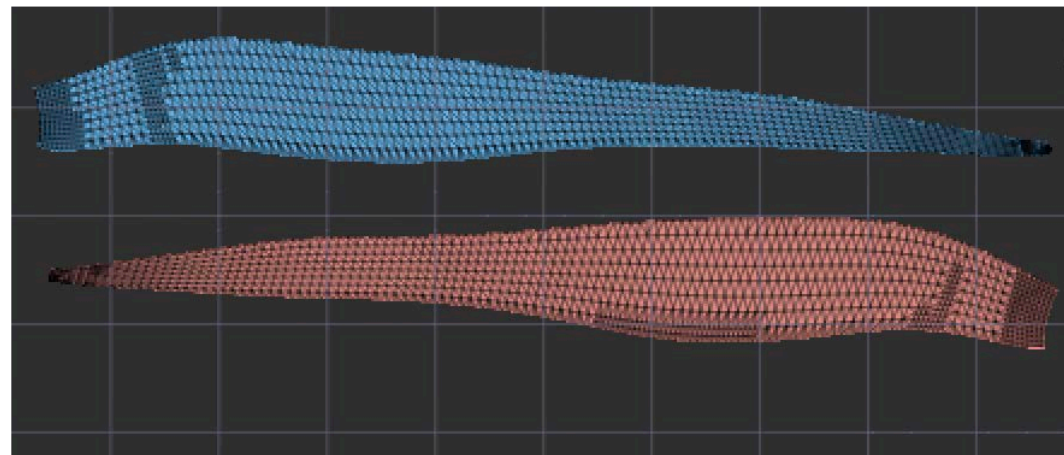
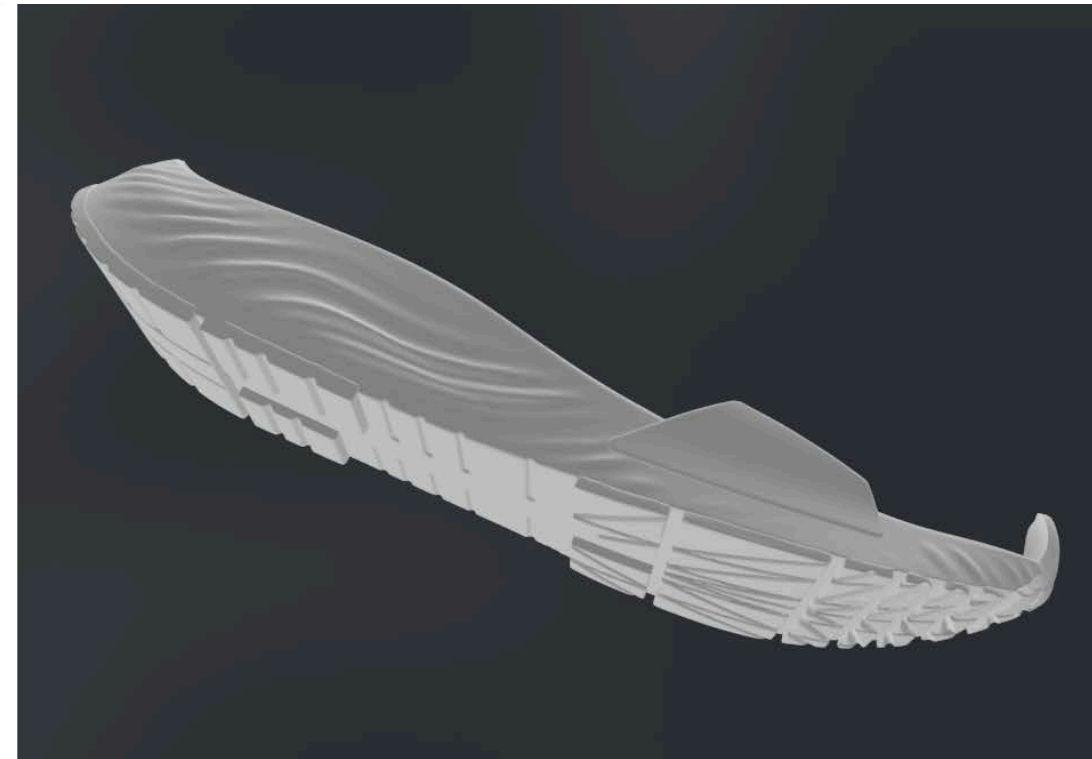
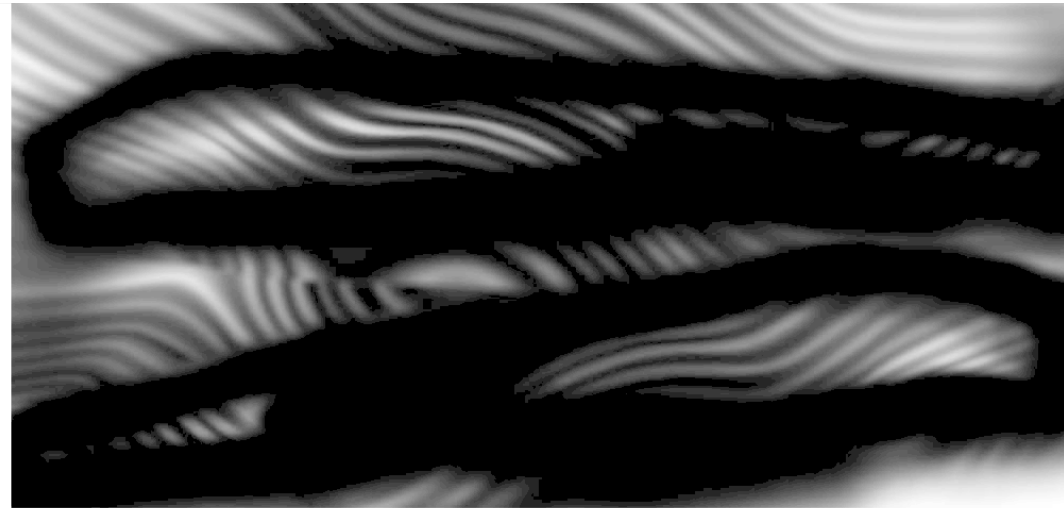
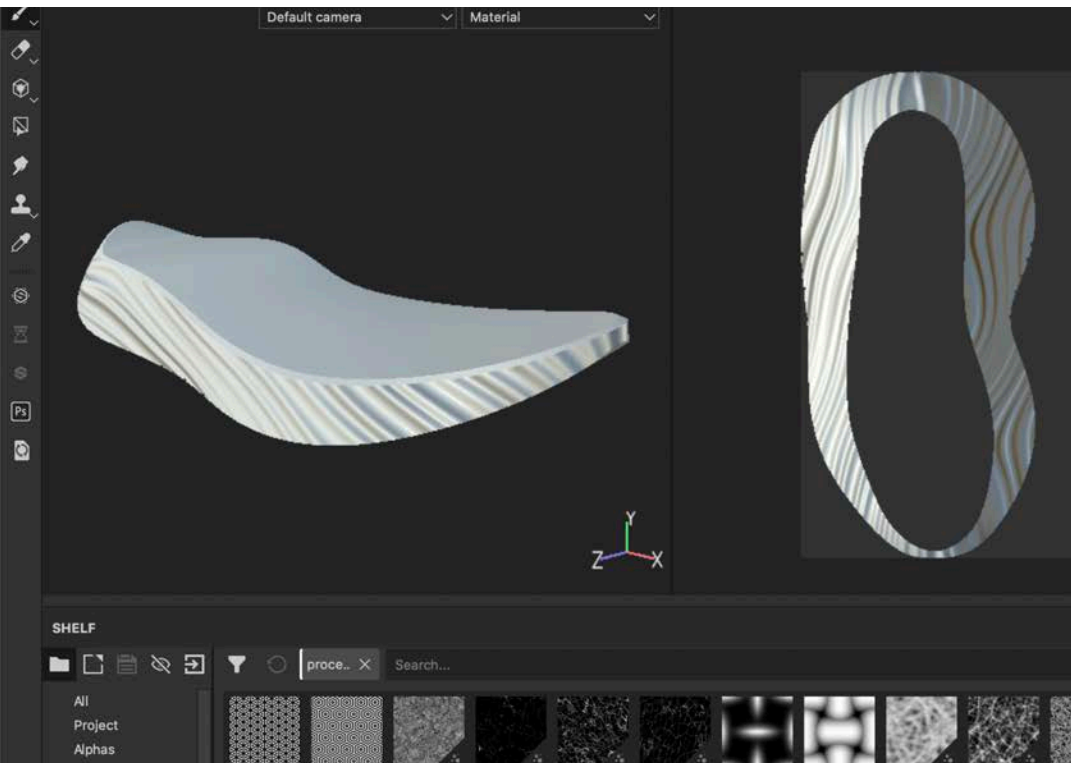
Casting works-like midsoles

PROTOTYPING

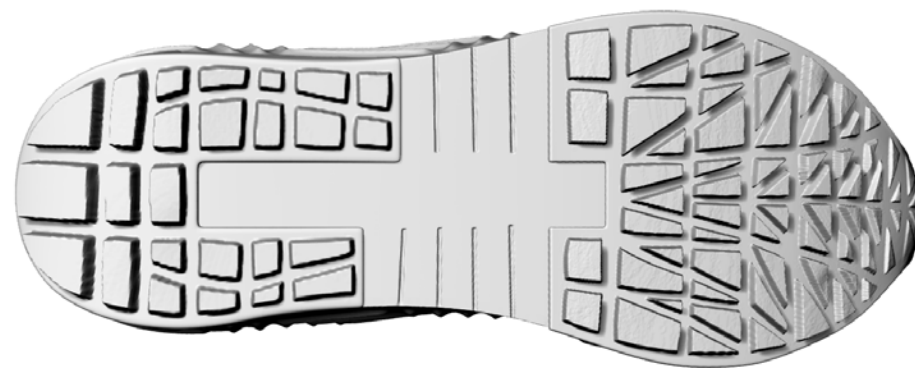
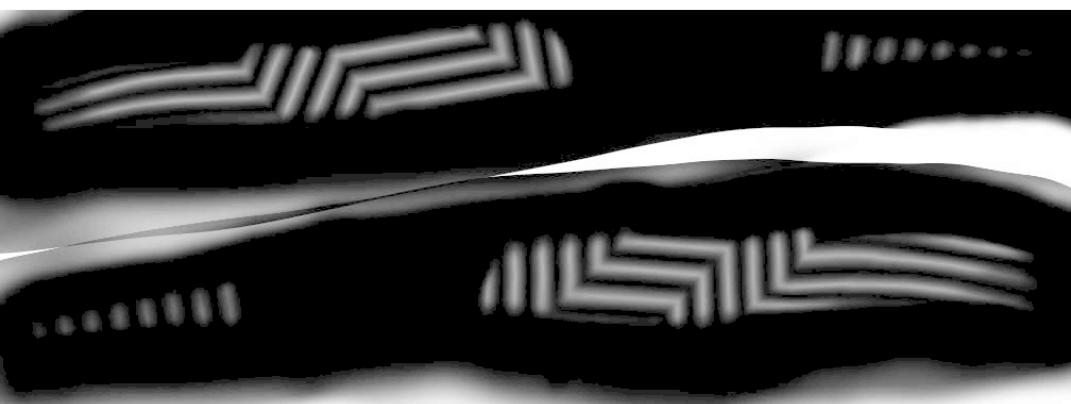
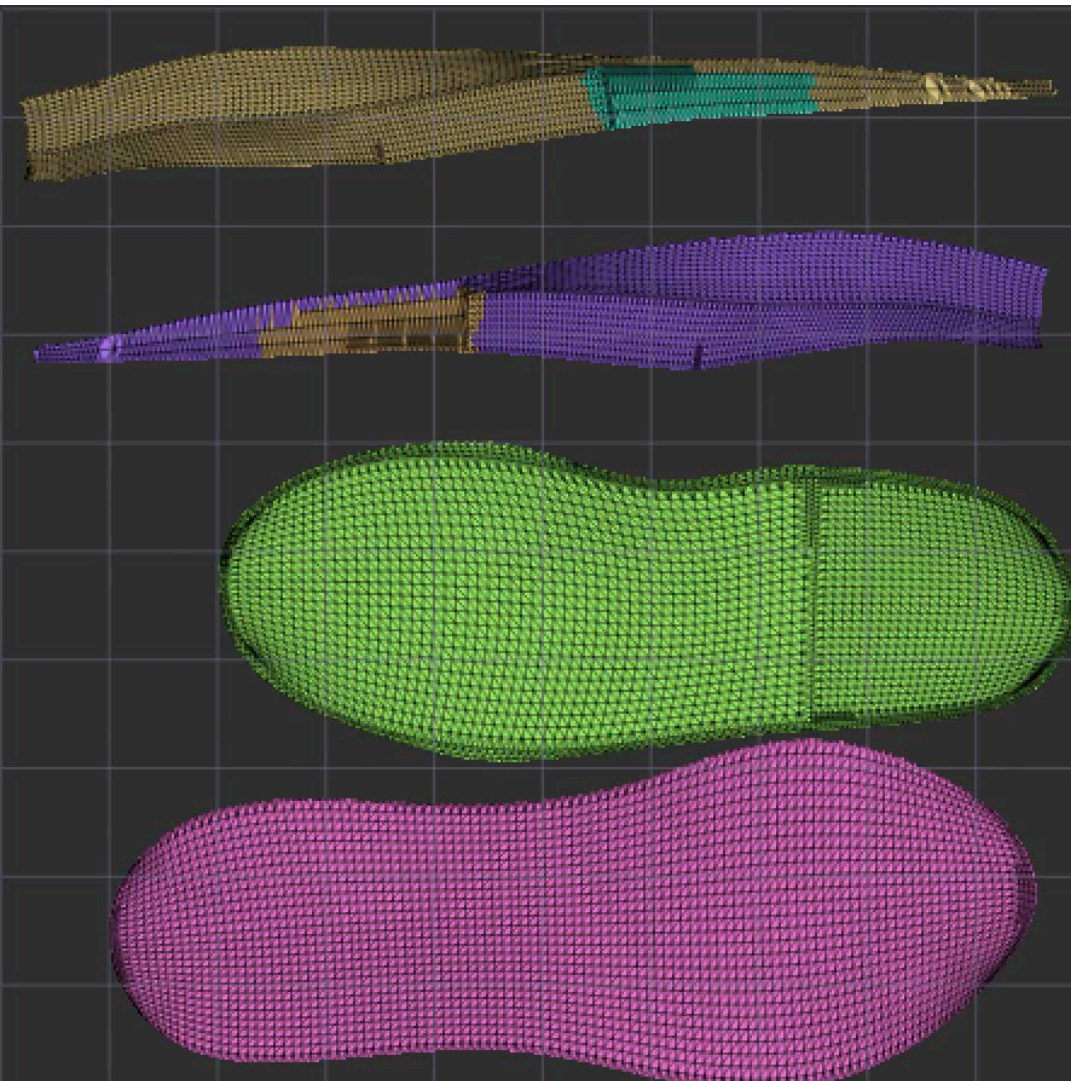


Final work-like prototypes

3D DEVELOPMENT ABR



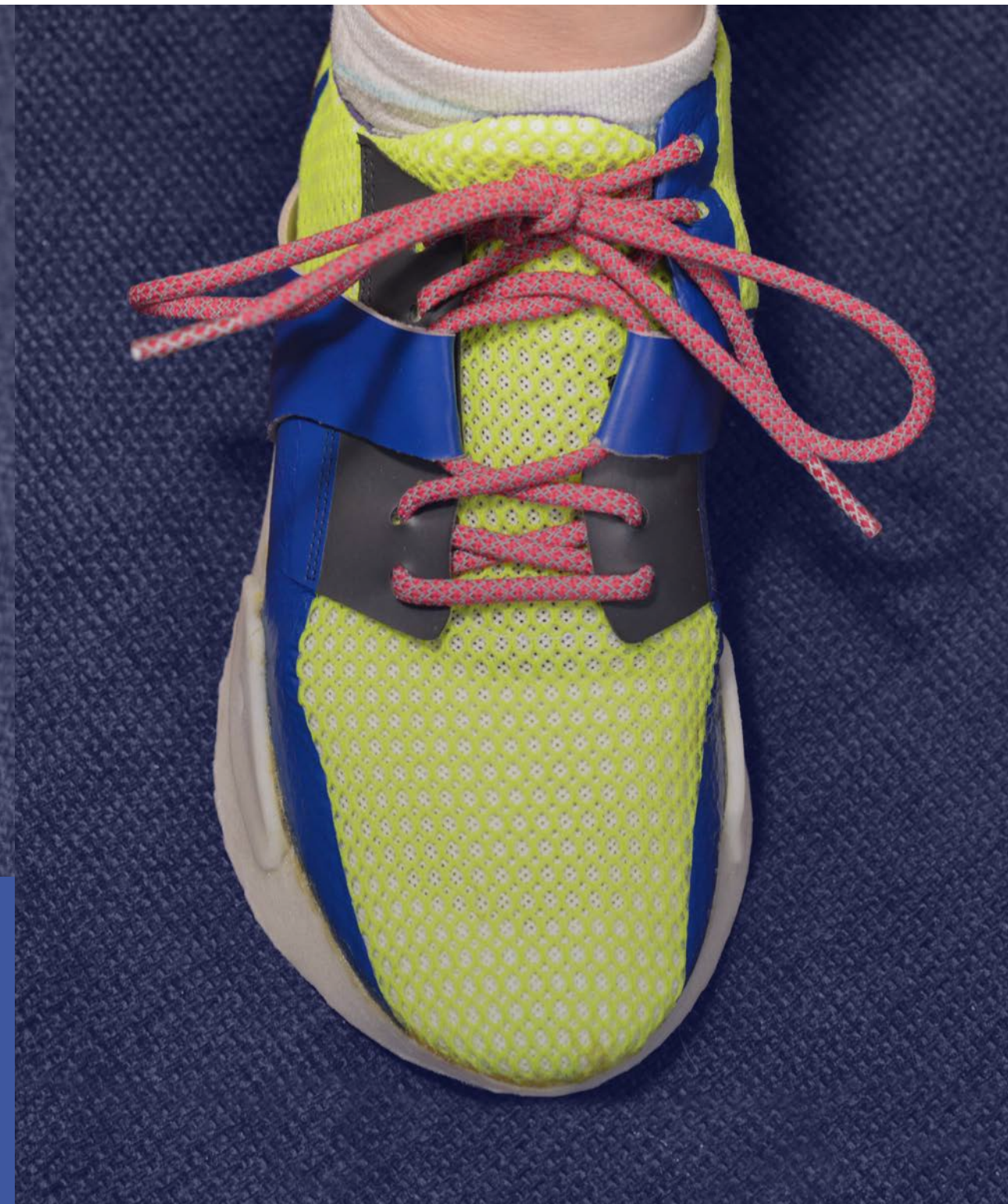
3D DEVELOPMENT ABT



WORKS-LIKE PROTOTYPES



VALIDATION FIT



"The toe box is nice. There's a **LOT OF ROOM WHERE MY TOES ARE**. It fits very comfortably around my foot. It **DOESN'T FEEL SNUG ANYWHERE.**"

ROBIN COON

VALIDATION FIT



"It's **SURPRISING HOW WIDE IT OPENS UP** to get your foot in."

"I like the tongue. **THAT'S A COOL DESIGN**. I like how it's only loose on one side because it **FEELS A LOT MORE STABLE**, like it's not going to get bunched up and slide to one side."

ROBIN COON

VALIDATION PERCEPTION



"YOU CAN ACTUALLY GET YOUR FOOT IN THE SHOE!"

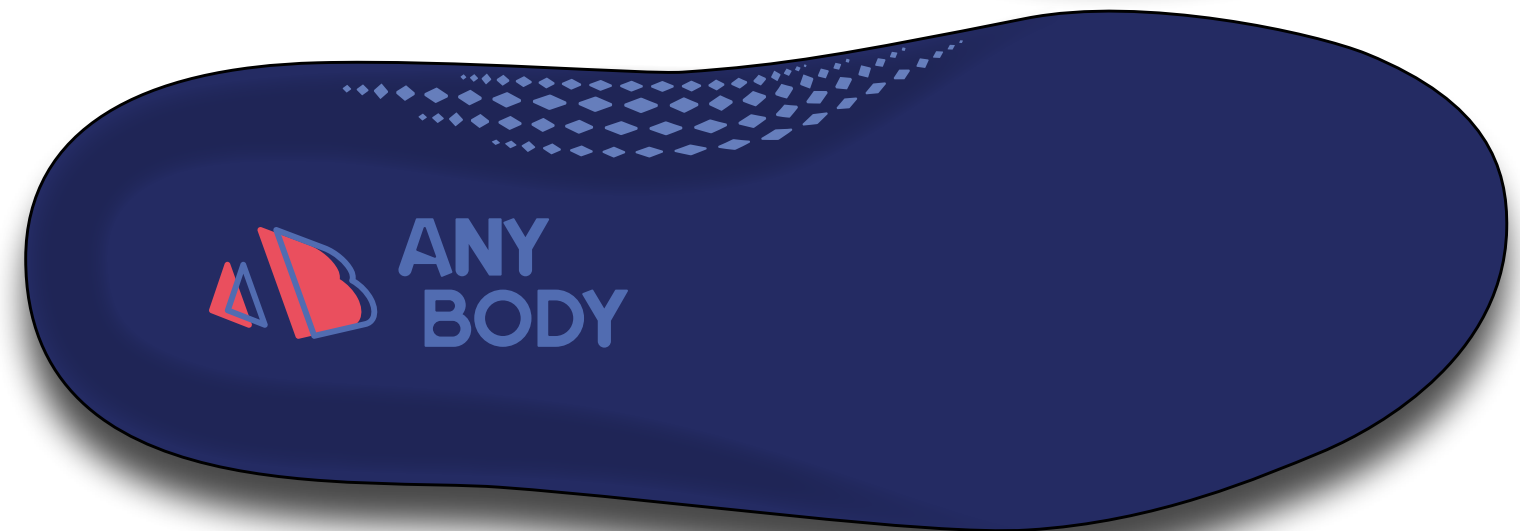
"I like the curves and ***I LIKE THAT IT LOOKS LIKE OTHER RUNNING SHOES.***"

MIRNA VALERIO || ULTRA RUNNER AND FOUNDER OF FAT GIRL RUNNING

VALIDATION EXPERT INTERVIEW



NATHAN GHABOUR // PROJECT ADVISOR
NIKE, DIGITAL INNOVATION PRODUCT DIRECTOR - NXT
SOLS, BIO-MECHANICAL ENGINEER



"IF YOU FEEL THE ARCH, YOU'LL START TO USE IT."

"TOO MUCH DAMPING in the insole will result in **DISSIPATING ENERGY**. The impact on the midsole will be too hard and it won't spring back."

PROOF OF CONCEPT



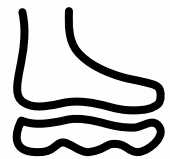
Any Body shoes use a last tuned to the proportions of a plus-size runner's foot with ample room in the toe box and instep and stretch textiles in key areas to accommodate a wide range of foot widths and girths.



The overlapping tongue design opens up wide for easy entry, even for runners with a high instep or thicker foot.



Forefoot flex supports and midfoot straps allow the foot to move freely while still being supported and stable.



The contoured, textured insole cradles the foot and works with the midsole for the right balance of support, step-in comfort, energy return, and durability.



ANY BODY'S ROAD

REFLECTIVE NYLON LACES
5mm oval laces with reflective thread for visibility
Durable, slight stretch for a little give



BREATHABLE, STRETCH-FIT UPPER
Mechanical stretch hugs the foot
Polyester diamond spacer mesh promotes airflow



INSOLE CUSHIONING
Ortholite® molded dual-density insole
2mm Impressions for step-in comfort
4mm Imperial Plus for dense, high rebound cushioning + support



FOREFOOT FLEX SUPPORTS
Side supports cradle and move with the foot for flexible, active support



FLEX GROOVES
Smooth, natural transition at toe off



OVERLAPPING TONGUE DESIGN
Sock-like fit with stretch knit that still allows for greater girth variability and opens wide for easy entry



LIGHTWEIGHT STABILITY
Bemis PU Sewfree® heat bonded toe and heel counter for added stability and protection



MIDFOOT SUPPORT
Polyester spacer mesh bonded with Bemis™ PU film to add stiffness and locks down midfoot for a secure fit



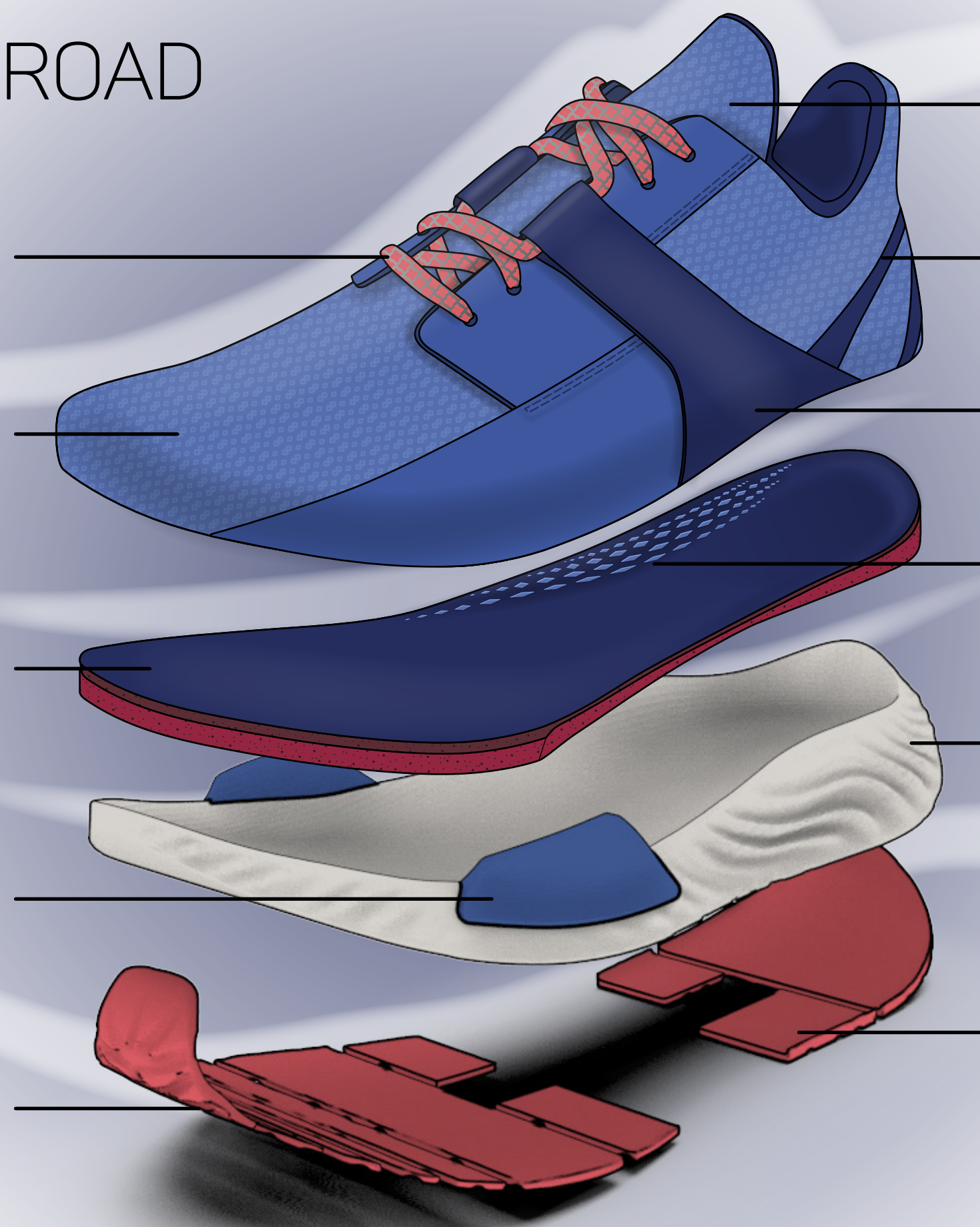
ARCH ACTIVATION
Supports the arch with subtle embossed texture that cues the arch to engage



DURABLE CUSHIONING MIDSOLE
Polyurethane foam for firm, tough cushioning that supports the foot



ZONED OUTSOLE
Durable polyurethane rubber
Tuned for plus-size runners' gait pattern



ANY BODY'S TRAIL

REFLECTIVE SPEED LACES

2mm high tensile strength cord with reflective thread for visibility
Low-profile speed lace cord lock for a fast, secure fit



LIGHTWEIGHT PROTECTION

Bemis PU Sewfree® heat bonded toe and heel counter for added stability and protection



INSOLE CUSHIONING

Ortholite® molded dual-density insole
2mm Impressions for step-in comfort
4mm Imperial Plus for dense, high rebound cushioning + support



FOREFOOT FLEX SUPPORTS

Side supports cradle and move with the foot for flexible, active support



ZONED OUTSOLE

Durable polyurethane rubber
Tuned for plus-size runners' gait pattern



OVERLAPPING TONGUE DESIGN

Sock-like fit with stretch knit that still allows for greater girth variability and opens wide for easy entry



WATER RESISTANT

GORE-Tex™ stretch lining
DWR coated woven polyester



MIDFOOT SUPPORT

Polyester spacer mesh bonded with Bemis™ PU film to add stiffness and locks down midfoot for a secure fit



ARCH ACTIVATION

Supports the arch with subtle embossed texture that cues the arch to engage



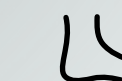
DURABLE CUSHIONING MIDSOLE

Polyurethane foam for firm, tough cushioning that supports the foot



SEGMENTED ROCK PLATE

Nylon rock plate adds extra underfoot protection from sharp rocks and roots

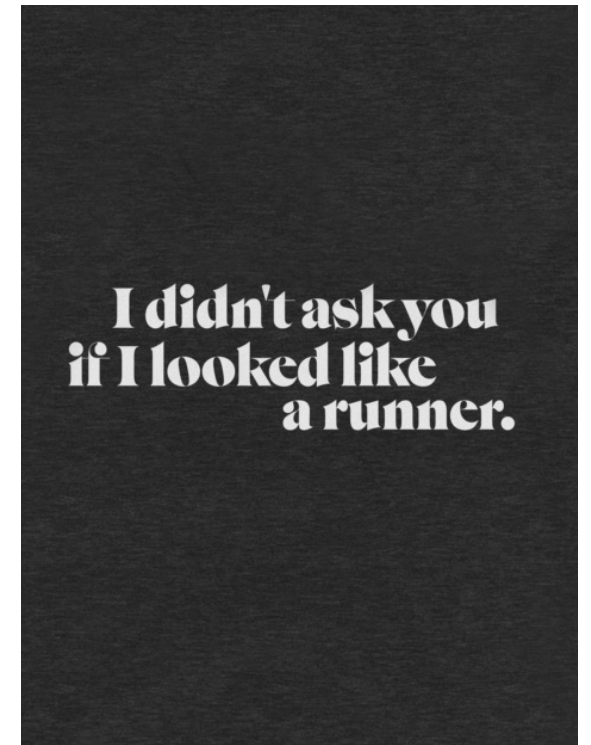
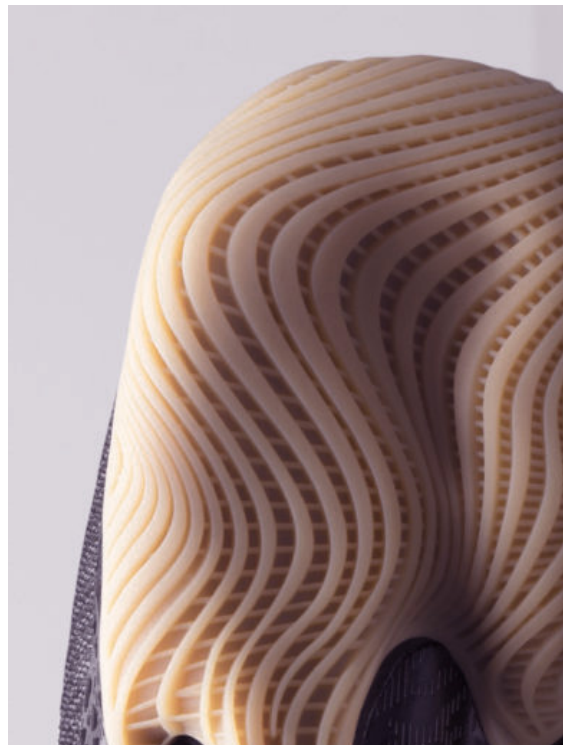
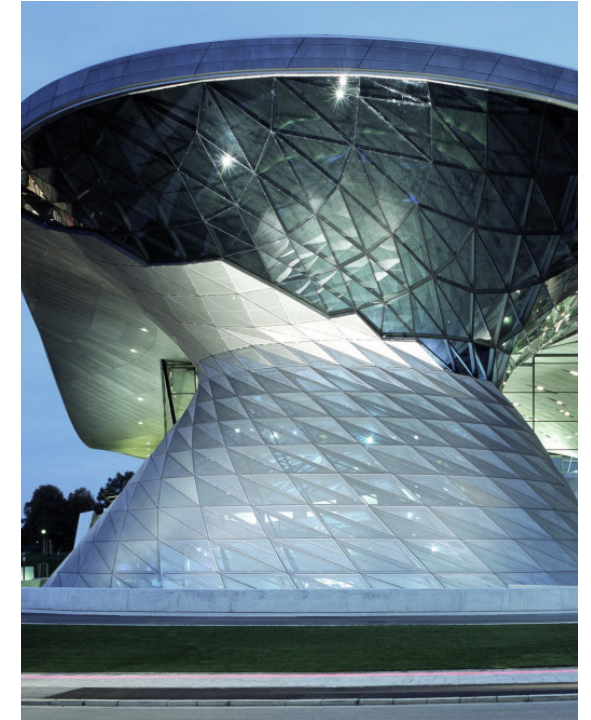
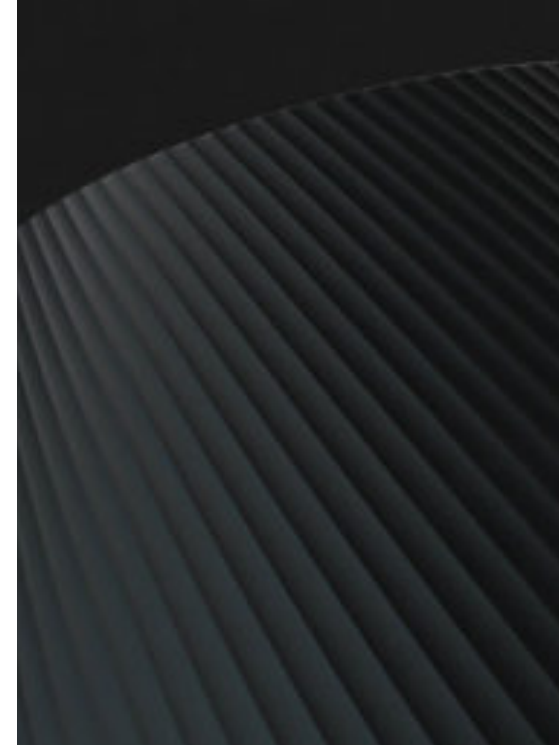


OUTSOLE LUGS

5mm lugs at forefoot and heel for traction on uneven terrain
Smooth, natural transition at toe off



BRANDING DEVELOPMENT

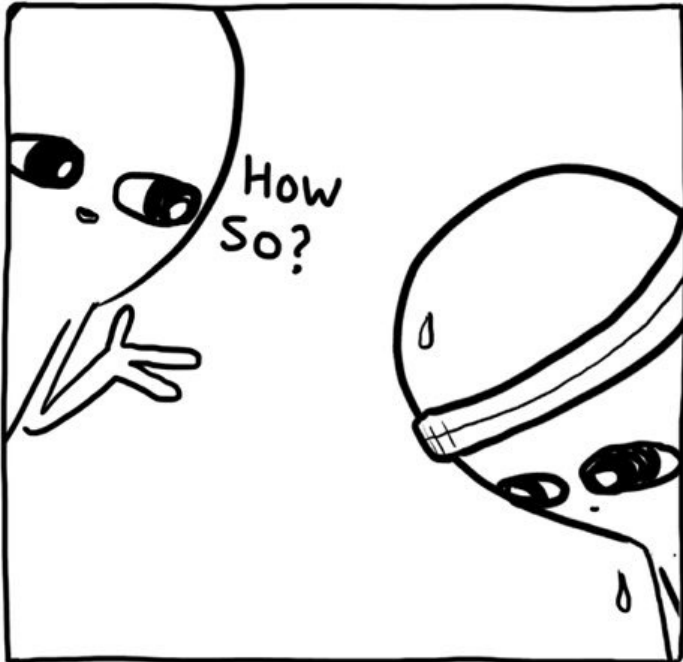


An early mood board that was replaced

MOOD BRAND



I didn't ask you
if I looked like
a runner.



NATHANWPLYE

BRANDING DEVELOPMENT



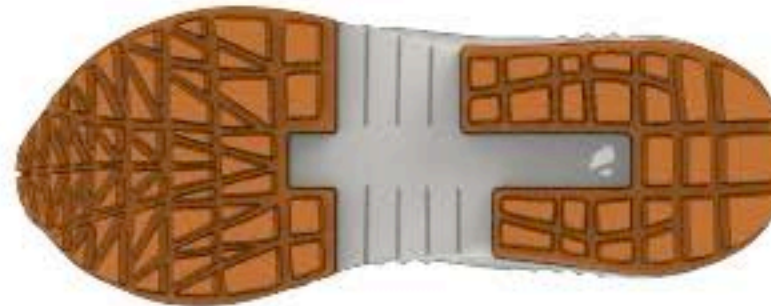
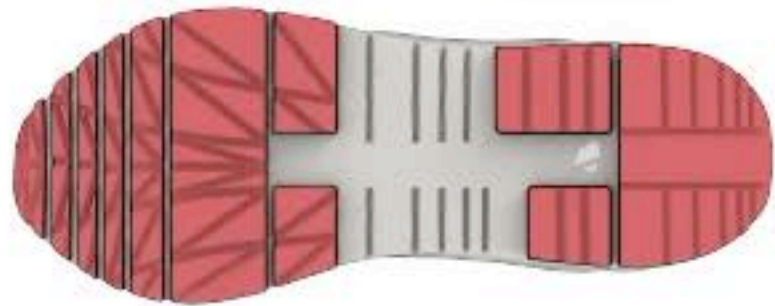
Initial package inspiration board

BRANDING DEVELOPMENT



Exploration of how the logo could be applied to the product

BRANDING DEVELOPMENT



Exploration of how the logo could be applied to the product

BRANDING DEVELOPMENT



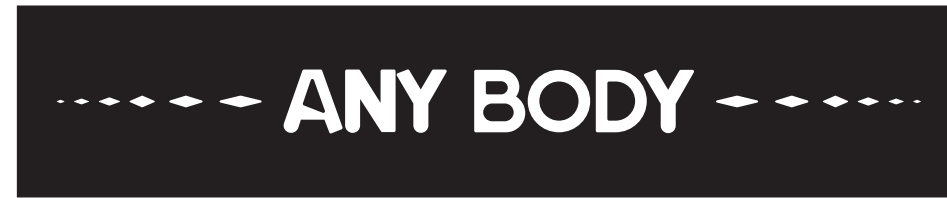
Mock up of product photography for midterm

STYLE GUIDE

PRIMARY LOGO

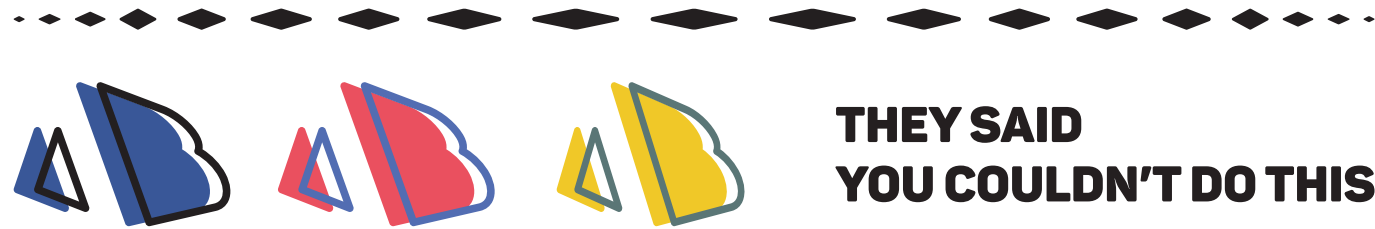


SECONDARY LOGOS

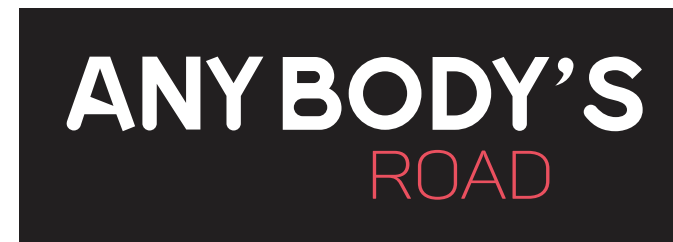


ANY BODY

BRAND ELEMENTS



PRODUCT NAME USAGE



TYPOGRAPHY

TITLE PANTON BLACK CAPS 45PT

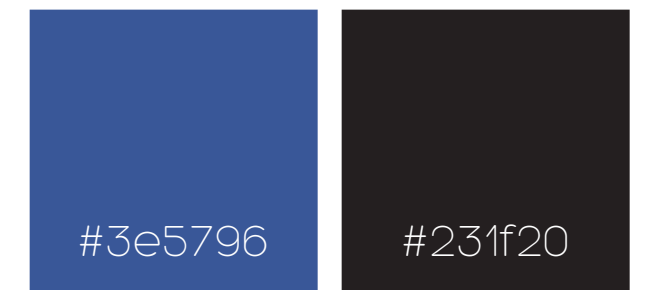
SUBTITLE PANTON BLACK CAPS 45PT

SUBHEADING PANTON LIGHT ITALIC CAPS 18PT

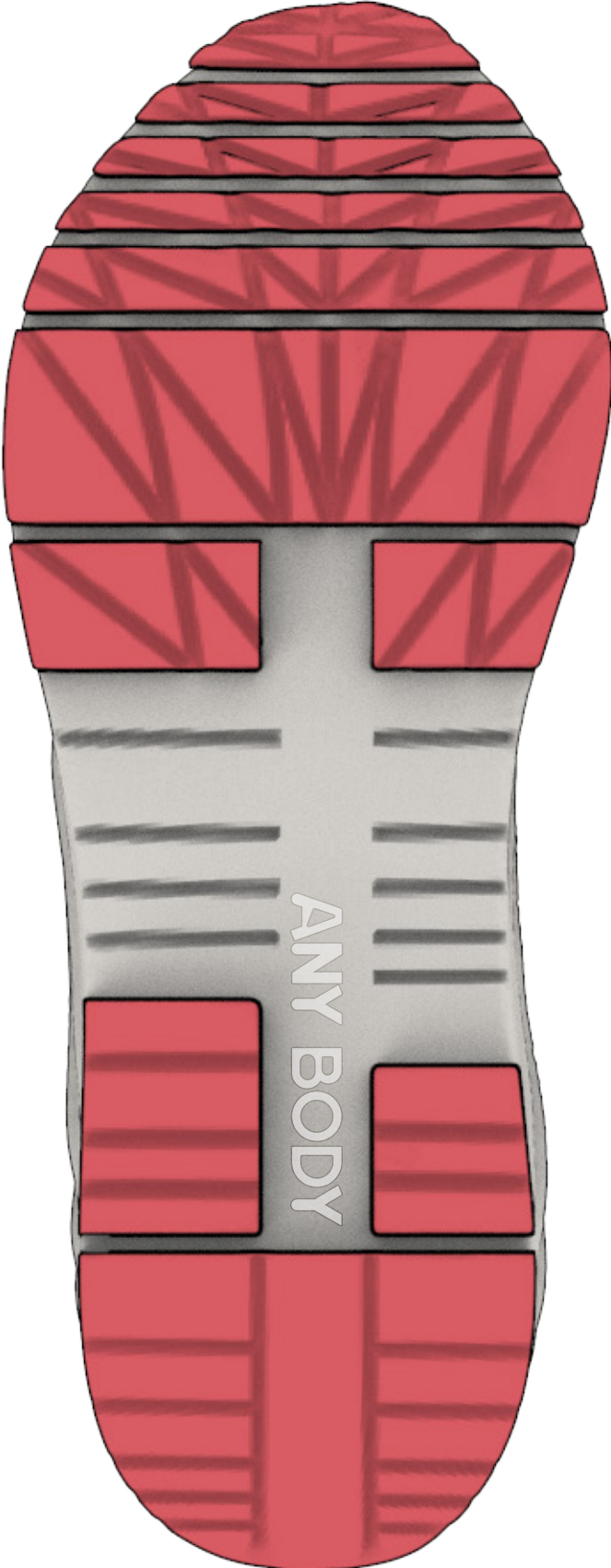
EMPHASIS PANTON BLACK ITALIC CAPS 18PT (USED SPARINGLY)

Body copy Hero Light 18PT

PRIMARY COLORS



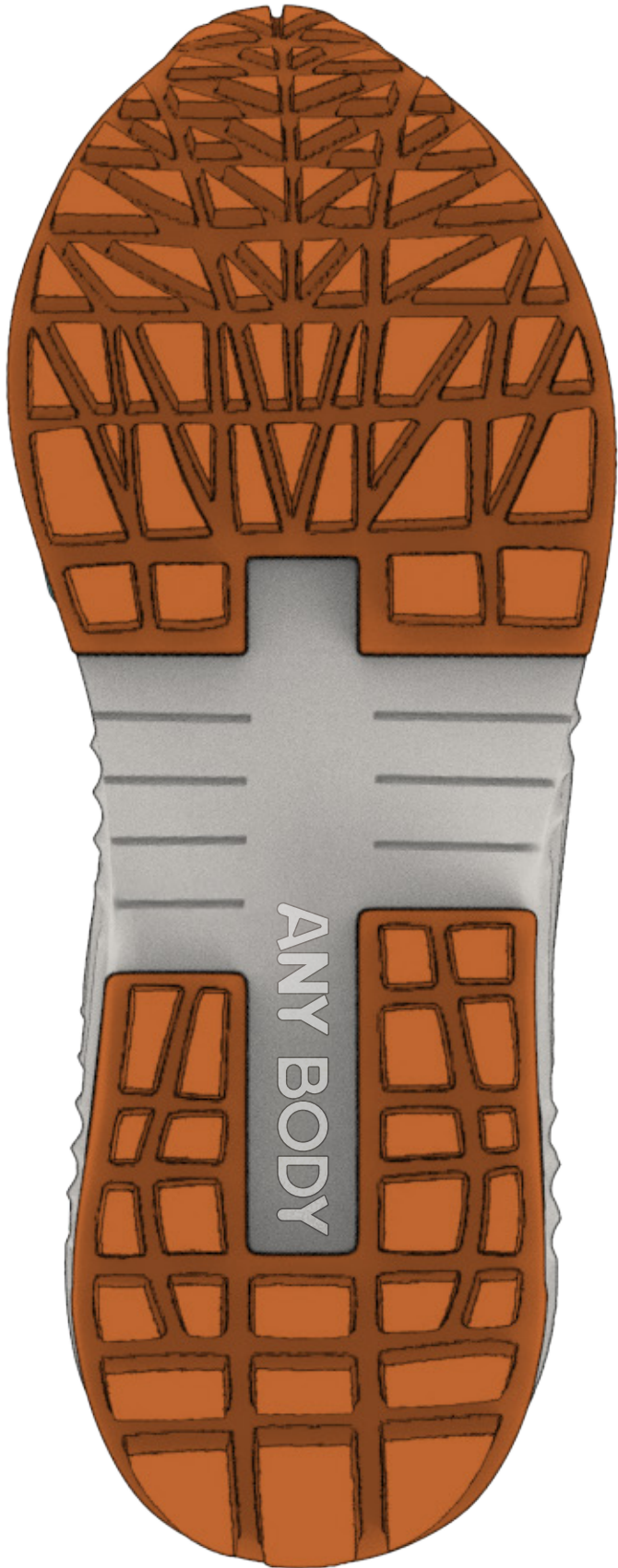
BRAND ELEMENTS



ANY BODY

**THEY SAID
YOU COULDN'T DO THIS**

BRAND ELEMENTS



ANY BODY

THEY SAID YOU COULDN'T DO THIS

COLORWAYS ABR



Colorway exploration. Mild -> Wild

COLORWAYS ABT



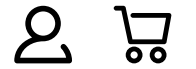
Colorway exploration. Mild -> Wild

WEBSITE DESIGN

A woman is running on a mountain trail, wearing a yellow and green technical running vest, leggings, and a yellow visor. The background shows a vast mountain range under a cloudy sky.

**TECHNICAL RUNNING SHOES
THAT SUPPORT YOUR BODY**

WEBSITE DESIGN



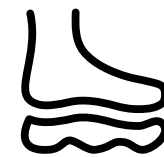
WHY ANY BODY?



The unique overlapping tongue design gives you a sock-like fit that opens wide so it's easy to put on.



A secure fit that moves with the foot! Your foot will be locked and loaded to get after your run.



Durable cushioning, arch support, and traction, designed for a plus-sized body. You'll feel confident on the road and trail.

[SHOP ROAD](#)

[SHOP TRAIL](#)

WEBSITE DESIGN

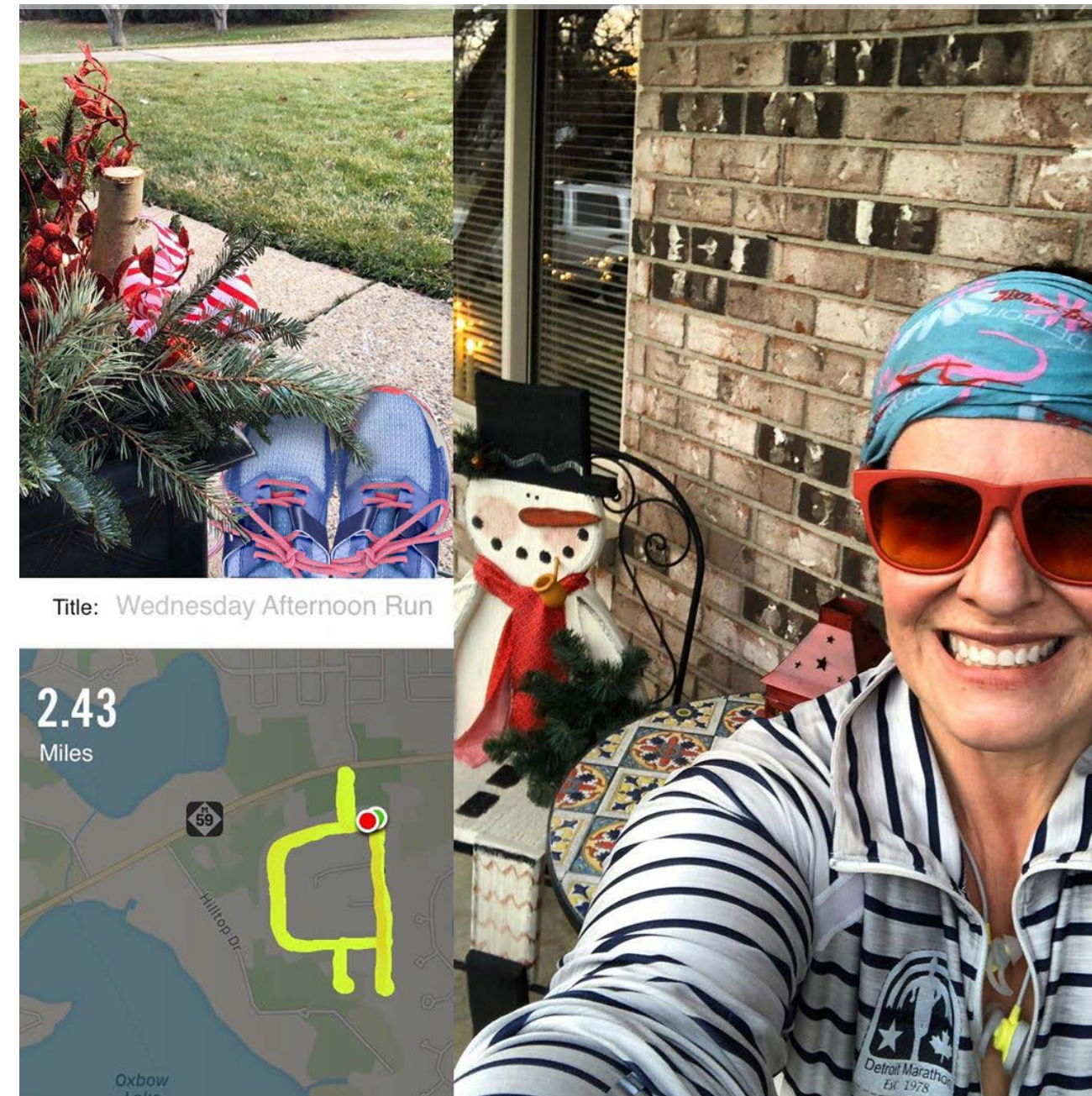


MORE THAN JUST RUNNING SHOES

Running is hard. It's a little bit easier with shoes that fit and support you, and a badass community of others going through the same thing as you.

Track your miles, post your runs, and join other Any Body women as you get out and celebrate the process.

[JOIN THE FUN](#)



Title: Wednesday Afternoon Run

2.43
Miles

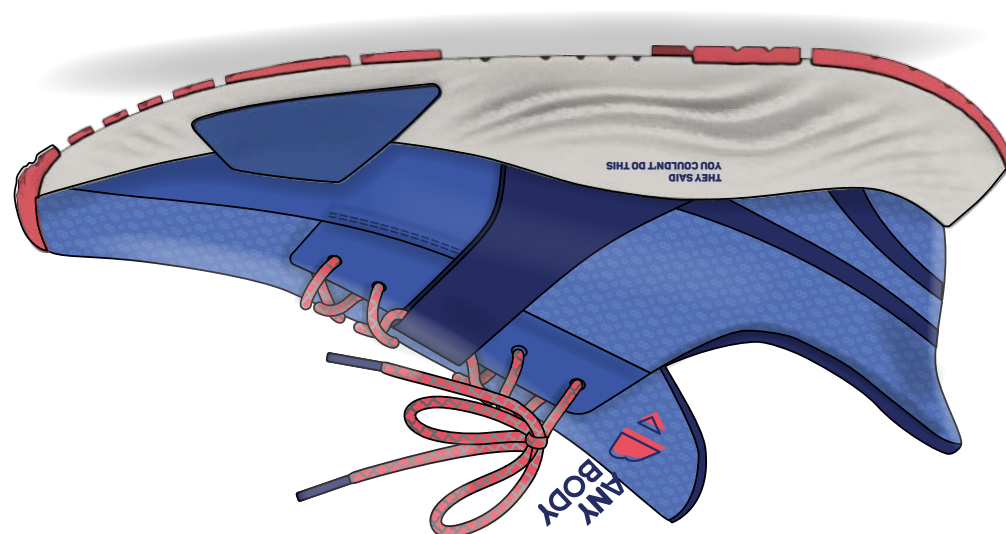
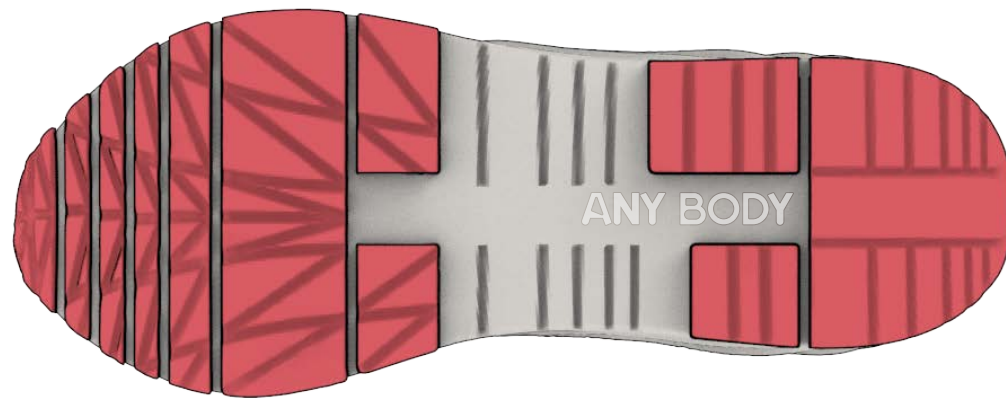
59



















Hilltop Dr.

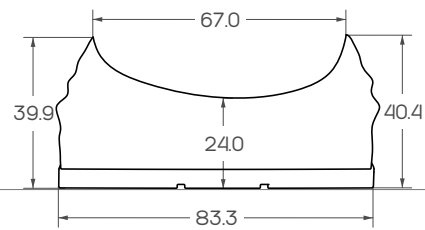
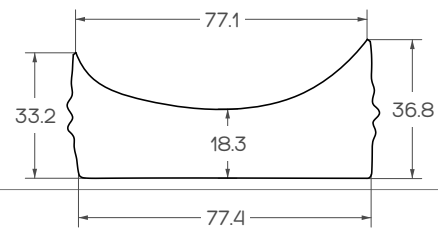
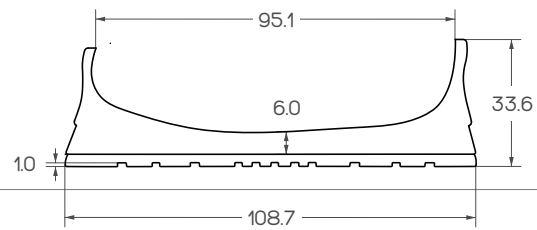
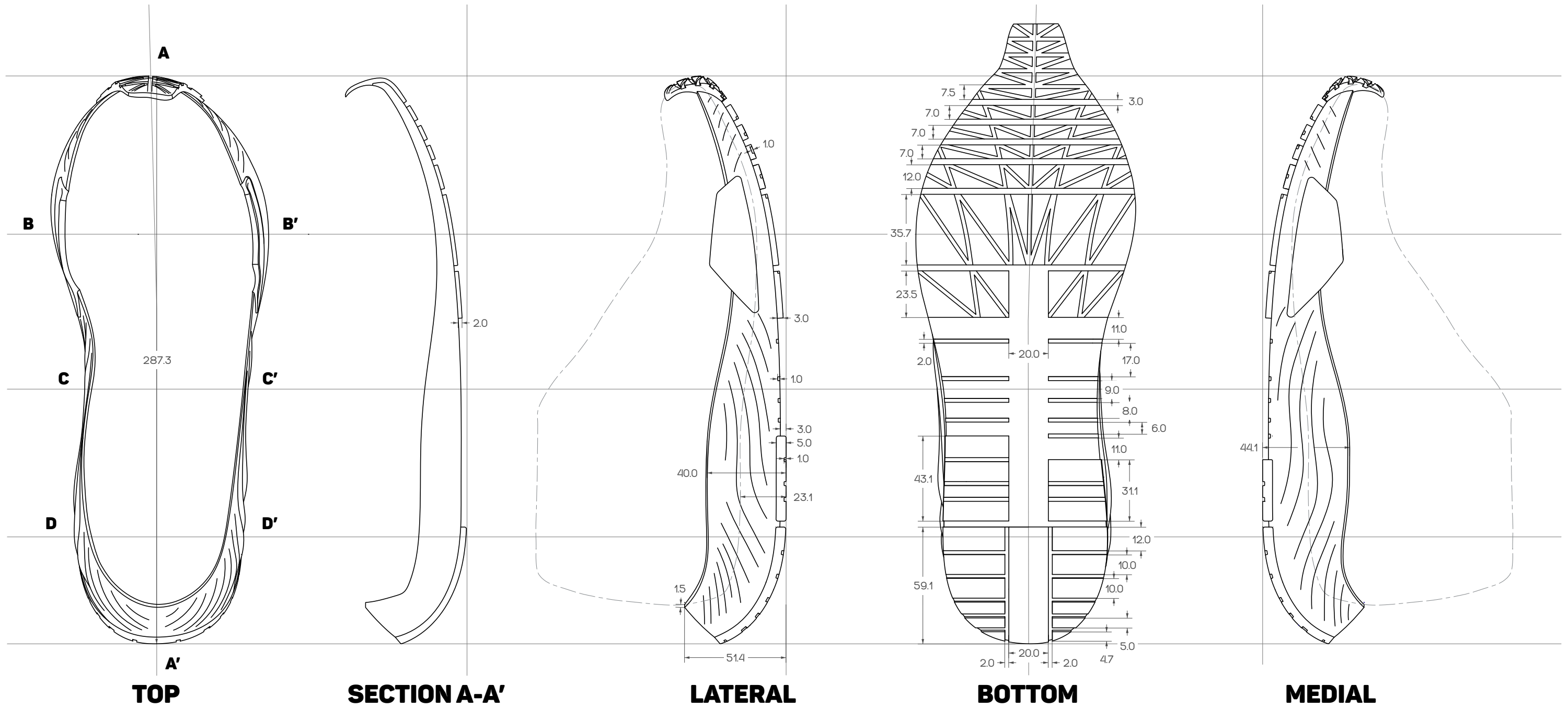
Oxbow
Lake

Detroit Marathon
EST. 1978

TECH PACK ABR



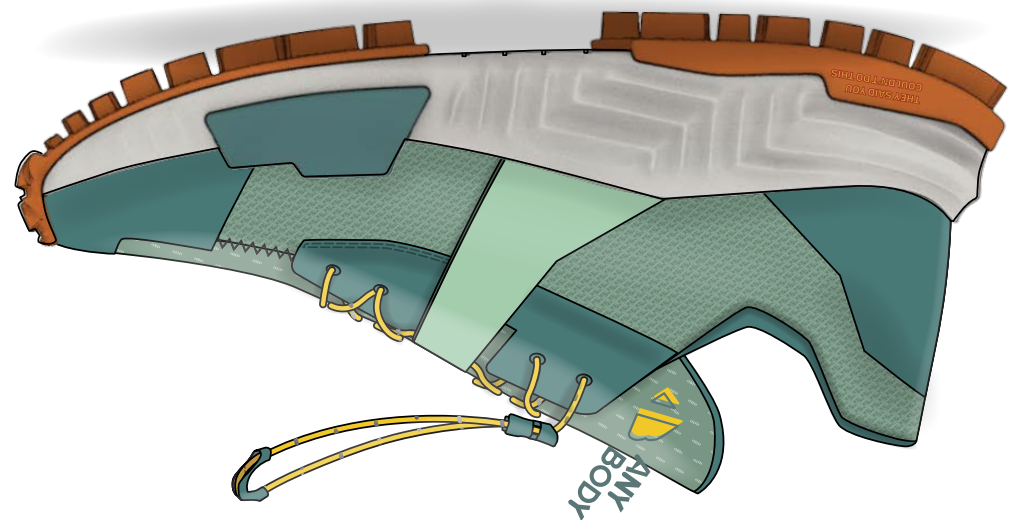
PIECE	SUPPLIER	MATERIAL	COLOR
Lining	Mogae	MG3848 Cool Blalon P	19-3943 TCX Bellwether Blue
Vamp	Mogae	MG3808 Cool Caligo Meshler V3P	 18-3946 TCX Baja Blue
Quarters	Mogae	MG3808 Cool Caligo Meshler V3P	 18-3946 TCX Baja Blue
Midfoot straps - top layer	Bemis	EXOFLEX (EXO03900)	 19-3943 TCX Bellwether Blue
Midfoot straps - bottom layer	Mogae	MG4013 Prio Meshler CDP	 18-3946 TCX Baja Blue
Toe	Bemis	EXOFLEX (EXO03900)	 18-3949 TCX Dazzling Blue
Heel counter	Bemis	EXOFLEX (EXO03900)	 19-3943 TCX Bellwether Blue
Eyerow	San Fang	HOLA-BUCK, 1.2mm	 18-3949 TCX Dazzling Blue
Laces	VASGO	Round reflective, 47in length	 17-1755 TCX Paradise Pink
Lace aglet	Trendware	CP-72	 19-3943 TCX Bellwether Blue
Midsole	Hunstman	Injection-molded DALTOPED PERFORM	 12-4300 TCX White Onyx,  18-3949 TCX Dazzling Blue
Outsole	Huntsman	Injection-molded DALTOPED GRIP	 17-1755 TCX Paradise Pink
Tongue logo	N/A	Screen print	 19-3943 TCX Bellwether Blue,  17-1755 TCX Paradise Pink
Midsole logos	N/A	Screen print	 19-3943 TCX Bellwether Blue
Sock liner - top cloth	Mogae	MG3848 Cool Blalon P	 19-3943 TCX Bellwether Blue
Sock liner - layer 1	Ortholite	2mm Impressions	 19-1725 TPX Tawny Port
Sock liner - layer 2	Ortholite	4mm Imperial Plus	 19-1850 TCX Red Bud



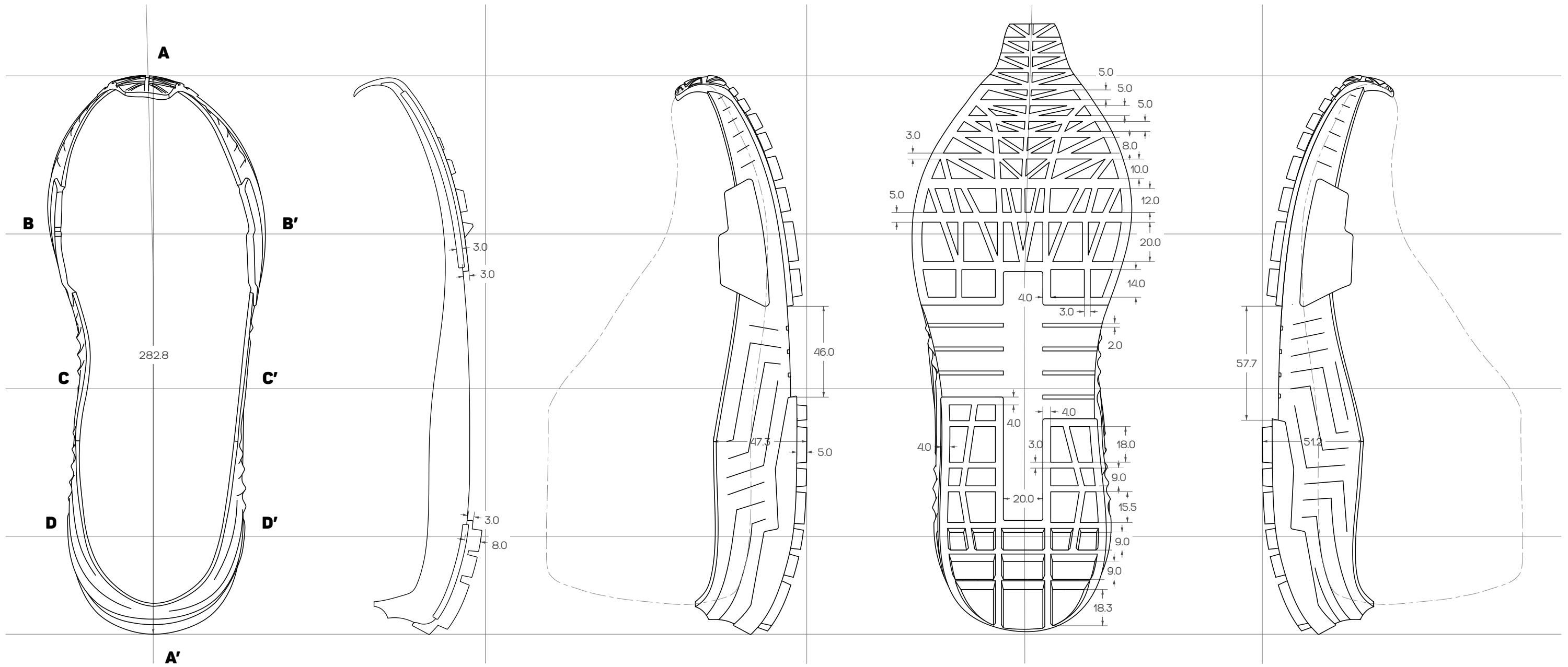
ANY BODY'S ROAD

Midsole/Outsole | Technical Drawing
 Scale 1:2
 Women's Size 8

TECH PACK ABT



PIECE	SUPPLIER	MATERIAL	COLOR
Lining	Mogae	MG3848 Cool Blalon P	18-5612 TCX Sagebrush Green
Vamp	Mogae	MG4022 Deteelon CDP-P	16-5304 TCX Jadeite
Quarters	Mogae	MG3859 Enamor Woven P	16-5304 TCX Jadeite
Midfoot straps - top layer	Bemis	EXOFLEX (EXO03900)	12-5506 TCX Dusty Aqua
Midfoot straps - bottom layer	Mogae	MG4013 Prio Meshler CDP	18-5612 TCX Sagebrush Green
Toe	Bemis	EXOFLEX (EXO03900)	18-5612 TCX Sagebrush Green
Heel counter	Bemis	EXOFLEX (EXO03900)	18-5612 TCX Sagebrush Green
Eyrow	San Fang	HOLA-BUCK, 12mm	18-5612 TCX Sagebrush Green
Lace kit	NIFCO	CLEF20SA 2mm	14-0852 TCX Freesia, 18-5612 TCX Sagebrush Green
Midsole	Hunstman	Injection-molded DALTOPED PERFORM	12-4300 TCX White Onyx, 18-5612 TCX Sagebrush Green
Outsole	Huntsman	Injection-molded DALTOPED GRIP	16-1260 TCX Harvest Pumpkin
Tongue logo	N/A	Screen print	18-5612 TCX Sagebrush Green, 14-0852 TCX Freesia
Sock liner - top cloth	Mogae	MG3848 Cool Blalon P	18-5612 TCX Sagebrush Green
Sock liner - layer 1	Ortholite	2mm Impressions	19-1725 TPX Tawny Port
Sock liner - layer 2	Ortholite	4mm Imperial Plus	17-1544 TPX Burnt Sienna



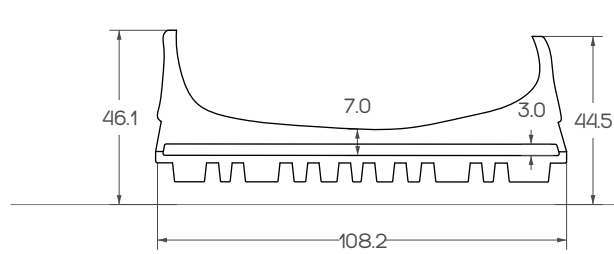
TOP

SECTION A-A'

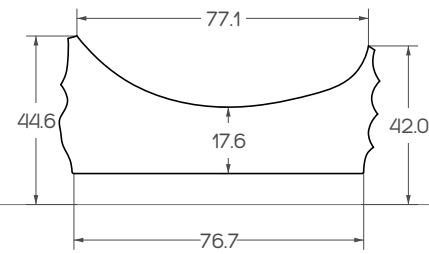
LATERAL

BOTTOM

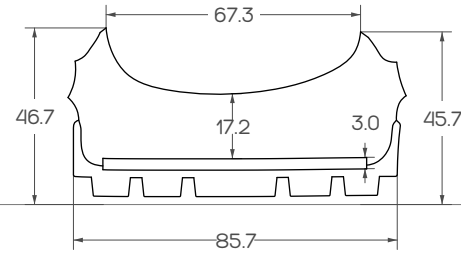
MEDIAL



SECTION B-B'



SECTION C-C'



SECTION D-D'

ANY BODY'S TRAIL

Midsole/Outsole | Technical Drawing

Scale 1:2

Women's Size 8

ANY BODY'S TRAIL



ANY BODY'S ROAD

ANY BODY'S

ROAD



ANY BODY'S

ROAD



ANYBODY'S

TRAIL



ANYBODY'S TRAIL



A woman with dark hair tied back, wearing a white long-sleeved athletic top and white leggings, is captured in motion running on a city street. The background shows blurred buildings and streetlights, suggesting an urban environment during the "blue hour" of dusk. The overall tone is motivational and focused on physical activity.

Any Body envisions a world where no one assumes anything about you as an athlete because of the way you look—a future where no woman feels out of place on the starting line.



ANY BODY

SPIRITED | UNAPOLOGETIC | PURPOSEFUL

Capstone Project: Final Presentation
Spring 2020

University of Oregon, MS Sports Product Design
Chrissy Bettencourt

PROBLEM STATEMENT

65% of women in the US wear size 14 or above, and yet running brands primarily design products for a thin, male body that fits the image of what a runner looks like.

Any Body acknowledges and embraces the athletes who don't fit that mold—the women who were told they're too fat to run, but did it anyways.



ATHLETE OVERVIEW

USER

Plus-size women (wear size 14+)

30-60 years old

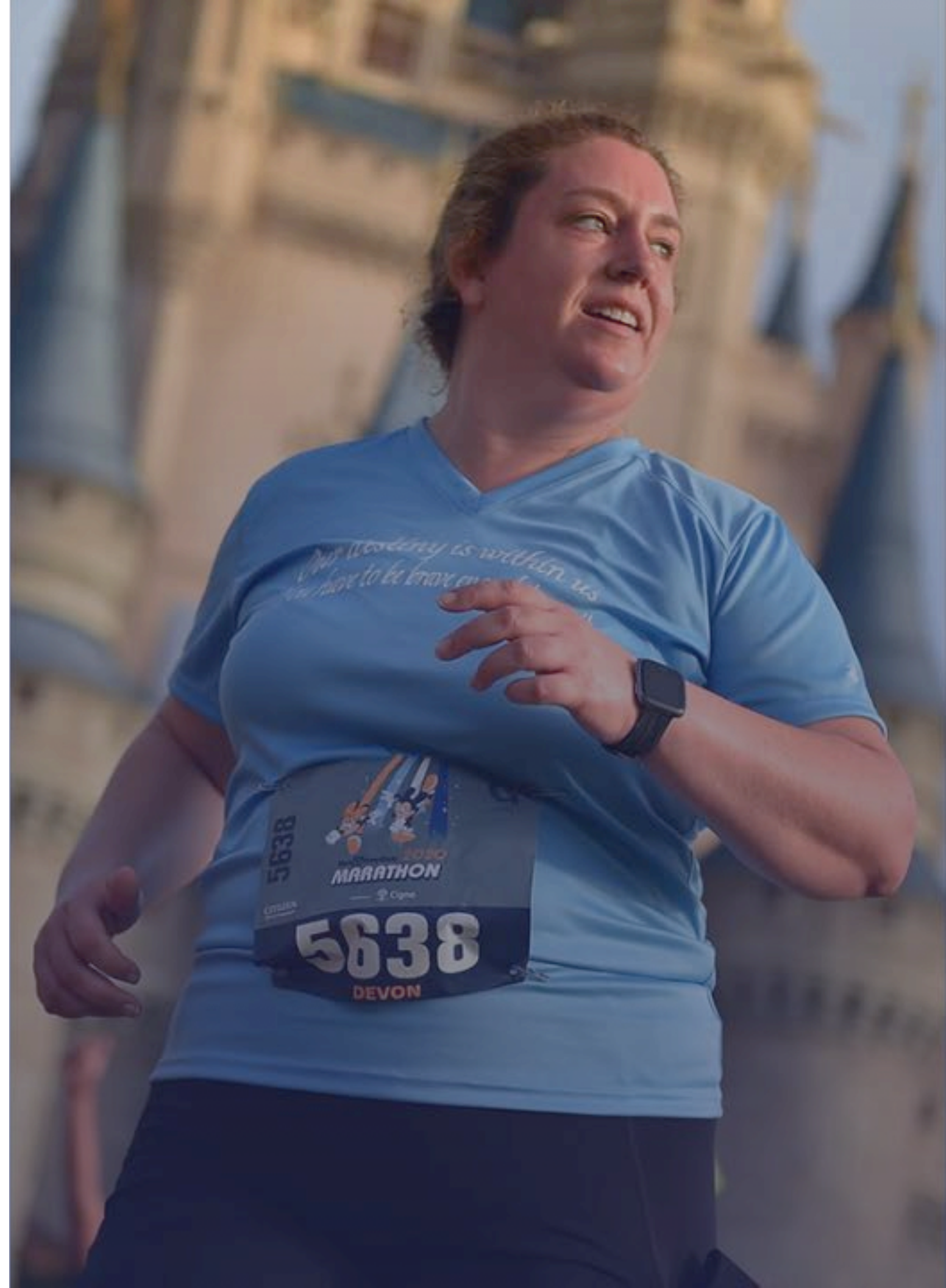
Motivated to live an active and healthy lifestyle,
not necessarily lose weight

SPORT

Run/walk/run

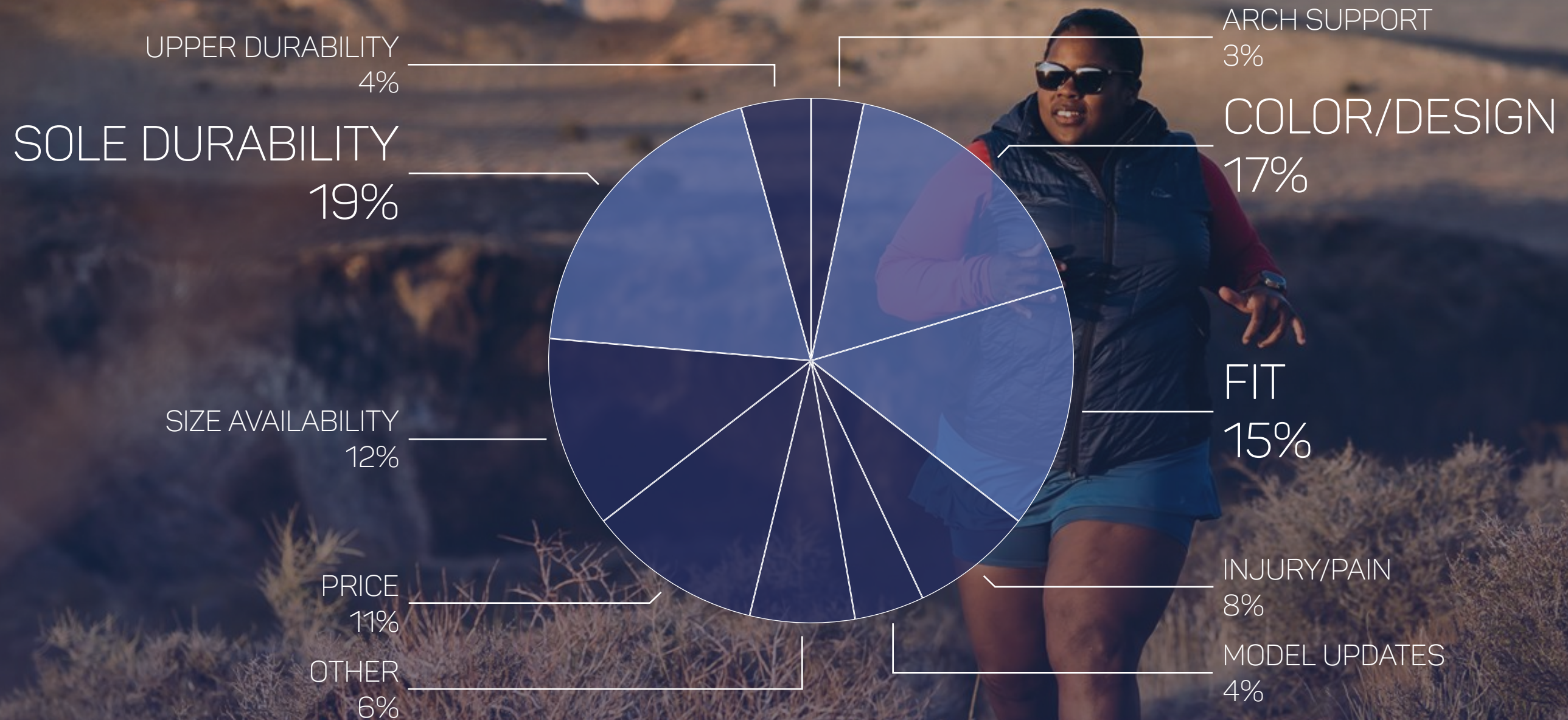
Goal: Half marathon

Runs with friends a few times a week, has done
a few 5Ks but wants to train for longer races



ATHLETE INSIGHT FAT GIRL RUNNING

WHAT DON'T YOU LIKE ABOUT YOUR CURRENT SHOES?



PROBLEMS TO SOLVE



POOR FIT

Flatter, fuller feet, but not necessarily "wide"
Shoes are hard to get on



CUSHIONING + SUPPORT

More weight = more stress on the feet and shoes
Super soft shoes break down quickly



WIDE SHOES ARE BORING

Running shoes tend to be bright and bold, but the same colors are not available in wide widths

ATHLETE OUTCOMES

A woman is running on a dirt trail. She is wearing a bright green long-sleeved athletic shirt, blue shorts, a blue cap, and a blue fanny pack. The background is a blurred green forest.

Any Body empowers women of all sizes and paces to run by providing road and trail shoes that support their bodies, fit comfortably, and look great. Plus-size women will be able to run longer and more confidently.

Any Body enables women to feel welcome in a space that too often is filled with people telling them they can't or shouldn't be there.

RESEARCH GAIT ANALYSIS



WALK

Prominent heel strike
Longer steps



RUN

Not a transitional gait cycle
Midfoot/flat strike - barely any dorsiflexion
All vGRF, resulting in significantly more stress on the body

RESEARCH LAST MAKING

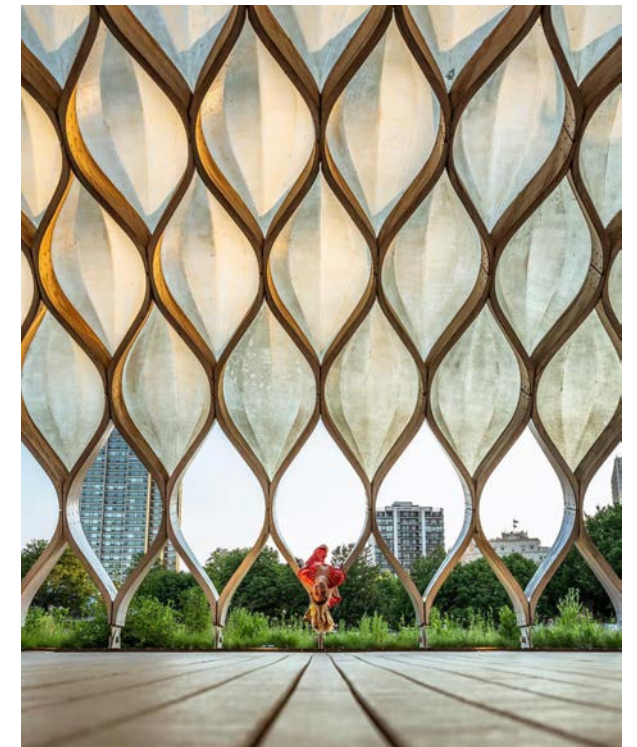
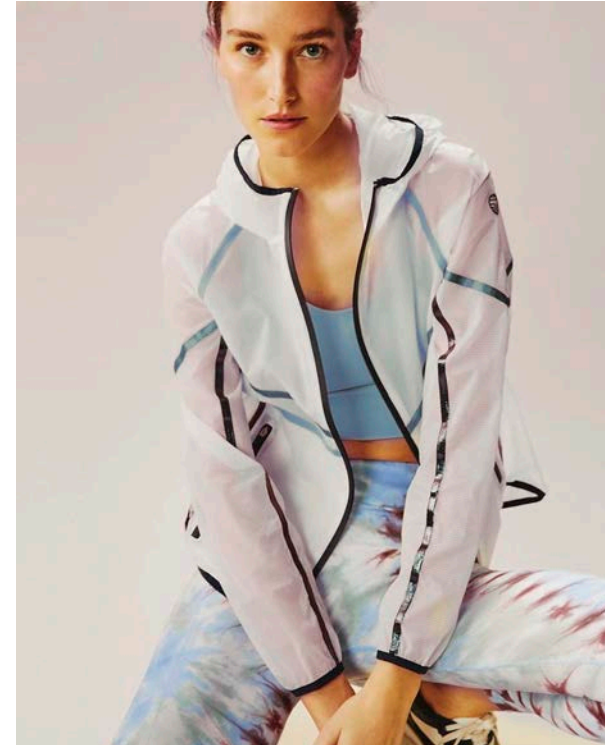
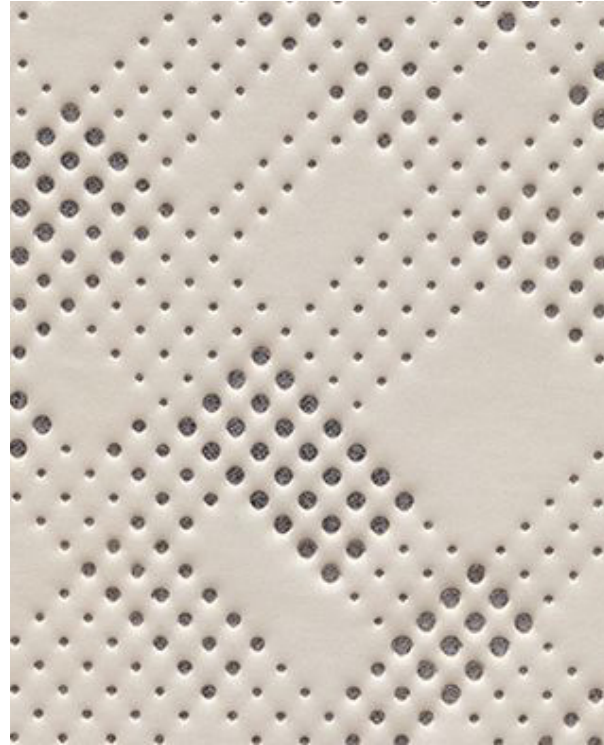


RESEARCH LAST MAKING



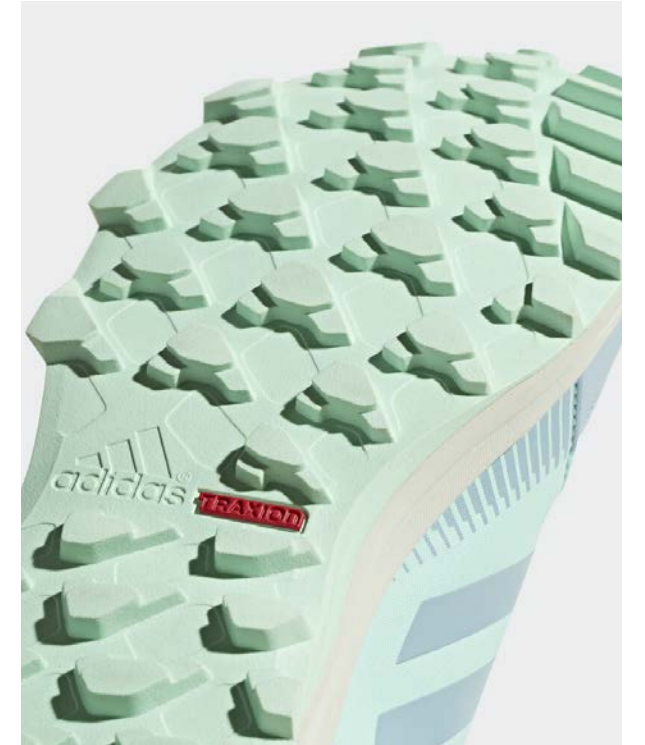
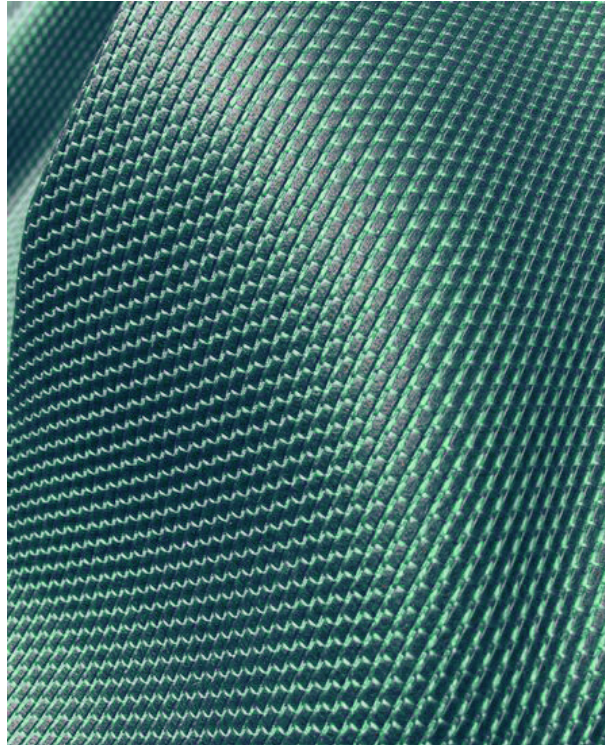
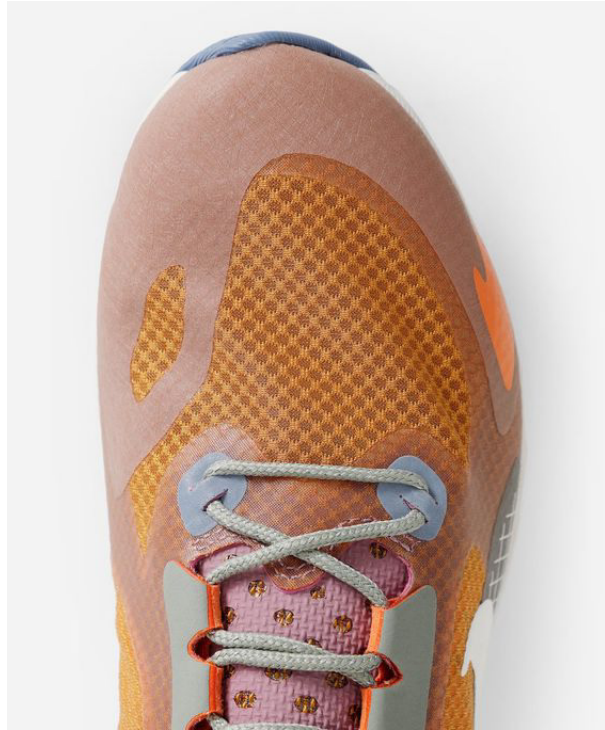
MOOD ABR

BREATHABLE | FLEXIBLE | LIGHTWEIGHT

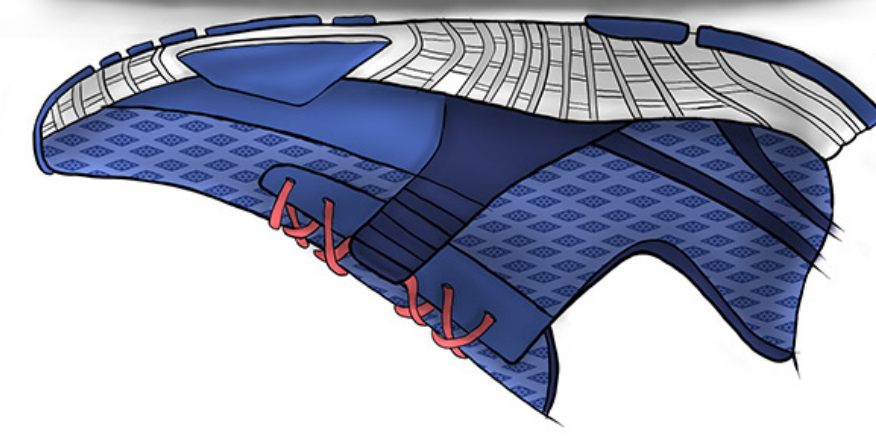
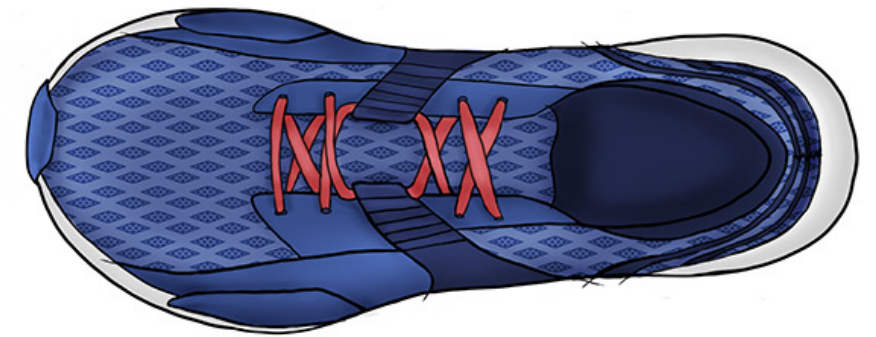
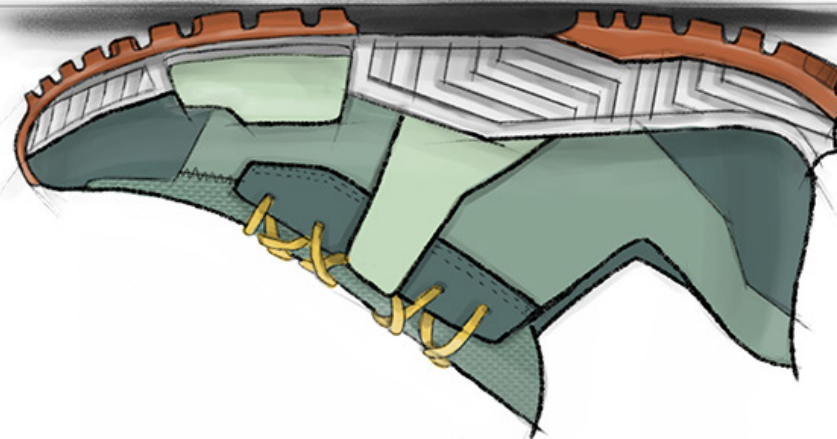
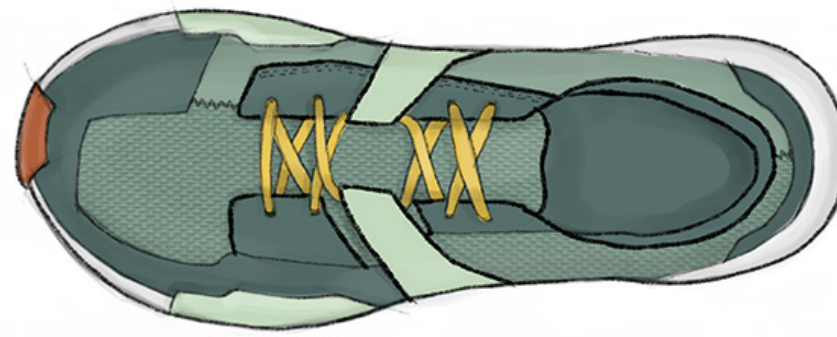
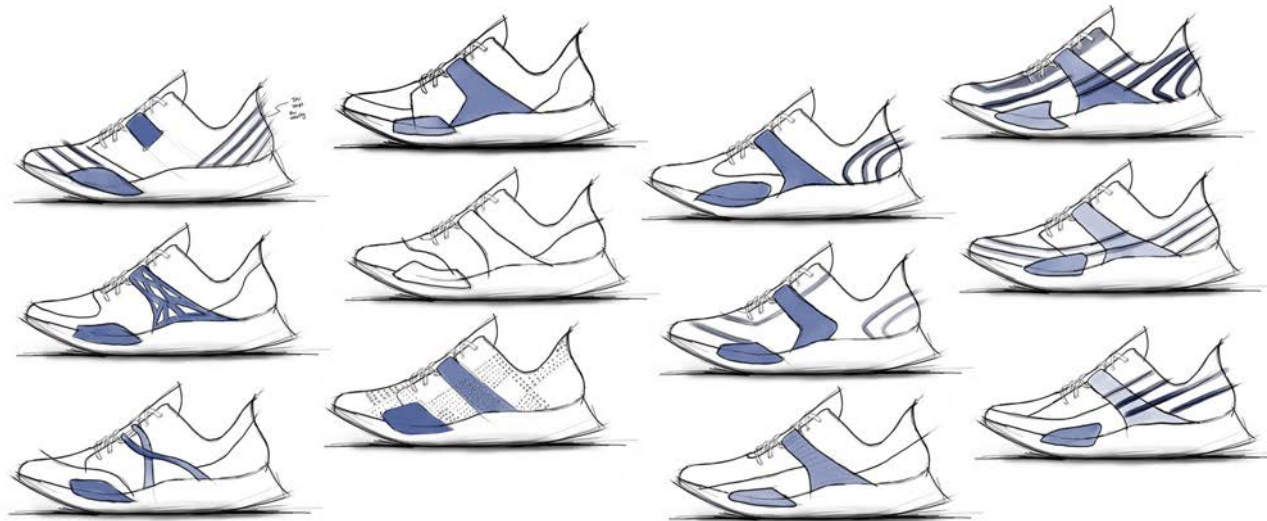


MOOD ABT

PROTECTION | TRACTION | DURABILITY



IDEATION REFINEMENTS



PROOF OF CONCEPT



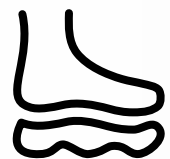
Any Body shoes use a last tuned to the proportions of a plus-size runner's foot with ample room in the toe box and instep and stretch textiles in key areas to accommodate a wide range of foot widths and girths.



The overlapping tongue design opens up wide for easy entry, even for runners with a high instep or thicker foot.



Forefoot flex supports and midfoot straps allow the foot to move freely while still being supported and stable.



The contoured, textured insole cradles the foot and works with the midsole for the right balance of support, step-in comfort, energy return, and durability.



WORKS-LIKE PROTOTYPES



VALIDATION FIT



"The toe box is nice. There's a **LOT OF ROOM WHERE MY TOES ARE**. It fits very comfortably around my foot. It **DOESN'T FEEL SNUG ANYWHERE.**"

ROBIN COON

VALIDATION FIT



"It's **SURPRISING HOW WIDE IT OPENS UP** to get your foot in."

"I like the tongue. **THAT'S A COOL DESIGN**. I like how it's only loose on one side because it **FEELS A LOT MORE STABLE**, like it's not going to get bunched up and slide to one side."

ROBIN COON

VALIDATION PERCEPTION



"YOU CAN ACTUALLY GET YOUR FOOT IN THE SHOE!"

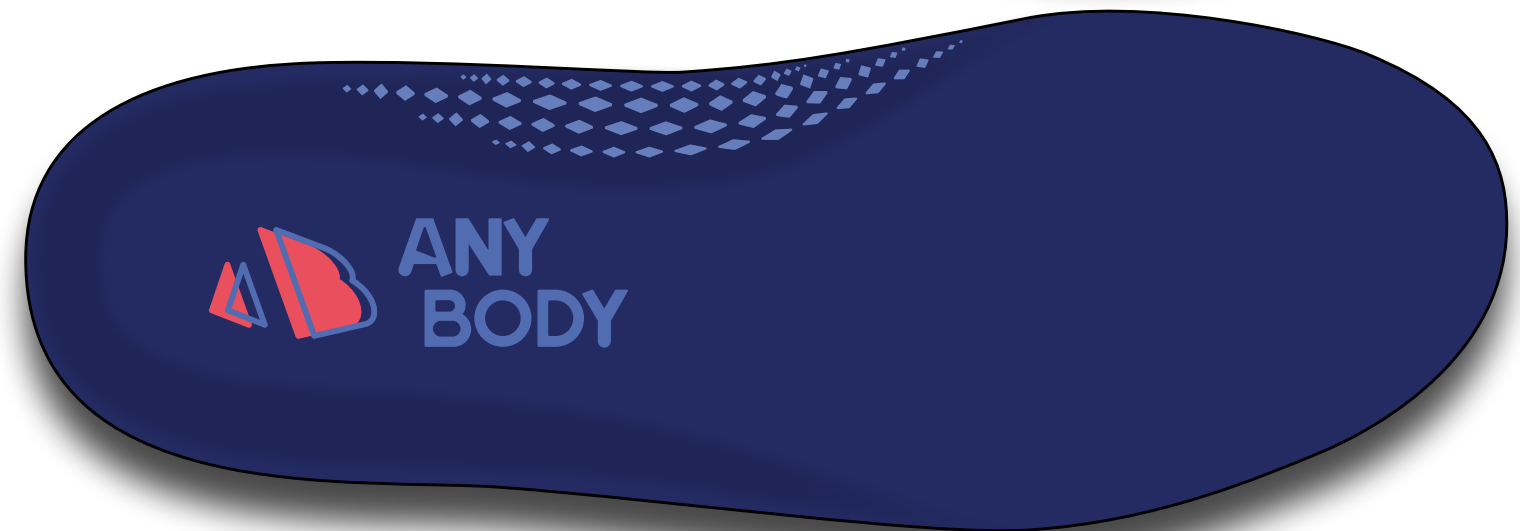
"I like the curves and ***I LIKE THAT IT LOOKS LIKE OTHER RUNNING SHOES.***"

MIRNA VALERIO || ULTRA RUNNER AND FOUNDER OF FAT GIRL RUNNING

VALIDATION EXPERT INTERVIEW



NATHAN GHABOUR // PROJECT ADVISOR
NIKE, DIGITAL INNOVATION PRODUCT DIRECTOR - NXT
SOLS, BIO-MECHANICAL ENGINEER



"IF YOU FEEL THE ARCH, YOU'LL START TO USE IT."

"TOO MUCH DAMPING in the insole will result in **DISSIPATING ENERGY**. The impact on the midsole will be too hard and it won't spring back."

ANY BODY'S ROAD

REFLECTIVE NYLON LACES
5mm oval laces with reflective thread for visibility
Durable, slight stretch for a little give



BREATHABLE, STRETCH-FIT UPPER
Mechanical stretch hugs the foot
Polyester diamond spacer mesh promotes airflow



INSOLE CUSHIONING
Ortholite® molded dual-density insole
2mm Impressions for step-in comfort
4mm Imperial Plus for dense, high rebound cushioning + support



FOREFOOT FLEX SUPPORTS
Side supports cradle and move with the foot for flexible, active support



FLEX GROOVES
Smooth, natural transition at toe off



OVERLAPPING TONGUE DESIGN
Sock-like fit with stretch knit that still allows for greater girth variability and opens wide for easy entry



LIGHTWEIGHT STABILITY
Bemis PU Sewfree® heat bonded toe and heel counter for added stability and protection



MIDFOOT SUPPORT
Polyester spacer mesh bonded with Bemis™ PU film to add stiffness and locks down midfoot for a secure fit



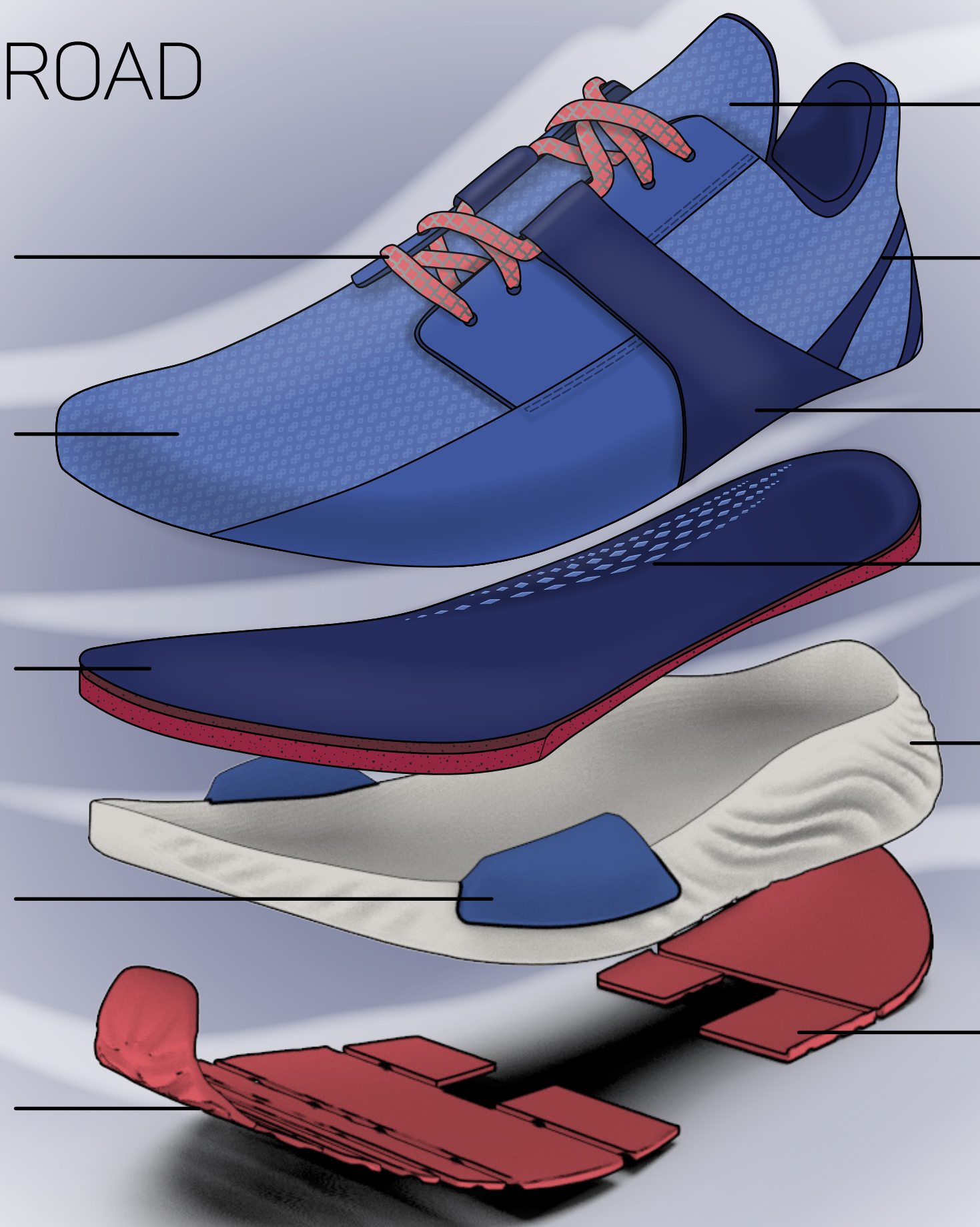
ARCH ACTIVATION
Supports the arch with subtle embossed texture that cues the arch to engage



DURABLE CUSHIONING MIDSOLE
Polyurethane foam for firm, tough cushioning that supports the foot



ZONED OUTSOLE
Durable polyurethane rubber
Tuned for plus-size runners' gait pattern



ANY BODY'S TRAIL

REFLECTIVE SPEED LACES

2mm high tensile strength cord with reflective thread for visibility
Low-profile speed lace cord lock for a fast, secure fit



LIGHTWEIGHT PROTECTION

Bemis PU Sewfree® heat bonded toe and heel counter for added stability and protection



INSOLE CUSHIONING

Ortholite® molded dual-density insole
2mm Impressions for step-in comfort
4mm Imperial Plus for dense, high rebound cushioning + support



FOREFOOT FLEX SUPPORTS

Side supports cradle and move with the foot for flexible, active support



ZONED OUTSOLE

Durable polyurethane rubber
Tuned for plus-size runners' gait pattern



OVERLAPPING TONGUE DESIGN

Sock-like fit with stretch knit that still allows for greater girth variability and opens wide for easy entry



WATER RESISTANT

GORE-Tex™ stretch lining
DWR coated woven polyester



MIDFOOT SUPPORT

Polyester spacer mesh bonded with Bemis™ PU film to add stiffness and locks down midfoot for a secure fit



ARCH ACTIVATION

Supports the arch with subtle embossed texture that cues the arch to engage



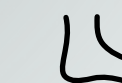
DURABLE CUSHIONING MIDSOLE

Polyurethane foam for firm, tough cushioning that supports the foot



SEGMENTED ROCK PLATE

Nylon rock plate adds extra underfoot protection from sharp rocks and roots

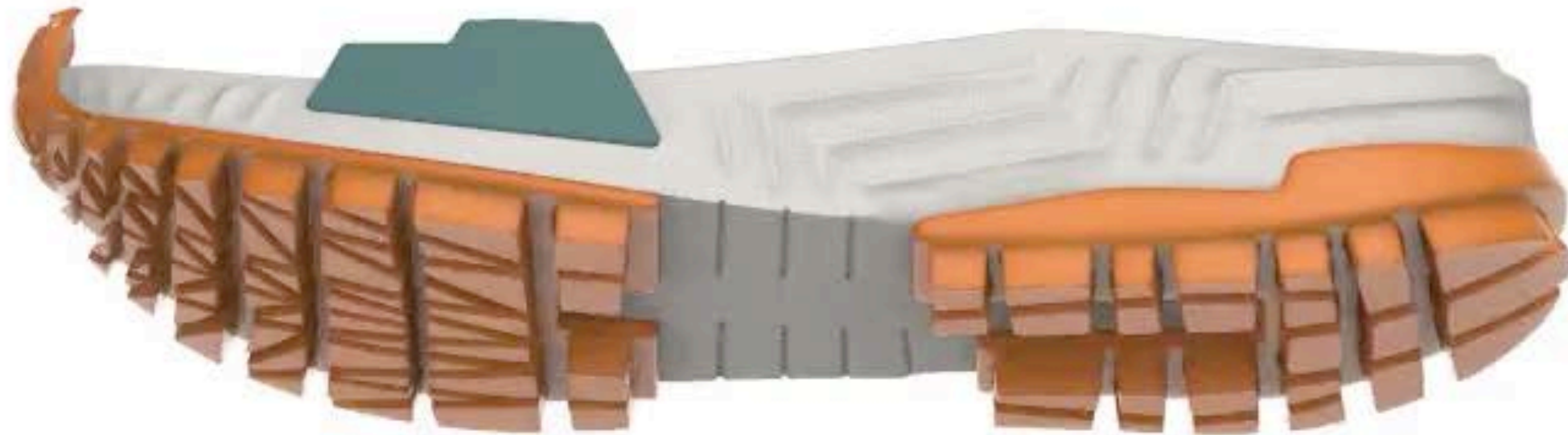
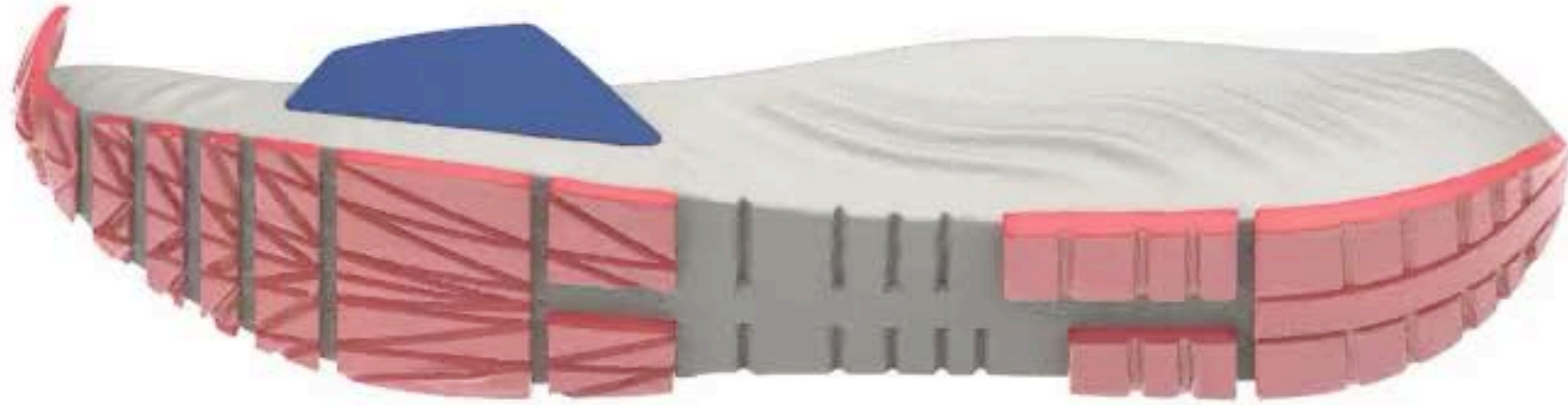


OUTSOLE LUGS

5mm lugs at forefoot and heel for traction on uneven terrain
Smooth, natural transition at toe off



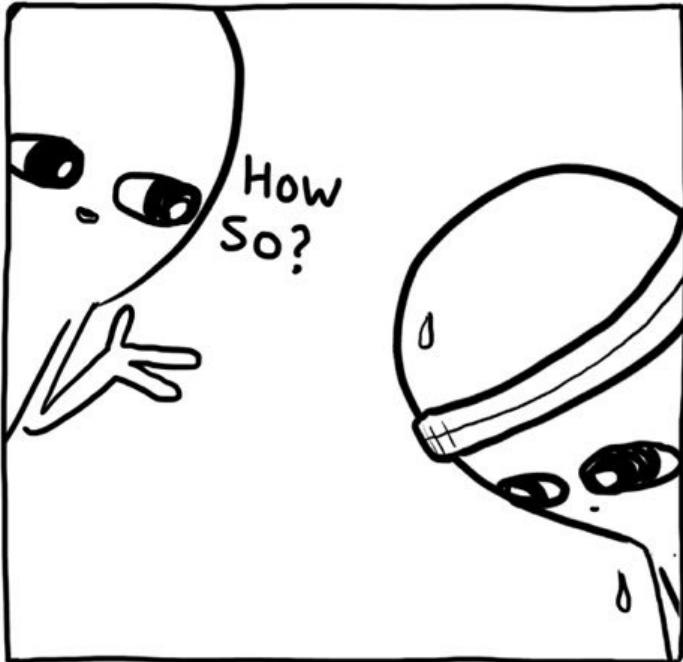
TOOLING



MOOD BRAND

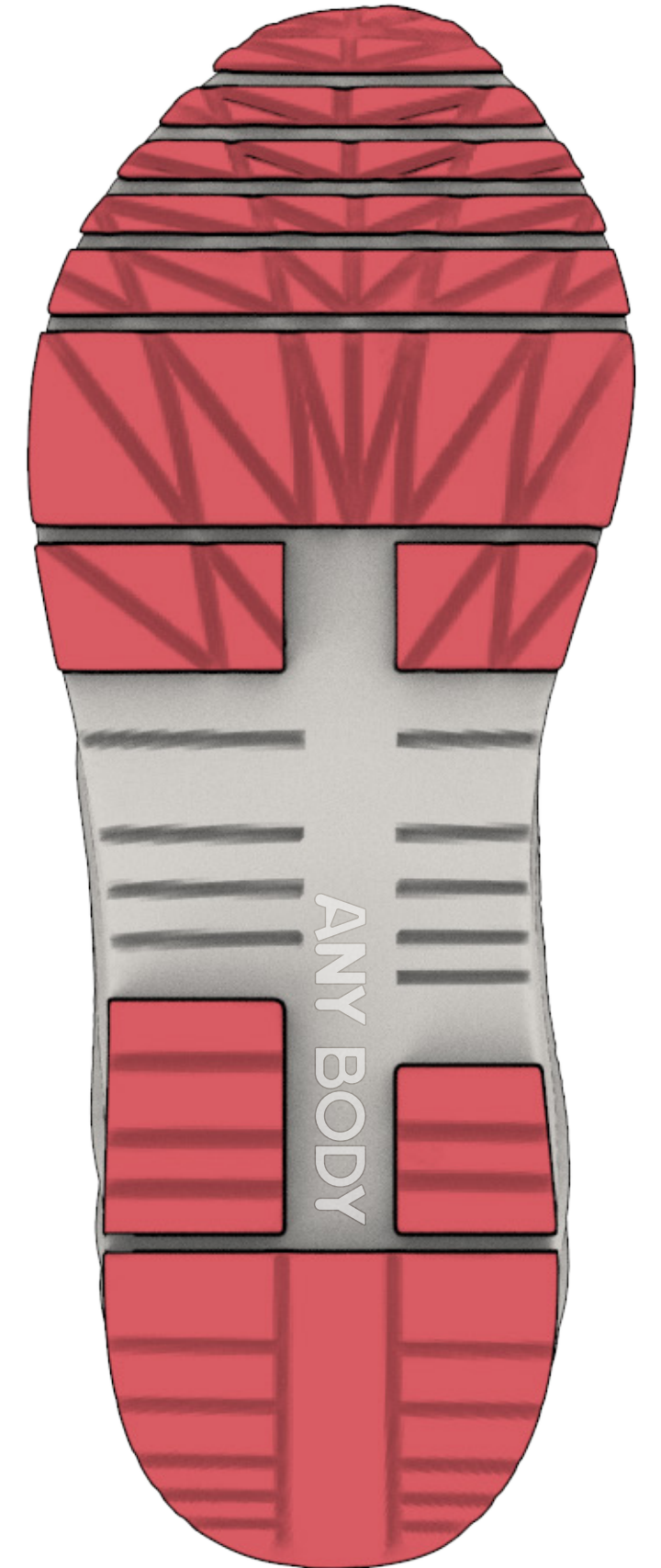


I didn't ask you
if I looked like
a runner.



NATHANWPLYE

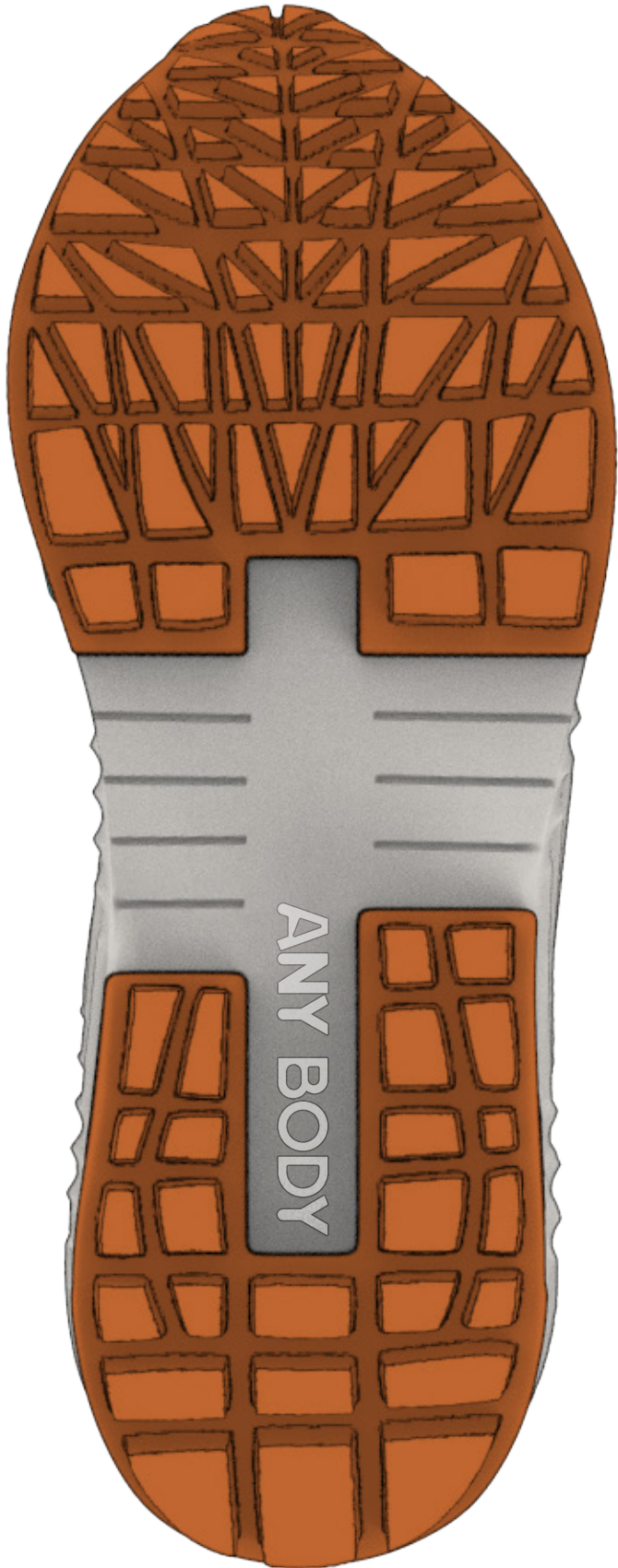
BRAND ELEMENTS



ANY BODY

**THEY SAID
YOU COULDN'T DO THIS**

BRAND ELEMENTS



ANY BODY

THEY SAID YOU COULDN'T DO THIS

ANY BODY'S

ROAD



ANYBODY'S TRAIL



A woman in a white athletic outfit is running on a track. The background is a blurred stadium with tiered seating. The text is overlaid on the image in a white, sans-serif font.

Any Body envisions a world where no one assumes anything about you as an athlete because of the way you look—a future where no woman feels out of place on the starting line.

A person with long blonde hair is running away from the camera on a paved path. They are wearing a black long-sleeved top and black leggings. A small black dog is running alongside them on a leash. The path is flanked by green grass and trees. In the background, there are streetlights and a clear sky. The text 'ANY BODY' is overlaid in large white letters, flanked by a dashed line of diamond shapes.

ANY BODY

THANKS!