

## Leave No Trace: Zero-waste Convertible Hiking Pants and Jacket

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**Contextual Review and Concept:** The purpose of making *Leave No Trace* was twofold. First, to create zero-waste garments for the outdoor enthusiast, and second, to validate the application of a recently published method of grading garments (Carrico, et al, 2022) to the pants. The publication showcases six different applications of the method that utilizes strategically placed bands as a means of achieving different sized garments from one zero-waste pattern. This builds on my previous design research working to find a way to grade zero-waste patterned garments (Carrico, 2016, 2020, 2021, 2022). While there are different ways for a manufacturer to be “zero-waste,” my focus is on creating a pattern layout for the garment(s) that leaves no scraps behind once the garment has been cut. Most zero-waste patterned garments on the market are not offered in a range of sizes customary for their category (Carrico, et al, 2022), and offering the designs in a range of sizes continues to be a barrier for bringing zero-waste patterned garments to market. (Carrico & Kim, 2014; Rissanen, 2014; Saeidi & Wimberley, 2018).

Only one previous iteration of gradable zero-waste garments using the bands was full length pants. That pant was a full-legged bias cut pull-on pant for women. With *Leave No Trace*, I wanted to successfully create a full-length pant that could be offered in a range of sizes from one zero-waste pattern.

**Process, Technique, and Execution** The pant and jacket patterns were both developed in Browzwear’s VStitcher. Each piece was initially developed independently from the other. Once patterns were established but not finalized, they were merged into one file to create the zero-waste layout and make necessary pattern adjustments. An advantage to using VStitcher is that pattern shapes can quickly be drawn from the negative areas in the layout. Those shapes can then be manipulated on the 3D garment to generate design solutions. The final pattern layout is shown in Figure 1.

A gray 2-ply nylon woven fabric with wicking capabilities and a durable water-resistant finish was selected for both garments. Such a fabric is commonly used for hiking pants and jackets by outdoor brands. Most of the bands used to grade the pants were cut



Figure 1. 85'' x 55'' pattern layout

from the same nylon fabric but in a black color, while the waistband, front waist, and top inseam were cut from a wicking polyester and spandex jersey for the wearer's comfort.

The jacket opens with a 2-way separating zipper and has welt pockets in the skirt front. An invisible zipper closes a single chest pocket, and Velcro® at the sleeve cuffs can be used to cinch the sleeve opening. A drawstring waist and underarm gussets finish the look. The jacket is unlined which provides the hiker with a lightweight, protective layer while maintaining a zero-waste pattern. The pants can convert to shorts via separating zippers at the mid-thigh (see Figure 2). Bands for grading are located at the inseams, sides, thigh, front waist, back hips, and one band spirals around each leg. The top inseam piece was cut from stretch jersey to gain added ease in the crotch area. Two areas on the pant required bands that were not uniform in width. The trapezoidal shapes at the top inseam and outseam thigh were achieved by splitting one wider band diagonally to create the two needed shapes. Such a split creates two of the same trapezoids instead of symmetrical shapes (see Figure 3); thus, the band-splitting technique is only successful if using a double-faced fabric for the bands or if making garments in pairs.

A size 10 pant and jacket were constructed. VStitcher was used to verify the fit once grading was done on the other sizes in the range. The 54 second video found at <https://youtu.be/MNXe1PWhpOk> shows virtual pants in sizes 4, 10, and 16 with corresponding pressure maps. The video also includes images of the pant on an avatar in a hiking pose and the mood board created for the pants.

**Aesthetic Properties and Visual Impact:** The bands in the pants provide graphic interest and movement to the outfit. Additionally, the bands offer many options for inserted pockets like the one on the back left hip of the pant. A piece of reflective fabric is inserted into the back jacket at the center of the yoke seam to aid in wearer visibility. Rather than work with multiple colors, I chose a neutral, monochromatic color scheme to be acceptable to more consumers. The overall silhouette is very typical of hiking attire, and typicality has been shown to be preferable by consumers when considering zero-waste apparel (Michaelson & Chattaraman, 2017). If reduced visual contrast is desired, the bands can be the same color as the rest of the garment.



Figure 2. Pant legs partially unzipped

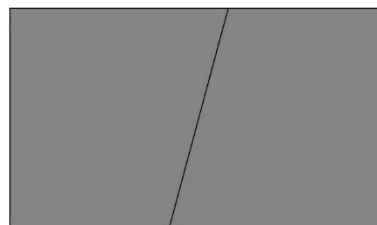


Figure 3. Split band

An additional approach could be to use patterned fabric for both the zero-waste pattern piece and the bands.

**Cohesion:** The black of the pant bands is echoed in the use of black zippers and drawstring in the jacket. The diagonal seams on the pant legs are repeated in the diagonally shaped top of the pleated side pockets and in the welt pockets of the jacket.

**Design Contribution and Innovation:** *Leave No Trace* successfully demonstrates that the banded grading method for zero-waste garments can be applied to full-length pants. This innovative approach to grading garments has been shown to work on multiple garment categories (Carrico, et al, 2022). The bands can be fabric similar to the rest of the garment, as was the case with this example, or they could be narrow trims cut to length. This technique is valuable for brands wanting to offer zero-waste patterned garments to their customers but struggling to determine how to offer the garments in an appropriate range of sizes.

## References

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