retrofit: space plan
circular concrete columns @ 10'8" centres
stone clad entrance retaining wall
9" thick concrete structural 'end walls'
12" thick concrete floor and roof slabs
basement entrance
circular concrete columns @ 10'8" centres
basement lecture hall 1-10
glazed curtain wall building envelope
pathway to main entrance
The original building was entered from the west, and with the main entrance subsequently relocating to the north - the west end, which is only accessible from basement level - has become a 'dead' zone. This lack of inter-activity extends around to the south, and east - where the first significant perforations in the building’s envelope are to be found. The western end of the building is endowed with sculptural qualities and significant design detail that is lost upon the occupants who scarcely visit the amphitheatre level due to the predominance of services infrastructure.
The concept for Boukunde III is based upon the premise of resurrecting beneficial aspects of Boukunde I that find resonance with the programmatic requirements of the department in 2008. The protective shell of Boukunde II will be partially compromised to accommodate an expansion & liberation of space and circulatory flow.

The starting point is at the most neglected sector of the current building - being the western basement area. The reconfiguration of the hvac system - from primarily a central mixed-air system to a hybrid of geothermal heat exchange, displacement air-conditioning and natural ventilation will afford the opportunity of relocating- & scaling down the bulk of the current system. This action will create the opportunity for new circulation paths to develop from the derelict nether-regions of Boukunde.
existing air-conditioning room wall to be broken out to form wide passage / exhibition space in concert with existing basement passage

existing air-conditioning equipment for lecture halls 3-3 & 2-6 to be relocated to residual storage space adjacent to passage

existing air-conditioning equipment for studios to be relocated to new air-conditioning room at basement level

Figure 82: BOUKUNDE II basement & air-conditioning layout - perspective view from west (overlaid with BOUKUNDE I)
BASEMENT LEVEL:
The intention is to open up a line of sight from the building’s core to the south & west. The 2 new basement spaces will be designated as circulation / exhibition space. The west break-through will be via the existing central air-conditioning room, which will be relocated to a new external construction. The south break-through will travel under the existing 3rd year studio (east) between north-south grid lines 15-17. The 2 spaces will connect at the building’s central circulation node comprising the existing main stairwell and a new personnel elevator.

GROUND FLOOR LEVEL:
The entire facade is opened up to improve the daylight factor and connect visually with Lynnwood Road to the south. The 3rd year studio (west) space is extended to the south above the new air-conditioning room, and around to the west - overlooking the amphitheatre. The existing air handling chambers located at the south-west corner of the building on each level remain in place as transition points for conditioned air.
FIRST FLOOR LEVEL:
The studio spaces are all extended south through the existing facade. The additional space extends around the western facade and connects back into the building using the existing western fire escape as a point of entry. The extension also draws out to beyond the eastern elevation - overhanging the geothermal ground loop embankment below. The 1st floor footprint is further extended to the east via the existing double volume crit hall - which facilitates a visual connection to the southern additions and lynnwood road beyond it.

SECOND FLOOR LEVEL:
The extension echoes that of the level below, and completes a circulatory loop through the central east-west axis by breaking through a pathway above the existing projector room of lecture hall 3-3 and the store room adjacent to it. The double volume of the crit hall is dissected with the addition of a mezzanine floor and extension, which connects the main passage at 2nd floor level with the new construction - including a new external eastern fire escape.
existing hvac equipment room

existing lecture hall 1-10
(& surrounding locales)

new hvac equipment room

new basement breakthrough
(between gridlines 15-17)

geothermal ground loop embankment

new external circulation path
(along sloped fall to basement level)

new ground floor structure

new internal circulation path
(connecting the existing west & south)

existing main entrance podium

existing amphitheatre

new personnel elevator
(basement - 2nd floor)

extended basement excavation
(under existing ground floor
gallery area)

new ground floor structure

5th year studio

Figure 87: basement breakthrough & circulation routes

Figure 88: ground floor breakthrough & circulation routes
new 1st floor south flank

new internal circulation path (connecting east, west & south)

existing 1st floor passage
existing main entrance podium
existing 1st floor east crit hall

new 1st floor extension to east crit hall

"The height of the building was limited to three stories so that people could use the stairs and meet in the stairwell, rather than being forced to use the elevator..." (Brand. 1994:179)

new mezzanine extension above east crit hall

existing 2nd floor passage

new personnel elevator
existing 2nd floor store room (broken through to passage)
existing volume above lecture hall 3-3 projector room (broken through to store room)
new 2nd floor west flank

existing amphitheatre

Figure 89: 1st floor breakthrough & circulation routes

Figure 90: 2nd floor breakthrough & circulation routes
retrofit: structure
Figure 91: perspective plan view from south-east - basement level

Figure 92: perspective plan view from south-west - basement floor level

TOTAL ADDITIONAL FLOOR AREA: 164m²
DESIGNATION: EXHIBITION SPACE

TOTAL ADDITIONAL FLOOR AREA: 252m²
DESIGNATION: HVAC PLANT ROOM
Figure 93: perspective plan view from south-east - ground floor level

Figure 94: perspective plan view from south-west - ground floor level

TOTAL ADDITIONAL FLOOR AREA: 130m²
DESIGNATION: 3D PRINTING LAB SPACE

TOTAL ADDITIONAL FLOOR AREA: 498m²
DESIGNATION: STUDIO SPACE
TOTAL ADDITIONAL FLOOR AREA : 140m²
DESIGNATION : EXHIBITION SPACE

TOTAL ADDITIONAL FLOOR AREA : 1024m²
DESIGNATION : STUDIO SPACE
Figure 97: perspective plan view from south-east - second floor level

TOTAL ADDITIONAL FLOOR AREA: 190m²
DESIGNATION: EXHIBITION SPACE

Figure 98: perspective plan view from south-west - second floor level

TOTAL ADDITIONAL FLOOR AREA: 1024m²
DESIGNATION: STUDIO SPACE
SPATIAL QUOTAS:

<table>
<thead>
<tr>
<th>ADDITIONAL</th>
<th>STUDIO/LAB SPACE</th>
<th>EXHIBITION SPACE (formal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>0m²</td>
<td>284m²</td>
</tr>
<tr>
<td>Ground floor</td>
<td>768m²</td>
<td>0m²</td>
</tr>
<tr>
<td>1st floor</td>
<td>1024m²</td>
<td>150m²</td>
</tr>
<tr>
<td>2nd floor</td>
<td>1024m²</td>
<td>190m²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESULTANT</th>
<th>STUDIO/LAB SPACE</th>
<th>EXHIBITION SPACE (formal)</th>
<th>EXHIBITION SPACE (informal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>0m²</td>
<td>284m²</td>
<td>190m² (amphitheatre + store room)</td>
</tr>
<tr>
<td>Ground floor</td>
<td>1428m²</td>
<td>172m²</td>
<td>60m² (passage ways)</td>
</tr>
<tr>
<td>1st floor</td>
<td>1724m²</td>
<td>300m²</td>
<td>110m² (passage ways)</td>
</tr>
<tr>
<td>2nd floor</td>
<td>1724m²</td>
<td>190m²</td>
<td>800m² (1st year studio + passage)</td>
</tr>
</tbody>
</table>

The 3D printing lab would be run by the 5th year students - whose studio is adjacent to the new facility. The lab itself, is therefore seen as supplementary 5th year studio space and allocated accordingly.

The resultant spatial quotas have been added to the existing space plan in an open format which does not specifically demarcate areas for the various tertiary levels within the Department. If the new studio space were to be allocated according to proximity - the following approximate assignments would result:

<table>
<thead>
<tr>
<th>2015 (projected - excluding research)</th>
<th>population increase</th>
<th>available workspace increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year - 140 within 1724m² = 12.30m² / head</td>
<td>30%</td>
<td>146%</td>
</tr>
<tr>
<td>2nd year - 130 within 1164m² = 8.95m² / head</td>
<td>30%</td>
<td>165%</td>
</tr>
<tr>
<td>3rd year - 100 within 1028m² = 10.28m² / head</td>
<td>30%</td>
<td>157%</td>
</tr>
<tr>
<td>4th year - 80 within 560m² = 7.00m² / head</td>
<td>30%</td>
<td>115%</td>
</tr>
<tr>
<td>5th year - 60 within 400m² = 6.70m² / head</td>
<td>30%</td>
<td>54%</td>
</tr>
</tbody>
</table>
retrofit : skin
Boukunde I has been enveloped in concrete by its successor. The architect of Boukunde II re-used the structural core and grid layout of the original building and supplemented it where required to meet the demands of the buildings new footprint. The first building presumably informed certain aspects of the design, and an effective concrete shield was drawn up around what once stood. The proposal for Boukunde III now seeks to resurrect certain aspects of the original built form which could benefit the current condition.
"Concrete is treated like nuclear power: we try not to think about decommissioning." (Brand. 1994:126)
During construction almost 186 tonnes of concrete will be cut from the buildings southern facade & brought to ground level. The method being proposed for effecting these incisions is thermolancing - as opposed to mechanical cutting (using a combination of circular saws & percussion drills). The process of using heat energy to cut through concrete instead of brute force and abrasion-based techniques would be less disruptive to functional continuity within the building due to less noise & vibration produced.

Regardless of the cutting method used - the intention would be to reduce the production of rubble waste and dissect the panels into uniform concrete 'sub-panels' to be redeployed as building block units. This 'disassembly' of the facade - as opposed to destruction - would also reduce the carbon footprint of the building works as approx. 186 tonnes of rubble would not have to be trucked away from site.
The entire building facade is punctuated with 60mm diameter shutter holes which are spaced at approx. 760mm horizontal centres & 670mm vertical centres. Each panel would be divided into sections generally in accordance with this shutter hole 'grid'. Accordingly, 20 sub-panels of approx. dimensions - 580mm x 1350mm x 178mm thick would be rendered from each facade panel.

Each sub-panel has a mass of approx. 320kgs.

"Concrete is second only to water as the world's most heavily consumed substance." (Brand. 1994:125)
6 (152mm) thick concrete panels will be removed from the eastern- & western facades.

Panel Surface area:
East = 45.87m² / West = 18.61m²

Panel Mass:
East = approx. 18 780kgs / West = approx. 7 620kgs

The new building works would produce approx. 518.62m² of concrete ‘facade’ that would be re-used as building block units. The designated unit dimensions of approx. 1350mm x 580mm x (178/152mm) thick could vary without affecting the their application, and 30mm variance in block measurements has been factored in for their use in this scheme.
The wall panels are all of the same general construction, with walls to the south being 1" thicker than those on the 3 remaining facades.

EXISTING WALL PANEL:
- 10mm thick cement plaster
- 6/7" (152/178mm) thick mesh reinforced in-situ concrete wall panel

152mm thick:
- U-value : 2.90 (W/m².K)
- Thermal Decrement : 0.69
- Thermal Lag : approx. 4 hours

178mm thick:
- U-value : 2.68 (W/m².K)
- Thermal Decrement : 0.60
- Thermal Lag : approx. 5 hours

The re-deployment of the concrete panels will be in accordance with their inherent thermal capacity and the areas of the new construction that would benefit most from these qualities. Thus, the thicker panels with a greater capacity to exclude unwanted heat in summer, and to reduce the extent of this penetrative heat - will be used on the north-, east- & western facades. The remaining panels will be used on the southern facade (basement level), and as landscaping / retaining / ballast structures.
One of the salient goals of the Boukunde III proposal is to achieve a significant improvement in natural light disbursement throughout the building. The execution of this ideal comes primarily via the southern flank, which is broken through and extended, resulting in a translucent elevation facing Lynnwood road.

Based upon the surface finish of the material being proposed to render this translucence - there will be a light reflective component that will affect the pedestrian & vehicular traffic passing by the buildings south facade. Given the law of reflection - angle of incidence = angle of reflection - the figures indicate the potential hazardous glare that could result off the western facade in the mid- to late afternoon during winter.

This would be indicative of specular reflection - typically from a hard polished surface such as plate glass. If one were to replicate the envelope of Boukunde I in the new facade proposals, then this form of reflected glare would have to be accounted for.
The reflective glare off the southern facade alone would only be a factor during the summer months - peaking at the solstice. The solar altitude during early morning- & late afternoon hours would result in an incident angle sufficient to produce glare off the glazed facade.

Due to the fact that Lynnwood road traffic flow is bi-directional and fairly evenly weighted in terms of directional volumes throughout the day - a glare attenuation strategy will have to accommodate both easterly- & westerly traffic flow, and do so at all times that there is a risk of reflected glare.
If the skin of Boukunde I is to be 'resurrected' for the new building - it will have to be evaluated for its prospects in terms of overexposure, as was indicative of the building in the 1960's. There will be a significant measure of overshadowing from the existing building, but not much from other elements in the immediate vicinity.
The graphs facilitate a comparison between the eastern & western facade proposals in terms of the amount of solar radiation incident upon them during the course of the year. Both facades will experience a more consistent exposure during winter months, and a greater magnitude - albeit less consistently - in summer.

The magnitude of variation and respective location different will determine whether a significantly varied approach is applied in ultimately resolving the 2 elevations.

Table 33: Incident Solar Radiation (annual) - Boukunde III facade - EAST & WEST

<table>
<thead>
<tr>
<th>MONTH</th>
<th>AVAIL SHADE</th>
<th>AVG INCIDENT</th>
<th>TOT.WH</th>
<th>TOTAL TOT.WH</th>
<th>TRANSMITTED</th>
<th>AVAIL SHADE</th>
<th>AVG INCIDENT</th>
<th>TOT.WH</th>
<th>TOTAL TOT.WH</th>
<th>TRANSMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>119043</td>
<td>34%</td>
<td>4838</td>
<td>31348</td>
<td>1596755</td>
<td>77%</td>
<td>52145</td>
<td>2123</td>
<td>432815</td>
<td>18436</td>
</tr>
<tr>
<td>Feb</td>
<td>107949</td>
<td>22%</td>
<td>4351</td>
<td>27966</td>
<td>1427616</td>
<td>57%</td>
<td>42099</td>
<td>2040</td>
<td>415537</td>
<td>17717</td>
</tr>
<tr>
<td>Mar</td>
<td>138774</td>
<td>48%</td>
<td>3578</td>
<td>34901</td>
<td>1779097</td>
<td>52%</td>
<td>31106</td>
<td>2707</td>
<td>551428</td>
<td>23519</td>
</tr>
<tr>
<td>Apr</td>
<td>140162</td>
<td>48%</td>
<td>3330</td>
<td>2972</td>
<td>1928550</td>
<td>50%</td>
<td>27352</td>
<td>2299</td>
<td>486289</td>
<td>19964</td>
</tr>
<tr>
<td>May</td>
<td>185742</td>
<td>48%</td>
<td>3227</td>
<td>2537</td>
<td>167638</td>
<td>50%</td>
<td>35486</td>
<td>3224</td>
<td>566783</td>
<td>29977</td>
</tr>
<tr>
<td>Jun</td>
<td>183244</td>
<td>50%</td>
<td>3011</td>
<td>2586</td>
<td>166438</td>
<td>50%</td>
<td>35909</td>
<td>3337</td>
<td>489690</td>
<td>28976</td>
</tr>
<tr>
<td>Jul</td>
<td>193465</td>
<td>50%</td>
<td>3295</td>
<td>2878</td>
<td>197631</td>
<td>50%</td>
<td>42593</td>
<td>3545</td>
<td>672056</td>
<td>30771</td>
</tr>
<tr>
<td>Aug</td>
<td>186277</td>
<td>48%</td>
<td>3240</td>
<td>2621</td>
<td>165260</td>
<td>50%</td>
<td>35835</td>
<td>3199</td>
<td>561618</td>
<td>27767</td>
</tr>
<tr>
<td>Sep</td>
<td>163402</td>
<td>50%</td>
<td>3337</td>
<td>2530</td>
<td>167638</td>
<td>50%</td>
<td>35364</td>
<td>3065</td>
<td>424418</td>
<td>26626</td>
</tr>
<tr>
<td>Oct</td>
<td>134069</td>
<td>50%</td>
<td>3494</td>
<td>2445</td>
<td>170631</td>
<td>51%</td>
<td>25986</td>
<td>3171</td>
<td>561618</td>
<td>27767</td>
</tr>
<tr>
<td>Nov</td>
<td>190570</td>
<td>50%</td>
<td>3605</td>
<td>3295</td>
<td>219546</td>
<td>51%</td>
<td>19685</td>
<td>1635</td>
<td>332966</td>
<td>14184</td>
</tr>
<tr>
<td>Dec</td>
<td>119249</td>
<td>48%</td>
<td>3288</td>
<td>2677</td>
<td>165260</td>
<td>55%</td>
<td>20080</td>
<td>1760</td>
<td>427367</td>
<td>15287</td>
</tr>
<tr>
<td>TOTALS</td>
<td>1780946</td>
<td>50%</td>
<td>4194</td>
<td>37752</td>
<td>192546</td>
<td>50%</td>
<td>20980</td>
<td>1760</td>
<td>427367</td>
<td>15287</td>
</tr>
</tbody>
</table>

From the detailed breakdown of exposure values it can be seen that the eastern facade will experience greater incidence of solar radiation per m² than the west due to its longer period of exposure, however the greater surface area of the western facade results in a far larger total transmitted load being brought into the open, contiguous volumes of the new construction.
The figures illustrate the extent of diurnal overshadowing that will be applicable during the longest- and shortest days of the year. This protection of the new exposed skin elements will be supplemented by new screening elements, as well as pre-existing natural features of the site. (*see technical annexure for development & incorporation)

Figure 107: winter solstice - shadow range - 08h00-16h00

Figure 108: summer solstice - shadow range - 08h00-16h00
Figure 109: winter solstice - shadow range - 08h00-16h00

Figure 110: summer solstice - shadow range - 08h00-16h00