



# AXIOM

ADAPTIVE OUTDOOR FOOTWEAR

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# BACKGROUND



B.S. KINESIOLOGY | AZUSA PACIFIC UNIVERSITY

M.S. SPORTS PRODUCT DESIGN | UNIVERSITY OF OREGON

SOME THINGS I LIKE:

THE OUTDOORS

SCIENCE

ADAPTIVE COMMUNITY

BUCKET HATS

# PROJECT IMPORTANCE

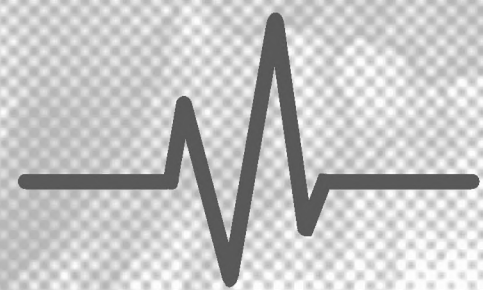
ADAPTIVE USERS FACE NUMEROUS HURDLES TO GETTING OUTDOORS.

THESE HURDLES BECOME MORE EXTREME IN COLD WEATHER.

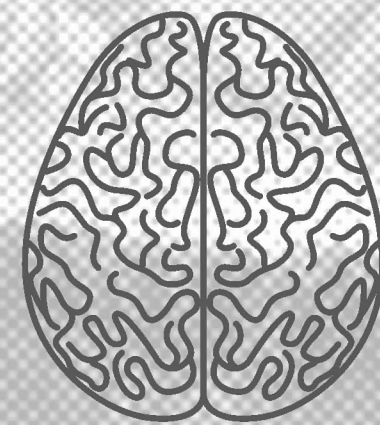
ADAPTIVE USERS ARE OFTEN FORCED TO SACRIFICE FASHION OR FUNCTION.

BEING OUTDOORS IMPROVES:

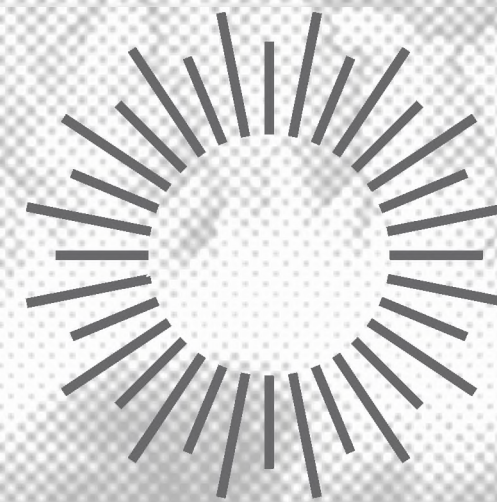
PHYSICAL HEALTH



MENTAL HEALTH



OVERALL MOOD & WELLBEING



CONFIDENCE & SELF-EXPRESSION



# PROJECT RELEVANCE

## A REAL PROBLEM

There are a glaring lack of outdoor products for those with disabilities or dexterity deficiencies.

27,500,000

Potential users of adaptive outdoor footwear within the United States alone (not including many others who would benefit).

## UNDERSERVED USERS

Traditionally, adaptive users and/or those with disabilities have had to sacrifice either function or fashion to simply have something work.

## BLOSSOMING CATEGORY

Companies like Nike, UGG, Zappos, and more are already investing in this product space, the outdoor industry will surely follow.

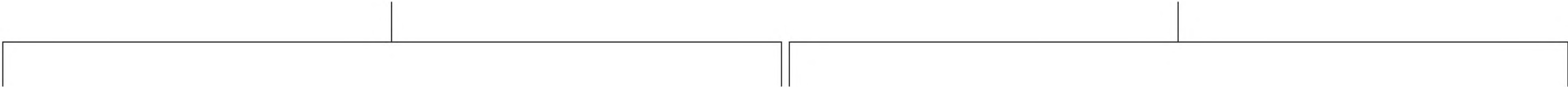
## WIDE APPLICATION

Functionality of outdoor products often trickles into other product categories, and in turn can benefit even more users.

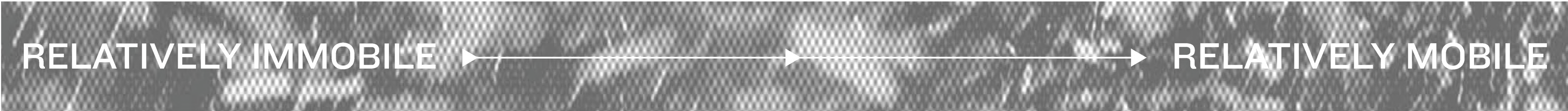
# CONTEXT

LOW-TOP SOLUTION

HI-TOP SOLUTION



## USER ABILITY SPECTRUM



POSSIBLE CONDITIONS:

QUADRIPLEGIA

PARAPLEGIA

WALKING PARAPLEGIA

NEUROPATHY

MODERATE ARTHRITIS

AGING USER

## USER PROFILES

LOW-TOP SOLUTION



WHEELCHAIR USER

HI-TOP SOLUTION

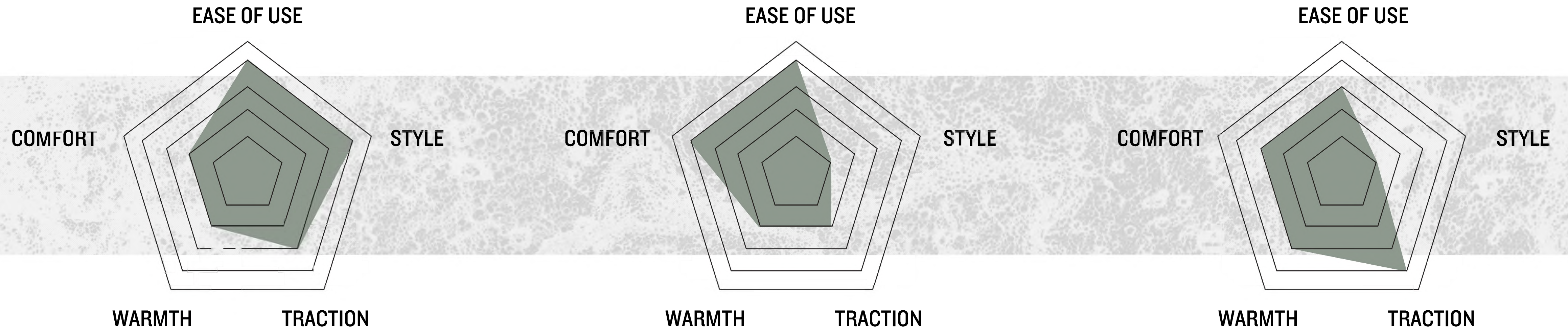


ACTIVE AGING USER



WHAT IF THERE WAS ADAPTIVE OUTDOOR FOOTWEAR THAT WAS EASY TO PUT ON & TAKE OFF, EASED CONCERNS ABOUT STABILITY, TRACTION, & COLD WEATHER, WHICH USERS WERE EXCITED TO WEAR?

# ADAPTIVE PRODUCT LANDSCAPE



Nike Go FlyEase

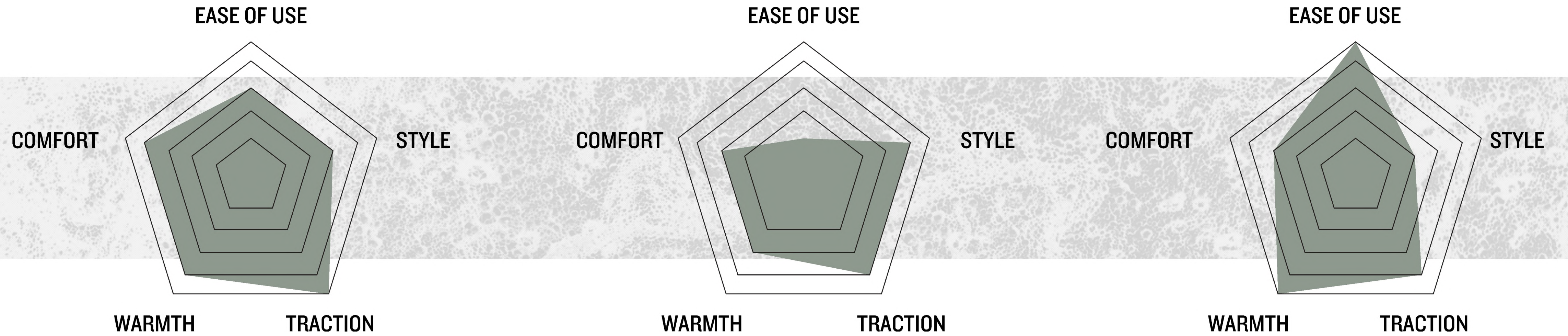


Silverts Extra Wide



Apex Work Boot

# OUTDOOR PRODUCT LANDSCAPE



Salomon Snow Moc



Salomon Snowcross Adv



Keen Revel IV

# PERFORMANCE FACTORS



## ON & OFF SPEED (& EASE OF USE)

### ENTRY SYSTEM

- Mule silhouette & sneaker boot style are fashionable, easy to use, and made to seal in heat for cold weather.
- Accentuated heel platform allows for easy step-out and removal of footwear.
- Magnetic hardware allows for swift lockdown with minimal dexterity requirement for use.
- Simplistic elastic cinch lace system enables easy and swift adjustment for fit and lockdown.



## OUTDOOR TRACTION

### OUTSOLE SYSTEM

- Strategically widened footprint to provide improved stability on outdoor surfaces without dramatically altering gait.
- Traction patterns designed with winter & the outdoors in mind, made to interface well widened footprint of midsole.
- Hiking style lugs for optimum grip on natural surfaces, targeted zones on the heel, toe, and lateral foot to mitigate slip occurrence.
- Toe wrap for increased protection around toebox.

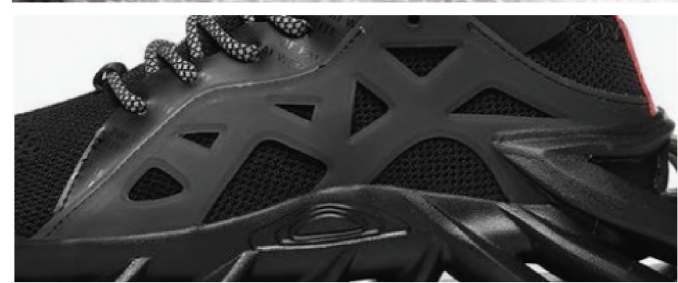


## HEAT RETENTION

### HEAT QUILTED UPPER

- Custom last design allows for thoughtful fit around the foot, alleviating concerns about skin and tissue irritation.
- Heat welded quilting allows for maximal heat retention without puncturing the upper like traditional quilting methods.
- Recycled 45g duck and goose down is quilted into the upper, providing optimum warmth to mitigate temperature concerns.
- Weather protection provided by PTFE membrane within quilt.

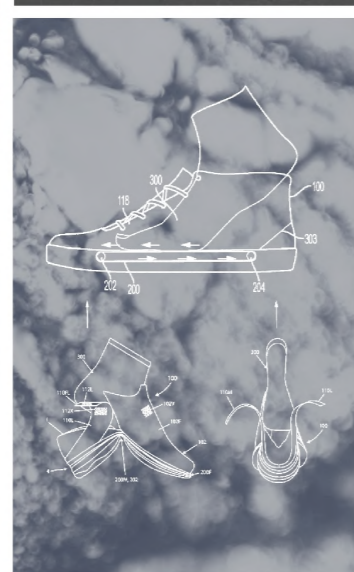
TECH CALLOUTS/FUNCTIONAL LABELING



FUNCTIONAL COMFORT



EASE OF USE

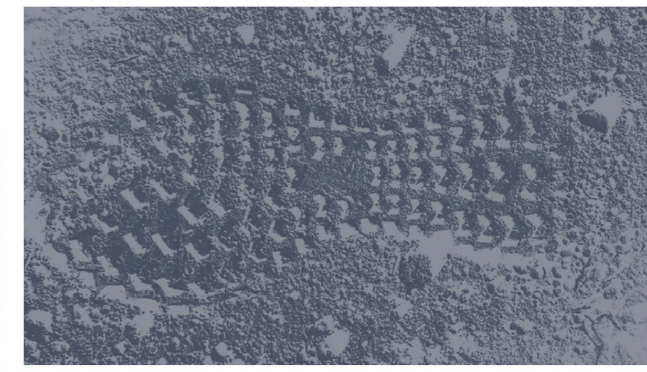
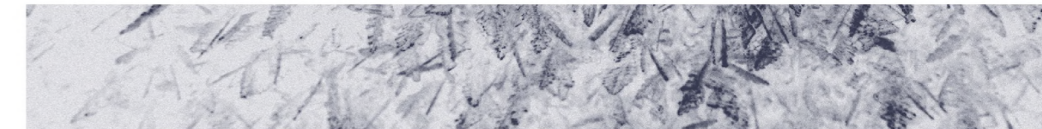


EMPOWERMENT/SWAGGER

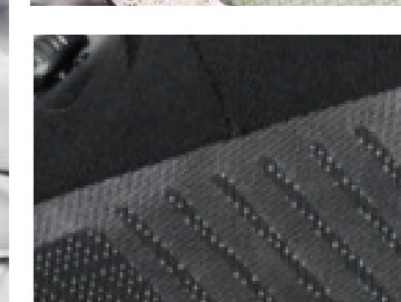
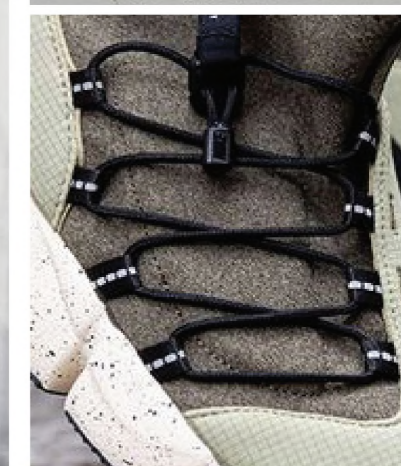


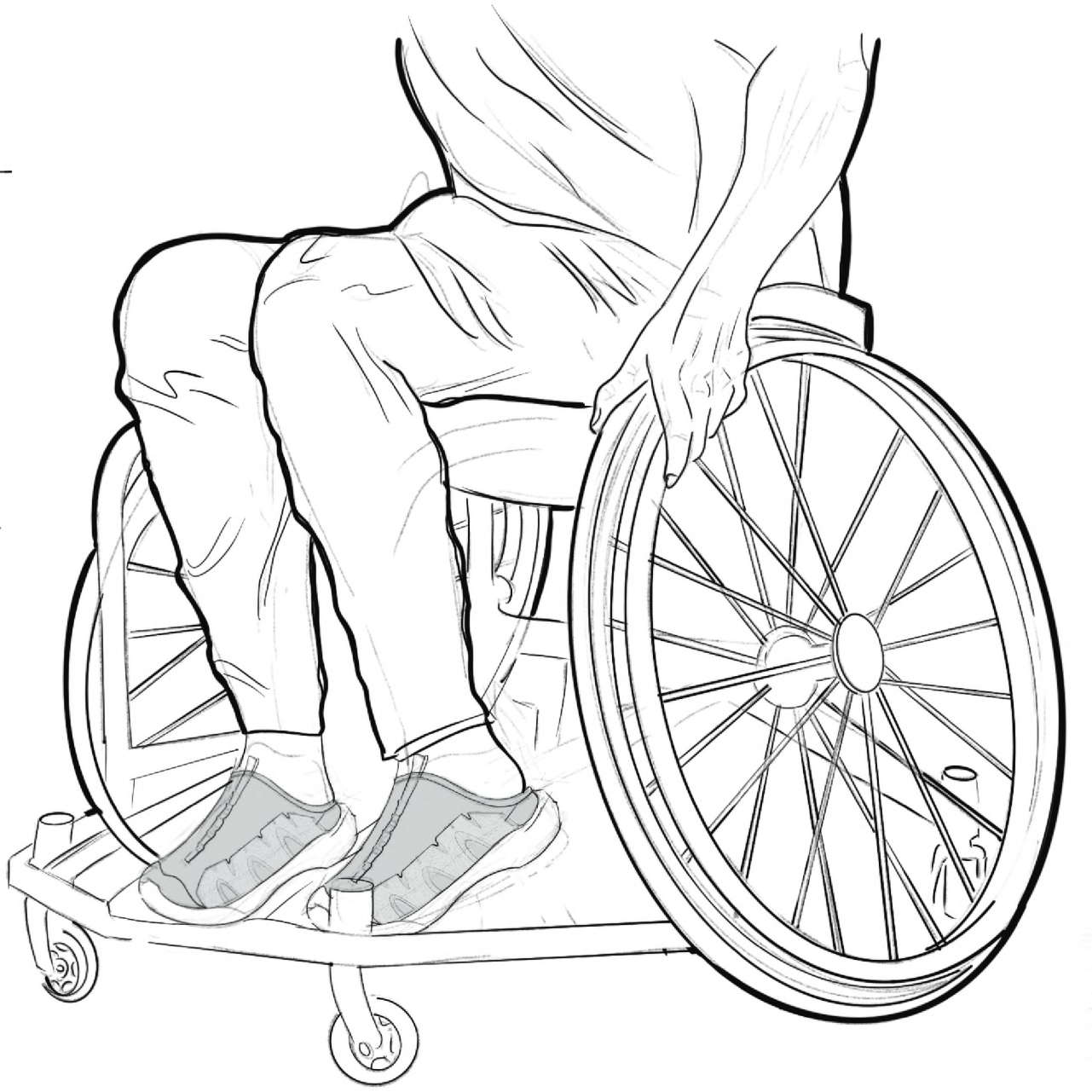
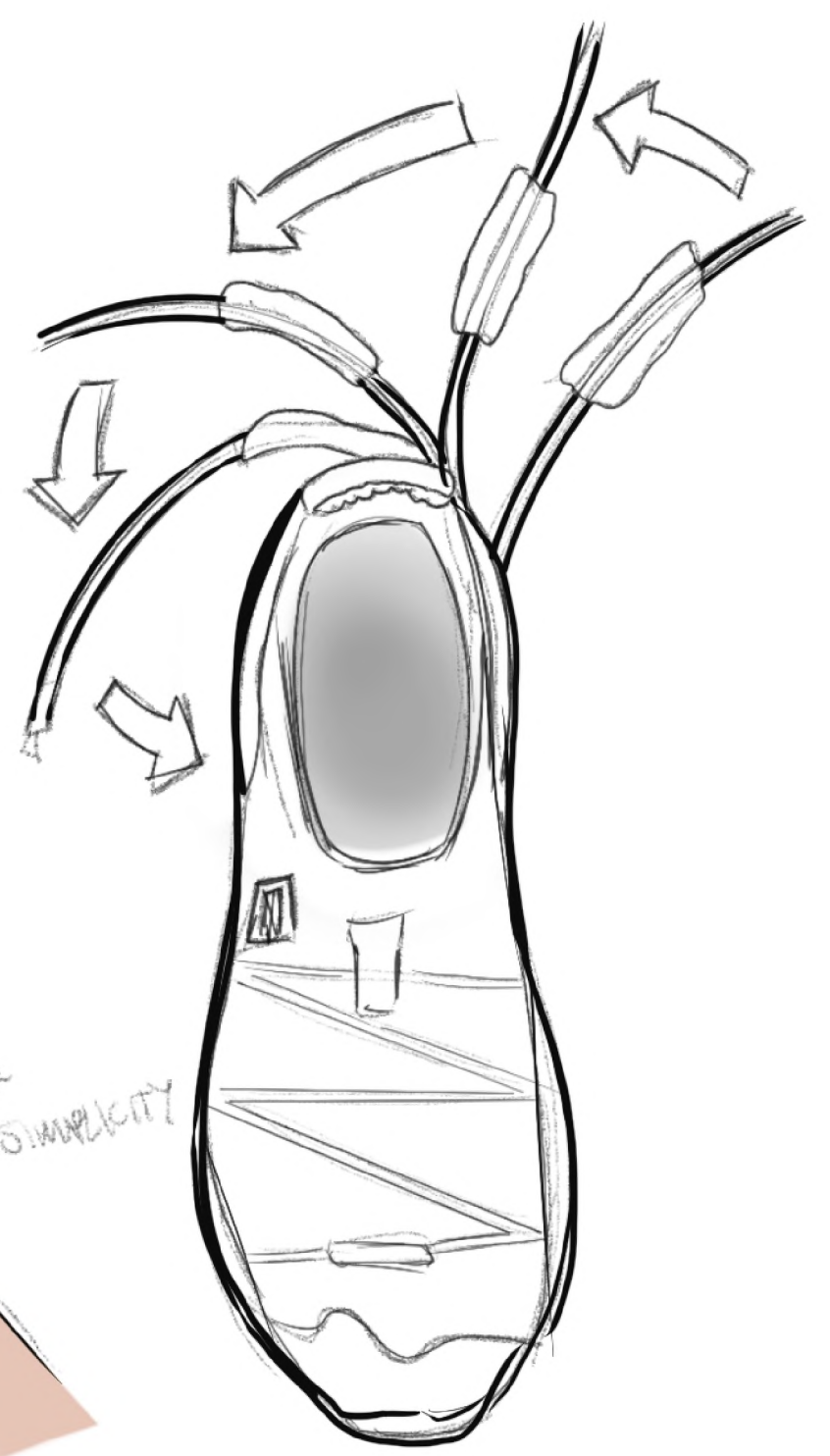
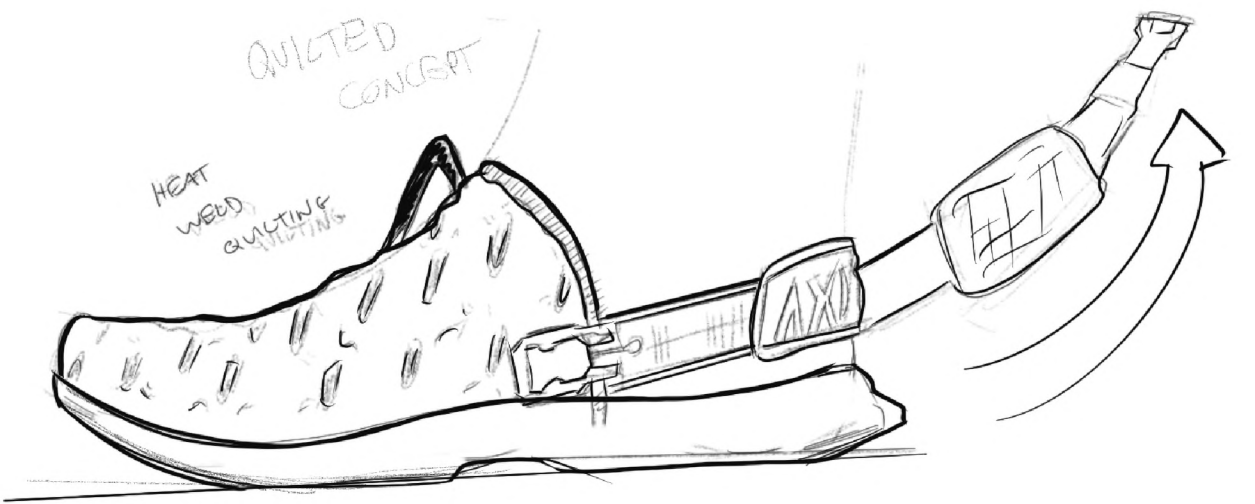
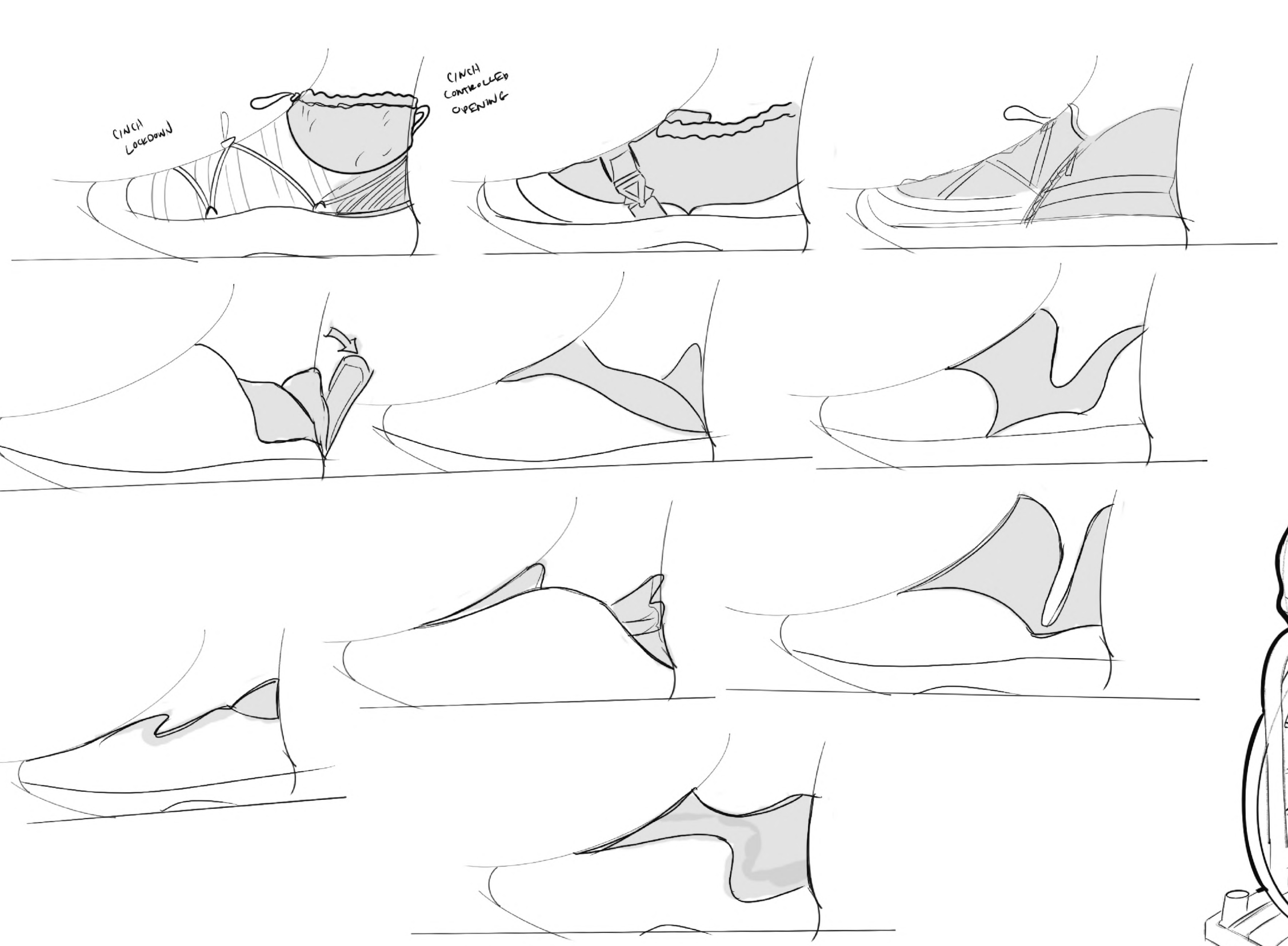
COLOR/DISTORTED NATURAL TEXTURES

NEUTRAL BLACK C 446 C 445 C 423 C 7538 C



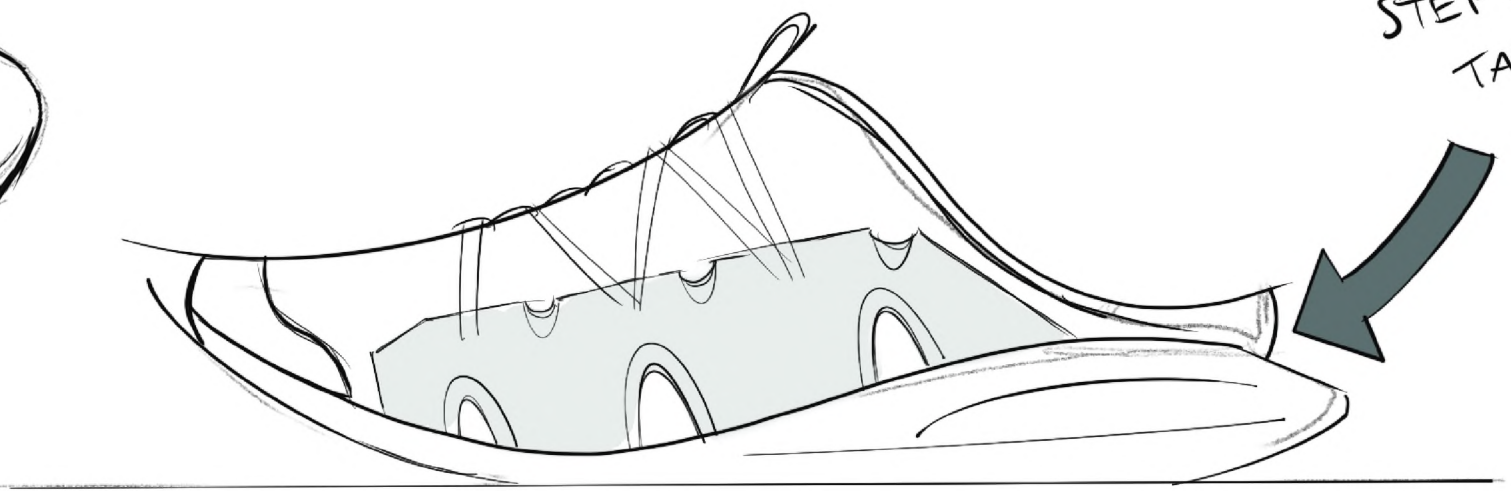
MODERN QUILTING



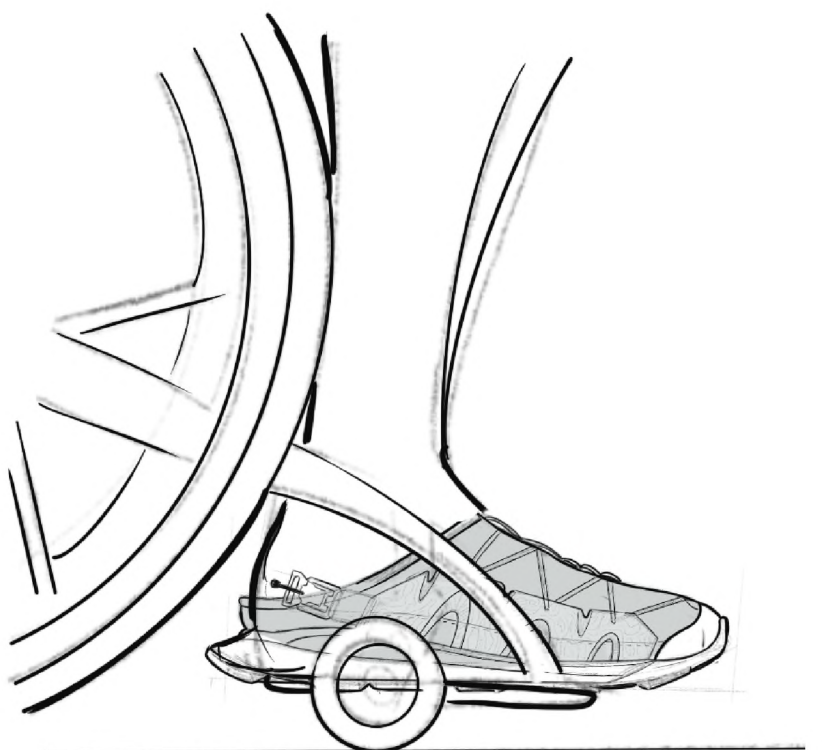
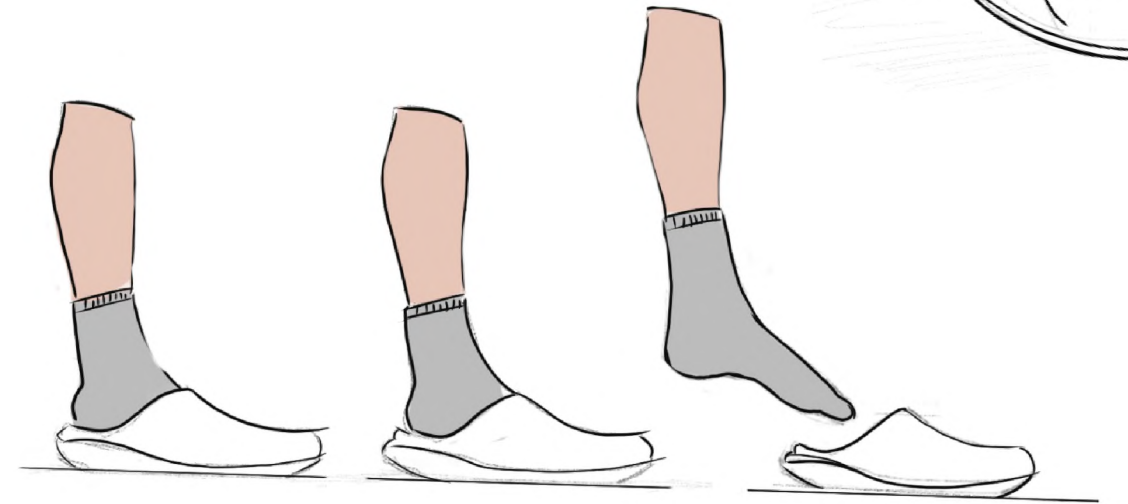


FOOT MORPHOLOGY  
CONSIDERATIONS:

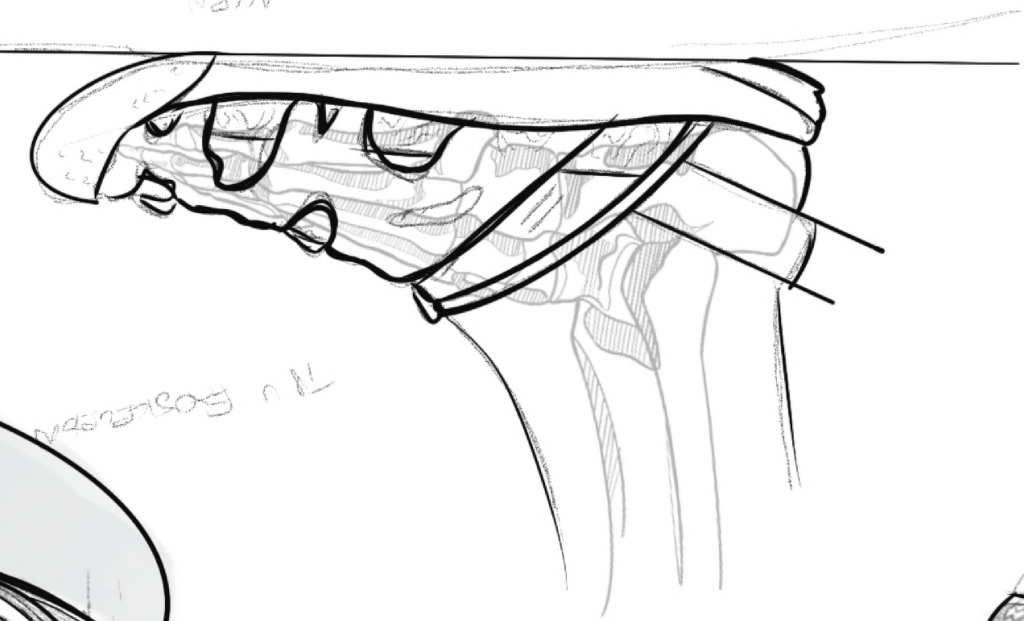
- SKIN SENSITIVITY



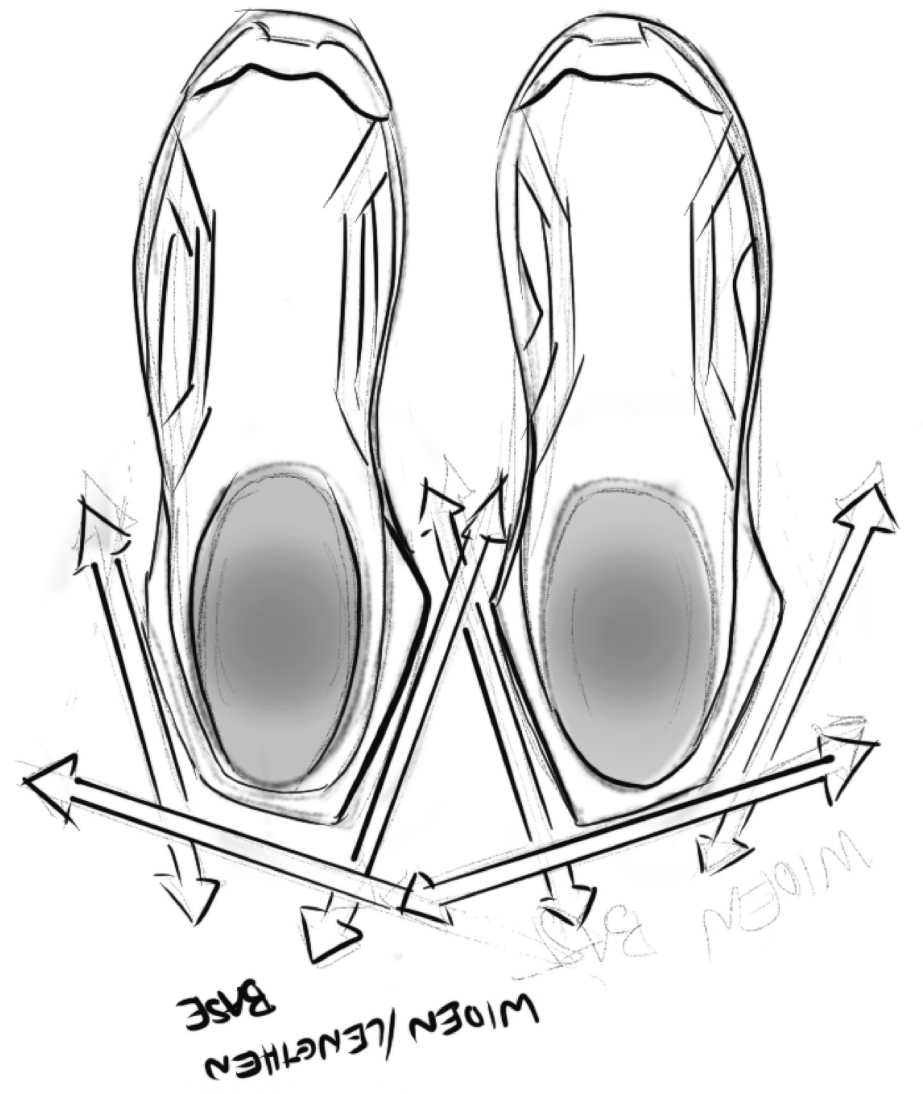
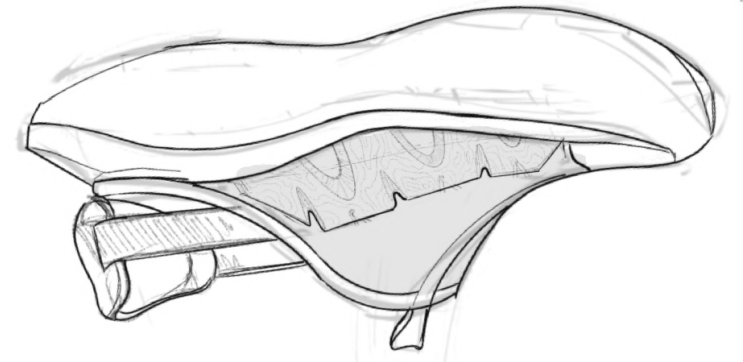
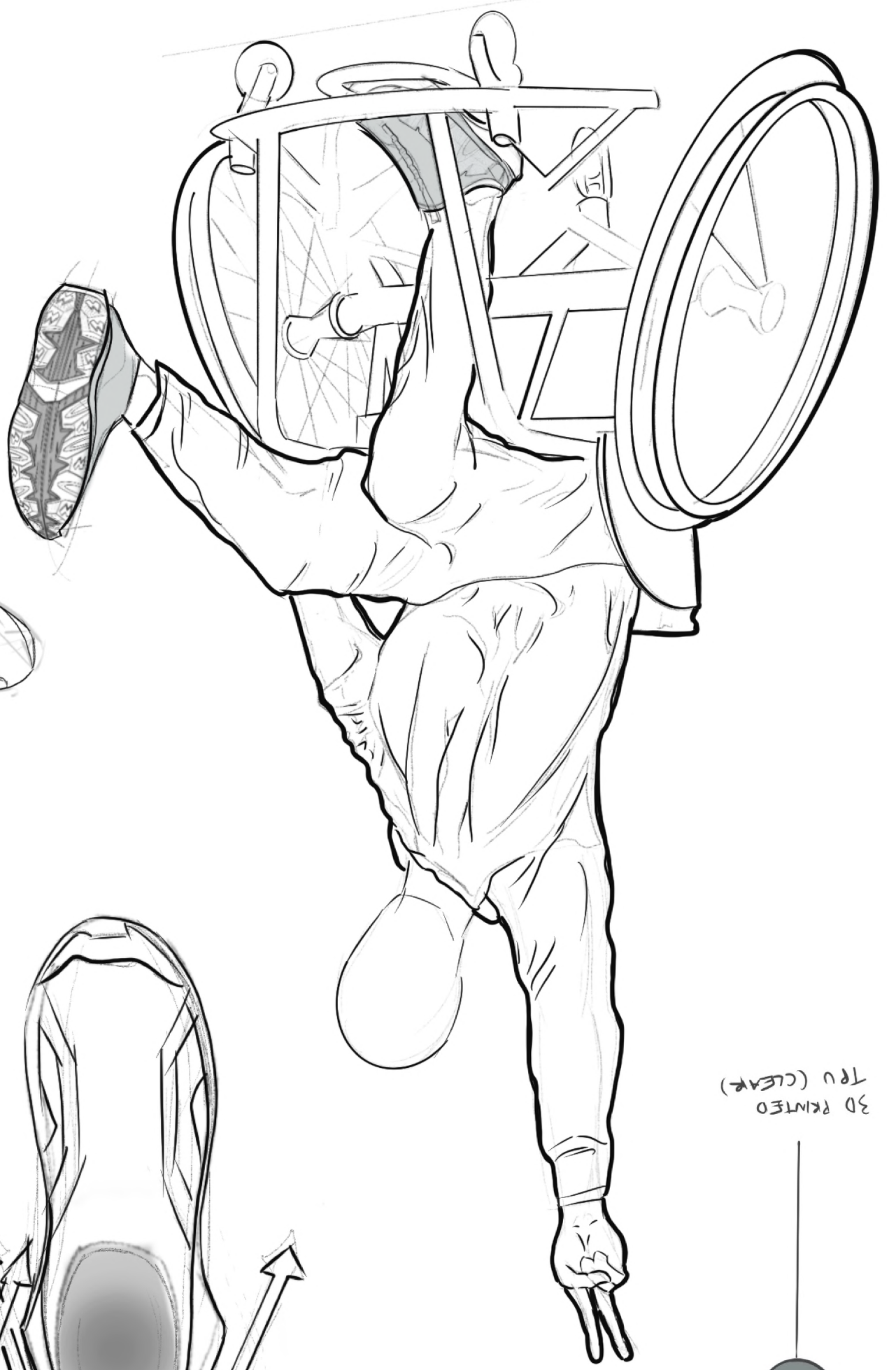
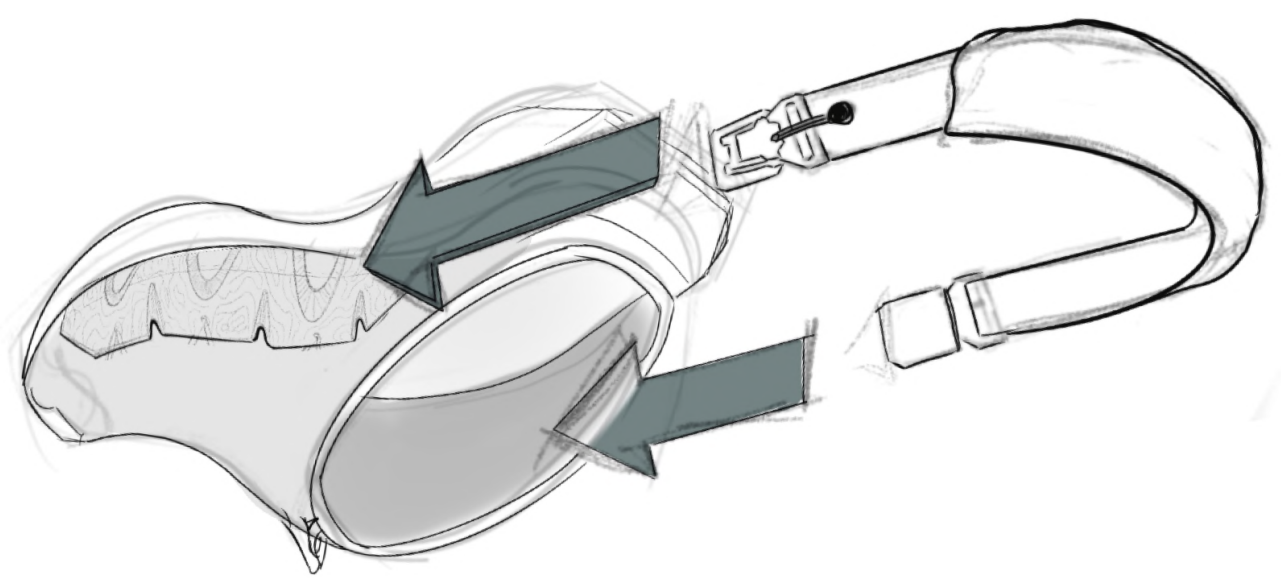
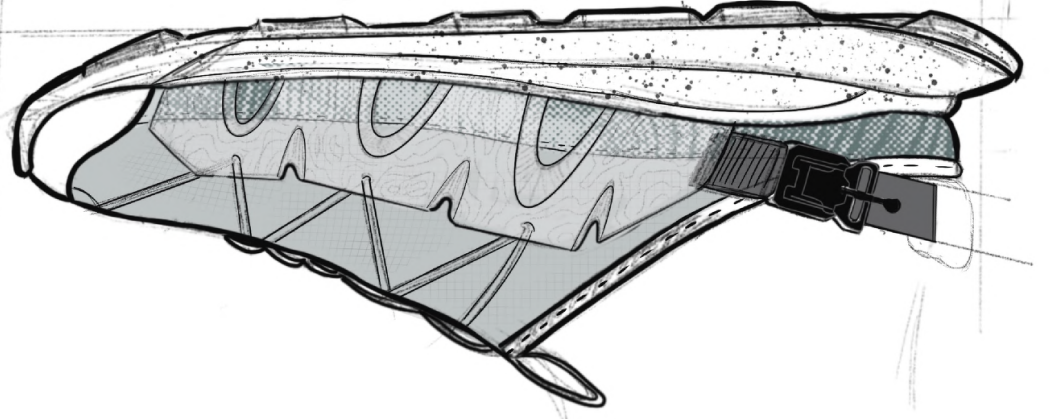
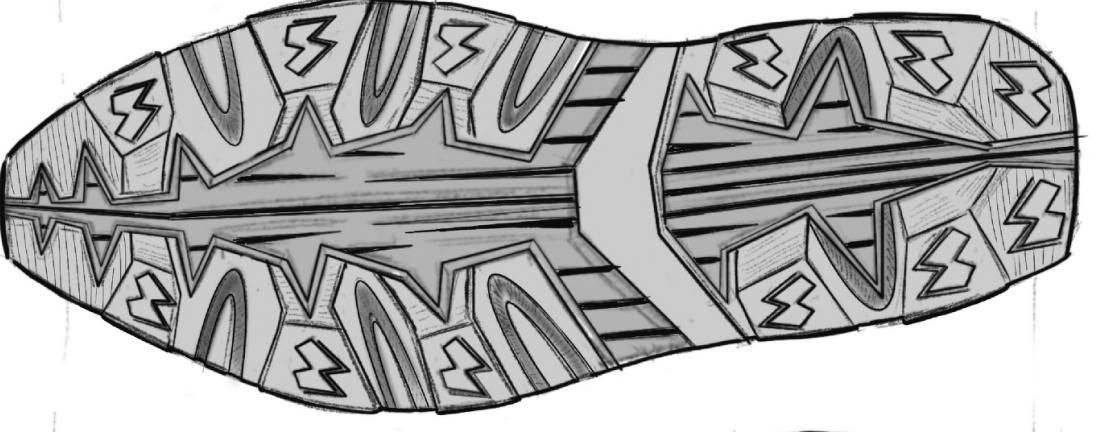
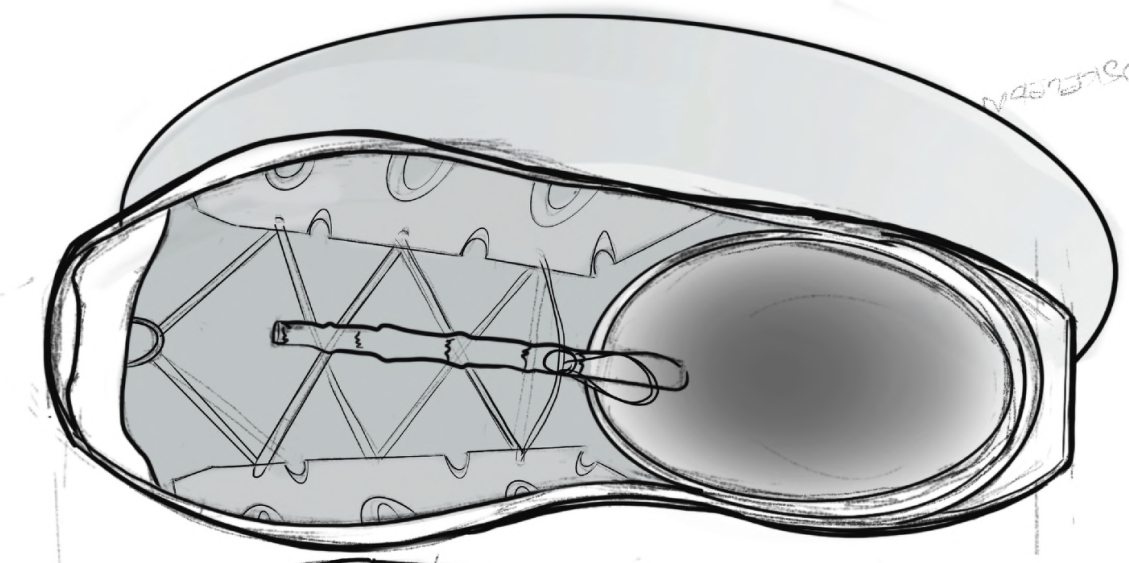
STEP ON TO  
TAKE OFF



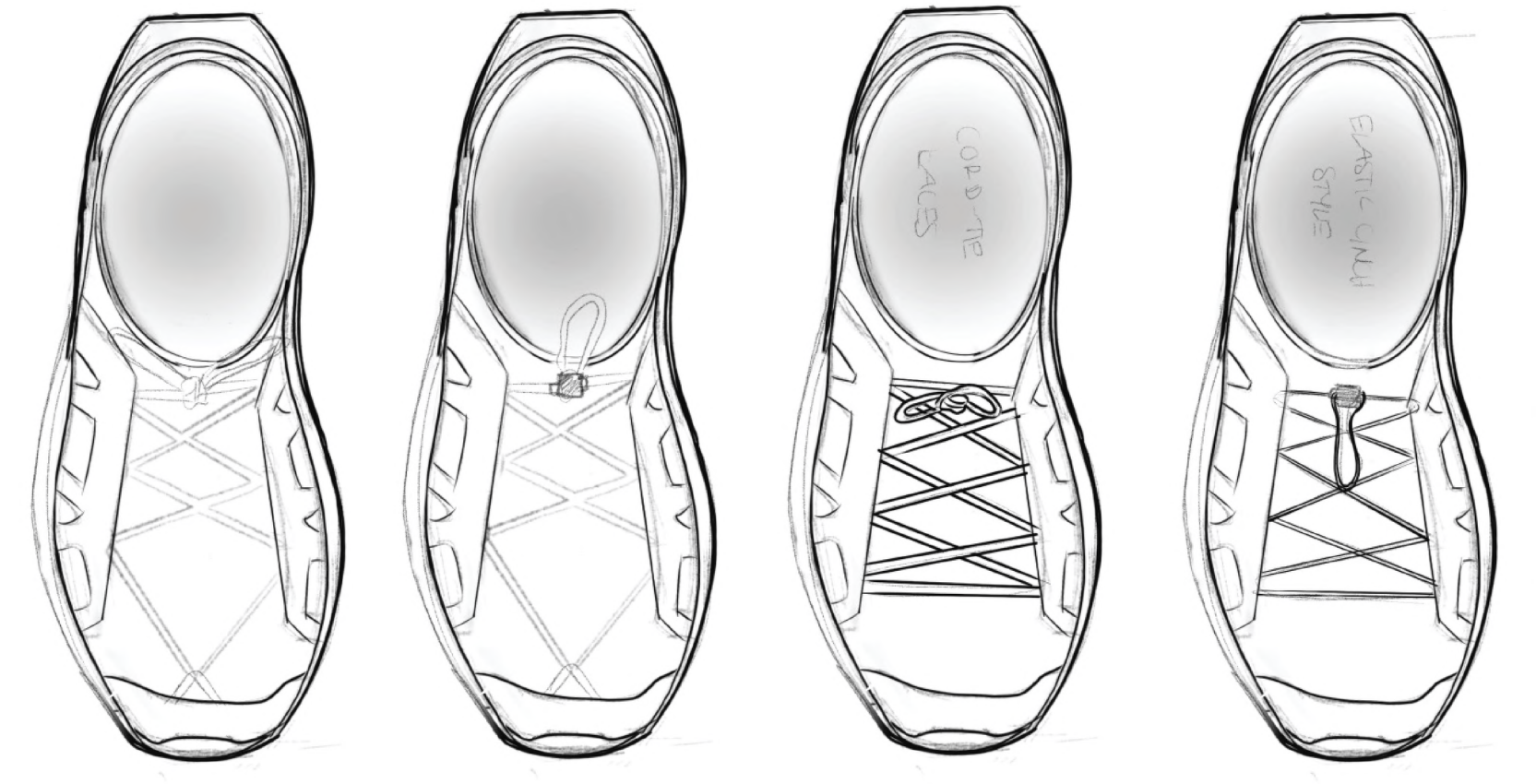
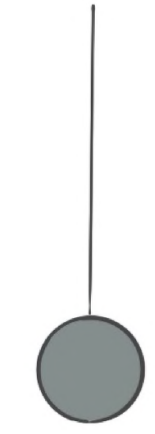
ACER  
GRAPHIC TEAM



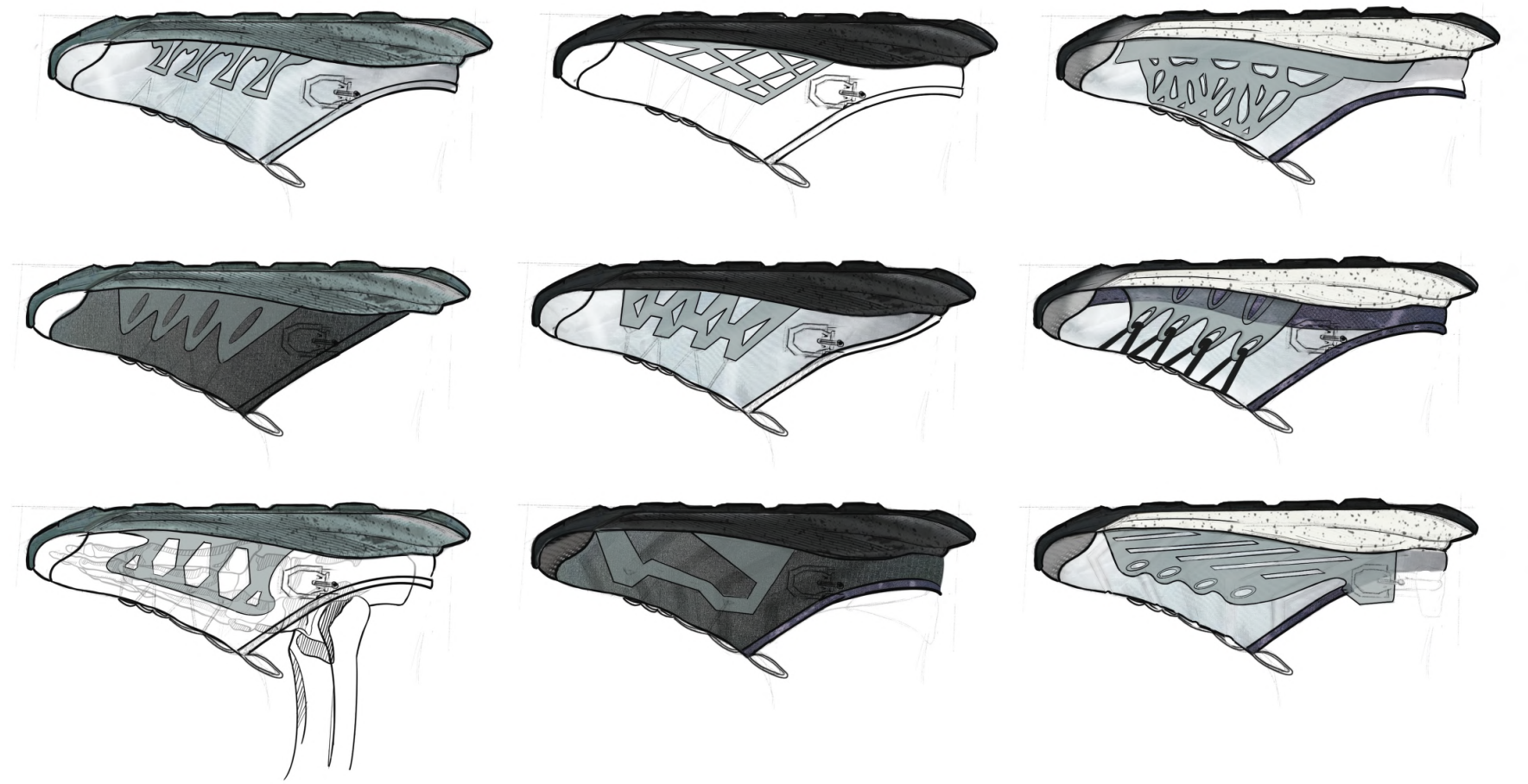
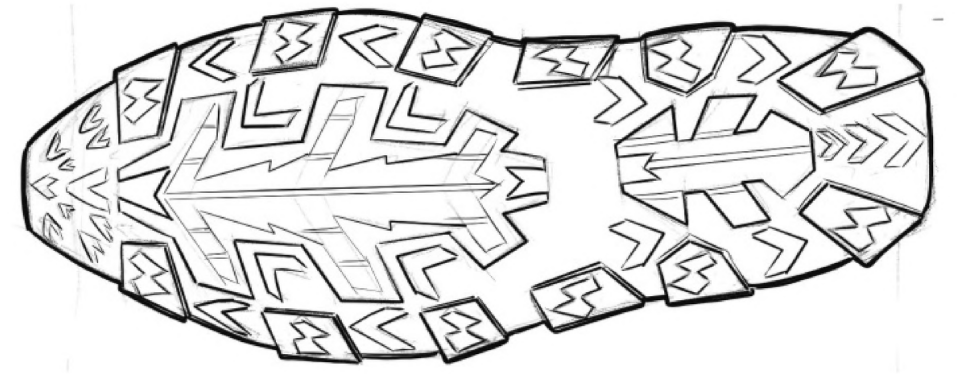
711 BOSTON

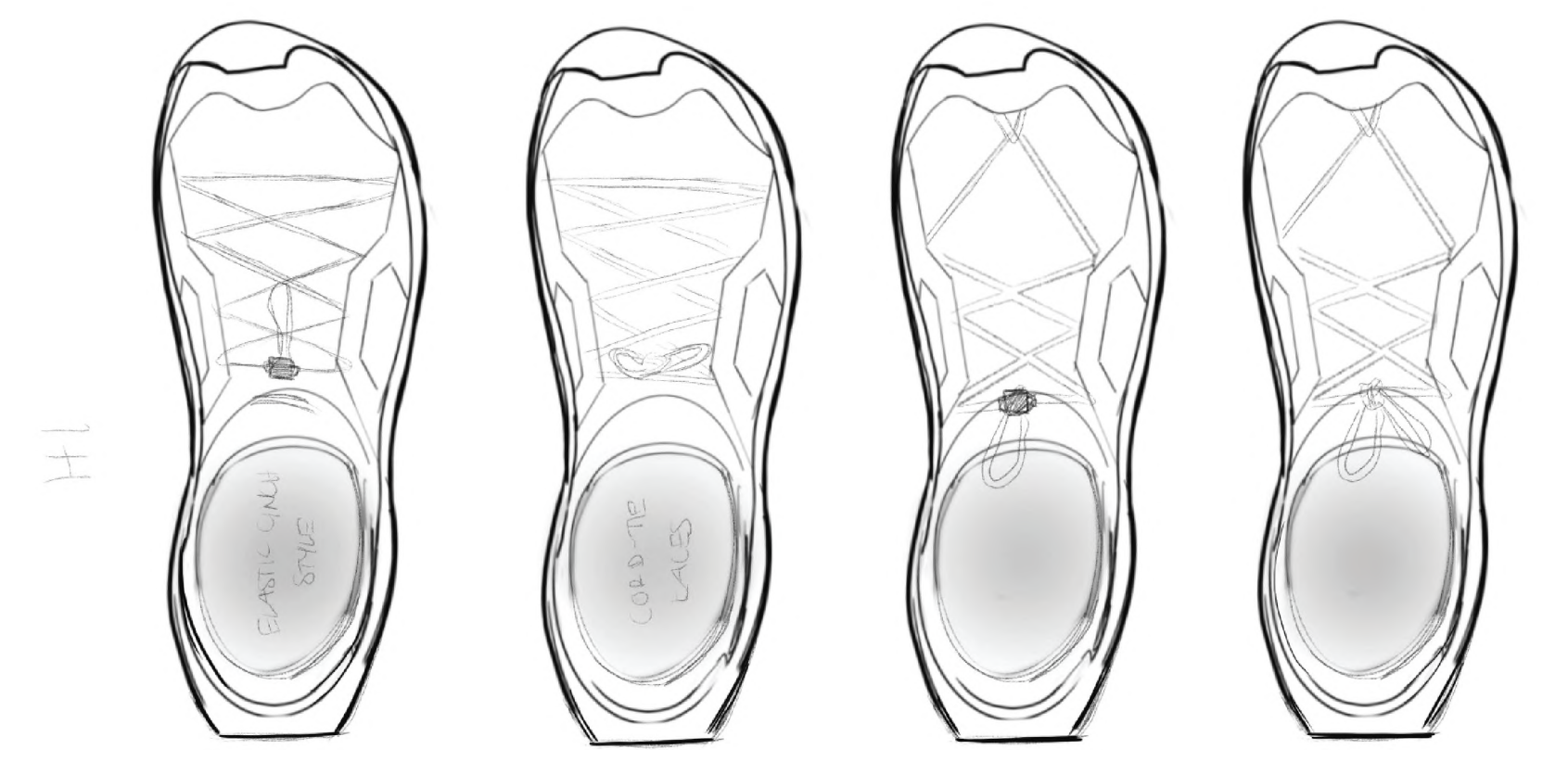
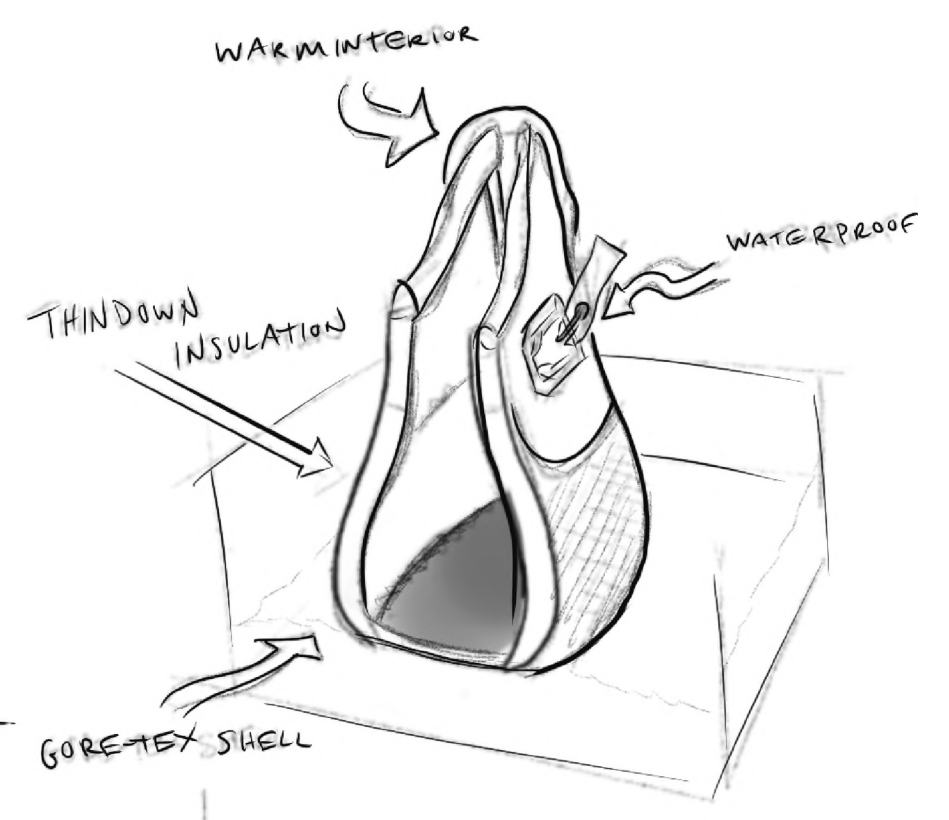
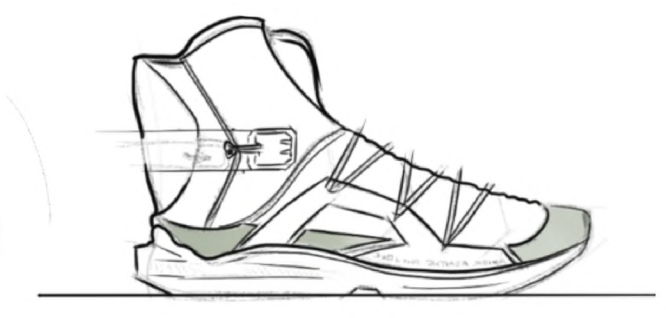
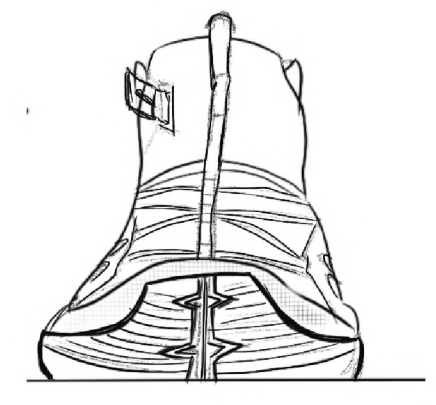
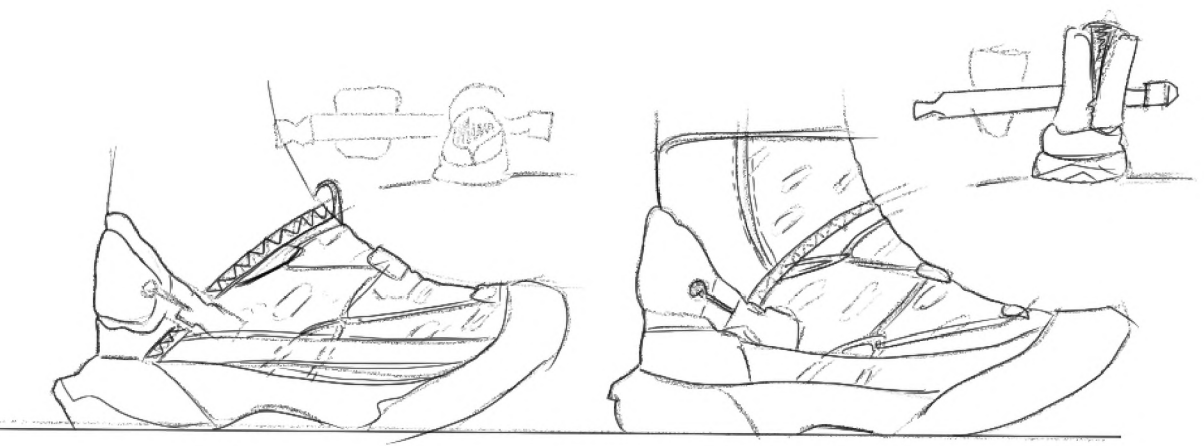
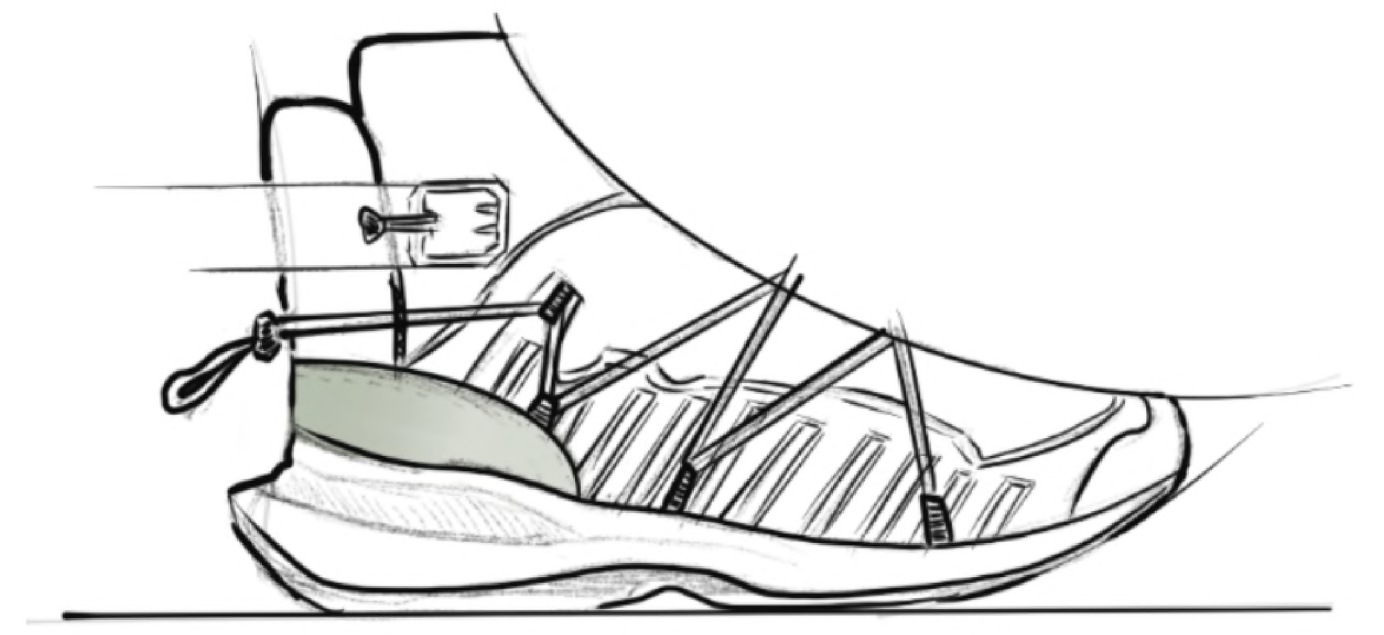
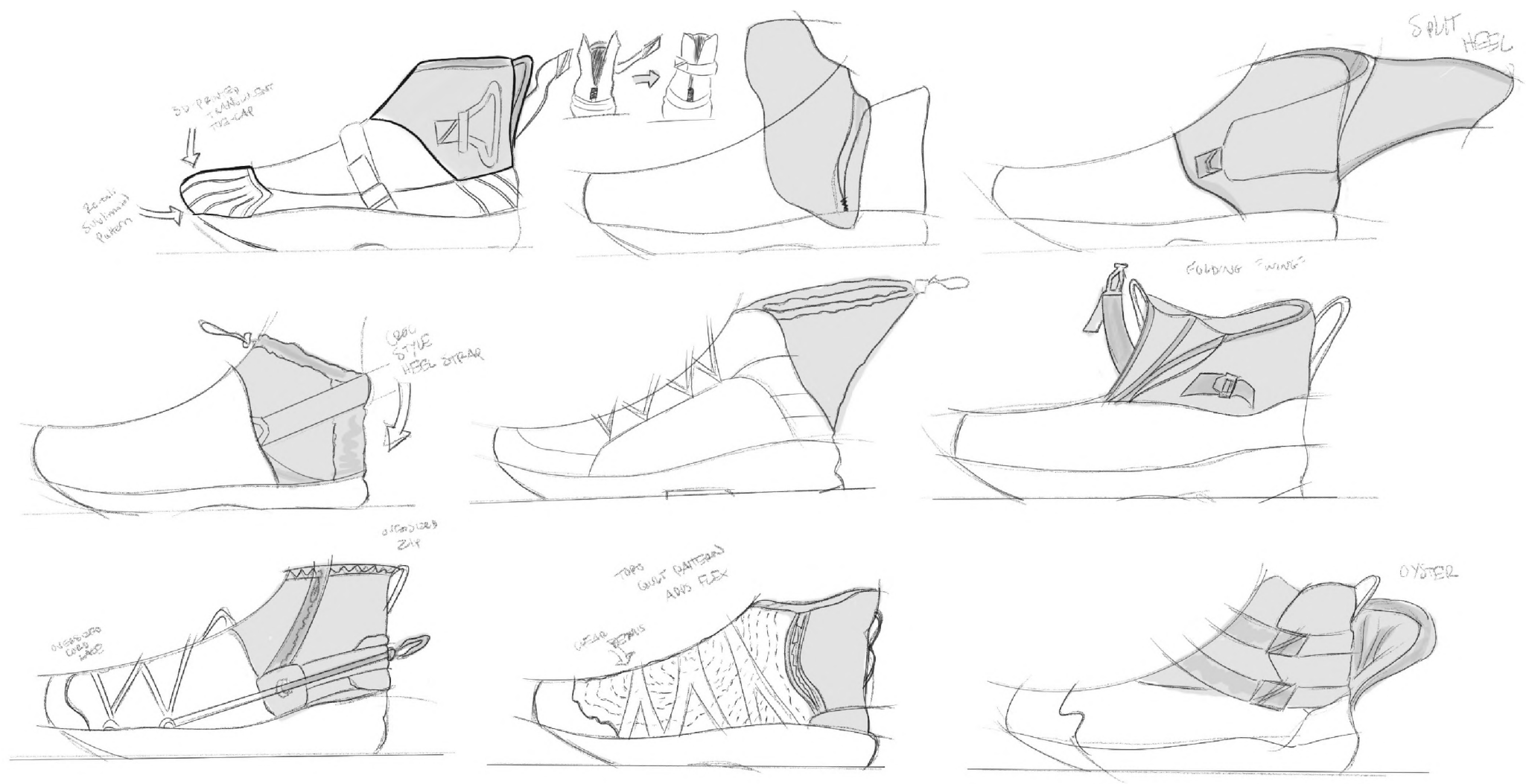


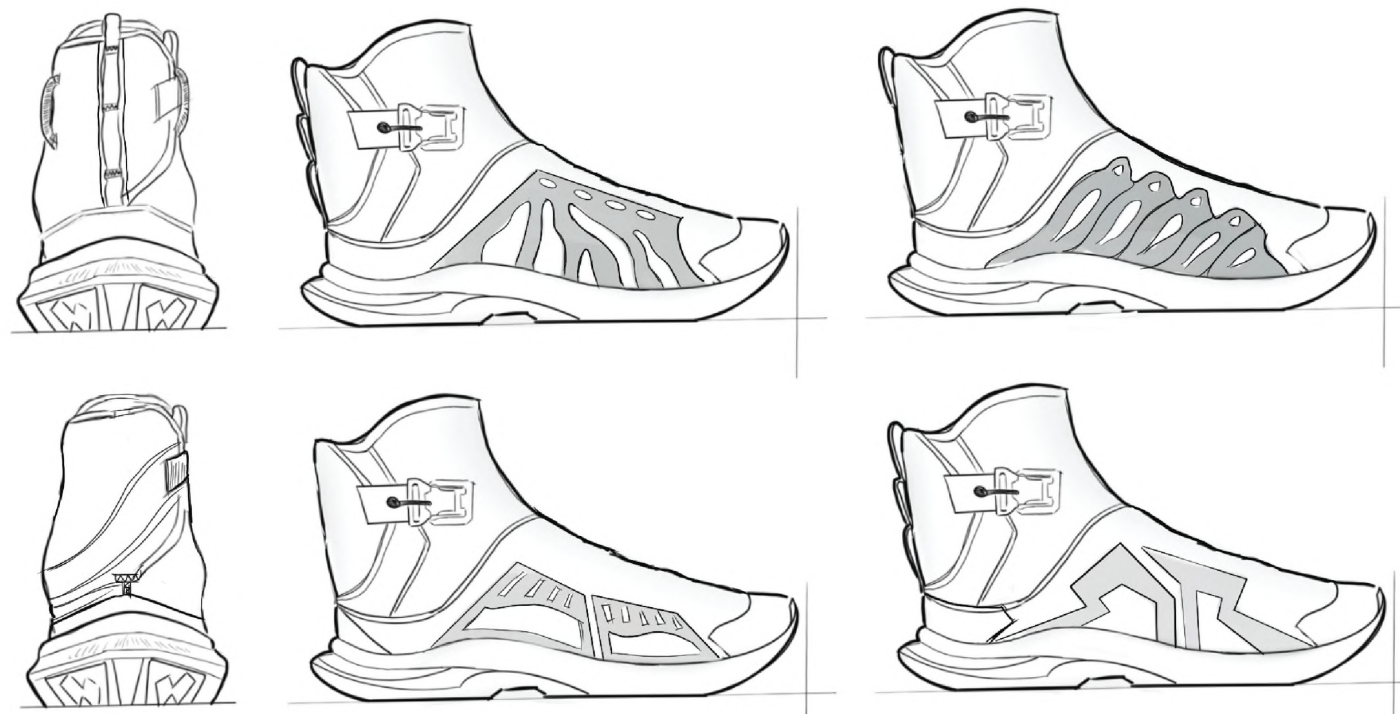
3D PRINTED  
TBU (CLEAR)



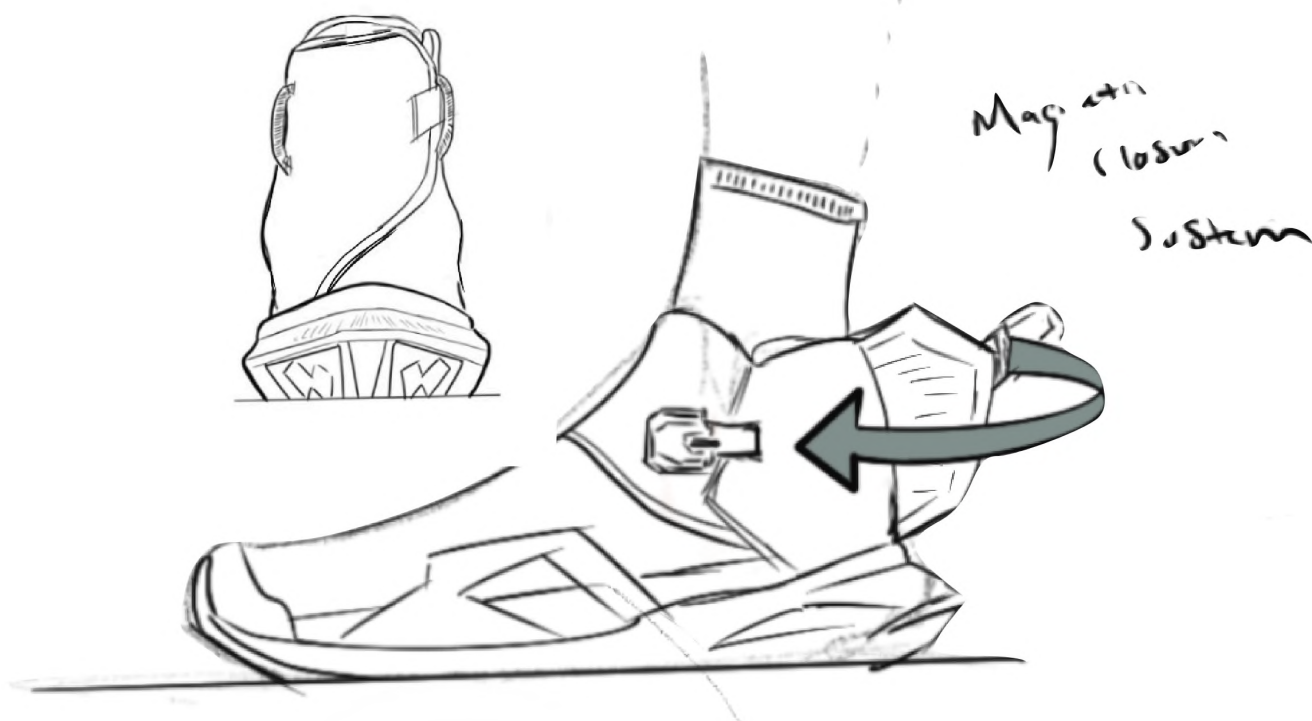
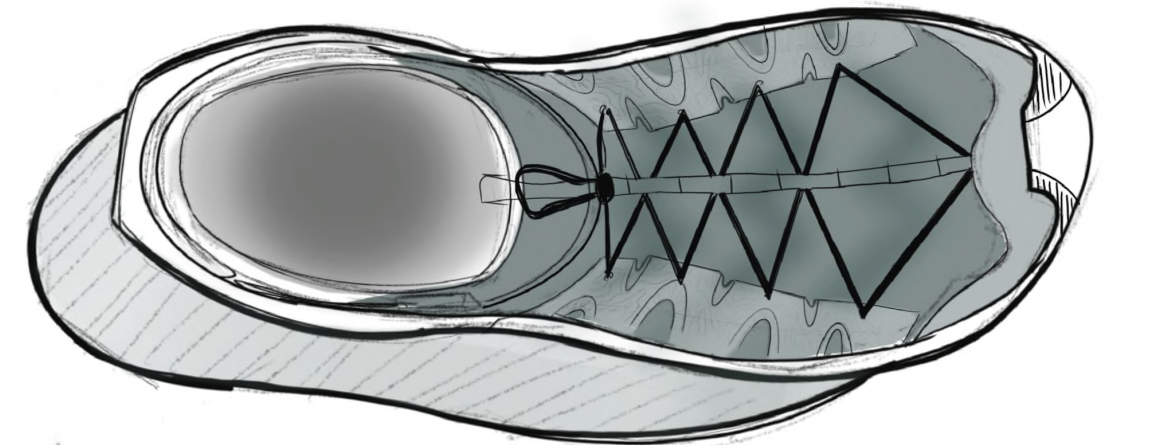
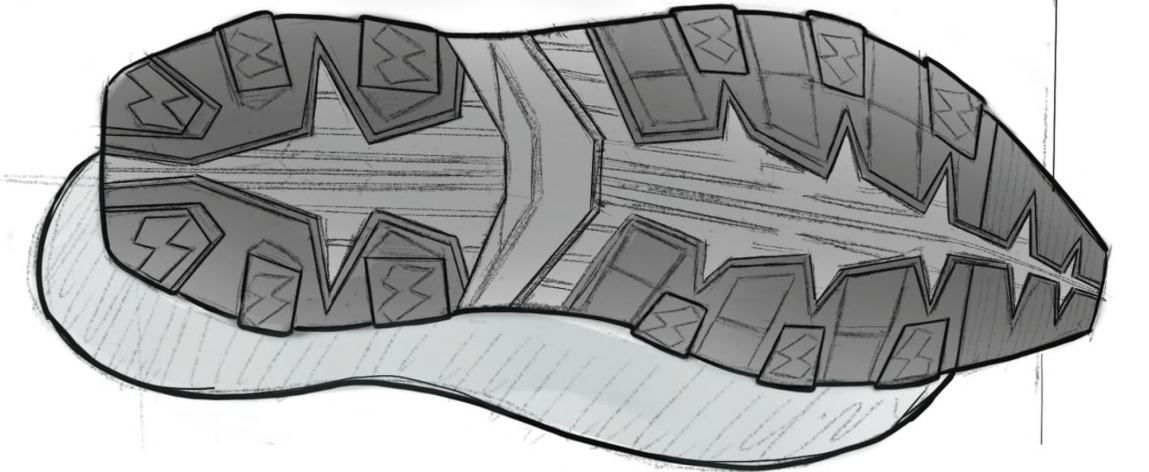
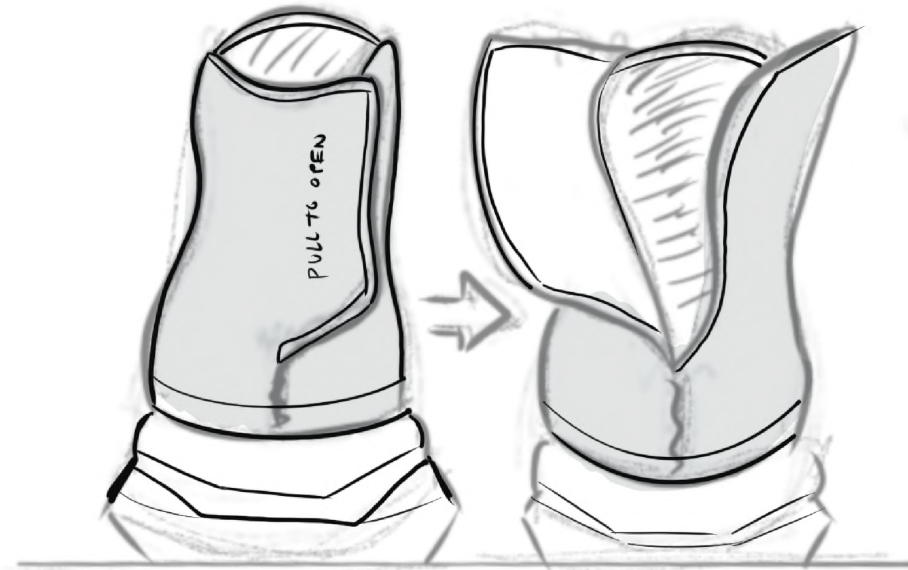
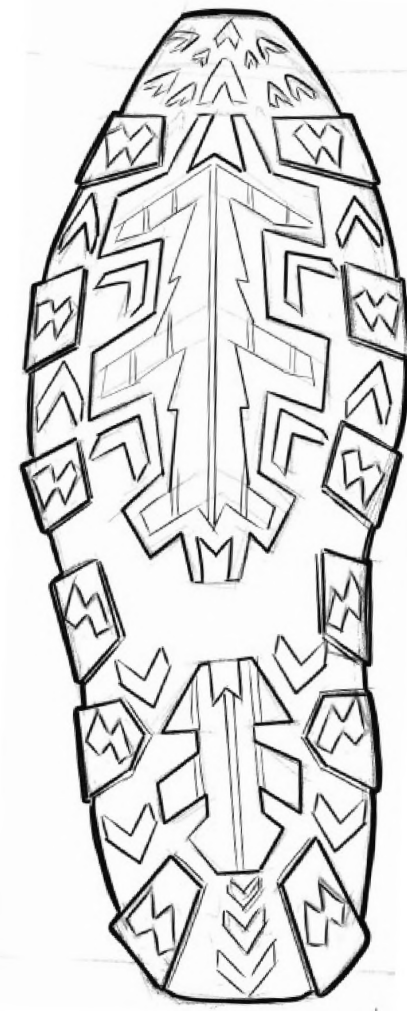
LOW

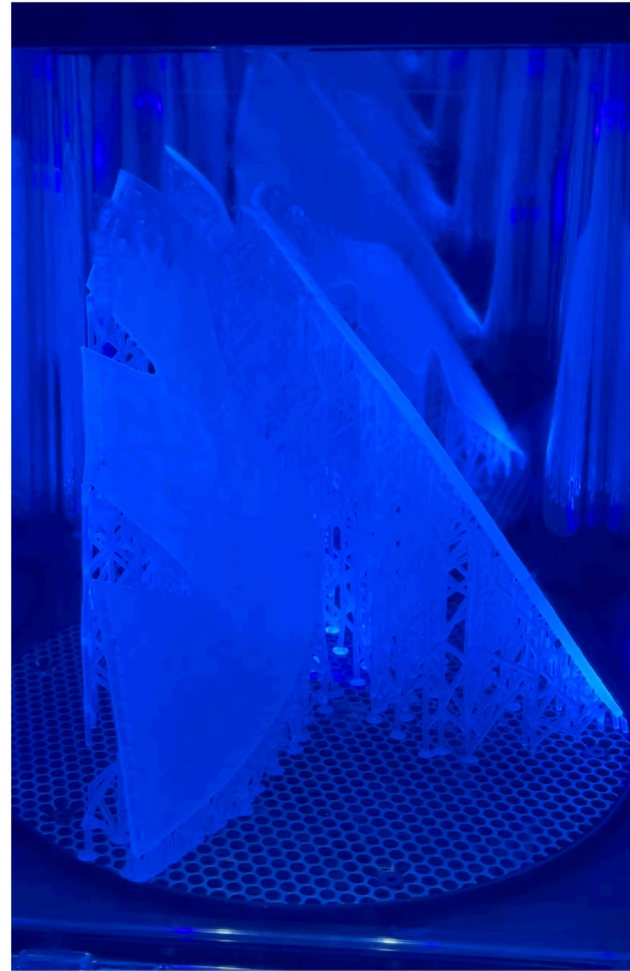






3D PRINTED TPU (CLEAR)





# DONNING & DOFFING TESTING



NIKE GO FLYEASE

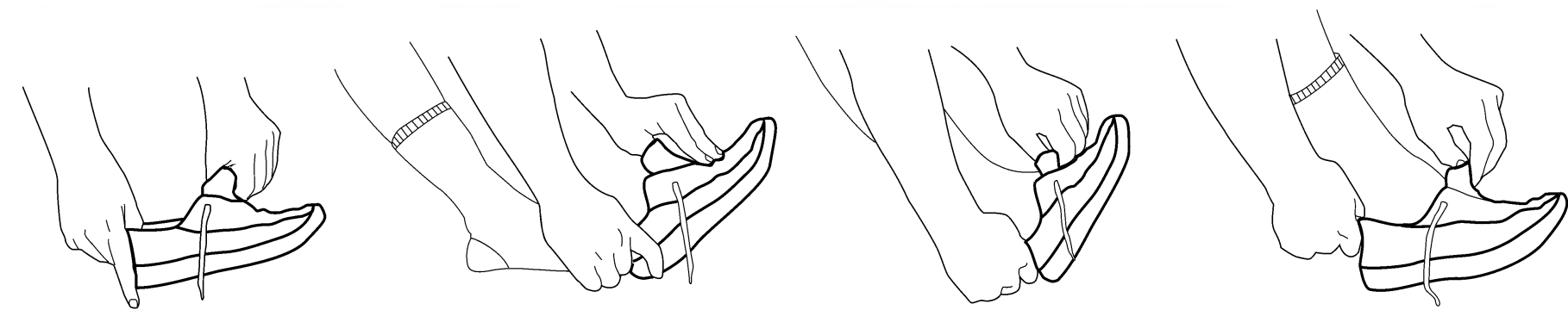
SALOMON SNOW MOC 2

SALOMON SNOWCROSS ADV.

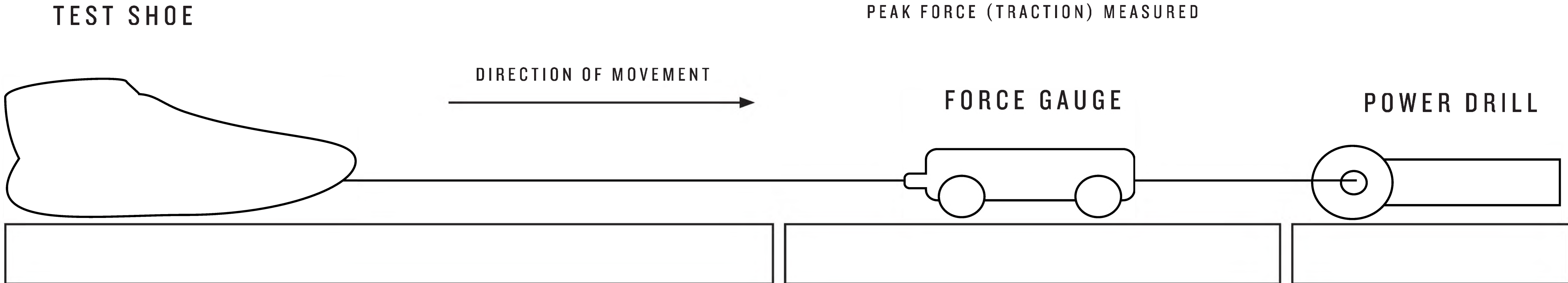
KEEN REVEL IV CHELSEA

AVERAGE TIME TO:

**DON**    DOFF



# TRACTION TESTING



# TRACTION TESTING



# HEAT RETENTION TEST METHODS

GOALS

## EXAMINE SHOE & PARTS

- Looking at how footwear is constructed (what materials, manufacturing methods) can help us to understand how heat is either retained or lost in cold environments.

## OBSERVE & MEASURE HEAT RETENTION ACROSS UPPER

- Observing how heat is trapped or released at different intervals can show us where improvements can happen and also what works well.

## COMPARE RECORDED DATA & ANALYZE RESULTS

- Comparing and analyzing the data collected in this test can inform how we approach a winter shoe in regards to design, materials, etc.

METHODS

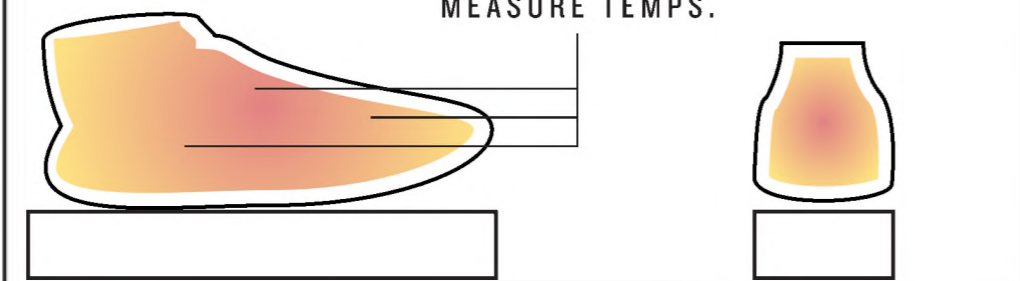
### WARM SPACE

WARM SHOE & BLADDER

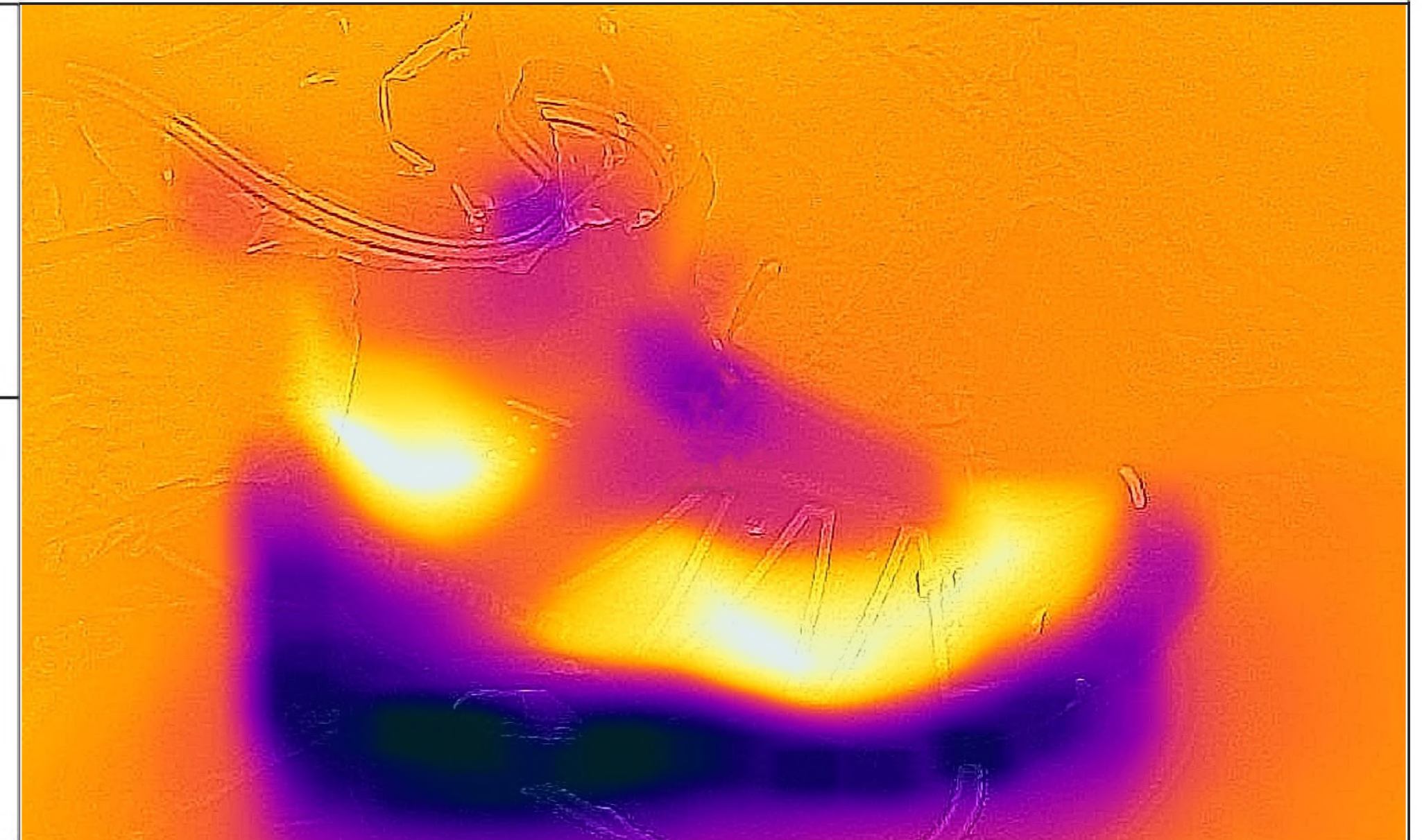
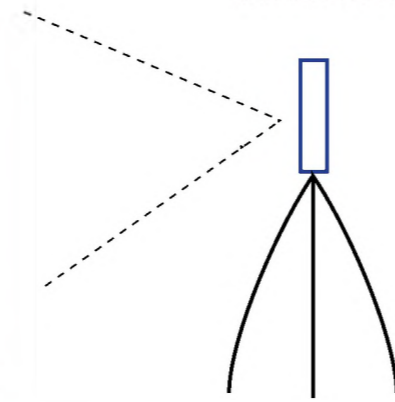


### FREEZER

SHOE & WARM BLADDER



IR CAMERA



RESULTS

% OF HEAT LOST IN 30 MIN

**40%**

AREA WITH MOST HEAT LOSS:

**LATERAL SIDE**



NIKE GO FLYEASE

% OF HEAT LOST IN 30 MIN

**22%**

AREA WITH MOST HEAT LOSS:

**TONGUE**



SALOMON SNOW MOC 2

% OF HEAT LOST IN 30 MIN

**20%**

AREA WITH MOST HEAT LOSS:

**TOE-BOX**



SALOMON SNOWCROSS ADV.

% OF HEAT LOST IN 30 MIN

**21%**

AREA WITH MOST HEAT LOSS:

**ANKLE**



KEEN REVEL IV CHELSEA

% OF HEAT LOST IN 30 MIN

**13%**

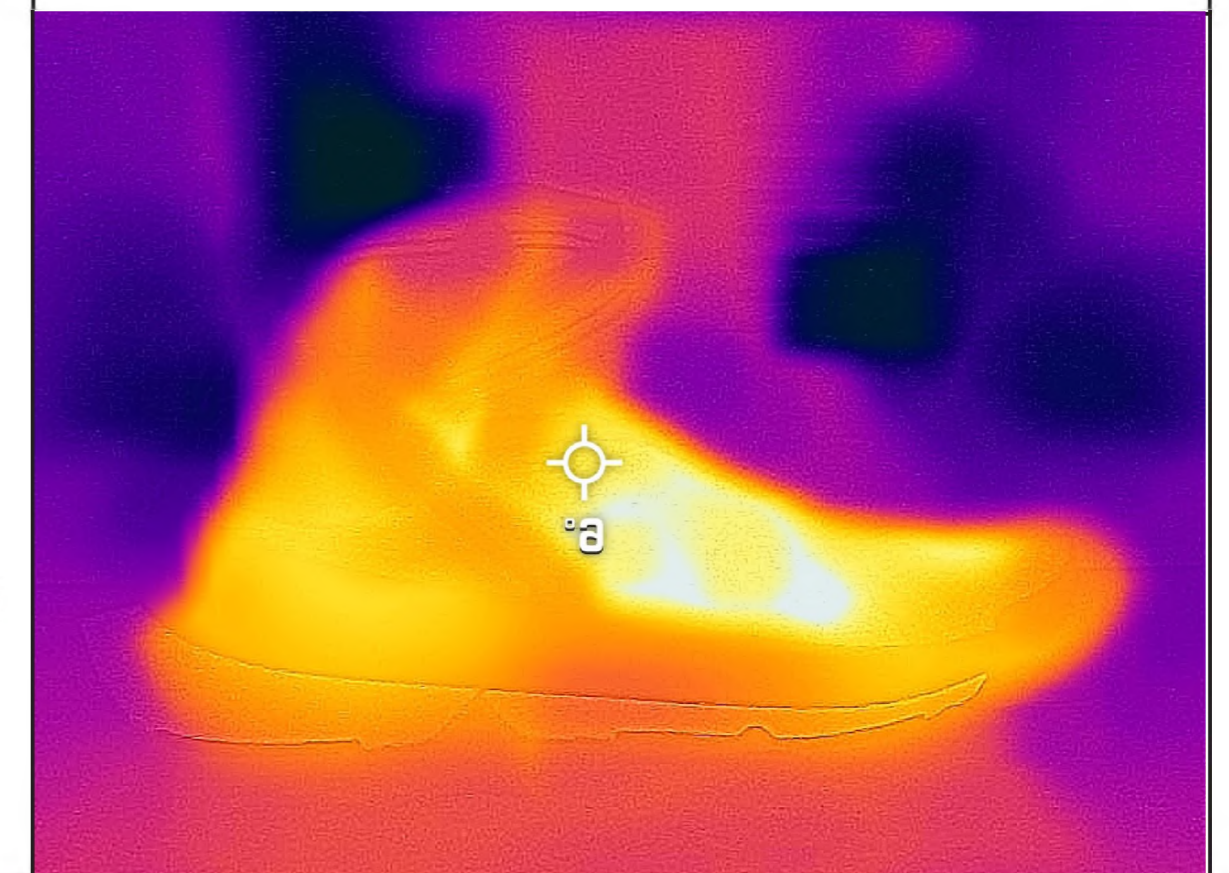
AREA WITH MOST HEAT LOSS:

**ANKLE**

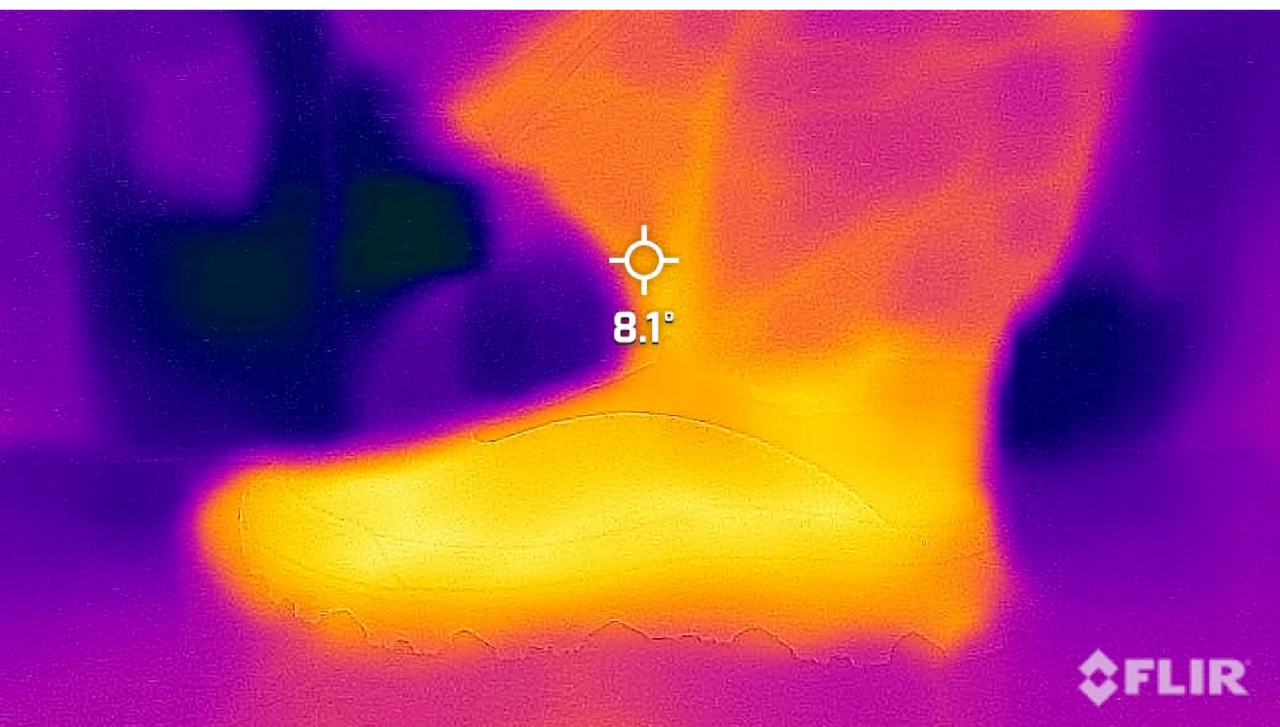


AXIOM VOYAGER

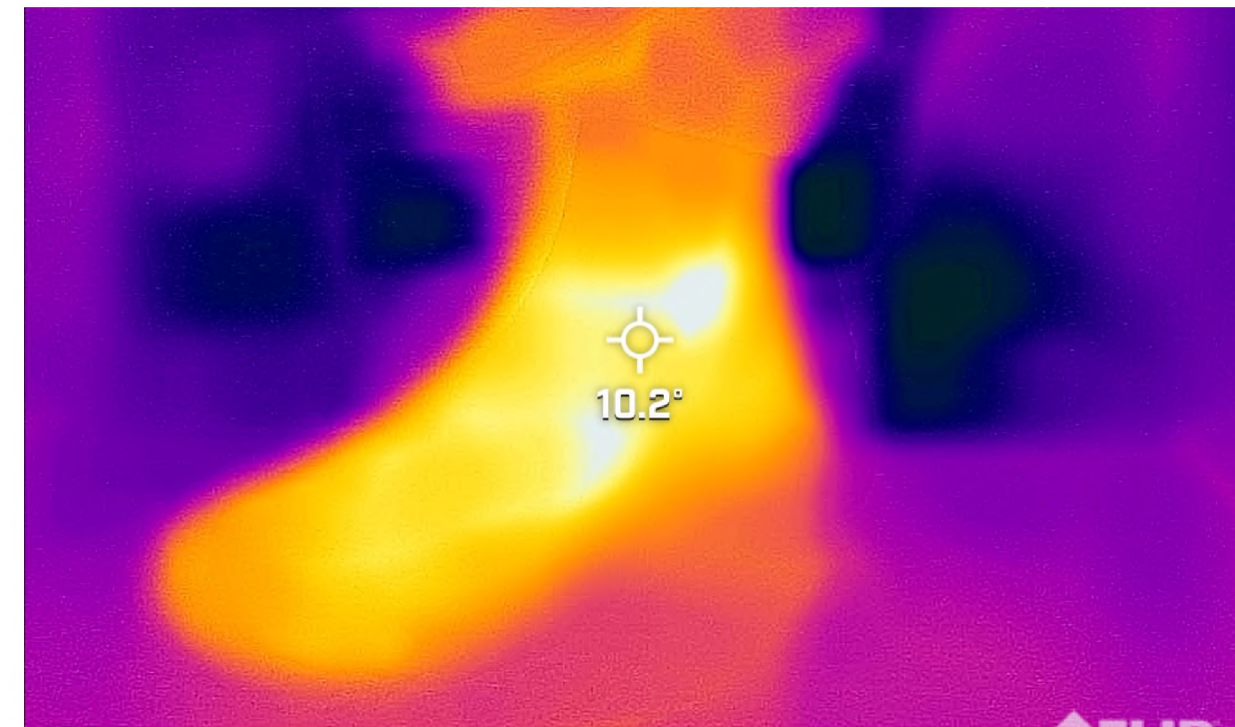
## HEAT ESCAPE TESTING:



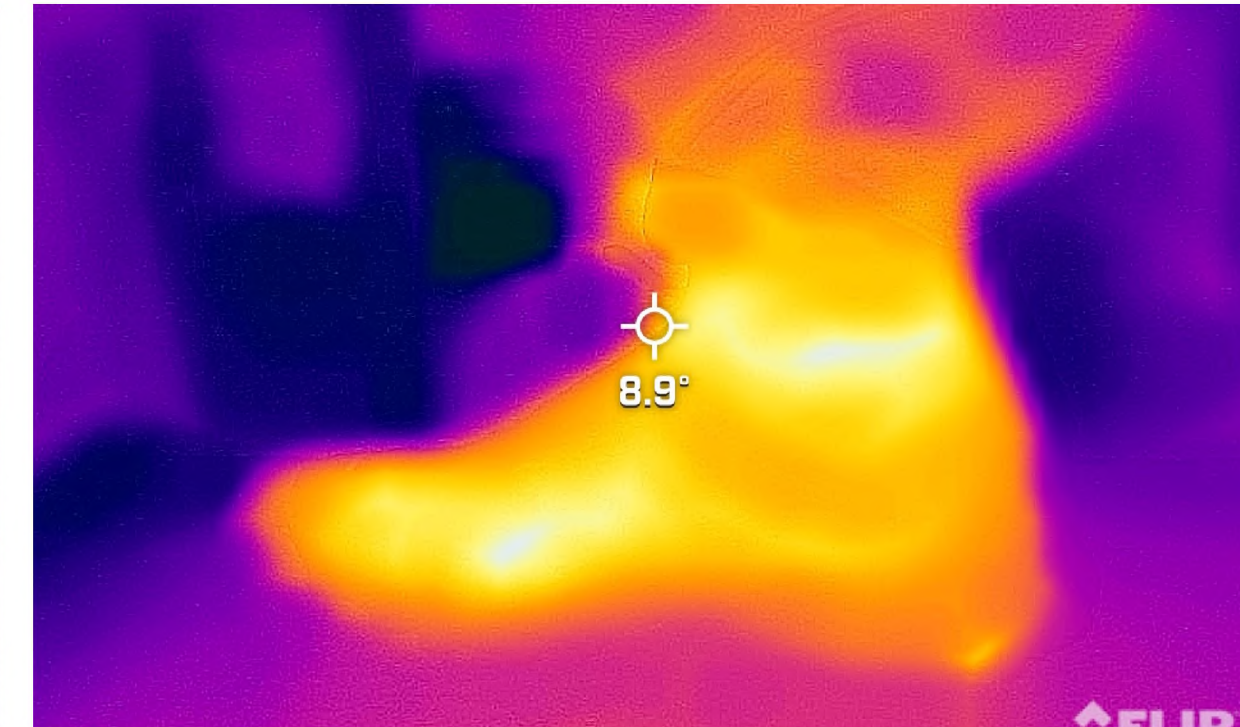
# INFRARED COLD ENV. TESTING



SALOMON SNOWMOC



KEEN REVEL IV

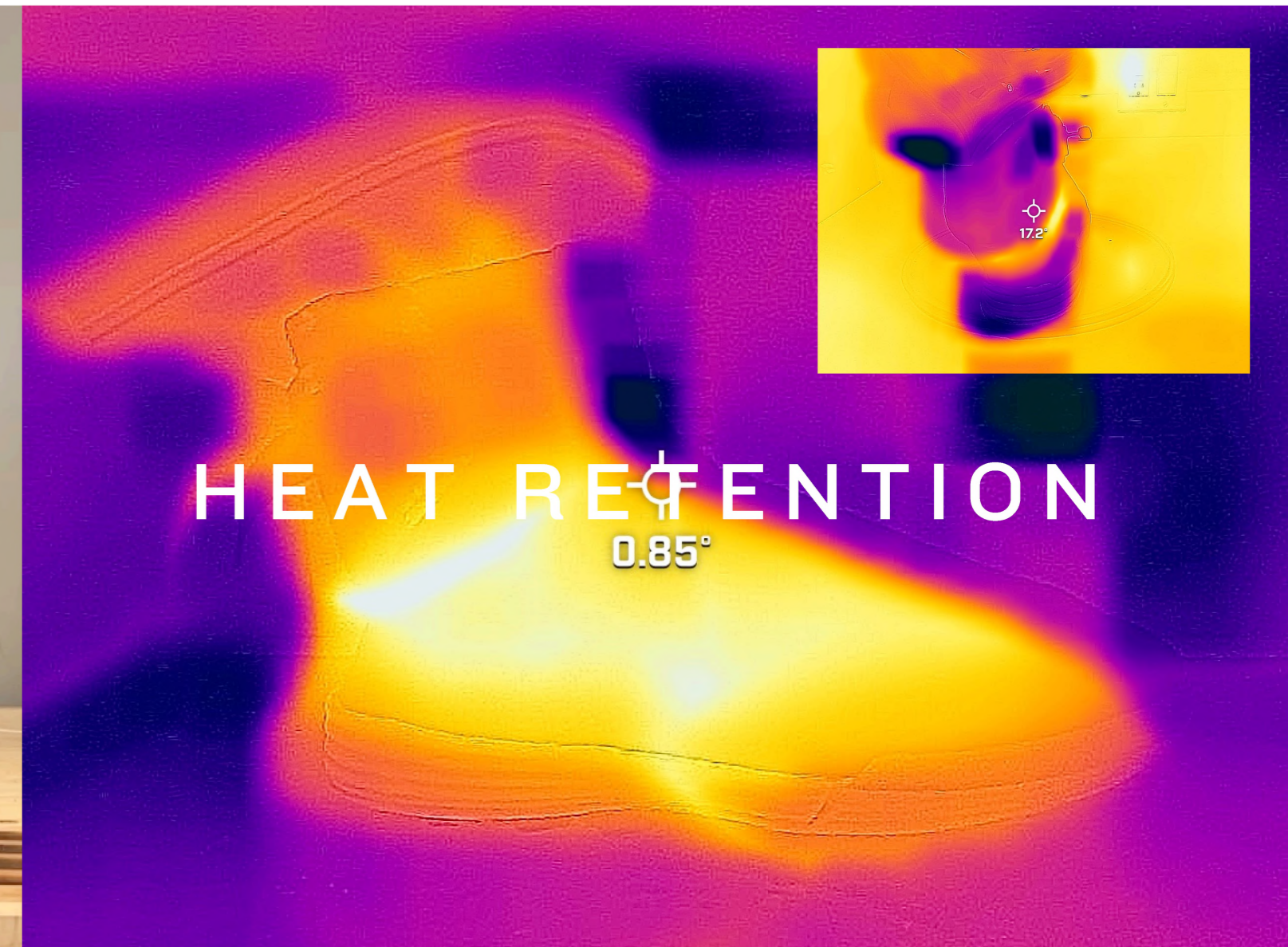


SALOMON SNOWCROSS



NIKE GO FLYEASE

# TESTING & RESULTS



**45% FASTER TO DON**

IN TIMED TRIALS

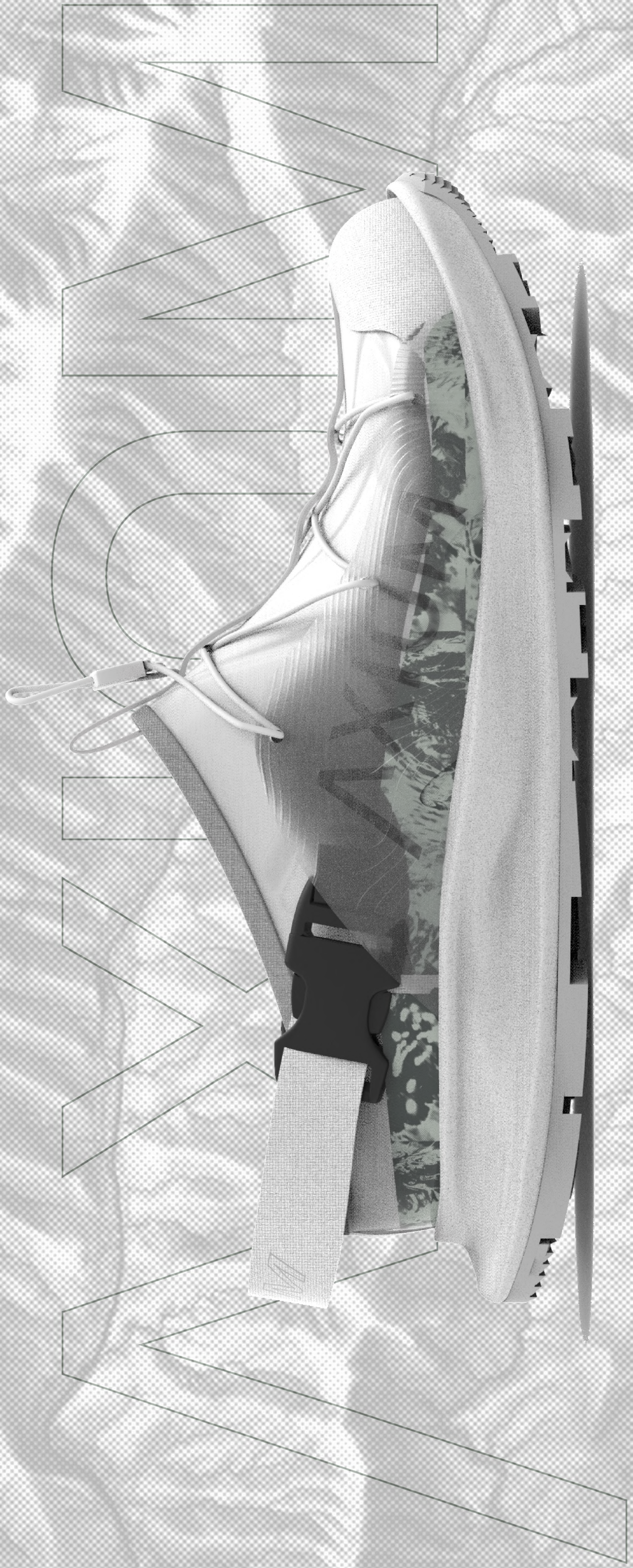
**6.2 N GREATER TRACTION**

ON DIRT, DIRT & SNOW, SYNTHETIC ICE

**14° WARMER**

IN 6° ENV. OVER 30+ MIN

\* ON AVG. COMPARED TO TESTED COMPETITORS



# CONSTRUCTION

## MATERIALS

NYLON ELASTANE LACE

PLASTIC LACE CINCH

NYLON ACCENT WEBBING

NYLON WEBBING

100% WOVEN COTTON TRIM

FIDLOCK MAGNETIC V-BUCKLE

WATERPROOF BREATHABLE 3-PLY WOVEN NYLON

100% KNIT COTTEN ACCENT

TPU TOECAP OVERLAY

TRANSLUCENT TPU SUPPORT CAGES

EVA & POLYESTER KNIT SOCKLINER

EVA FOAM MIDSOLE

068 HARD RUBBER OUTSOLE



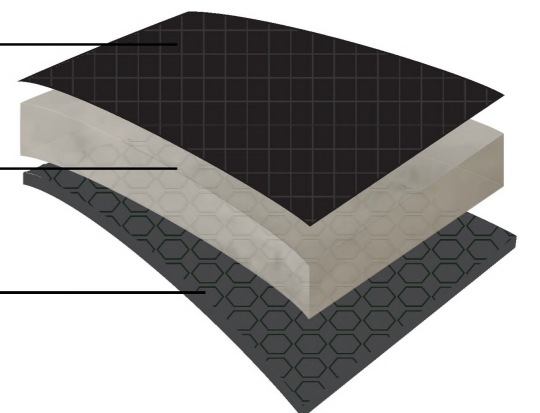
## FEATURES & BENEFITS

- Mule silhouette is stylish, intuitive, easy to use and made to seal in heat for cold weather.
- Enlarged opening paired with interchangeable heel straps makes for simple use and custom fit.
- Accentuated heel platform allows for easy step-out and removal of footwear.
- Magnetic hardware allows for swift lockdown with minimal dexterity requirement for use.
- One-pull elastic cinch lace system enables easy and swift adjustment for fit and lockdown.

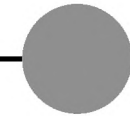
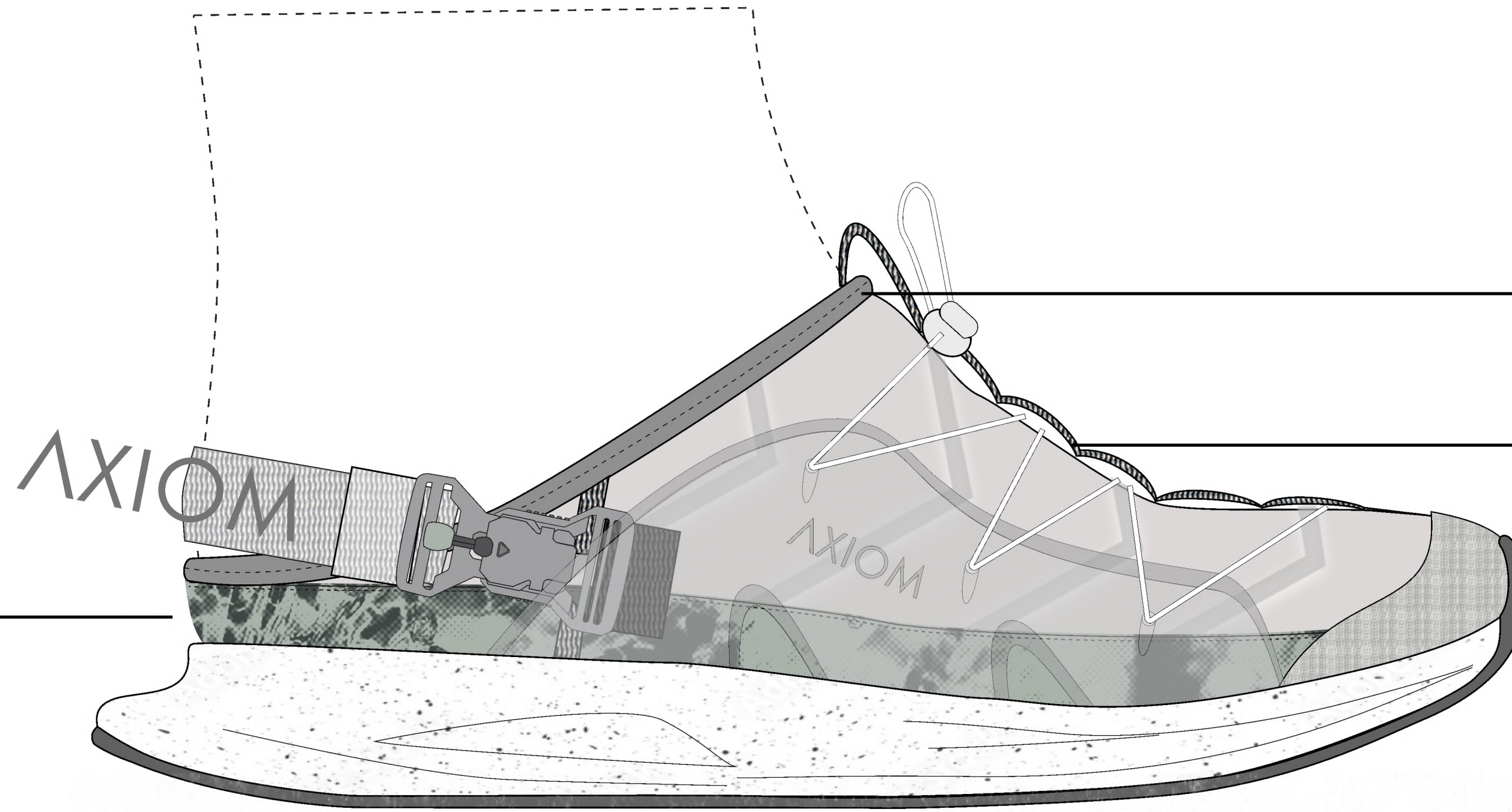
WATERPROOF BREATHABLE 3-PLY WOVEN NYLON

RECYCLED GOOSE & DUCK DOWN

100% KNIT POLYESTER LINING



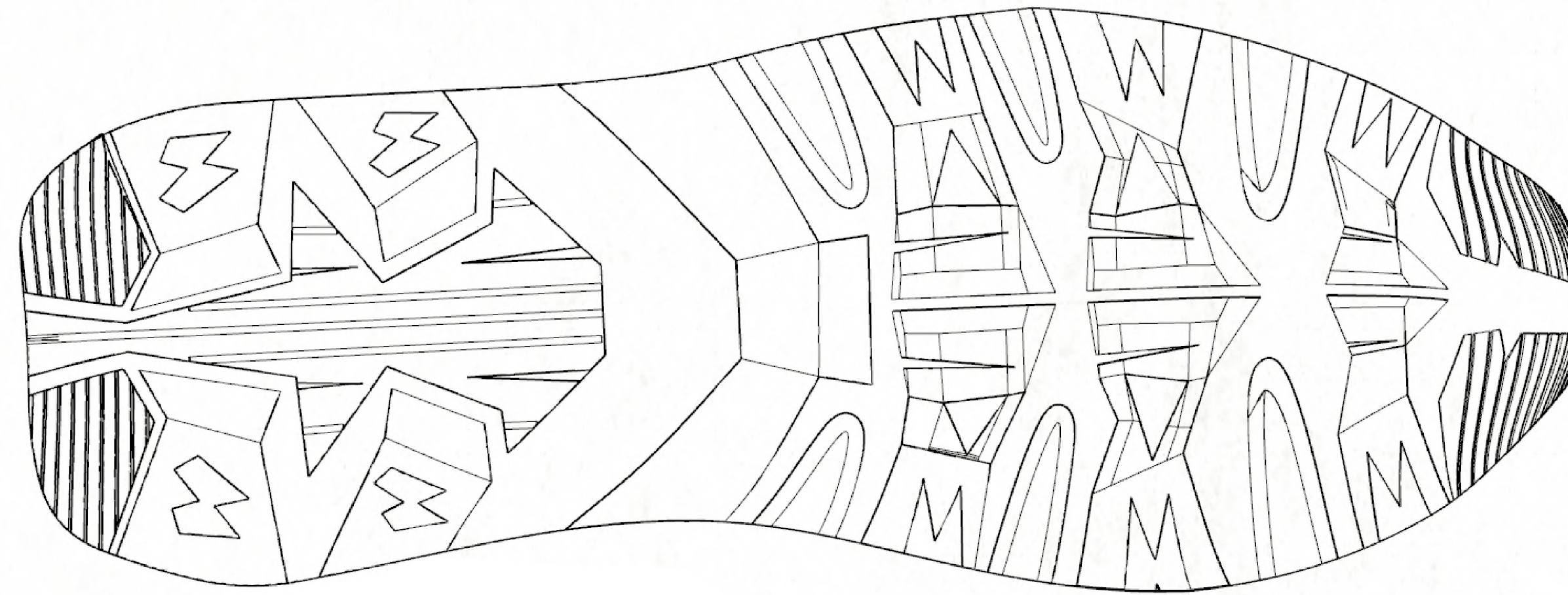
CUSTOM GREENSCALE TEXTURE

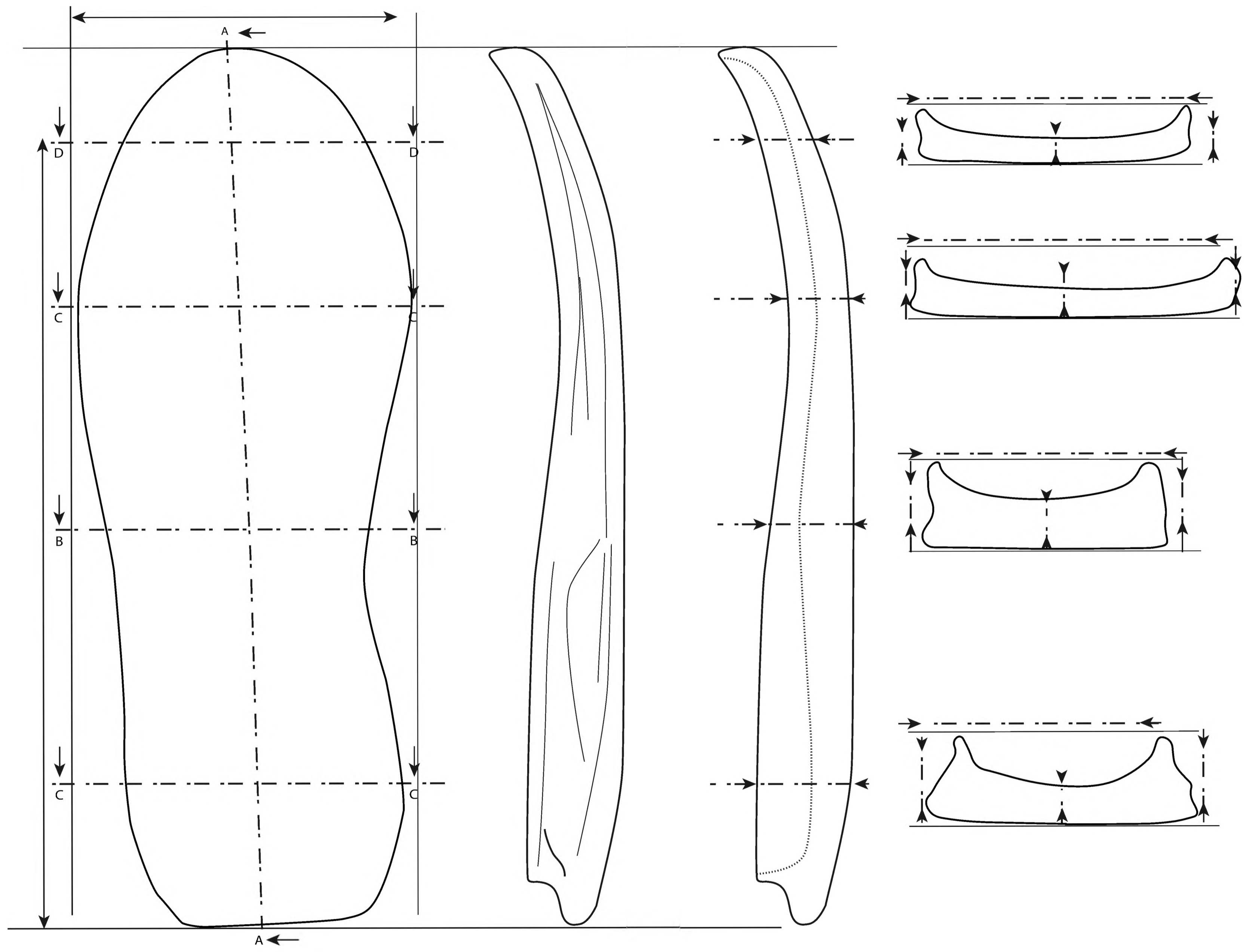


PANTONE 445C

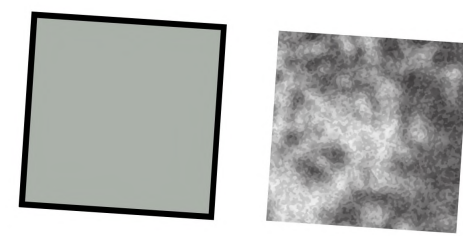
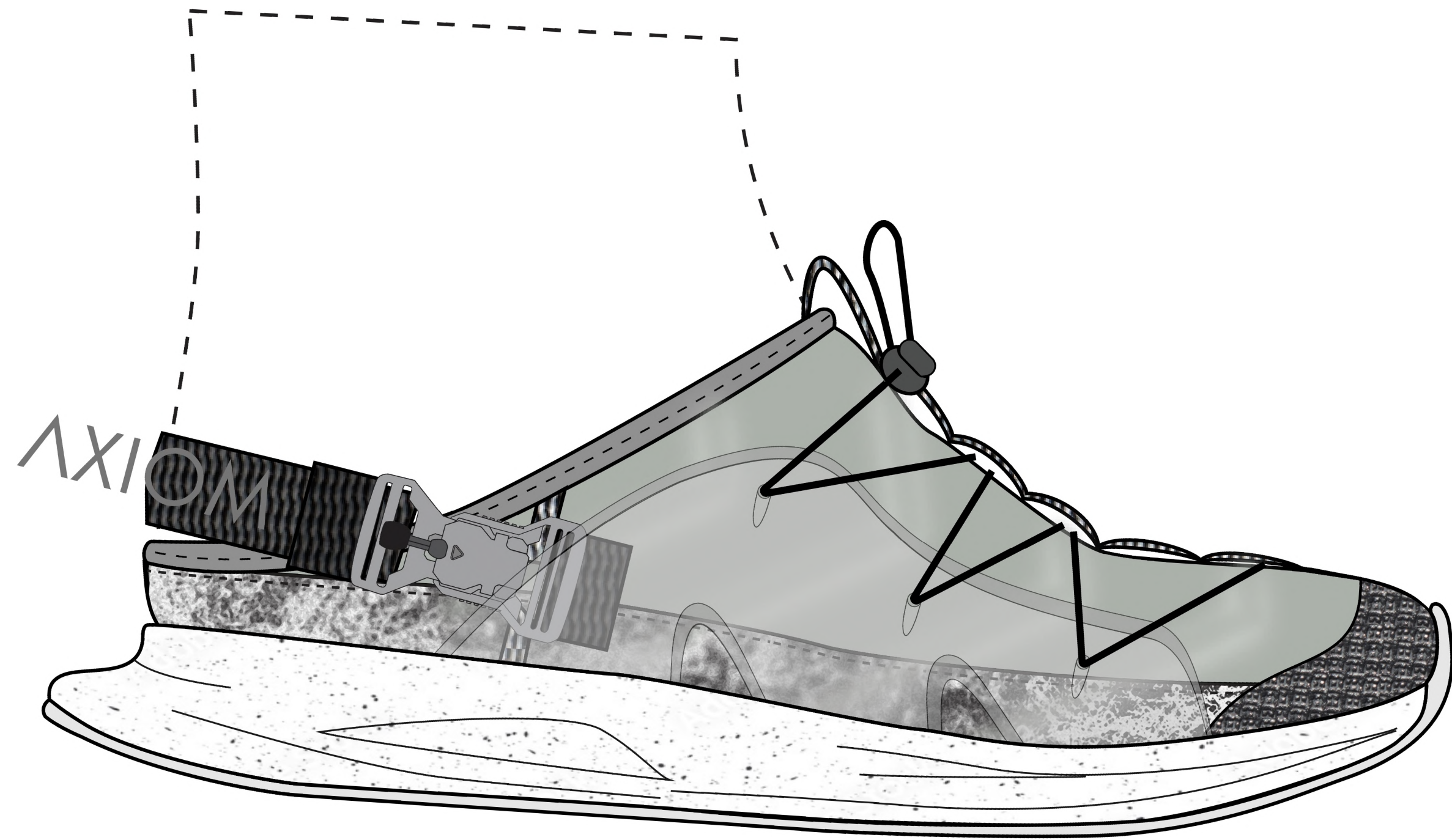


PANTONE 445C

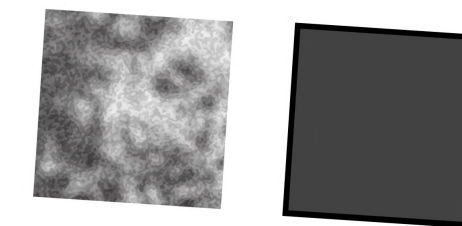
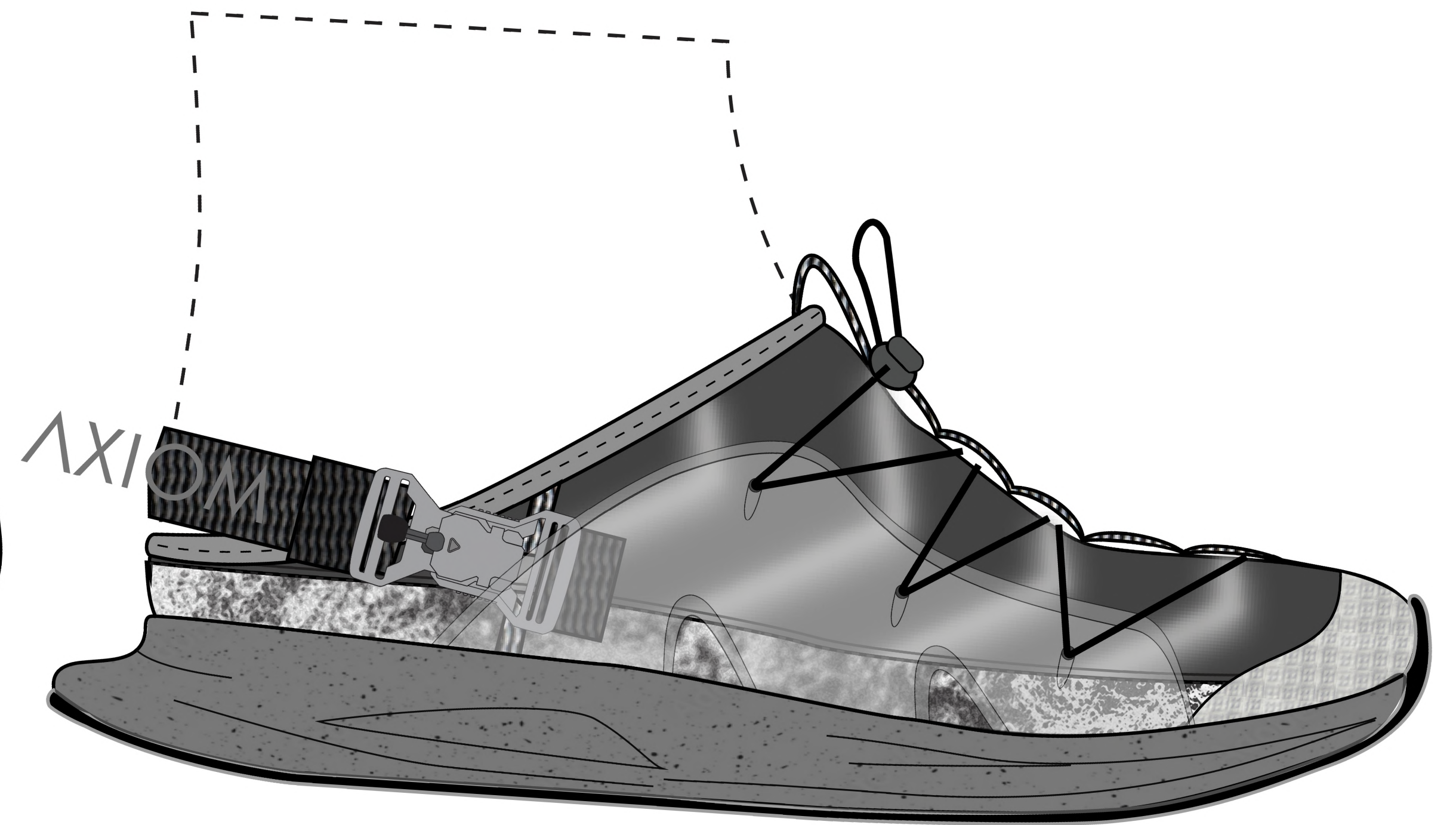




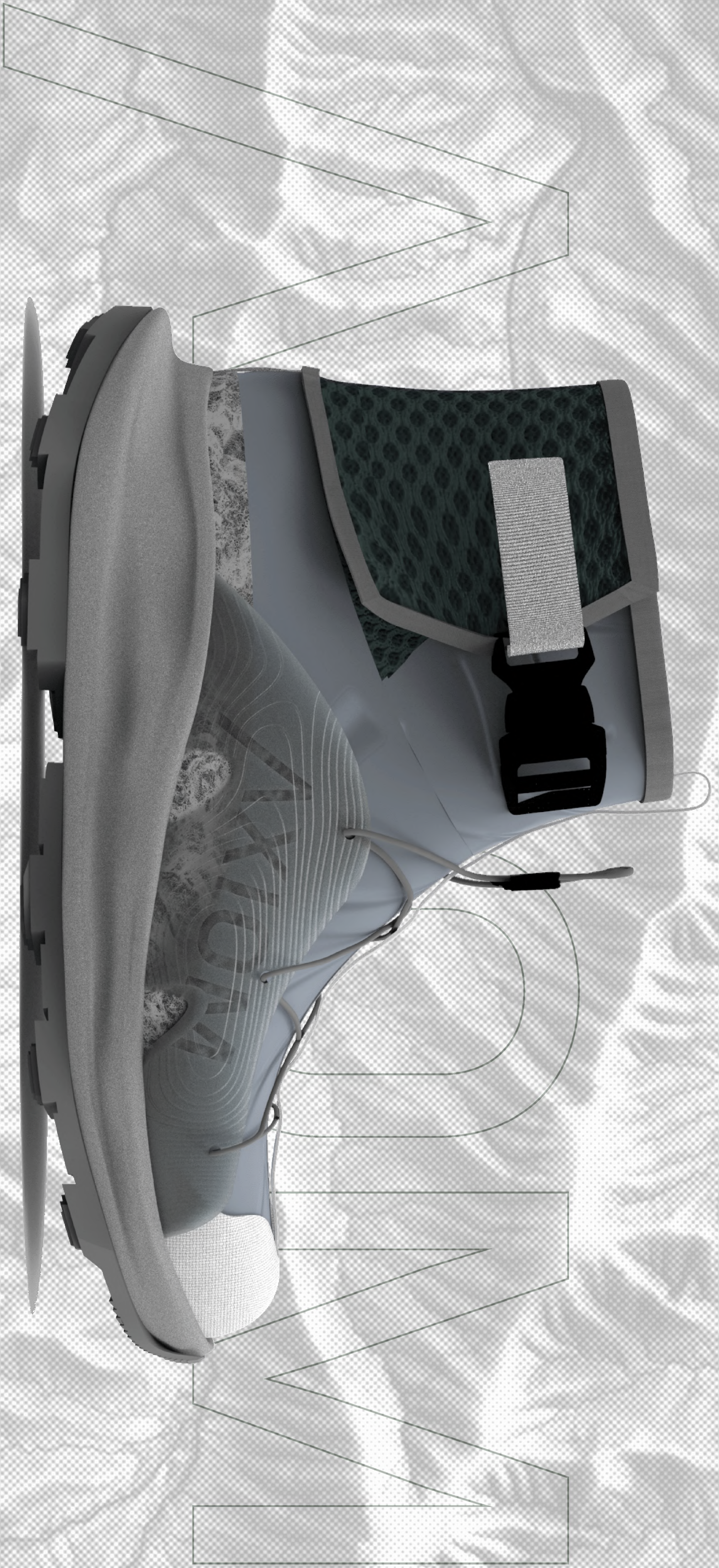
# ALTERNATE COLORWAYS



#aabl9



#424243



# CONSTRUCTION

## MATERIALS

NYLON ELASTANE LACE

PLASTIC LACE CINCH

NYLON ACCENT WEBBING

FIDLOCK SEWABLE MAGNETIC V-BUCKLE

100% KNIT POLYESTER ANKLE SHROUD

100% WOVEN COTTON TRIM

WATERPROOF BREATHABLE 3-PLY WOVEN NYLON

TPU TOECAP OVERLAY

TRANSLUCENT TPU SUPPORT CAGES

100% KNIT COTTEN ACCENT

EVA FOAM & POLYESTER KNIT SOCKLINER

EVA FOAM MIDSOLE

068 HARD RUBBER & 004 STICKY RUBBER OUTSOLE



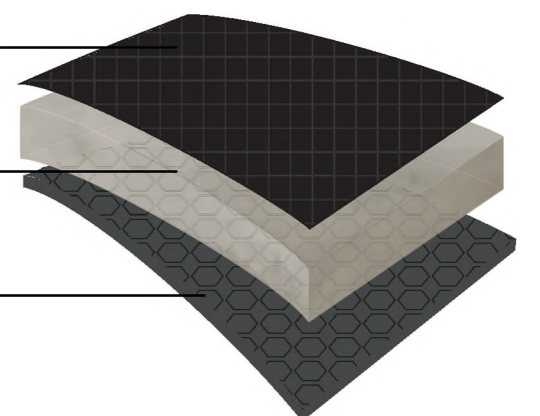
## FEATURES & BENEFITS

- Sneaker boot silhouette is stylish, intuitive, easy to use and made to seal in heat for cold weather.
- Enlarged opening paired with split heel system makes for simple use and custom fit.
- Accentuated heel platform allows for easy step-out and removal of footwear.
- Magnetic hardware allows for swift lockdown with minimal dexterity requirement for use.
- One-pull elastic cinch lace system enables easy and swift adjustment for fit and lockdown.

WATERPROOF BREATHABLE 3-PLY WOVEN NYLON

RECYCLED GOOSE & DUCK DOWN

100% KNIT POLYESTER LINING



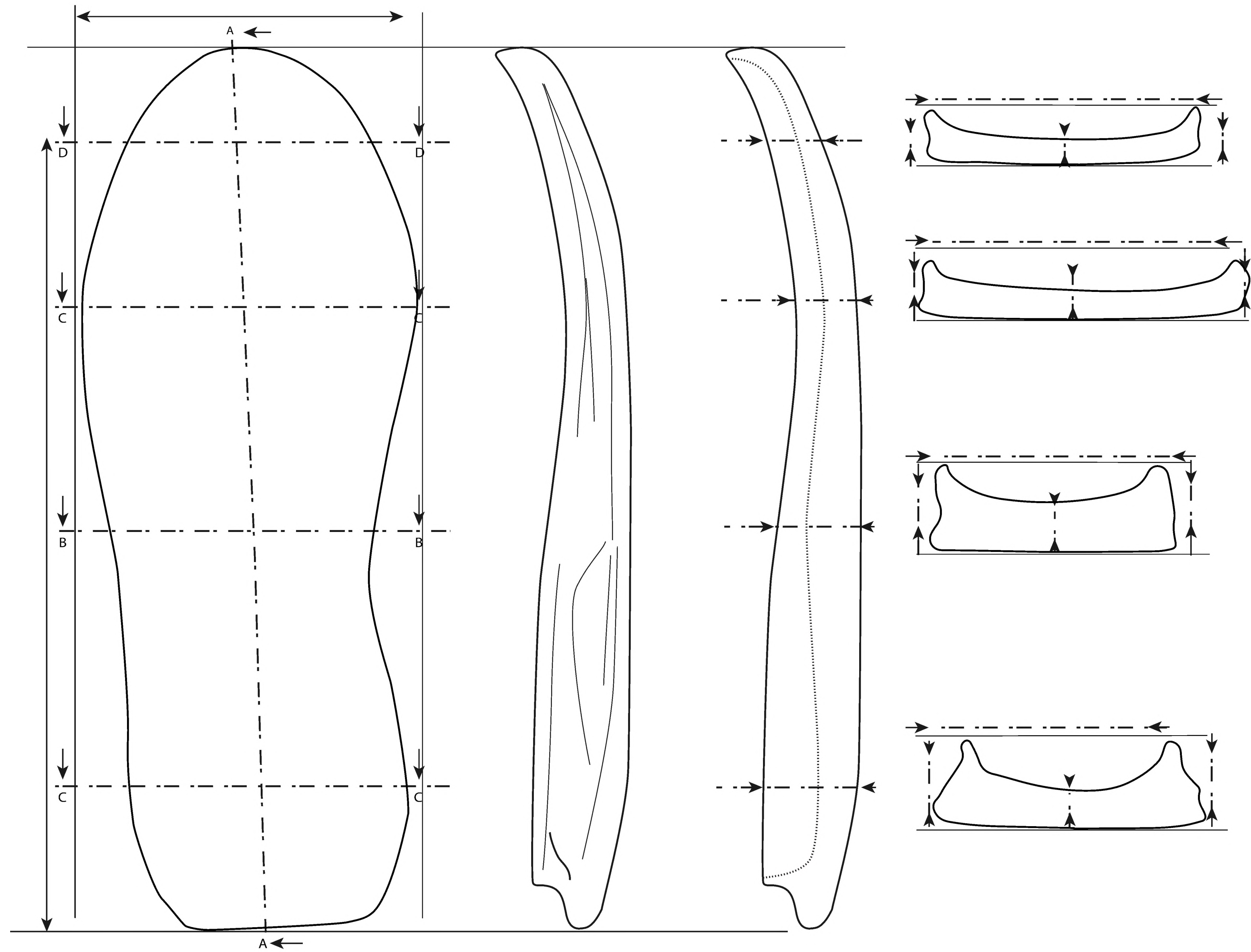


PANTONE 446 C

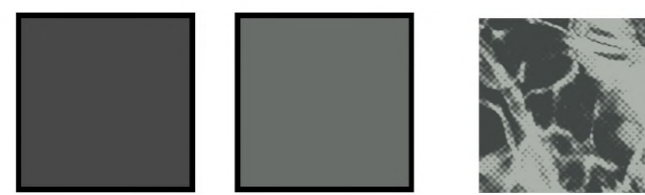
PANTONE NEUTRAL GRAY C

PANTONE 445C

CUSTOM B/W TEXTURE



# ALTERNATE COLORWAYS



#676d78 #676d78



#676d78 #676d78 #676d78



# KNOW

A STATEMENT OR PROPOSITION WHICH IS REGARDED AS BEING ESTABLISHED, ACCEPTED, OR SELF-EVIDENTLY TRUE.





NT OR PROPOSITION WHICH IS REGARDED AS BEING ESTABLISHED, ACCEPTED, OR SELF-EVIDENTLY TRUE.

# WIXOM







# EXPERT VALIDATION



**WILLIAM  
WILKINSON**

M.D., PROFESSOR OF KINESIOLOGY  
AZUSA PACIFIC UNIVERSITY

“These solutions account for all of the physiological and overall functional factors at play for the users mentioned.”



**TIM  
BURR**

FOUNDER, RETURN TO DIRT  
ADAPTIVE OUTDOOR ATHLETE

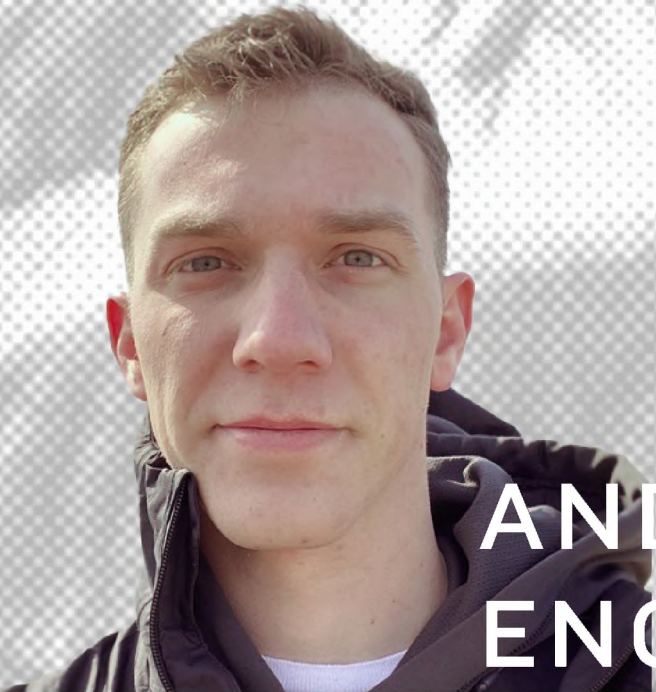
“That design seems revolutionary dude. It looks really really cool so far!”



**ROY  
TUSCANY**

DIRECTOR, HIGH-FIVES FOUNDATION  
ADAPTIVE OUTDOOR ATHLETE

“This is so exciting, I love that it looks like other exciting outdoor shoes and not like a slipper or something.”



**ANDREW  
ENGEL**

FOOTWEAR DESIGNER, MERRELL

“This is well thought out—keeping with silhouettes that are proven to work (mule) but adding a winter twist is really interesting.”

# EXPERT COLLABORATION



FOUNDER, RETURN TO DIRT  
ADAPTIVE OUTDOOR ATHLETE



M.D., PROFESSOR OF KINESIOLOGY  
AZUSA PACIFIC UNIVERSITY



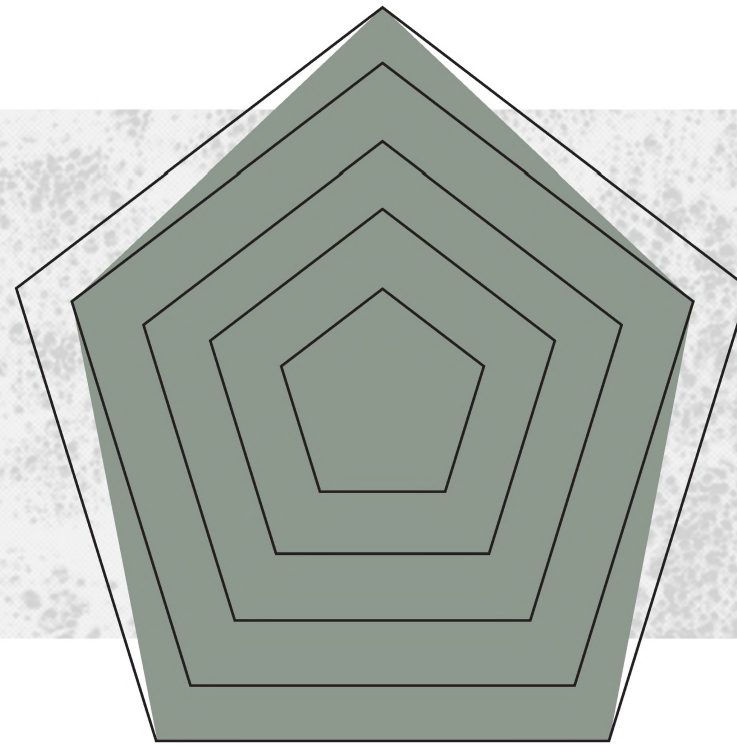
FOOTWEAR DESIGNER, MERRELL

**“These solutions account for all of the physiological and overall functional factors I’m aware of for these adaptive users.”**

# RECAP

EASE OF USE

COMFORT



STYLE

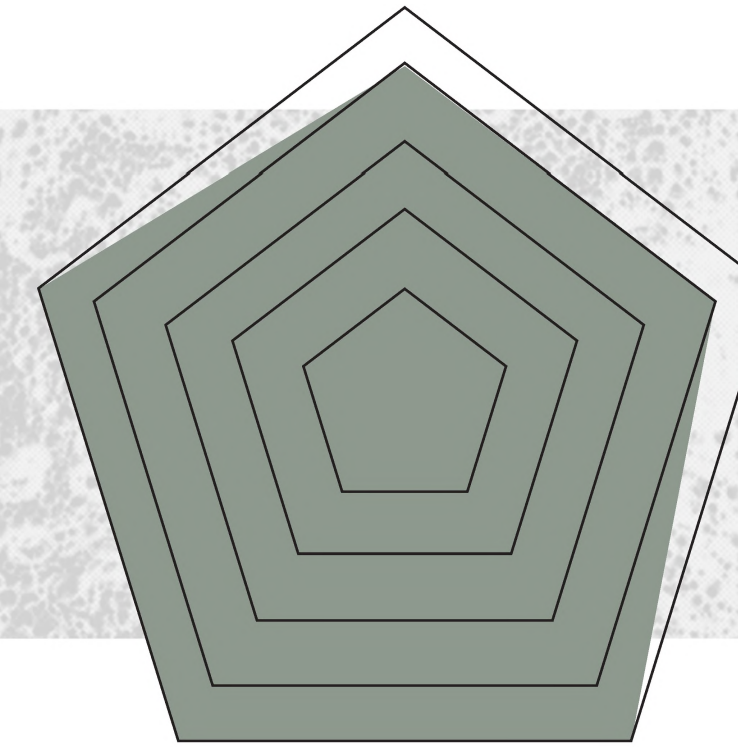
WARMTH

TRACTION



EASE OF USE

COMFORT



STYLE

WARMTH

TRACTION



45% FASTER TO PUT ON

14° WARMER

6.2N OF INCREASED TRACTION

\* ON AVG. COMPARED TO TESTED COMPETITORS

# CONCLUSION

COLD WEATHER & THE FOOTWEAR ADAPTIVE USERS WEAR CAN BE HINDRANCES TO THEM GETTING OUTSIDE AND DOING WHAT THEY WANT TO DO.

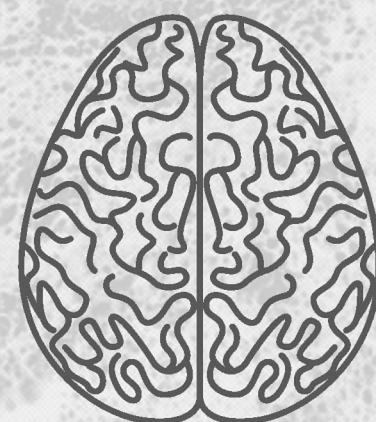
WHAT IF OUTDOOR SHOES WERE EASIER TO USE, COULD MITIGATE HEALTH RISKS, AND ENABLED WEARERS TO REAP THE BENEFITS THE OUTDOORS HAS TO OFFER?

## BEING OUTDOORS IMPROVES:

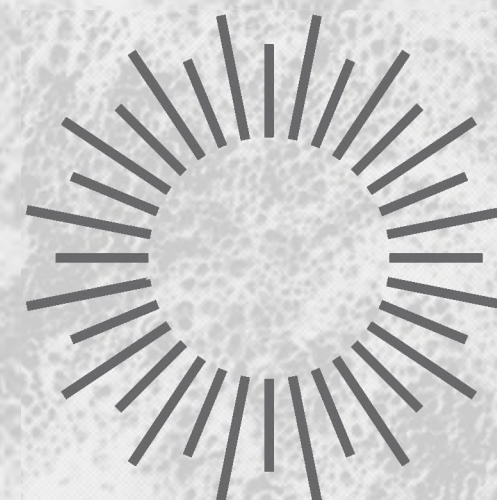
PHYSICAL HEALTH



MENTAL HEALTH



OVERALL MOOD & WELLBEING



CONFIDENCE & SELF-EXPRESSION





THANK YOU