Figure 5.1. Hand-crafted, knotted textile sample

design application

CHAPTER 5

"Always design a thing by considering it in its next larger context-a chair in a room, a room in a house, a house in an environment, an environment in a city plan."

-Eliel Saarinen

This chapter investigates, documents and conveys the design process and development. The chapter firstly introduces the conceptual thinking behind the design. This is followed by a description of the design process followed during the production of the hand knotted textiles. Whereafter an overview of the test sites, the site for intervention and the programme is presented. The design process is documented in cycles and each cycle includes a variety of sketches, photo studies, diagrams and textual documentation. All documentation of the design process and development can be found in APPENDIX B and C.

conceptual approach

TRADITIONAL & ALTERNATIVE

5.1.
CONCEPTUAL THINKING

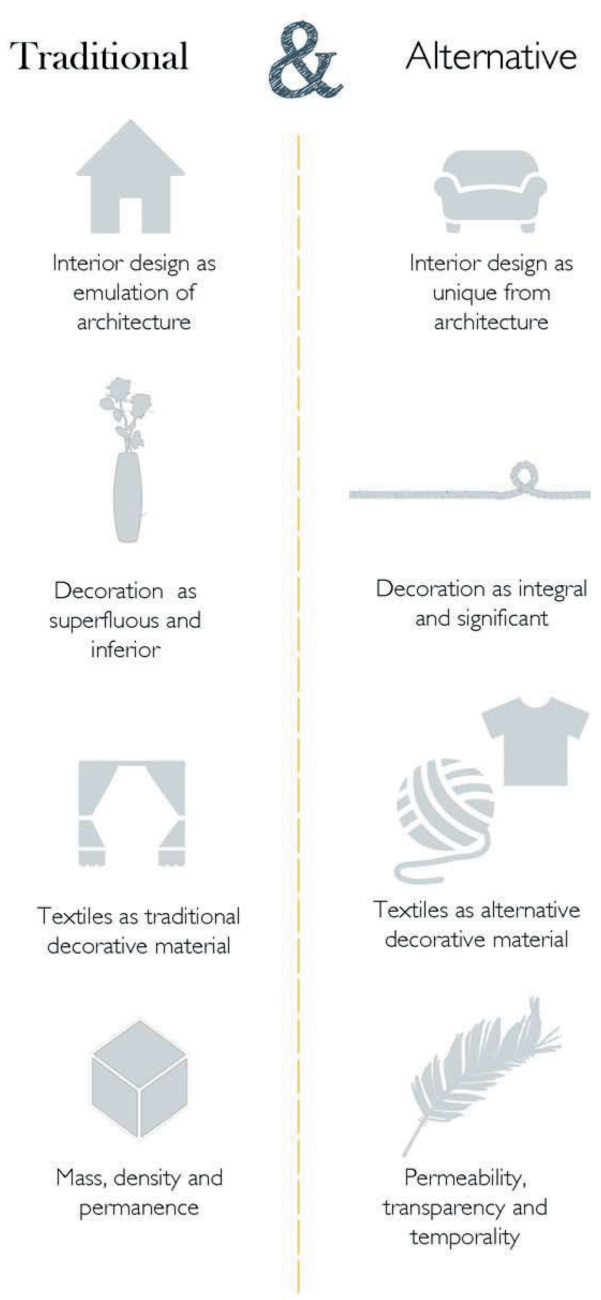
Throughout the dissertation, the terms traditional and alternative are visible. These concepts are posed against each other and the resulting paradox contributes to the decision making process. In this way the dissertation investigates how traditional ideas, methods, material use and applications can be translated alternatively. The conceptual thinking is illustrated through the following illustrations:

Figure 5.2. Traditional versus alternative, diagram (Various sources) (below)
Figure 5.3. Conceptual image board, (Various sources) (right)

The conceptual approach diagram represents various manual construction methods that exist within the realm of textile craft. For each method of construction there are various examples. The examples are also split into the two categories 'traditional' and 'alternative'. Traditional examples are found left of the cut line, while alternative examples are right of the cut line. The conceptual diagram also serves as a 'pasteboard' for a range of small precedents. Textile construction methods explored in the diagram include:

-Fabric (Material)
-Sewing (Post-production)
-Cross stitch (Post-production)
-Macramé (Post-production)
-Knitting * (Pre-production)
-Weaving * (Pre-production)
-Crochet * (Pre-production)

*Represents pre-industrial textile production techniques where lace-making is the fourth manual fabrication technique.



5.2.
DESIGN PROCESS

The principles of Action Research - planning, acting, and critically analysing - form the basis of the iterative design process within this study.

The Action Research method is responsive to the design situation in a way that many other research methods can't be (Dick, 2000) – rendering it appropriate to the investigation of the process of knowing through making.

Figure 5.4. Design process diagram (below), indicates the way in which the Action Research method is applied in this dissertation. Each rectangle firstly represents one of the steps typically present in the process of manual textile fabrication. See Figure 5.19. Typical steps in manual textile fabrication, poster 12 (page 58). In addition to representing the Action Research method within the rectangles, the test sites and intervention site are also indicated within the rectangles as an integrated part of the process.

The process of planning, acting and critically analysing always takes place in the same order, but, the process is not always initiated in the same rectangle (as indicated by the arrows above and below the rectangles). Each design cycle is recorded and the observations made at the end of each cycle forms the basis for the plan of action set out for the ensuing cycle. Refer to Table 5.5. Test matrix on poster 12 (page 58).

The design process takes place within the various sites, which respond to various scales of design investigation. The first two sites are the test sites. The first of the two test sites is focused on detail design (the fabrication of a textile through the method of knotting) and the second test site is focussed more on the spatial manipulation of the textile space-definer. The site for intervention is the final physical manifestation of the textile space-definer. This spatial manifestation realises the theory discussed on spatial definition in CHAPTER 3. The cycles of design incorporate a response to all three of these sites, with planning, acting and critical reflection as part of each of the cycles. (It is however important to note that the iteration process is not necessarily a linear process. The design response might move two boxes to the right on the diagram and then one step to the left. It does not mean that the next design steps would be back to the right.

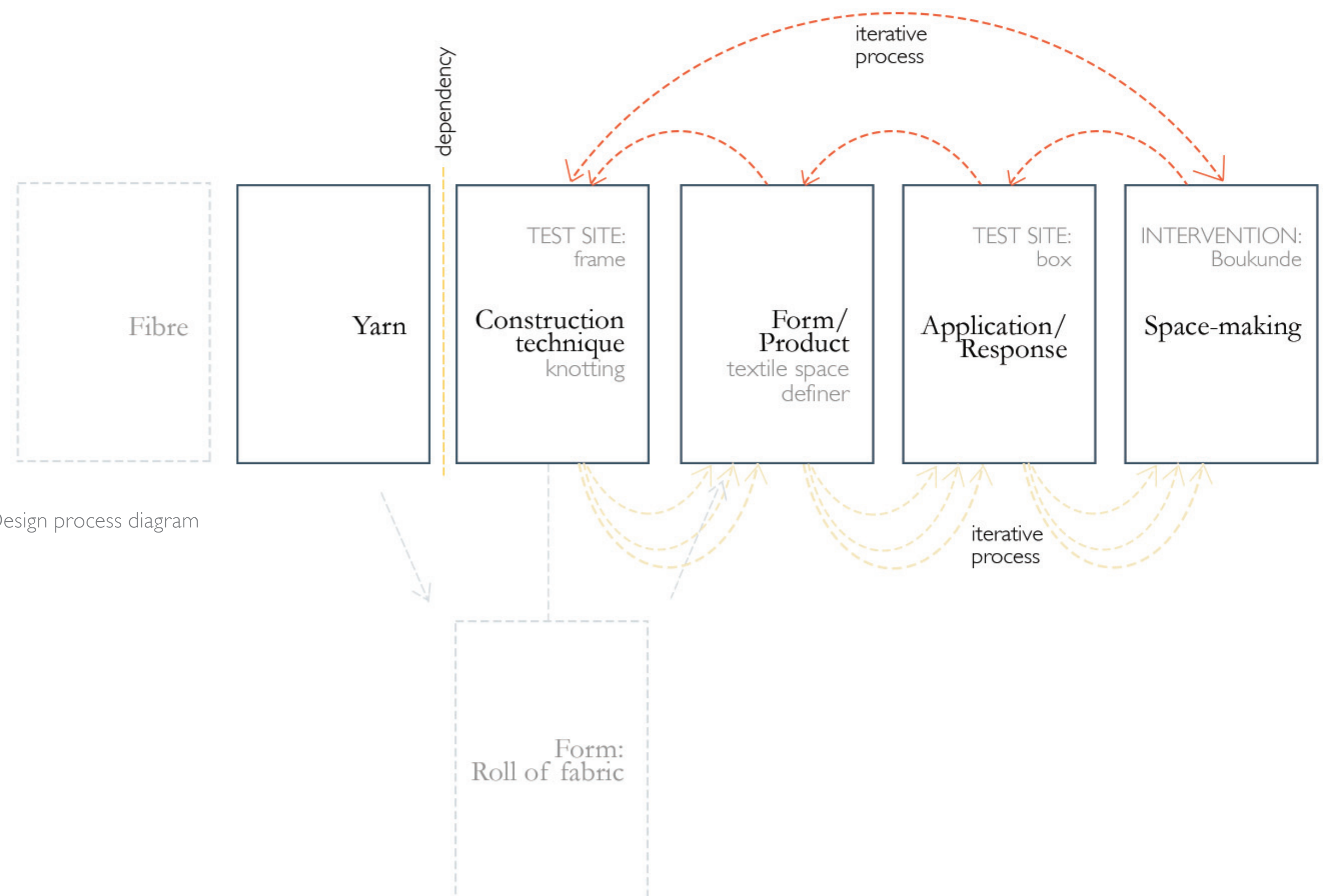


Figure 5.4. Design process diagram

5.3.
SITES FOR MAKING AND TESTING

Section 5.2. Design process offers a visual representation of the iterative design process. This process is represented by means of a **process icon** at the top of pages where appropriate. The process icon is based on Figure 5.4. The design process diagram.

The iterative cycles, employing various sites, ensure that design is considered on a larger intervention scale as well as on a more detailed and focussed scale.

The iterative cycles therefore allows for the comprehensive development of the eventual textile space-definer. The three test sites act as neutral 'areas' for the making and testing of the knotted textile. Each of the test sites have their own parameters and characteristics. The test site for intervention allows the textile to be tested on human scale, as a spatial manifestation. See APPENDIX A for the process of construction for the Testing frame and Testing box.

See section **5.3.1. Testing frame, 5.3.2. Testing Box and 5.3.3. Testing site for intervention** on poster 10 (following page) for a discussion on each of the sites. Tables 5.1. - 5.3. provide feedback in terms of observations made during the design process and the specific response to each of the observations. These observations and responses are findings related specifically to construction of the site, its parameters and issues that surfaced while working and designing within the sites.

making and testing

TEST SITE PARAMETERS

5.3.2.
TESTING BOX

form

The testing box is not designed according to a specific scale but allows for the testing of space-definers in a three dimensional setting. One could imagine the horizontal surface of the box as a floor or ceiling of an interior space and the vertical panels of the box as the walls. Therefore testing is done to discover spatial response and not the solving of construction details on a scale of 1:1 as with the testing frame.

Construction parameters of the testing box was derived from knowledge gathered throughout the iterative process. See Table 2.1. Plan of Action, part 1, poster 3 (page 16). This includes responses as seen in Table 5.1.-5.3. (below). Figure 5.17. Test type diagram, poster 11 (page 57) indicates that test completed within the framework of the box would fall under category A and B, rigid and semi-flexible testing. See APPENDIX A for construction process of the testing box. See Figure 5.8. View of test box (directly below) and Figure 5.9. Test box, scale 1:10, and Figure 5.10. Test box exploded view.

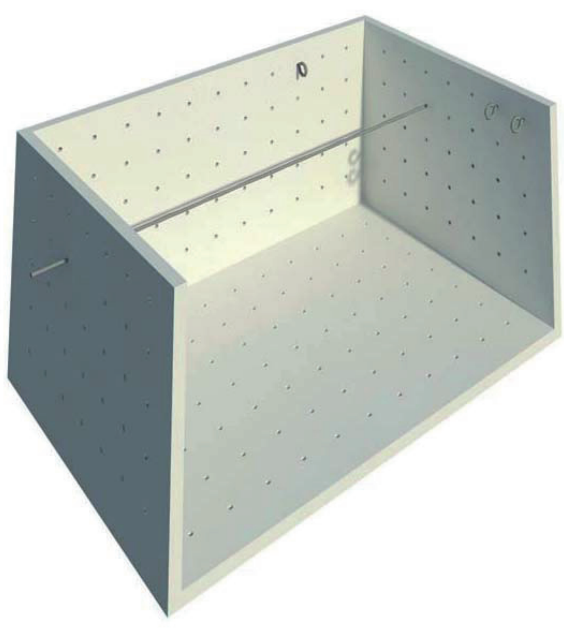


Figure 5.8. View of test box

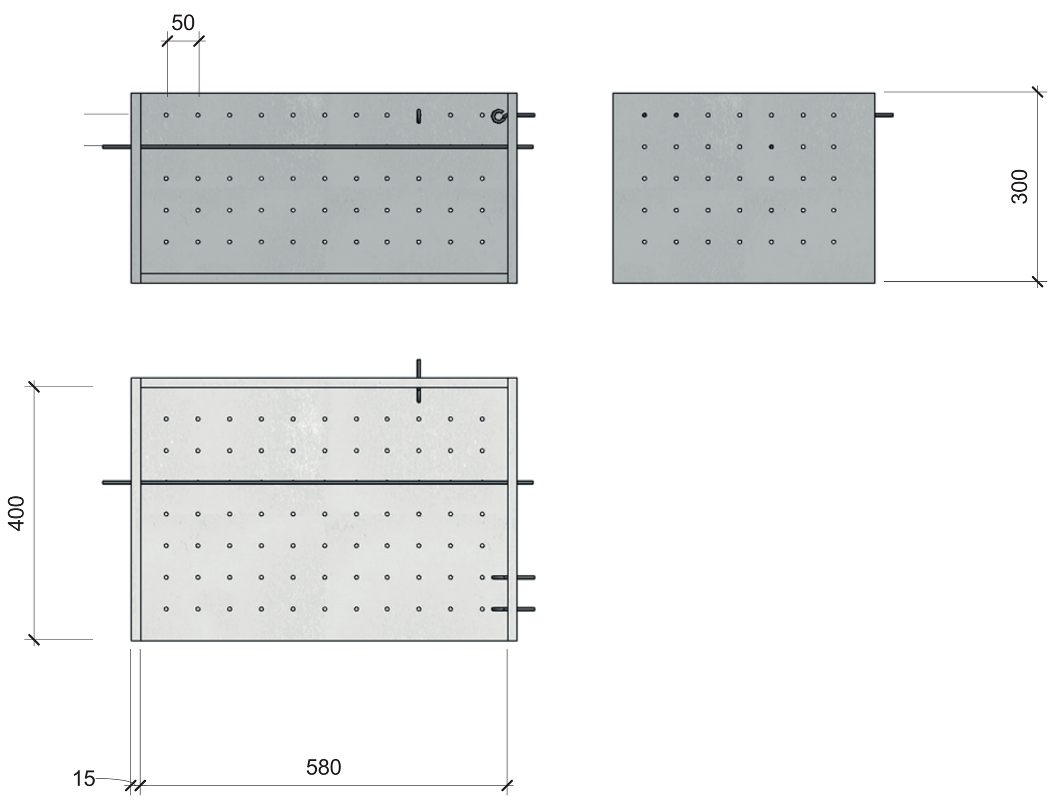
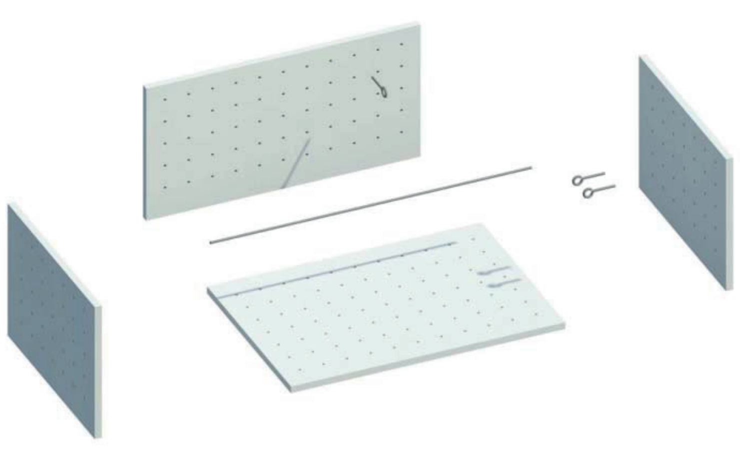


Figure 5.9.
TEST BOX
SCALE 1:10



1. Cut MDF panels, glue and screw together
2. Mark exterior surface with grid, drill holes
3. Sand mdf to remove glue and pencil marks
4. Insert eye bolts and threaded rod

Figure 5.10. Test box exploded view.

Observation	Response
Initially the purpose of the testing box was aimed towards a scaled down testing site for samples developed on the test frame. During the first stages of testing within the box it became clear that this type of testing would be time consuming and inaccurate as the knotting process (and samples) could not be reproduced on the smaller scale.	The physical parameters of the box was not altered but rather way that the box was used when designing inside of it. Textile samples were cut to fit (from traditional textile) instead of creating scaled down versions of the knotted units.
The placement of the holes on the sides of the box, remain as rigid as with the testing frame.	A threaded rod was added to compensate. The threaded rod allows for more flexible fixing points than the eye bolts.
The neutrality of the box makes it unclear where in 'Boukunde' fixing points or anchor points would be placed. (The form of the box is not based on the parameters of the test site for intervention. It is simply a rectangle)	Cardboard cut-outs resembling the main structural columns within the studio was placed into the box. Labels were fixed to anchor points within the box to indicate related anchor points within the testing site for intervention.
The flat pieces of textile do not accurately replicate the character of the knotted textile sample.	Strings were used to indicate bending lines of textile units instead of the composition of the knotted textile. Whereafter the purpose of the testing box was re-evaluated. Instead of focussing on testing in the box during this part of the process, design would rather be done by sketching on plan.

Table 5.2. Test box, observation and response.

5.3.2.
TESTING BOX

form

The testing box is not designed according to a specific scale but allows for the testing of space-definers in a three dimensional setting. One could imagine the horizontal surface of the box as a floor or ceiling of an interior space and the vertical panels of the box as the walls. Therefore testing is done to discover spatial response and not the solving of construction details on a scale of 1:1 as with the testing frame.

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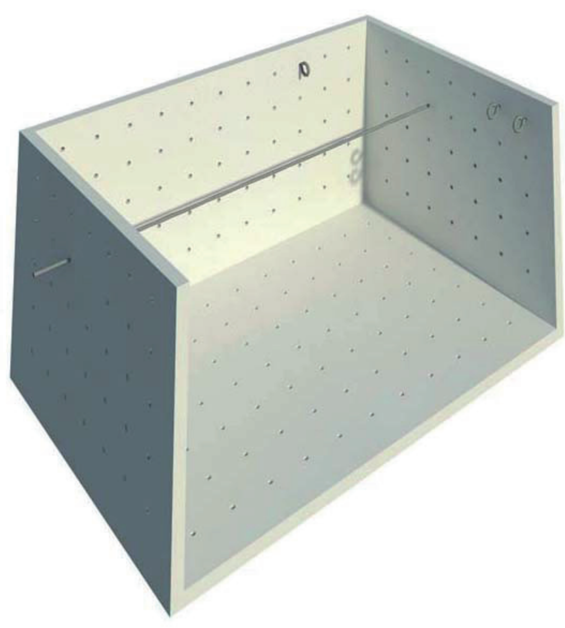


Figure 5.8. View of test box

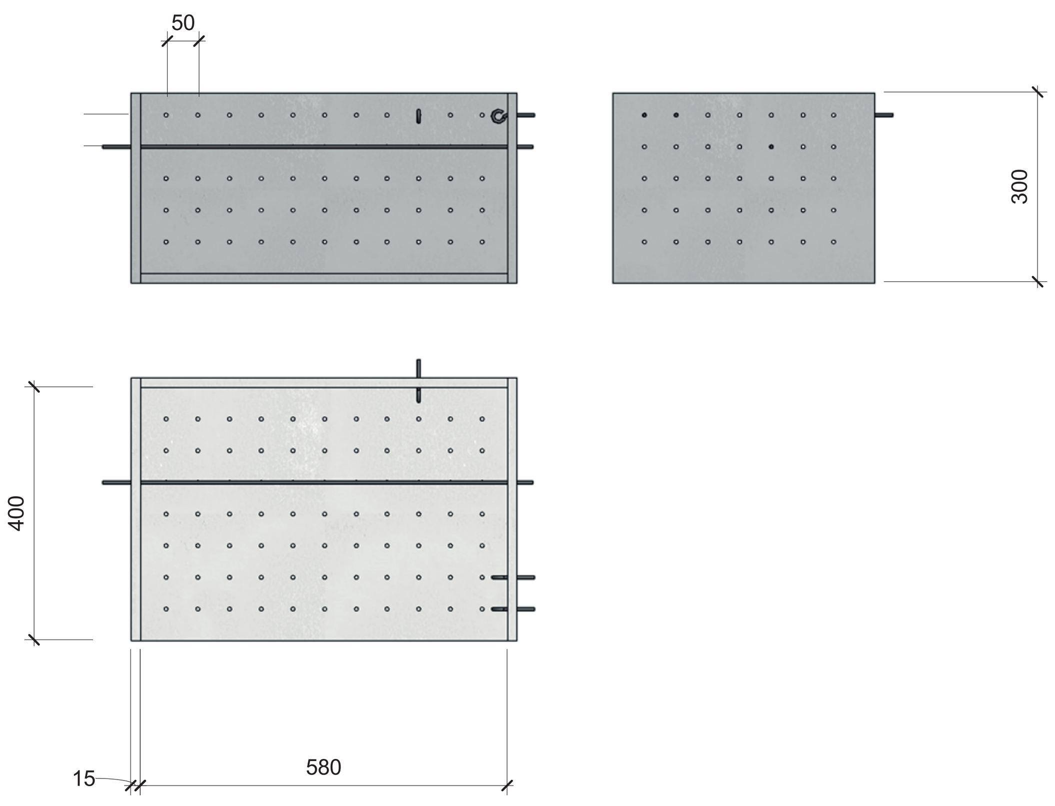
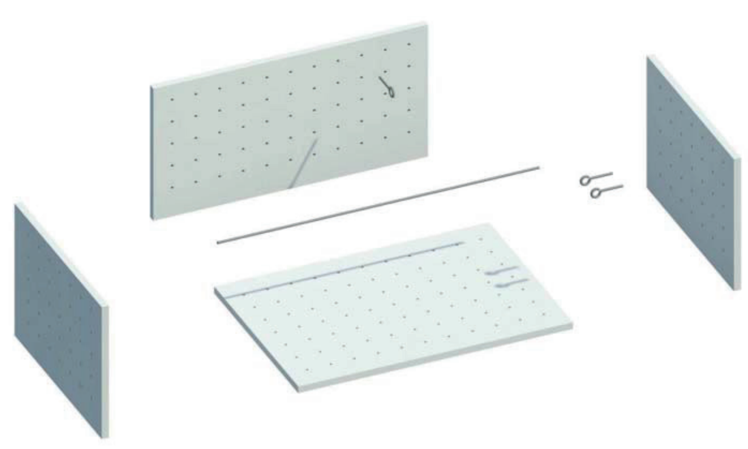


Figure 5.9.
TEST BOX
SCALE 1:10



1. Cut MDF panels, glue and screw together
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Figure 5.10. Test box exploded view.

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The neutrality of the box makes it unclear where in 'Boukunde' fixing points or anchor points would be placed. (The form of the box is not based on the parameters of the test site for intervention. It is simply a rectangle)	Cardboard cut-outs resembling the main structural columns within the studio was placed into the box. Labels were fixed to anchor points within the box to indicate related anchor points within the testing site for intervention.
The flat pieces of textile do not accurately replicate the character of the knotted textile sample.	Strings were used to indicate bending lines of textile units instead of the composition of the knotted textile. Whereafter the purpose of the testing box was re-evaluated. Instead of focussing on testing in the box during this part of the process, design would rather be done by sketching on plan.

Table 5.2. Test box, observation and response.

space-making

5.3.3.
TESTING SITE FOR INTERVENTION

The site for intervention forms part of the process of iteration and acts as a spatial informant. Within the structure of the dissertation, the site for intervention acts as a site within which to investigate and display the spatial manifestation of the hand knotted textile. The focus of the study remains primarily on the design process, with the product of the process as the primary research contribution.

The selected site is the first year studio in the Building Sciences Building (Boukunde) on the Main Campus of the University of Pretoria. The building houses the Department of Architecture, with programmes in Architecture, Interior Design and Landscape Architecture. See Figure 5.11. View of test site for intervention (directly below) and Figure 5.12. Test site for intervention, not to scale, and Figure 5.13. Existing traditional space-defining elements.

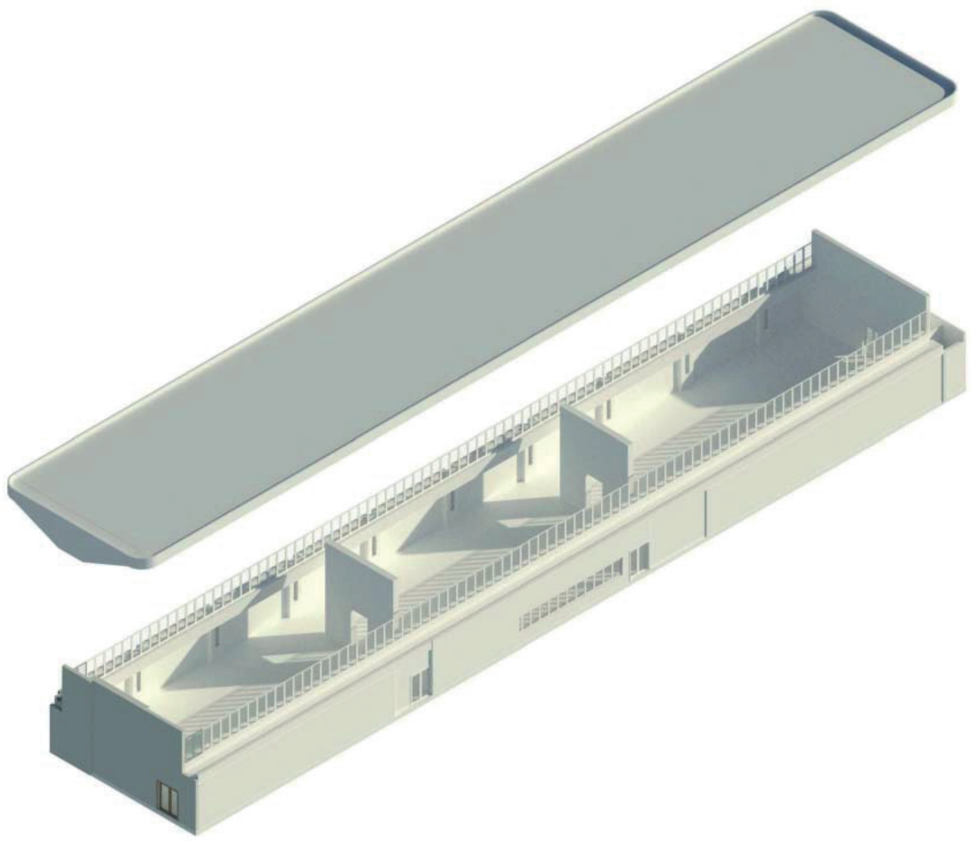


Figure 5.11. View of test site for intervention

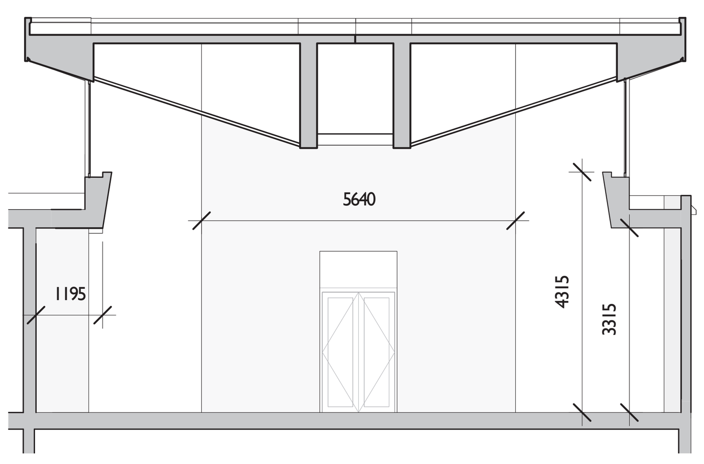
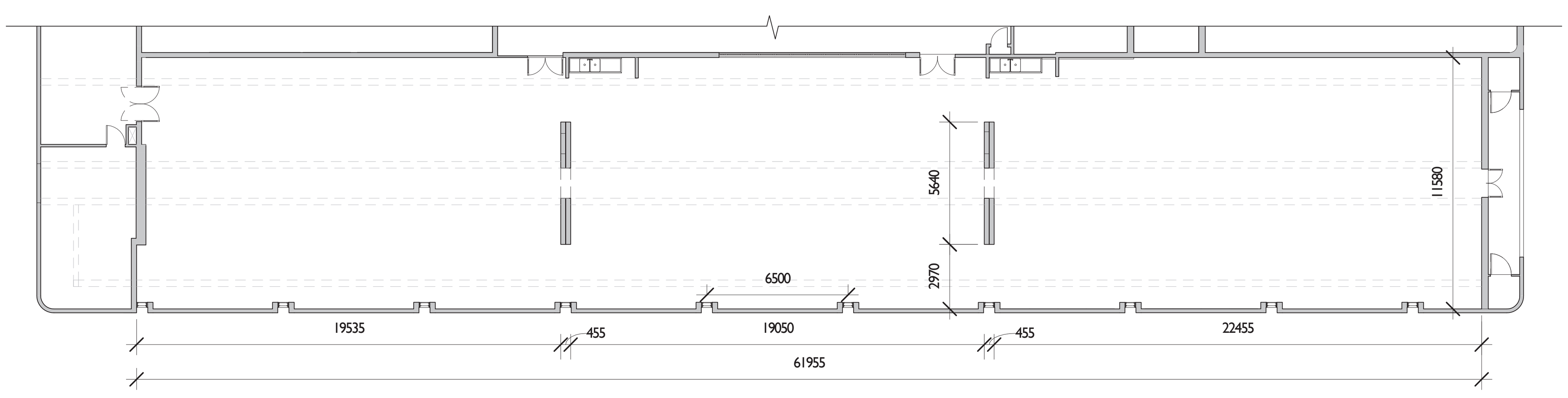


Figure 5.12.
TEST SITE
FOR INTERVENTION
(not to scale)



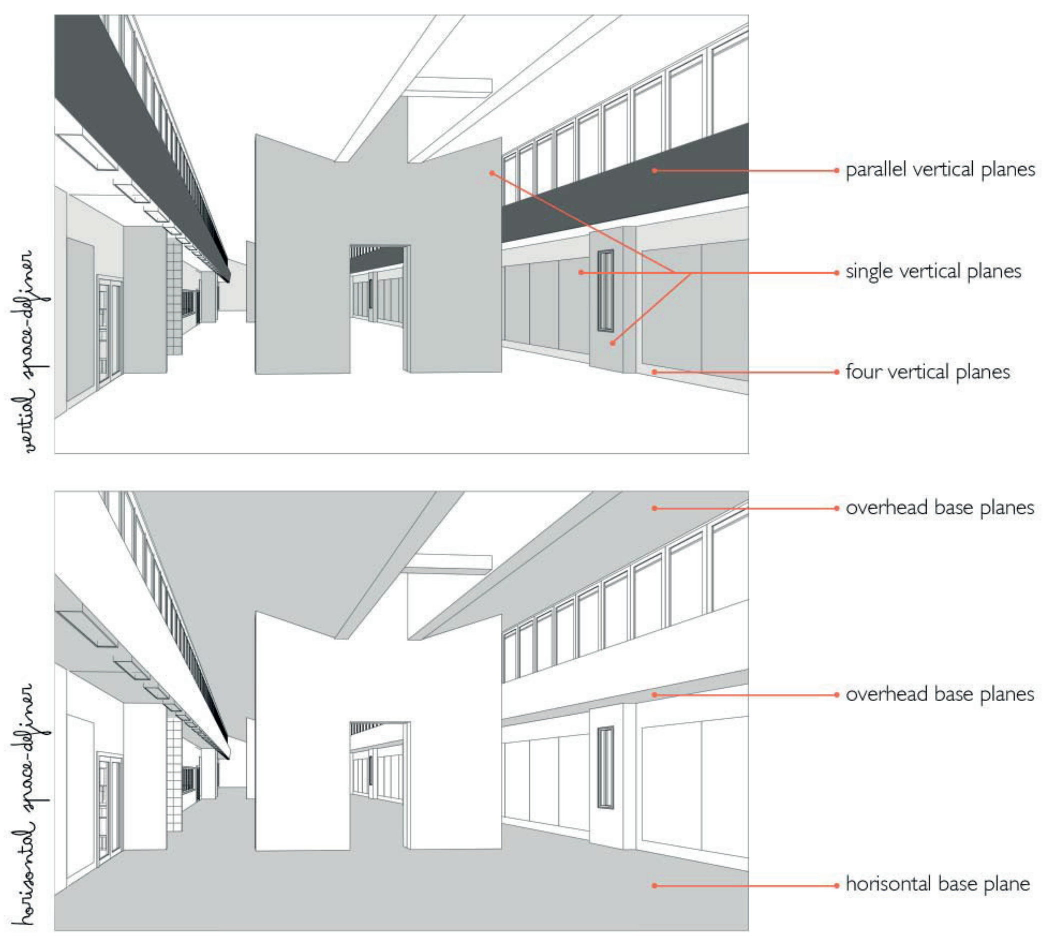


Figure 5.13. Existing traditional space-defining elements.

Observation	Response
Working on plan too early in the design process resulted in a very traditional first design response in terms of material choices, form and spatial thinking.	Instead of continuing on plan, design was moved back to the test frame and an exploration of material uses. Inspiration was also taken from various images and resulted in the formulation of image boards. Afterward the design process returned to the site for intervention.
Due to a fairly limited understanding of the potentials and limitations that the material offers, it was hard to determine an alternative spatial response.	A design charrette was done using existing knowledge and skills. This traditional response and understanding would then be 'translated' into an alternative response.
Design on plan reached a certain level of development when new textile ideas or input was needed. Design response was spatially appropriate in terms of movement through space, but form and aesthetic did not speak the same language as the use.	Various images were found online to create an Image board. These images indicate ideas of textiles in tension, textiles as suspensions system and cable-stayed structures and designs. Design process returned to section, plan and detailing.

Table 5.3. Test site for intervention, observation and response.

5.3.4.
TESTING MATERIALS

The tests were completed by making use of found materials – textile strips and rope in particular. It is however **important to note that the dissertation is not an exercise in the reuse, recycling or upcycling of found rope or rope-like materials.** The test materials are representative of the final materials but not identical nor indicative of the final material or aesthetic palette.

ROPE: Initially string, rope and various other cordage was purchased in small sections. See Table 5.4. Rope types on poster 11 (opposite page). Initial rope choices were limited by price and availability of the material in one metre increments (instead of an entire roll of rope). Testing involved knotting, flexing, pulling and bending the rope to obtain a sense of the character of the rope. Finally 5mm and 7mm cotton rope was selected as the main material to use for sample testing. See Figure 5.15.Selected testing cordage on poster 11, (opposite page).

ROPE-LIKE MATERIALS: See definition for rope-like materials in **CHAPTER 1**, page 9. Due to availability, cotton fabric in 15mm wide strips were selected for sample testing. These strips were off-cuts from Design team fabric. See Figure 5.14. below for an image of Design team fabric and more information on Design Team. The process involved knotting strips together, documenting the results (textual, sketches, diagrams and photos) and then taking these apart to construct new samples. See section **5.6. Design cycles** for an example of documentation, also see **APPENDIX B and C**. Samples that illustrate pertinent design process of construction were kept aside for final exhibition.

ASSISTIVE TESTING HARDWARE: The primary hardware items used can be seen in Figure 5.18. Main assistive testing hardware, (opposite page).

5.3.5.
REFLECTION (ONE)

During the planning phases of the test sites, certain design and construction assumptions were made. These assumptions were based on knowledge accumulated from precedent studies and literature reviews. **See Chapter 3: Literature study.** This was used as the starting point for decisions made in terms of the parameters that would be used for construction of the test sites. After designing using the textiles within each of the individual sites, it became clear that some of the initial assumptions were incorrect. A number of changes and refinements could then be made based on the new knowledge collected during the making and testing phase. These observations and responses are discussed within Table 5.1. -5.3. on poster 10 (page 55).

Research through making implies gaining knowledge through the process of making. The process of designing and testing the test sites clearly illustrated this to me. This was an important step for me as it demonstrates the importance of the process of plan, act, observe and reflect. It also demonstrates the importance of action plans based on knowledge that was gained during the actual making part of the process. Instead of knowledge collected through the typical research style, this type of knowledge could potentially gain a more accurate design response the first time around.

Through reflection certain deductions were made concerning the nature of the test sites. See Figure 5.17. Textile systems in section **5.3.5.1. Analysis** on poster 11 (opposite page).

design team
creating inspiration print by print

"DT Designs cc trading as Design Team is a textile design business focusing on the design, print and conversion of South African inspired textiles. Contemporary, topical designs form the basis of our fabric collections, rather than the already well represented ethnic approach." (Designteam, 2011).

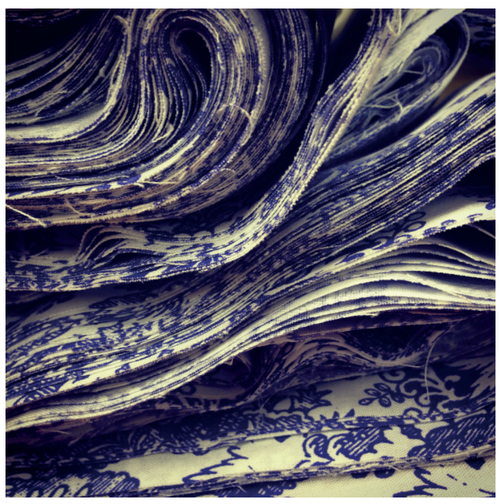


Figure .5.14. Photo of Design team fabric (right).

testing materials

5.3.4.1.
MATERIAL USE

NOTE that the dissertation is not an exercise in the reuse, recycling or upcycling of found rope or rope-like materials. The test materials are representative of the final materials but not identical nor indicative of the final aesthetic of material palette. Refer to section **5.3.4. Testing materials** (page 56, document) for more information of the various testing materials and images. Find below the definitions for rope and rope-like materials.

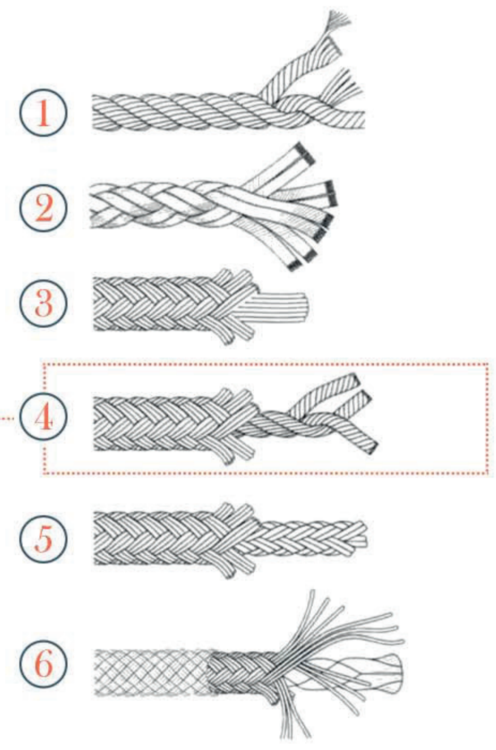
rope: A length of thick strong cord made by twisting [braiding or plaiting] together the strands of hemp, sisal, nylon, or similar material.

TEST ROPE

NATURAL ROPE FIBRES

Hemp
Sisal
Cotton
Manila
Coir
Jute & Hessian

Biodegradable
Heat resistant
Flame retardent
Soft to the touch
Abrasion resistance: Fair
Chemical resistance: Fair
UV resistance: Good



SYNTHETIC ROPE FIBRES

Polyamide (Nylon, Perlon)
Polyethylene
Polypropylene
Polyester (Dacron, Terylene)
Aramid (Kevlar, Twaron, Technore)
Polyolefin
Carbon fibre
HMPE (Spectra, Dyneema)
LCAP (Vectran)
PBO (Zylon)

Figure 5.15. Selected testing cordage

Table 5.4.
ROPE TYPES

Type	Name	Material	Structure	Attribute
1	Sash cord	Cotton	Double braid	Shared load
2	Sash cord	Cotton	Double braid	Shared load
3	T-Shirt rope	Viscose	Knit	Stretch
4	Ski-rope			
5	Lacing cord	Polyethylene	Three strand twisted	Rotational force
6	Fabric strip	Cotton	Weave	Increased surface area

Figure 5.18. Main assistive testing hardware.

Figure 5.16. Rope-like materials.

rope-like: Any textile that exhibits similar characteristics to those of rope (as defined above) or that can be knotted and handled in a similar manner to rope.

5.3.5.1.
ANALYSIS

Three kinds or systems of textile interaction manifest. These systems are illustrated on the diagram to the right.

- test frame performs as rigid grid system, TYPE A on Figure 5.17.
- test box performs as semi rigid system, TYPE B on Figure 5.17.
- test site performs as most flexible system, TYPE C on Figure 5.17.

This information could not be gained by means of traditional research methods at the beginning of the study. These facts were gained purely by means of making.

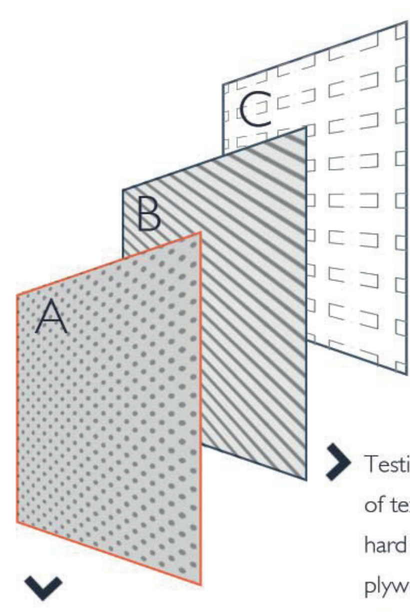


Figure 5.17. Test type diagram.

test matrix for design cycles

ACTION AND OBSERVATION

5.4.
TEST MATRIX

The test matrix is a table with a summary of the results of the Design cycles. Each sample test was made and recorded within the test matrix. See table 5.5. Test matrix, below. Further, each step of each sample test was recorded in more detail within another table, see APPENDIX B: Data collection and synthesis and APPENDIX C: Raw data. This collected data potentially allows the design process to be simulated by another person in future. It also relays the steps taken to produce the final hand knotted textile.

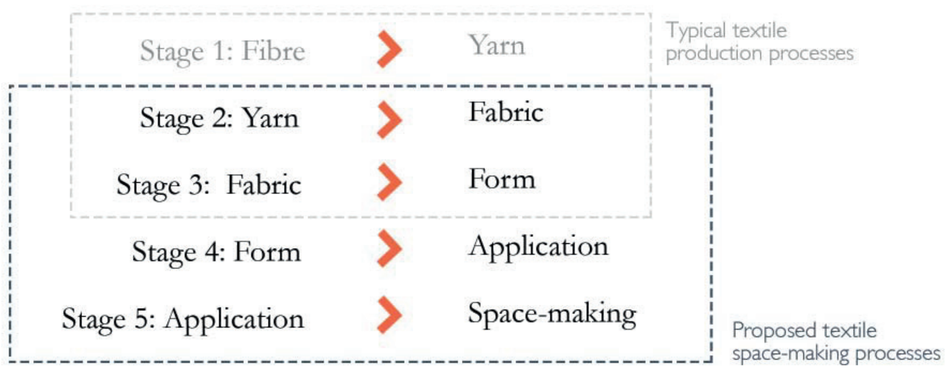


Figure 5.19: Typical steps in manual textile fabrication

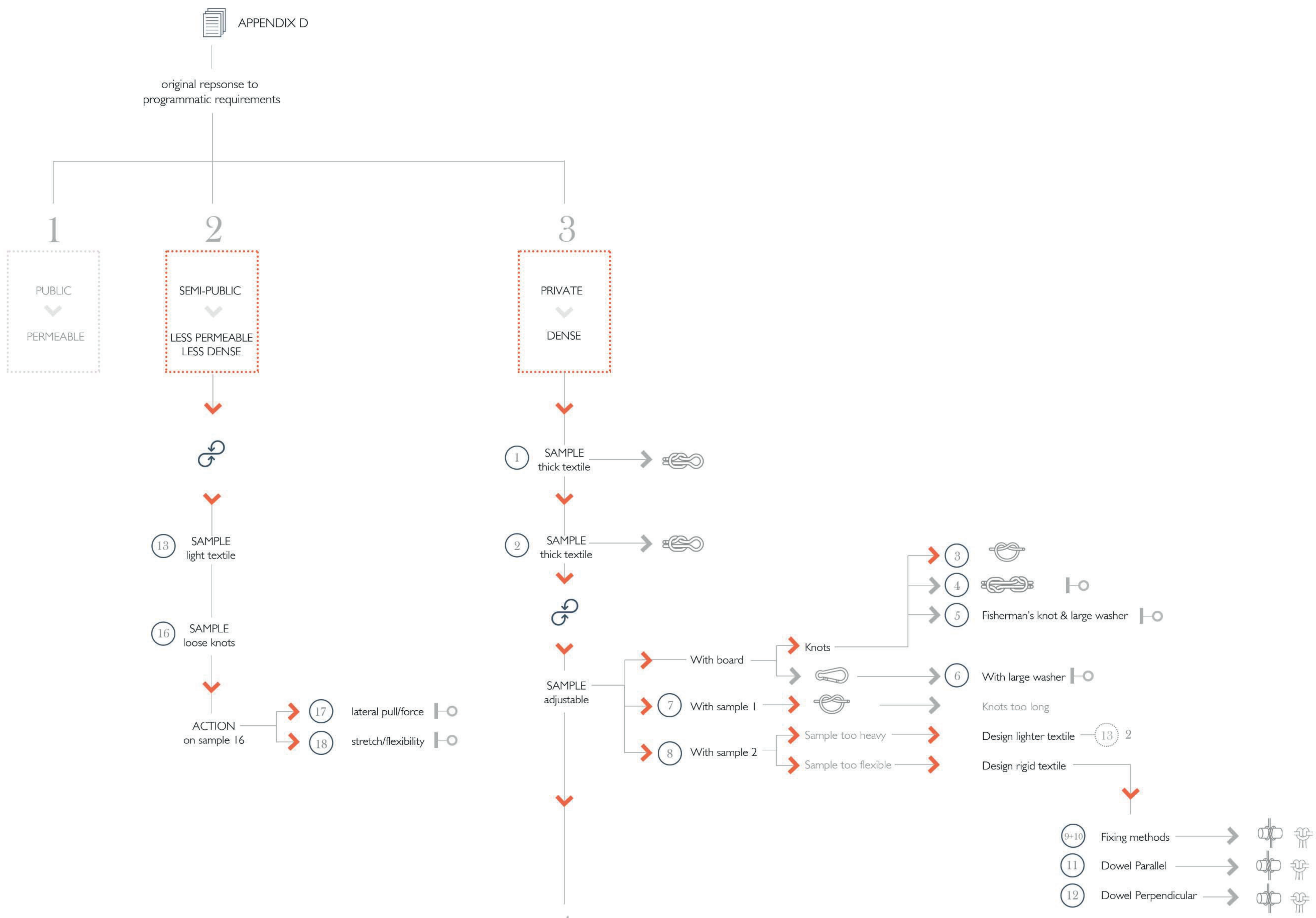
table 5.5. test matrix

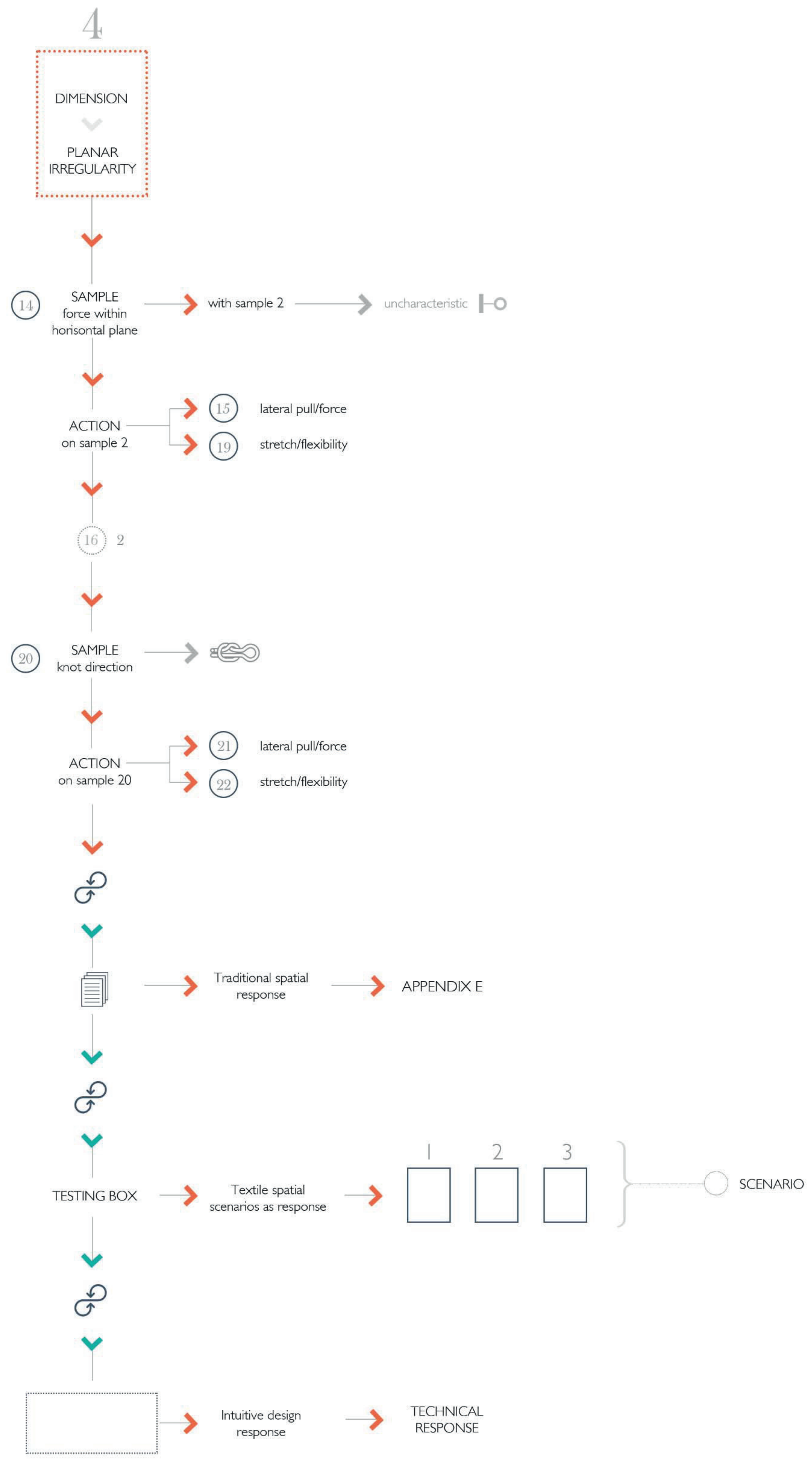
DATE	Test Nr	Desired result	Knot category	Knot name	ABOK	Additional material	Notes	Observations	Response and questioning
									Initial scale
06_05	1	Thick textile 1	Noose	Simple Noose Knot	#1114	Eye bolts and carabiners	First sample test based on programmatic requirements	Sample area is quite small for the amount of material used, sample stretches easily because of the T-shirt rope, Colour and knot type is aesthetically pleasing, Textile is still very two dimensional and represents traditional material use, and therefore could just as well be replaced with any kind of board product	Investigate how sample can be constructed to appear less 'flat' or two dimensional
10_05	2	Thick textile 2	Noose	Simple Noose Knot	#1114	Eye bolts and carabiners	Sample 2 based on sample 1, 2x FC stapled together to increase length of cord	Sample depth appears thicker but knots are less compact forming larger holes, sample 2 appears more bulky than sample 1 which is good, The off white colour of the filler cord used is well suited to the cotton primary cord, Textile is more bulky but still a very two dimensional,	Ivenstigate whether textile could potentially be more dynamic or have more dimension. Does the knot itself not represent the three-dimensionality of the textile sample?
									* Scale change
22_05	3	Adjustable vertical space-definer (a)	Stopper knot	Overhand Knot	#46	Cardboard, representing plywood or similar board material	Board product to be secured with all 4 ropes through all 4 holes	Sample depth dependent on hole spacing within the board material, Insufficient knot usage, Difficult to ensure exact knot spacing with Overhand Knot used, Sample still very empty and very 'traditional' in the sense that it is simply a rope with a hard board material as spacing and fins.	Sample does not exploit unique character of textiles but simply emulates traditional uses, Can the board product be replaced by a textile? Can Overhand Knot be replaced with a knot that can be moved accurately into position?
25_05	4	Adjustable vertical space-definer (b)	Bend	Double Fisherman's Knot	#1415	Cardboard, representing plywood or similar board material	Position board with knots securely fixed against board	The Double Fisherman's Knot slides to fit snuggly against the board within the first tier, At the second tier the knots do not fit snuggly against the board, The main rope which forms both knots buckles in-between the two tiers, add another piece of rope to counteract buckle but this prohibits the last knot from being secured, another piece of rope is needed, Type of knot cannot be placed in series using the same primary cord throughout, TEST ABANDONED	
25_05	5	Adjustable vertical space-definer (c)	Bend	Double Fisherman's Knot	#1415	Knot and large washer	Looping rope A through rope B and inserting a large washer as bottom stopper and Double Fisherman's Knot as top stopper	The Knot pushes securely against the top side of the board, The second tier fixing point is problematic, Number of running ends become problematic, TEST ABANDONED	
25_05	6	Adjustable vertical space-definer (d)	Bend, Stopper knot	Double Fisherman's Knot and Overhand Knot	#1415 #46	Large washer	Loop 2 rope ends firstly through washer and secondly through holes within the board	No tension in ropes, not a secure connection, not a balanced or even connection, not a strong connection, Severely negative test results due to lack of tension, strength and cohesion, TEST ABANDONED	
25_05	7	Adjustable vertical space-definer (d) with thick textile sample 1				Knotted textile sample 1	Fix textile sample 1 in place of board product	The type of knot used to fix the sample to the rope structure creates an overly elongated connection point that is not aesthetically pleasing, Loose or running ends of the sample pieces hanging loose, Textile simply replaces board product as flat component and does not exploit the character of the textile to the full.	Ideally the fixing knot type should be changed to get a more effective binding, however this will not be tested at present.
27_05	8	Adjustable vertical space-definer (d) with thick textile sample 2				Knotted textile sample 2	Fix textile sample 2 in place of textile sample 1	Rope structure not enough tension causing the sample to 'sag' or hang low, moving the fixing points does not fix the issue (primary cord of sample 2 runs lengthwise), Textile sample is too heavy, Textile sample is too flexible	Design lighter textile, Design more rigid textile
29_05	9	More rigid textile, Fixing method	Square Hitch Loop	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel	The test investigates methods of fixing rope or primary cord to a dowel, dowel could represent another material within structure	Primary cord is fixed to the main frame with eye bolt and carabiner by means of Larks head knot, Connection is very secure and very neat, One dowel is suspended and fixed firstly by means of Double stranded Clove Hitch knot, knot seems secure when pulling on dowel, Two strands are split and two separate Clove Hitch knots are tied, knots are very neat and very strong, Fixing methods work well for when the running end of the rope needs to continue past the fixing point, if the running end of the rope needs to be secure without loose ends, then another knot needs to be tested	Test investigates a single fixing point or line of fixing points, perhaps multiple fixing point can be investigated.
29_05	10	Rigid textile, Fixing method with multiple anchor points	Square Hitch Loop	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel	Test investigate how to fix timber dowel with multiple anchor points	Timber dowel suspended from main frame with knots as tested in test nr 9, additional anchor points secured to back board, dowel suspended and at rest with four anchor points, Structure very secure and strong	Could textile sample be suspended from this structure?
29_05	11	Rigid textile sample 2, parallel	Square Hitch Loop	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel knotted textile sample 2	Primary cord parallel to dowel	When pulling the dowels apart the textile flattens out into a horisontal plane, the initial sagging as in the test 8 is reduced, the sample is less sturdy than in test 11, when pulling on the dowel sticks the sample stretches out, if the running ends are not secured there is the danger that the textile could completely unravel	If it is so that the textile unravels when the dowels are parallel to the Primary Cords, can the dowels be turned to be positioned perpendicularly to the Primary Cord? What would the effect be?
29_05	12	Rigid textile sample 2, perpendicular	Square Hitch	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel knotted textile sample 2	Primary cord perpendicular to dowel	Specific sample is too long for the frame, when pulling the dowels apart the textile flattens out into a horisontal plane, the initial sagging as in the test 8 is reduced, the sample is sturdy due to the force being excerted on the primary cord, Fixing knot is not the most appropriate choice, Employing the loops available from the sample itselfs should not be the final solution, excess running ends untidy	How can the loose ends or running ends be fixed up or tied back to be neatened? Is the weight of the sample still a hindrance to the effectiveness of the horisontal textile? Design a lighter textile sample.
31_05	13	Lightweight textile	Noose	Simple Noose Knot Overhand Knot	#1114	Eye bolts and carabiners	Original thick textile as in sample 2 contains double layer of filler cord. This will be adjusted to a single layer to reduce weight	At start of knotting process it is clear that the pattern changes because of the loop of a single layer filler cord instead of using a double layer filler cord, the sample is much more permeable than sample 2, The weight of the sample is reduced but aesthetic quality is compromised, Due to the textile being fixed at one point but seperated into two layers the pattern is slightly different than for test 2, Pattern includes line crossover, textile seems lighter, visual quality of the sample is very different than that of sample 2, construction of knots must occur in order from left to right otherwise pattern is not repeated and knotting is tedious	Is the visual quality of the sample acceptable? Can the textile be composed with alternative patterns? How will this textile perform under the testing applied to sample 2 and sample 20?
									* Scale change
04_06	14	Planar irregularity (a), Textile beyond one dimension,LATERAL PC FIXED TO VERTICAL PC					Currently textile manifests within a singel vertical plane, rope to be added for extra horisontal plane	When exerting a force on the vertical primary cord structural integrity of the pc is decreased, Without additional rigid reinforcement the unit will not be structurally adequate, Additional rigidity could be added in order to force the manipulation of the textile but this is not the true character of textiles	What is the true character of the textile, how does the textile naturally manifest? Can the unit of sample 2 be distorted in order for the textile to manifest in more than one plane? Can the filler cord be manipulated instead of the Primary cord?
05_06	15	Planar irregularity (b), Textile beyond one dimension, plane, axis, LATERAL PULL ON PC				Added weight, horisontal pulling force on sample 2	Sample 2: Filler cord and Primary cord run parallel, what is the effect of lateral forces?	When pulling on PC 3, the center cord, the sample forms a rounded hollow shape, The filler cords slide on the PC and compress toward each other causing a more dense sample, At the point at where the PC is pulled a larger opening is formed, The PC slide easily through the loops in the FC, Once the PC is released it has to be pulled downwards to adjust the pattern on the FC, The PC that assists with planar irregularity has to be longer than other PC's and needs a stopper knot at the end, It also has to be weighted or anchored,	Can the knots be tied more loosely in order to assist with knot sliding of the Filler Cord on the Primary Cord? Tie a sample with looser knots.
08_06	16	Planar irregularity (c), Textile beyond one dimension, plane, axis, LOOSE KNOTS	Noose	Simple Noose Knot	#1114	Eye bolts and carabiners	Loose/elongated Simple Noose Knot	The effect of the loose is untidy and is not visually appealing, The knots are also not strong, the unit is weak and flimsy, Textile appears very fragile, Sample not durable. TEST ABANDONED	
08_06	17	Planar irregularity (d), Textile beyond one dimension, plane, axis, LATERAL PULL ON PC					Testing lateral stretch on Sample 16	When pulling on PC center a large opening is formed at the point at which the force is applied, Loose knots (FC) slide easily allong PC. TEST ABANDONED	
08_06	18	Planar irregularity (e), Stretching LOOSE textile					Testing strength and amount of flex/stretch of Sample 16	Sample composed of parallel PC and FC, When pulling at the four corners of the textile (outwards) the textile expands and deteriorates, The openings within the textile enlarge and distort completely, The primary cord pulls out of the Filler Cord completely causing the sample to fall apart, , TEST ABANDONED	
08_06	19	Planar irregularity (f), Stretching textile					Testing strength and amount of flex/stretch of Sample 2	Sample composed of parallel PC and FC, When pulling at the four corners of the textile (outwards) the textile expands but does not deteriorate, The openings within the textile are enlarged, The primary cord distorts into an s-shape, The top fixing loops stretch out of proportion causing a wider top end,	Top loops need to be fixed to slide but not move downward, Fixing points need to be considered,
10_06	20	Textile sample change direction of PC and FC	Noose	Simple Noose Knot	#1114	Eye bolts, carabiners and frame	PC and FC 'woven' using same knotting technique as sample 2	Completely different aesthetic than seen in sample two, Sample 18 appears much more structured and neat, Knot rows easily slide up and down the PC, Therefore density can be adjusted by hand, unless FC fixed at each end, Pulling down on PC's has no effect on the FC as these do not run parallel	What would the effect of various pulling forces be on the 'woven' format of the knots?
10_06	21	Planar irregularity (g), Textile beyond one dimension, plane, axis, LATERAL PULL ON PC				Added weight, lateral pulling force on sample 20	Sample 20: Filler cord and Primary cord run parallel,	When pulling on PC center the sample forms a rounded hollow shape, the sample distortion appears more evenly than distorition found in sample 2 (test 15), The filler cords mainly remain static except for point of force, The PC slides more easily through the loops of FC than in sample 2, After releasing PC downward force needs to be applied for PC to settle back, Stopper knot and weight needed	How long would the FC need to be to allow for sufficient deformation? What type of Stopper Knot would be most succesful?
10_06	22	Planar irregularity (h), Stretching textile				Added weight, horisontal pulling force on sample 20	Testing strength and amount of flex/stretch of Sample 20	Textile does not stretch in the same manner as sample 2, The Filler Cord keeps the sample rigid, Therefore sample 20 more rigid vertically and horisontally than sample 2	What are the possibilities for spatial application of this textile sample as oposed to textile sample 2? How can each of these samples be used to exploit the unique characteristics of a knotted rope textile?
									* Scale change

* Scale change occurs when design moves from one test site to another. Often this would be a time where design charettes are done. Scale changes are indicated on the flow diagram on the opposite page (poster 13).

design cycle overview

A FLOW DIAGRAM





5.5.
FLOW DIAGRAM

The diagram represents the process of making. The process starts at the identification of three types of space (numbered 1,2,3). Each type of space requires a different type of textile. This is divided into categories of density.

The arrows indicate the path of the process, while the number within the dark blue circle indicates the test number. The test number on the diagram correlates with the test number as found in the TEST MATRIX. All procedures and observations are documented in the Test Matrix. Refer to the key below the diagram for further instruction.

Figure 5.20. Flow diagram.

design cycles

REFLECTIONS

5.4.1. thick textile 1

From the onset of the first test, the framework for the creation of the first test sample was based on the proposed programme. The programme requires three basic types of interior spaces. Private space, semi-public space and public space. The design response investigates three types of textiles that would fulfil the requirements for each of these interior spaces. The first cycle focusses on a material that is thick and dense.

Conclusions were reached in terms of:

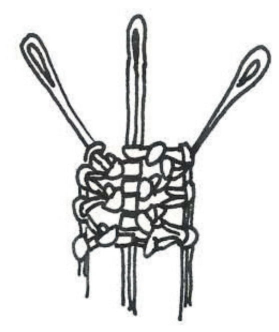
Possible spatial functionality: The sample is quite thick and can act as a strong visual barrier. The sample could potentially be used to create a space-definer for a private interior spatial zone. The textile can be stretched easily due to material selection.
Aesthetic and tactile quality: The completed knotted textile has a defined and organised knot pattern on one side and a less structured, pattern on the other side. The textile feels soft to the touch and has a very pliable and malleable quality to it.
Knot and material selection: The initial knots were done instinctively as a way of fixing two pieces of rope together. The T-Shirt rope allows for ease of knotting. Due to the width and stretch of the rope-like material, a substantial length of rope results in a small sample surface area. Research on the knot type and category took place after the completion of this first test sample.

Potential: The textile sample allows for stretchability, flexibility, coverage, density. It can also act as a visual barrier, influence the acoustic quality of a room and be visually appealing.

Figure 5.21. Sample 1 knot texture, Backing side.

Figure 5.22. Sample 1 knot texture, Facing side.

Figure 5.23. Sample 1, sketch.



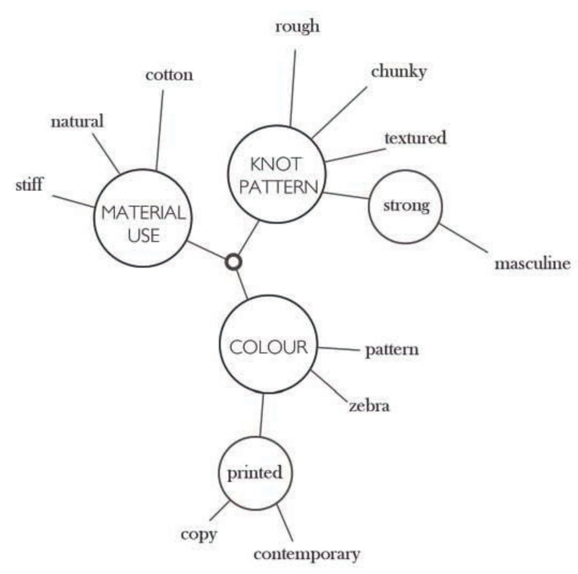


Figure 5.24. Sample 1, associations.

5.4.1.1. CONSTRUCTION PROCESS

1

1 Fix three ropes to upper frame (loop through eye bolt)
One primary cord centred (10)
Two filler cords (A and B) either side of the primary cord (9,11)

2 Select FC-A and make an overhand loop knot towards the PC
Place PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot

3 Repeat step 2 using FC-B. Push knot from FC-B up against FC-A to ensure a snug fit

4 Hang one AC over left V and one AC over right V. Ensure that ends meet

5 Select FC-A and make an overhand loop knot towards the AC
Place AC through the eye of loop FC-A. Dress knot

6 Repeat step 5 using FC-B

7 Repeat steps 2-5 until end of rope is reached

5.4.2. thick textile 2

Thick textile 2 is a response to the observations made after the construction of thick textile sample 1.

Conclusions were reached in terms of:

Possible spatial functionality: The sample is quite thick and can act as a strong visual barrier. The sample could potentially be used to create a vertical space-definer for a private interior spatial zone.
Aesthetic and tactile quality: The completed knotted textile has a defined and organised knot pattern on one side and a more unruly, pattern on the other side. The textile gives way when pushing onto it. The textile is slightly more rigid than thick textile sample 1. The openings between the knots are larger than in thick textile sample 1.
Knot and material selection: The wider textile strip allows for larger more bulky knots to be formed and therefore causes larger openings in the finished sample.

Potential: The textile sample is visually appealing and could be employed as a vertical space-definer yet still allowing for visual connection between spatial zones. The softness of the textile sample could potentially 'soften' the feel of an interior zone. The nature of construction allows for various configurations of colour and pattern which need to be explored further.

Figure 5.25. Sample 2 knot texture, Backing side.

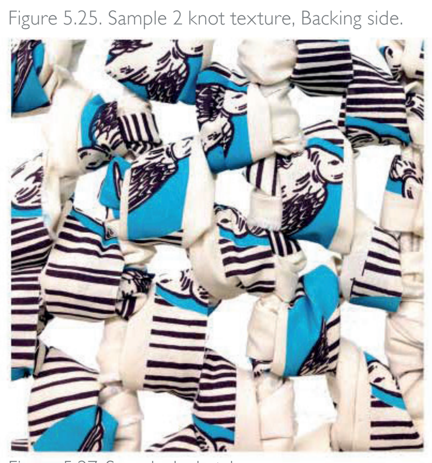
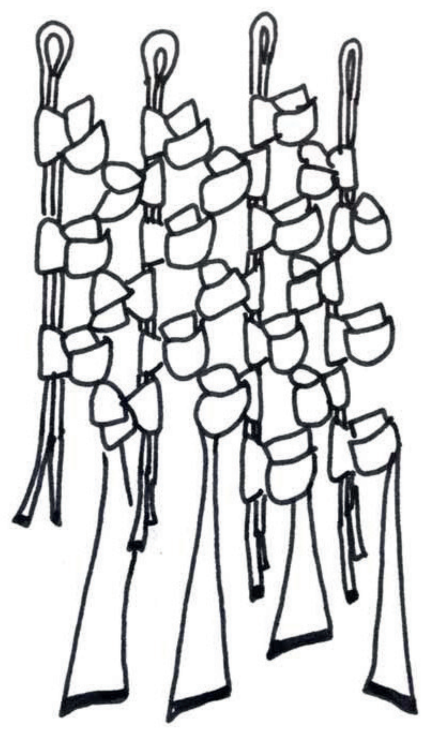


Figure 5.26. Sample 2 knot texture, Facing side.

Figure 5.27. Sample 1, sketch.



5.4.2.1. CONSTRUCTION PROCESS

2

1 Fix five Primary Cords (14,16) to the upper frame
Fix four Filler Cords (13,15,15,17) to the upper frame

2 Select the first FC and make a simple noose not toward the second PC (angling the FC-A toward the right to reach the second PC). Place running end of first PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot

3 Repeat step 2 using the second FC and the second PC . Push knot from FC-B up against FC-A to ensure a snug fit

4 Select the FC-C and make a simple noose not toward the fourth PC (angling the FC-A toward the left to reach the fourth PC). Place running end of first PC through the eye of loop FC-C. Pull the running end of FC-C to dress the knot

5 Repeat step 4 using the fourth FC and the fourth PC . Push knot from FC-D up against FC-C to ensure a snug fit. One row of knots are now completed

6 Repeat steps 2-4, angling each of the FC to the PC opposite the existing knot criss crossing down the PC one row at a time. Repeat the steps until the remaining PC is covered completely with FC.

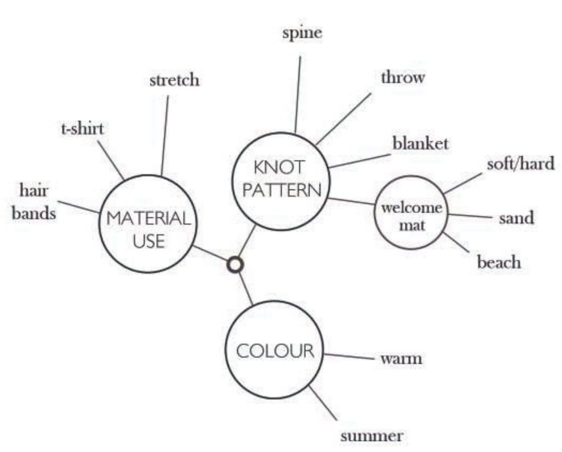


Figure 5.28. Sample 2, associations.

design cycles

REFELCTIONS

application

5.4.3. adjustable space-definer 1

The spacing of the Primary Cord's by means of a board product, is a response to the initial observation that the thick textile sample appeared 'flat'. Secondly the form and functionality is a response to the spatial quality of the proposed site of intervention. The sample aims to offer the user the opportunity to adjust the conditions of the interior space as a response to light, sound and visual influences.
Conclusions reached in terms of:

Possible spatial funcionality: The adjustable panels within the sample allows for customizable spatial zones. The textile sample is noticibly deeper than samples 1 and 2, allowing for the creation of a more articulated spatial definer.
Aesthetic and tactile quality: The sample is reminicent of a blind, evoking ideas of interior furnishings and decoration yet remaining quite traditional due to the board.
Knot and material selection: The use of a board product as horizontal definition gives the sample a hard, more traditional quality and appearance. The material choice should be reconsidered.

Possible potential: The adjustable nature of the sample allows for adaptable spatial zones.

Figure 5.31. Adjustable space-definer, concept sketches.

Figure 5.29. Knot positions a,b,c. (top to bottom)

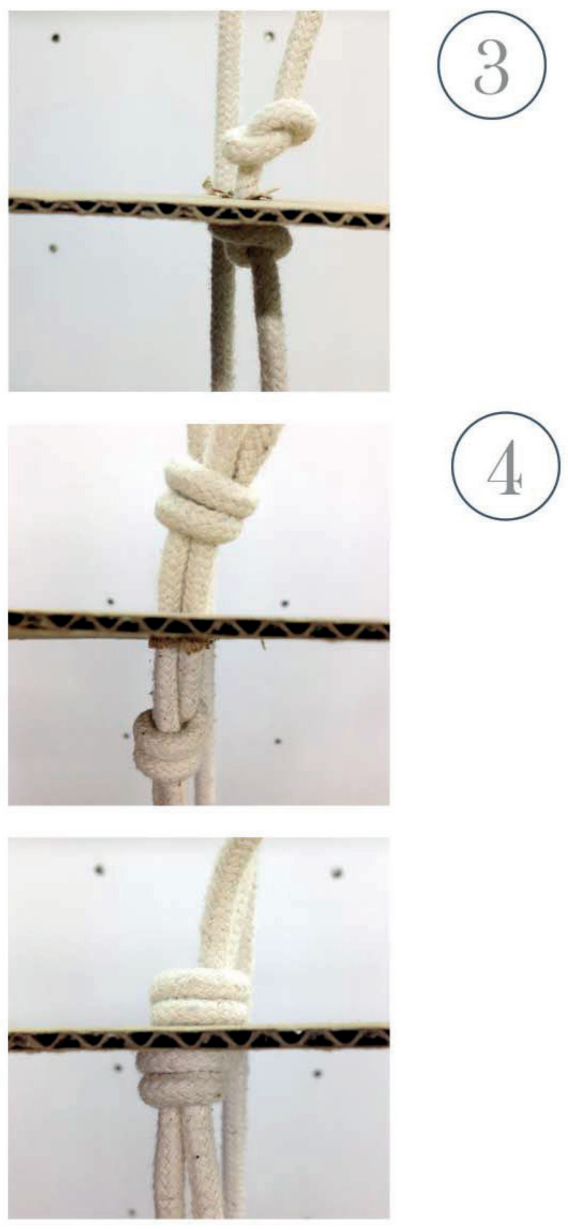
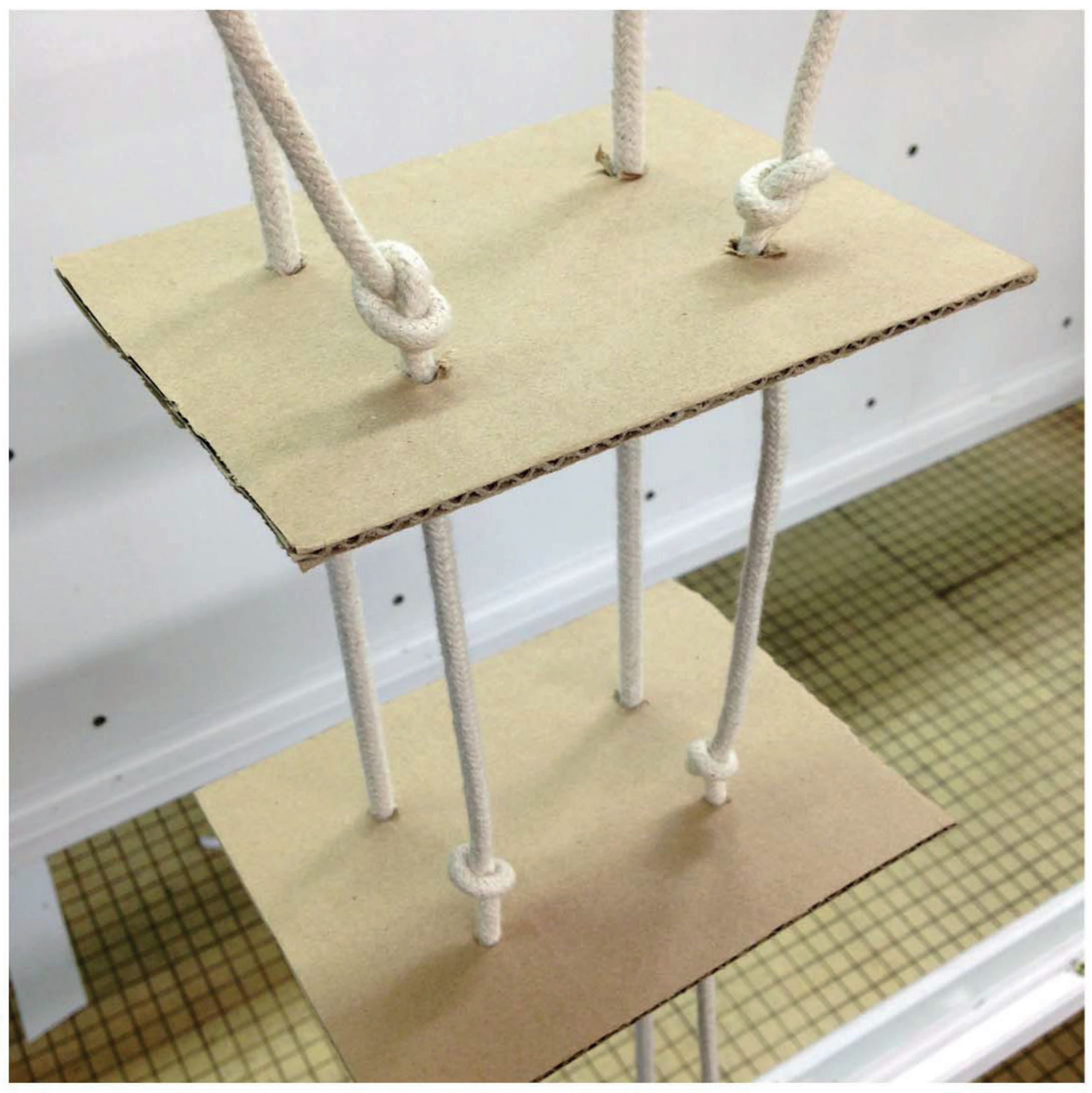


Figure 5.30. Adjustable space-definer with cardboard spacers.



5.4.3.1. CONSTRUCTION PROCESS

3

1 Fix two rope loops through four eye bolts so that each of the four running ends of the rope hang towards the floor

2 Insert four evenly spaced holes in two rectangular sections of board material

3 Tie an overhand knot about 400mm down the front two rope ends and feed the rope ends through the two front holes of the board. Tie two more overhand knots below the board to secure the board between the two sets of knots

4 Repeat this step using the two back ropes

5 There should now be two boards secured horisontally between hanging rope ends

6 When pulling on the front top rope loop (Between the two widely spaced eye-bolts) the horisontal boards should tip to a diagonal position

5.4.4. adjustable space-definer iterations

The first adjustable space-definer employes hard board materials. The iterations of this adjustable space-definer makes use of the thick textile samples from test one and two. The sample aims to offer the user the opportunity to adjust the conditions of the interior space as a response to light, sound and visual influences. The use of the softer infil transforms the traditional hard blind into a softer alternative.
Conclusions were reached in terms of:

Possible spatial funcionality: The adjustable panels within the sample allows for customizable spatial zones. The textile sample is noticibly deeper than samples 1 and 2, allowing for the creation of 'thicker' spatial definition. The softer, more permeable nature of the textile infill would potentially respond better to environmental factors than the solid hard board. These factors could include sunlight, auditory and visual noise.
Aesthetic and tactile quality: The sample is reminicent of a window blind evoking ideas of interior furnishings and decoration. The textile infil accentuates these ideas of decoration, softness and femininity.
Knot and material selection: The fixing knots employed are not ideal and should be reconsidered. Main knot and material selection discussed on page one.

Possible potential: The adjustable nature of the sample allows for adaptable spatial zones. The soft textile infil allows for design opportunity in terms of 'soft' space.

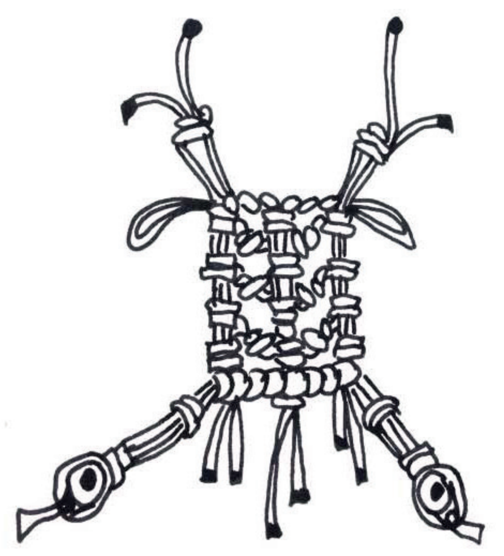


Figure 5.32. Sample 1. Sketch of adjustable textile space-definer

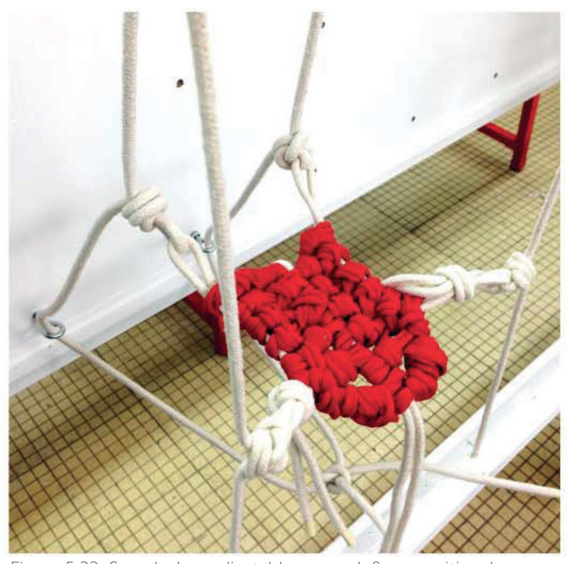


Figure 5.33. Sample 1 as adjustable space-definer, position 1.

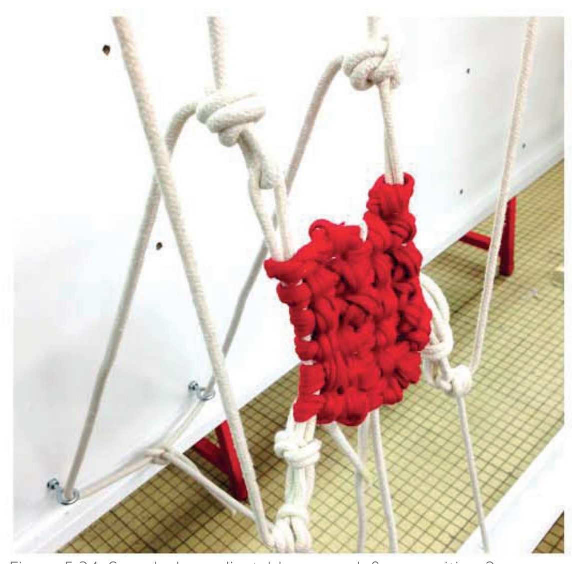


Figure 5.34. Sample 1 as adjustable space-definer, position 2.

7

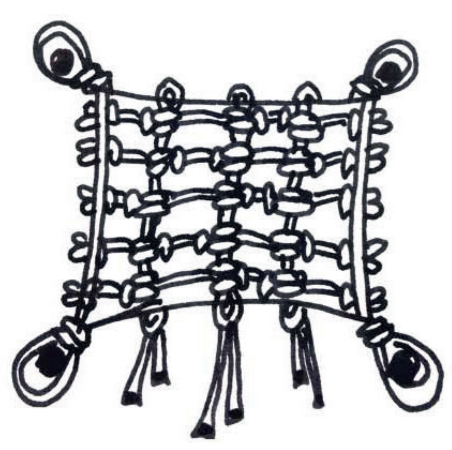


Figure 5.35. Sample 2. Sketch of adjustable textile space-definer

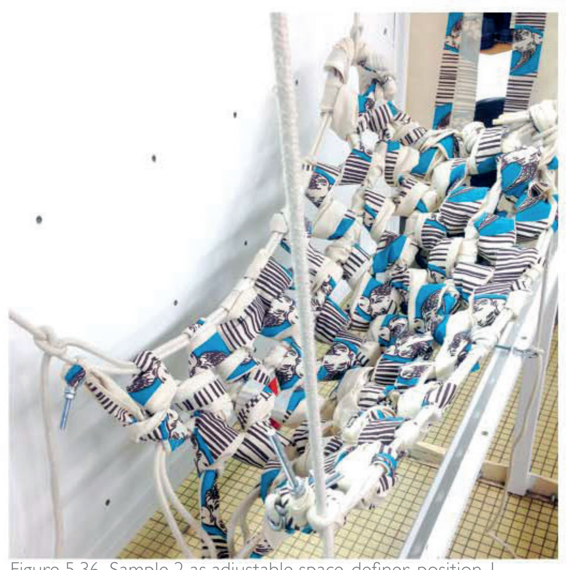


Figure 5.36. Sample 2 as adjustable space-definer, position 1.

Figure 5.37. Sample 2 as adjustable space-definer, position 2.

8

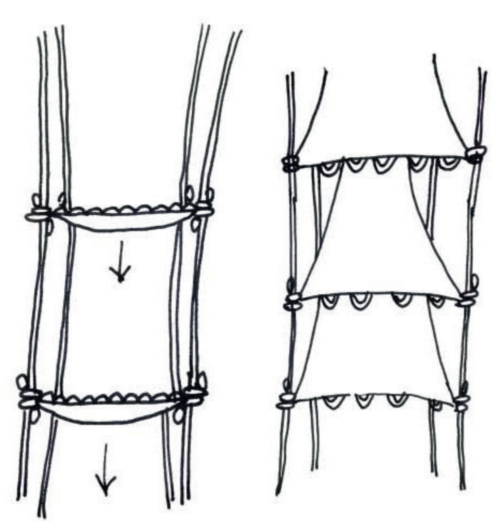


Figure 5.38. Sketch of adjustable textile space-definer as a whole

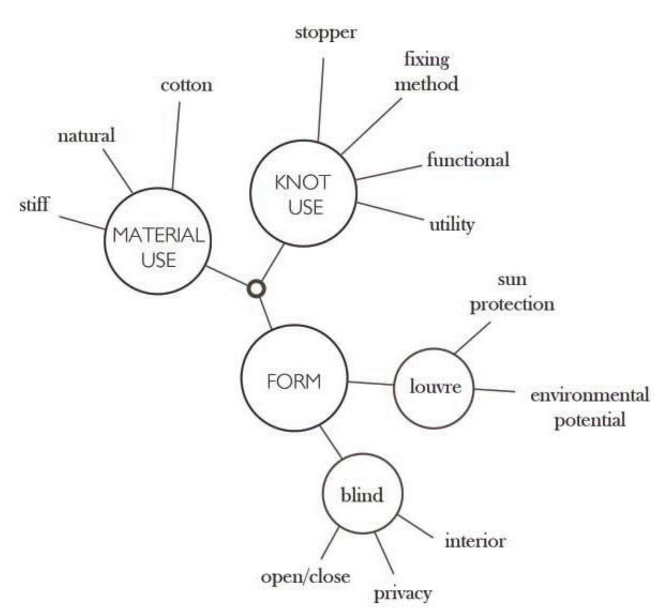
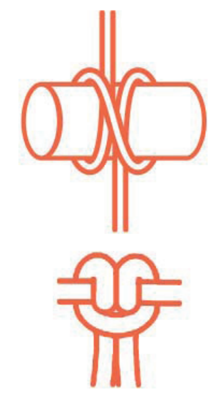


Figure 5.39. Adjustable textile space-definer, associations.

design cycles
REFLECTIONS



5.4.5. rigidity

The board as horizontal element is naturally rigid. When replacing the board with a textile sample the rigidity is reduced. Knot choices in terms of fixing as well as other 'hard' materials need to be added to the textile to provide adequate rigidity. Conclusions were reached in terms of:

Possible spatial functionality: The fastening methods and insertion of stiff materials (such as a dowel) allow for rigidity within the textile sample. This rigidity is employed to ensure structural stability of textile-space defining elements.
Aesthetic and tactile quality: The use of the dowel as rigid material within the textile does not detract from the soft and fluid quality of the textile sample. Knots for fixing feel strong and rigid and provide a finished and rounded look to the product.
Knot and material selection: The knots used for fixing provide ample structure. The insertion of a dowel stick into the fabric provides rigidity to the textile sample. However it is not in the nature of a textile to behave in a rigid fashion unless it is in terms of tensile forces.

Possible potential: The textile sample can span further and with more ease than without added rigidity. This would allow for larger sections of vertical or horizontal space-defining elements to be covered or divided. The knotting techniques investigated can be employed at various stages throughout the construction process.

Figure 5.40. Sketches of fixing methods

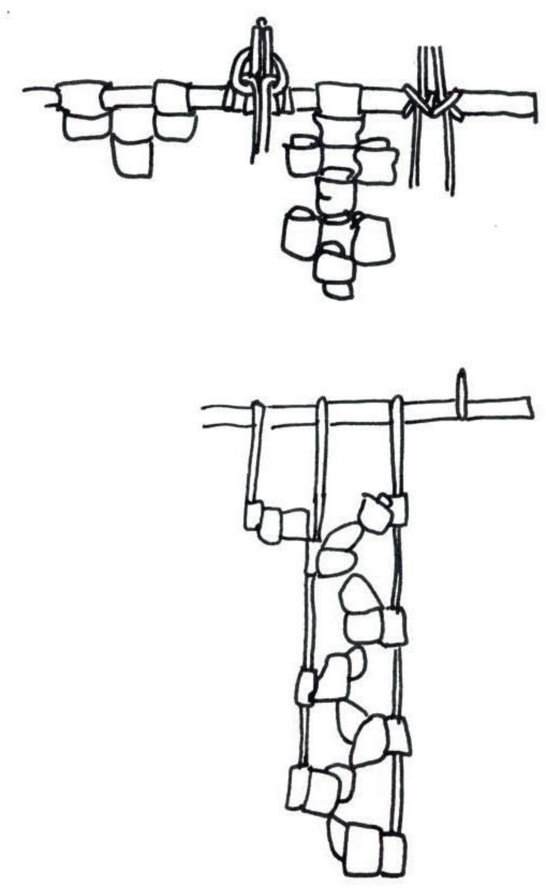


Figure 5.41. Collection of photos of various rigid fixing methods.

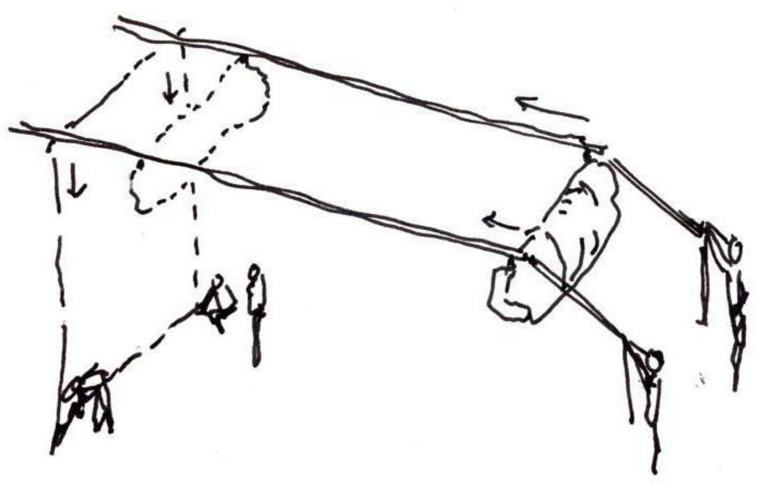


Figure 5.42. Concept sketch of rigid system with textile infil

5.4.5.1. CONSTRUCTION PROCESS

9-10

Left to right, top to bottom

1 Clove Hitch, side by side
2 Single Clove Hitch
3 Dowel perpendicular to Primary Cords
4 Clove Hitch with double cord
5 Clove Hitch with fold over loop
6 Dowel Parallel to Primary Cord
7 Larks Head Knot looped through carabiner
8 Clove Hitch with fold over loop
9 Larks Head Knot looped over frame

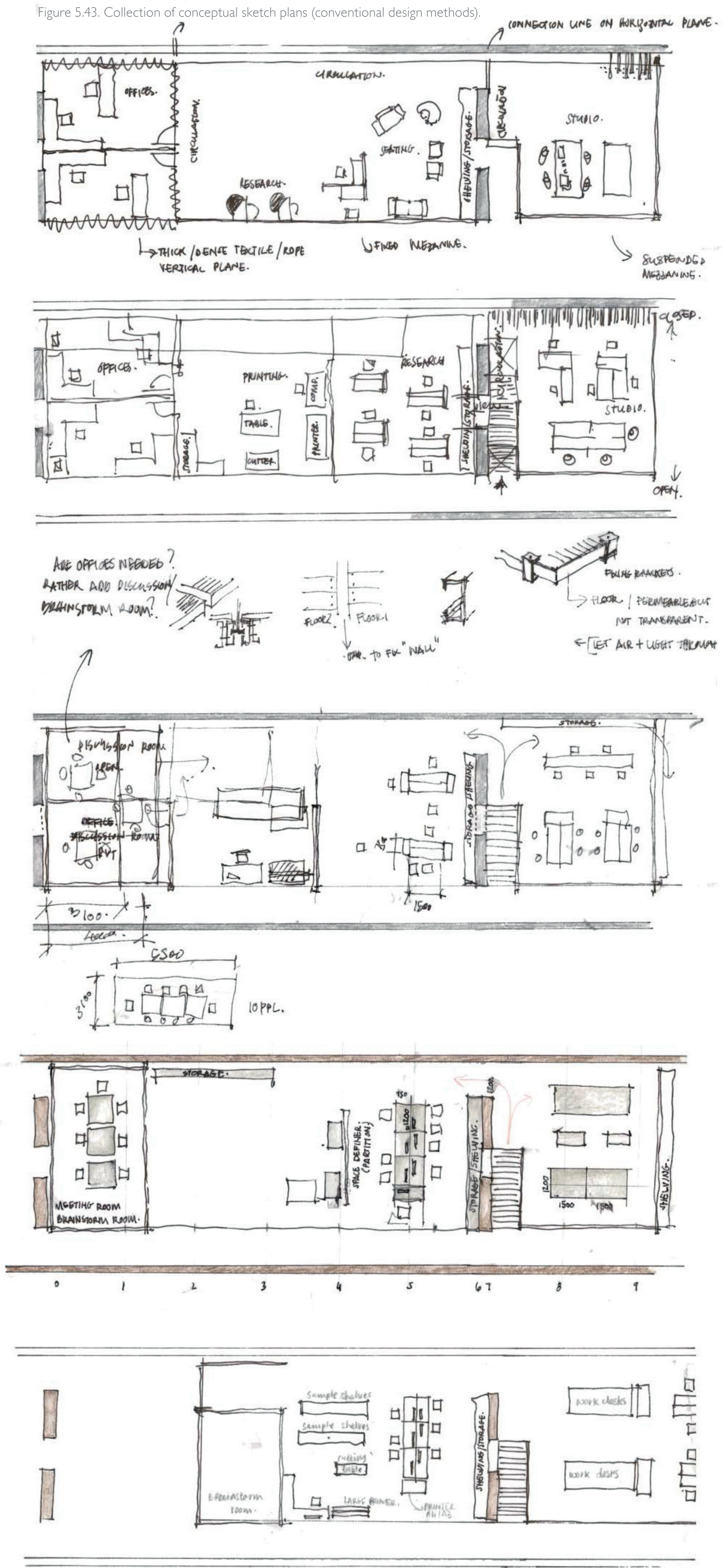
5.4.6. spatial exploration

When certain points within the sequence of the design process is reached, a jump in scale occurs. Between test 12 and 13 the spatial intervention was investigated on plan and various quick perspective sketches.
The following conclusions were reached:

When assessing the sketches and plans drawn it is apparent that conventional design methods result in conventional design proposals. This is especially noticable in the form that the plans take on as well in the representation of solid volumes inserted into the existing space.

Knowing through making focusses on the creation of data instead of the collection of data. The importance of this process is clear in the design that resulted when the focus of the research was shifted to more conventional methods.

Figure 5.43. Collection of conceptual sketch plans (conventional design methods).



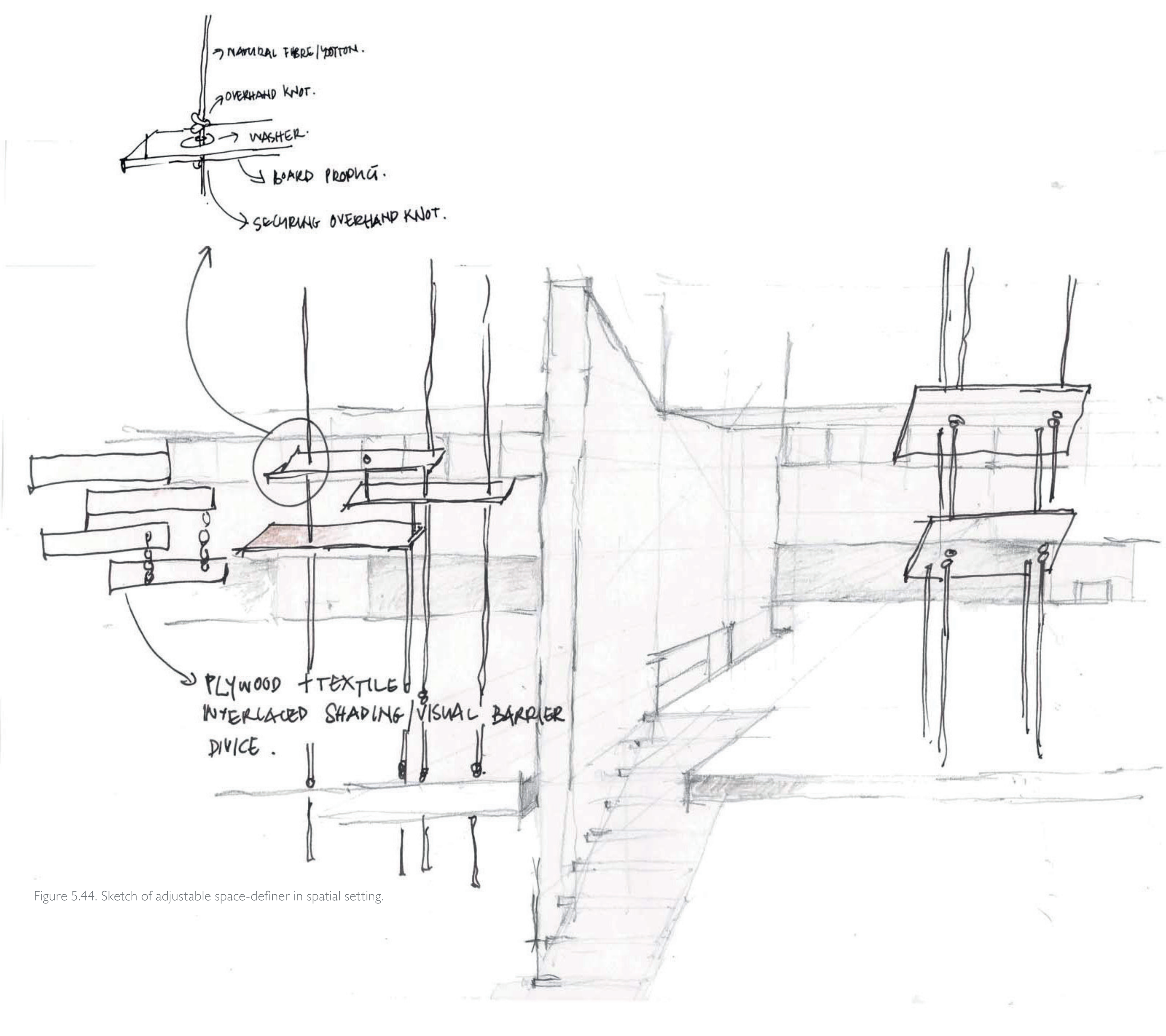


Figure 5.44. Sketch of adjustable space-definer in spatial setting.

5.4.7. lighter textile

The light textile sample is a response to the conclusions reached during the rigidity cycle. The lighter textile sample is also the second type of textile that can be applied in the formation of semi-private spatial zones. (See process diagram).
Conclusions were reached in terms of:

Possible spatial functionality: The textile is considerably lighter than thick textile sample 2. The textile could sufficiently define semi-private spatial zones.
Aesthetic and tactile quality: The openings between knots are larger and provide less visual obstruction than the thick textile samples. The knot sequence creates an organised and recognizable pattern. The sample is looser than sample 1 and 2.
Knot and material selection: The selected rope-like fabric provides sufficient bulk for the construction of a textile that remains thick but is lighter and less dense. The selected knot type remains as is and provides opportunity for the adjustment of the overall textile pattern and look.

Possible potential: Similar to previous textile samples the nature and composition of the textile allows for variations in colour and pattern. The reduced weight of the textile is beneficial overall as it influences issues that arise such as structure, fixing points and methods of insertion.

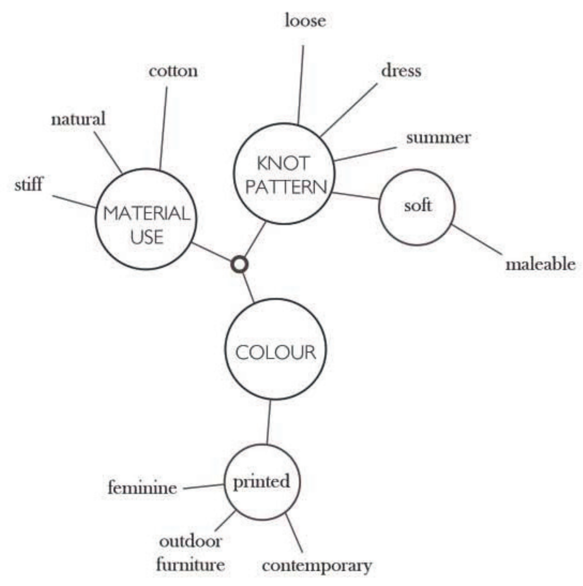


Figure 5.48. White and blue patterend fabric, associations.

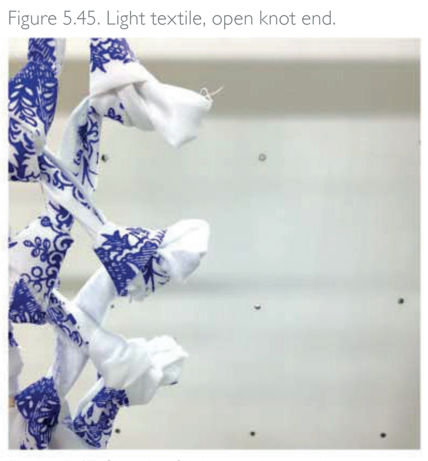
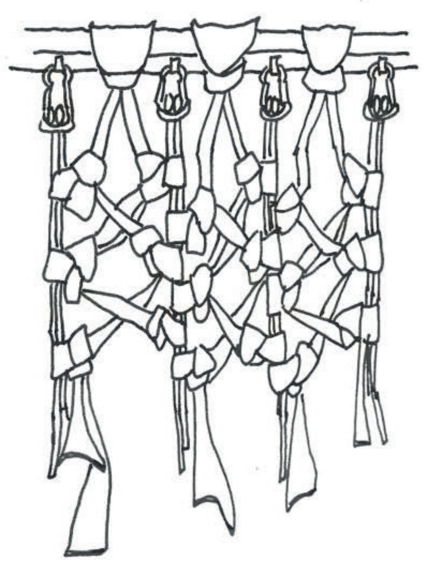
Figure 5.45. Light textile, open knot end.


Figure 5.46. Light textile, Facing side.


Figure 5.47. Sketch of light textile sample.


5.4.7.1. CONSTRUCTION PROCESS

13

1 Fix five Primary Cord's to the upper frame

2 Fix three Filler Cords consecutively inbetween each of the PC's

3 Select FC-A and make a Simple noose knot towards the first PC. Place the running end of the second PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot

4 Repeat step 3 using FC-B and the second PC. Ensure that FC-B is ontop of FC-A in the diagonal cross formed by the two filler cords.

5 Repeat steps 3 and 4 with the remaining FC's and PC's. Ensure that the FC joining from the left always crosses over the FC joining from the right.

6 Repeat steps 3-5 until end of rope is reached

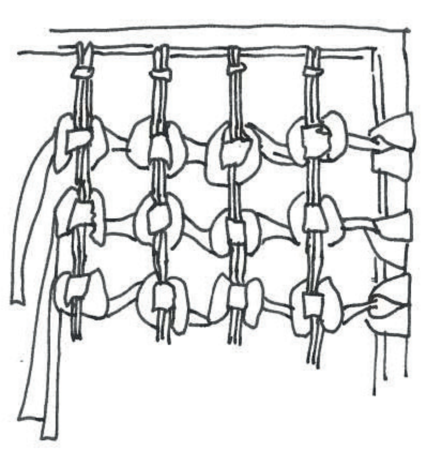
5.4.8. planar irregularity

The planar irregularity cycle returns to the original textile samples created. The cycle employs the same knot as applied to the first sample tests, but introduces subtle changes in procedure.
Conclusions were reached in terms of:

Possible spatial functionality: The sample is quite thick and can be used to create a strong visual barrier. The sample can be a space-definer for a private interior spatial zone.
Aesthetic and tactile quality: The knotted textile has a defined knot pattern on one side and a more irregular pattern on the other side. See section 1.6. Definition of terms: Developed terms on page 9. The distinctive visual quality of the textile sample is very different from that achieved during the first sample tests. The textile feels soft to the touch and has a very pliable and malleable quality to it.
Knot and material selection: By simply changing the direction of knotting the result is changed completely. The structural behaviour of the textile responds in a significantly different manner than that of textile sample one and two.

Figure 5.49. Sample 20, Backing side


Figure 5.50. Sample 20, Facing side.


Figure 5.51. Sample 20, sketch.


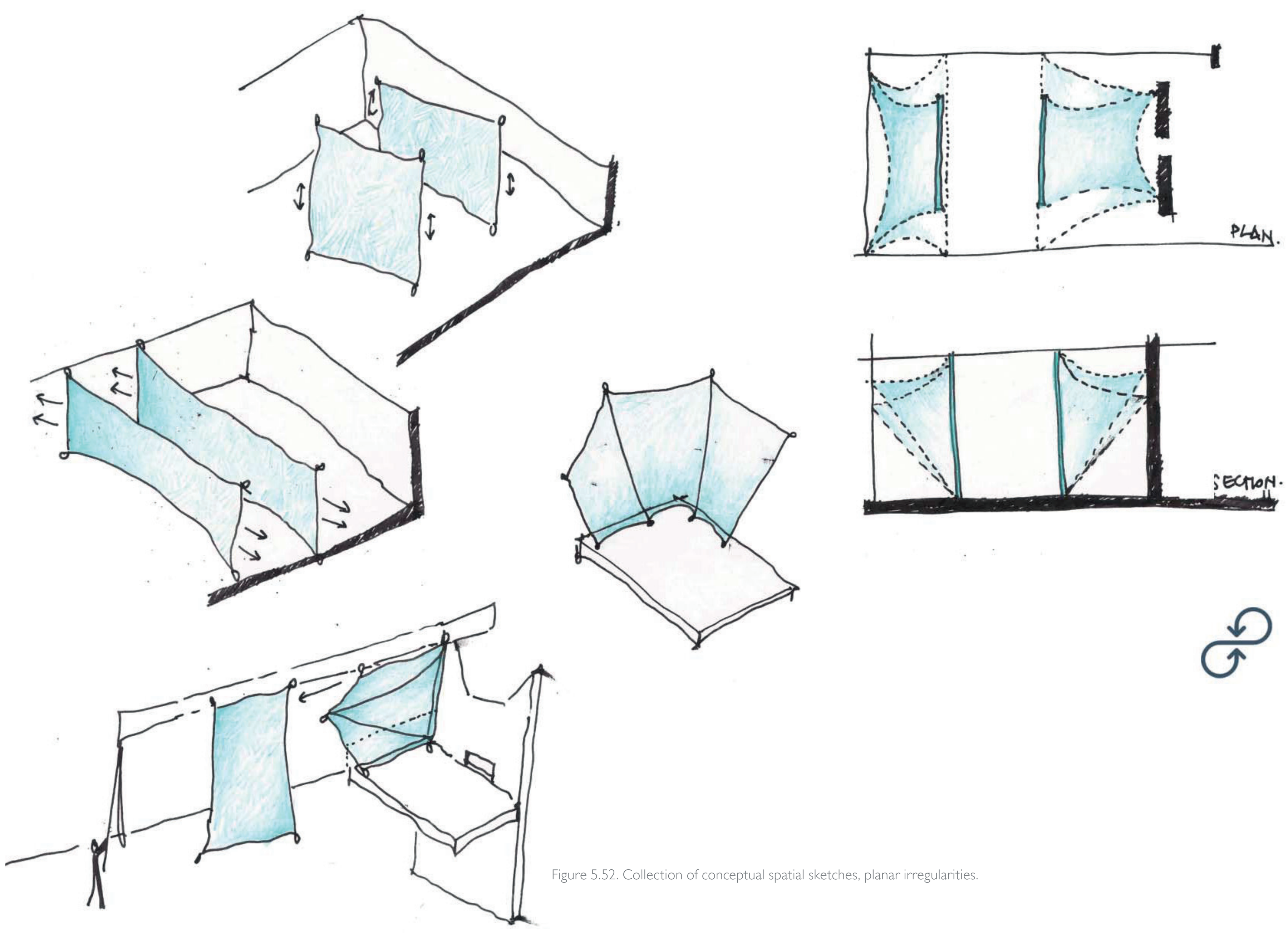


Figure 5.52. Collection of conceptual spatial sketches, planar irregularities.

5.4.8.1. CONSTRUCTION PROCESS

20

1 Fix five Primary Cords to carabiner within upper frame. Fix to carabiner using Cow hitch knot.

2 Fix five Filler Cords to side of frame. Select the uppermost FC and make a Simple noose knot towards the firts PC. Feed the PC through the eye of the loop of the FC. Pull the running end of FC to dress the knot

3 Repeat step 2 with the same FC and remaining PC's

4 Repeat step 2 and 3 with the remaining FC's and PC's

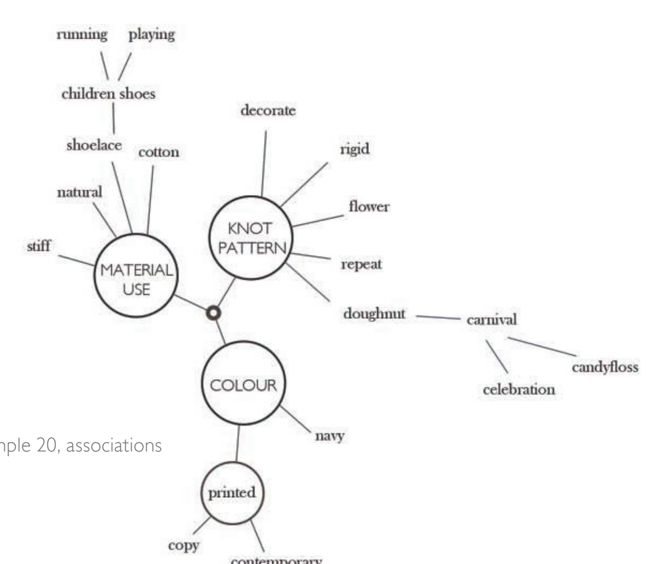


Figure 5.53. Sample 20, associations

image board 1

AESTHETIC, TEXTURE AND DETAIL

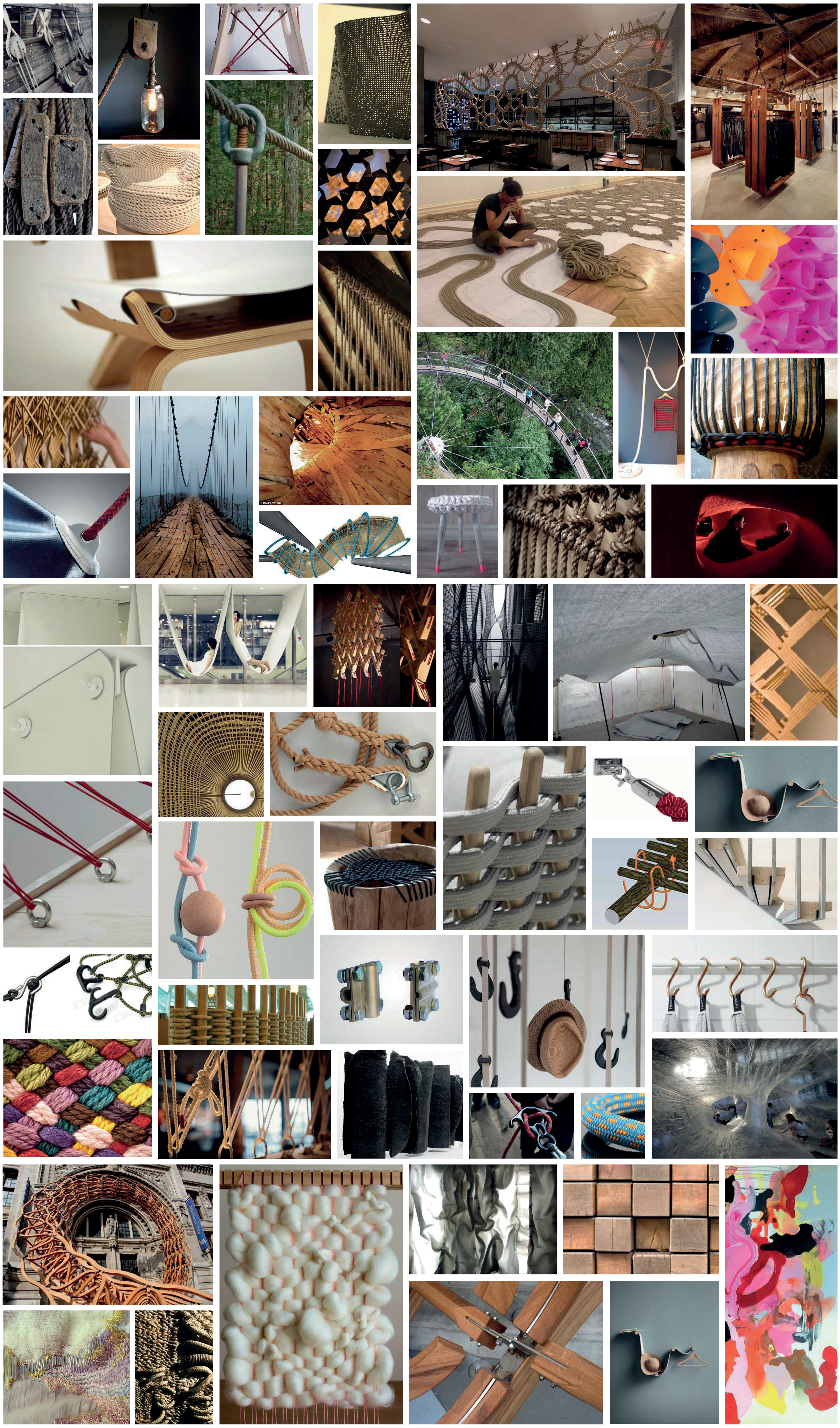


Figure 5.54. Image board (Various sources).

knot selection

STEP BY STEP

5.6.
FINAL KNOT SELECTION

Figure 5.55. Collection of selected knots (Right), illustrate the specific knots that were selected after the Design cycles (See section **5.4.1-5.4.8.**) Each illustration includes the name of the selected knot, its ABOK number, a short description and the selected icon to represent the knot. The tying process of the knot is also illustrated directly below each knot icon. Each knot icon can also be found at the top right hand corner of certain pages to indicate its use.

knot:

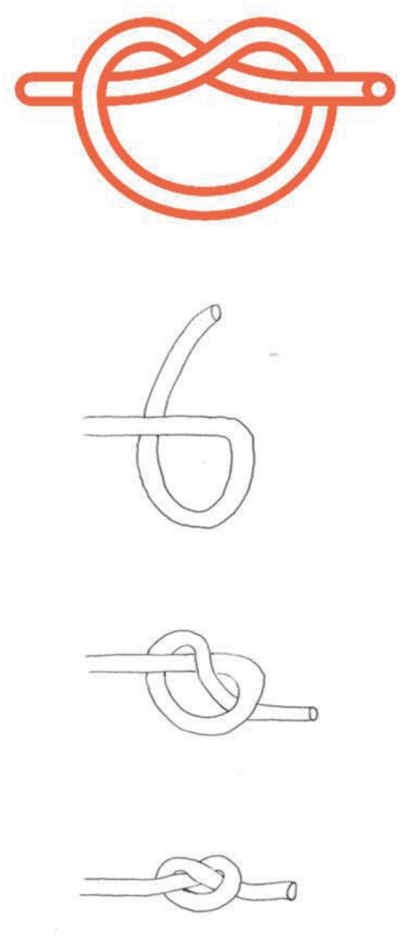
An interlacing of the parts of one or more flexible bodies forming a lump or knob (as for fastening or tying together) (Meriam-Webster: knot). An intertwined loop of rope, used to fasten two such ropes to one another or to another object. A knot even when not in use, will hold its shape or form.

Figure 5.55. Collection of selected knots (right).

OVERHAND KNOT

ABOK #46

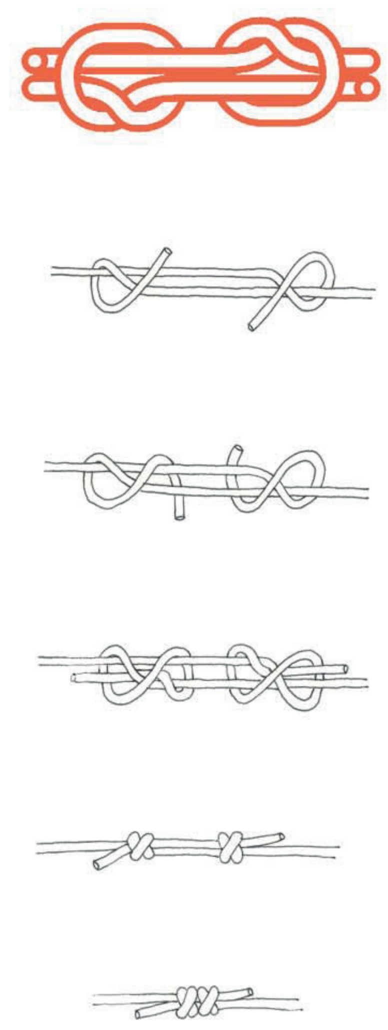
The overhand knot is the simplest of the single-strand stopper knots, and is tied with one end around its own standing part, its purpose being to prevent unreeving.



DOUBLE FISHERMAN'S KNOT

ABOK #1415

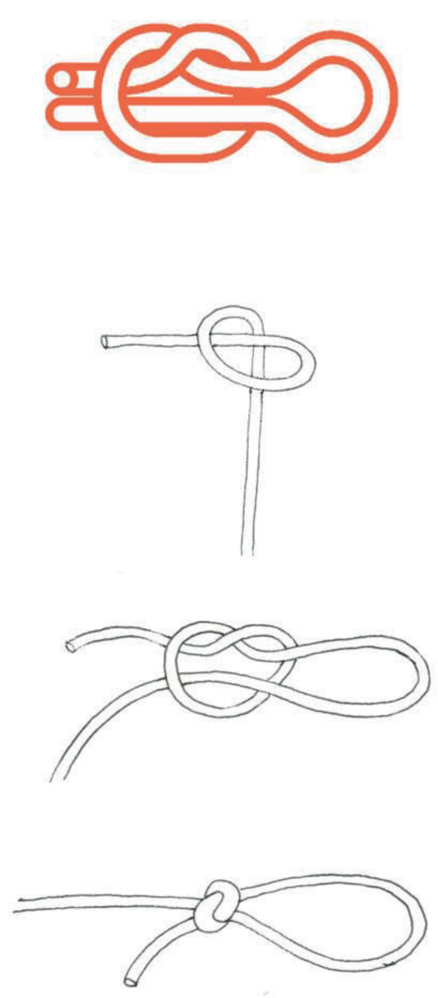
The Double Fisherman's Knot is also known as the Grapevine knot or Double English Knot. This variation of the Fisherman's knot is a very secure bend widely used in climbing and in search and rescue operations. All variations of this knot tend to jam under strain, and in situations when the knot needs to be easily united other bends are preferable.



SIMPLE NOOSE KNOT

ABOK #1114

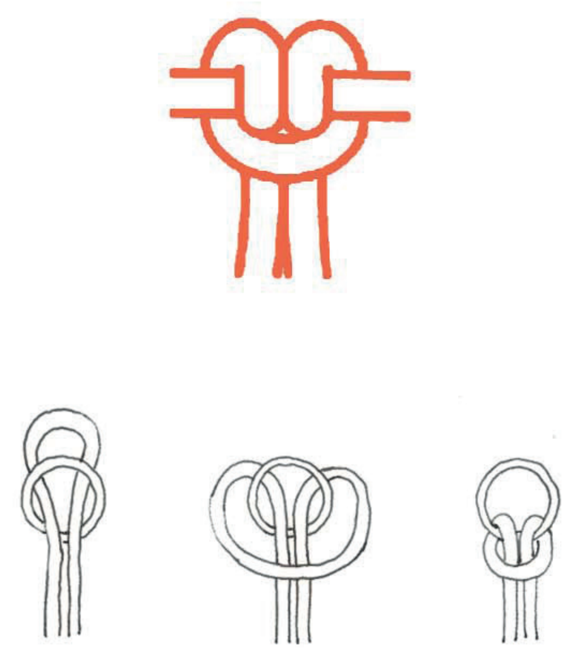
The simple noose knot is closely related to the Overhand Knot, the final tuck of the Noose being made with a bight instead of a single end, as in the Overhand. It is often employed ashore, seldom at sea, its simplicity being its greatest recommendation. It may be tied in the bight as well as in the end of a rope.



LARKS HEAD KNOT

ABOK #2485, 56

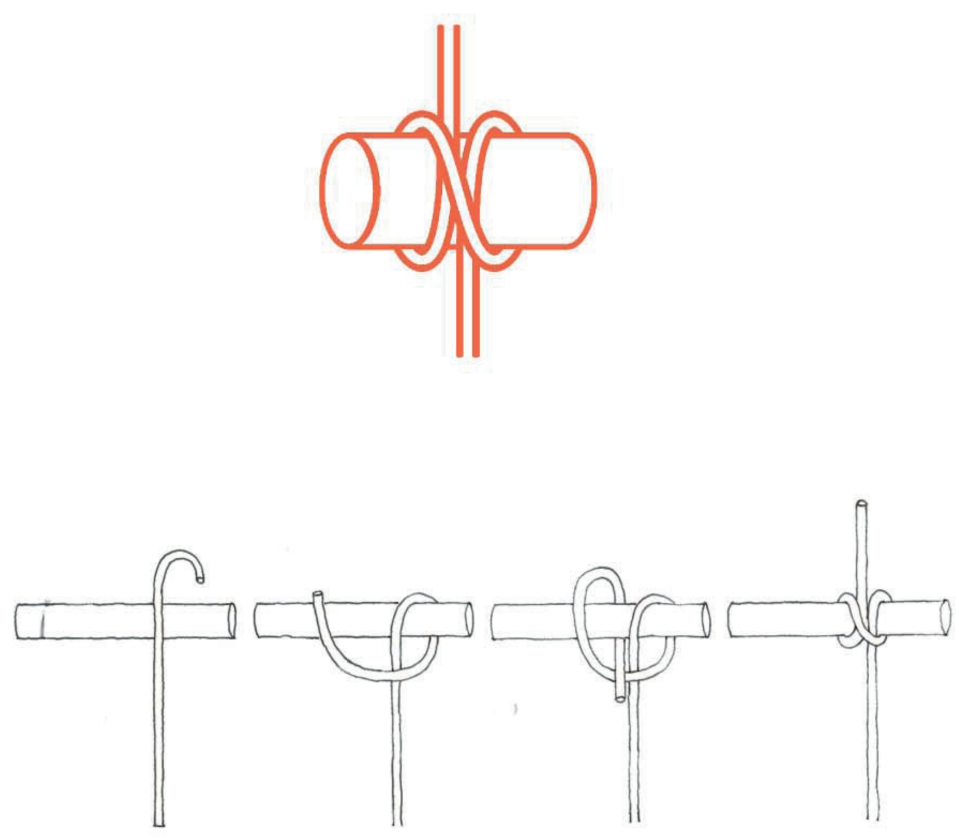
The Larks Head is also known as the Cow Hitch. It is most commonly used in square knotting or Macrame. Square knotting is started with a series of cords made fast to a foundation cord, by means of a Larks Head Knot.



CLOVE HITCH KNOT

ABOK #1176-1180, 1773-1777

The Clove Hitch is a simple yet useful hitch. It is used to secure more complex hitches, in lashings, to make rope fencing, to temporarily moor small boats, in climbing, where it is tied around a Carabiner and as a general utility knot. The Clove Hitch can be tied in the Bight or with the Working End.



working plan 2

ACTION PLAN & TIME FRAME

5.7.
PLANNING PART TWO

After the design cycles as documented in the test matrix, a second Plan of Action was set out. As with the plan of action part one, the table includes a number indicating the **phase**, a description of the **action** performed within that specific phase, the **research technique** applied and the **purpose** for the action. Further information such as the primary source used as basis for the action, the time frame to perform the action, as well as the **physical manifestation** of the action performed is included.

PHASE	ACTION	RESEARCH TECHNIQUE	SOURCE	MATERIAL	PURPOSE	TIME FRAME	PHYSICAL MANIFESTATION	Notes
11	Investigate spatial intervention and characteristics	**Observation** **Design response**	PHASE 6-10	N/A	Determine spatial intervention	Incremental process	Sketches, plans, sections, perspectives and spatial interpretations	Iterative process, refer back and forth between PHASE 6,7,12. Spatial intervention will be mainly determined on testing sites and translated on paper by means of sketches
12	Set up documentation procedures for testing		PHASE 6,9	N/A	To allow for rigorous documentation of the process	1 DAY	Outline and steps for data collection and documentation process	The documentation procedure is revised once or twice after the first phases of design has occurred
13	Test rope and rope-like materials on a spatial level within testing model 2	**Making** **Iteration** **Observation**	Preceding phases Intuition	Rope and rope-like materials, hardware	Determine size, shape, characteristics and scope of spatial intervention	Continuous process	Photographs, sketches and process documentation as well as possible models and maquettes	Iterative process involving design on various scales, moving back and forth between the construction level and the spatial level
14	Document conclusions	**Analysis** **Synthesis**	PHASE 12	N/A	Synthesis of data in order to reach appropriate conclusion and well planned responses	Continuous process	Synthesised data in excel spreadsheets	Observations and conclusions are of the utmost importance
15	Investigate type of 'hard' or rigid elements	**Making** **Iteration**	PHASE 12,14	N/A	Investigating types of hard or rigid insertions will inform form	1 WEEK	Lasercut board elements and other hardware items as needed	Determine type A,B,C of space-defining element
16	Determine spatial intervention according to intervention site	**Design response**	PHASE 6-16	N/A	Formulating application type will assist with the design of space-defining-element	2 WEEKS	Plans, Sections, Perspectives	Iterative process
17	Material and colour selection	**Design response**	Association bubbles and intervention site	Rope and rope-like materials	Formulate design response as a whole	1 WEEK	Samples and diagrammatic colour studies and pattern layouts	
18	Investigate and determine fixing methods	**Making** **Iteration** **Response**	PHASE 12,14,16	Rope and rope-like materials, hardware	Fixing methods will inform spatial response	1 WEEK	Selection of hardware with knots and method of fixing	Test various methods of fixing rope and what types of hardware responds best to the characteristics of the materials
19	Technification	**Analyse** **Literature**	PHASE 4 and literature sources	N/A	Determining technical specification for construction and fabrication purposes	TO BE DETERMINED	Sketches, detail sections	
20	Documentation		PHASE 17-20	N/A	Documentation to relay fabrication methods	TO BE DETERMINED	Technical sketches, revit drawings and specification	
21	Presenting fabrication methods		PHASE 19,20	N/A	Production purposes	TO BE DETERMINED	Technical sketches, revit drawings and specification	

Table 5.6. Plan of Action, part 2. (above).

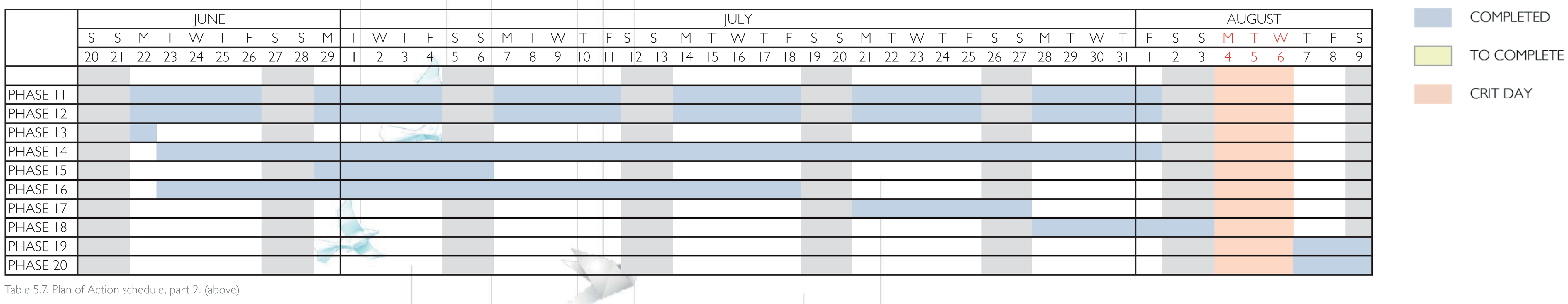


Table 5.7. Plan of Action schedule, part 2. (above)

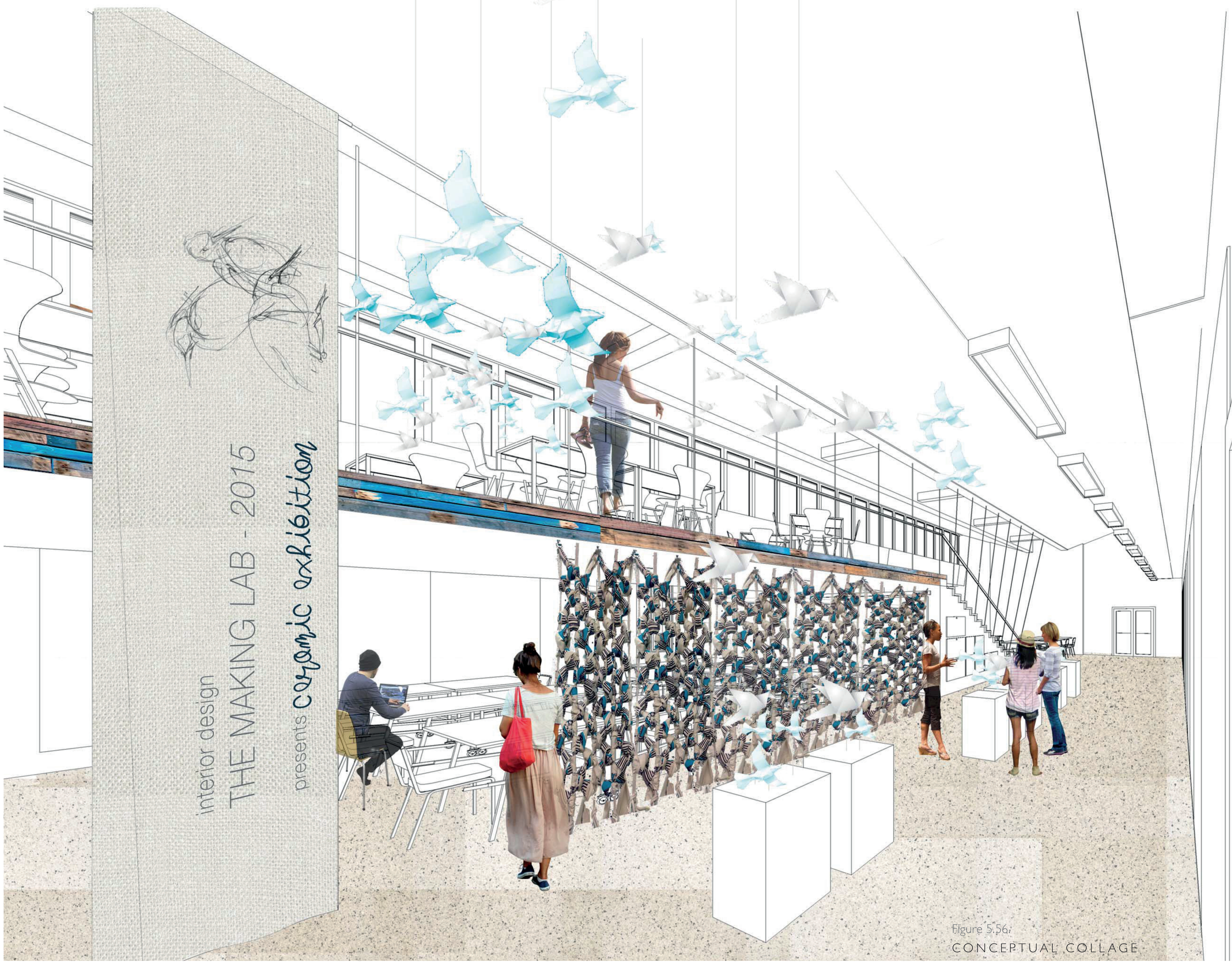


Figure 5.56.
CONCEPTUAL COLLAGE

image board 2

SUSPEND AND STRETCH

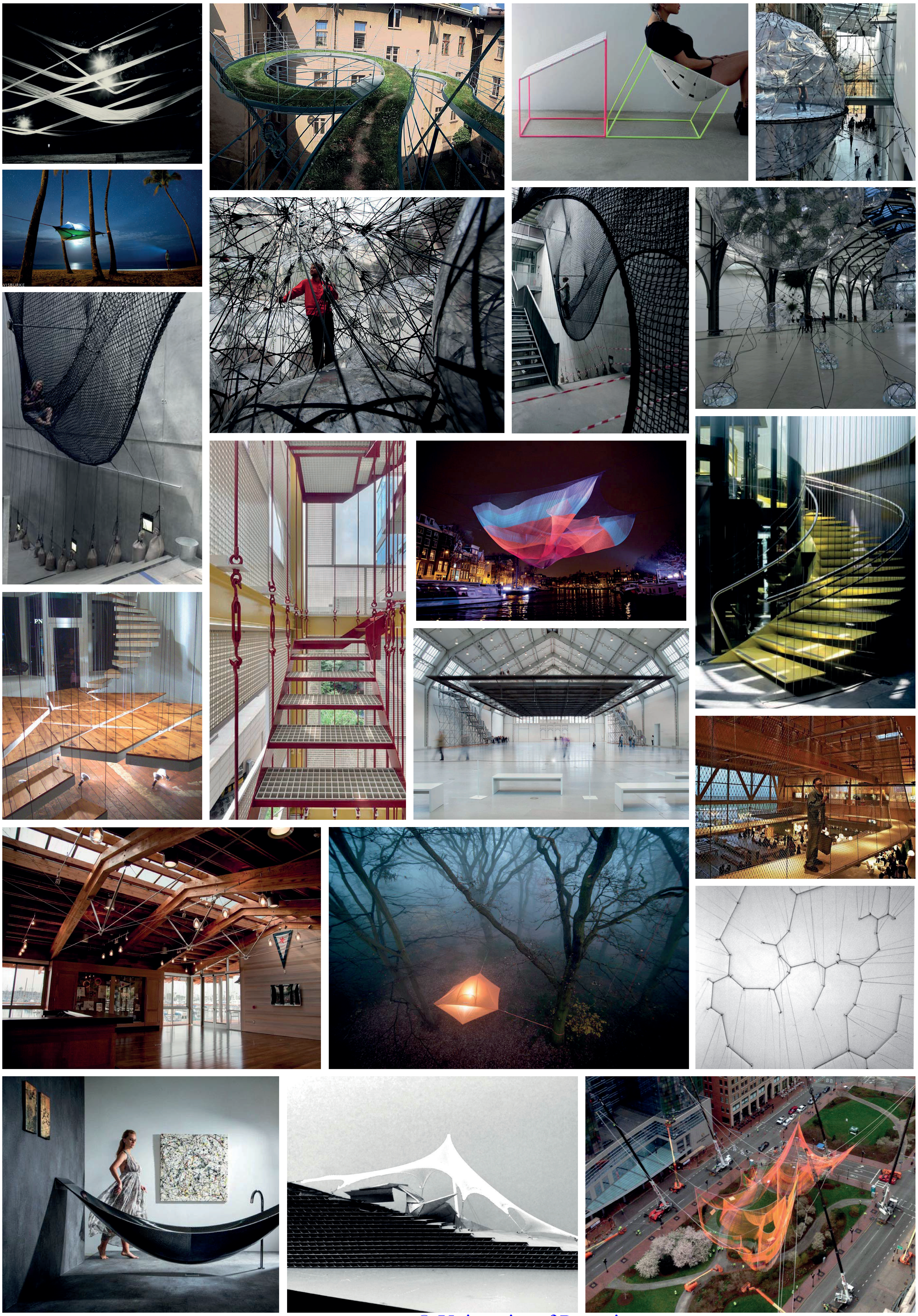


Figure 5.57. Image board 2 (Various sources).

testing box results

DEVELOPMENT OF SCENARIOS

5.8.
DEVELOPMENT OF SCENARIOS

During the testing and making phases (using the testing box), the textile scenario's were developed. The following images illustrate the initial development of the scenario's as well as the form and use of the textile space-definers on a spatial level.

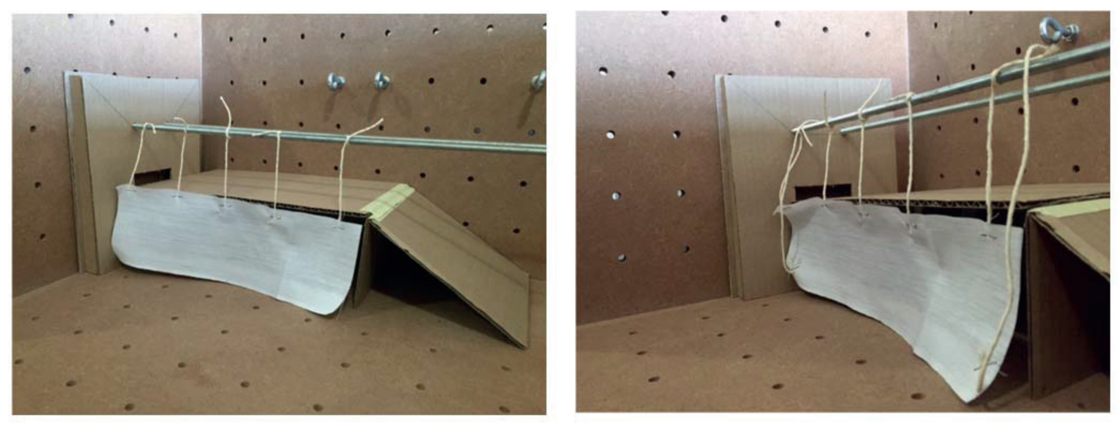


Figure 5.58.
TEXTILE PLANE ONE,
POSITION 1 (above left and right).

The textile plane is adjustable by means of a pulley system, Position one defines a spatial zone below the mezzanine as either digital classroom or a informal seating space. North of the textile plane is a formal studio space and exhibition space.

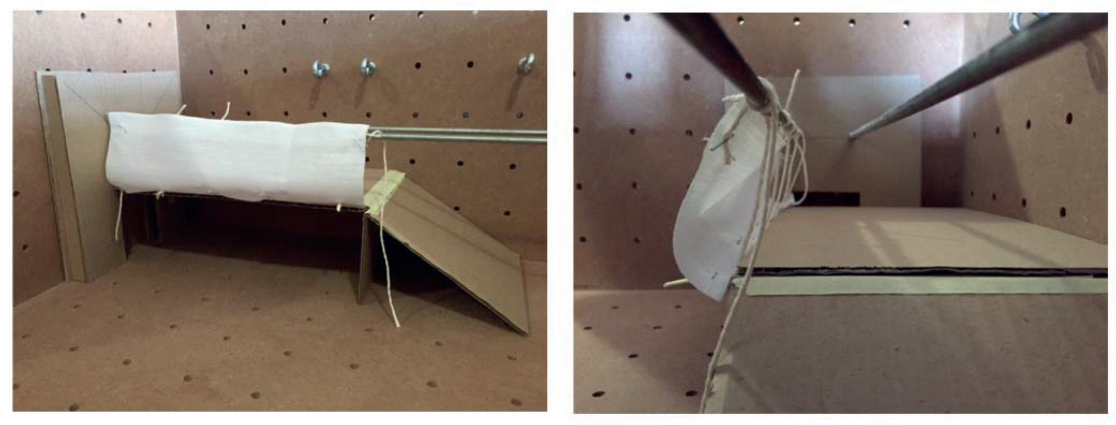


Figure 5.59.
TEXTILE PLANE ONE,
POSITION 2 (above left and right).

Position two defines spatial zone three and four. Zone three combines the space underneath the mezzanine with the existing formal studio space. Spatial zone four is now an enclosed area on top of the mezzanine with access from the west using the stairs.

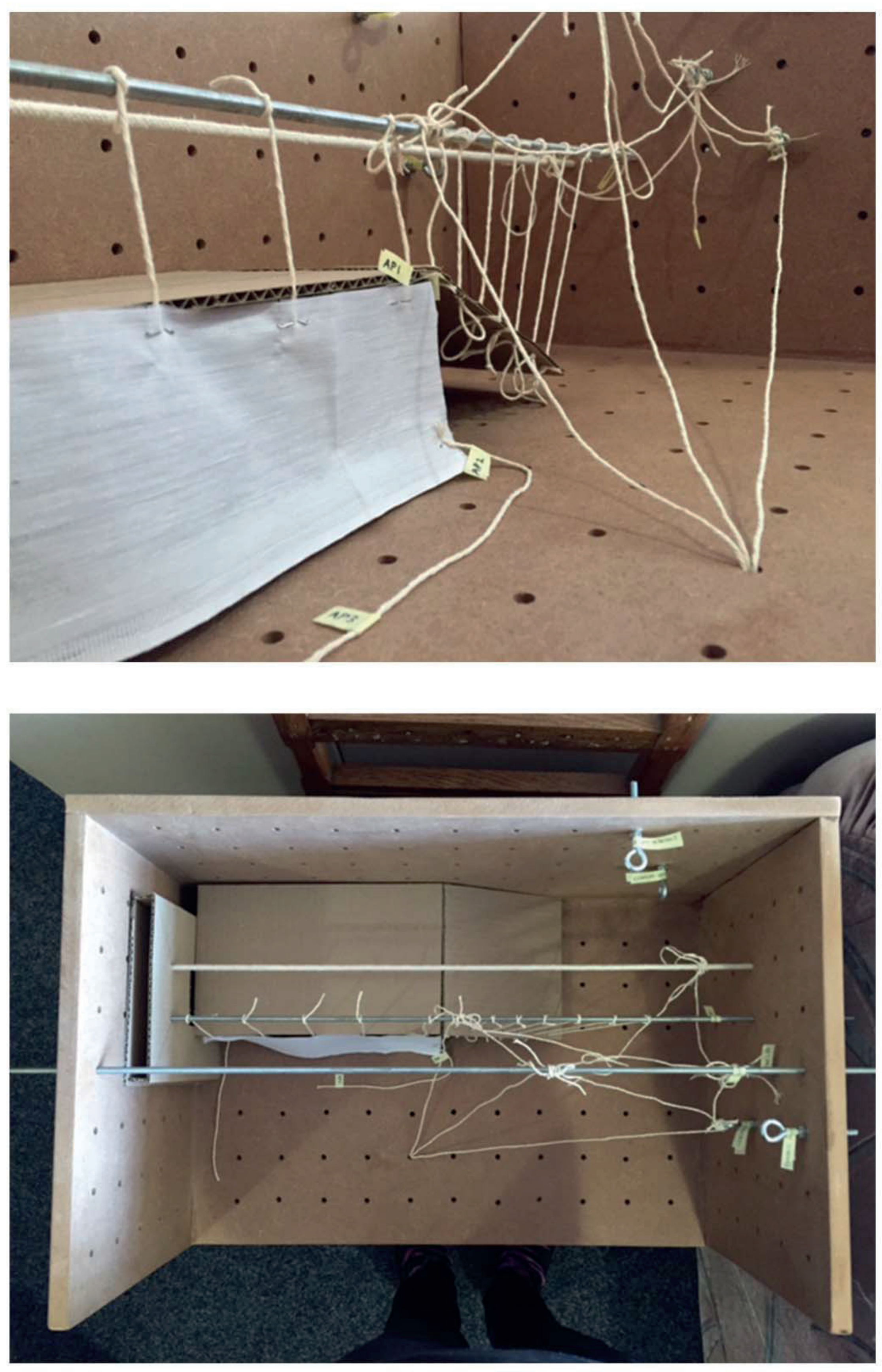


Figure 5.60.
LARGE SUSPENDED TEXTILE,
POSITION 1 (above).

The large suspended textile plane is considered a combination of horizontal and vertical planes. The structure is suspended by two static, permanent anchor points.

The exhibition and digital presentation sees the textile suspended from the existing overhead pane and fixed in position to define a more secluded or enclosed area at the south west corner of the existing studio space. This area can be used in various formations for digital projection and exhibition or presentations. Here the staircase incorporated within the proposed mezzanine act as amphitheatre seating.

spatial scenarios

TEXTILE MANIFESTATION

5.9.
DESIGN RESPONSE

The Boukunde site for intervention acts as a shell for the textile intervention. Firstly a hard element is inserted into the space - a cable-stayed mezzanine. This structure is not a textile space-defining element itself, but assists in the formation of space. See Figure 5.61. Design intervention diagram (bottom). With textile space-making in mind, the mezzanine structure is designed to be as lightweight as possible, conceptually alluding to permeability and lightness. See **section 5.1. Conceptual thinking** on poster 9 (page 50).

Fixing and connection details between hard and soft - mezzanine and textile space-defining elements - are accentuated and exposed to respond to the conceptual approach. These textile space-defining elements are designed according to the identified scenarios. See Figure 5.62. Scenario sketches 1,2 &3 (boxed below).

5.9.1.
PROGRAMME

The commitment of the Department of Architecture to innovate, combined with the desire of the interior design disciplines to define and differentiate themselves from the discipline of architecture, creates the unique opportunity for the design of an INTERIOR DESIGN MAKING STUDIO for the department. See Figure 5.63. Diagram of proposed programme (right) for a bubblediagram indicating the different functions of the proposed programme.

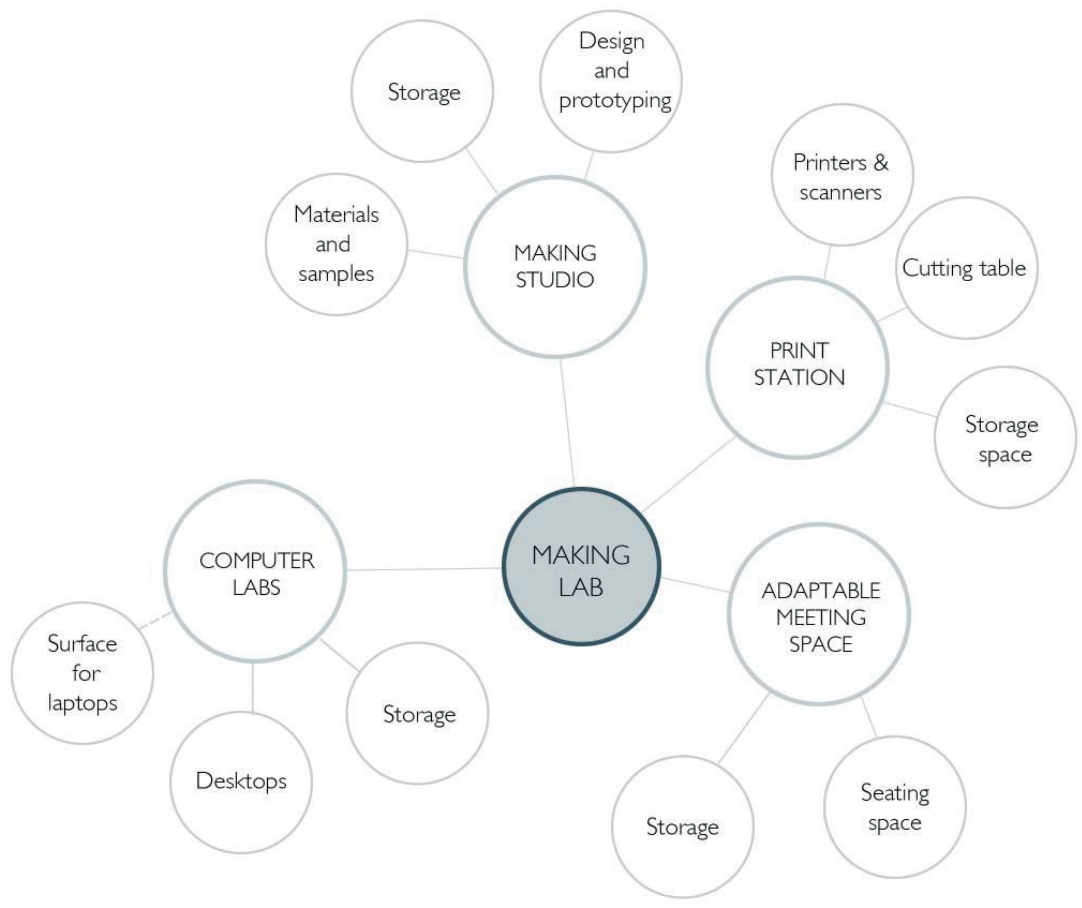


Figure 5.63. Diagram of proposed programme.

5.9.2.
SCENARIO ONE - DIVISION OF GROUP WORKSPACES

The textile unit for scenario one is a semi-fixed unit (One point of the textile always remains fixed to the structure). Scenario one allows the user to create a visual barrier between group working spaces. Each textile unit can be manoeuvred individually to suit the needs of the user, both at the bottom of the mezzanine and at the top. All of the units can also be rolled up for easy storage. Even though the large workspaces above and below the mezzanine can be divided by the user, the textile is restricted to two vertical planes.

5.9.3.
SCENARIO TWO - DIVISION OF INDIVIDUAL WORKSPACES

Scenario two offers the user more flexibility than scenario one. Each textile unit can be completely detached from the structure, allowing the user to relocate the sample to a different location. This allows the user to create a more private or enclosed space. The individual unit is equipped with colour-coded carabiners allowing various configurations of space.

5.9.4.
SCENARIO THREE - DIVISION OF ROOM FUNCTIONS

Scenario three offers the potential of subdividing larger interior spaces. This allows for the creation of temporary 'rooms' within an interior setting which could potentially house different functions. Within the design studio scenario three includes the creation of a temporary digital projection space within an exhibition area.

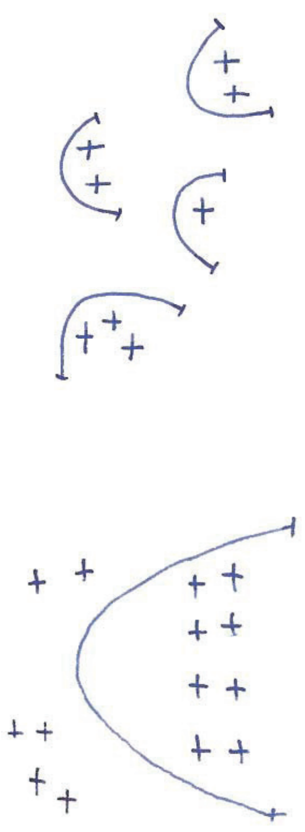


Figure 5.62. Scenario sketches 1,2 &3 (top to bottom).

Figure 5.64. Student allocation diagram (above).

5.9.5.
EXISTING CONDITION

Figure 5.64. (left) indicate the areas where students currently have their design studios. Table 5.8. (below) indicate the number of students for each discipline in each of the years. The Honours student occupying the Western wing of the test site for intervention (first year studio) will be relocated to the OPEN AREA indicated in red on the plan. Figure 5.65. (bottom) illustrate with a collection of images, the current condition of the test site for intervention.

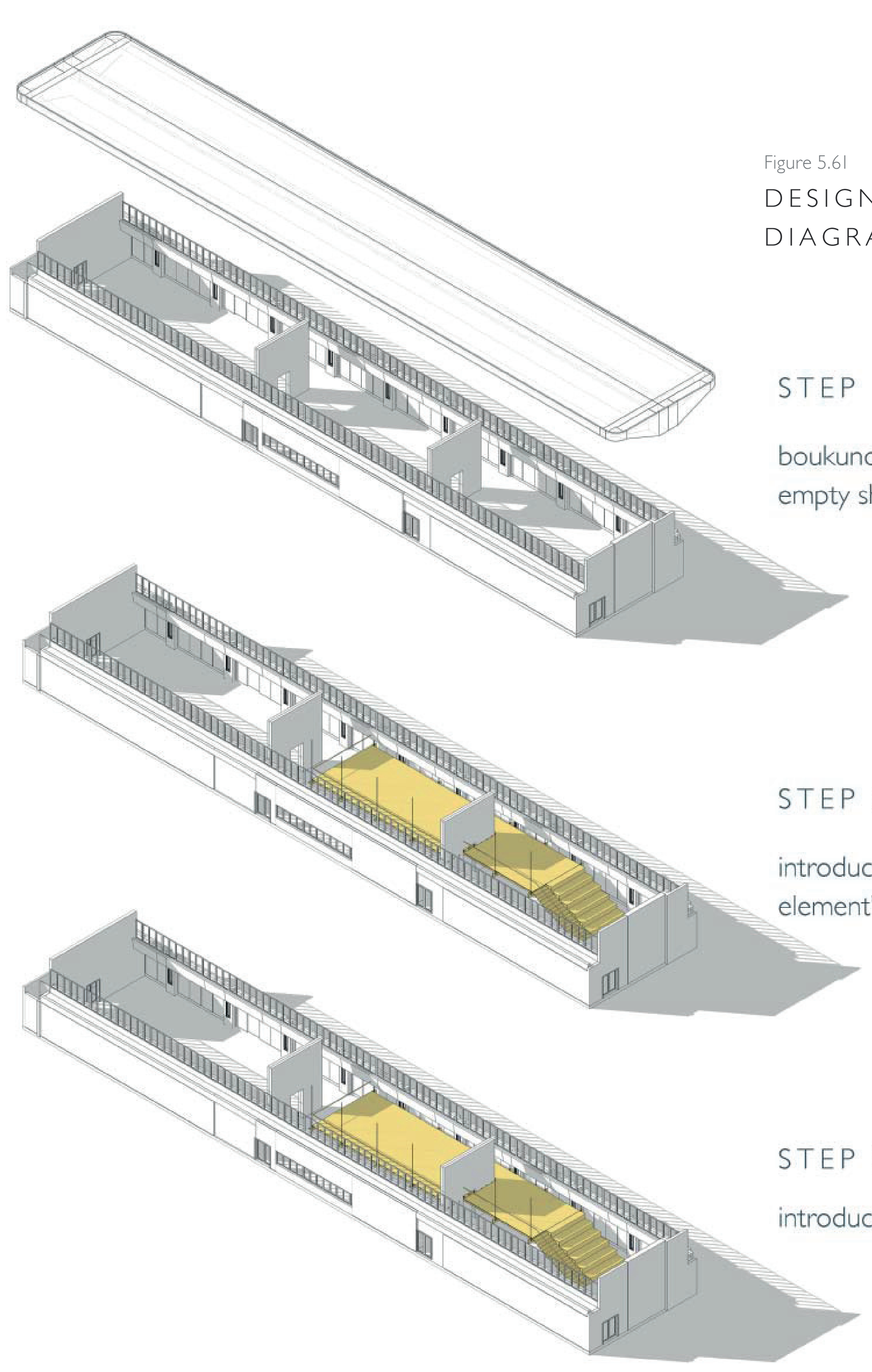
Table 5.8. (below)

ALLOCATION OF STUDENTS

Year	Interior	Architecture	Landscape	TOTAL
First year	~	~	~	**88**
Second year	14	60	16	**90**
Third year	28	50	20	**98**
Honours	12	10	43	**65**
Masters	7	23	15	**45**

Figure 5.61

DESIGN INTERVENTION DIAGRAM (below).



STEP 1

boukunde, site for intervention as empty shell

STEP 2

introduce mezzanine as 'hard element'

STEP 3

introduce textile as 'soft element'

Figure 5.65. Collection of images of first year studio in Boukunde building (below).

look and feel

THE MAKING STUDIO

Figure 5.66. Look and feel (moodboard).

test site for intervention

5.10.
SPATIAL DESIGN RESPONSE

The basis for the design of the textile space-defining element is presented in the first part of this chapter in the form of design cycles, reflections and observation and response tables. The information and ideas discovered throughout the making process fully informs the spatial design response that follows.

The making process continues throughout the design development in order to enrich and contribute towards the more conventional spatial design process.

The textile samples and knowledge collected from the making process directly informs the basic textile unit. The basic textile unit is then altered to create the various spatial responses that follow. These space-defining elements are presented as part of the three scenarios as discussed earlier on poster 23, page 69. This is indicated when appropriate at the top right corner of the poster pages.

Sections 5.4.1. - 5.4.8. on posters 14-17, illustrate the initial design detailing cycles. Differently than with conventional research methods, research through making, introduces a process where smaller focussed detailing takes place before detailing on a larger scale. This section however looks at design detailing as part of the spatial manifestation. The design detailing takes place on the test site for intervention.

This section covers the following detail areas:

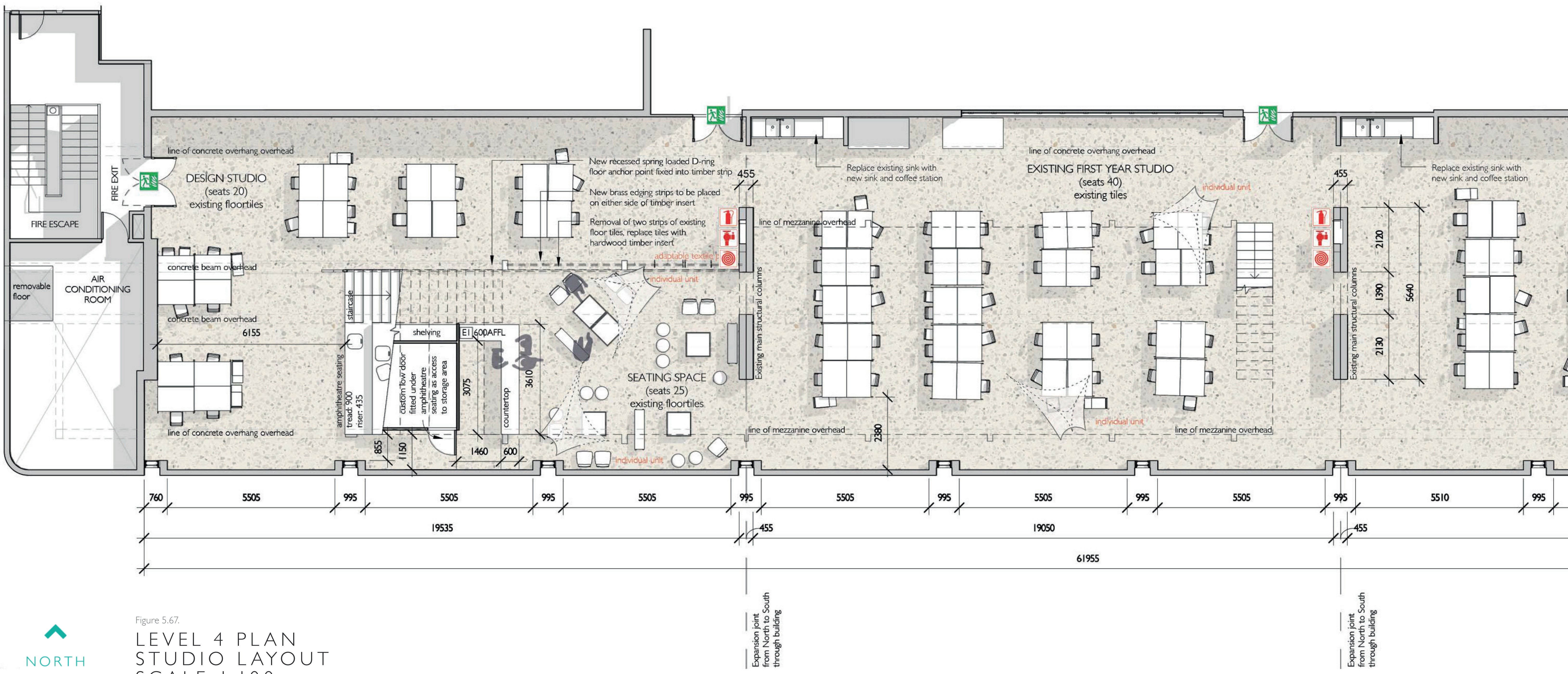
- the cable-stayed mezzanine
- the balustrade
- textile unit one & two
- rigging details
- the conceptual development of textile unit three

The location of each of these details are indicated on Figure 5.78. Section 1 - scenario one and two with detailing, poster 29 (page). A small development sketch is added as reference.

NOTE:
All scales indicated on drawings (plans, sections and details) apply only to full scale poster prints. Al drawings indicated within the book are 'not to scale'.

plans scale 1:100

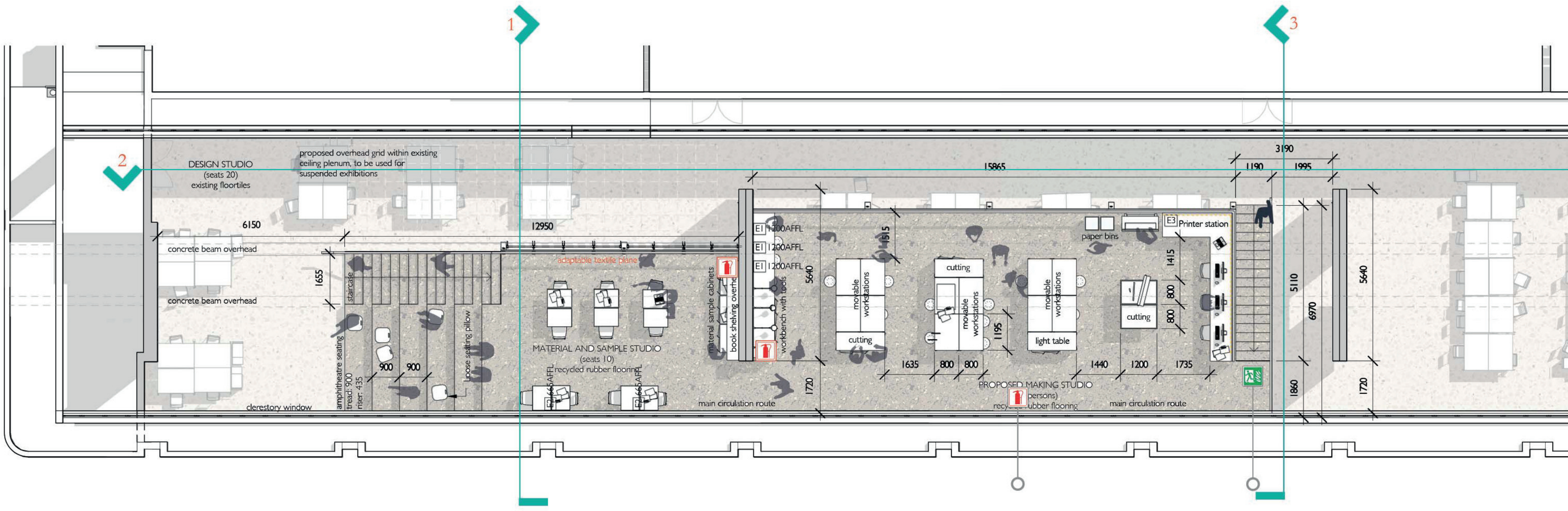
SCENARIO ONE & TWO



NORTH

Figure 5.67.

LEVEL 4 PLAN
STUDIO LAYOUT
SCALE 1:100



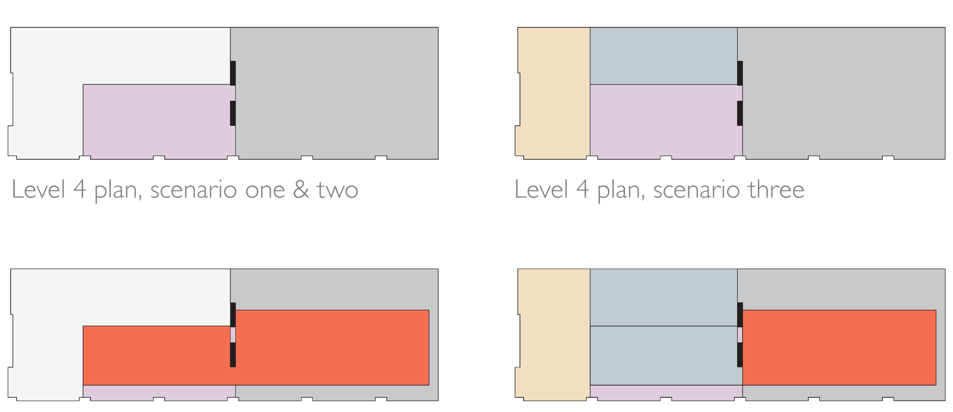
NORTH

Figure 5.68.

MEZZANINE PLAN
STUDIO LAYOUT
SCALE 1:100

Figure 5.69.

SPATIAL USE DIAGRAM



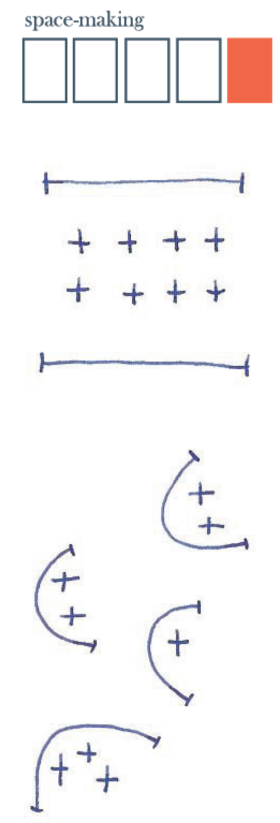
Level 4 plan, scenario one & two

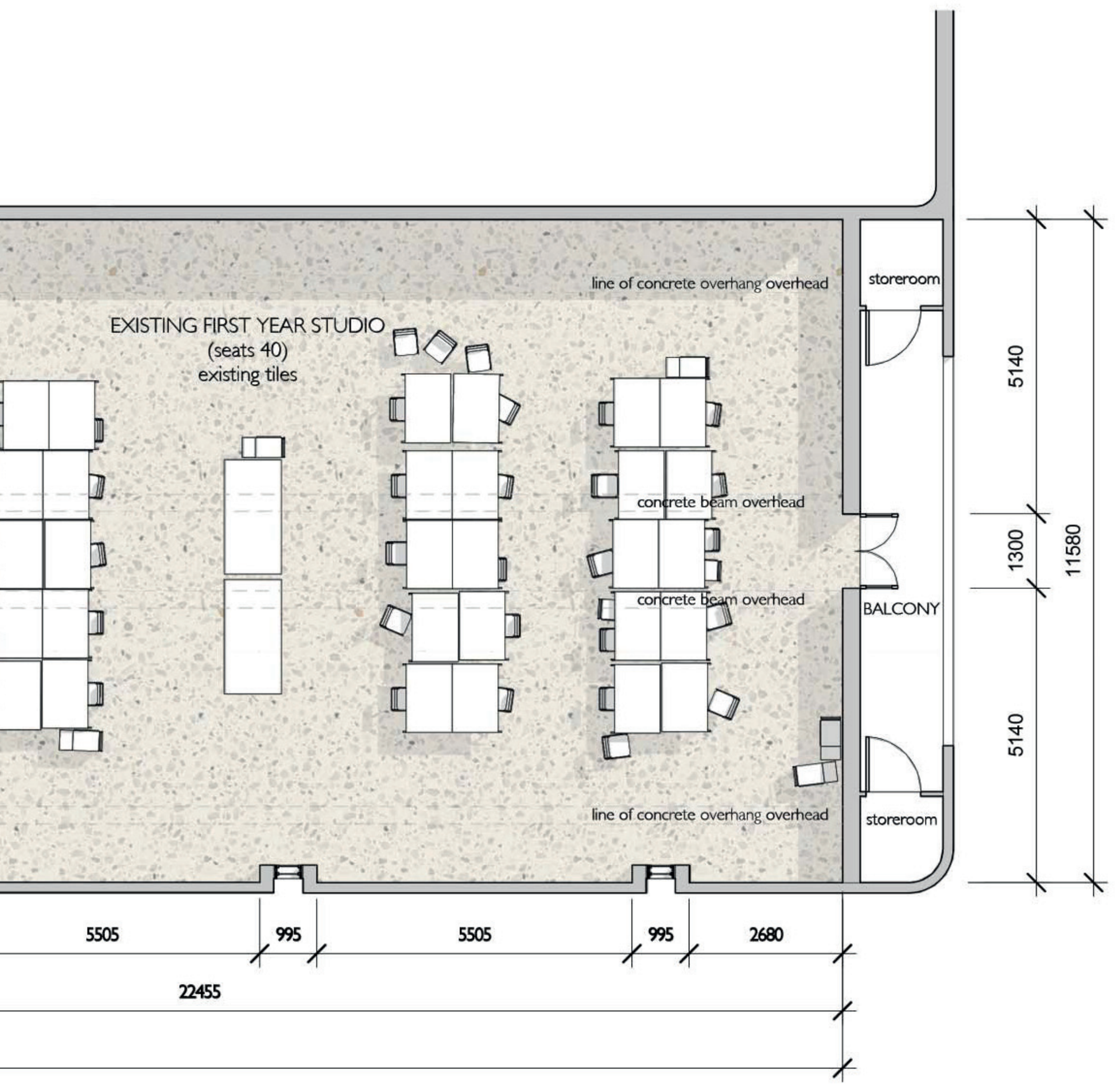
Level 4 plan, scenario three

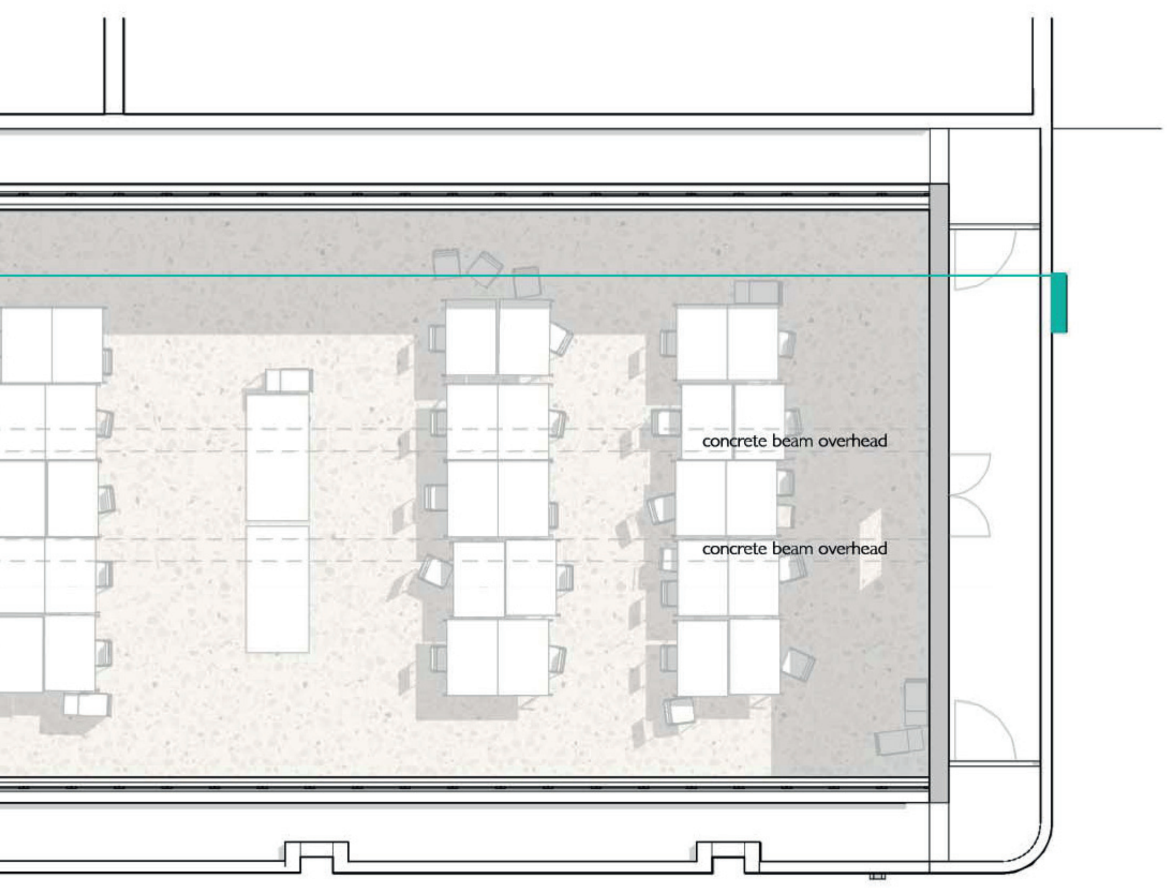
Mezzanine plan, scenario one & two

Mezzanine plan, scenario three

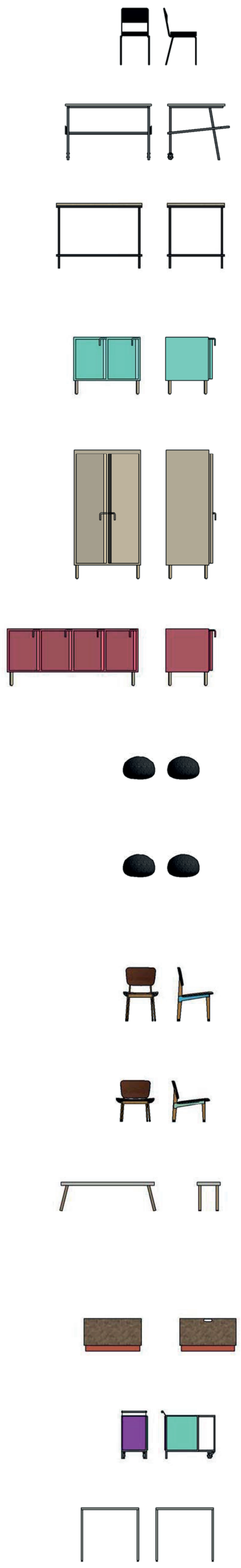
- Exhibition space
- Interior design studio space
- First year studio space
- Informal seating area/entertainment area
- Digital exhibition space
- Making lab







FURNITURE LEGEND:



F1 Existing studio chair

F2 Existing studio desk
DOKTER & MISSES

F3 Existing light tracing table

F4 Two door storage unit
DOKTER & MISSES
Colour: Mint green
RAL 6019

F5 Two door storage unit, tall
DOKTER & MISSES
Colour: Sand
RAL 7044

F6 Four door storage unit, tall
DOKTER & MISSES
Colour: Dusty Pink
RAL 3017

F7 300x500 mm Crochet pouffe
MR PRICE HOME
Colour: Burnt orange
Code: 6102016343001

F8 300x500 mm Cable knit pouffe
MR PRICE HOME
Colour: Natural
Code: 6102016343001

F9 Standard OH!Two chair
RAW STUDIOS
Colour: Brown and blue

F10 Low OH!Two chair
RAW STUDIOS
Colour: Brown and green

F11 1300x320x430 mm powder coated mild steel and ash timber easy bench
DOKTER AND MISSES
Colour: White, Code: ST001
With additional: magnetic upholstered cushion
Colour: Grey, Code: CS001

F12 400x800x800 mm custom stackable plinth as coffee table

F13 Existing credenza
DOKTER & MISSES
Assorted colours

F14 760x800x800 steel frame and MDF top work table

ELECTRICAL LEGEND:

E1 Double wall socket at height indicated above finished floor level
16A Slimline compact standard combined socket outlets 100x100mm
Combo socket switch on yoke as per CRABTREE
Colour: Black
Part number 6859/008
with Stainless steel coverplate
Part number: 6529/8

E2 Double wall socket surface mounted to underside of concrete overhang at height indicated above finished floor level
16A surface mounted combined socket outlets 100x100mm
Combo socket switch on yoke with surface mount box as per CRABTREE
Colour: White
Part number: 6859/008

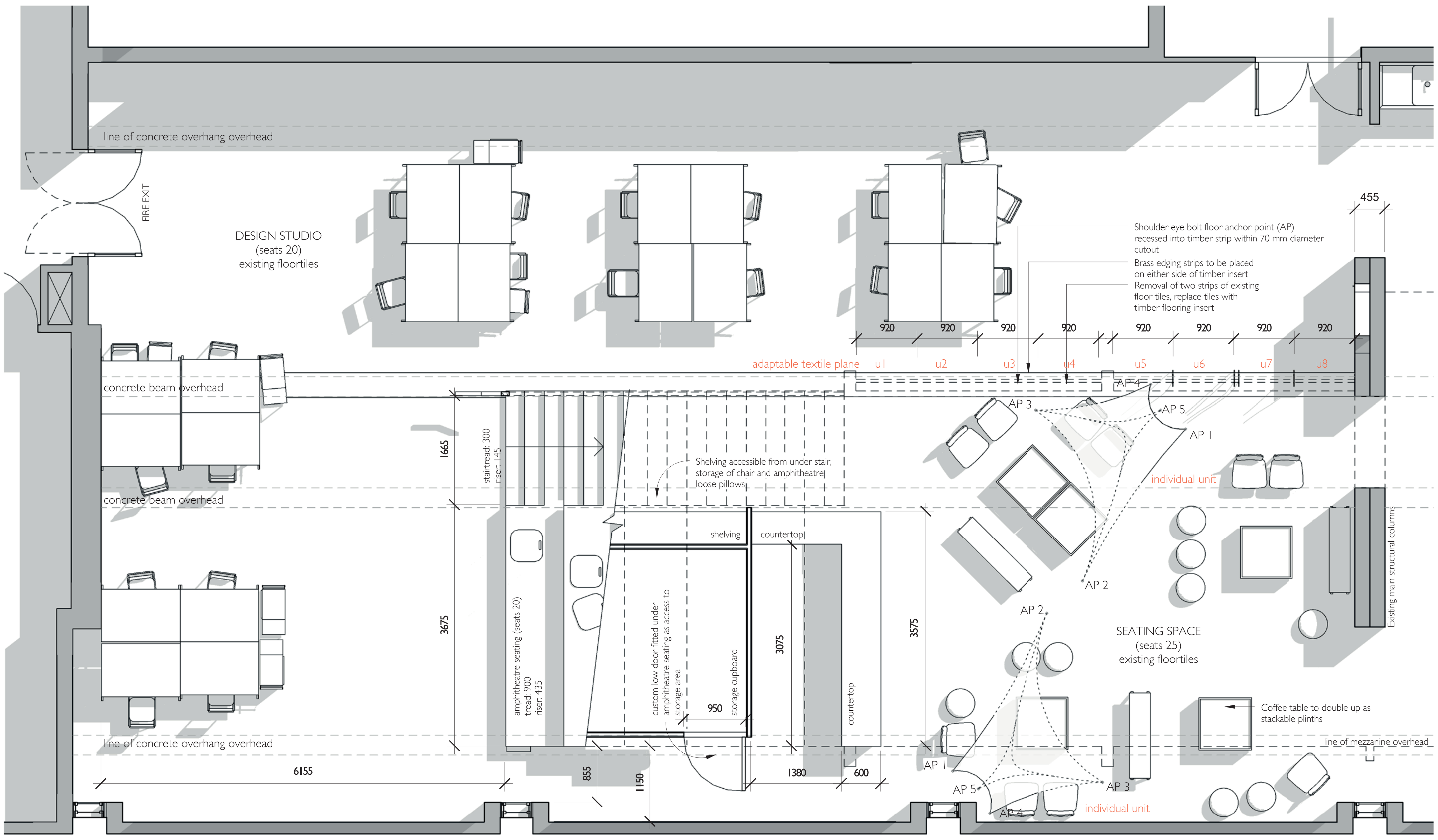
E3 55x90 mm Single compilation galvanised mild steel powerskirting to be mounted to underside of workdesk.
Powerskirting as per STRUTFAST
Finish: Matt
Colour: Umber grey, RAL 7010
Code: F802
with service outlet cover with gripclips as per CRABTREE

FIRE RETICULATION:

9kg Dry powder fire extinguisher 1/200 sq/m
Fire Hydrant 1/1000 sq/m
Fire Hose reel 1/500 sq/m
Fire Escape

callout plan scale 1:50

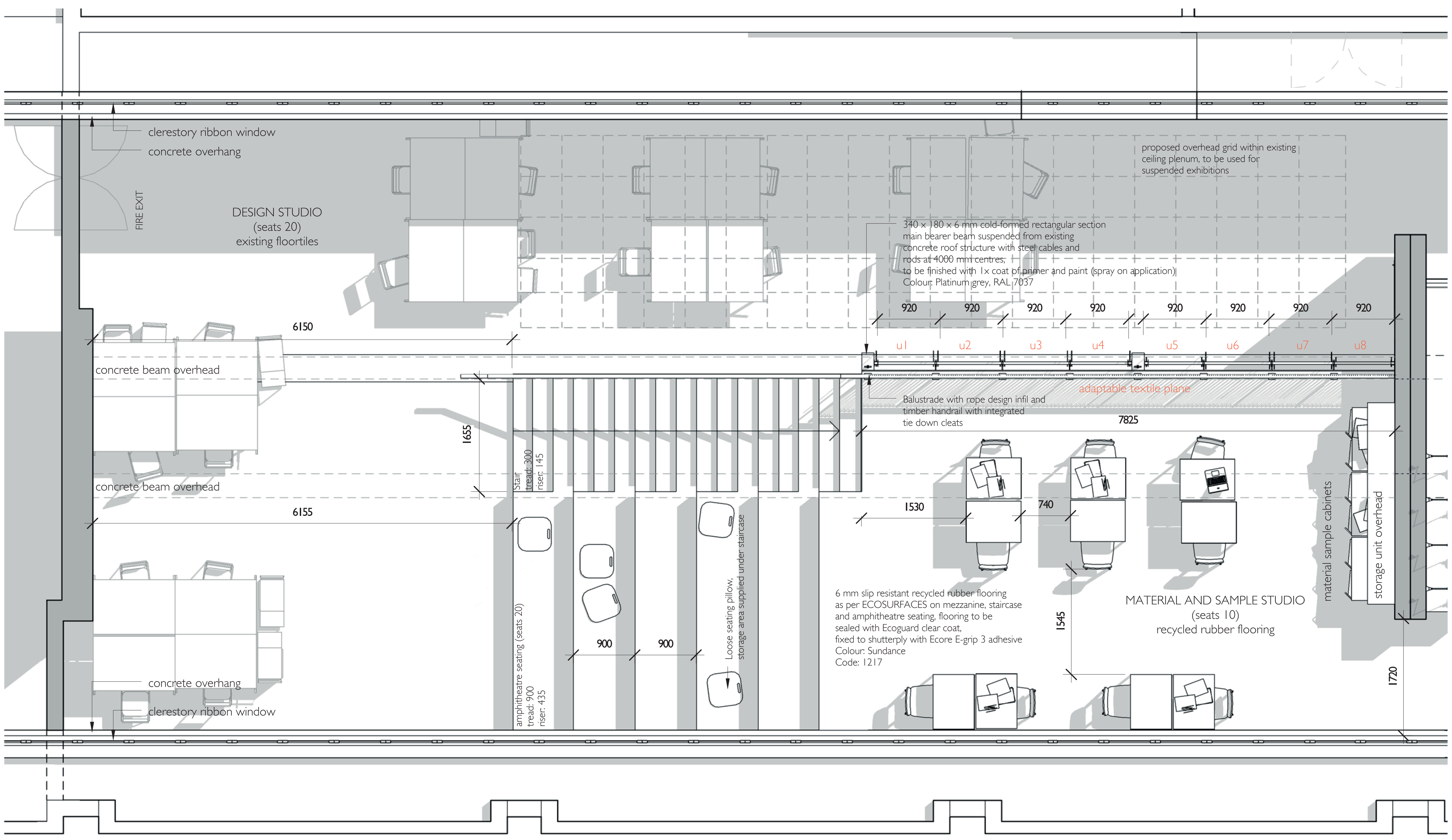
SCENARIO ONE & TWO



NORTH

Figure 5.70.

LEVEL 4 PLAN
STUDIO LAYOUT
SCALE 1:50



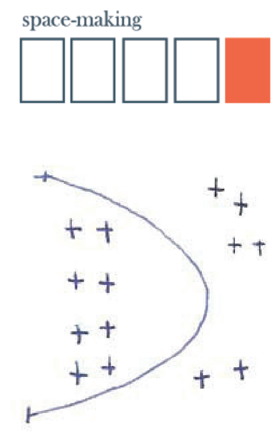
NORTH

Figure 5.71.

MEZZANINE PLAN
STUDIO LAYOUT
SCALE 1:50

plans scale 1:100

SCENARIO THREE



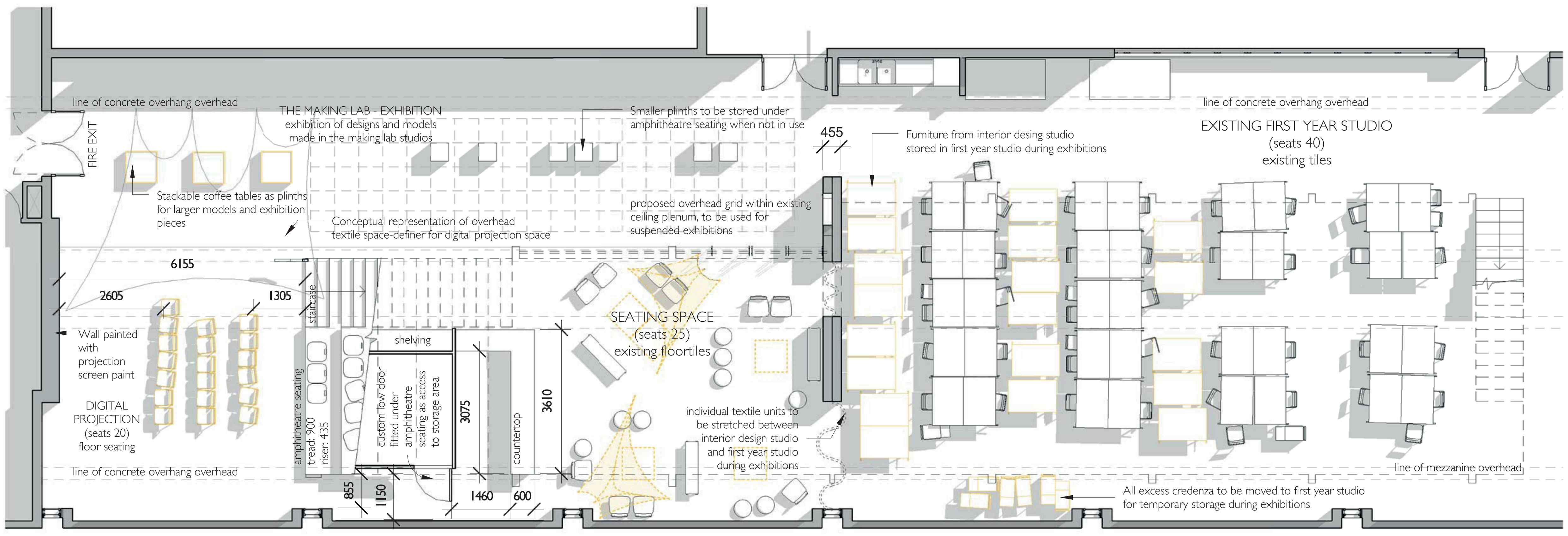


Figure 5.72.

NORTH

LEVEL 4 PLAN
EXHIBITION LAYOUT
SCALE 1:100

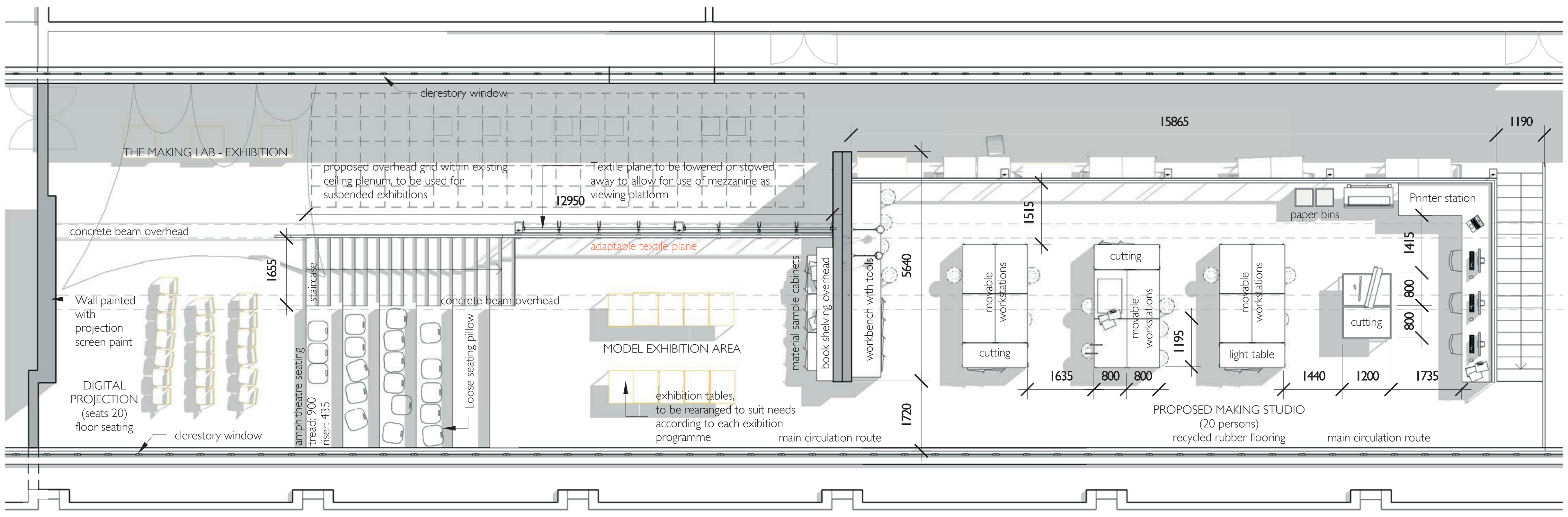


Figure 5.73.

NORTH

MEZZANINE PLAN
EXHIBITION LAYOUT
SCALE 1:100

FURNITURE USE LEGEND:

- Furniture moved to another position or location within the studio
- Furniture items used for secondary application within studio spaces (or stored as in the case of the existing interior design studio desks)
- Textile unit moved to another position or location within the studio
- Conceptual representation of textile for digital presentation

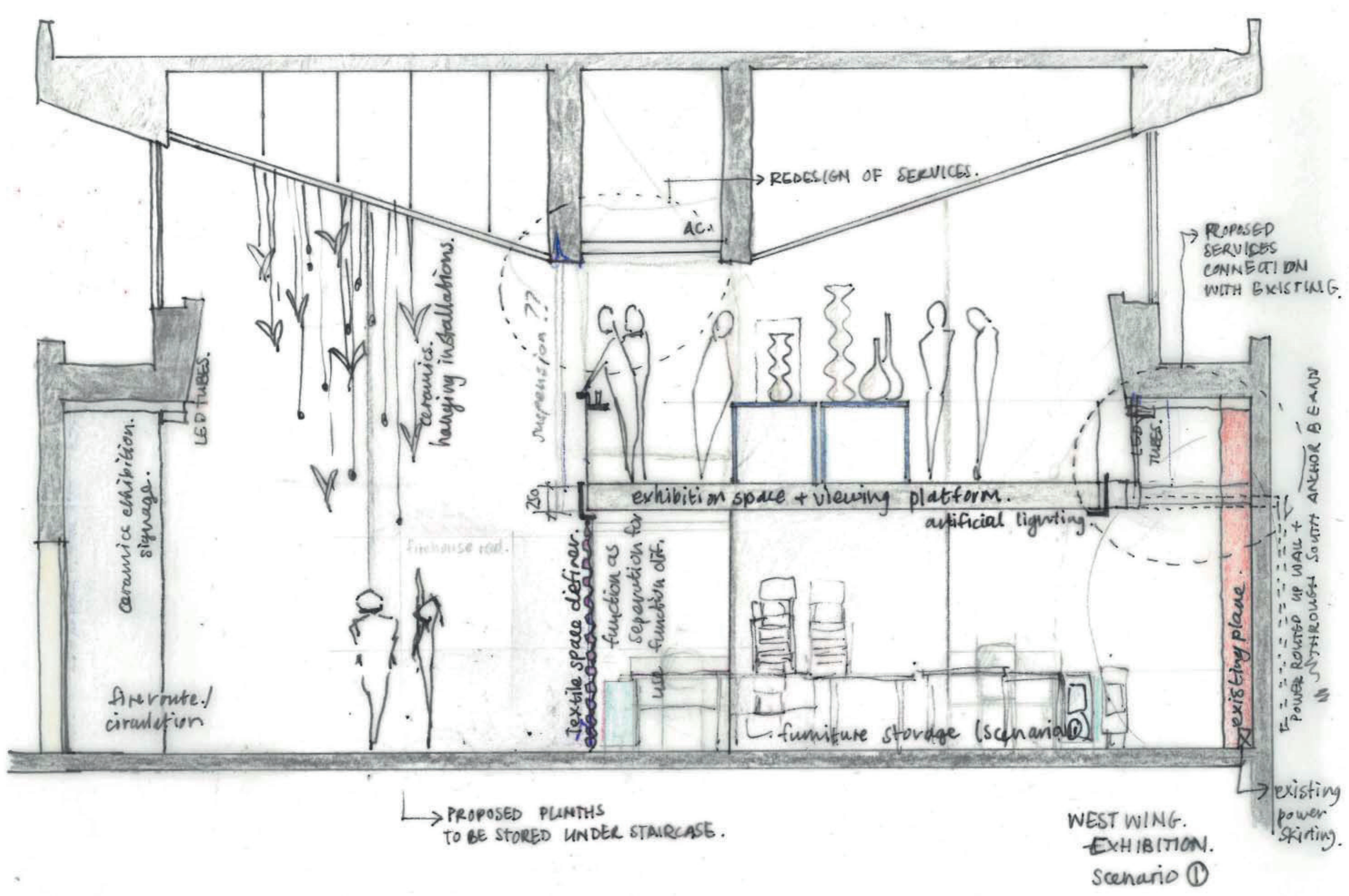
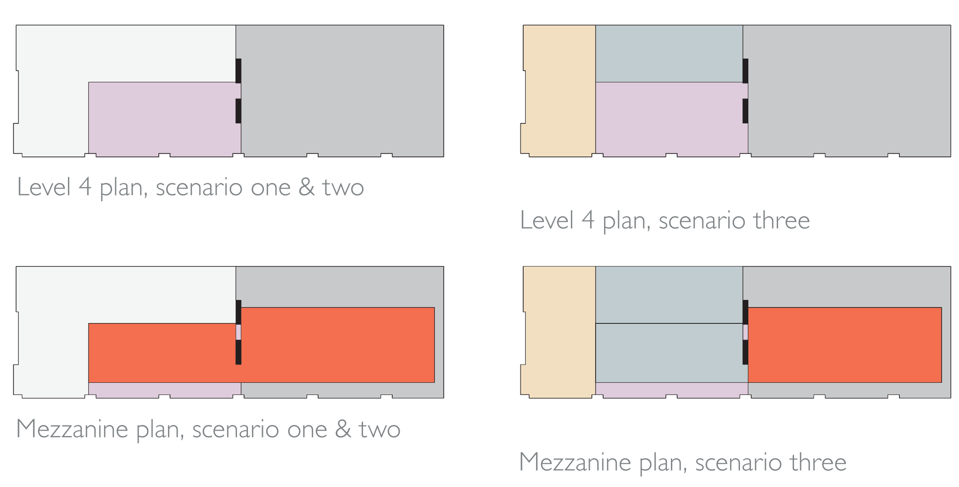


Figure 5.74.

SECTION DEVELOPMENT SKETCHES
EXHIBITION LAYOUT
SCALE 1:50

Figure 5.69. (duplicate)

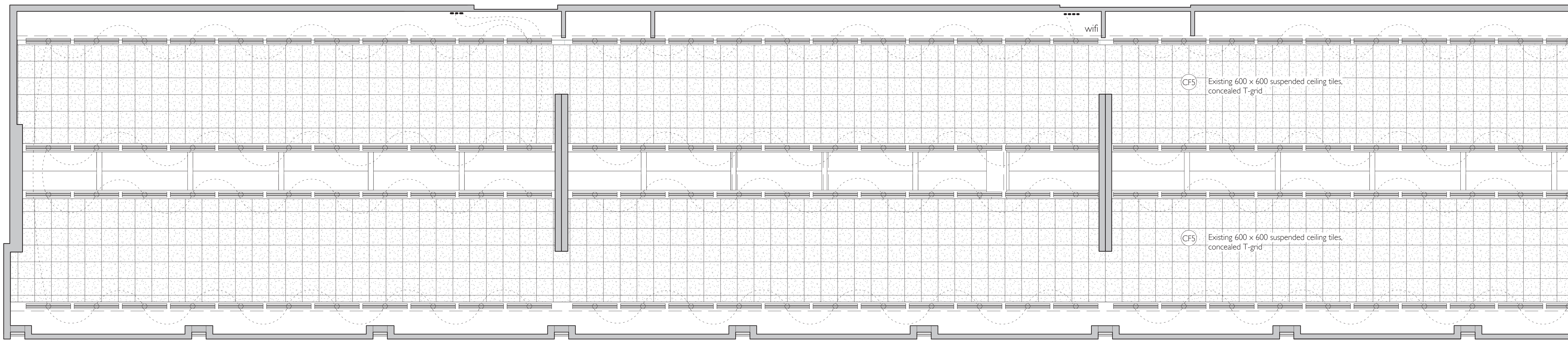
SPATIAL USE DIAGRAM (Duplicate, see poster 25)



- Exhibition space
- Interior design studio space
- First year studio space
- Informal seating area/entertainment area
- Digital exhibition space
- Making lab

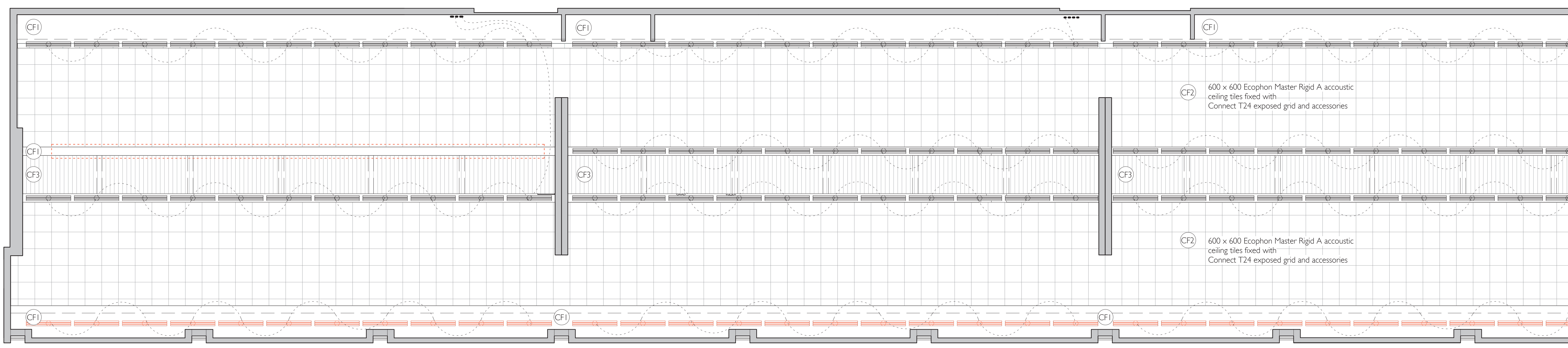
ceiling plans 1:100

LAYOUTS AND CALCULATIONS



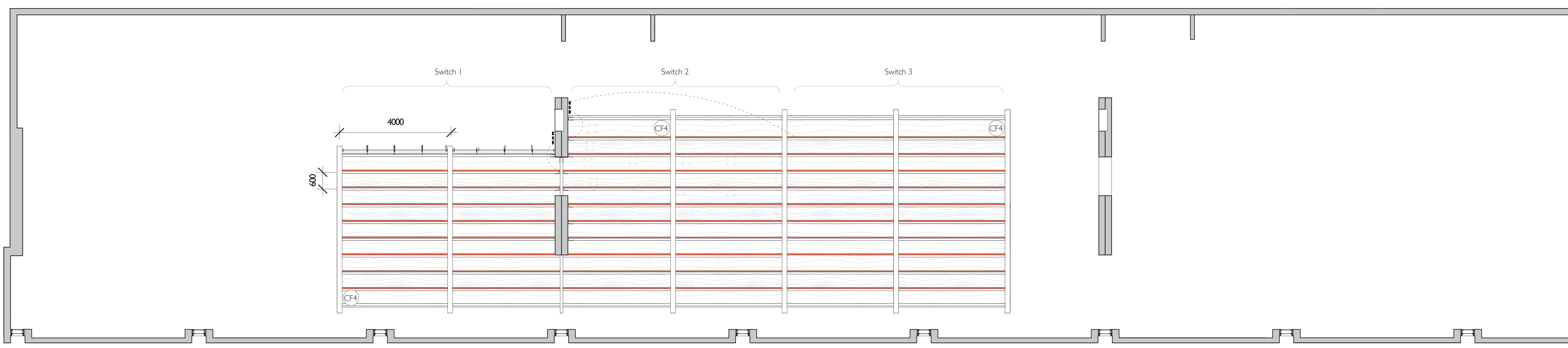
NORTH

Figure 5.75.
EXISTING MAIN STUDIO CEILING PLAN
SCALE 1:100



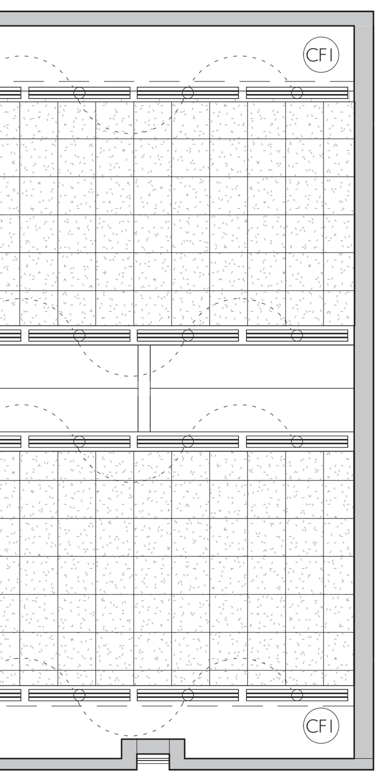
NORTH

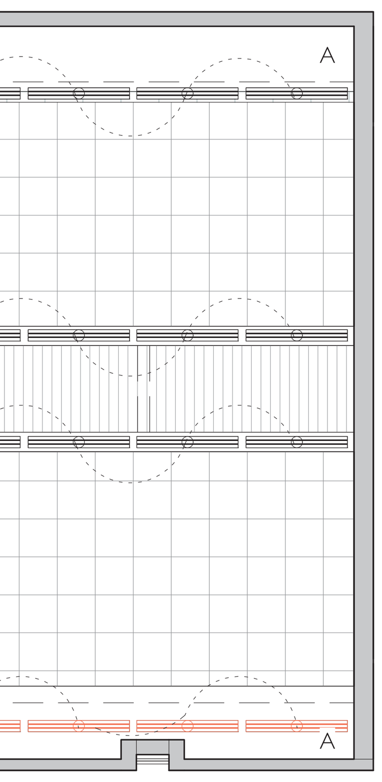
Figure 5.76.
NEW MAIN STUDIO CEILING PLAN
SCALE 1:100



NORTH

Figure 5.77.
NEW MEZZANINE CEILING PLAN
SCALE 1:100





CEILING LEGEND:

CF1 — Underside of existing concrete soffit, all holes to be filled and sanded. Surface to be skimmed with rhinolite and prepared for painting. Underside of soffit to be painted with PLASCON, waterbased, 'one coat ceiling paint', Ultra matt finish
Colour: Brilliant white

CF2 — Existing 600 x 600 suspended ceiling tiles with concealed T-grid hangers TO BE DEMOLISHED and replaced with NEW 600 x 600 Ecophon Master Rigid A accoustic ceiling tiles fixed with Connect T24 exposed grid and accessories

CF3 — New alluminium aircon directional fins to be installed to conceal existing airconditioning ducts

CF4 — 16 mm plywood sealed with WOODCOTE water-based, quick dry varnish as per MIDAS plywood ceiling to be sealed with a water-based quick dry varnish.

CF5 — Existing 600 x 600 suspended ceiling tiles with concealed T-grid hangers TO BE DEMOLISHED.

LIGHTING LEGEND:

Existing luminaires to be removed permanently

Existing luminaires to be cleaned and lamps to be replaced where needed with 58W "T8" Lumilux lamps (L58 W/840) as per OSRAM

Existing luminaires to be removed from soffit and moved back 700 mm, toward the Southern interior wall

90 x 100 continuous surface mounted LED luminaire as per REGENT to be fixed onto underside of plywood. Luminaire to be fixed against flat end of lipped channel as indicated on plan. Luminaire to be fitted with 24W/m, 230V, single LED strip light as per OSRAM

Dimmer switch, one way, with Crabtree classic range light cover Stainless steel cover plates as per CRABTREE

Table 5.9.

LIGHTING CALCULATION:

	Symbol	Luminaire specification	Lamp specification	Quantity (luminaire x lamp)	Luminous flux	Total Watt	**Total luminous flux**	Efficacy (lumen/watt)
Existing		Surface mounted fluorescent luminaire with reflectors. Powder coated white	58 W "T8" Light colour 840 [cool white] [LUMILUX L58 W/840] by OSRAM	140 x 2	5200 lm	58 W	**1456000**	90 lm/W
Adjusted existing		Surface mounted fluorescent luminaire with reflectors of which **11 luminaires to be removed** (see new studio ceiling plan) Powder coated white	58 W "T8" Light colour 840 [cool white] [LUMILUX L58 W/840] by OSRAM	129 x 2	5200 lm	58 W	**1341600**	90 lm/W
New		90 x 100 continuous surface mounted LED, Charcoal grey (CG) [Linear Maxi surface] by Regent Lighting	24 W/m single LED strip, 4000 K, Dimmable by OSRAM	264 m	2420 lm/m	24 W/m	**638880**	100 lm/W

	Number of lamps	lumen per lamp	Luminous flux [lumens]	Total luminous flux [lumens]	Utilization Factor*	Maintenance Factor*	Working plane area [m ^{2}]	**Average illumination [lux]**
Existing	280	90	5200	1456000	0.4	0.5	708	**411**
Adjusted existing	258	90	5200	1341600	0.4	0.5	708	**378**
New	264	100	2420	638880	0.45	0.27	150	**517**

Existing : Room Index (RI) =W/2H
=11580/2(3975)
=1.4
UF =0.4

MF = LLMF x LMF x RSMF x LSF
=(0.90)(0.82)(0.69)(0.99)
=0.5

New: Room Index (RI) =W/2H
=7295/2(1835)
=1.98
UF = 0.45

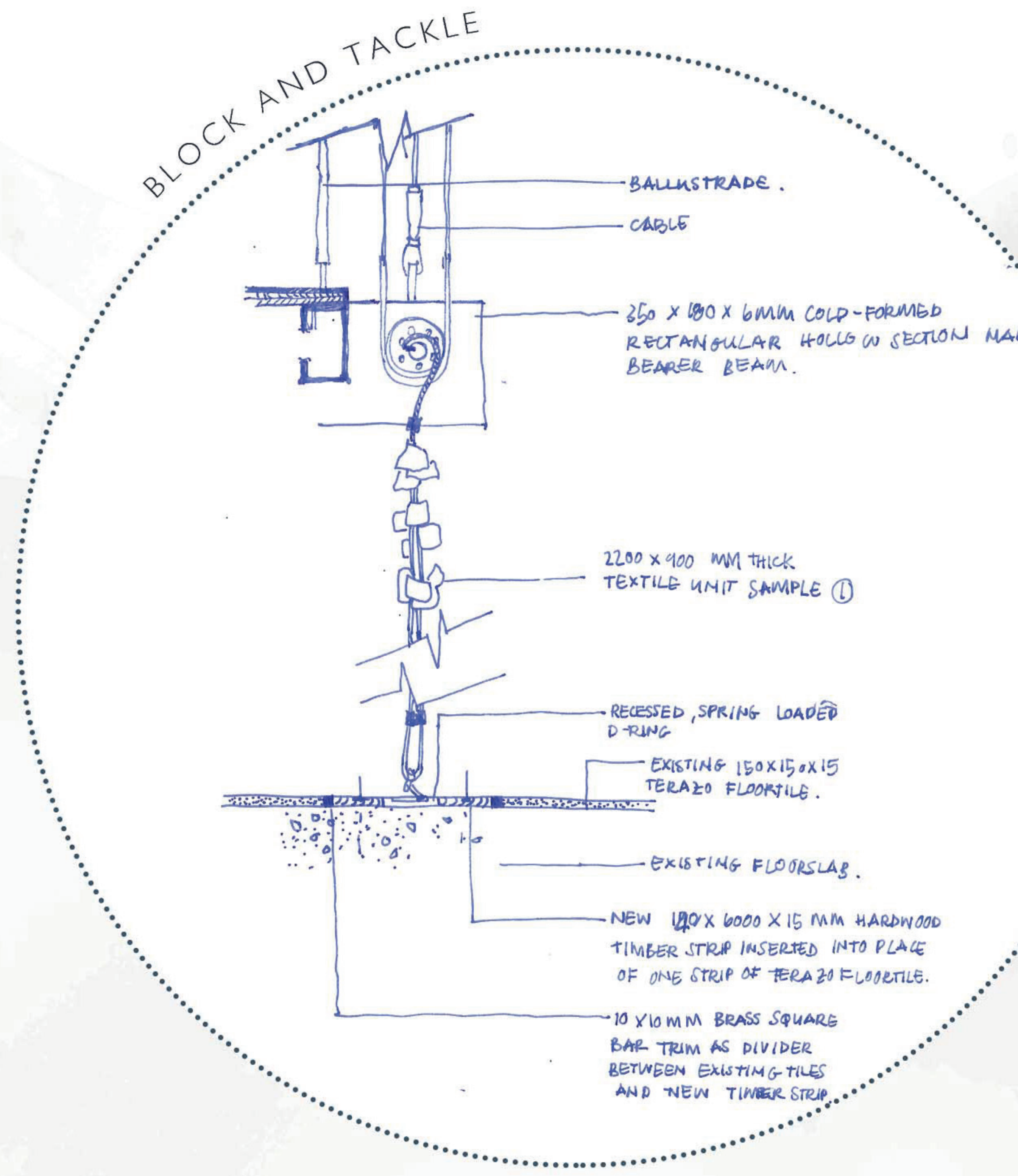
MF = LLMF* x LMF x RSMF x LSF*
=(0.7)(0.82)(0.69)(0.7)
=0.27

*LLMF and LSF for LED strip lighting, information not available. Values used for calculation taken from similar lamp type to allow for calculation.

interior elevation 1: 20

SCENARIO ONE & TWO

MASS VERSUS PERMEABILITY



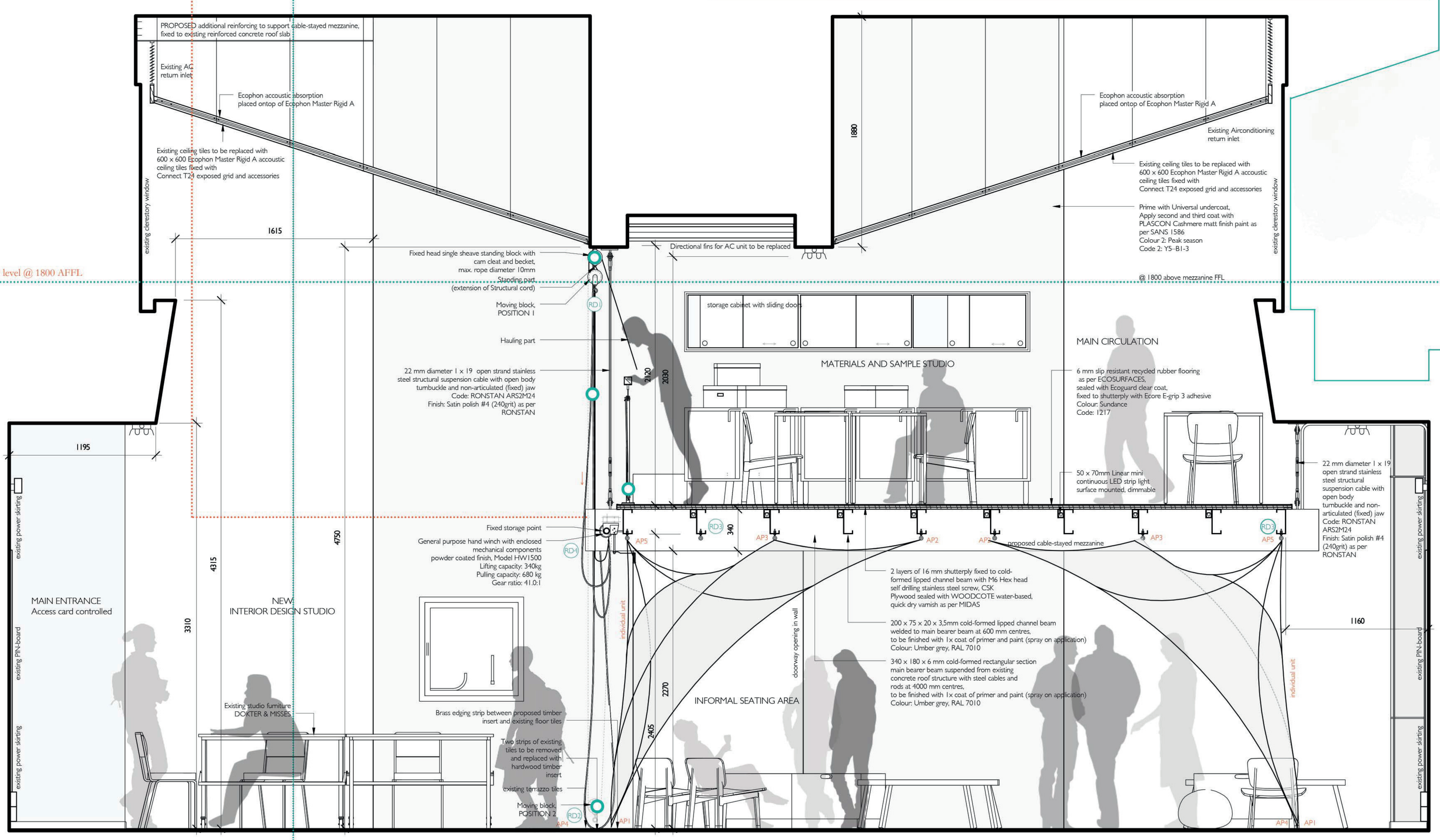
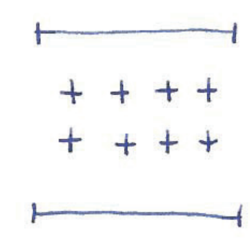
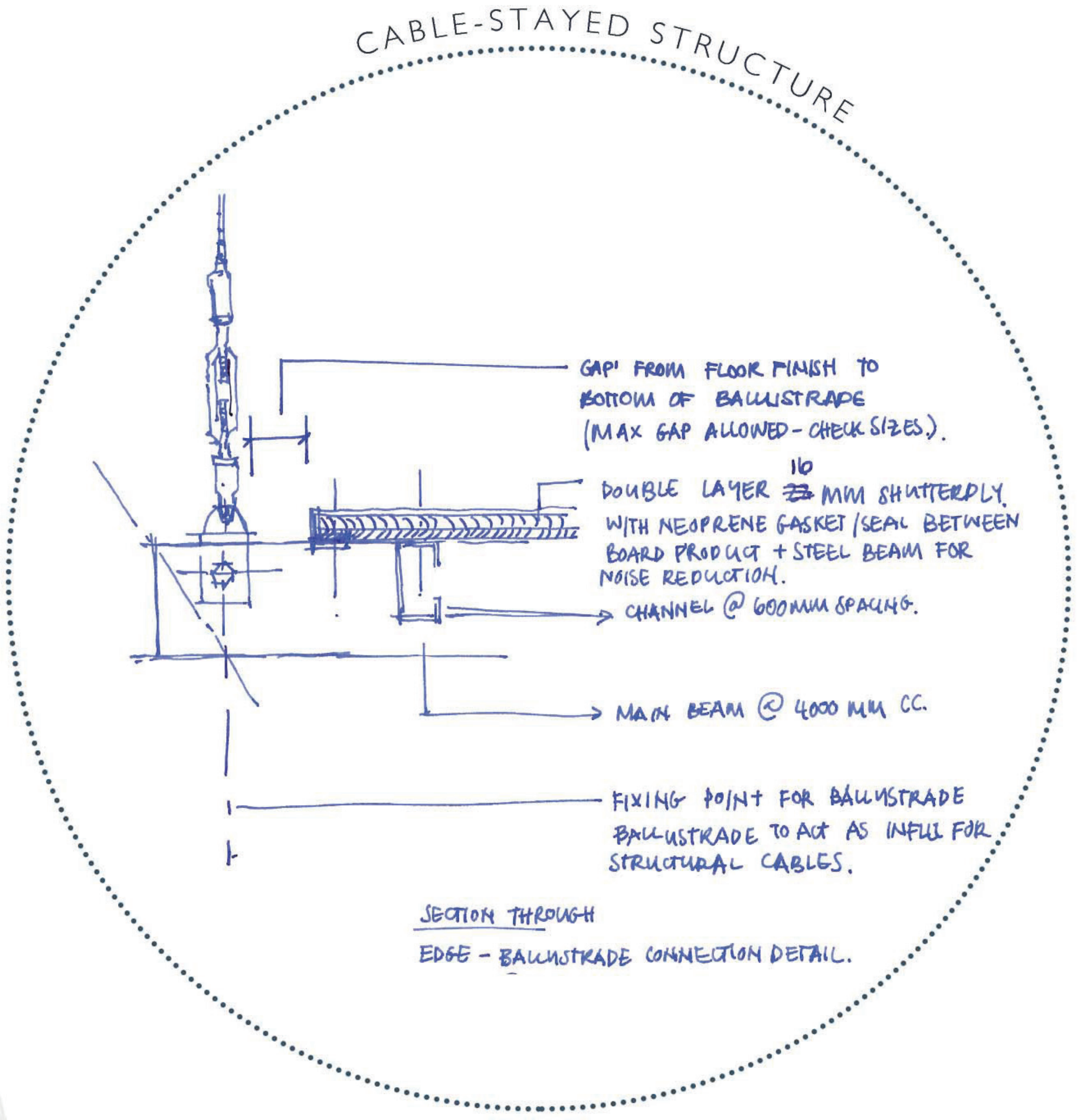


Figure 5.78.

SECTION 1 - SCENARIO ONE & TWO
WITH DETAIL SKETCHES
SCALE 1:20

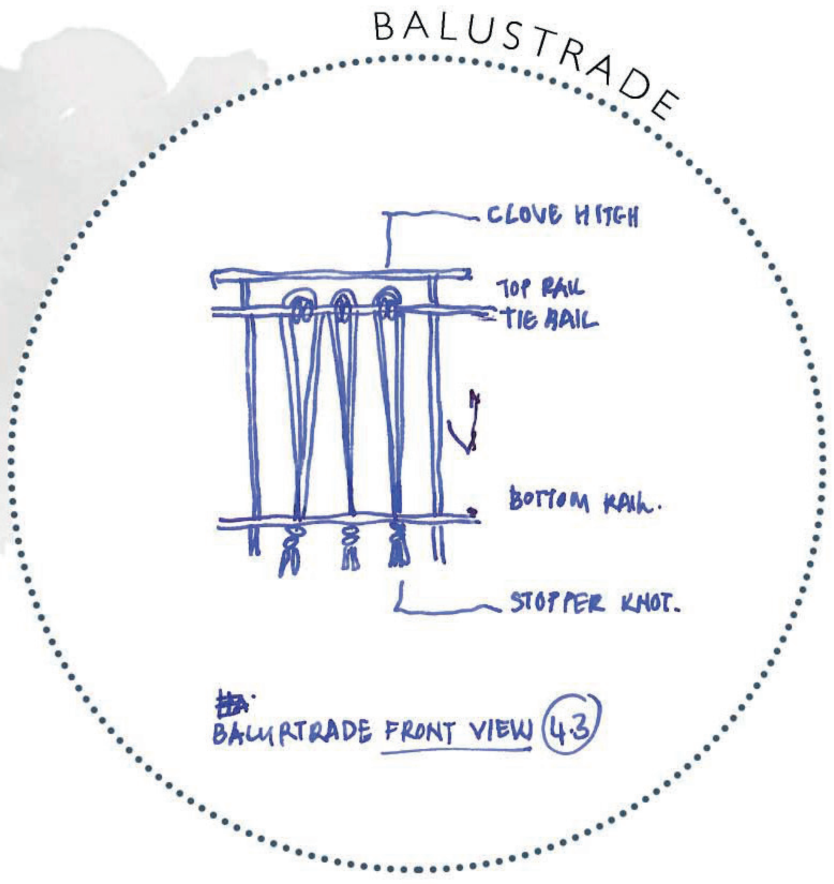


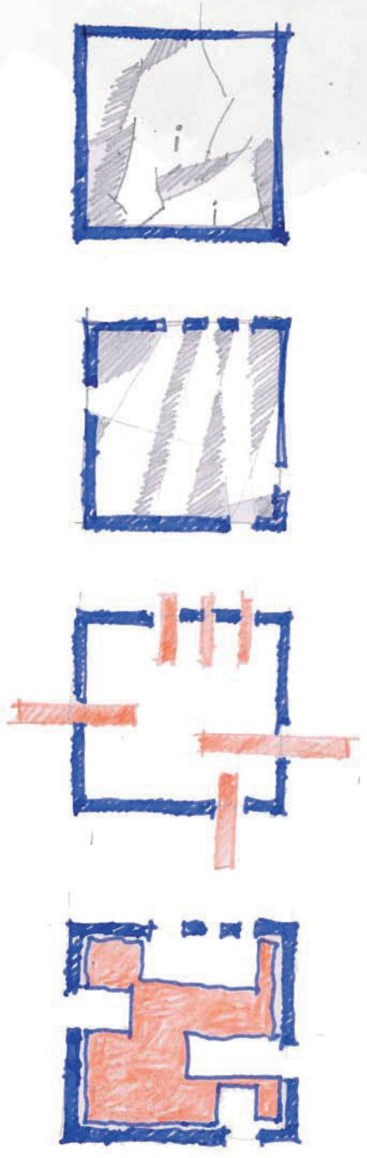
CABLE-STAYED STRUCTURE

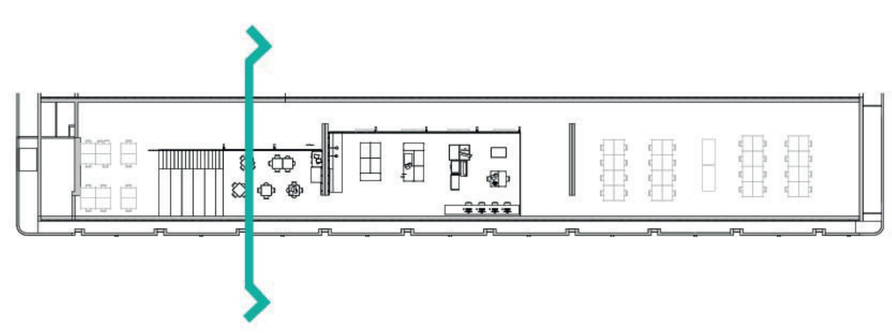


TEXTILE UNITS

BALUSTRADE







cable-stayed structure

DEVELOPMENT OF STRUCTURE

5.10.1.
DEVELOPMENT OF CABLE-STAYED STRUCTURE

This mezzanine structure is not a textile space-defining element in itself, but assists in the making of space. With textile space-making in mind, the mezzanine structure is designed to be as lightweight as possible. The mezzanine structure is also designed to appear as permeable as possible. Connection and fixing details are designed to remain exposed. Similar to the way in which a knot simply is what it is, revealing its structure.

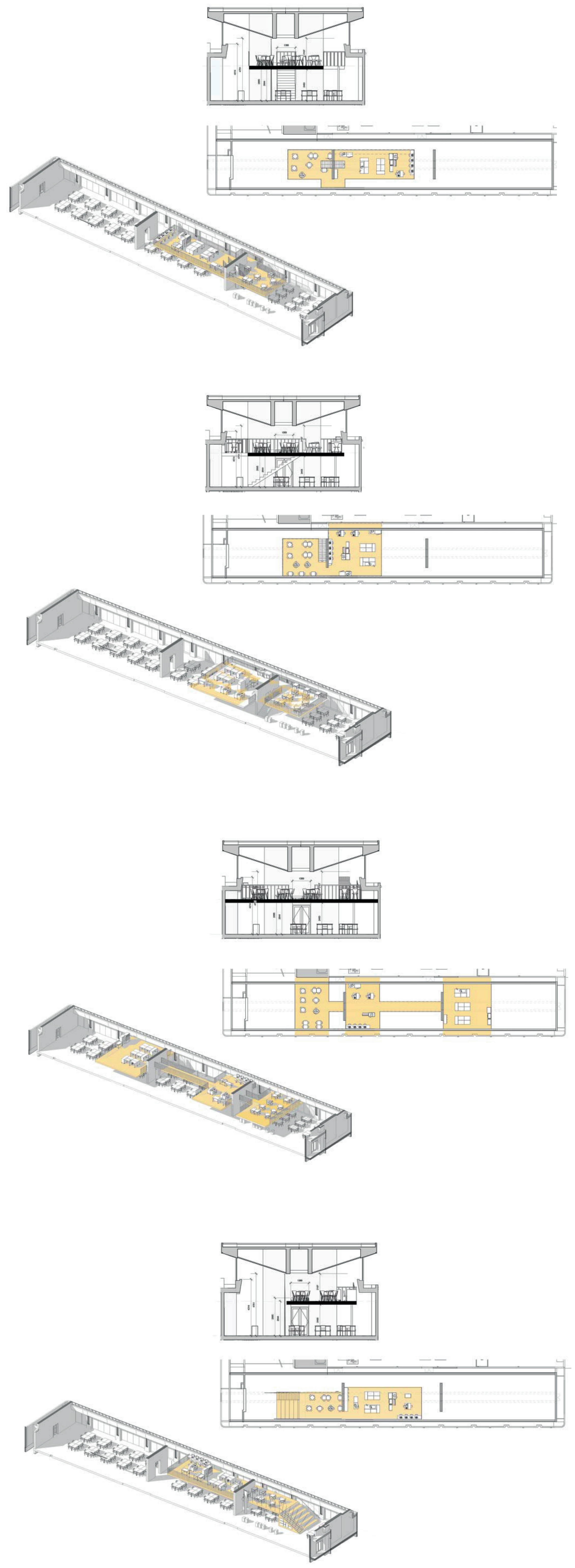
The existing interior volume consists of a virtually column free floor area. Due to the clerestory windows within the space, the concrete roof structure seems as if it floats. Two main columns or walls within the interior space act as the structure for the roof. The newly proposed cable-stayed mezzanine is suspended from the existing structure by means of cables. In this manner the mezzanine does not make use of any additional columns, allowing for an open floorplan wihtout obstruction.

Figure 5.79. Development of mezzanine form (right) and Figure 5.80. Sectional perspective of final form (below), shows a selection of images representing some of the various layouts, sizes and forms explored during the design of the mezzanine.

The final form of the mezzanine was influenced by the following factors:

- natural light
- meeting points between existing structure and proposed mezzanine
- structural fixing points for suspension cables
- existing studio layouts (in terms of student allocation)
- proposed programme and function of the mezzanine
- maximum potential for textile intervention

The main factor that influenced the final form of the mezzanine, was the fact that the test site for intervention merely acts as a space to test the spatial manifestation of the hand-knotted textile. This means that the mezzanine structure's main feature is to ensure maximum testing potential. The final form does not necessarliy represent the 'best' layout in terms of movement and placement of furniture, but allows for maximum utilisation concerning the textile unit.



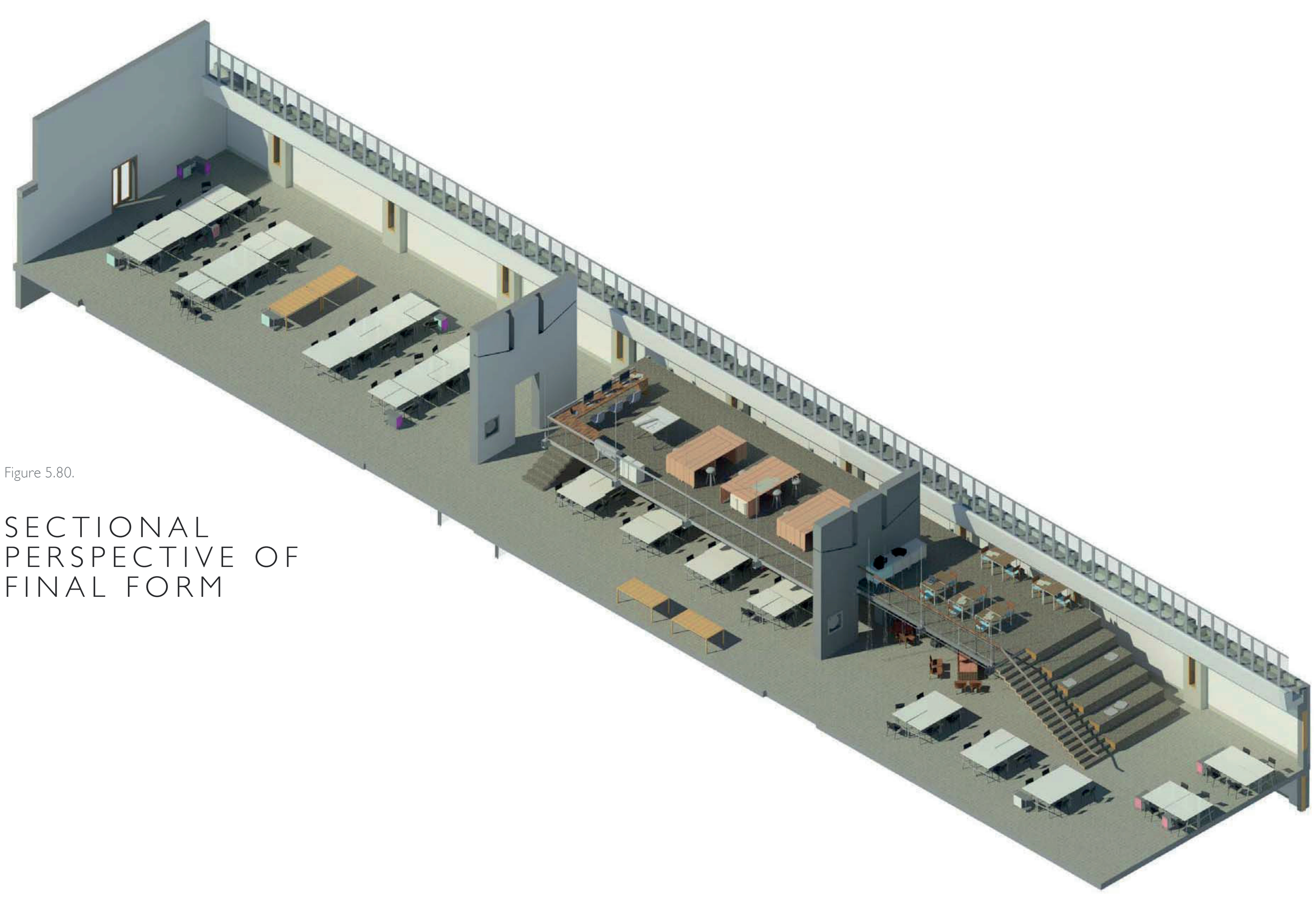


Figure 5.80.

SECTIONAL PERSPECTIVE OF FINAL FORM

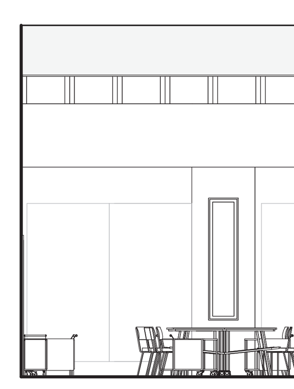


Figure 5.83.

STUDIO IN
SCALE 1:10

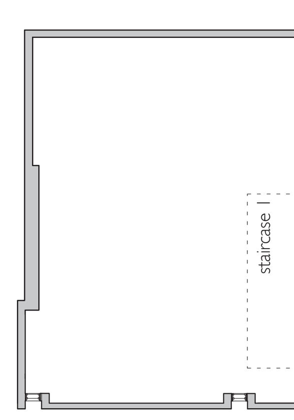


Figure 5.84.

MEZZANIN
SCALE 1:20

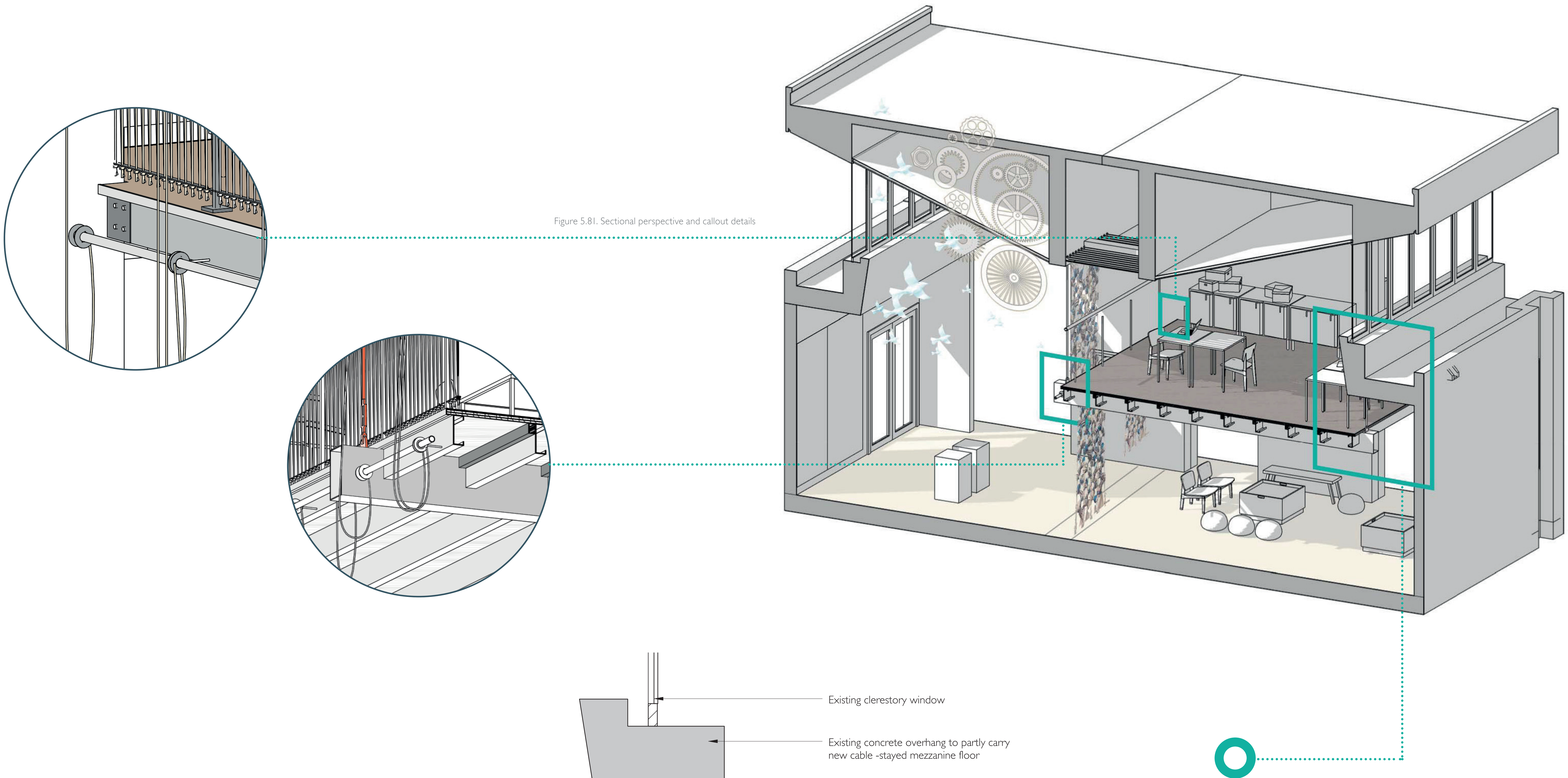


Figure 5.81. Sectional perspective and callout details

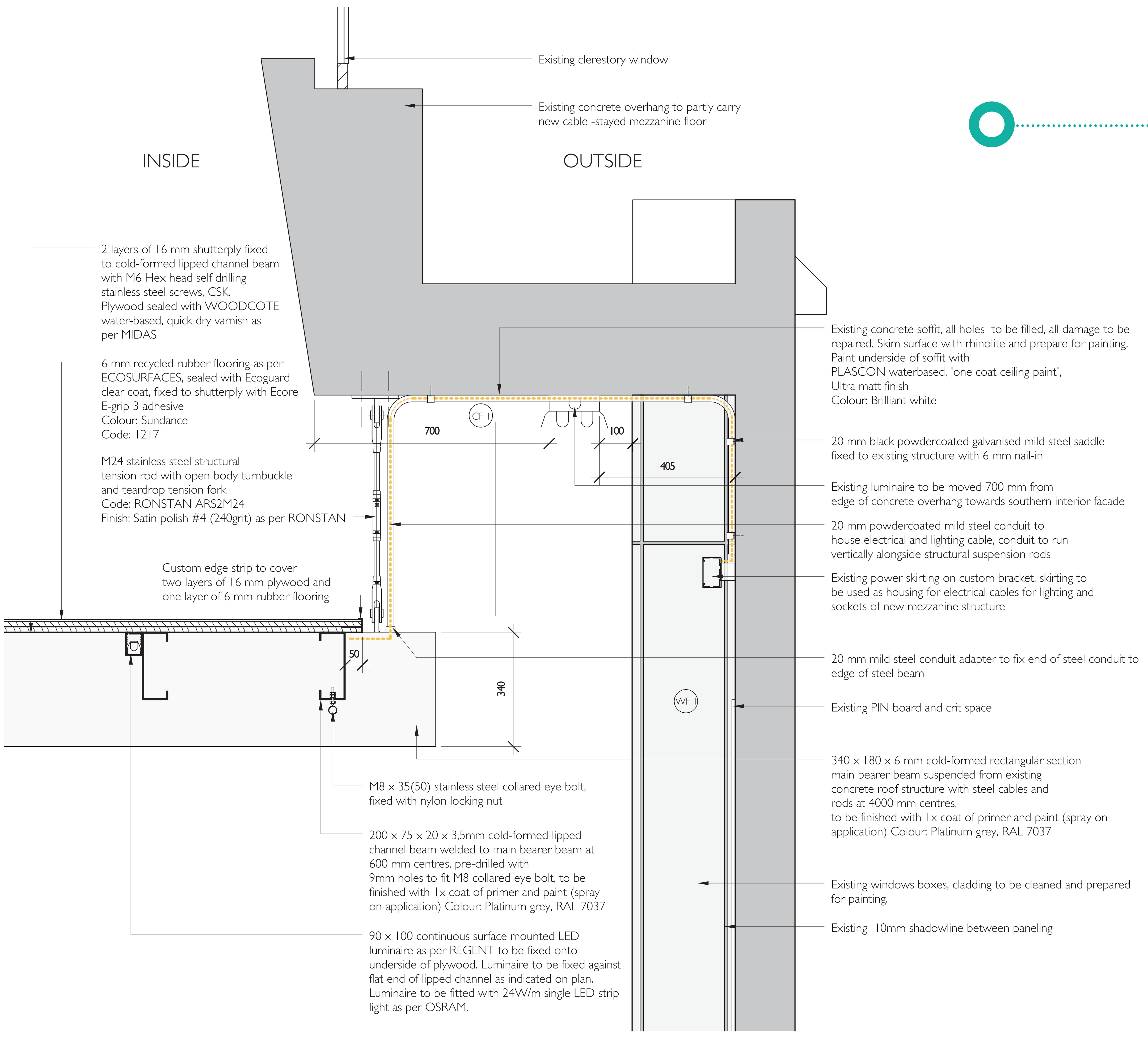


Figure 5.79.

DEVELOPMENT OF MEZZANINE FORM

(immediately left and below)

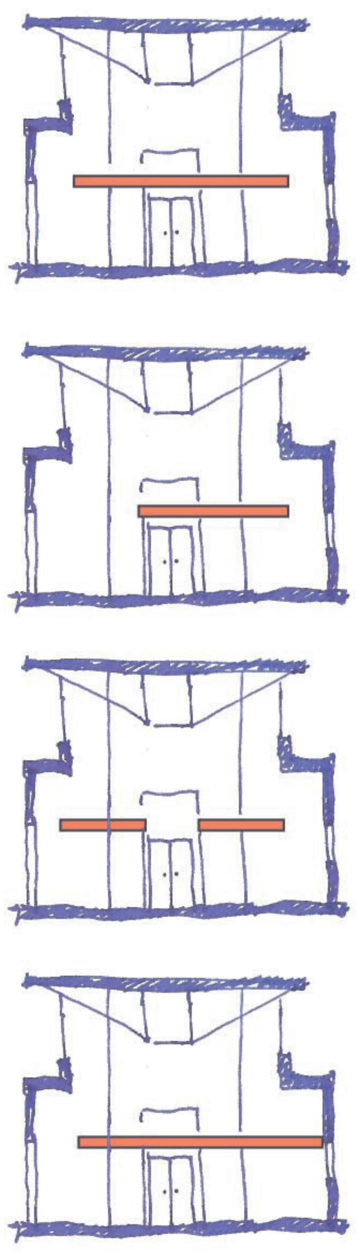
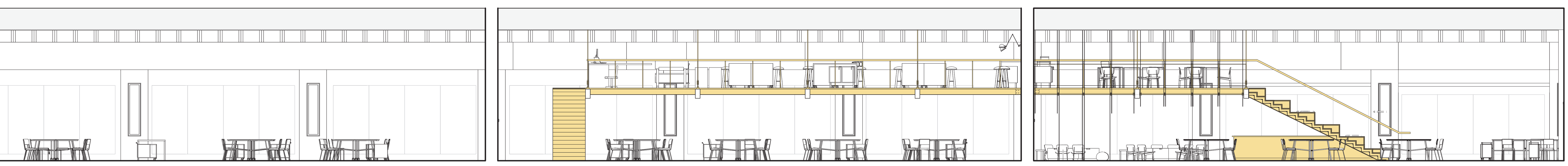
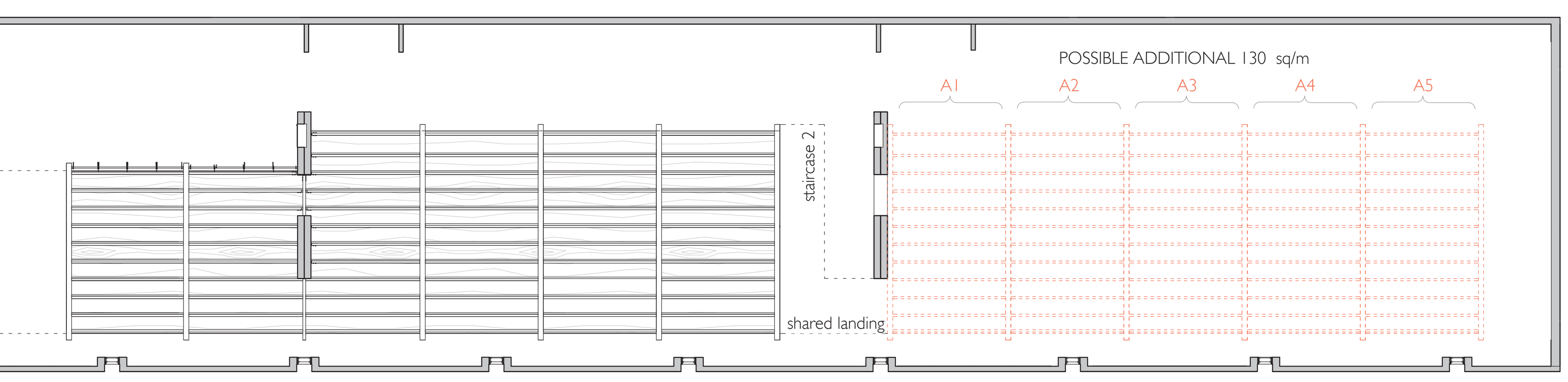


Figure 5.82.

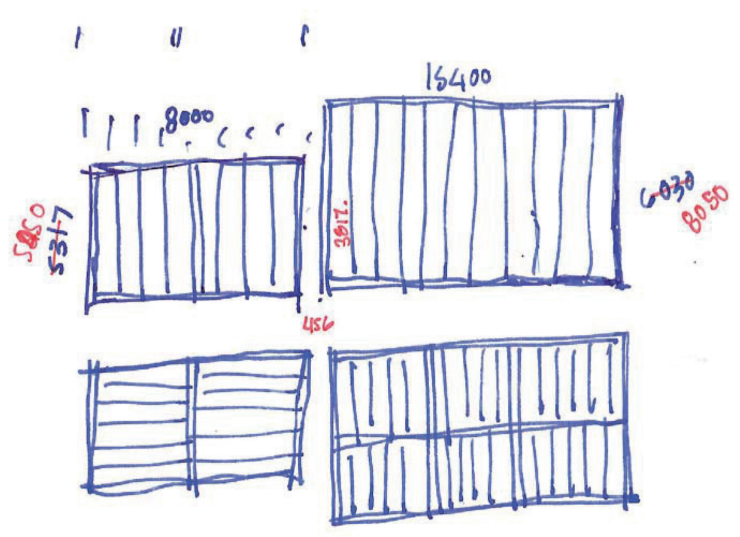
CABLE STAYED-STRUCTURE, EDGE DETAIL
SCALE 1:10

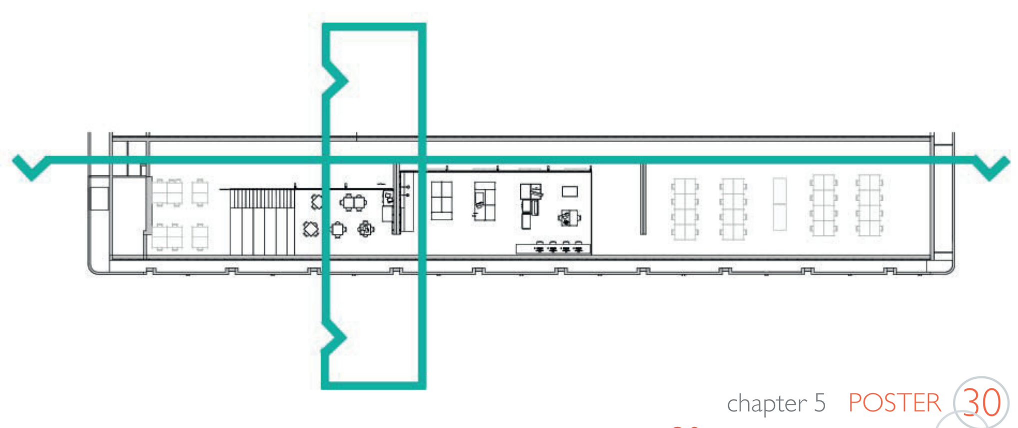


ERIOR ELEVATION



EXTENSION GRID LAYOUT





textile space-defining elements

INTERIOR ELEVATION

5.10.2.
DEVELOPMENT OF TEXTILE UNIT

The textile unit specifically designed for Scenario 2 - division of individual workspaces, acts as the base unit for all the Scenario's. The textile unit has a set of parameters that are adjusted during the fabrication process to suit the parameters and requirements for each of the scenarios. See poster 33 for the fabrication process on page 88.

Further each of the textile units work in conjunction with a rigging system. These rigging systems are what connect the 'soft' and the 'hard' elements. Here the soft elements or textile space-defining elements are the alternative space definers and the hard elements such as the mezzanine and the existing testing site for intervention, act as the traditional space definers. These rigging systems are discussed in greater depth on poster 32 on page 84.

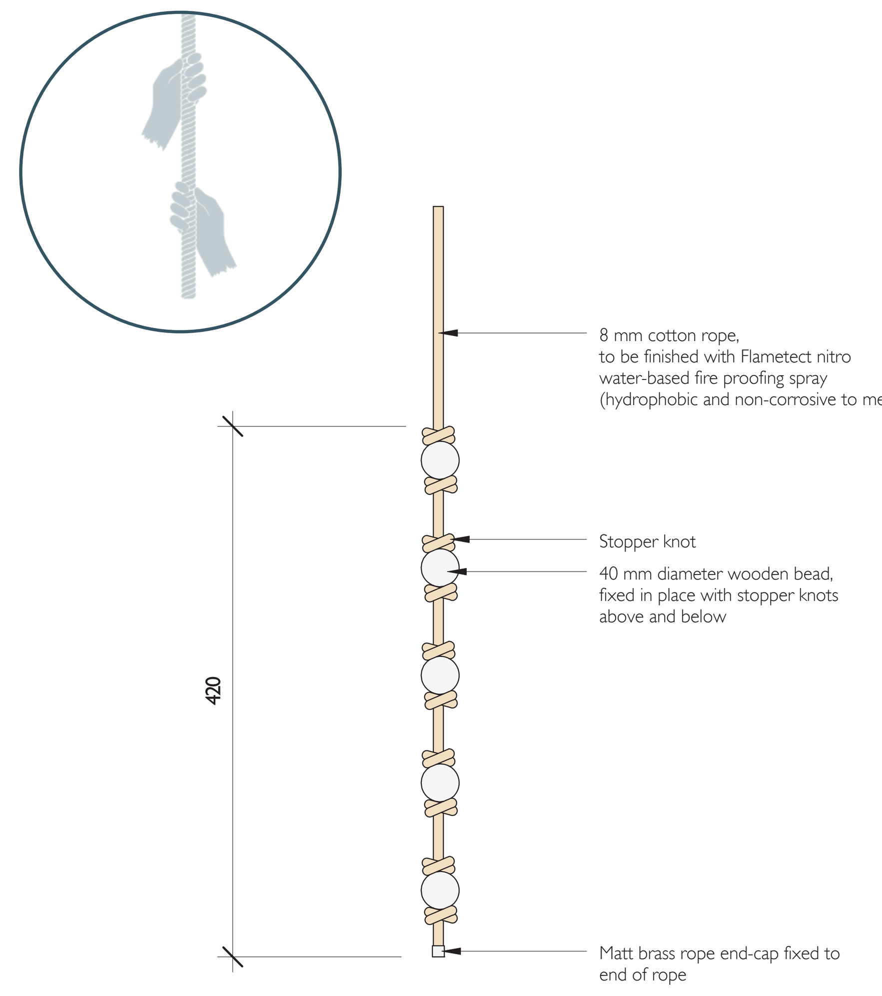


Figure 5.88.

ROPE SALLY
SCALE 1:5

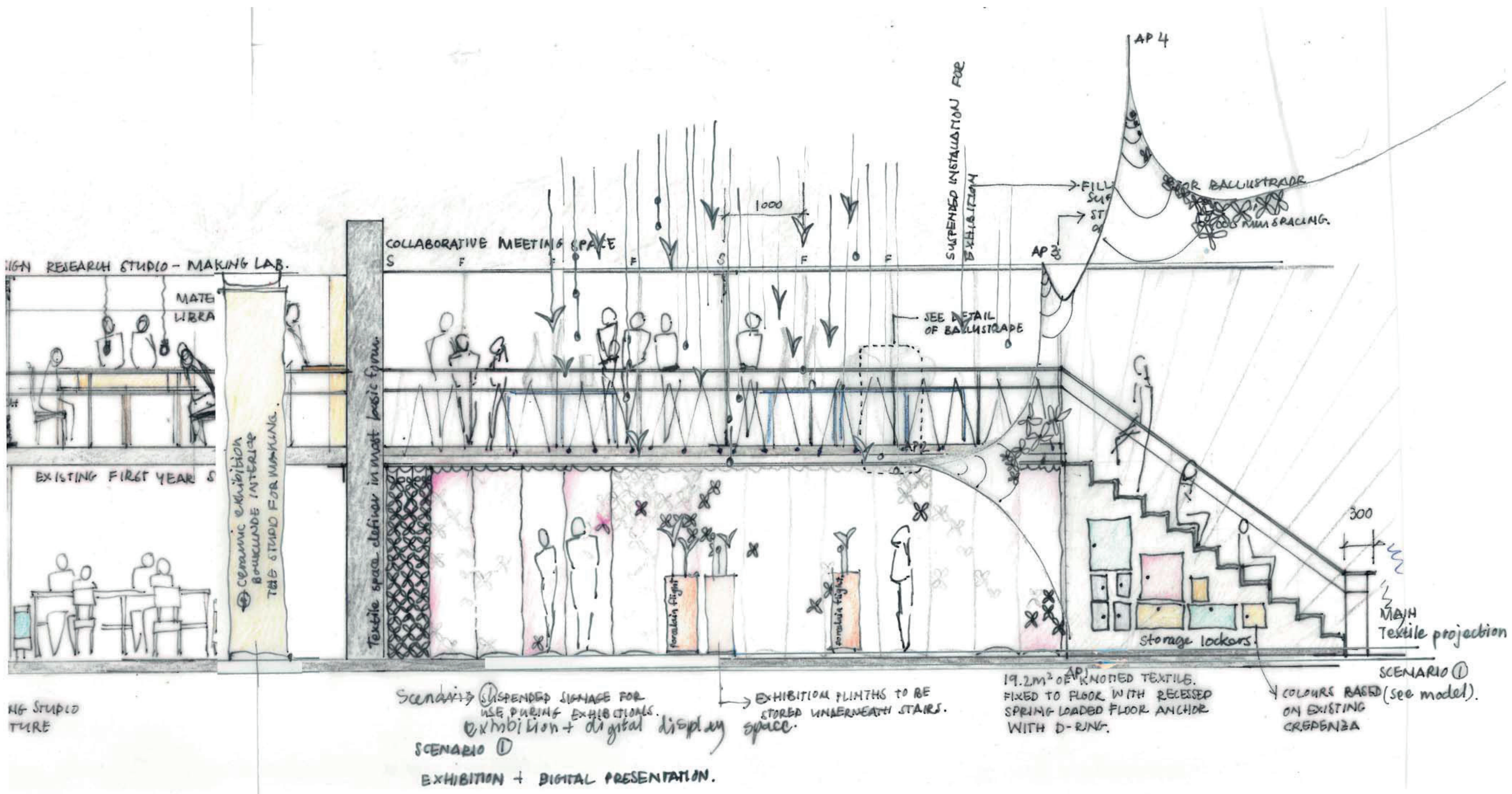


Figure 5.85.

SECTION DEVELOPMENT SKETCHES
SCALE 1:100

"making lab" exhibition

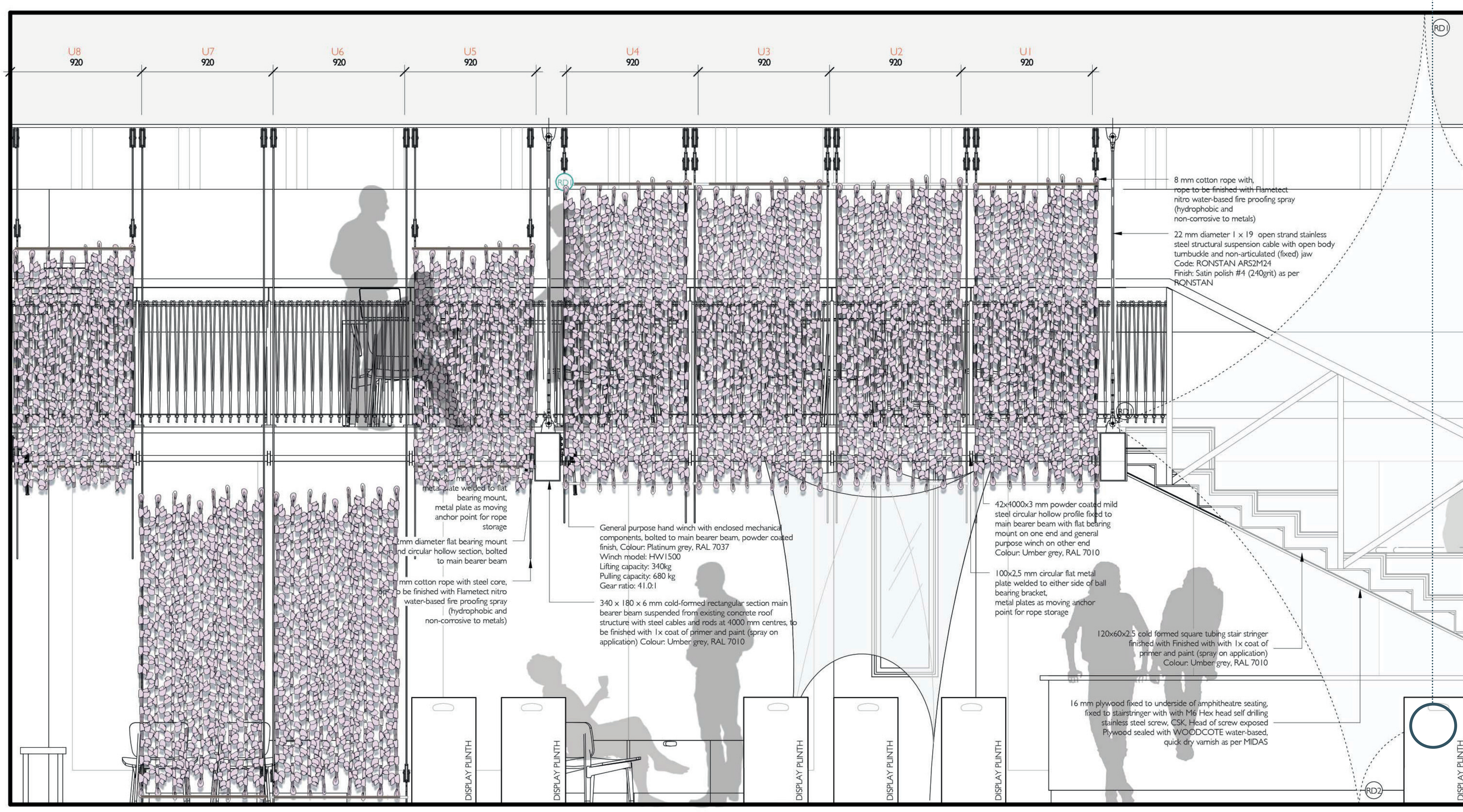


Figure 5.86.

SECTION 2 - SCENARIO ONE, TWO & THREE
SCALE 1:20

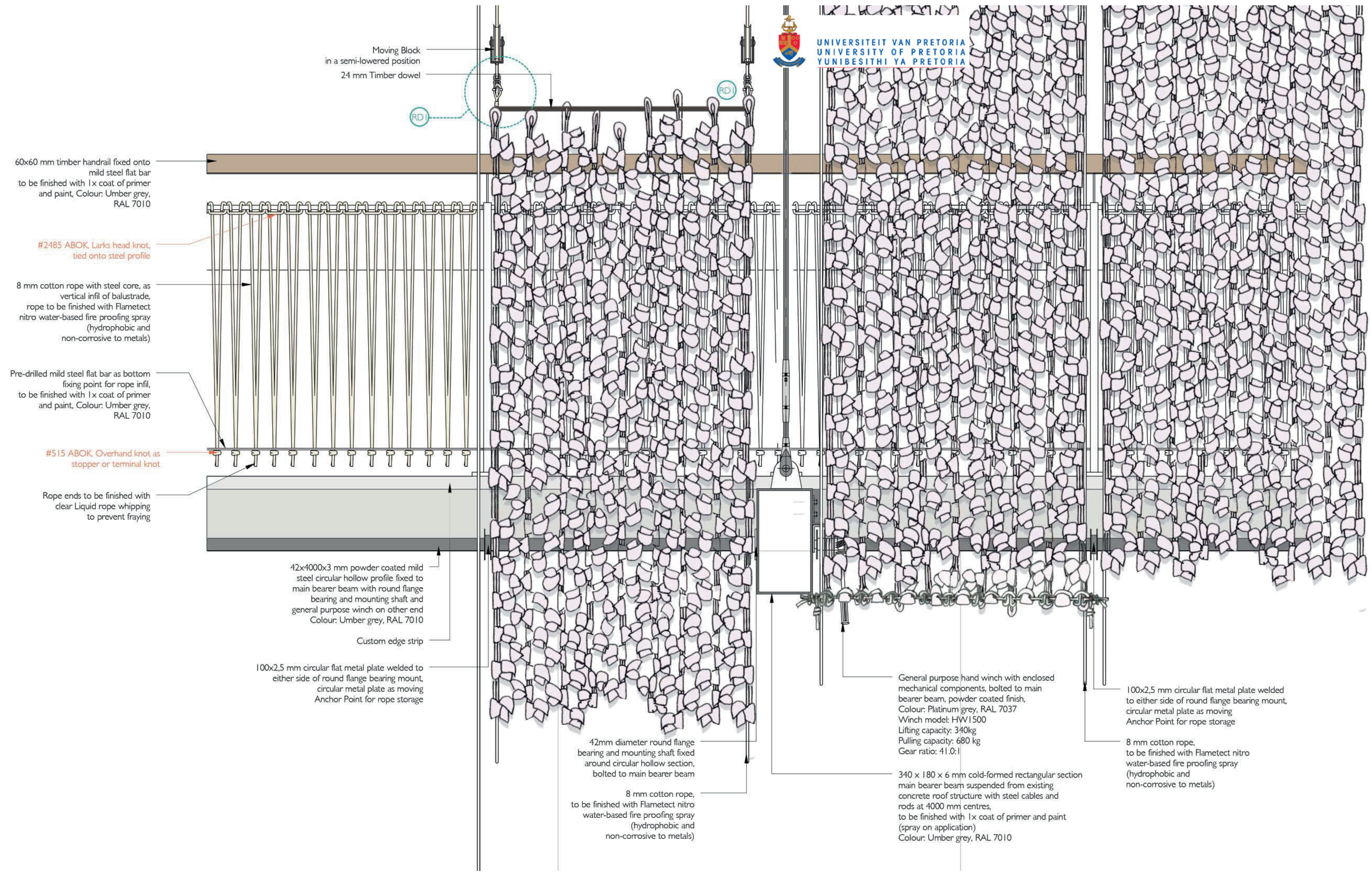
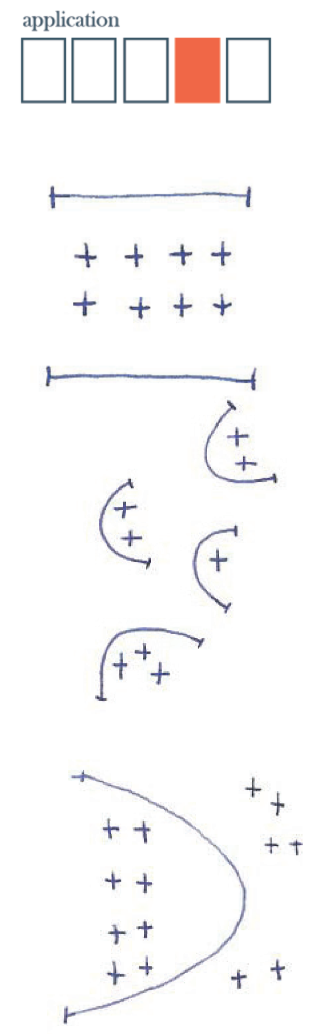


Figure 5.87.

ANCHOR TO MEZZANINE
SCALE 1:10



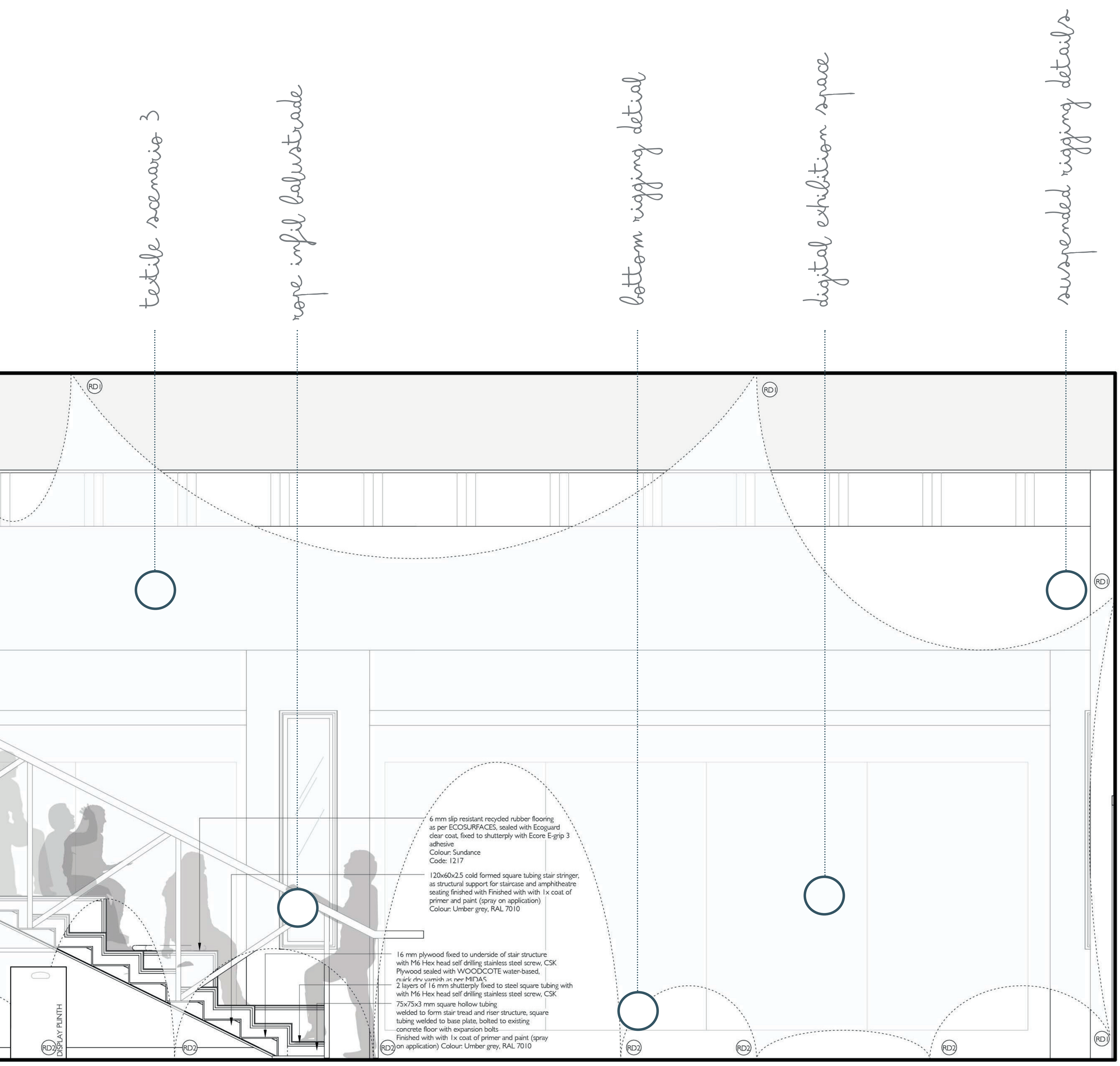
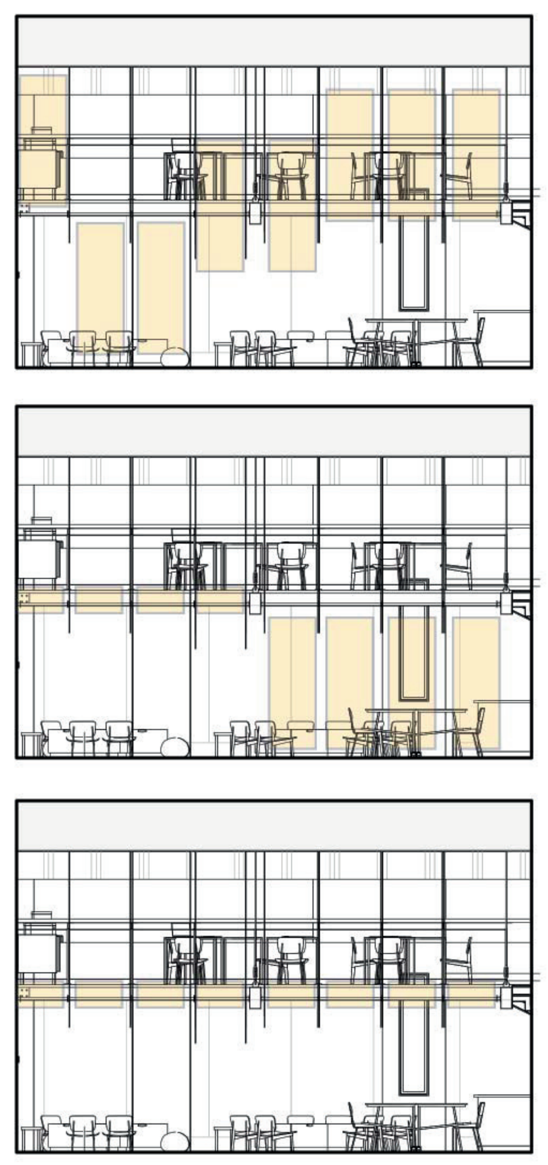


Figure 5.89.

CONFIGURATION DIAGRAMS:



rigging and hardware

FIXING DETAILS

5.10.3.
DEVELOPMENT OF RIGGING SYSTEMS

The basic rigging details are designed to accommodate the various textile units. The basic rigging details are presented on this poster. Further, the rigging details for the textile unit for scenario 2 are presented in more depth on this poster. See Figure 5. 90 - 5.94. These rigging details are indicated where appropriate on sections and further details.

WHAT IS A BLOCK AND TACKLE?

"A block and tackle is a system of two or more pulleys with a rope or cable threaded between them, usually used to lift or pull heavy loads. The pulleys are assembled together to form blocks and then blocks are paired so that one is fixed and one moves with the load. The rope is threaded, or rove, through the pulleys to provide mechanical advantage that amplifies the force applied to the rope." (www.rcsccwarrior).

PARTS OF A TACKLE

See Figure 5.97. Parts that make up a tackle (right).

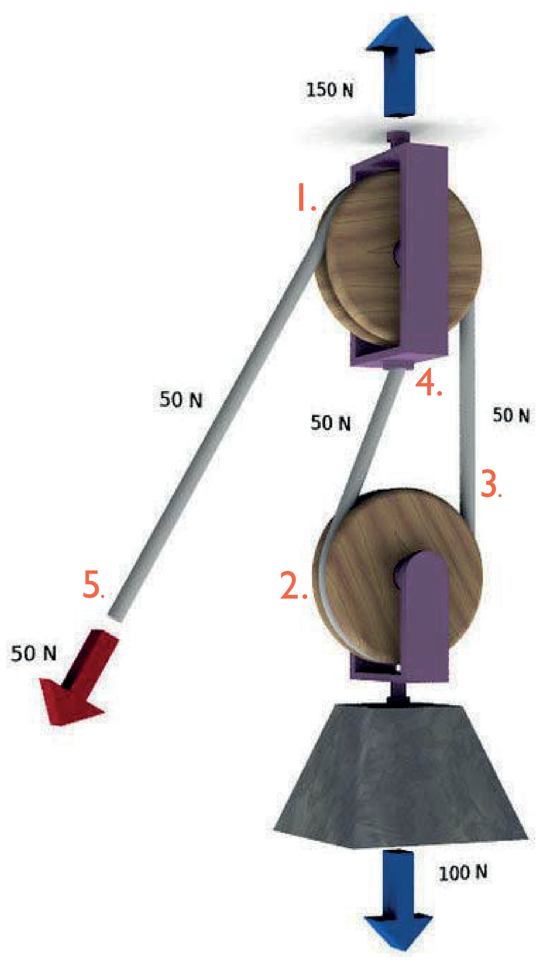
1. **Standing block:** The block that is anchored and is not moving. This block changes the direction of the running part.
2. **Moving block:** The moving block is attached to the moving end of the rope (the end the cargo is on).
3. **Fall:** The fall is the rope that is rove through the block.
4. **Standing part:** The standing part does not move. It needs to be secured to either the standing block or some other fixed position.
5. **Hauling part:** The hauling part is the part that is pulled.

Mechanical Advantage: Mechanical advantage is the effect of using blocks and rope to act as a force multiplier. It is the amount by which the pull on the hauling part is multiplied by the tackle. This, in general, is equal to the number of parts of the fall at the moving block (www.rcsccwarrior).

GUN TACKLE

See Figure 5.98. Pulley type options (right).

"A gun tackle is made up of two single-sheave blocks. A gun tackle has a mechanical advantage of 2. (tpub.com). Your effort (E) acts upward upon the arm (EF), which is the diameter of the sheave. The resistance (R) acts downward on the arm (FR), which is the radius of the sheave. Since the diameter is twice the radius, the mechanical advantage (M.A.) is 2 (constructionknowledge.net)."

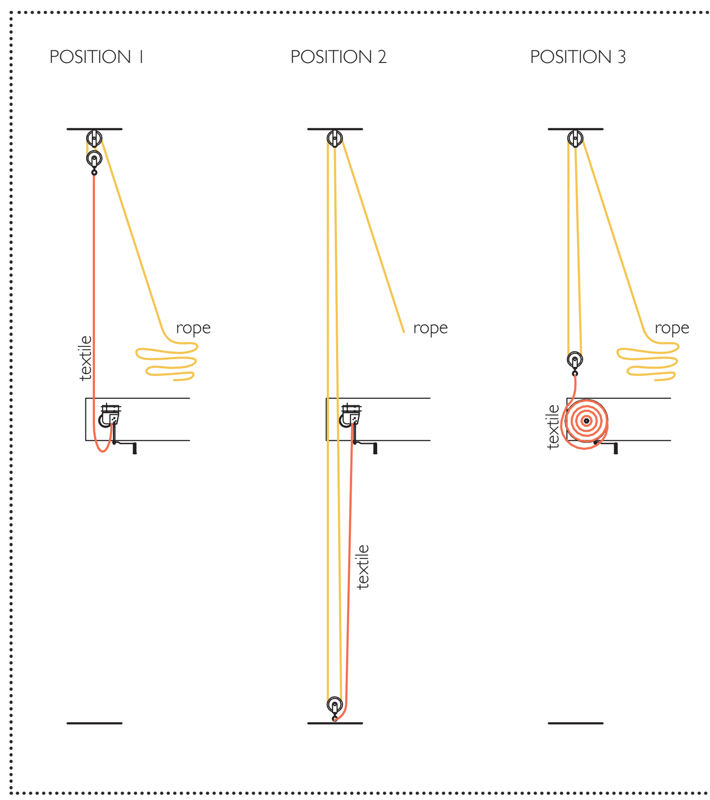


M.A. = R/E

Figure 5.97. PARTS THAT MAKE UP A TACKLE (Constructionknowledge.net)

Figure 5.98.
PULLEY TYPE OPTIONS

OPTION 1: BLOCK & TACKLE (Mechanical advandage M = 2)



OPTION 2: PULLEY (NO mechanical advantage)

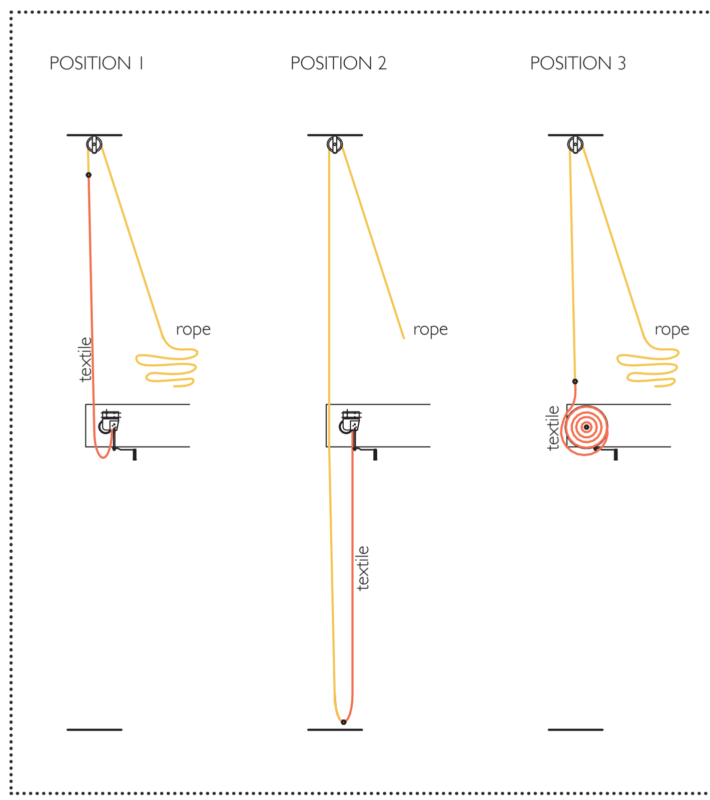
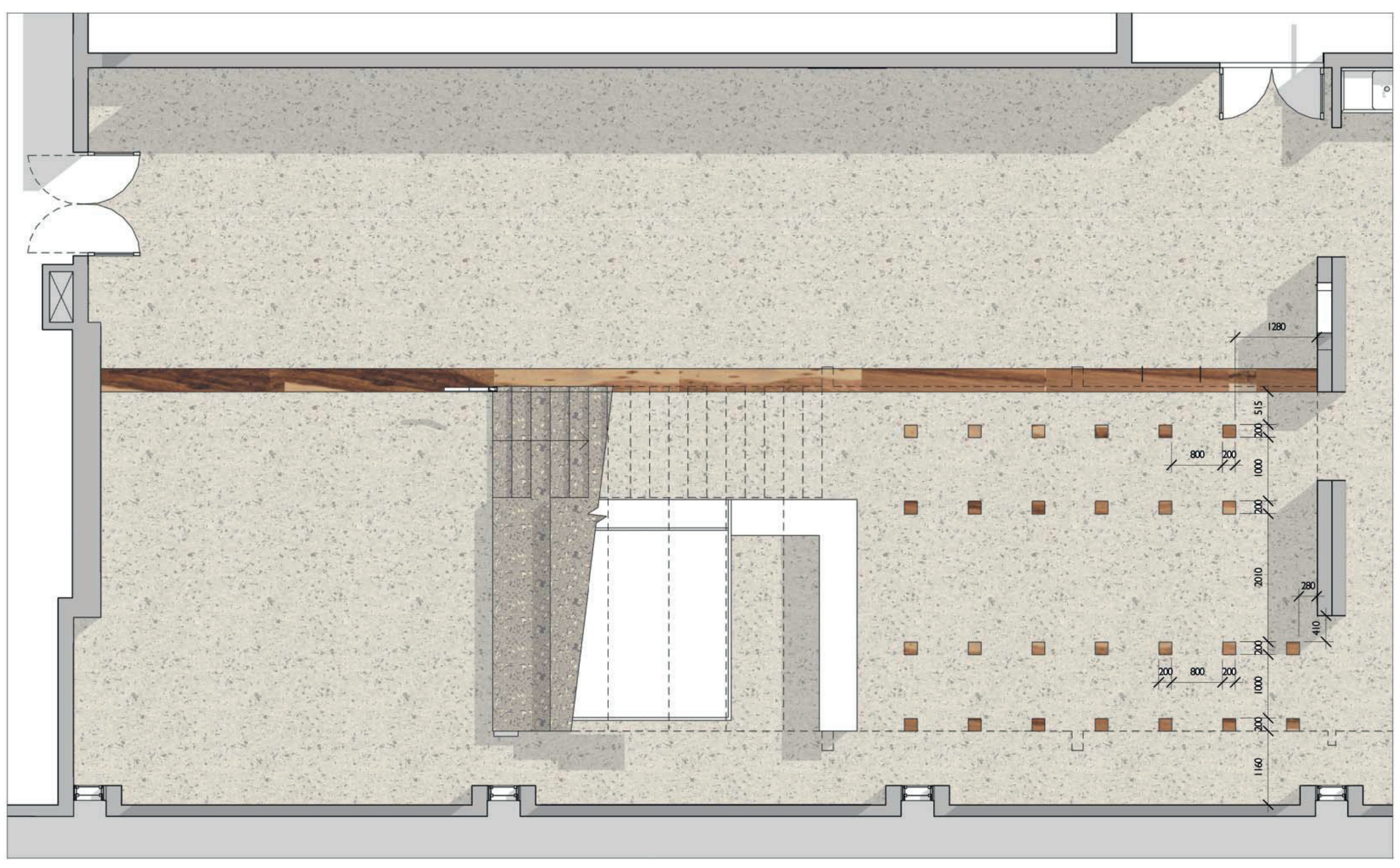
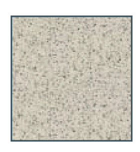
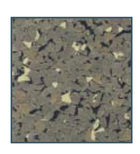


Figure 5.95.
FLOOR FINISH LAYOUT PLAN
(not to scale)



FLOOR FINISH LEGEND:

FF1  12x200x200 mm existing floor tiles

FF2  6x1220x76000 mm roll of recycled rubber flooring as per ECOSURFACES,
sealed with Ecoguard clear coat,
fixed to shutterply with Ecore E-grip 3 adhesive
Colour: Sundance
Code: 1217 of

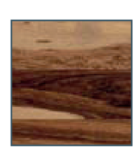
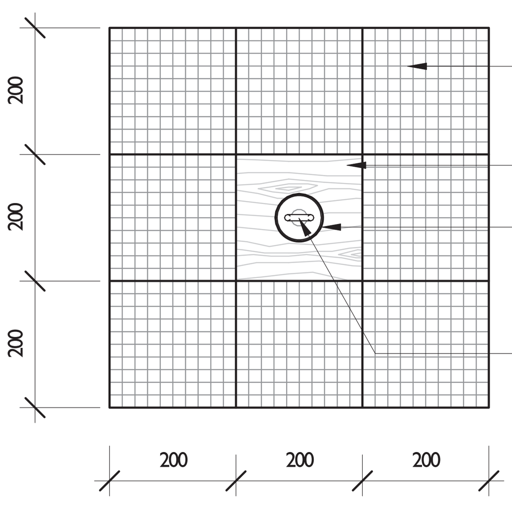
FF3  12x200x200 timber floor insert, finished with
Arboritic compo water-based sealant as per BEDSON
Finish: Clear matt

Figure 5.96.
ANCHOR TO FLOOR TILE DETAIL SCALE 1:10



12x200x200 existing floor tiles

One tile to be removed and replaced with fitted timber insert

2,5x70x75 mm mild steel circular hollow section inserted in pre-drilled hole in existing concrete floor, steel section to be fixed flush with timber floor insert, to be finished with 1x coat of primer and paint

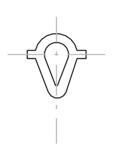
M12 eye bolt fixed in pre-drilled hole, bolt head to be lower than edge of mild steel profile so as to avoid obstruction

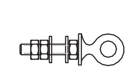
RIGGING HARDWARE LEGEND:

 Heavy duty stainless steel oval basket carabiner with straight double-locking screw-gate and swivel eye. Assorted colour locking gates.

 Heavy duty stainless steel double eye swivel hook, removable eyes.

 Large eye rope splice with whipping

 8mm Nylon teardrop rope thimble with side keepers

 M8 Stainless steel collared eye bolt, fixed with locking nylon nuts and spring washers

32 mm diameter mild steel profile in 900 mm lengths as suspension rod for textile unit. Profile to be pre-drilled with 8 mm holes at 60 mm from each end.

RD1

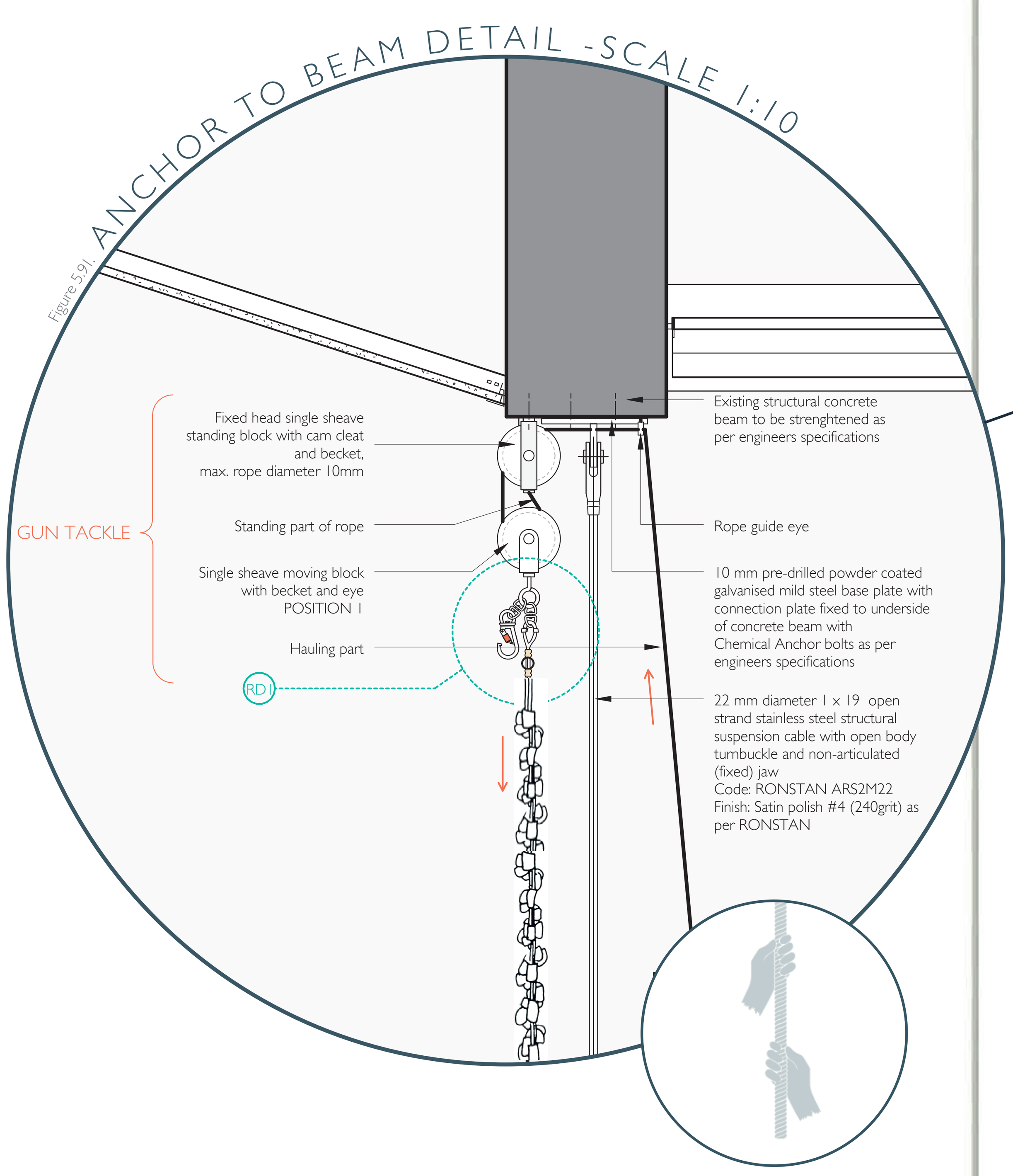


Figure 5.91.

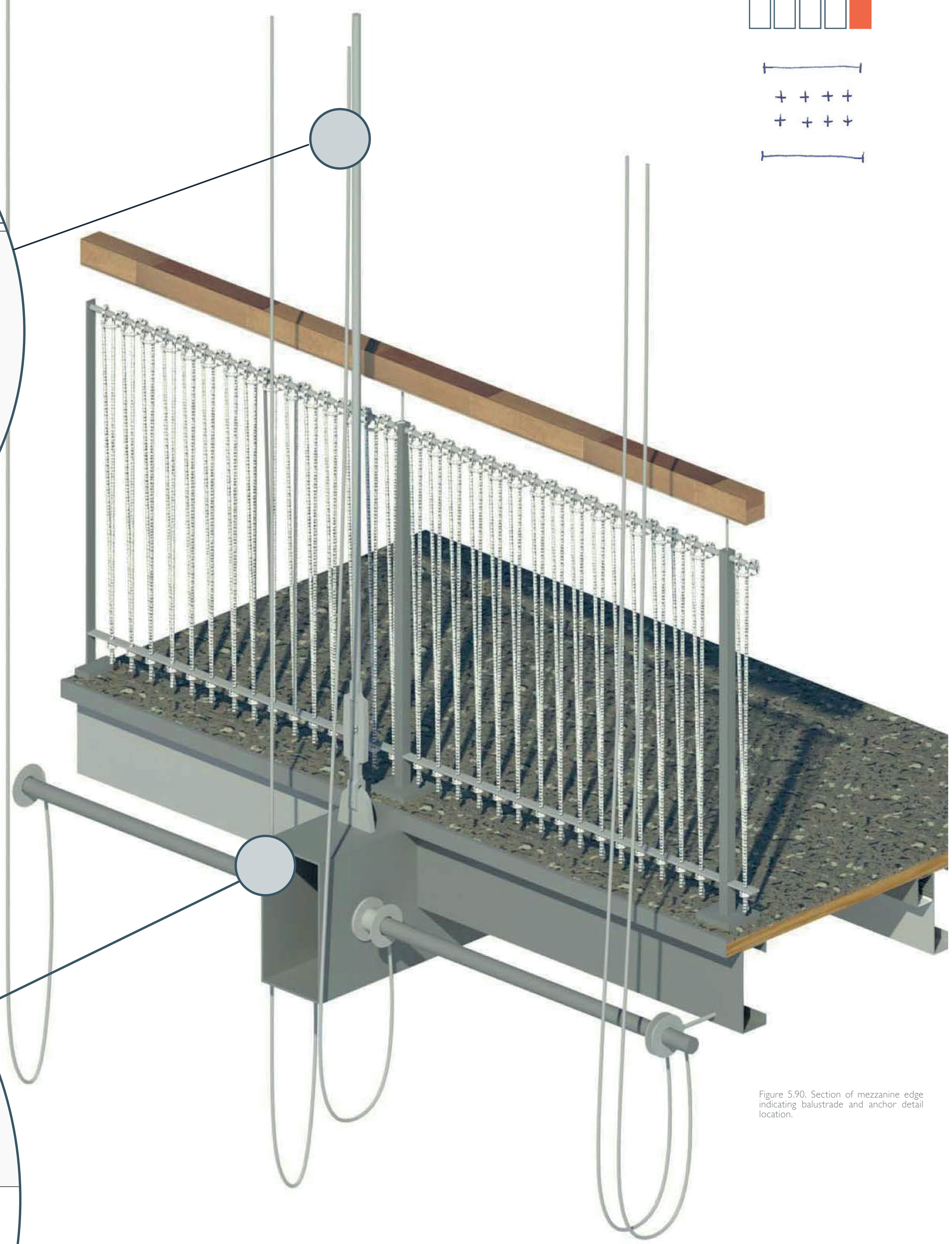


Figure 5.90. Section of mezzanine edge indicating balustrade and anchor detail location.

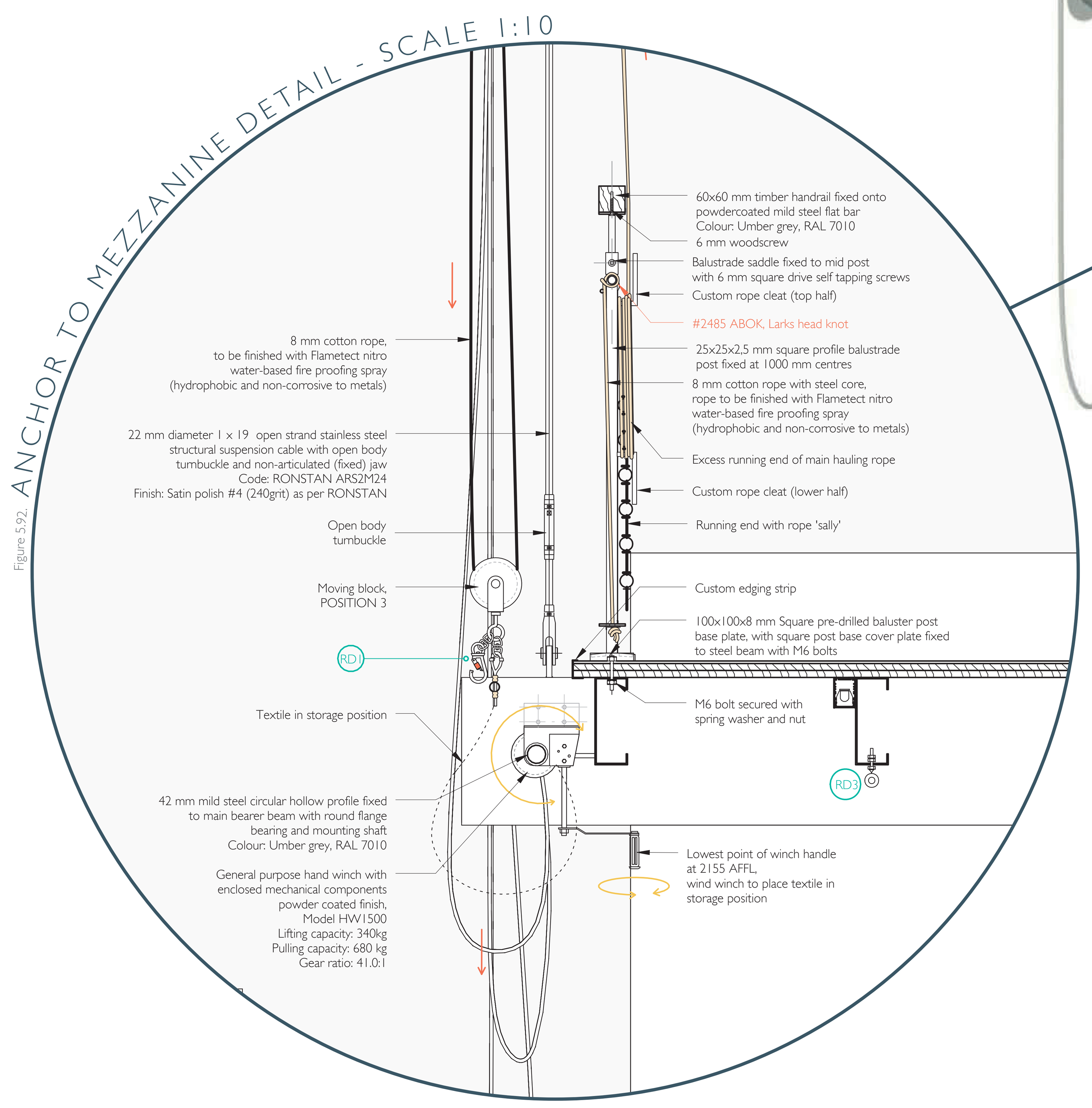


Figure 5.92.

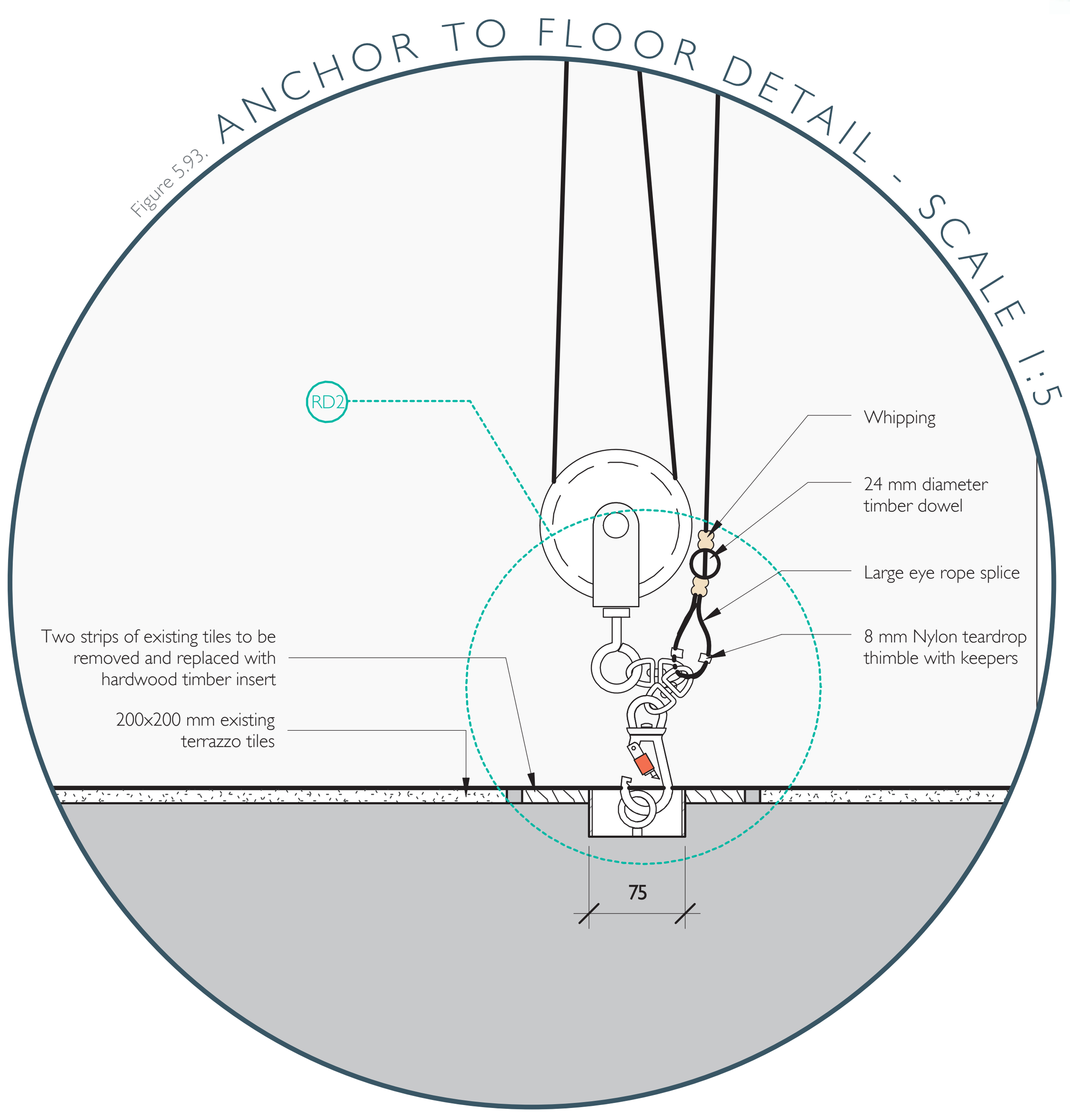


Figure 5.93.

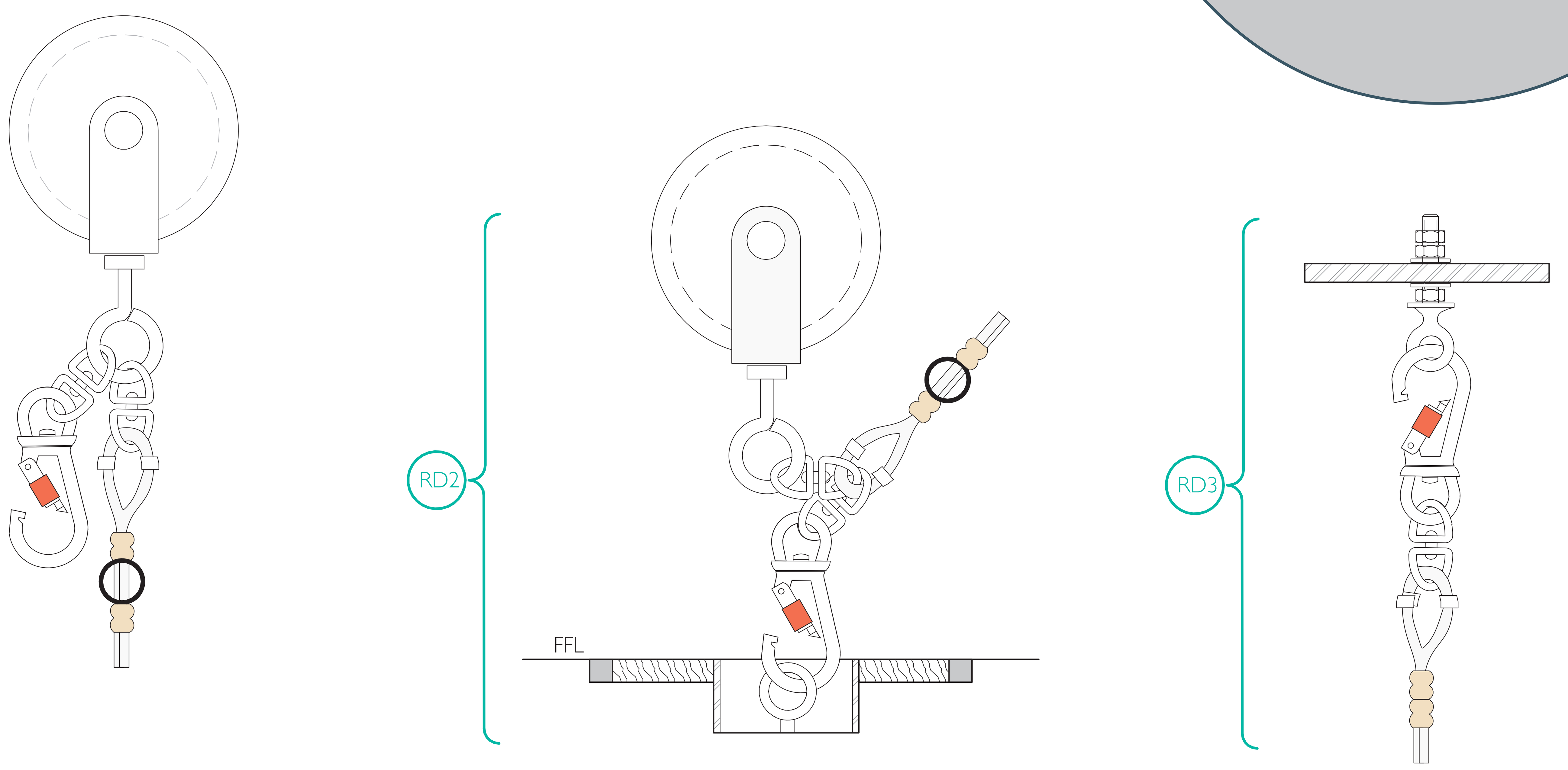
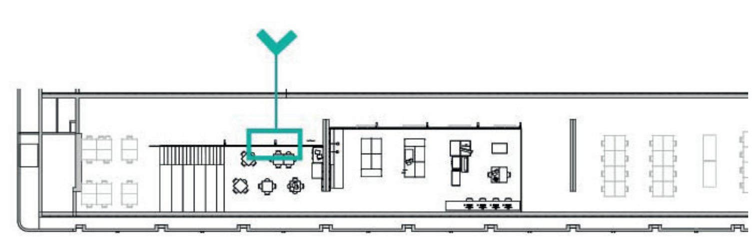


Figure 5.94.

RIGGING DETAILS
SCALE 1:2 (left)



5.11. DOCUMENTING THE FABRICATION METHOD

This section provides instructions on the fabrication and construction process of a basic textile sample unit. The type of content and way that the fabrication process is displayed is based on a combination of different principles found in both knitting stitch patterns and friendship bracelets. A **knitting stitch pattern** typically consists of a description plus an image, diagrammatic instructions accompanied by a symbol key or a set of traditional instructions (Dummies, 2015). See Figure 5.99. Knitting stitch pattern (Craftcookie, 2015) on the opposite page. **Friendship bracelets** are handmade decorative bracelets knotted from hemp, yarn, linen, silk or cotton. Traditionally Friendship bracelets are worn until they wear through and naturally fall off the arm. The knotting process for making a Friendship bracelet is related to macramé or square knotting (Wisegeek, 2015). See Figure 5.100. Friendship bracelet pattern (Friendshipbracelet, 2015) on the opposite page for an example of a bracelet knotting pattern and knot instructions.

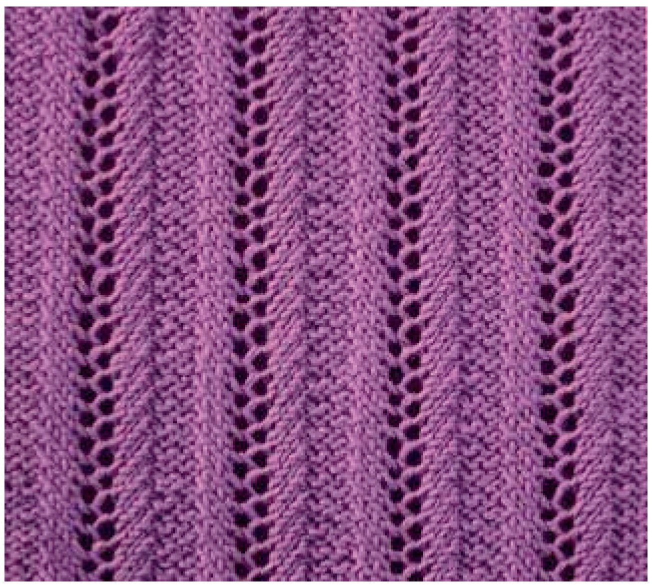
See section **5.9.1. Knot pattern instructions** on poster 32 (following page) for the full description and instructions on the fabrication process of an individual textile unit.

Figure 5.99.

KNITTING STITCH PATTERN

(Craft cookie, 2015)

Lace ribs 2



Description

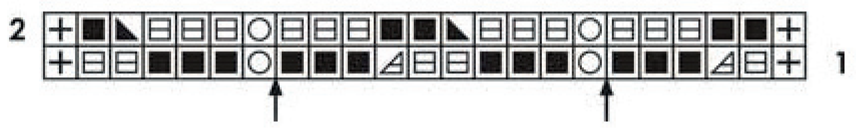
A lace rib stitch variation with narrow vertical stripes. See also Lace Ribs I and Lace Ribs III.

Difficulty level: Easy

Instructions

You need a stitch number multiple of 10 + 11 + 2 edge stitches. Repeat the pattern between the arrows as many times as you like.

Work right and wrong side rows as shown in the chart. Right side rows (1, 3, etc.) are worked from right to left. Wrong side rows (2, 4, etc.) are worked from left to right.



Symbol Key

- edge stitch

- knit 1

- purl 1

- 1 yarn over

- slip 1 knitwise, knit 1, pass the slipped stitch over

- purl 2 together

Traditional Instructions

Row 1: edge st, p1, p2tog, k3 * yo, k3, p2, p2tog, k3; repeat from * to last 6 sts, yo, k3, p2, edge st
Row 2: edge st, k1, sl1kw, k1, psso, p3, yo, * p3, k2, sl1kw, k1, psso, p3, yo; repeat from * to last 6 sts, p3, k2, edge st

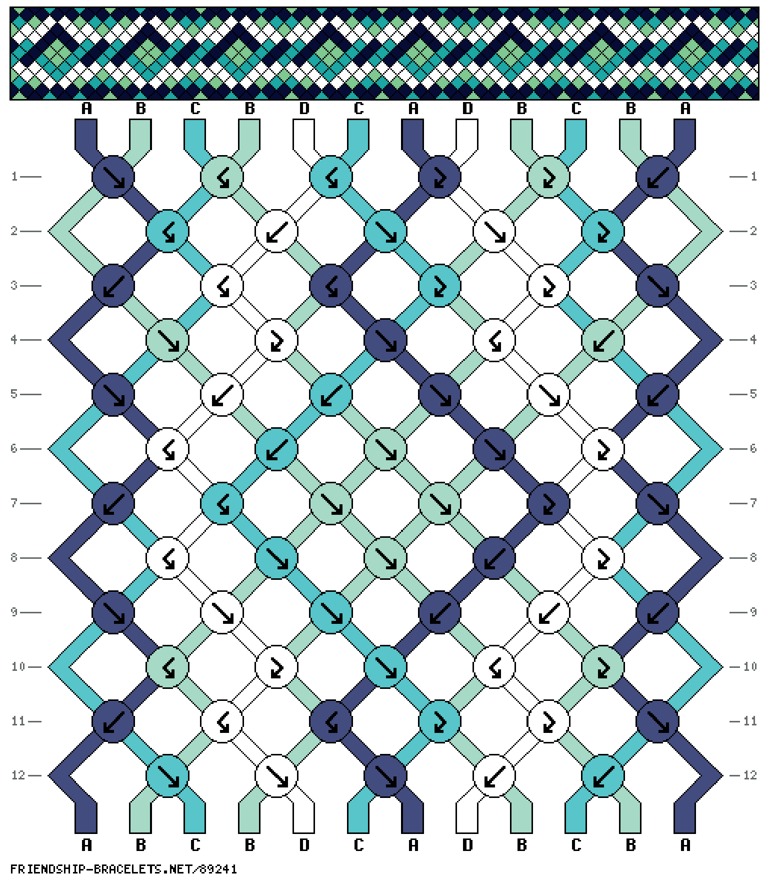
Repeat rows 1 through 2.

Figure 5.100.

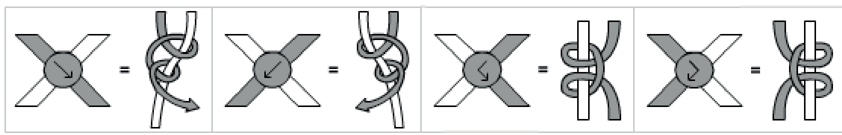
FRIENDSHIP BRACELET PATTERN

(Friendshipbracelet, 2015)

Pattern #89241



Knot instructions



knotting instructions

HOW TO KNOT A TEXTILE UNIT

FOLD

Figure 5.101.

FABRICATION INSTRUCTION SHEET

5.11.1.
DESCRIPTION

Dimensions: 900 x 2100 mm
Flat surface area: 1.89 sq/m
Approximate weight: 8-12kg dependent on type of Filler cord

Rectangular sample composed of cotton rope as Structural cord and Fabric strips as filler cord. Structural cords and Filler cords are tied together with the use of a Simple Noose Knot (See diagram indicating left hand oriented knot and right hand oriented knot).

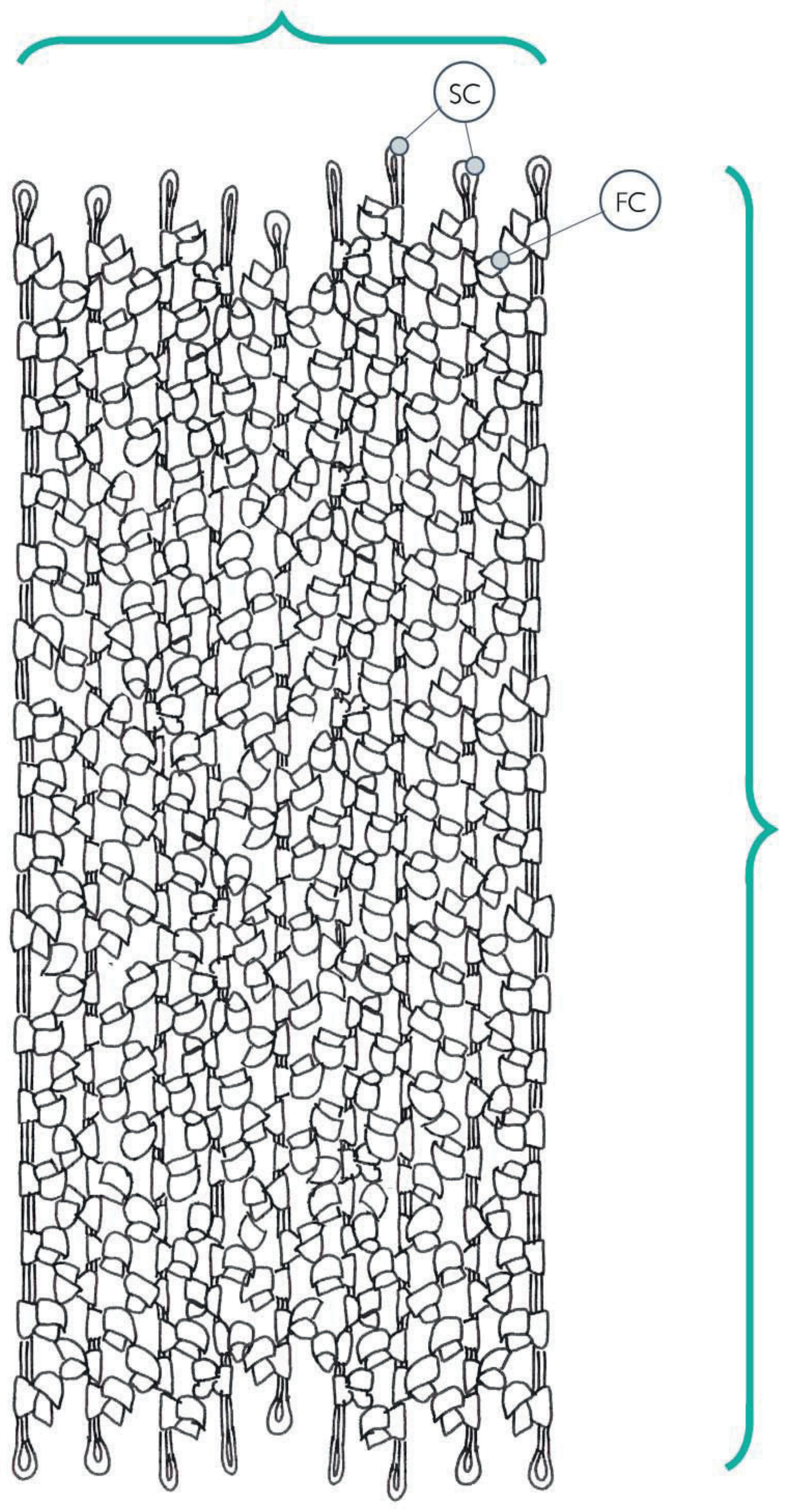
5.11.2.
KNOT PATTERN INSTRUCTIONS

YOU WILL NEED:

To complete one hand-knotted sample unit you will need the following materials:

FOLD

900 mm
9 rows of (2)7 mm structural cord with eye loops at the top and bottom of the textile unit.



2100 mm
9 rows of (2)7 mm structural cord with eye loops at the top and bottom of the textile unit.

- Approximately 40 m of 7mm sash cord or cotton rope as Structural cord (SC). This can be a braided sheath with either a twisted or braided core. Cut these into 9 equal pieces. Temporarily whip the running ends using masking tape.
- Approximately xxx m of 15 mm wide strips of fabric as Filler cord (FC). The strips can be sewn together without a seam. You will need 8 separate strips of equal length.
- 18 eye bolts (M6 or M8 works well)
- 9 spring gate carabiners (6-8 mm works well)
- A Large working frame with M6 or M8 holes (depending on eye bolt size) evenly spaced approximately 100-120 mm apart at the top and bottom of the frame. NOTE, holes at top and bottom of frame should line up.

SETUP

See Figure xxx: Knot pattern diagram. and Figure xxx: Knot pattern (symbol) key.

Securely fix one row of 9 eye bolts at the top of the frame, these will be the Top Anchor Points. Securely fix one row of 9 eye bolts at the bottom of the frame. The bottom row of eye bolts should line up vertically with the top row of eye bolts. Clip one carabiner onto each of the top eye bolts. The bottom eye bolts will have no carabiners.

Ensure that all SC are secured to carabiner at top AP with a larks head knot. Running ends hang freely or if more rigidity is required, running ends can be passed through the eye. The knot is made using the FC. Each row, indicated by a gridline has to be finished consecutively, starting with row A left to right, row B left to right. Do not start the next row if the previous row of knots are not completed. All knots running down one structural cord follow a left hand right hand pattern.
Important: Dress each knot after tying. Orient print to Facing side.

FOLD

BACKING SIDE PATTERN

FACING SIDE PATTERN

TERMS:

CORD TYPE SET: Any collection of cords within one sample that are of the same material
PRIMARY CORD: The main carrying cord in any cord type set
SECONDARY CORD: The cord secondary to the primary cord in any cord type set
STRUCTURAL CORD: Any cords forming the structure or carrying the weight of any filler cord, cord type set.
FILLER CORD: Any cords forming the infill or body of a sample and is fixed by means of knotting to any structural cord, cord type set. The Filler cord does not carry the weight of the sample unit
ANCHOR POINT: Any point or fixing place to which a textile can be fixed using various configurations of rigging hardware
FACING SIDE: Facing side is the side of the sample unit that you see while knotting.
BACKING SIDE: Backing side is the side of the sample unit that faces away from you while knotting.

Term	Key
Primary cord	Pr
Secondary cord	Se
Structural cord	SC
Filler cord	FC
Resultant V	V
Cord type set	CTS
Sampe unit	U
Anchor point	AP
Facing side	FS
Backing side	BS

FOLD

KNOT PATTERN (SYMBOL) KEY:

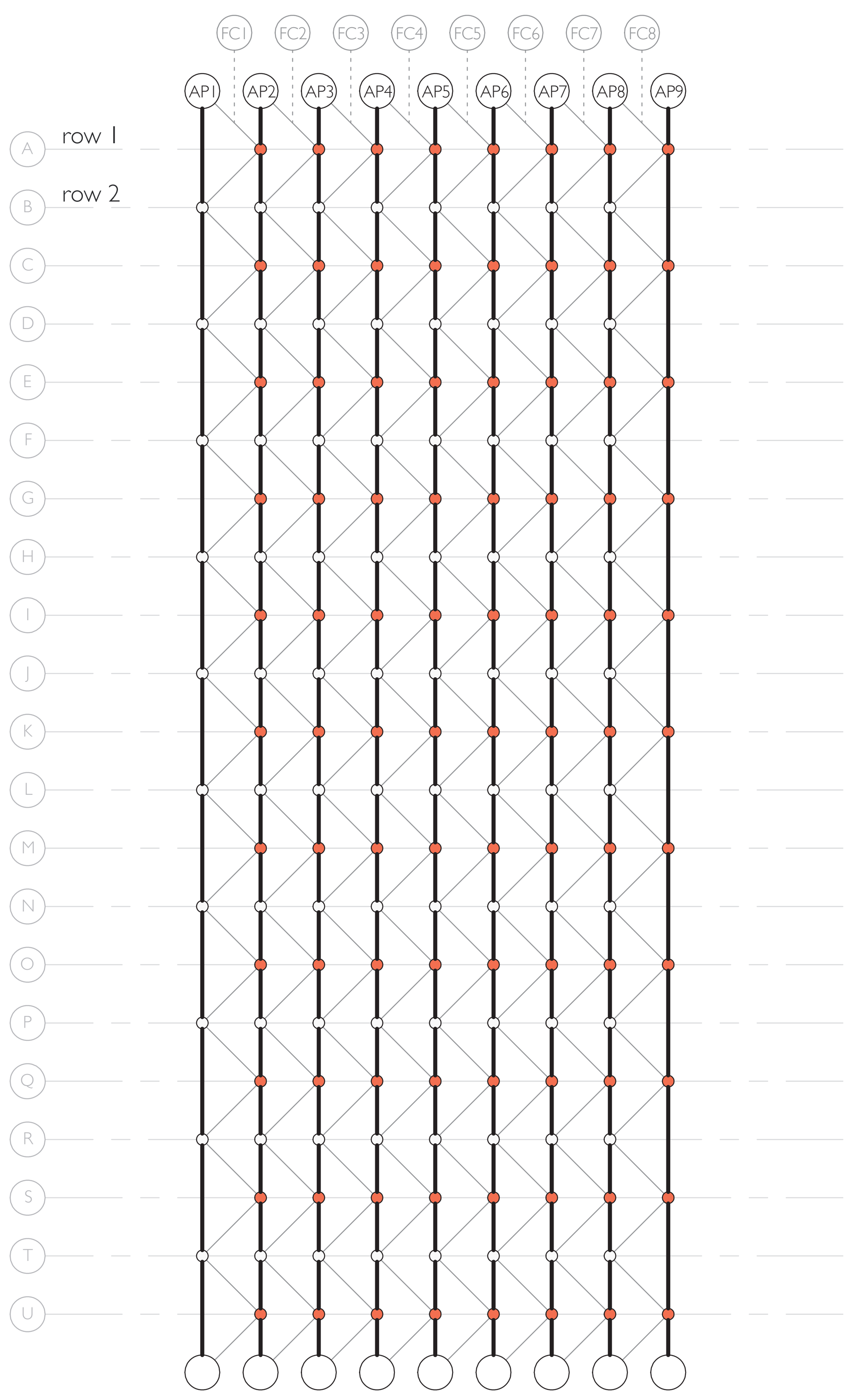
- (AP1) Anchor point (Eye bolt with carabiner)
- (A) Grid line or row allocation (Guide only)
- ● Left hand oriented simple noose knot (See instructions)
- ○ Right hand oriented simple noose knot (See instructions)
- — Structural cord, double strands of 7mm cotton rope
- — Filler cord, double strands of 15mm fabric strips

5.11.3.
UNIT EDGE VARIATIONS

The standard textile unit can be constructed using either a frame or dowel as top anchor point (as described in section xxx: Knot pattern instructions). Further, this anchor point can remain as part of the finished product or can be replaced with one of the variations as seen below.

FOLD

KNOT PATTERN DIAGRAM:

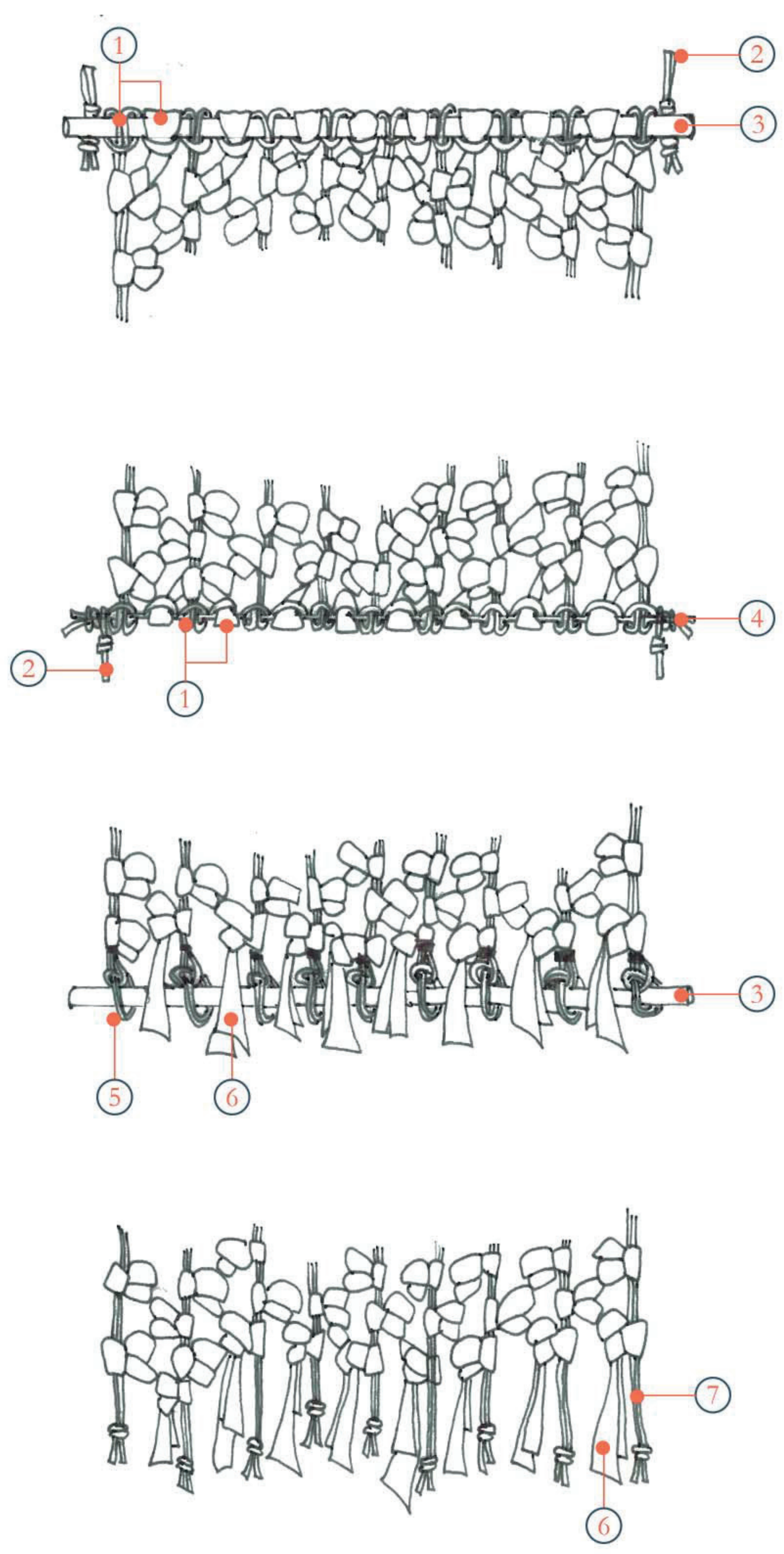


A

B

C

D



FOLD

KNOT INSTRUCTIONS

● LEFT HAND ORIENTED NOOSE KNOT

○ RIGHT HAND ORIENTED NOOSE KNOT

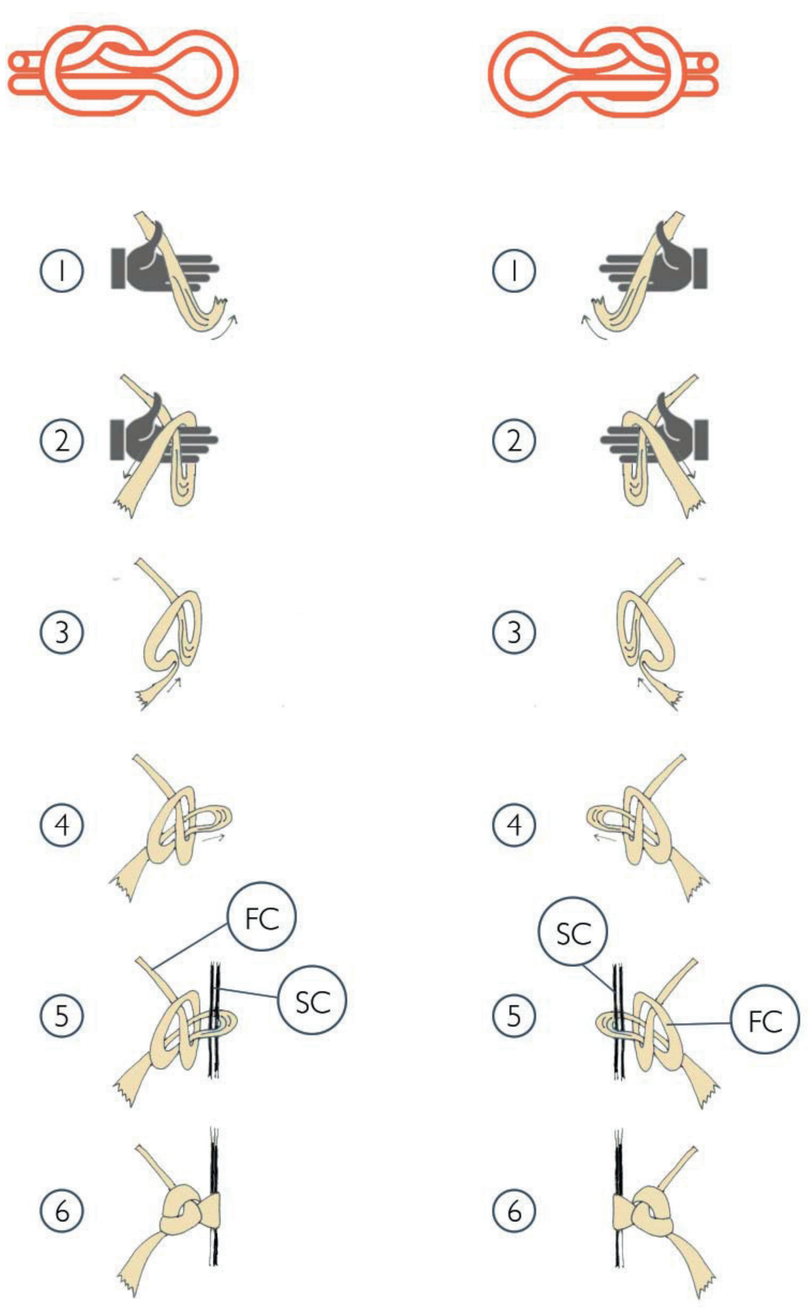


Figure 5.67.

EDGE VARIATION KEY:

1. ABOK #2485, Larks head knot
2. Large eye splice and with whipping
3. Dowel or steel circular profile as AP
4. Rope as AP
5. ABOK #1717, Half hitch-permanently siezed with whipping
6. FC running end hangs free
7. SC running end hangs free, finish rope tip with clear whip end dip, finish running end with stopper knot.

5.12.
MATERIAL SELECTION

The initial testing and making of the sample units were done using Design Team, printed cotton fabric strips. See **Section 5.3.4. Testing materials** on page 56. However, although cotton is a renewable resource, it has a severe environmental impact (Kadolph 2007: 48). Cotton is a water-intensive crop and mainstream farming methods make extensive use of agricultural chemicals. Although the cotton industry has improved recycling efforts, processing cotton remains an environmental concern (Kadolph 2007: 49). Organic cotton is a more environmentally friendly option, however additional costs related to lower fibre yields and the absence of hazardous chemicals results in organic cotton costing approximately twice as much as conventional cotton (Kadolph 2007: 50).

Further issues such as durability, light resistance (colour fastness), overall appearance retention and maintenance influenced the final decision on fabric fibre selection. See Table 5.10. Fibre ratings related to performance (Kadolph 2007: 28) on the opposite page, for a comparison of various fibre types. The final selected fibre type is a **polyester and cotton blend.** See Figure 5.103. Material selection, Fabric samples and Table 5.12. Fabric specification on poster 34 (following page). Polyester is sometimes referred to as '...*the workhorse fiber of the industry*...' and is the most widely used synthetic fibre (Kadolph 2007: 131). See Table 5.11.Properties of polyester on the opposite page (Kadolph 2007: 132).

5.12.1.
FINISHING AND MAINTENANCE

Due to the nature and overall focus of the project finishing and maintenance is only briefly considered.

Finishing:

Fire retardence is defined as '*the resistance to combustion of a material when tested under specifed conditions*' (Kadolph, 2007: 375). Flame-retardent **finishes** can be used on fabrics such as cotton, rayon, nylon and polyester. These finishes should be nontoxic, noncarcinogenic and be durable enough to withstand approximately 50 washes. Further, they should not affect texture or hand of the fabric and should also not contain any unpleasant odours (Kadolph, 2007: 376).

Most topical finishes require special care in laundering in order to preserve flame resistance.

The fabric strips will not receive any additional finishing, however, the rope will be finished with *Flametect Nitro Water-based fire proofing spray*/dip This finish is hydrophobic which will help protect the cotton rope against water and dirt.

Maintenance:

The temporal nature of the textile installation means that textile units that are dirty, damaged or fatigued can easily be replaced. The textiles can be hand-knotted on site and assembled in place of the textile unit being removed.

Further than this, any additional cleaning can be done through regular vacuuming of the textile as well as scheduled dry cleaning or washing of the textile unit. Vaccuming can be done by staff on site.

Table 5.10.

FIBRE RATINGS RELATED TO PERFORMANCE

(Kadolph, 2007: 28).

Rating	Abrasion resistance	Thermal retention	Resiliency	Light resistance
Excellent	Aramid Fluoropolymer Nylon Olefin Polyester	Wool Acrylic Modacrylic Polyester	Nylon Wool	Glass Acrylic Modacrylic Polyester
Good	Saran Spandex Flax Acrylic PBI Sulfar Cotton Silk	Olefin Nylon Aramid	Olefin Acrylic Modacrylic Polyester	Sulfar Lyocell Flax Cotton Rayon PBI
Moderate	Wool Rayon	Silk Spandex	Silk	Triacetate Acetate Olefin
Poor	Vinyon Acetate Glass	Flax Cotton Lyocell Rayon Acetate	Lyocell Flax Cotton Rayon Acetate	Nylon Wool Silk

Table 5.11.

PERFORMANCE PROPERTIES OF POLYESTER

(Kadolph, 2007: 132).

Properties of polyester	Importance to consumer
Resilient- wet and dry	Easy care
Dimensional stability	Machine-washable
Sunlight-resistance	Good for curtains and draperies
Durable, abrasion-resistant	Industrial uses
Aesthetic superior to nylon	Blends well with other fibres

knotting instructions

FABRIC SELECTION

Figure 5.102.
KNOT PATTERN DIAGRAM
SCENARIO ONE
(Not to scale)

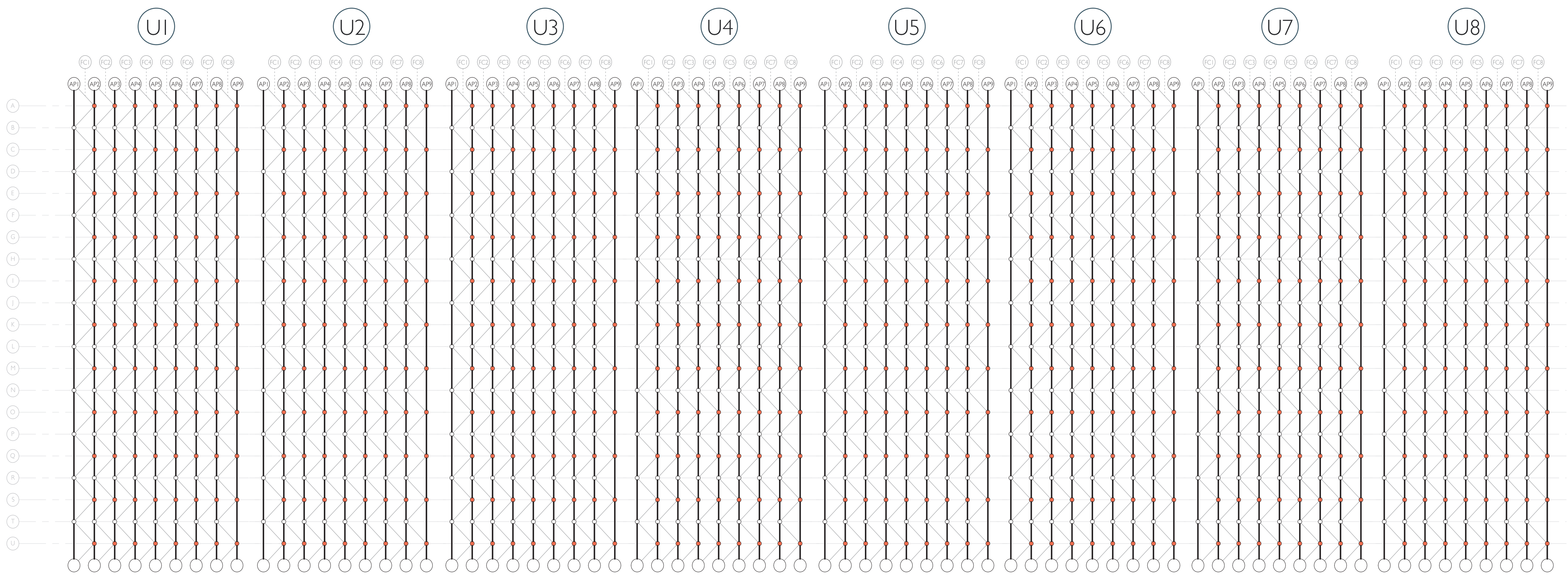


Table 5.12.
FABRIC SPECIFICATION:

U1	FC1	T3	U2	FC1	T1	U3	FC1	T5	U4	FC1	T1	U5	FC1	T1	U6	FC1	T4	U7	FC1	T5	U8	FC1	T5
	FC2	T3		FC2	T1		FC2	T8		FC2	T7		FC2	T7		FC2	T4		FC2	T3		FC2	T5
	FC3	T3		FC3	T7		FC3	T8		FC3	T7		FC3	T7		FC3	T5		FC3	T3		FC3	T5
	FC4	T8		FC4	T4		FC4	T8		FC4	T7		FC4	T7		FC4	T2		FC4	T8		FC4	T5
	FC5	T6		FC5	T2		FC5	T6		FC5	T6		FC5	T6		FC5	T2		FC5	T8		FC5	T5
	FC6	T6		FC6	T5		FC6	T5		FC6	T8		FC6	T8		FC6	T2		FC6	T8		FC6	T5
	FC7	T7		FC7	T5		FC7	T6		FC7	T8		FC7	T8		FC7	T2		FC7	T8		FC7	T5
	FC8	T7		FC8	T5		FC8	T6		FC8	T5		FC8	T5		FC8	T4		FC8	T5		FC8	T5

Figure 5.104.
TEXTILE UNIT SCENARIO ONE

order of assembly

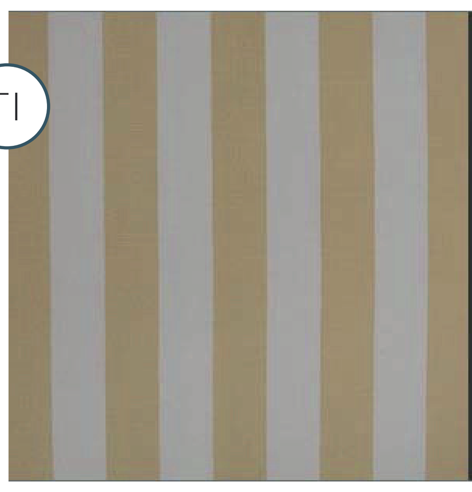
TEXTILE UNIT SCENARIO ONE

form

Figure 5.103.

MATERIAL SELECTION, FABRIC SAMPLES

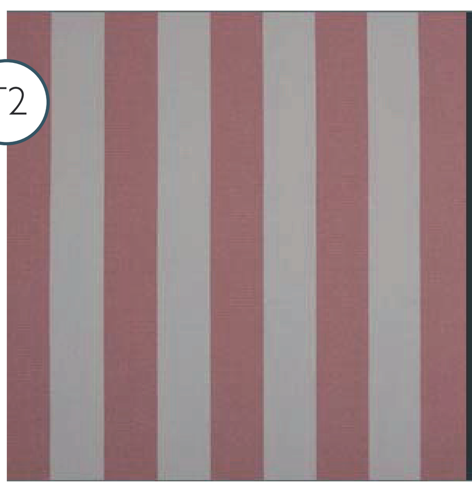
T1



Awash - Sea sponge

Design : Awash
Colour : Sea sponge
Width : 145cm
Vertical repeat : 0cm
Horizontal repeat : 10cm
Composition : 75% Polyester; 25% Cotton
Weight : 370 g/m²
Application : Domestic use
Brand : Stonehaus

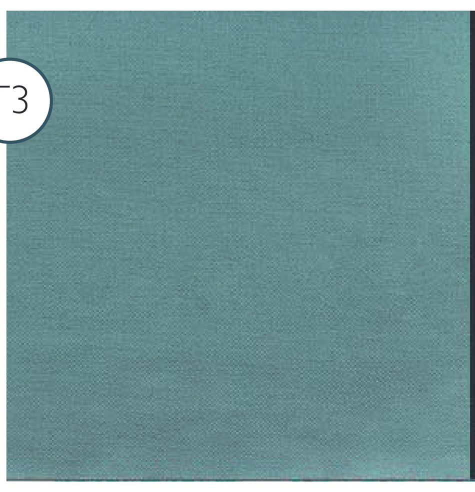
T2



Awash - Anemone

Design : Awash
Colour : Anemone
Width : 145cm
Vertical repeat : 0cm
Horizontal repeat : 10cm
Composition : 75% Polyester; 25% Cotton
Weight : 370 g/m²
Application : Domestic use
Brand : Stonehaus

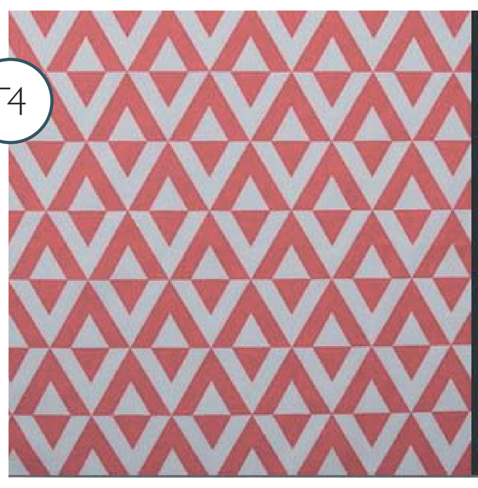
T3



Stinson - Mediterranean

Design : Stinson
Colour : Mediterranean
Width : 140cm
Composition : 100% Olefin
Weight : 247 g/m²
Application : Outdoor
Brand : Hertex

T4



Prism - Spiced coral

Design : Prism
Colour : Spiced coral
Width : 140cm
Repeat : 16.5cm (Vertical)
Repeat : 9.5cm (Horizontal)
Composition : 65% Polyester; 35% Cotton
Weight : 210 g/m²
Application : Curtaining and Accessories
Brand : Stonehaus

T5

Prism - Space ship

Design : Prism
Colour : Space ship
Width : 140cm
Repeat : 16.5cm (Vertical)
Repeat : 9.5cm (Horizontal)
Composition : 65% Polyester; 35% Cotton
Weight : 210 g/m²
Application : Curtaining and Accessories
Brand : Stonehaus

T6

Prism - Mentos

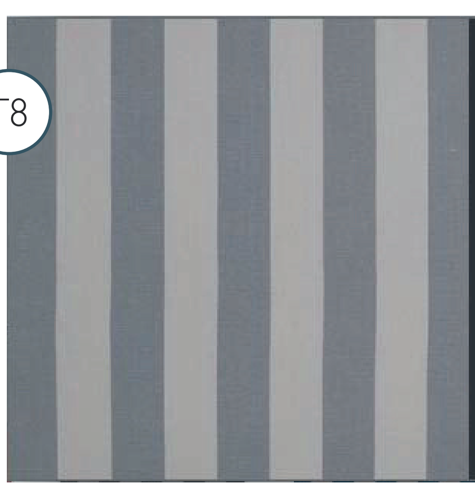
Design : Prism
Colour : Mentos
Width : 140cm
Repeat : 16.5cm (Vertical)
Repeat : 9.5cm (Horizontal)
Composition : 65% Polyester; 35% Cotton
Weight : 210 g/m²
Application : Curtaining and Accessories
Brand : Stonehaus

T7

Prism - Lemonade

Design : Prism
Colour : Lemonade
Width : 140cm
Repeat : 16.5cm (Vertical)
Repeat : 9.5cm (Horizontal)
Composition : 65% Polyester; 35% Cotton
Weight : 210 g/m²
Application : Curtaining and Accessories
Brand : Stonehaus

T8



Awash - Surf

Design : Awash
Colour : Surf
Width : 145cm
Vertical repeat : 0cm
Horizontal repeat : 10cm
Composition : 75% Polyester; 25% Cotton
Weight : 370 g/m²
Application : Domestic use
Brand : Stonehaus

5.12.2. ASSEMBLY PROCESS

Basic assembly for the individual textile unit is discussed in Section **5.9.1. Unit edge variations** on the previous poster. This section provides a brief overview for the assembly of textile unit scenario two.

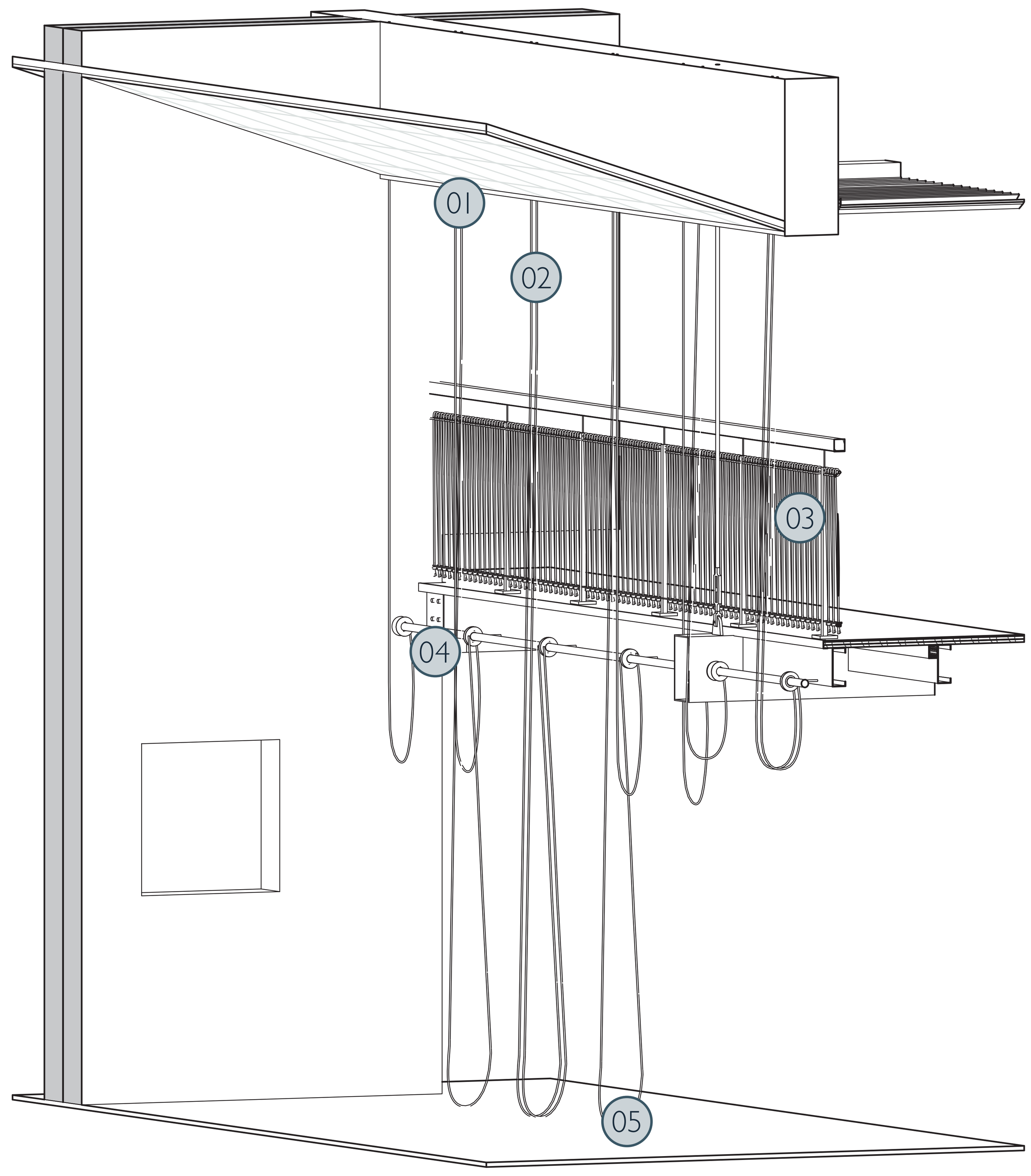


Figure 5.106. Order of assembly (above).

01 STEP ONE

Fixing Standing block to existing structure. See Figure 5.9.1. Anchor to beam detail on poster 32.

02 STEP TWO

Fixing Moving block to Standing block. See Figure 5.97. Parts that make up a tackle on poster 32.

03 STEP THREE

Ballustrade with custom rope cleat. See Figure 5.92. Anchor to mezzanine detail on poster 32, and Figure 5.87. Anchor to mezzanine detail front view on poster 31.

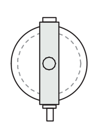
04 STEP FOUR

Fixing point to mezzanine floor. See Figure 5.93. Anchor to floor detail on poster 32.

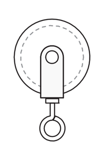
05 STEP FIVE

Fixing point to existing floor.
See rigging detail 2 (RD2) on poster 32 for more detail.

PARTS FOR ASSEMBLY :
(for one textile unit)



2x
Fixed head single sheave standing block with cam cleat and becket, max. rope diameter 10mm



2x
Single sheave moving block with eye becket, max. rope diameter 10mm

2x
Heavy duty stainless steel oval basket carabiner with straight double-locking screw-gate and swivel eye. Assorted colour locking gates.

6x
Heavy duty stainless steel double eye swivel hook, removable eyes.

4x
Large eye rope splice with whipping

2x
8mm Nylon teardrop rope thimble with side keepers

1x
32 mm diameter mild steel profile in 900 mm lengths as suspension rod for textile unit. Profile to be pre-drilled with 8 mm holes at 60 mm from each end.

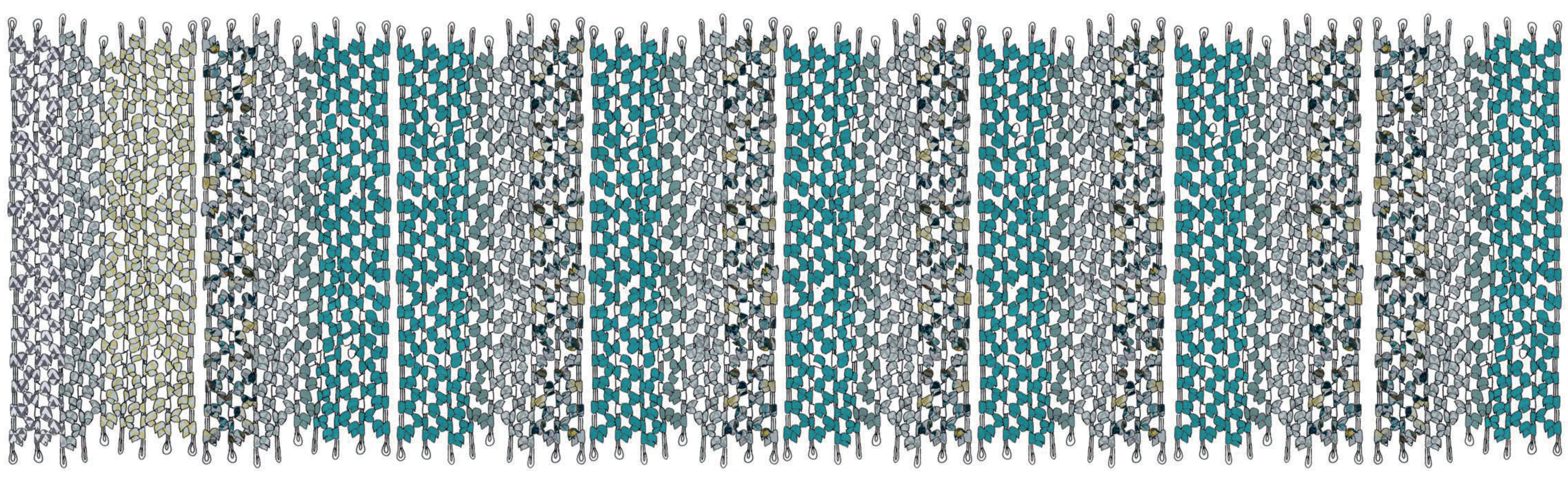
Table 5.13.

COSTING PER UNIT:

Item	Description	Quantity	Rand per Unit	Total cost
SASH CORD	7 mm diameter Cotton rope Colour: Natural CC273	38m	R5.00 p/m	R190:00
TEXTILE INFILL	Calico 2800 mm wide roll cut into 100-120 mm wide strips,	56 strips 5000 mm long	R65.00 p/m	R650.00
CARABINER	Heavy duty stainless steel oval basket carabiner with straight double-locking screw-gate and swivel eye. Assorted colour locking gates.	2	R60.00	R120.00
DOUBLE EYE SWIVEL HOOK	Heavy duty stainless steel double eye swivel hook, removable eyes.	6	R80.00	R480.00
EYE BOLT	8x80 Stainless steel eye bolt	2	R8.00	R16.00
THIMBLE	8mm Nylon teardrop rope thimble with side keepers	2	R6.00	R12.00
				R1468.00
				R960.00

Figure 5.105.

FABRIC SPECIFICATION
SCENARIO ONE
(Not to scale)



textile space-defining element

CONCEPTUAL DEVELOPMENT - SCENARIO THREE

5.13.
SCENARIO THREE
INITIAL DEVELOPMENT

The textile unit for scenario three is constructed with the same knots as in the textile units for scenario one and two. The knotting pattern for scenario one and two are 'flat' patterns. This means that the textile sample unit can be knotted using the knotting process as described on poster 33. (By means of a knotting frame). However, the knotting pattern for scenario three would be slightly different. See Figure 5.108. (right).

Due to the three-dimensionality of the sceanrio three knotting pattern, the basic flat pattern first had to be fully developed. This basic flat pattern then forms the basis for the development of a three-dimensional knotting pattern. The images below illustrate the initial development of the textile unit for scenario three.

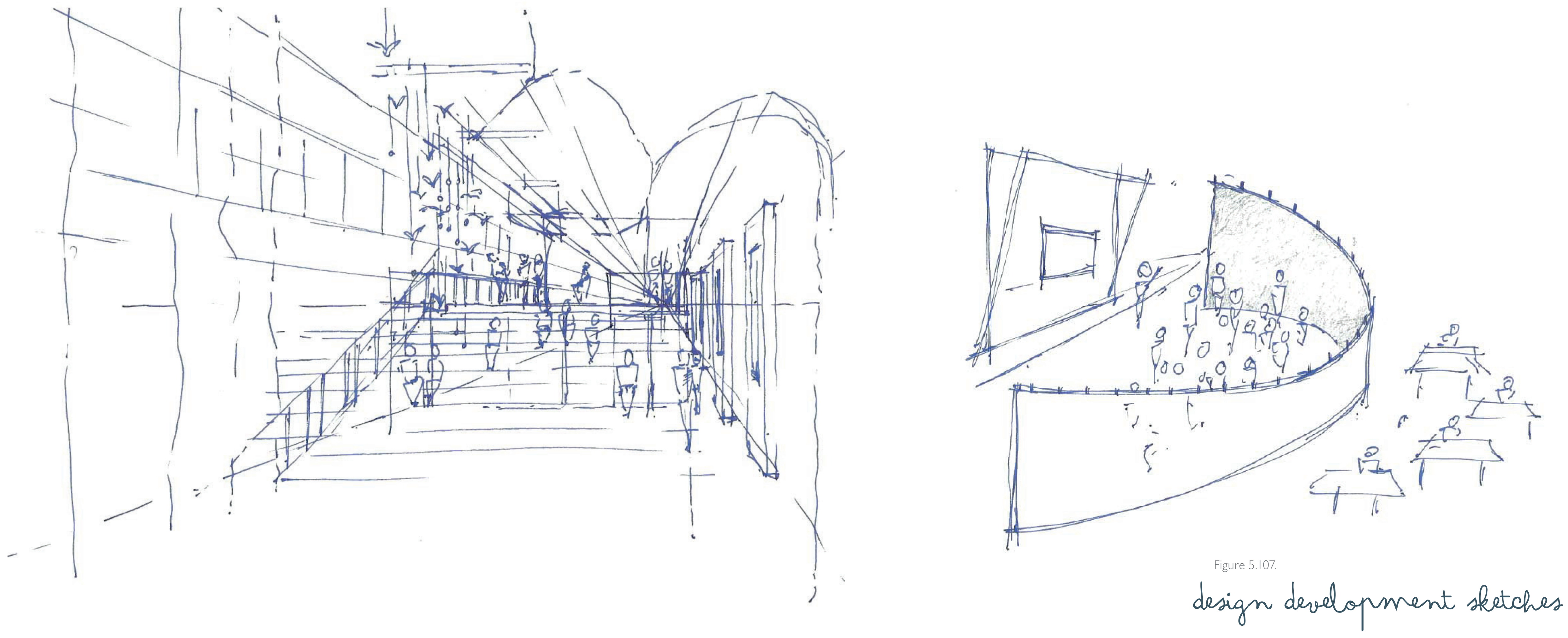
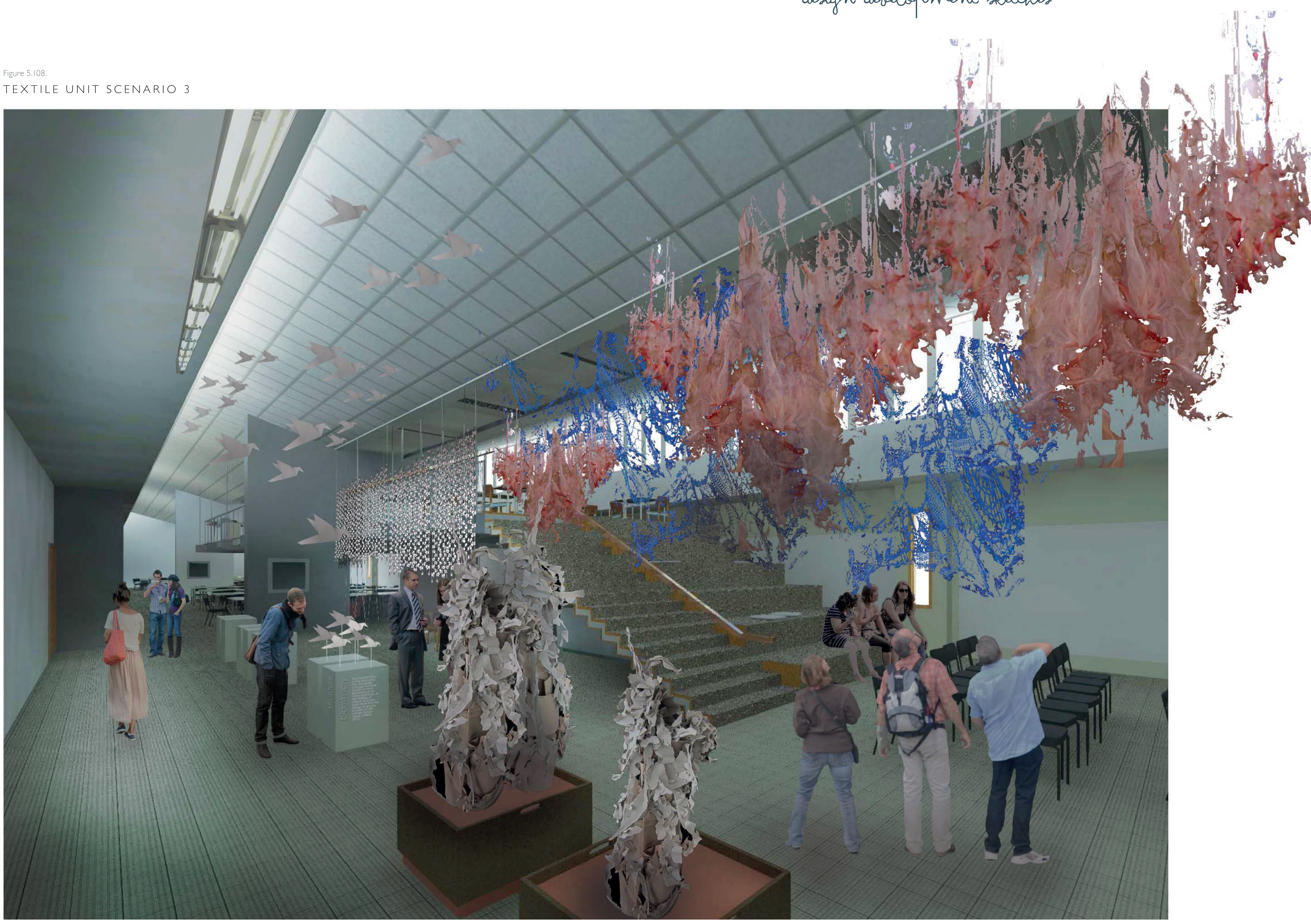


Figure 5.107.
design development sketches

Figure 5.108.
TEXTILE UNIT SCENARIO 3



planar irregularity
CONCEPTUAL DEVELOPMENT

PLANAR IRREGULARITY
INITIAL DEVELOPMENT

Figure 5.108. (below) indicates the initial textile fabrication diagram for the three-dimensional knotting patterns. Further development would indicate knot count and structural cord length. Once these two aspects are determined, approximate material usage and weight can be calculated. This would allow for more accurate specification of rigging hardware, rails and pulleys.

Figure 5.110. Indicates the preliminary development of a textile unit for the computer lab. This installation is a combination of the individual textile unit and a further development of the three-dimensional textile unit.

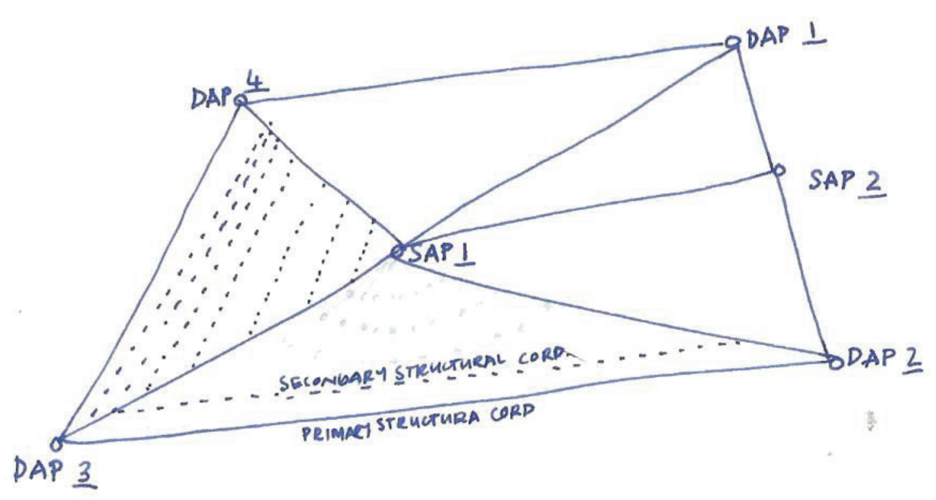


Figure 5.109.
INITIAL TEXTILE FABRICATION DIAGRAM

1. Build scaled model
2. Measure lengths of string, these then form the Primary cords
3. Calculate lengths of Secondary cord
4. Determine knot density in order to determine length of Filler cords.
5. Make scaled sample piece of large textile
6. Determine weight of final textile
7. Adjust fixing hardware and structural cordage

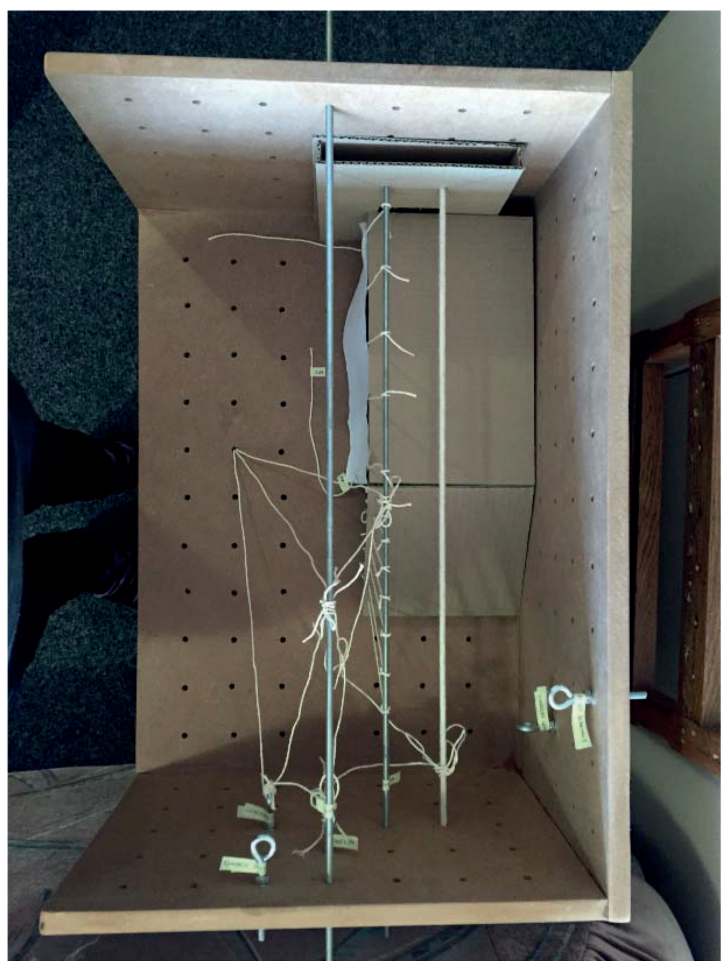


Figure 5.110. View of testing box with textile, scenario three (above).

ADDITIONAL TEXTILE INTERVENTION
COMPUTER LABS

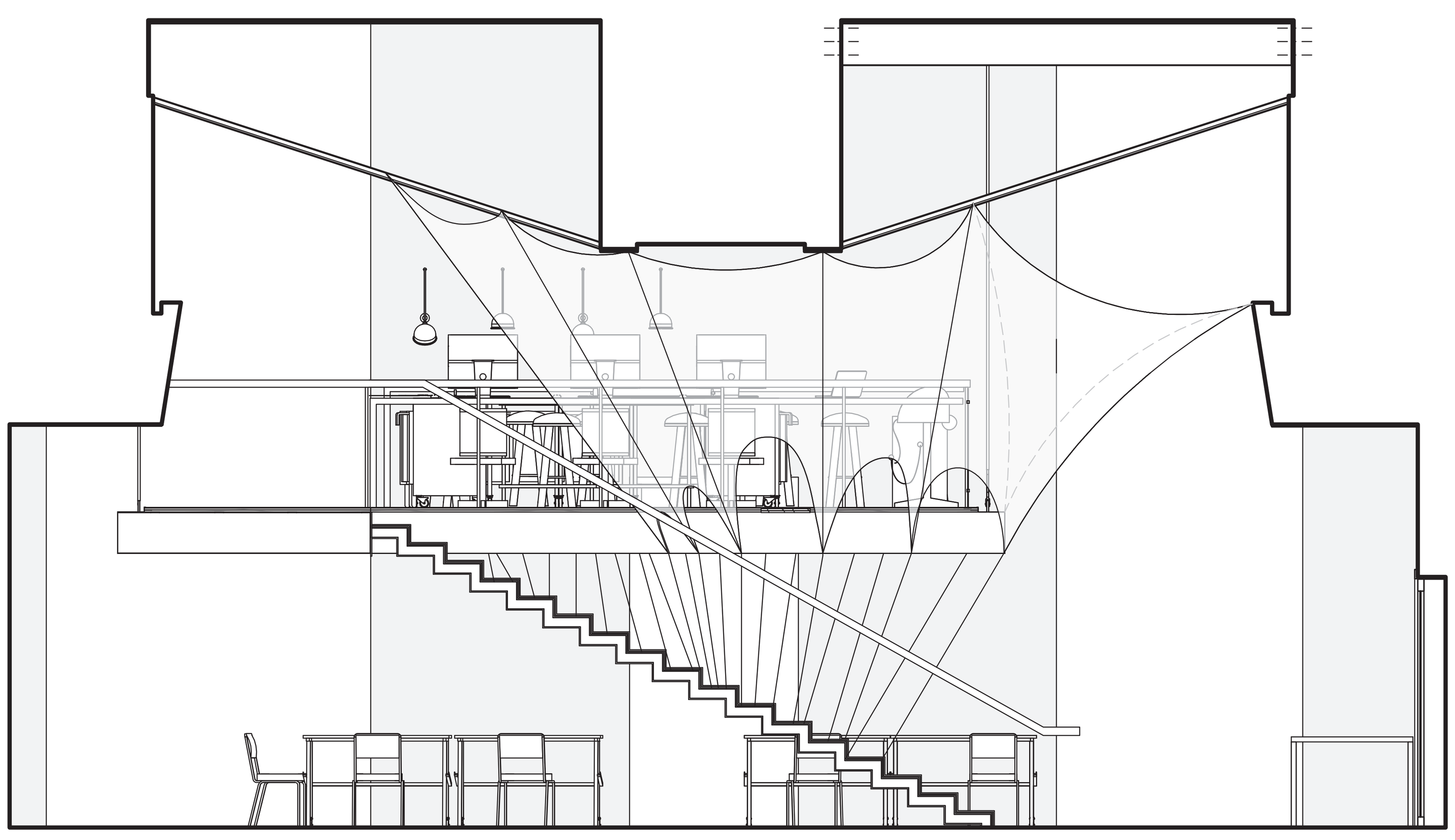
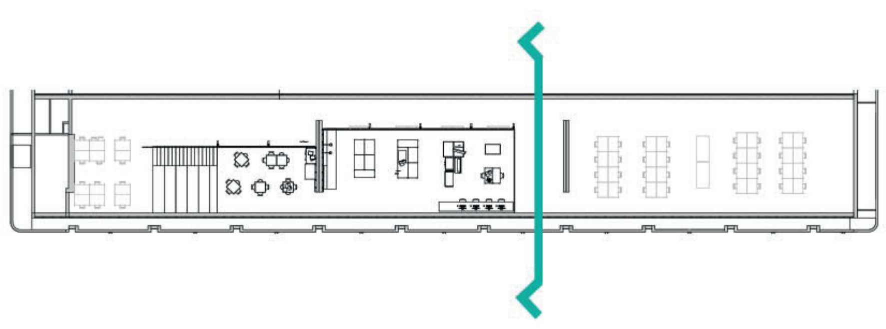


Figure 5.111.
SECTION 3 - COMPUTER LABS



5.14.
POSSIBILITIES AND RESTRICTIONS OF HAND-KNOTTED TEXTILES

Due to the parameters and requirements of the Hybrid research strategy, possibilities and restrictions of the hand-knotted rope and rope-like textiles were discovered and discussed throughout the making process. All observations, in terms of the possibilities and restrictions, can be found within Table 5.5. Test Matrix on poster 12, page 58. With each possibility or restriction (design cycle test result) a response and plan followed. These steps are documented graphically in Figure 5.20. Flow diagram on poster 13, page 59. Further, the major possibilites are discussed in the reflection sections of the design cycles and can be found on poster 14-17, page 60-63.

The knowledge gained through the process of making in terms of the material, the manner in which it responds to certain influences and the spatial possibilities and restrictions are applied during the intervention design cycles

In summary,

- Textiles, specifically hand-knotted rope and rope-like textiles, posses an aesthetic and metaphysical quality that can not be duplicated with the use of traditional or conventional 'hard' space-defining elements. Therefore, textiles offer opportunity for unique spatial manifestations.
- Textiles create a unique connection between the user and the interior environment as it is always '*... present between the body and the hard fabric of the building...*' (Hoskyns, 2007: 87). To add to this, Hoskyns (2007:87) says that:

> For interior architecture not to include soft furnishings [textiles] is to strip the discipline of its relationship with the body, positioning it with the building rather than the body.

- Textile performs well in tension but does not naturally perform well as a 'structure' under compression.
- Textiles or fabric is naturally flat, but hand-knotted rope and rope-like textiles are inherently textured and bulky, offering opportunities for acoustic and visual spatial design responses.
- Textiles posses characteristics that allow for spatial responses that are adaptable and temporary. The temporality of textiles further offer interest in terms of user interaction and change.

5.15. CONCLUSION

This chapter introduced the conceptual thinking behind the design response in the form of a large conceptual diagrammatic image board. The design process was described and applied to the various test sites in order to fully explore the hand-knotted textile. The design cycles were documented and include planning, making, observation and written reflection. The design process culminates in textile space-defining elements placed within the test site for intervention. Finally the chapter offers a short summary on the possibilities and restrictions of hand-knotted textiles.