07
TECHNOLOGY

> The drawing has always played a central role in architecture. It is the graphic language that architects use to express an idea and, consequently, it is intimately linked to the history of architecture, having been its principal mode of translating ideas into reality. The drawing is the architect's essential means of expression and communication, the tool most often used to convey his or her intentions to clients, builders, and the general public. While, like any other means of representation, it has a limited ability to reflect the real world, it is the mechanism that allows for the best reading of the relationships between a project's formal, functional, and technical aspects.
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> Depending on the standpoint from which it is analysed, the architectural drawing has great importance as a document. It is considered a work of art in and of itself and, in this respect, each document can be analysed in terms of composition, colour, or intent. With regard to its creator, the drawing has enormous biographical interest, reflecting his or her ideas and architectural reasoning, and even his or her moods. Finally, the drawing is also of documentary interest vis-à-vis the architecture. (Bahamón, 2005:8)

This introduction to *Sketch-Plan-Build, World Class Architects Show How It's Done* is a suitable description of what we as architects do, how we communicate with our audience of the public. Through the process of iteration of the ideas and drawings for this design, the discovery of one's own intentions are interesting to note, how such ideas reveal themselves. How the tectonic intention is deeply imbedded in the early stages of the design without being intentional. The approach to any design project is deeply rooted in the technology that will be used in the final product. The process is not product-driven, rather technology-driven, and also by the systems that dictate the product and the form of the product.

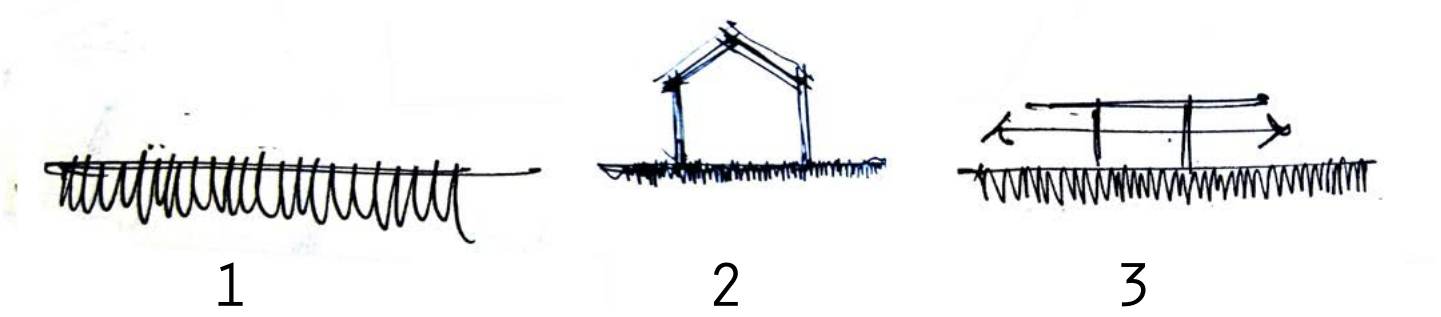


fig.7.1. DIAGRAM OF THE CONCEPT INTENTION FOR THE NEW AGRICULTURE ARCHITECTURE ON IRENE DAIRY FARM.

1. CONVENTIONAL AGRICULTURE: The norm is that agriculture takes place on the landscape that is available.
2. CONVENTIONAL AGRICULTURAL ARCHITECTURE: Portal frame structures are used to create maximum sheltered space with minimum structure. ''Portal frames are very efficient in material use and are therefore competitive in price. However, they do have large labour content and need to be accurately made.'' (SAISC, 1994:12.1)
3. SIMPLE AGRICULTURAL ARCHITECTURE: To create continuous and unobstructed space for the learning process of agriculture within a sheltered space. This is the intention of the architectural vision on the site.

The issue in question is the fact that in Africa, and specifically southern Africa, agriculture is the sector from which most rural communities derive their livelihoods and financial income. It is also the source of food for both rural and suburban communities. "Most people in sub-saharan Africa live in rural areas, and most Africans work in agriculture (57.3 percent), according to data from the UNFood and Agriculture Organization (faostat)" (Dercon & Gollin 2014:2).

According to the Agricultural Household census (2011), undertaken by the Department of Agriculture, the majority of households involved in agriculture are managed by men and women between 45-54 years old, and consist of 10.8of men and 10.5 percent of women (Statistics South Africa, 2013:3).

The smallest age bracket is between the ages of 15-29 years old and is made up of 5.7 percent of men and 3.9 percent of women. The research also indicates that there were in general more males (52.1 percent) than female (47.8 percent) agricultural household heads (Statistics South Africa, 2013:3). These numbers bear witness to the scale of the issue, which can be accounted to the fact that the youth in South Africa contribute to the stigma that agriculture is not a viable career choice in the twenty first century; rather that it is an activity that grandparents practice in the rural communities in southern Africa. The intention of this learning facility is to turn agriculture into an attractive career choice for the youth of our country, where they can contribute to the economic strength of the country and the sustenance of our society.

The location for this learning and didactic facility is the Irene Dairy Farm in the suburb of Centurion in Pretoria. The site is situated between the city fabric of Pretoria and the productive landscape around the city, specifically the Delmas agriculture landscape. This gives the opportunity to bridge this difference in the activities in the city and the suburban areas, specifically.

The greatest challenge that agricultural development faces is the means by which agriculturalists learn. "How farmers learn" is a topic of discussion all around the world, and this issue is also echoed in South Africa. According to Mutizwa Mukute in his paper "Improving Farmer Learning in and for Sustainable Agriculture in Southern Africa of 2010", "approaches to, training and perceptions of sustainable agriculture in the region are currently rather negative, under-resourced and weak" (Mukute, 2010:2).

The intention of the technology that will be used on the site is that it should be as simple as possible so that the students can apply this technology in the future after graduating from the institute [Refer to page 047, *Pole Pass Retreat* by Olson Kundig]. Blurring the thresholds between the internal and external spaces, with flexible facades and sliding doors will achieve this. The architecture will form the edges and the boundaries of the public spaces and the farmyard and schoolyard. These boundaries will be articulated by water channels and yard walls to define the public and private spaces on the site, and will determine the public movement on the site in general. This relates to the practice of conventional agriculture that takes part on the landscape that is available for agricultural activities.

The basic principles of uniformity for profile sizes of steel members for columns and beam structures will form the basis of the simple construction approach that will be employed. To keep the construction as simple as possible determines that the members should be easily handled and easily constructed.

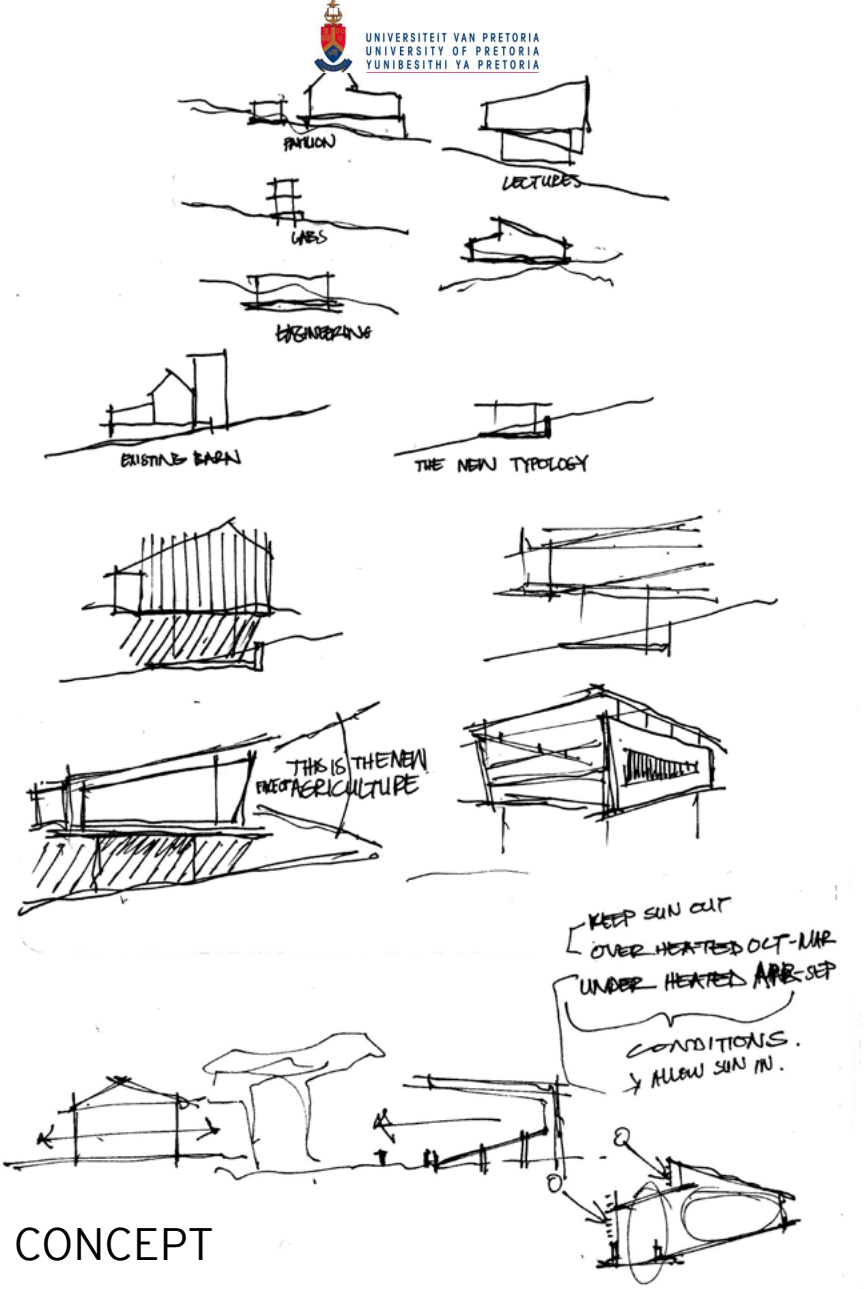


fig.7.2. TECTONIC CONCEPT

EXISTING TYPOLOGY VERSUS NEW TYPOLOGY

The existing typology has a strong stereotomic base from where the light tectonic elements are placed on this heavy base. The intention of the new typology is to simply extend the horizontal surface with the stereotomic elements and then place the light weight tectonic elements on top of the extension of the landscape.

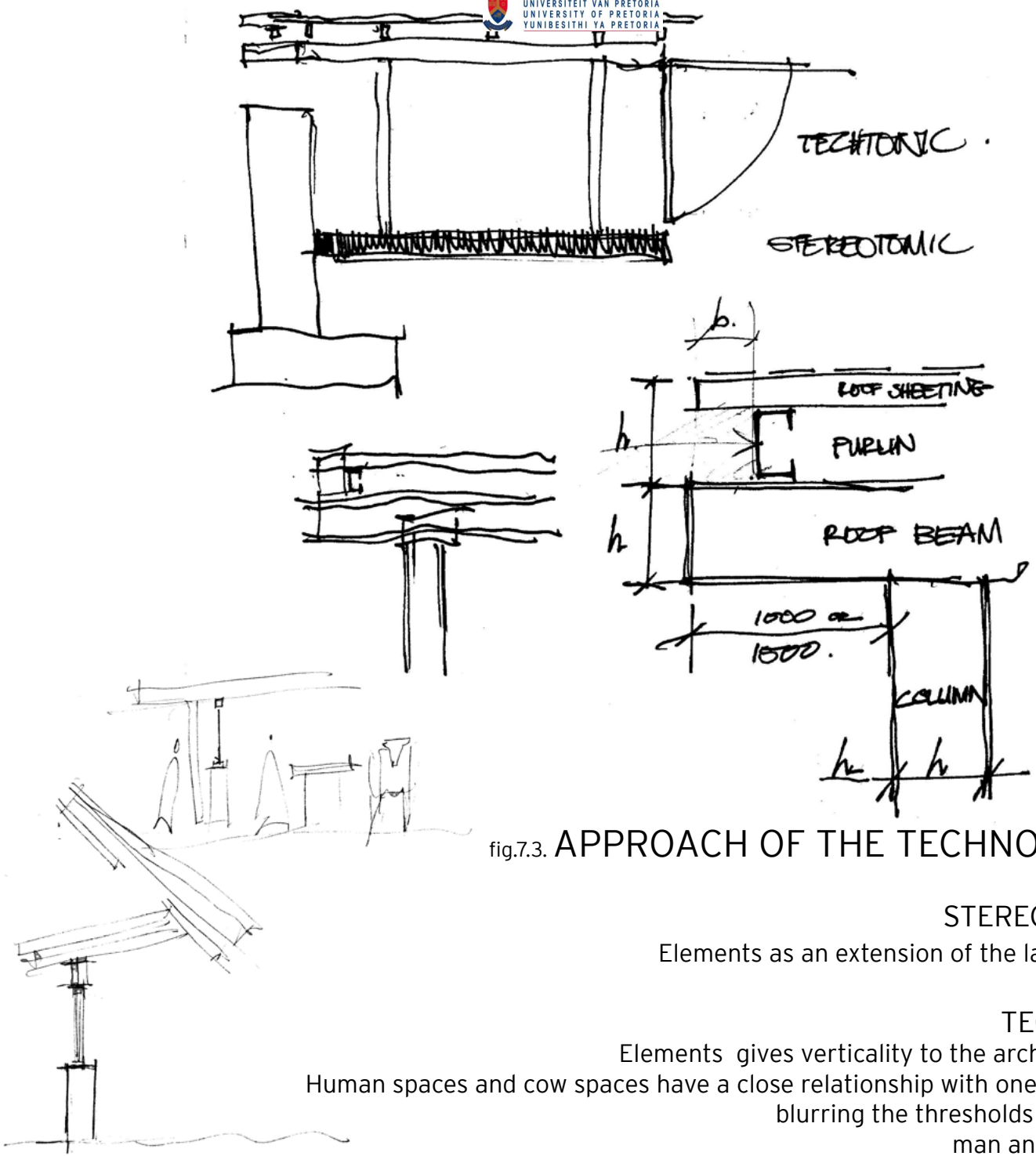


fig.7.3. APPROACH OF THE TECHNOLOGY

STEREOTOMIC

Elements as an extension of the landscape

TECTONIC

Elements gives verticality to the architecture.
Human spaces and cow spaces have a close relationship with one another, blurring the thresholds between man and nature.

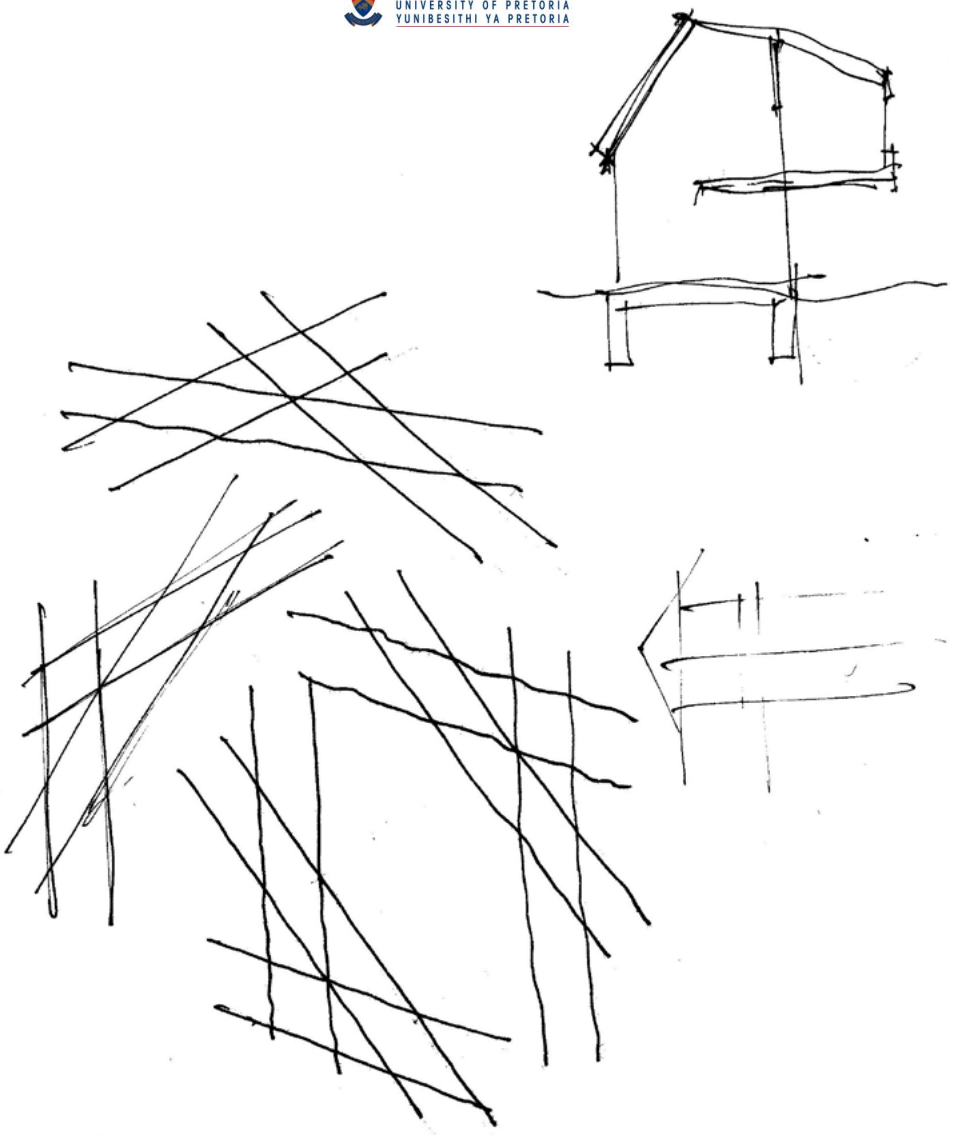


fig.7.4. TECTONIC INTENTION: LIGHTWEIGHT ENVELOPE

The initial intention for the technology that will form the architecture on the site is informed by the composition and the geometry of the haunch support between an I-profile column and beam. Juxtaposing the distilled geometry of these elements creates an applicable composition for a plan and section application for the new architecture on the site.

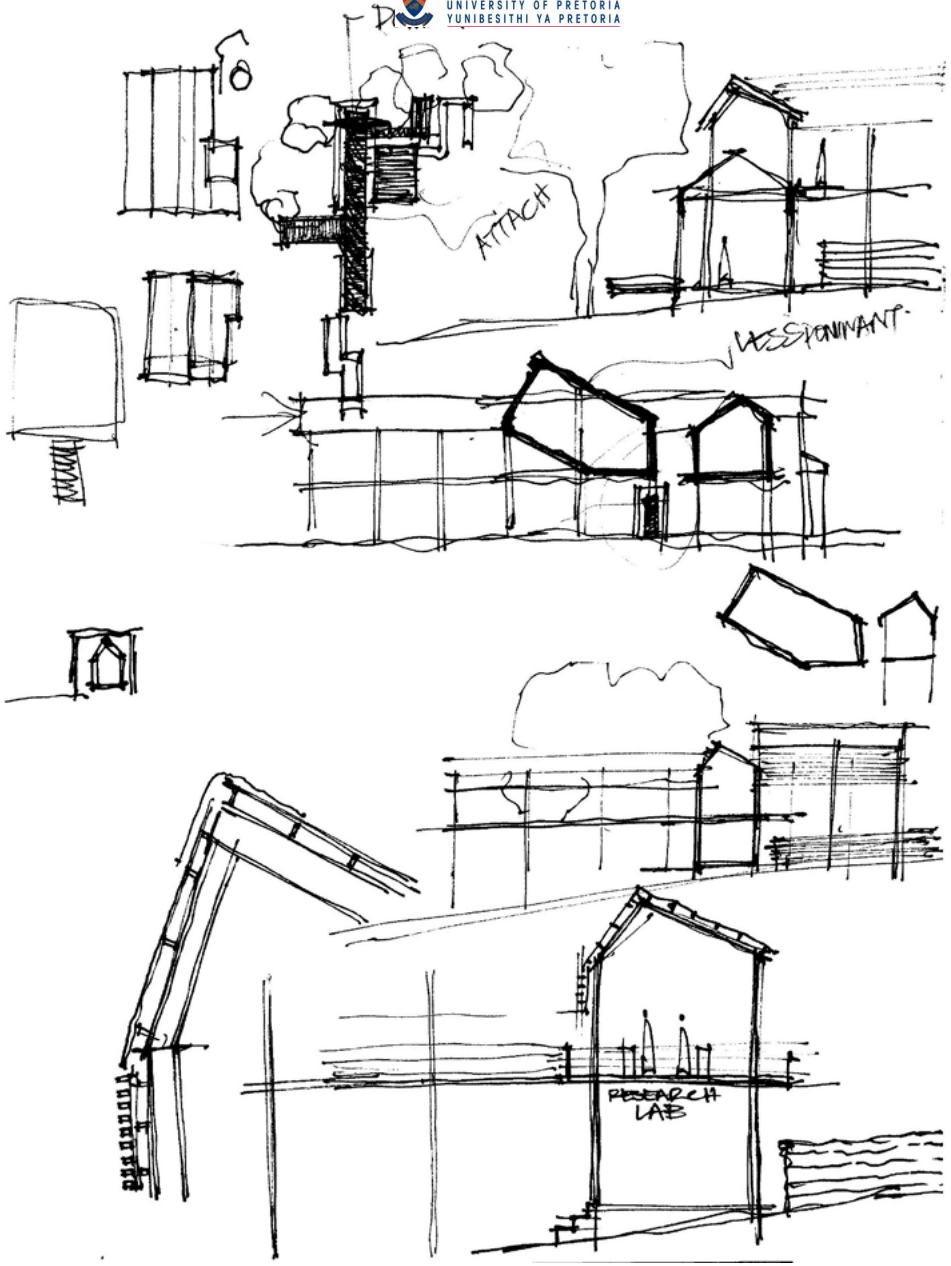


fig.7.5. THE NEW TYPOLOGY

This image depicts some of the initial ideas for the envelope of the new structures, being as light as possible and is informed by the existing practice on the site, where the infill is done in a tectonic fashion while the stereotomic elements extend the horizontal landscape of the terrain.

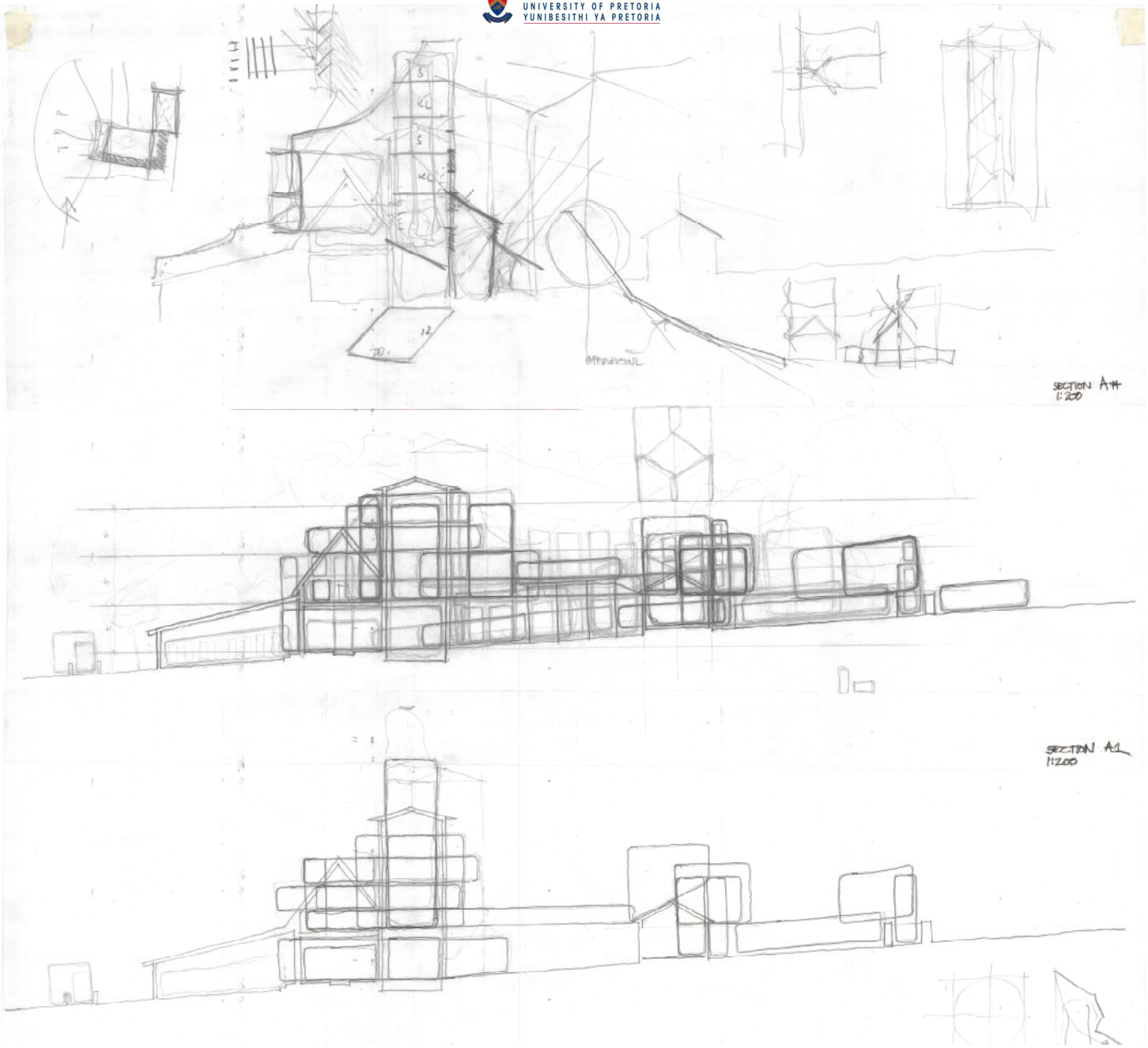


fig.7.6. MAIN STABLE FORMS

The Main Stable was reduced to the essence of its form and the composition of these forms. These forms became the kit-of-parts for the shape of the new typology.

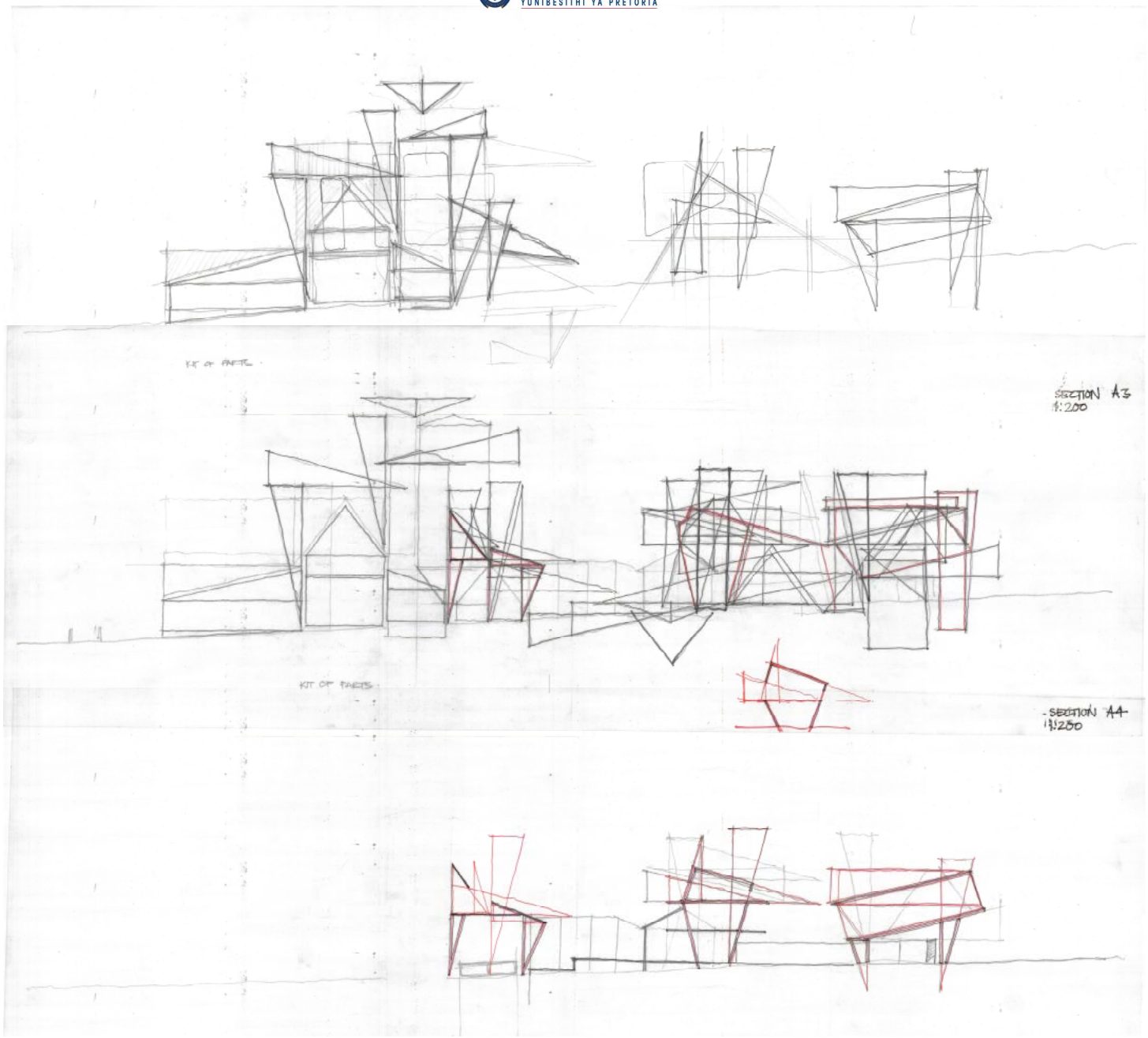


fig.7.7. KIT OF PARTS

By manipulating this kit of parts that make up the form of the Main Stable the new typology grew and revealed various option for the intervention.

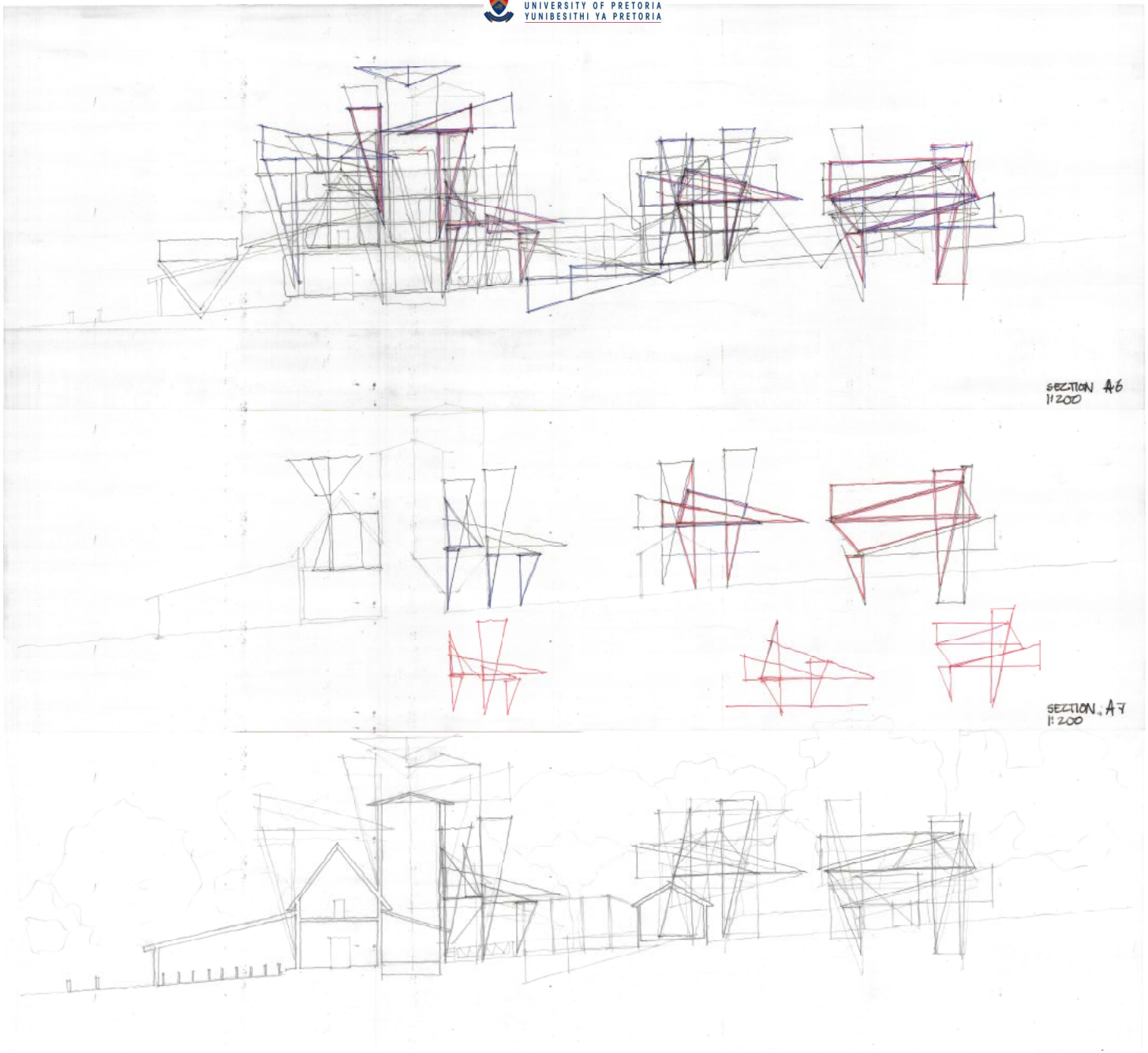


fig.7.8. DEVELOPMENT OF THE NEW TYPOLOGY
The various options for the new typology became clearly distinguishable as contemporary and not simply a re-interpretation of the existing historic fabric.

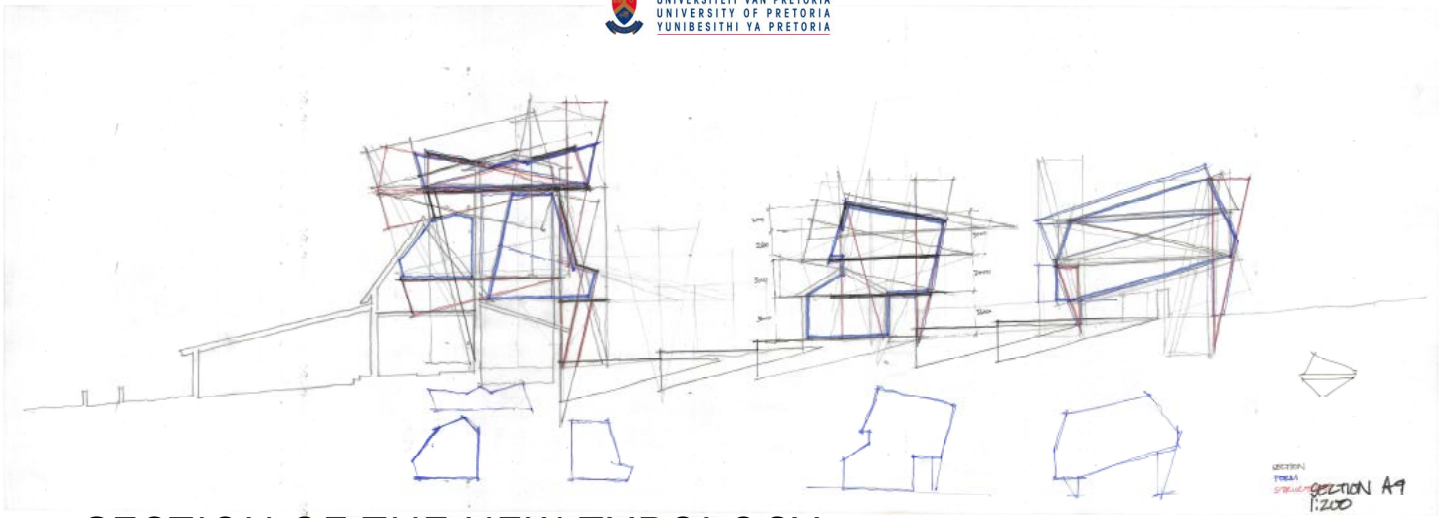


fig.7.9. SECTION OF THE NEW TYPOLOGY

This section depicts the form of the new architecture on the Irene Dairy Farm.

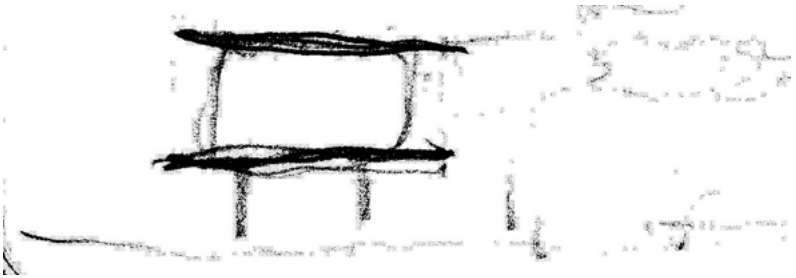
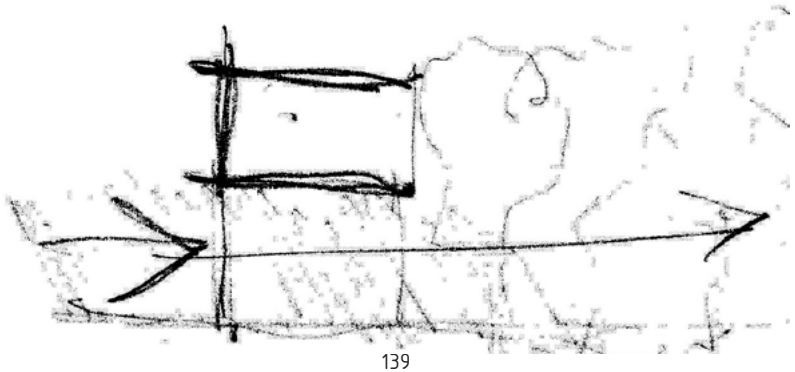


fig.7.10. EXTENSION OF THE LANDSCAPE

By extending the landscape on which agriculture takes place. The architecture will be inserted in such a manner that it does not obstruct the activities related to agriculture.



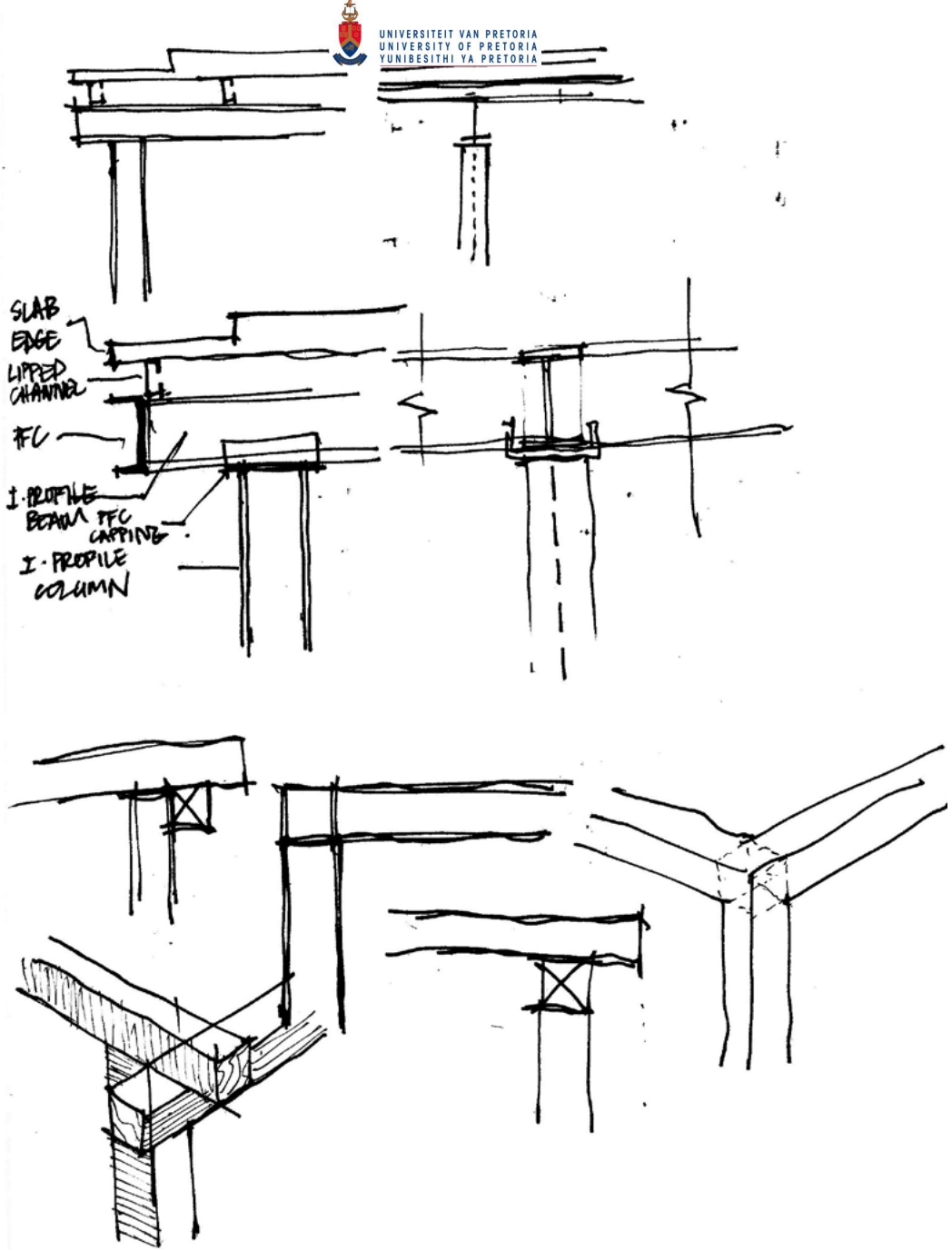


fig.7.11. STRUCTURAL INTENTION: UNIFORMITY.
Standardised connections and details.

STRUCTURAL STEELWORK AS A CHOICE FOR TECTONIC APPLICATION

The choice for the tectonic elements suggested in the design of this dissertation is that of structural steelwork. According to the Southern African Structural Steelwork Detailing Manual "The term structural steel is used to describe the steel members whose function it is to support the loads or resist the forces that act on a structure." (SAISC, 1994:2.1)

The fact that structural steelwork is described as a versatile material makes it an logical choice as material for the new architecture on site. This relates to the attitude that has been practiced on the Irene Dairy Farm, where all additions on the site has been done with structural steelwork, for its easy application and the relatively lightweight of the material.

Historically this varied slightly with the addition of a heavy stereotomic plinth, usually done with rock that was sourced on site, with light structures fulfilling the tectonic requirements, done with timber members, also sourced from the site. Although this was in a time when the farm produced lumber in large quantities and with no environmental consciousness towards the sustainability of timber as a building material in the region. Replacing the timber used as a tectonic elements with steel will give the new typology its unique aesthetic which will be protected with sustainable timber cladding material, or with light steel mesh.

The last aspect of the steelwork as material and structural choice is the "desirability of using standardised steelwork connections and details." (SAISC, 1994:ix).
This in turn ties in with the tectonic concept to keep uniformity in the structural system which reduces the construction period of the new buildings and keeping the construction as simple as possible to relate to the practical learning experience of the intended programme. The students of the learning facility should be able to apply this new knowledge of technology in the future in their own farming endeavours.

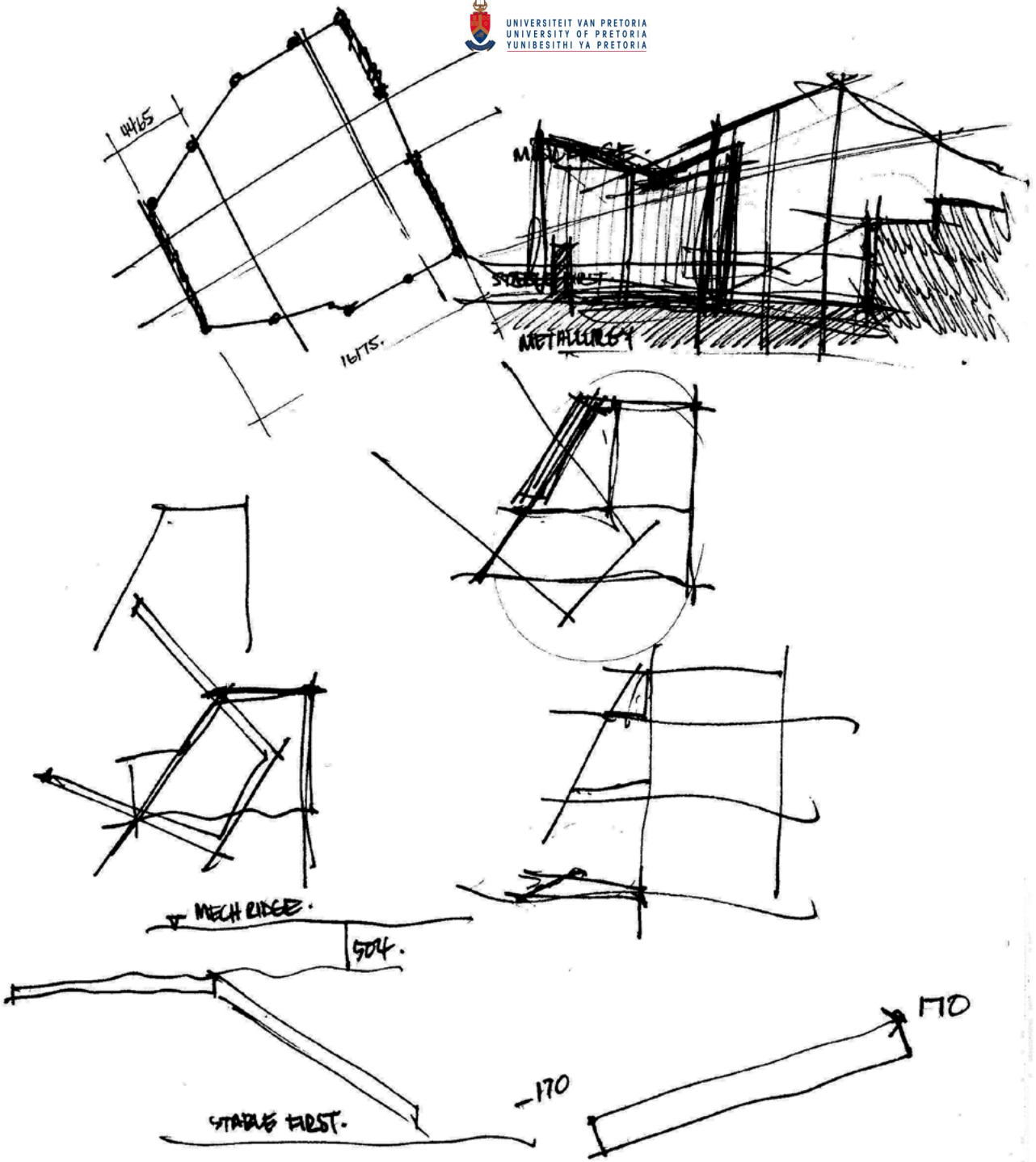


fig.7.12. INITIAL FORM OF LECTURE SPACE

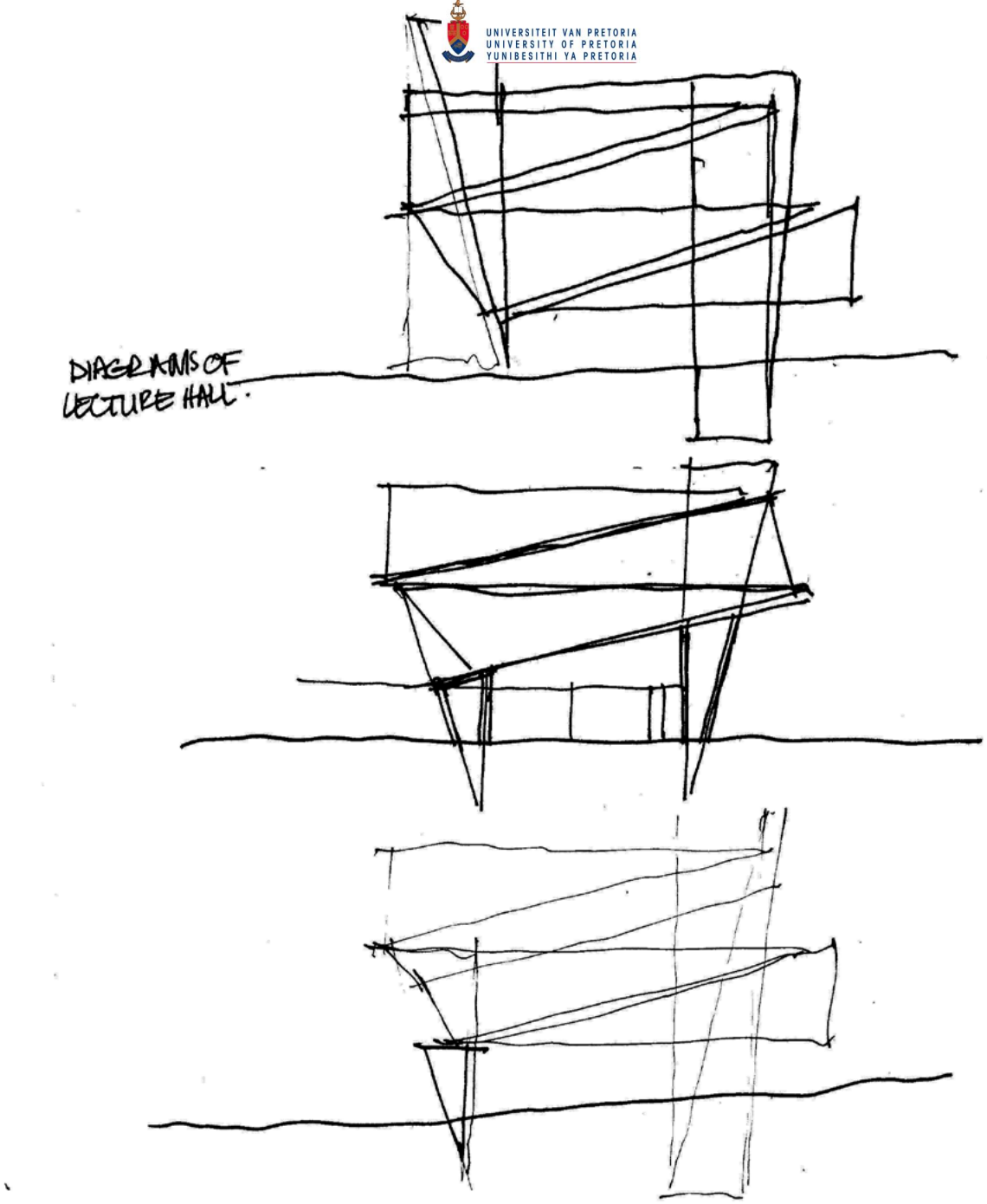


fig.7.13. DEVELOPMENT OF THE LECTURE SPACE.
Creating a clearly new language on site

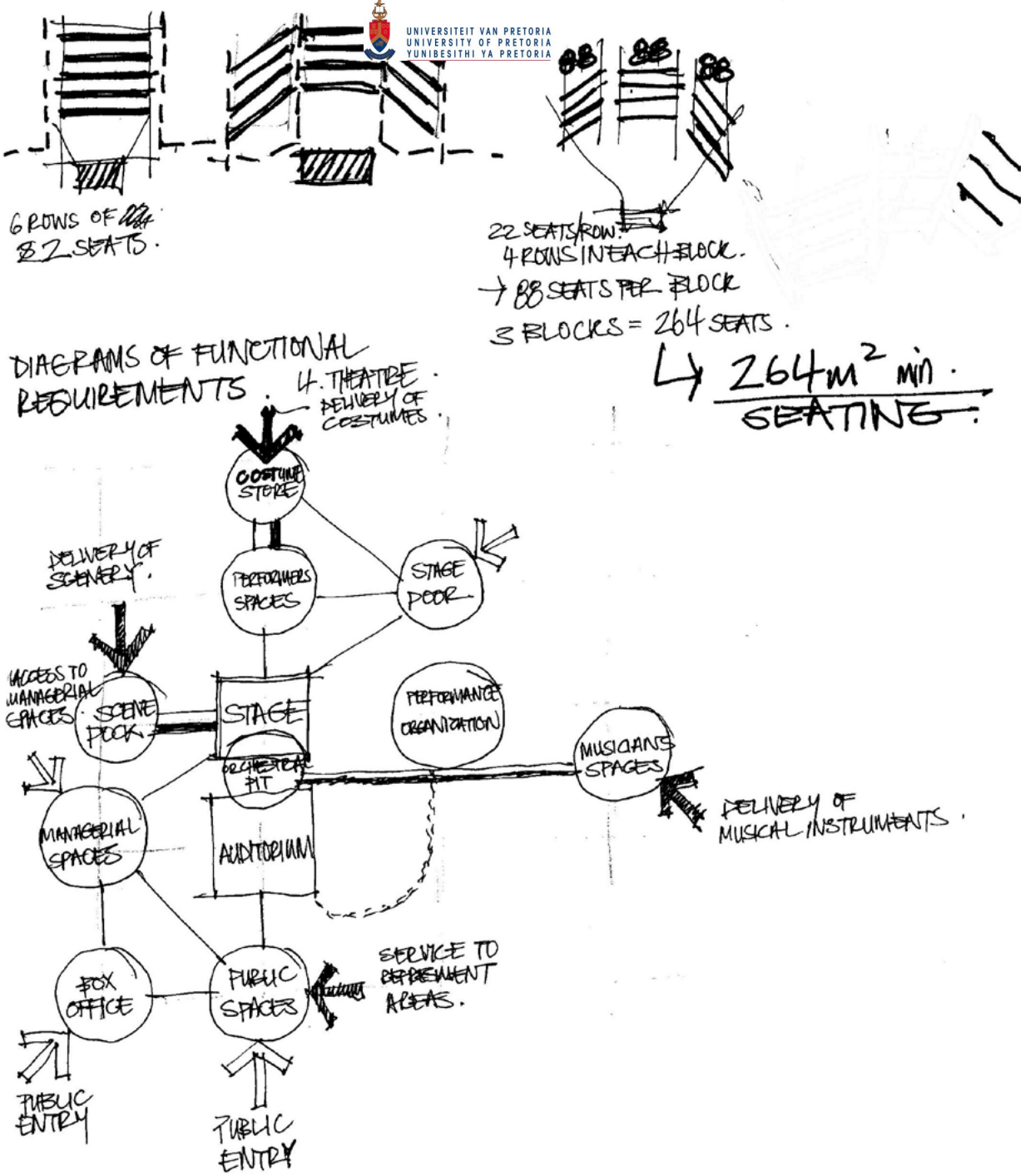


fig.7.14. DIAGRAMMATIC LAYOUT OF AUDITORIUM SPACES
from the Metric Handbook (Adler, 1999:20,13).

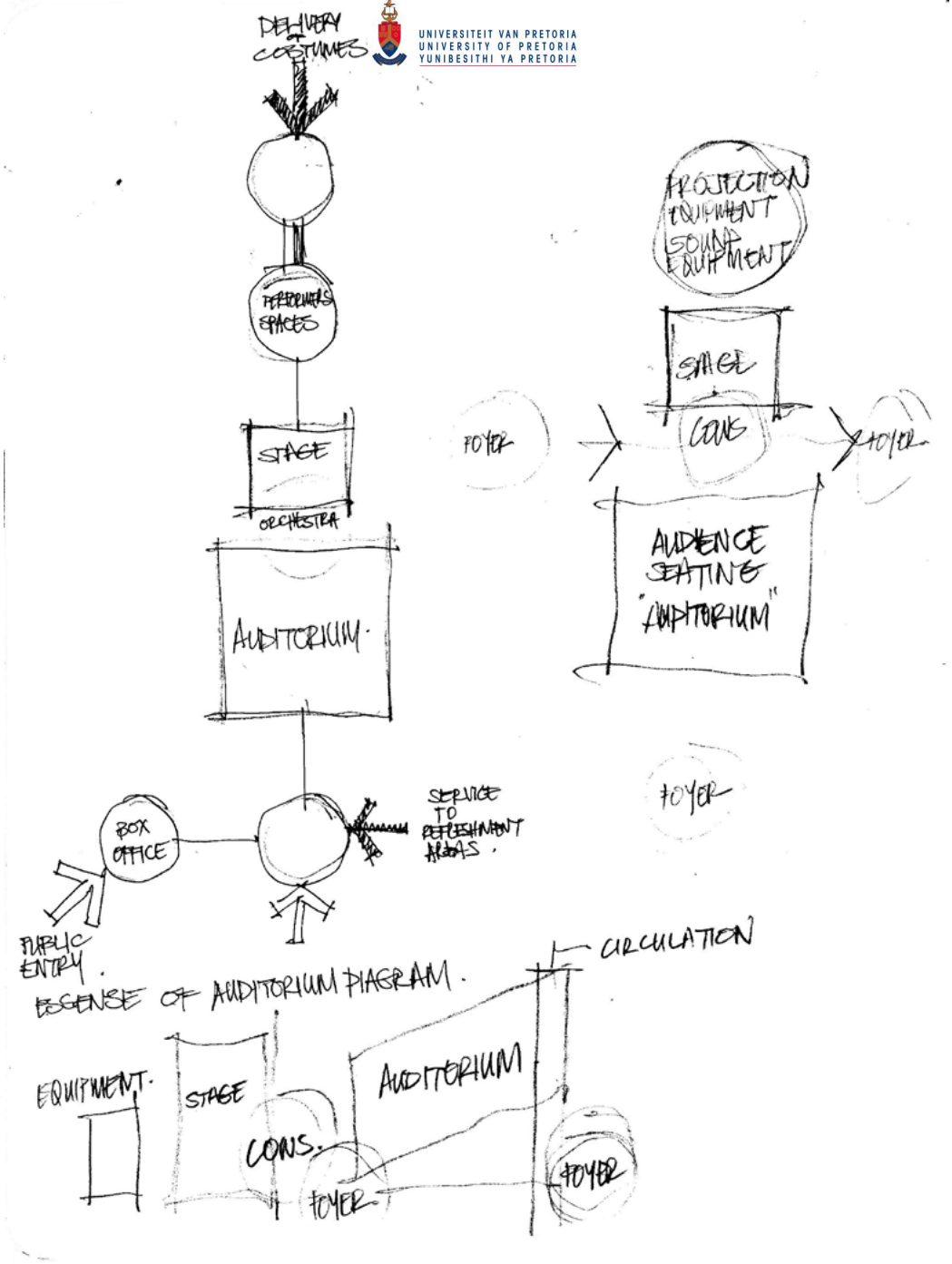


fig.7.15. REDUCING THE DIAGRAMMATIC LAYOUT OF AUDITORIUM SPACE
from the Metric Handbook (Adler, 1999:20,13).

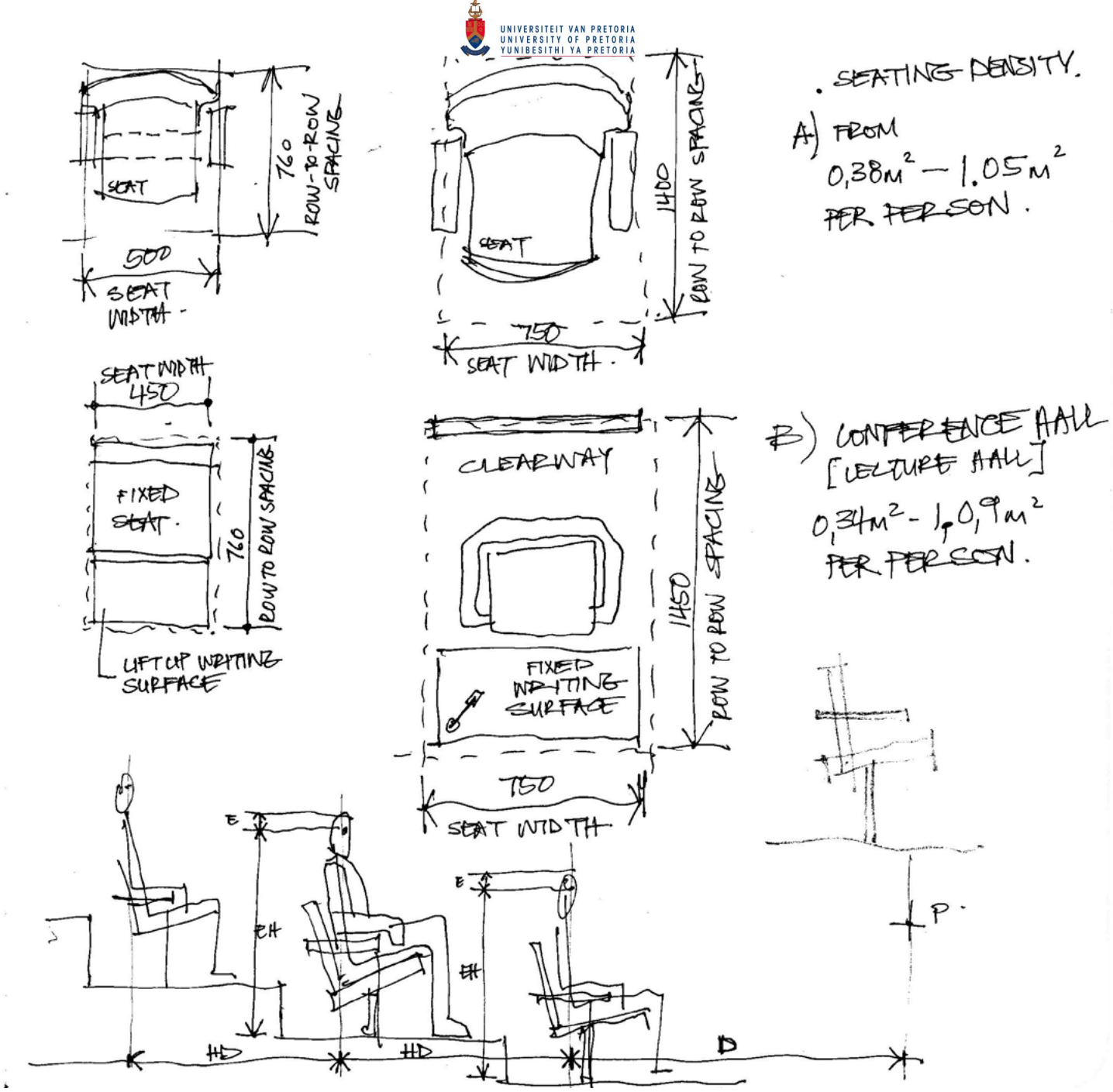


fig.7.16. SEATING DENSITIES AND GRAPHIC OF VERTICAL SIGHT LINES
from the Metric Handbook (Adler, 1999:20,7).

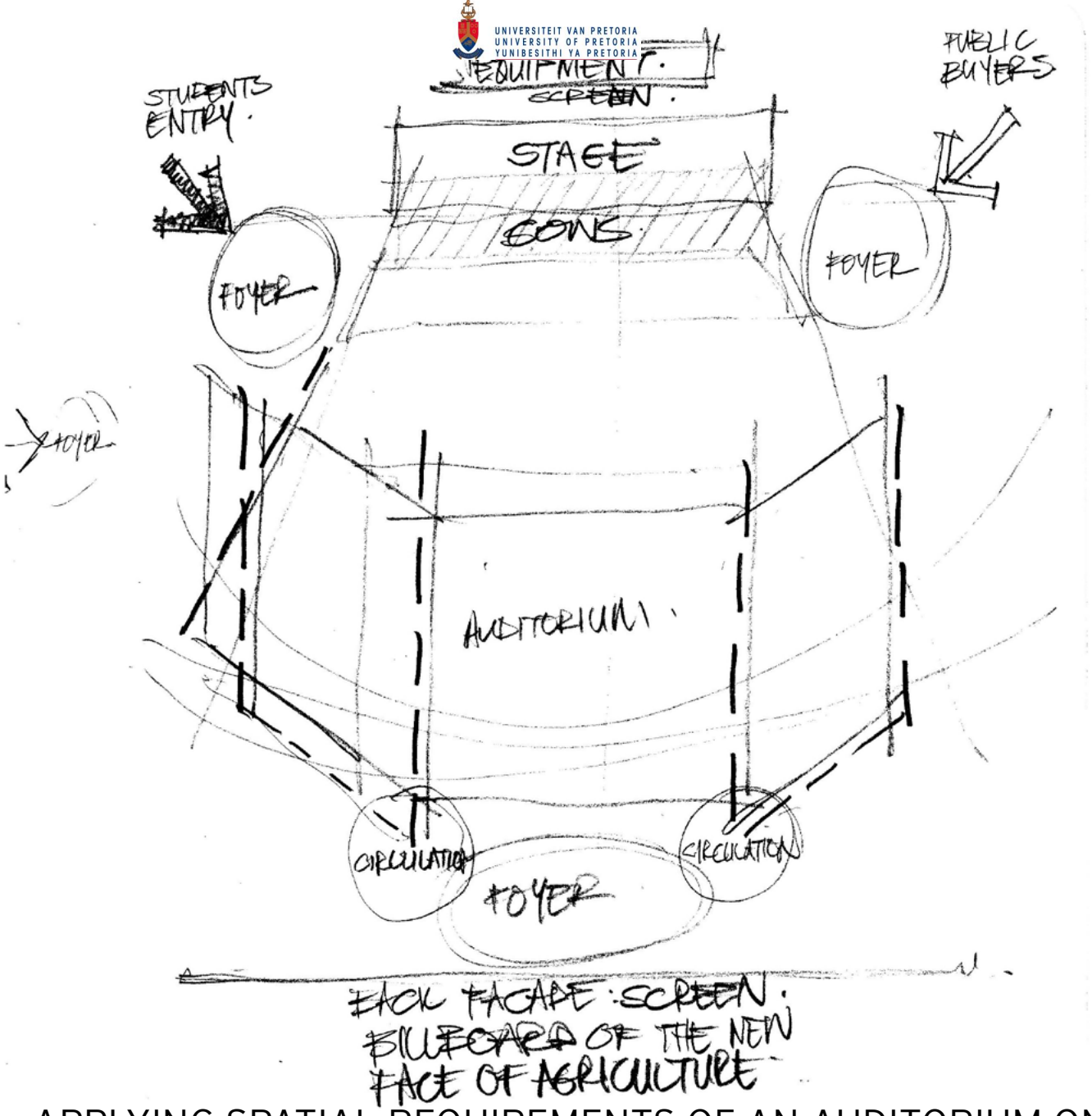


fig.7.17. APPLYING SPATIAL REQUIREMENTS OF AN AUDITORIUM ON THE IRENE DAIRY FARM.
This was determined by the functional requirements of the learning facility.

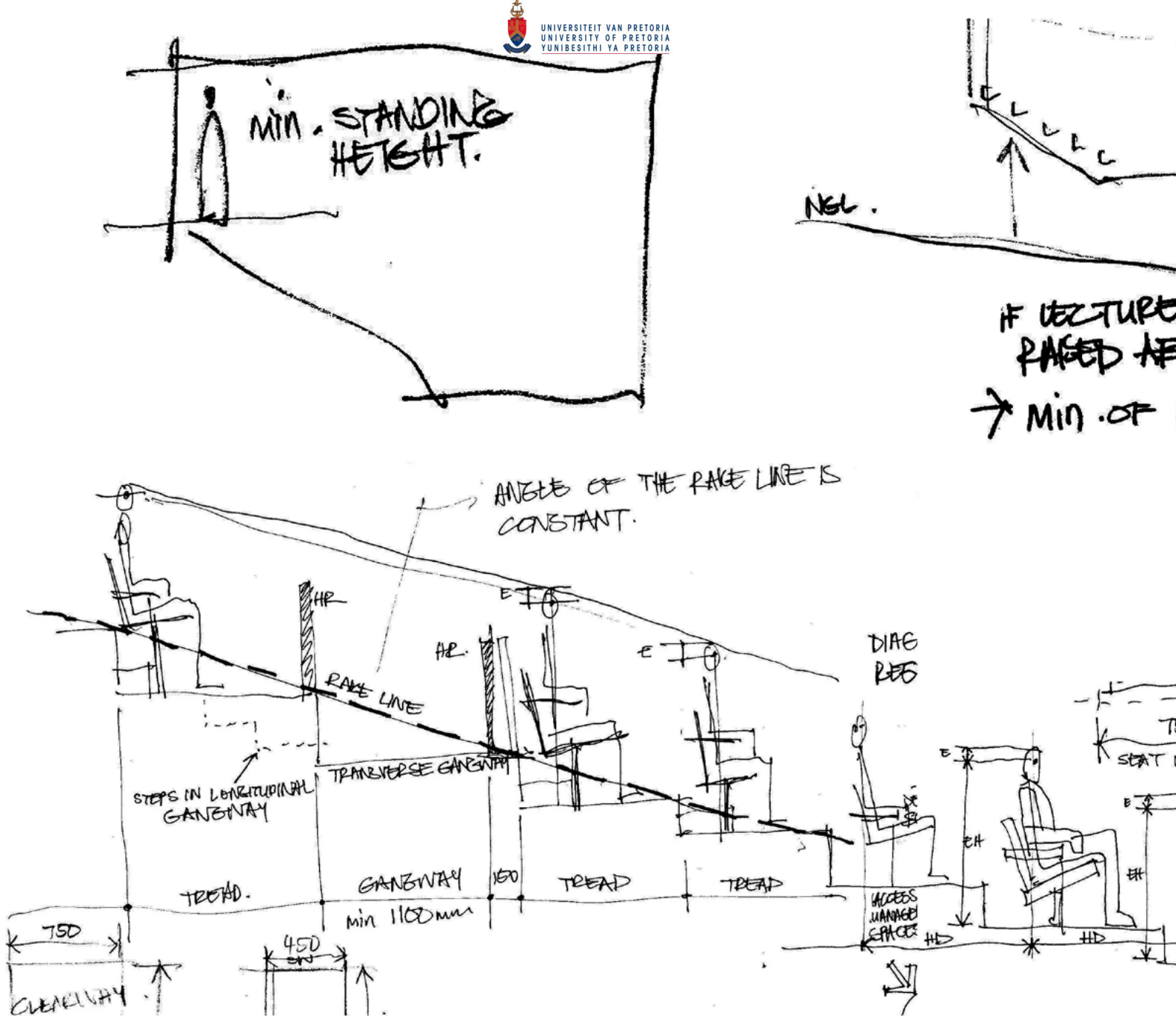
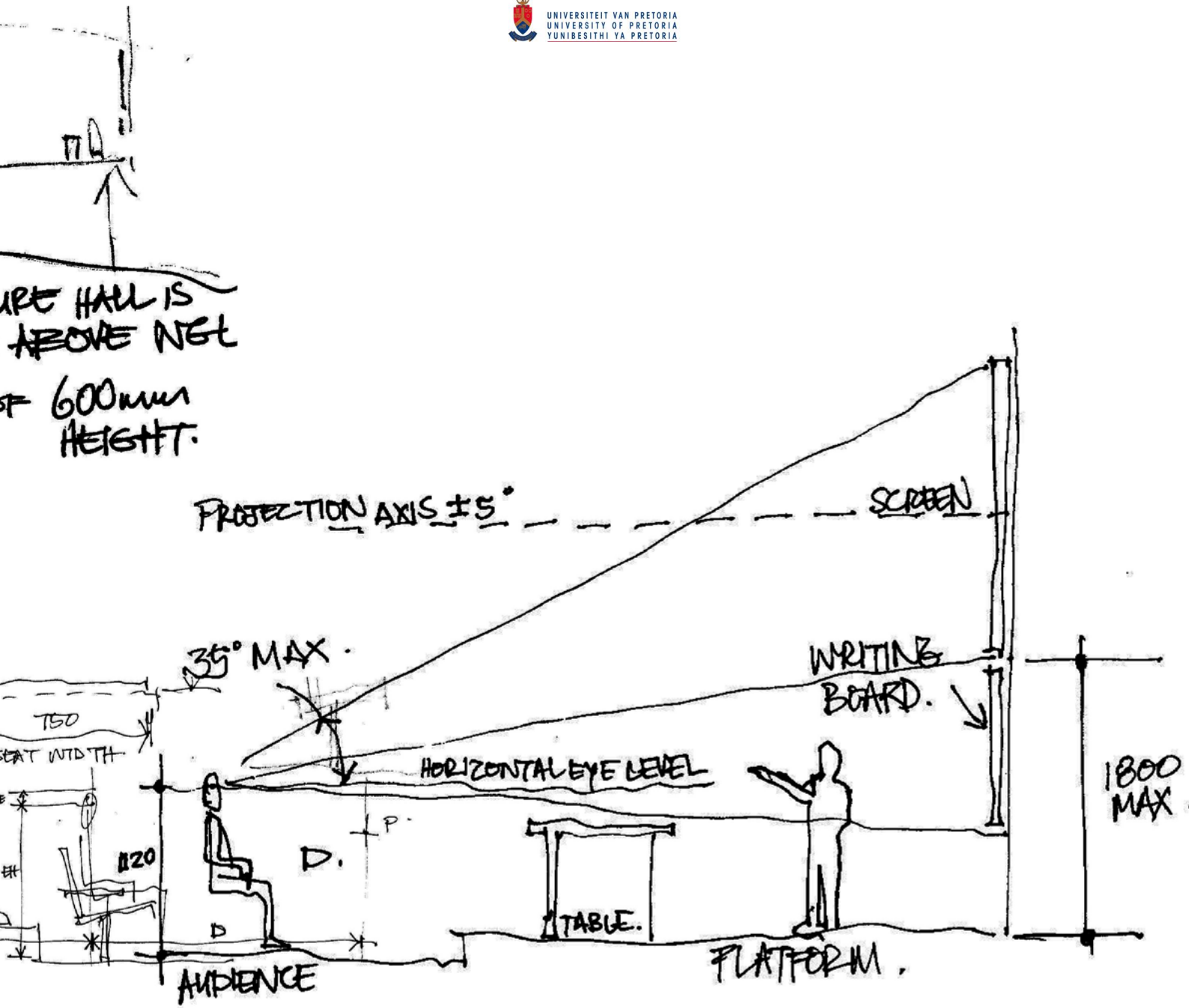


fig.7.18. LECTURE THEATRE

This combined diagram depicts the basic requirements for a theatre intended for lectures, informed by the Metric Handbook, by David Adler.



The left portion showing the "sight lines at a transverse gangway" (Adler, 1999:20,8), the next portion of the diagram showing the "vertical sight lines" (Adler, 1999:20,7), and the last portion depicting a "section through a lecture theatre" (Adler, 1999:20,28).

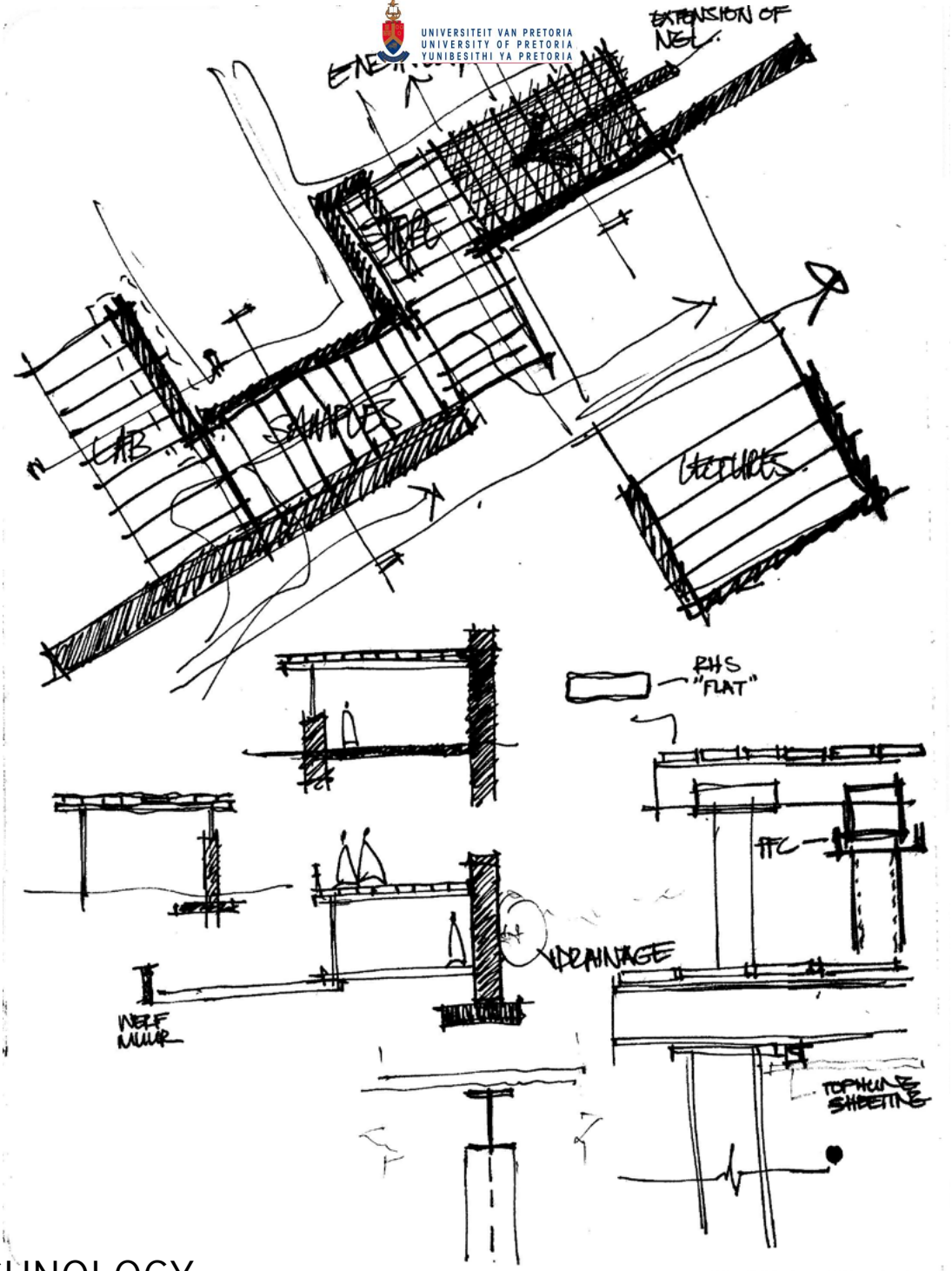


fig.7.19. TECHNOLOGY.

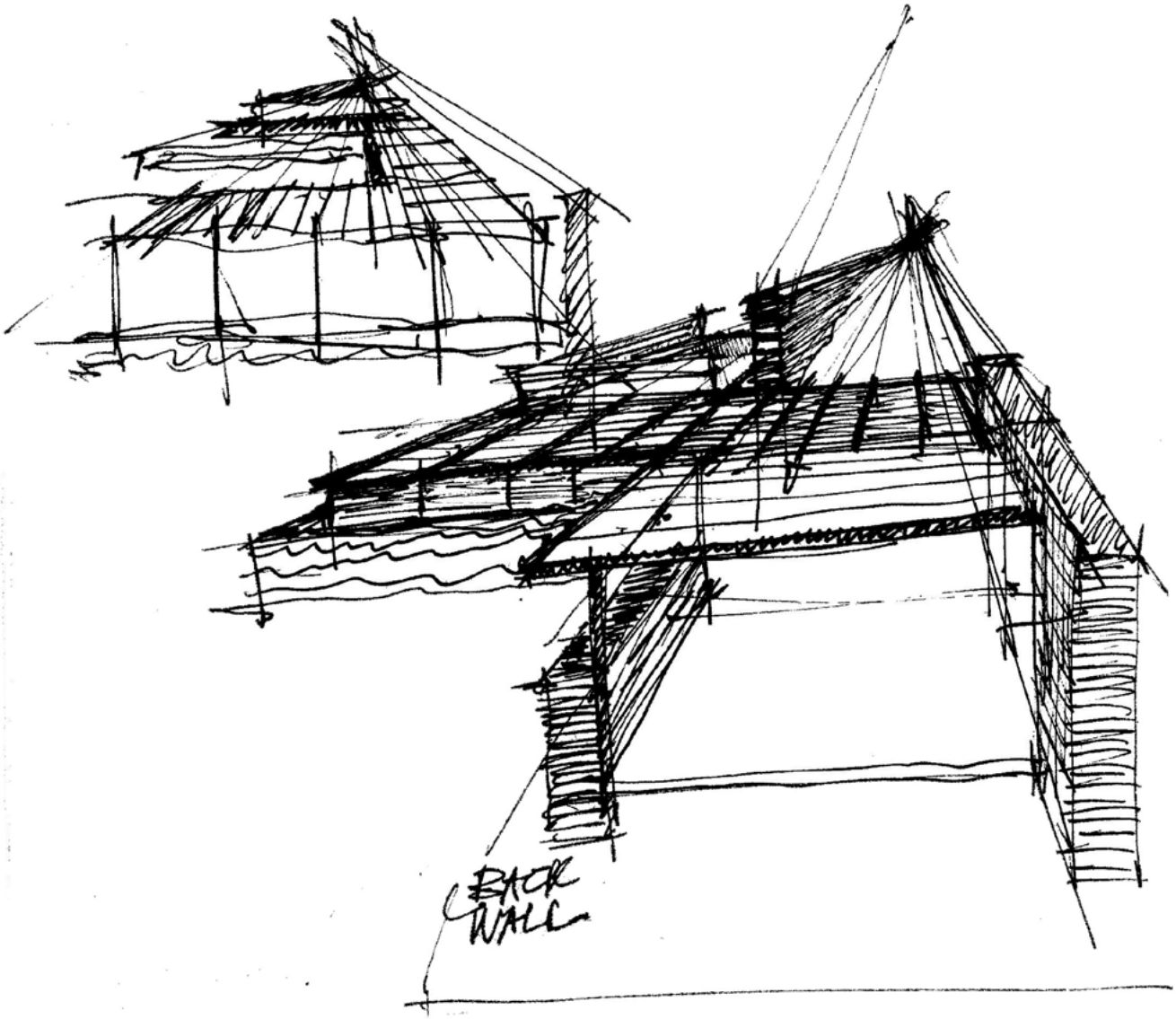


fig.7.20. TECHNOLOGY DIAGRAM.

The technology that will be used in the construction of the new architecture on the Irene Dairy Farm, separating the horizontal and vertical elements and emphasizing the horizontal proportions of the architecture.