



## CONCLUSION

---



The design fulfils its intention of creating an architecture that empowers, which manifested from a detailed understanding of the existing community. The project aimed to create a space of justice; a space that the community can claim as their own, a space where they have the necessary resources and tools needed for their success, and a space that begins to break down social barriers and encourage interaction and new social relationships.

The project showcases a new model for the development of inner-city blocks in Johannesburg. It successfully illustrates the value of working within an existing fabric in order to support and strengthen existing networks, and create an interactive dynamic between building, street edge and pedestrian.

## APPENDIX A: THE WATER BUDGET

### RAINWATER YIELD

$$\text{Yield (m}^3\text{)} = P \times A \times C$$

= precipitation x area x run-off coefficient

#### RAINWATER HARVESTING YIELD

Catchment surface	Area (m2)	Runoff coefficient weighted	Area of catchment weighted
Roof	3209,3	0,9	2888,37
Decking	552	0,9	496,8
Paving	3522,89	0,8	2818,312
lawn	1819	0,4	727,6
Total			6931,082

Column1	Ave. monthly pr	Area of catchment weighted	Yield
January	0,105	6931,082	727,76361
February	0,121	6931,082	838,660922
March	0,096	6931,082	665,383872
April	0,039	6931,082	270,312198
May	0,025	6931,082	173,27705
June	0,009	6931,082	62,379738
July	0,003	6931,082	20,793246
August	0,007	6931,082	48,517574
September	0,019	6931,082	131,690558
October	0,078	6931,082	540,624396
November	0,085	6931,082	589,14197
December	0,109	6931,082	755,487938
Total	0,696	6931,082	4824,033072



## RAINWATER DEMAND

DOMESTIC DEMAND SUPPLIED BY RAIN WATER YIELD

Month	Days/month	Working days/month	Water capita/day	Water capita/month	Domestic demand/month (m3)
January	31	20	560	11200	11,2
February	28	20	560	11200	11,2
March	31	20	560	11200	11,2
April	30	20	560	11200	11,2
May	31	20	560	11200	11,2
June	30	20	560	11200	11,2
July	31	20	560	11200	11,2
August	31	20	560	11200	11,2
September	30	20	560	11200	11,2
October	31	20	560	11200	11,2
November	30	20	560	11200	11,2
December	31	15	560	8400	8,4
					131,6

### IRRIGATION DEMAND

Months	Planting Area (m2)	Irr. Depth/ month	Irrigation demand (m3 per month)
January	1819	0,16	291,04
February	1819	0,16	291,04
March	1819	0,16	291,04
April	1819	0,12	218,28
May	1819	0,08	145,52
June	1819	0,08	145,52
July	1819	0,08	145,52
August	1819	0,08	145,52
September	1819	0,12	218,28
October	1819	0,16	291,04
November	1819	0,16	291,04
December	1819	0,16	291,04
		Total	2764,88

## RAINWATER BUDGET

WATER BUDGET - RAINWATER HARVEST

Months	Rainwater Yield	Irrigation Demand	Domestic Demand	Monthly Balance	Water in Tank (m <sup>3</sup> )
January	727,76361	291,04	11,2	425,52361	2353,076682
February	838,660922	291,04	11,2	536,420922	2889,497604
March	665,383872	291,04	11,2	363,143872	3252,641476
April	270,312198	218,28	11,2	40,832198	3293,473674
May	173,27705	145,52	11,2	16,55705	3310,030724
June	62,379738	145,52	11,2	-94,340262	3215,690462
July	20,793246	145,52	11,2	-135,926754	3079,763708
August	48,517574	145,52	11,2	-108,202426	2971,561282
September	131,690558	218,28	11,2	-97,789442	2873,77184
October	540,624396	291,04	11,2	238,384396	3112,156236
November	589,14197	291,04	11,2	286,90197	3399,058206
December	755,487938	291,04	8,4	456,047938	3855,106144
<b>YEAR</b>	4824,033072	2764,88	131,6	1927,553072	

GREATEST VOLUME IN TANK AT ANY TIME IS THE MIN CAPACITY OF TANK	3855,106144 m <sup>3</sup>
FINAL TANK /SIZE WITH 1.5 SAFETY FACTOR	5782,659216 m <sup>3</sup>
TANK SIZE	34 X 34 X 5



## GREY WATER YIELD

$$\text{Yield (m}^3\text{)} = P \times A \times C$$

= precipitation x area x run-off coefficient

### GREY WATER YIELD

total people	Appliances	Litres/day/person served	total yield per day
80	Handwashing:spray taps	4	320
40	Urinal flushing 8h day	4	160
80	Drinking, food preparation a	15	1200
80	Washing dishes	10	800
			2480

### GREY WATER RETURN

Month	Days/month	Working days/month	Water capita/day	Water capita/month	Domestic demand/month (m3)
January	31	20	2480	49600	49,6
February	28	20	2480	49600	49,6
March	31	20	2480	49600	49,6
April	30	20	2480	49600	49,6
May	31	20	2480	49600	49,6
June	30	20	2480	49600	49,6
July	31	20	2480	49600	49,6
August	31	20	2480	49600	49,6
September	30	20	2480	49600	49,6
October	31	20	2480	49600	49,6
November	30	20	2480	49600	49,6
December	31	15	2480	37200	37,2
					582,8



# GREY WATER DEMAND

## DOMESTIC WATER CAPITA/DAY (L)

total people	Appliances	Litres/day/person served	total demand/day
80	Handwashing:spray taps	4	320
40	Urinal flushing 8h day	4	160
80	WC flushing-urinals provided	5	400
TOTALS			320
			560

	Rainwater Yield
	Greywater Yield

## DOMESTIC DEMAND SUPPLIED BY GREY WATER YIELD

Month	Days/month	Working days/month	Water capita/day	Water capita/month	Domestic demand/month (m3)
January	31	20	320	6400	6,4
February	28	20	320	6400	6,4
March	31	20	320	6400	6,4
April	30	20	320	6400	6,4
May	31	20	320	6400	6,4
June	30	20	320	6400	6,4
July	31	20	320	6400	6,4
August	31	20	320	6400	6,4
September	30	20	320	6400	6,4
October	31	20	320	6400	6,4
November	30	20	320	6400	6,4
December	31	15	320	4800	4,8
					75,2

# GREY WATER BUDGET

## WATER BUDGET - GREY WATER HARVEST

Months	Grey Water Yield	Domestic Demand	Monthly Balance	Water in Tank (m <sup>3</sup> )
January	49,6	6,4	43,2	550,8
February	49,6	6,4	43,2	594
March	49,6	6,4	43,2	637,2
April	49,6	6,4	43,2	680,4
May	49,6	6,4	43,2	723,6
June	49,6	6,4	43,2	766,8
July	49,6	6,4	43,2	810
August	49,6	6,4	43,2	853,2
September	49,6	6,4	43,2	896,4
October	49,6	6,4	43,2	939,6
November	49,6	6,4	43,2	982,8
December	37,2	4,8	32,4	1015,2
<b>YEAR</b>	582,8	75,2	507,6	

GREATEST VOLUME IN TANK AT ANY TIME IS THE MIN CAPACITY OF TANK	1015,2 m <sup>3</sup>
FINAL TANK /SIZE WITH 1.5 SAFETY FACTOR	1522,8 m <sup>3</sup>
TANK SIZE	20 X 20 X 4

# LIST OF FIGURES

---

All images by author unless otherwise referenced

## CHAPTER 1

Figure 1.1	The Joubert Park Precinct (Johannesburg Art Gallery Collection)	1
Figure 1.2	The People of the Street	4-5
Figure 1.3	The General Issue	9
Figure 1.4	The Urban Issue	9
Figure 1.5	The Architectural Issue	9
Figure 1.6	Spatial Justice Methodology Diagrams (Basset 2013)	11
Figure 1.7	A Spatial Justice Approach (Krom 2010)	11
Figure 1.8	The General Intent	13
Figure 1.9	The Urban Intent	13
Figure 1.10	The Architectural Intent	13

## CHAPTER 2

Figure 2.1	National	16
Figure 2.2	Provincial	16
Figure 2.3	Regional	16
Figure 2.4	Johannesburg Nollie Map (Joubert Park Group 2016)	17
Figure 2.5	The Existing Context (Google Earth 2013 edited by author)	18-19
Figure 2.6	Die Uitvalgrond (Museum Africa Collection)	21
Figure 2.7-10	Reminiscing (JAG collection)	23
Figure 2.11	The Old Fountain (The Heritage Portal)	25
Figure 2.12	The Park at Night (Lost Johannesburg)	25
Figure 2.13	Artists under the Sun (JAG Collection)	25
Figure 2.14	High Rise (Lost Johannesburg)	25
Figure 2.15	Broken Barriers (Lost Johannesburg)	25
Figure 2.16	Taxi Culture (Divisions_in_Space 2015)	27
Figure 2.17	Informal Trade (Divisions_in_Space 2015)	27
Figure 2.18	Dance Battle	27
Figure 2.19	Peak Time (JJ Pieterse 2016)	27
Figure 2.20	Lunch Time	27
Figure 2.21	Street Edge	27
Figure 2.22	Noord St Taxi Rank	27
Figure 2.23	Mapping Urban Boundaries	29
Figure 2.24	Urban Connections	31
Figure 2.25	A City Park	33
Figure 2.26	Integrated Inner-City Fabric	35
Figure 2.27	Site	37
Figure 2.28	Urban Form	38-39
Figure 2.29	Trade and Transport	41
Figure 2.30-33	SWOT Analysis	43-49
Figure 2.34	The Existing Site	51
Figure 2.35	The Seam and The Spine	55
Figure 2.36	The Final Vision	55
Figure 2.37-41	The Urban Vision	57-65
Figure 2.41	The Everyday and the Extraordinary	67
Figure 2.43	The Conceptual strategy	68-69
Figure 2.44	The Urban Artscape	70-71
Figure 2.45	Economic Centre of Development	73
Figure 2.46	Creative Council (Verseput 2016)	73
Figure 2.47	The Memory Archive (Swanepoel 2016)	73



## CHAPTER 3

Figure 3.1	Site Map	77
Figure 3.2-5	Site Walk Through	77
Figure 3.6	Site Location	79
Figure 3.7	The Site Context	81
Figure 3.8	Site Plan	82
Figure 3.9	3D Site	83
Figure 3.10	Constantia Residential Towers	84
Figure 3.11	Residential Section	85
Figure 3.12	The Bridge Mall	86
Figure 3.13	The Ground Floor Layout	87
Figure 3.14	Nodal Zoning	89
Figure 3.15	Typologies	91
Figure 3.16	Trade Typologies	93
Figure 3.17-21	Street Edge Analysis	95-97
Figure 3.22	Inhabitants	99
Figure 3.22-24	Case Study Analysis	101-106
Figure 3.25	Social Networks	107

## CHAPTER 4

Figure 4.1	Spatial Justice	115
Figure 4.2	Spatial Claim	116
Figure 4.3	Spatial Power	117
Figure 4.4	Spatial Linkage	118
Figure 4.5	Site Map	119
Figure 4.6	Gaurdians of the Park	121
Figure 4.7	Lack of Ownership in the Public Sphere	121
Figure 4.8	Re-appropriated Living Spaces (Wessels 2015)	121
Figure 4.9	Temporary Squat flats (Wessels 2015)	121
Figure 4.10	Taxi Culture of Joubert Park	121
Figure 4.11	Survivalist Trade	121
Figure 4.12	Social Laundry Roof (Bestall 2012)	121
Figure 4.13	Circulation Play Space (Wessels 2015)	121
Figure 4.14	Re-appropriated Gym (Bestall 2012)	121
Figure 4.15	Vibrant Energy	123
Figure 4.16	Lack of Maintenance	123
Figure 4.17	JMPD Outside Jag	123
Figure 4.18	Street Artists	123
Figure 4.19	Trading Skills	123
Figure 4.20	Trading Skills	123
Figure 4.21	Fenced off JAG	123
Figure 4.21	Railway Barrier	125
Figure 4.22	Infrastructure as Barrier	125
Figure 4.23	Fence as Barrier	125
Figure 4.24	Traffic as Barrier	125
Figure 4.25	Dead Edge Barrier	125
Figure 4.26	Barrier Between Hillbrow and Parktown	125
Figure 4.27	Spatial Justice Map	126
Figure 3.28-30	Hindered Mobility	127
Figure 3.31-33	Transport Analysis	128
Figure 3.34-36	Residential Analysis	129
Figure 3.37-41	Trade Analysis	131
Figure 3.42-44	Event Space	133
Figure 3.45-48	Re-appropriated Living	135
Figure 3.49-52	Re-appropriated Playing	137





# LIST OF FIGURES

---

All images by author unless otherwise referenced

## CHAPTER 5

Figure 5.1	Spatial development concept	155
Figure 5.2	MASP (Plinio Dondon)	156
Figure 5.3	MASP (Moore 2012)	157
Figure 5.4	Void and street (Pedro Kok)	158
Figure 5.5	Spatial configuration	159
Figure 5.6	Section through MASP (Arch Daily, David Langdon)	160
Figure 5.7	Kanchanjunga apartments (Khan, Hassan-Uddin)	161
Figure 5.8	Loggia (Khan, Hassan-Uddin)	162
Figure 5.9	Environmental Considerations (Hakki Can Özkan)	163
Figure 5.10	Spatial Concept (Charles Correa)	163
Figure 5.11	Interlocking Units (Charles Correa)	164
Figure 5.12	WITS Art Museum (WAM)	164
Figure 5.13	Street Edge (The heritage portal)	165
Figure 5.14	Existing Street Edge condition (Granova)	167
Figure 5.15	New defined street edge (Granova)	168
Figure 5.16	Threshold (WAM)	169
Figure 5.17	Survivalist trade	171
Figure 5.20	Existing Site	171
Figure 5.21	Phase 1	171
Figure 5.22	Phase 2	175
Figure 5.23	Phase 3	176
Figure 5.24	Space of oppression	177
Figure 5.25	Expose	178
Figure 5.26	Define	179
Figure 5.27	Integrate	180
Figure 5.28	Occupy	181
Figure 5.29	Empower	182
Figure 5.29 (1-8)	The Bridge Mall	183
Figure 5.29	Empower	184
Figure 5.36	Massing study 1	185
Figure 5.37	Massing study 2	190
Figure 5.39	Existing site model	190
Figure 5.40	Conceptual development sketch	191
Figure 5.41	Conceptual development sketch	192
Figure 5.42	Marquette of bridge intervention	193
Figure 5.43	Marquette of larger site	194
Figure 5.44	Spatial intentions of the intervention	195
Figure 5.45	Spatial intentions of the intervention	195
Figure 5.46	Inter-connecting walkway	196
Figure 5.47	Model for the development of trade	197
Figure 5.48	Iteration 1	198
Figure 5.49	Ground floor plan	199
Figure 5.50	Third floor plan	200
Figure 5.51	Circulation	201
Figure 5.52	Services	202
Figure 5.53	Elevation	205
Figure 5.54	3D model	206
Figure 5.55	Cross section exploration	207
Figure 5.56	Long section exploration	210
Figure 5.57	Long section through eastern elevation	210



## CHAPTER 6

Figure 6.1	Technical concept diagram	215
Figure 6.2	Technical concept axo	220
Figure 6.3	Tools of empowerment	225
Figure 6.4	Approach to existing structure	226
Figure 6.5	The intervention	227
Figure 6.6	The masses	228
Figure 6.7	The lightbox	229
Figure 6.8	Panel option 1	232
Figure 6.9	Panel option 2	240
Figure 6.10	Panel option 3	245
Figure 6.11	Scenario 1	246
Figure 6.12	Scenario 2	247
Figure 6.13	Material palette for adaptable system	250
Figure 6.14	The social learning modules	252
Figure 6.19	Summer Solstice	254
Figure 6.20	Spring Solstice	255
Figure 6.21	Winter Solstice	256
Figure 6.22	North facade solar study	257
Figure 6.15	Water sources	258
Figure 6.16	Rainwater harvesting diagram	259
Figure 6.17	Drainage details	260
Figure 6.18	Orientation	262
Figure 6.16	Rainwater harvesting diagram	262
Figure 6.23	Eastern shading device	264
Figure 6.24	Solar study	265
Figure 6.25	Western shading device	266
Figure 6.26	Insulated sandwich panel system	272
Figure 6.27	Natural cross ventilation	272
Figure 6.28	SBAT assessment graph	273
Figure 6.29	Deck detail	274
Figure 6.30	Adaptable insulated panel detail	275
Figure 6.31	Detail cross section	276
Figure 6.32	Detail cross section	277

# BIBLIOGRAPHY

---

- Brad Evan Krom (2010). *Spatial Justice: Reintegrating the High Court and bridging the political divide*. Johannesburg: School of Architecture and Planning. The University of Witswatersrand.
- Bestall, C. (2012). Hillbrow: Between heaven and hell. Received from: <http://www.youtube.com/watch?v=hHk7h71hGxw>. [accessed 14/03/201
- Basset, S.M. (2013). *The role of spatial justice in the regeneration of urban spaces*. University of Illinois at Urbana-Champaign.
- Cotze, P. (2014). *Award of Merit : Wits Art Museum*. Artfacts. Received from : <http://www.artefacts.co.za/main/Buildings/bldgframes.php?bldgid=8509>. [Accessed 4-10-2016].
- Johannesburg Development Agency (JDA). (2015). *The Joubert Park Urban Vision*.
- Khan, Hasan-Uddin, ed. (1978) *Charles Correa*. Singapore: Concept Media Ltd.
- Kihato, C.W. (2013). *The Migrant Women of Johannesburg : Life in an in-between city*. Johannesburg: Wits University Press.
- Lefebvre, H. (1991). *The Production of Space*. New Jersey: Wiley.
- Lefebvre, H. (1996). *Writings on cities Translated and edited by, E. Kofman & E. Lebas, eds*. Oxford and Cambridge: Routledge.
- Malan, D.G. et al, (1986). *Johannesburg: One Hundred Years*. Johannesburg: Chris Van Rensburg Publishing.
- Marais, I. E. (2013). *Public space/public sphere: An ethnography of Joubert Park*, Johannesburg. University of Johannesburg.
- Moore, M. (2012). *Why We Build*. London: Macmillan Publisgers Ltd.
- Morris, A. (1991). The Desegregation of Hillbrow, Johannesburg, 1978-82. *Urban Studies*, 31 (6), pp. 821-834.

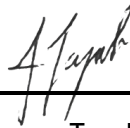
- Murray, M. (2010). *Taming the disorderly City: The spatial landscape of Johannesburg after Apartheid*. London: Cornell University Press.
- Nielsen, N.D. (2012). Joubert Park: The need for intervention. M(Tech) Arch. [Unpublished]: University of Johannesburg . Retrieved from: <https://ujdigispace.uj.ac.za> . (Access: 06/07/2016)
- Sarah Minah Basset (2013). *The role of spatial justice in the regeneration of urban spaces*. Illinois: University of Illinois.
- Soja, E. W. (2009). *The city and spatial justice*. Spatail Justice Conference. Paris. March 12-14
- Soja, E.W. (2010). *Seeking Spatial Justice*. Minnesota: University of Minnesota Press.
- South African History Online. (2015). History of Hillbrow. Retrieved from: <http://www.sahistory.org.za/image-gallery/johannesburg-today%2C-1980s---present>. Access: 03/04/2016)
- Spellman, W. M. (2008). *Uncertain Identity: International Migration since 1945*. London: Reaktion Books Ltd.
- Themba, M. Bailey, K. Lobenstine, L. (2011). *Spatial Justice: a frame for reclaiming our rights to be, thrive, express and connect*. Design Studio for Social Intervention. Retrieved from: [http://www.thepraxisproject.org/sites/default/files/Miles/201201/SpatialJustice\\_ds4si.pdf](http://www.thepraxisproject.org/sites/default/files/Miles/201201/SpatialJustice_ds4si.pdf). [Accessed: 02/09/2016].



In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree of Master of Architecture (Professional), at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this thesis is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.



---

Ilhaam Tayob  
November 2016