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socio-economic context

002.1

"In the 1980's, the South African government took a policy decision to have more power stations than the country needed at that time so that we could offer investors the 'cheapest electricity in the world'. Eskom built so many power stations in the 1980's and early 1990's that we had 25-30% excess electricity capacity, but this was not accompanied by a meaningful expansion of the electricity grid for ordinary people. The fact that most electricity is generated from poor-quality coal has meant that South Africa is one of the worlds worst polluters. Its CO^2 emission per unit output per person in 1999 was 20 times worse than that of the US."

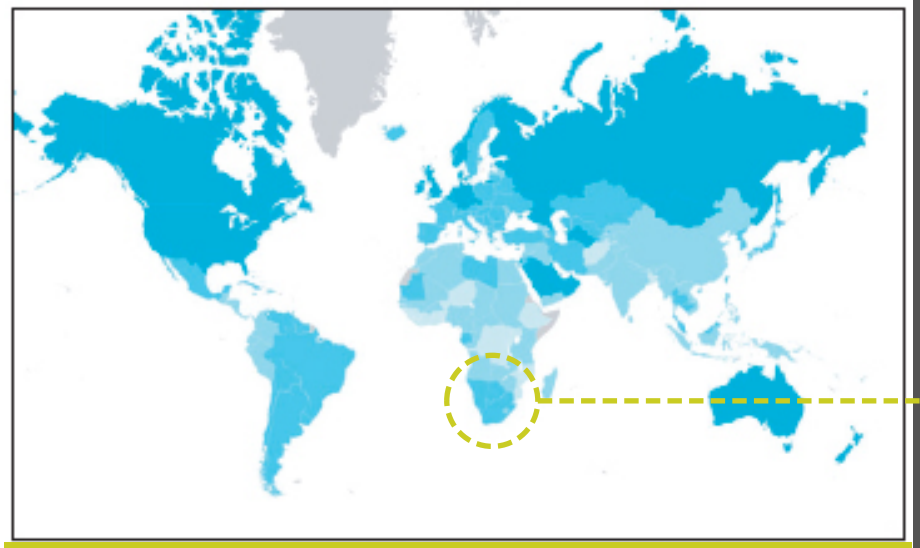


Figure 1 : Greenhouse gas emissions per capita (darker shades represent higher levels of emissions) (www.maplecroft.net)

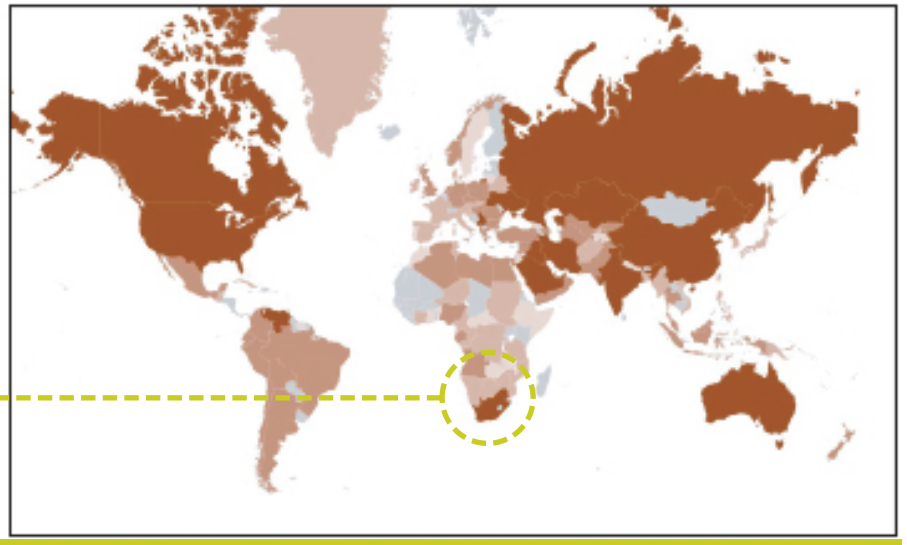


Figure 2 : Carbon resources - oil,gas & coal (darker shades represent higher levels of reserves) (www.maplecroft.net)

"South Africa contributes 1.8% of total greenhouse gases, making it one of the top contibutors world-wide. The energy sector is responsible for 87% of CO^2-, 96% of sulphur dioxide (SO^2)-, and 94% of nitrous oxide emissions. Due to the fact that our domestic economy is powered by coal, South Africa has experienced a five-fold increase in CO^2 emissions since 1950. South Africa accounts for 41.9% of Africa's CO^2 emissions, followed by Egypt (14.1%), Nigeria (10%), Algeria (9.9%), and Libya (4.8%)."

"Since 1970, South Africa has consistently consumed the most energy and emitted the most carbon per dollar of GDP among major countries. South African energy-intensity measured 33.5 K BTU per $ unit - nearly China's level." (Bond. 2006:3)

"The South African Government is bringing into action it's voluntary commitment to climate-change mitigation, and Cabinet has mandated the National Treasury to investigate the possible imposition of a tax on carbon-dioxide (C02) emissions. Under the Country's newly adopted strategic direction and framework for climate policy the Treasury would examine the most appropriate fiscal measures to support government's Long-Term Mitigation Scenario (LTMS), which could include escalating 'CO2 taxes', a 'cap-and-trade' system, as well as incentives to help place South Africa's economy on a low-carbon growth and development path."

"Under a cap-and trade system, government could set a limit, or cap, on the amount of CO2 that can be emitted, and companies needing to increase their emissions would have to buy credits from those who pollute less. Finance Minister Trevor Manuel, in his February Budget, announced a 2c/kWh tax on non-renewable energy, which is already a form of carbon tax, and should the tax be introduced from September as proposed, it would be the equivalent of R19/t of CO2 emitted. This, however, is relatively modest when compared with the €20/t-plus level at which carbon is currently trading on markets in Europe."

"The LTMS itself is a progressive step for a developing-country government, particularly given that South Africa is as yet not bound by any international legal obligations to make emission reductions. South Africa now joins only a handful of developing countries, including China, Brazil and India, in moving ahead with mitigation programmes under a so-called 'comparability of effort' framework canvassed at the recent global climate change gathering in Bali."

"South Africa has now also formally endorsed the emerging global aspiration to limit to 2ºC the change in temperatures from pre-industrial levels. Climate scientists calculate that the Earth's temperature had already increased by 0,7ºC from the start of the industrial revolution (approx. 1750), and there was also near consensus that CO2 emissions resulting from human endeavours - primarily from industrial activity, was contributing to these rising temperatures." (Creamer. 2008:23)

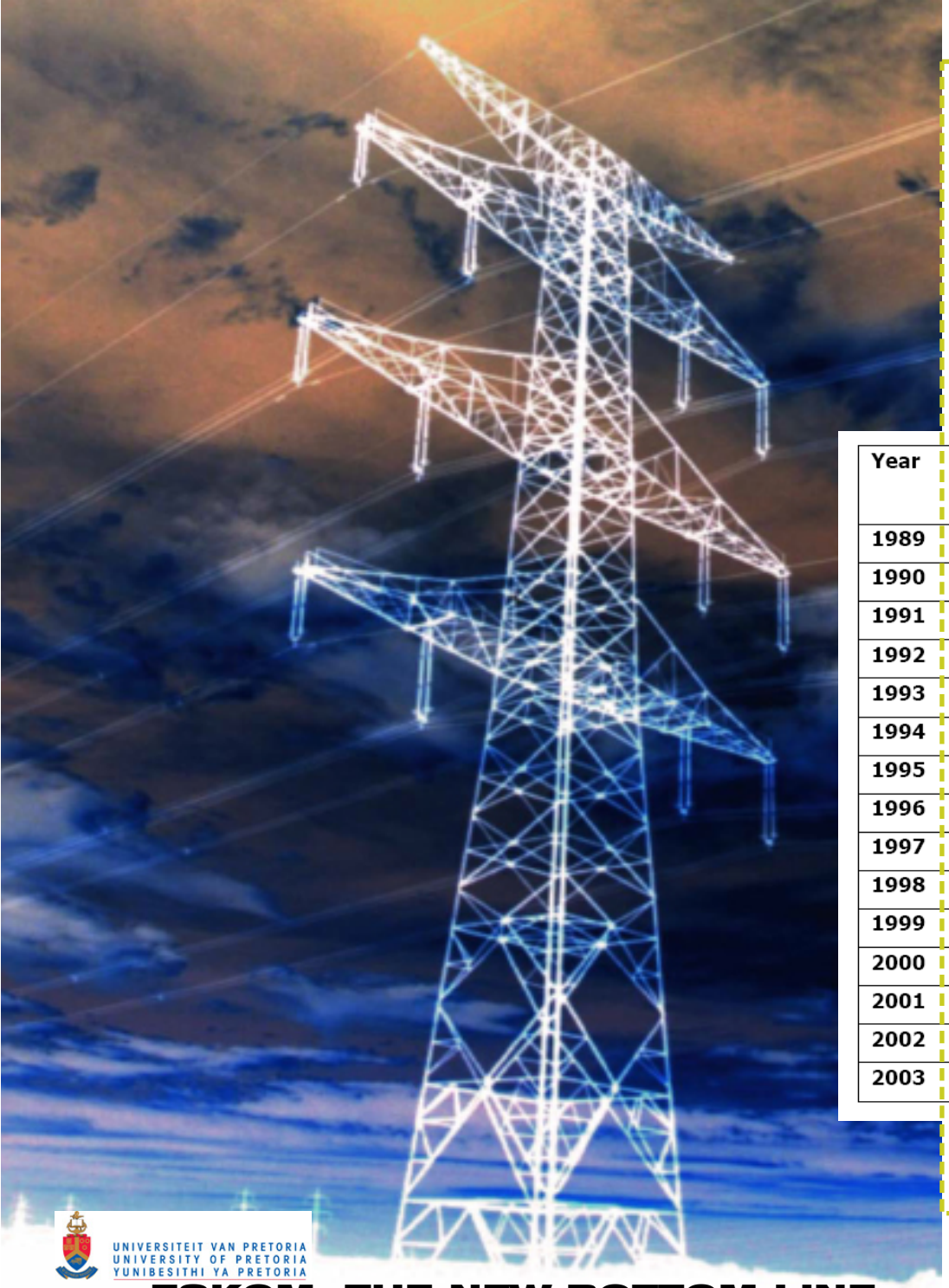
"Cabinet had also endorsed a proposal that electricity tariffs be 'smoothed' over a number of years so as to avoid a destructive price spike. Indeed, the National Energy Regulator of South Africa, on granting Eskom an additional increase for 2008/9, called on Treasury to review the implementation, given that it would add to the burden already faced by consumers. Although ESKOM's current coal-fired operations are being consolidated for the sake of operational continuity, energy-efficiency targets will soon be made mandatory under the Power Conservation Programme (PCP), with no future coal-fired power stations or coal-to-liquids facilities to be approved unless it could be shown that the development was carbon-capture and storage (CCS) ready."

Figure 3 : Exposure to impacts of Climate Change (darker shades = higher levels of exposure) (www.maplecroft.net)

Figure 4 : Energy consumption from non-renewable resources (darker shades = greater reliance) (www.maplecroft.net)

"At present, South Africa's CO2 emissions stand at about 800-million tons/year, which is likely to climb to above 1.2-billion tons by 2025. Should the country succeed in reducing its absolute emissions from 2030, these could fall again to below 600-million tons by 2050. To achieve this, the Department of Environmental Affairs and Tourism is proposing that the country adopts a so-called "Reach for the Goal" strategic option, which entails not only the adoption of carbon-friendly technologies, but also regulatory mechanisms such as mandatory targets for energy efficiency and changes to building standards, to enforce the adoption of green-building technologies and materials."

"This also implied a major shift in South Africa's industrial-policy trajectory from one that had, hitherto, incentivised energy-intensive developments, to one that favoured sectors using less energy per unit of economic output." (Creamer. 2008:23)



South Africa has for decades enjoyed the advantage of being "the lowest cost global producer of electricity" (www.eskom.co.za), and powered our development upon the 'cheapest' electricity tariffs - relative to general expenditure. Consumer Price Inflation (CPI) is a benchmark against which to measure such expenditure, and the figures below show that - except for 1 year (2000) when CPI was relatively low - electricity tariff adjustments have always been below CPI, or at most - on par with CPI. This indicates, a 'comfortable' assimilation of energy costs into the economic landscape - irrespective of a sector cost variance.

Year	Average price (c/KWh)	Price Increase Announced (%)	Effective Price Increase (%)	Consumer Price Inflation (%)
1989	6.9	10.00	9.52	14.51
1990	7.88	14.00	14.25	14.29
1991	8.46	8.00	7.24	15.57
1992	9.16	9.00	8.31	13.67
1993	9.59	8.00	4.74	9.87
1994	10.32	7.00	7.55	8.82
1995	11.15	4.00	8.04	8.71
1996	11.30	4.00	1.38	7.32
1997	11.85	5.00	4.87	8.62
1998	12.29	5.00	3.72	6.87
1999	12.44	4.50	1.19	5.21
2000	13.23	5.50	6.35	5.37
2001	13.76	5.20	4.06	5.70
2002	14.98	6.2	8.84	10.10
2003	n/a	8.43	n/a	7.4

Table 1: Eskom tariff increases (1989 to 2003) (Khalil-Hassen. 2006: 31)

This picture has changed somewhat over the past 5 years...

Average CPI has grown from 3.4% in 2005 to 7.1% in 2007, and is heading upwards still, standing currently at 10.9% (year-on-year as at 30 June). (source: www.statssa.org.za) Whereas electricity tariffs, which had effectively increased by 4.1% through 2005, now rises 27.5% in 2008 (14.2% approved in December 2007 by the National Energy Regulator - NERSA, and a further 13.3% in June 2008). (source: www.nersa.org.za) This is less than the 60% total that energy parastatal ESKOM had requested, but still far in excess of CPI figures for the corresponding period.

Based upon this evidence it can be seen that electricity now consumes a greater proportion of budgetary allotments - whether residential, commercial or institutional - than it did in the not-too-distant past. It may have been forgivable in 'plentiful times' that a building's operational consumption and resultant expenditure weren't necessarily overt design concerns, but it is entirely indefensible to ignore these aspects in 2008. 'Times have changed' understates the current circumstance, and there has to be a significant response from the design profession.

It is not just South Africa that has experienced a rude awakening, but the world-at-large. The fact that the global energy sector is having to re-evaluate operations resonates our local difficulties and creates contemporary frames of reference, as well as opportunities to illustrate leadership and/or independence in approaching what is a global common purpose.

"The World Energy Outlook's Reference Scenario states that the world's energy needs will be more than 50% higher in 2030 than today, an average annual growth rate of 1.6%. More than two-thirds of growth in world energy use will come from the developing countries where economic and population growths are highest. In developed countries, electricity supply is struggling to cope with demand, and the International Energy Agency predicts there will be more outages such as those experienced in the US, Japan, and Canada." (www.eskom.co.za)

Figure 5: ESKOM Power Alert barometer (www.eskom.co.za)

"In line with the global picture, South Africa's marked economic growth in recent years has also propelled electricity peak demand to rise at around 4% a year in a high growth scenario (Eskom Integrated Strategic Electricity Plan). Consequently, unless something is done, peak-period demand will soon exceed Eskom's ability to supply electricity during these periods, and additional baseload capacity will be required. It is vital to have reliable and uninterrupted electricity for the South African economy to grow."

"ESKOM is addressing the South African electricity challenge by the expansion of supply options, by the return-to-service programme of mothballed power stations, and through promoting energy efficiency in its Demand Side Management (DSM) programme, which facilitates influence over usage patterns of electricity consumers." (www.eskom.co.za)

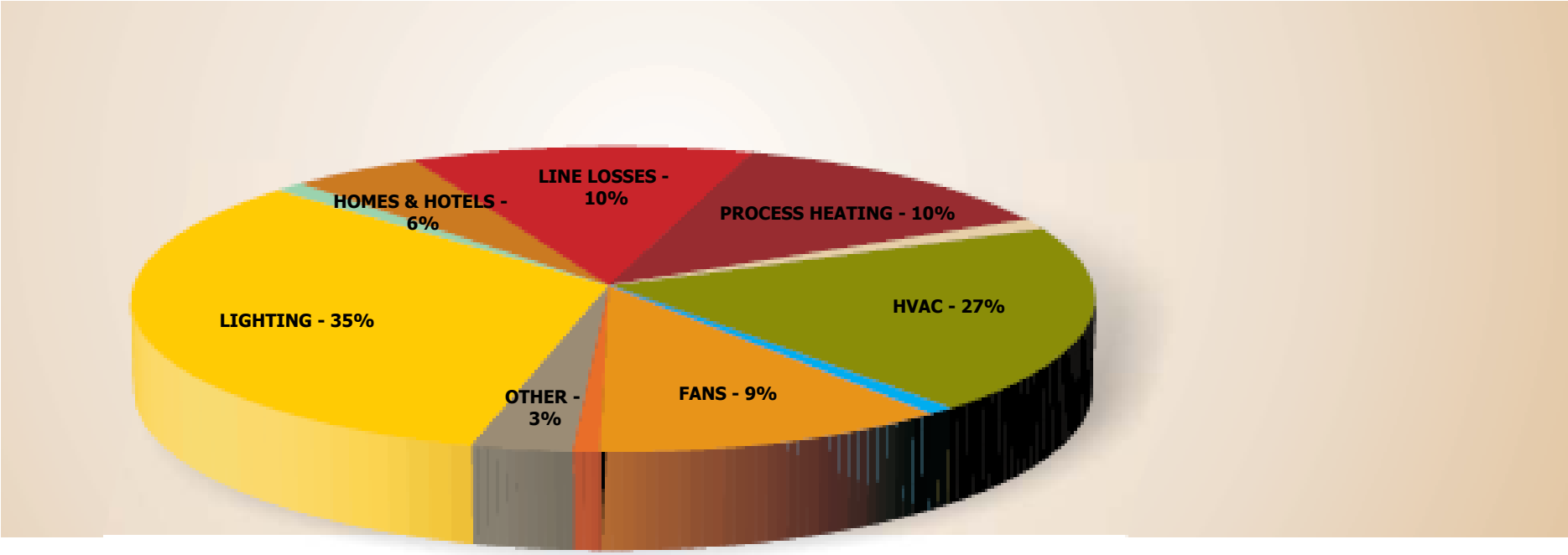


Figure 6 : Maximum energy demand in the Commercial Sector (www.eskom.co.za)

"DSM is being implemented in collaboration with the Department of Minerals and Energy (DME) and the National Energy Regulator of South Africa (NERSA), and comprises a dual approach:

- to reduce electricity demand at peak periods (07:00-10:00 and 18:00-21:00) by shifting load to off-peak periods
- and overall consumption reduction (24-hour reduction) by installing energy efficient equipment and optimising industrial processes."

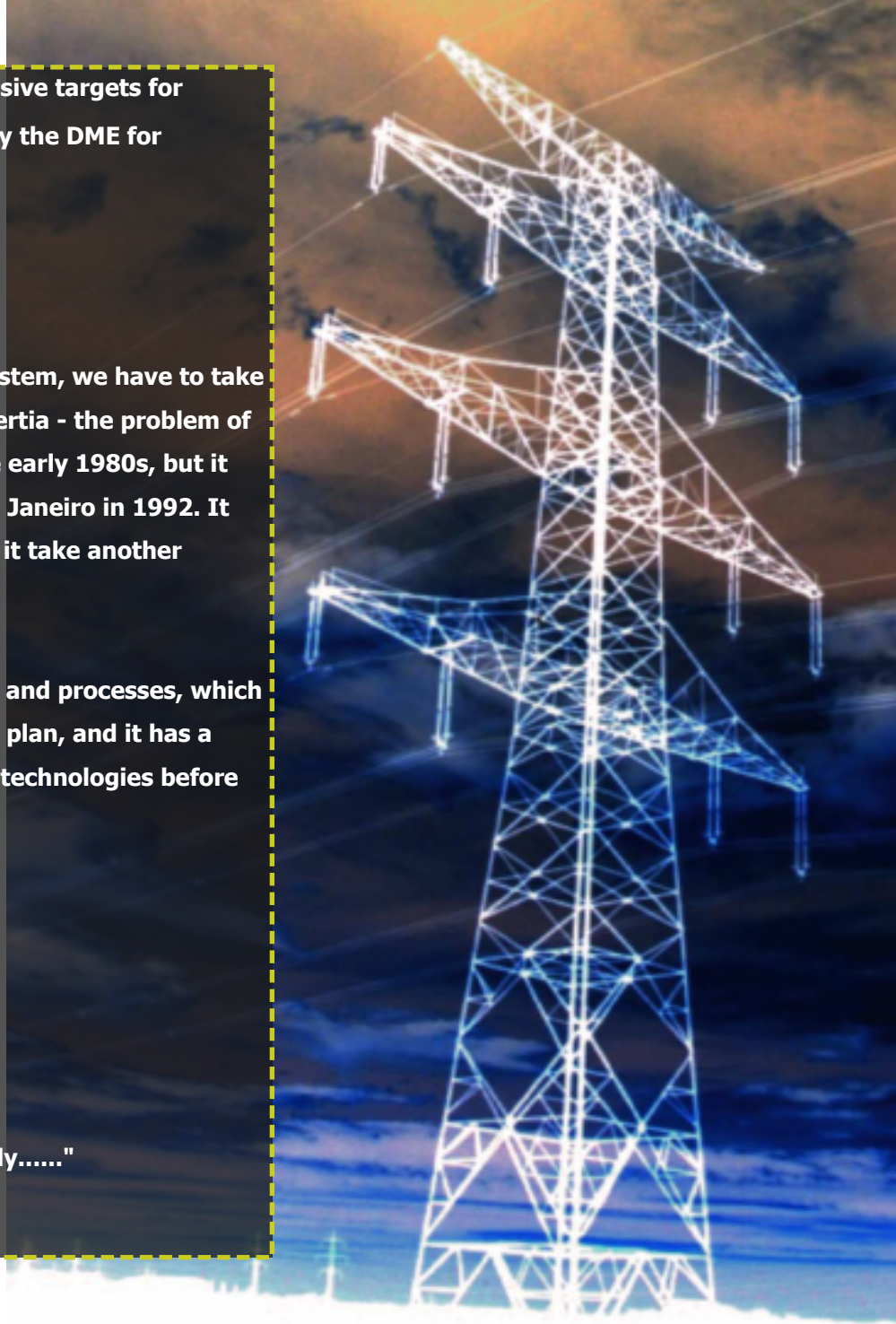
"South Africa is among a few countries worldwide that have set comprehensive targets for energy efficiency improvements. The Energy Efficiency Strategy compiled by the DME for South Africa proposes the following energy efficiency targets:

- A final energy demand reduction of 12% by 2015.
- The DSM long-term goal is to save 4 255MW over a period of 20 years."

"The climate system has a built-in inertia. Because of this time lag in the system, we have to take action before the changes take place. The second type of inertia is social inertia - the problem of getting people to respond in time. The climate change debate started in the early 1980s, but it took a decade before the UNFCCC was signed at the Earth Summit in Rio de Janeiro in 1992. It took another decade for the Kyoto Protocol to enter into force in 2005. Will it take another decade to mobilise people?"

"The third kind of inertia is technical inertia, for instance in energy systems and processes, which take 30-50 years to replace. An energy generation facility takes 10 years to plan, and it has a working life of 40 years. The costs to society of rapidly changing to cleaner technologies before the old plant needs replacement are massive." (Scholes: 2006: 7)

"Eskom will spend R450 million a year on energy-saving measures nationally....."
(www.eskom.co.za)



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historical context

"For a building, driving forces might include changes in technology, in the neighbourhood, in the economy, and in tenant use. The [planning] group ranks these driving forces in terms of importance and uncertainty, placing the most important and most uncertain highest, because it is the most important uncertainties that will drive the scenarios apart." (Brand. 1994:182)

One of the primary objectives of the Architect and Quantity Surveyors (Private) Act No.18 of 1927, passed by Parliament of the Union of South Africa, was to make dedicated facilities available for training professionals in these 2 fields. Due to the fact that a great concentration of activity relating to these professions was to be found in Pretoria and Johannesburg, it was decided that architects from the University of Witwatersrand and quantity surveyors from the Transvaal University College would henceforth be educated in Pretoria.

In 1929 Prof. Harry Bell-John, a quantity surveyor, was appointed to head up organization of the Department and the 1st students were enrolled. It was the Depression years and the University was financially threadbare. Student numbers were very low within the Department and, as such, there was no immediate need for a dedicated structure. Thus the faculty made use of existing lecture halls in the Old-Arts- (Ou Lettere), Physics-, and Old Clubhall buildings to deliver it's prospectus.

Upon the inauguration of the Merensky library next to the Old Arts building in 1939, the Department relocated to the southern hall of the Old Arts which helped establish a more secure tenure, but didn't appreciably improve the generally disjointed structure of the (then) UPAQA (University of Pretoria Architects and Quantity Surveyors Association).

Most of the students were registered for part-time diplomas in the 2 fields and were working full-time in offices located in the CBD. As a result, classes were held at night, which was the instruction format at the University's satellite facility in Vermeulen Street.

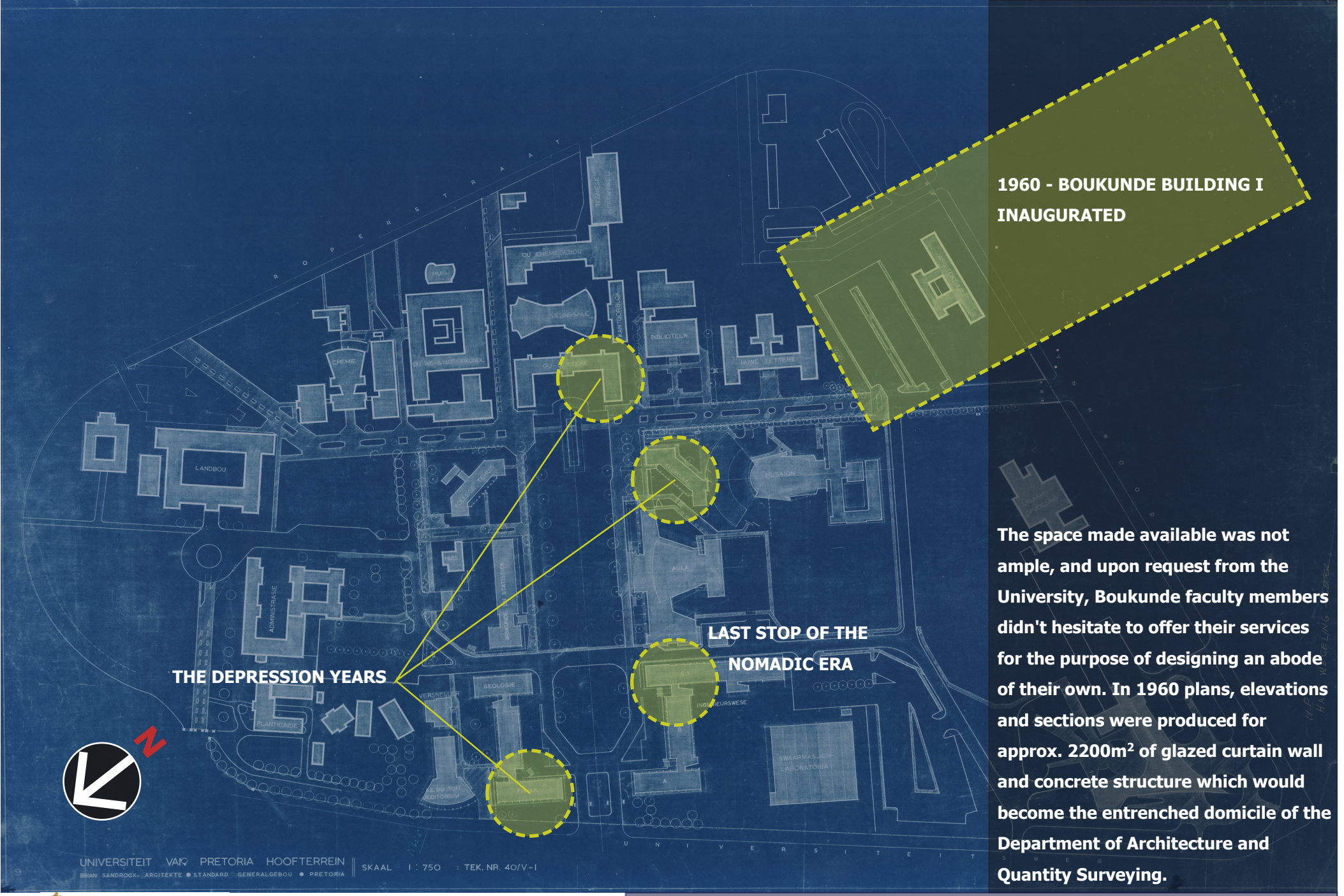
When the time came to extend the satellite facility - space was made available for the Department on the 2nd floor extension behind the MacFayden hall. The Department was now eventually able to foster a unique identity and solidarity amongst it's ranks. Faces became familiar when passed in the Department's halls, and the seeds of a collaborative 'studio culture' were sown.

The house of Boukunde (Building Science) was thus established and the Department made a successful appeal to the University governing body for 'a place at the table', and gained Boukunde students representation on the Student Council.

The years that followed however, came to be the most disruptive in the history of the Department.

Student numbers swelled considerably and various alternate accommodations were explored, with the Department eventually settling in the Kerry office building to the north of Vermeulen street - opposite the MacFayden building - where space was rented by the University for Boukunde use.

Clashes occurred between the building's incumbent private tenants and the academic newcomers - with the Department's sense of autonomy suffering as a result. The situation was deemed untenable & the Boukunde horde returned to the University main campus - to be hosted within the newly built Engineering building.



CAMPUS LAYOUT PLAN - 1960

The space made available was not ample, and upon request from the University, Boukunde faculty members didn't hesitate to offer their services for the purpose of designing an abode of their own. In 1960 plans, elevations and sections were produced for approx. 2200m^2 of glazed curtain wall and concrete structure which would become the entrenched domicile of the Department of Architecture and Quantity Surveying.

Figure 7 : Campus Layout Plan - drawing no. 40/V - 1 (Brian Sandrock Architects)

BASEMENT PLAN / SECTION 4-4 / EAST & WEST ELEVATION

The curtain wall format was decided upon for reasons of stylistic preference and relative speed of construction. For the first time the Department faculty and students were to be found under one roof and productive discourse could be entered into on a daily basis.

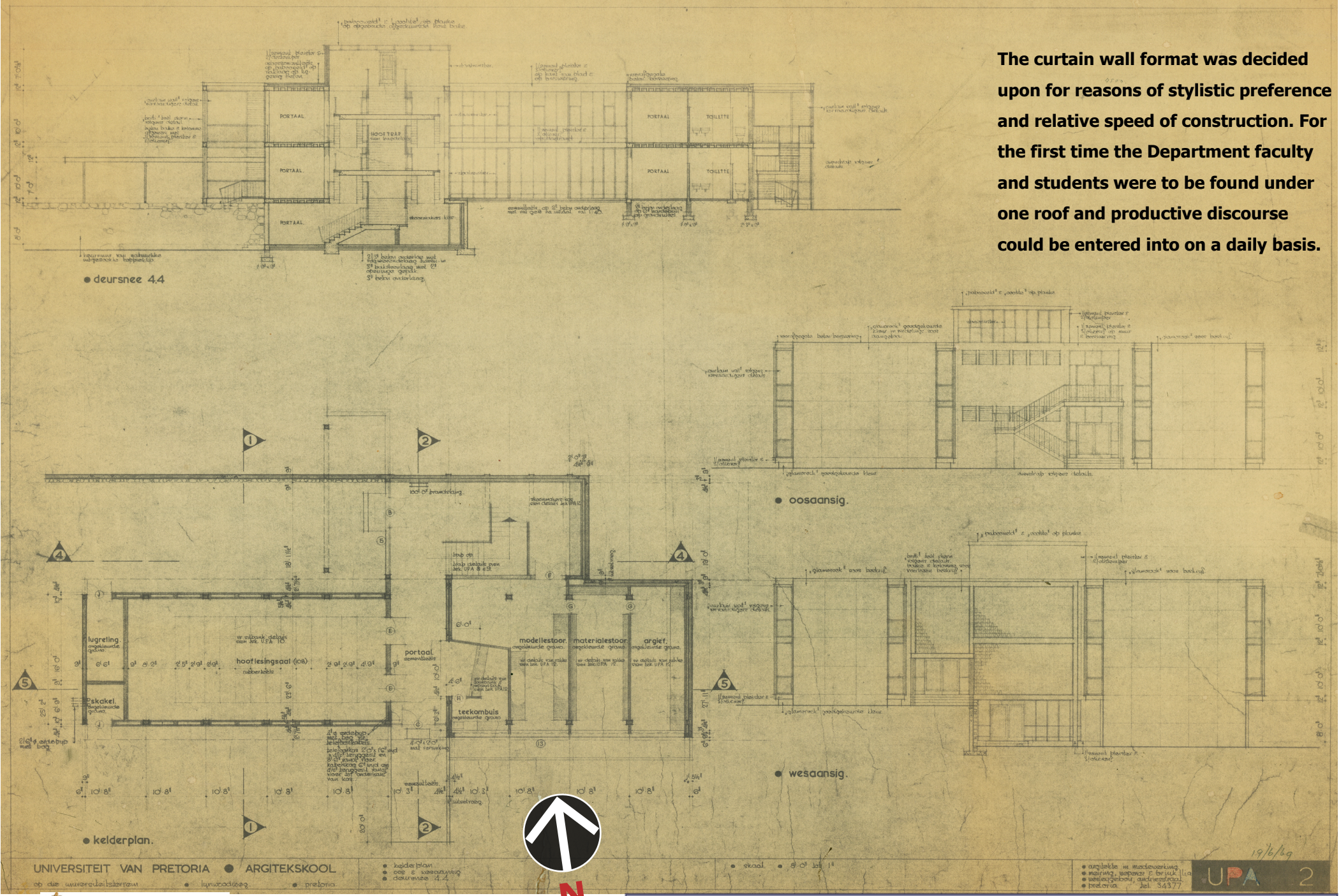


Figure 8 : Basement Plan - drawing no. UPA 2 (UP School of Architecture)

At the time BIFSA (Building Industry Foundation of South Africa) was negotiating with the University for the creation of a training facility in Construction Management. The decision was then taken to separate the Architecture and Quantity Surveying faculties, with a sub-department for Construction Management falling under the latter. A sub-department for Landscape Architecture was also introduced, and the trajectory was set for what has now become a department incorporating the disciplines of Architecture, as well as Landscape- & Interior Architecture.

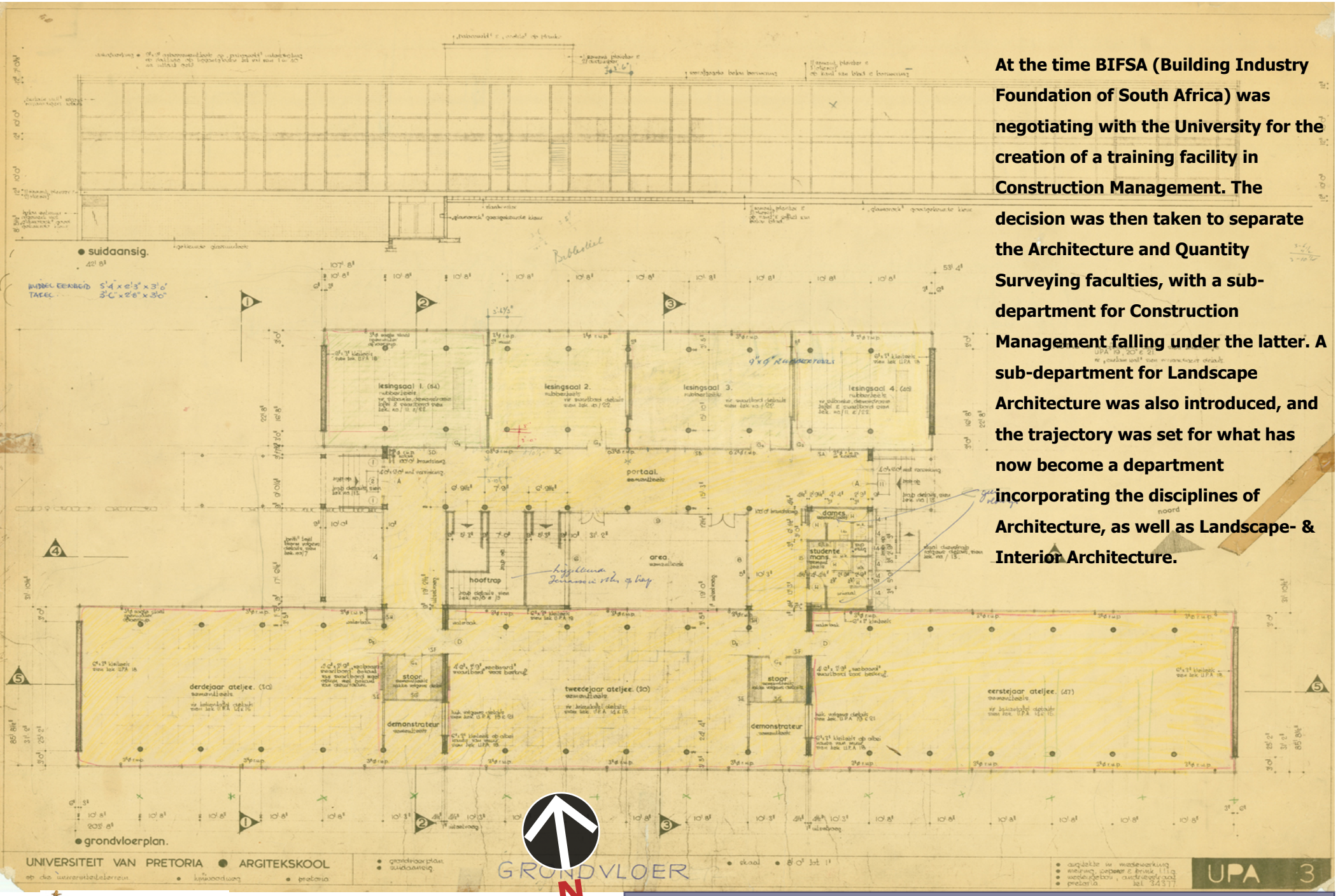


Figure 9 : Ground Floor Plan - drawing no. UPA 3 (UP School of Architecture)

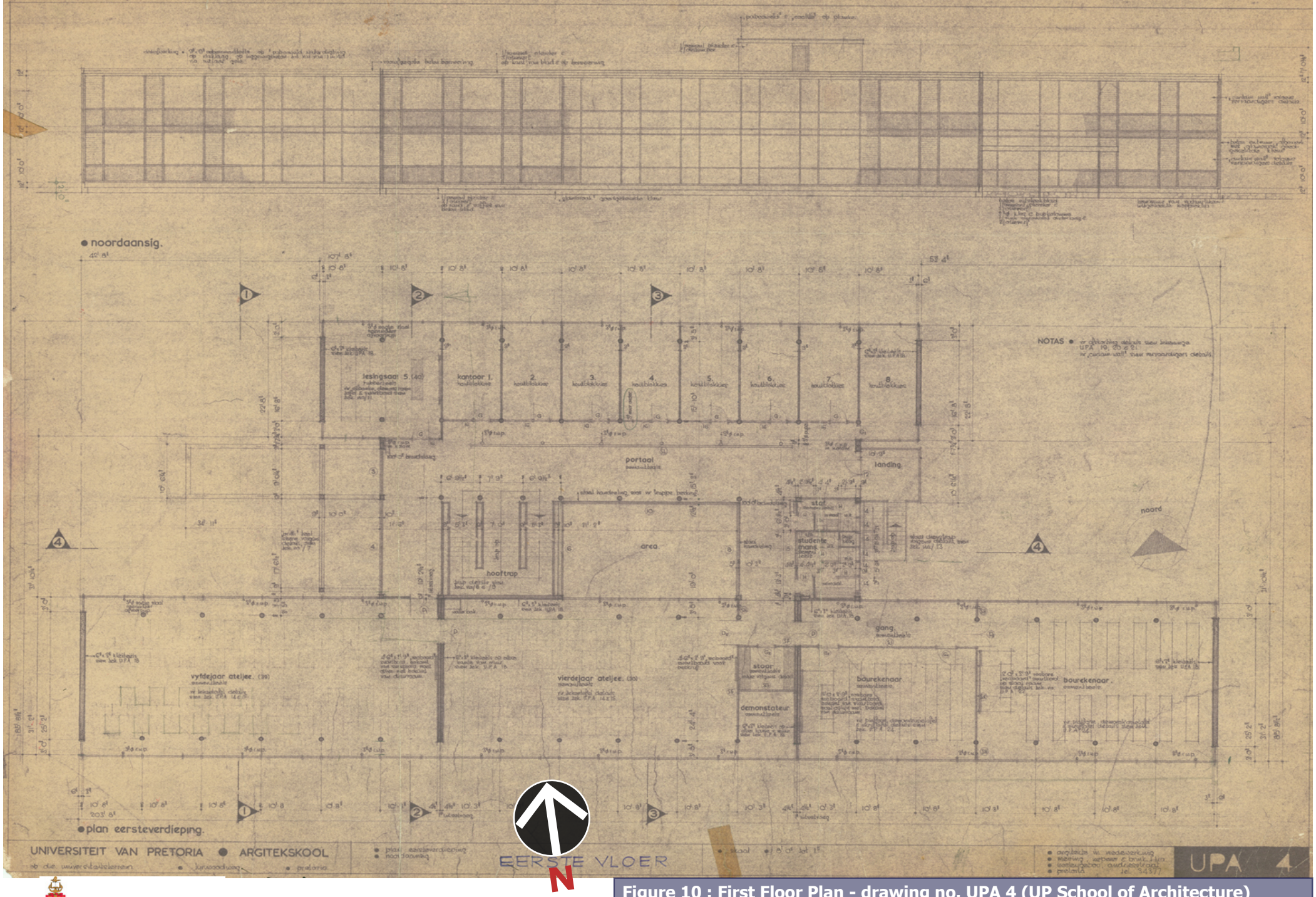
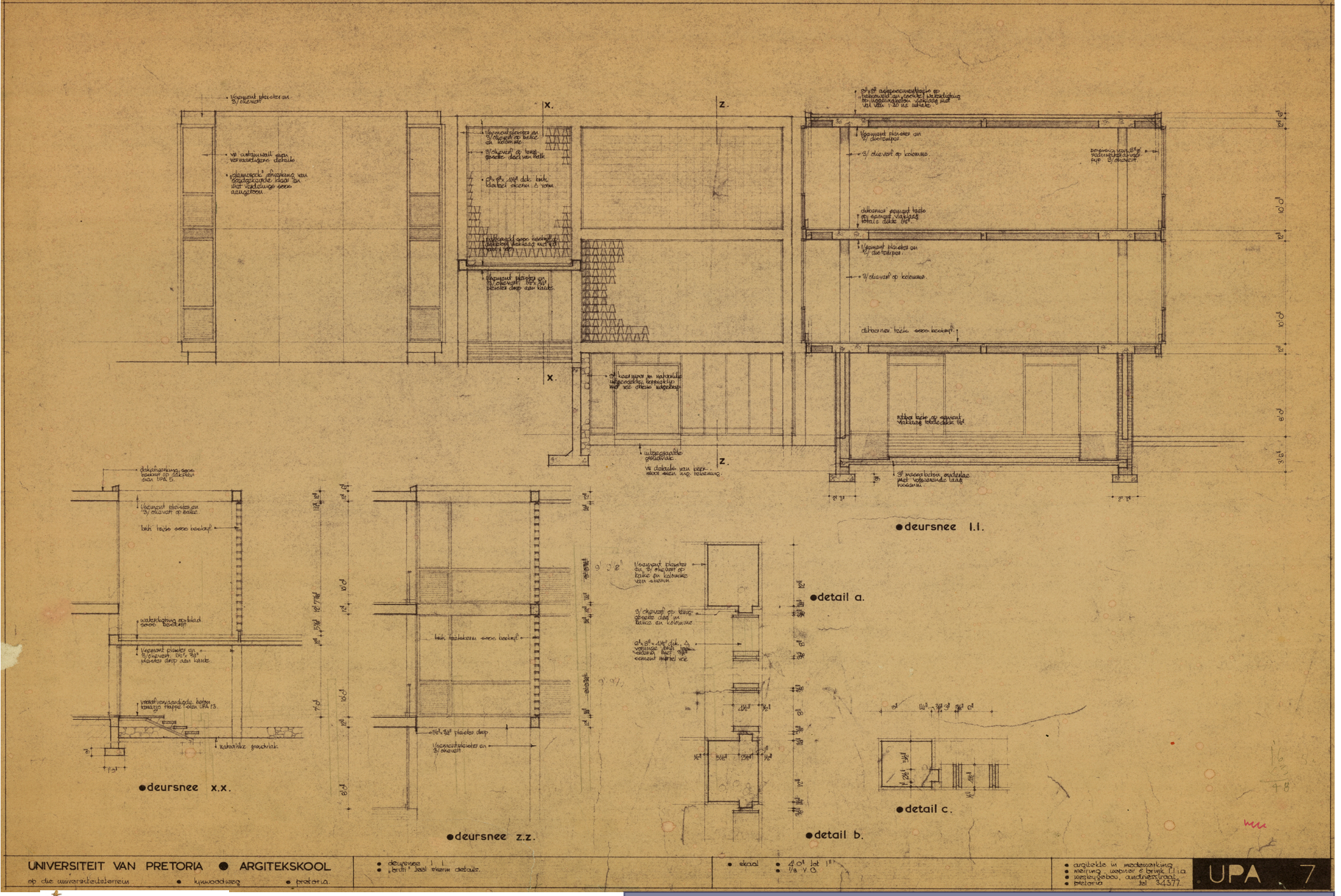


Figure 10 : First Floor Plan - drawing no. UPA 4 (UP School of Architecture)



SECTION 1-1 / x - x / z - z

Figure 11 : Section 1-1 / x-x / z-z - drawing no. UPA 7 (UP School of Architecture)

The history of Boukunde I has been translated from the original article "Die Boukundegebou" appearing in the Boukunde periodical. The article was written in afrikaans by Prof. J.T.B. Viljoen - August 1986.

Figure 12 : Boukunde Building (Viljoen. 1986:2)

"The growing prestige of Walter Gropius's Modernist educational methods at the Harvard Graduate School of Design, along with Ludwig Mies van der Rohe's similar efforts at the Illinois Institute of Technology, seemed fatal to revivalist styles. After 1945 the vision of dreaming spires and insular cloisters seemed even less appropriate to the cultural powerhouses that American universities were poised to become. The cold war, which made American intellect into a weapon of global freedom, required major research universities to look - or seem to look - forward and outward, forming world citizens and not smug clubmen. Any university wishing to seem timely and remain prestigious now had to build to reflect positively stated ideals, not withdraw from them into cloisters and quads." (Samson. 2006: B17)

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institutional context

South African higher education has three primary sources of funding: about half is from government, a quarter from student fees, and the rest is generated through donations and entrepreneurial activities. The government spends over R10 billion a year on higher education, which is 13% of the education budget and 2.6% of total government spending. (www.studysa.co.za)

"Short of cash, and jostling colleges from America to China for the smartest students and staff, universities across the country are rethinking fund raising. The need is obvious: investment in British higher education stood at 1.1% of GDP in 2004, according to the most recent data from the OECD, while the U.S. spent 2.9%." "No matter which way you look at it, higher education is internationalizing and the competitive intensity is increasing."

"In late May (2008), Oxford launched the most ambitious fund-raising drive ever undertaken by a European university, aimed at boosting its coffers by at least $2.5 billion (approx. R19 billion). The eager among you have chipped in already - helping Oxford to more than $1 billion so far..." "The task before us is to guarantee Oxford's pre-eminence in a world now changing so fast that we must lead or fall behind, announced Vivian Duffield, chairman of the campaign."

"Money raised through Oxford's appeal will be poured into new facilities and the endowment. Scholars at Cambridge needn't feel outdone. Under its own campaign, launched in 2005 to mark the university's 800th anniversary next year (2009), Cambridge hopes to bring in $2 billion by 2012, and has already raised some $1.3 billion."

"Lower revenues mean lower spending, and the result is bleakly evident in rankings of the world's best universities. In the highly regarded table published annually by China's Shanghai Jiao Tong University, European institutions fill just four of the top 25 places; wealthy North American institutions account for almost all the rest." (Smith, A. 2008: 35)

Naturally, economies of scale would indicate that there is no relation between South African- and U.S. or U.K. universities competitive aspirations and/or capacity to fullfil such ambition, but a pro-active approach to consolidation of assets and a deliberate policy regarding resource efficiency should be standard operating procedure for institutions worldwide.

Education and skills development is one of the 6 selected areas of intervention identified under the Accelerated and Shared Growth Initiative of South Africa (ASGI-SA), which was launched in 2005 to address the concerns of inequitable national growth. The significance thereof is that it demonstrates an awakening amongst policy-makers at the highest level to the realities of there is no growth without education and skills.

"The resources to make this happen are there, although more funds are needed. Finance minister Trevor Manuel allocated R600 million to further education and training colleges for more student bursaries. He also allocated an extra R2.2 billion to universities to increase enrollment and produce more science, engineering and technology graduates." (Jacks, 2007:2)

With an increase in student numbers there will ultimately come a point where the existing tertiary facilities will burst at the seams. Universities countrywide will face the prospect of infrastructure expansion and/or consolidation in terms of existing building stock, and whilst it is infinitely more exciting to conceive of shiny new complexes - it is seemingly more responsible to dust off the old ones and initiate them into the 21st century.

Assuming that these structures have stood the test of time - their robustness can't be questioned, but their agility in serving a revised set of circumstances could be the characteristic that extends their longevity beyond expectations.

The tertiary architecture programme has evolved over the past 80 years since the first students were enrolled in the Transvaal University College (Transvaal Universiteitskollege, or TUKS) Architecture Department. The acronym remains, although the University has a new official name and is privy to a vastly different era.

The building that hosts the programme has seen it expand substantially. What was once a singular 5 year Bachelor of Architecture degree has now become a 3 year body of undergraduate coursework in the subjects of Architecture, Landscape Architecture & Interior Architecture. Supplementary to this are a further 2 years, being Honours and Masters in the respective coursework fields, as well as research Masters and PhD offerings.

Academic programmes have to respond to the demands that society and economy place on them. The various fields of application that are ultimately underpinned by the tertiary graduates will also have evolving expectations informed by specific needs. These needs will take the form of certain qualitative aspects of the product, as well as quantitive - depending generally upon the 'colour' of the economy. When we are 'in the red' graduates might struggle to find work prospects, whereas a buoyant economy will absorb competent, qualified recruits like water to a thirsty sponge.

The University of Pretoria Architecture Department is set to expand its girth with an extension of the post-graduate research programme, as well as an increase in undergraduate enrollment numbers. This population explosion is expected to surpass the carrying capacity of Boukunde II, and thus the building should offer a proportionate response. Given that the content of the coursework degrees is not likely to change - the number of tenured staff is not expected to increase proportionally, and thus the primary programmatic concern is for an extension of studios and related facilities.

STUDENT NUMBERS: (including architecture / landscape- & interior architecture - where applicable)

1986 = 180 (excluding research degrees)

1st Year - approx. 60

2nd year - approx. 40

3rd year - approx. 30

4th year - approx. 30

5th year - approx. 20

2008 = 400 (excluding research degrees)

1st Year - approx. 110

2nd year - approx. 100

3rd year - approx. 80

4th year - approx. 60

5th year - approx. 50

1st year enrollment is mandated to increase by approx. 30% by 2010, which will swell subsequent years by the same margin. Therefore, by 2015 Boukunde will serve as domicile for approx. 520 coursework conscripts, as well as a further indeterminate number of research students. The building has no spare capacity available and there is no foreseeable re-assignment of space that could serve to accommodate the looming influx.

The 'tools of the trade' have evolved, and although a drawing board and pencil are not considered alien to contemporary studio culture - spatial appetites are generally less voracious than they were in the not-too-distant past. An education in architecture revolves largely around 'studio culture' though, and it is not uncommon for students to spend an inordinate proportion of their waking hours in a building like Boukunde. This fact dictates that the space made available to them should be of a certain functional quality.

According to the Metric Handbook chapter on Education facilities - an architecture department should be allocating "approx. 6.55m^2 of specialised accommodation" (Adler3. 1999:5) to each member of its student populace. Translated from the original drawings, which had apportioned the second floor studios of Boukunde II to 135 students (75 x 2nd year/ 60 x "senior") - the space available per capita would have been approx. 5.55m^2. The building at that stage was also hosting the Construction Management and Quantity Surveying faculties, and thus there wasn't necessarily an abundance of architecture studio space available throughout the structure.

The projected head count has changed since then, and so too the spatial assignments. The Construction Managers & Quantity Surveyors have left the building, and the second floor studios have subsequently become the 1st years domain.

ACCOMMODATION SCHEDULE (studios):

2008 (excluding research)

1st Year - 110 within approx. 700m^2 = 6.36m^2 / head

2nd year - 100 within approx. 440m^2 = 4.40m^2 / head

3rd year - 80 within approx. 400m^2 = 5.00m^2 / head

4th year - 60 within approx. 260m^2 = 4.33m^2 / head

5th year - 50 within approx. 260m^2 = 5.20m^2 / head

2015 (projected - excluding research)

1st Year - 140 within 700m^2 = 5.00m^2 / head

2nd year - 130 within 440m^2 = 3.40m^2 / head

3rd year - 100 within 400m^2 = 4.00m^2 / head

4th year - 80 within 260m^2 = 3.25m^2 / head

5th year - 60 within 260m^2 = 4.33m^2 / head

Working upon the premise that each student should have a drawing board in their workspace - the current studio rations do not- and will not-suffice. However, the architecture studios currently resemble a hybrid workspace - fitting somewhere between the archetypal studio and an open plan office environment. It is thus debatable whether the 6.55m^2 per capita requirement is still valid.

Irrespective of the what the precise spatial quota needs to be - the general consensus would seem to be that additional space is required to avoid significant departmental growing pains in the medium- to long term.

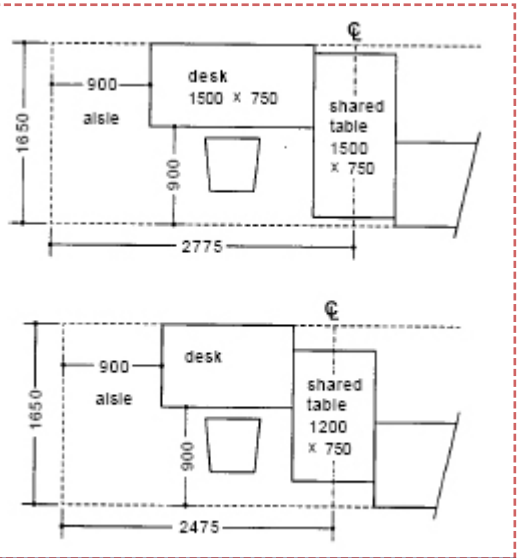

Figure 13 : Desk with shared table - spacing & layout (Adler2. 1999:13)

Type of board	Size	Width (mm)	Length (mm)
Parallel motion unit only or parallelogram type drafting machine	A2	470	650
	A1	730	920
	A0	920	1270
	2A0	1250	1750
Track or trolley type drafting machine requiring additional 'parking' area to one side	A1 extended	650	1100
	A0 extended	920	1500
Parallel motion unit with drafting head requiring additional 'parking' area at bottom of board	A1 deep	730	920
	A0 deep	1000	1270

Table 2 : Nominal sizes of drawing boards (Adler1. 1999:3)