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SA Council for Scientific and Industrial Research Pretoria. 1. Report on Witbank New Native Township (Architect: Calderwood, D.M.): 1.1 Location, site & zoning BR/V/506: 634X350 1.2 Development control analysis (graphs) BR/V/508: 655X685. 1.3 Space anaysis. BR/V /507: 655X685 1.4 . Space & Services analysis.BR/V/ 510: 655X685

S.A. Council for Scientific and Industrial Research, Pretoria. National Building Research Institute.Architect: Calderwood, D M.

2012-01-19
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AREA OF HOUSE.	TYPES OF HOUSES, SHEWING DIMENSIONS. DETACHED. 1.	SEMI-DETACHED. 2.	SINGLE STOREY ROW.	DOUBLE STOREY ROW.
600. SQ. FT.	25' 24' 27'	DIMENSIONS OF SEMI-DETACHED SAME AS COLUMN 1. DIAGRAMED.	25' 24' 20'	20' 24' 30' COVERAGE 480 SQ.FT.
700. " "	24' 27' 30'		27' 24' 26'	30' 24' 35' 500. " "
800. " "	24' 30' 33'		30' 24' 30'	30' 24' 40' 550. " "
900. " "	24' 33' 36'		30' 30' 30'	30' 30' 30' 600. " "
1000. " "	24' 36' 39'		33' 30' 30'	30' 30' 33' 650. " "
1200. " "	24' 40' 46'		30' 40' 30'	30' 30' 40' 750. " "
1400. " "	24' 46' 56'		30' 46'6" 34'	34' 30' 46'6" 850. " " 150 SQ.FT. CIRCULATION

TABLE 1. DIMENSIONS OF HOUSES.

SCALE: 1 INCH = 100 FEET.

AREA OF HOUSE.	MIN. PLOT 30% COVER AREA.	DETACHED. AREA.	DETACHED. PLOT SIZE	SEMI-DETACHED AREA.	SEMI-DETACHED PLOT SIZE.	SINGLE STOREY ROW. AREA.	SINGLE STOREY ROW. PLOT SIZE	DOUBLE STOREY ROW. AREA.	DOUBLE STOREY ROW. PLOT SIZE.
600. SQ.FT.	2000. SQ.FT.	2780 SQ.FT.	45'x 62'	2170 SQ.FT.	35'x 62'	2000 SQ.FT.	25'x 80'	1500. SQ.FT.	15'x 100'
700. " "	2333. " "	3008 " "	47'x 64'	2368 " "	37'x 64'	2333. " "	26' x 90'	1666. " "	15'x 111'
800. " "	2666. " "	3200 " "	50' x 64'	2680. " "	40' x 67'	2666. " "	30'x 88'	1833. " "	15' x 122'
900. " "	3000. " "	3520 " "	55'x 64'	3015 " "	45' x 67'	3000. " "	30'x 100'	2000. " "	20' x 100'
1000. " "	3333. " "	3776 " "	59' x 64'	3332 " "	49' x 68'	3333. " "	30'x 111'	2166. " "	20'x 108'
1200. " "	4000. " "	4224 " "	66'x 64'	4032 " "	56'x 72'	4000. " "	40'x 100	2500. " "	25'x 100'
1400. " "	4666. " "	4864 " "	76'x 64'	4636 " "	66'x 71'	4666. " "	46'6"x 100'	2833. " "	25'x 113'

DISTANCES. COVERAGE.

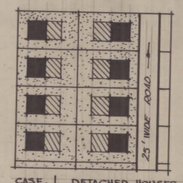
THIS SIDE OF LINE CONTROL BY DISTANCES BETWEEN UNITS — THIS SIDE OF LINE CONTROL BY MAX. COVERAGE OF 30%.

TABLE 2. AREA & DIMENSIONS OF STANDS FOR VARIOUS SIZED HOUSES. COVERAGE & SPACING CONTROL.

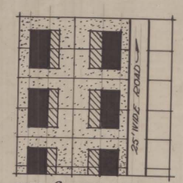
NOTE. CONTROL AS FOLLOWS.
MINIMUM DISTANCE BETWEEN DWELLINGS, FRONT TO FRONT, REAR TO REAR OR FRONT TO REAR 50'-0" & SIDE TO SIDE 20'-0" AND NO SITE COVERAGE TO EXCEED 30% COVERAGE.
TABLE.1 GIVES DIMENSIONS OF HOUSES USED IN TABLE. 2.
TABLE.2. SHOWS HOW MINIMUM SPACING CONTROLS STAND SIZES FOR DETACHED, & SOME SEMI-DETACHED DWELLINGS WHERE AS COVERAGE CONTROLS THE REMAINDER.

DISTANCES & COVERAGE TABLES.

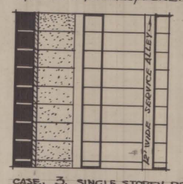
PLATE NUMBER BRA/K/23.



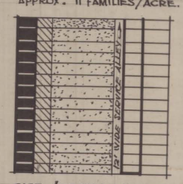
CASE. 1. DETACHED HOUSES.
PLOTS 50' x 80' & 30% COVERAGE.
APPROX. 8 FAMILIES/ACRE.



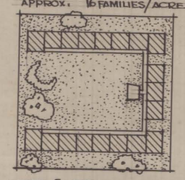
CASE. 2. SEMI-DETACHED.
PLOTS 40' x 75' COVERAGE 35%
APPROX. 11 FAMILIES/ACRE.



CASE. 3. SINGLE STOREY ROWS.
PLOTS 25'x80' COVERAGE 35%
APPROX. 16 FAMILIES/ACRE.



CASE. 4. DOUBLE STOREY ROWS.
PLOTS 15'x 133' COVERAGE 35%
APPROX. 20 FAMILIES/ACRE.



CASE. 5 THREE STOREY FLATS.
1 ACRE PLOT. NOTHING SPECIFIED.
30% COVERAGE TAKEN FOR EXAMPLE.
& APPROX. 37 FAMILIES/ACRE RESULTING.

SYSTEM. AMERICAN.

FEDERAL HOUSING ADMINISTRATION. ← LOT AREAS NOT TO BE LESS THAN:-
DETACHED ONE FAMILY DWELLING 4000 SQ.FT.
SEMI-DETACHED " " " 3000 SQ.FT.
ROW DWELLINGS ONE FAMILY. 2000 SQ.FT.
WHEN HOUSING TWO FAMILIES INCREASE 50%.
COVERAGES, DETACHED 30%, SEMI-DETACHED 35% & ROW HOUSES 35%.
= HOUSE AREA 600 SQ. FEET.
= MAX. ALLOWED UNDER PROVISION OF COVERAGE CLAUSE.

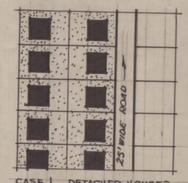
OBSERVATIONS.

CASE. 1. DETACHED. GOOD SIZE OF MINIMUM STAND. TAKING A MAXIMUM COVERAGE OF 1200 SQ.FT. INCLUDING OUTBUILDINGS IF ANY.
CASE. 2. SEMI-DETACHED, GOOD SIZE OF MINIMUM STAND WITH A COVERAGE GIVING 1050. SQ.FT. INCLUDING OUTBUILDINGS.
CASE 3. SINGLE STOREY ROW HOUSES, GOOD STANDARDS GIVING 700 SQ.FT OF BUILDING COVERAGE.
CASE 4. DOUBLE STOREY ROW HOUSES, STANDARDS GOOD IF STAND FRONTAGE IS LIMITED TO MINIMUM OF SAY 20'-0". AS DRAWN AT 15'-0" WITH MAXIMUM COVERAGE OF 700 SQ.FT. GIVING 1400 SQ.FT. HOUSE. THE CROSS VENTILATION OF DWELLING IS BAD (DEPTH IS 46'-8") AND MINIMUM FRONTAGE WOULD AT ONCE RECTIFY THIS.
CASE 5. THREE STOREY APARTMENTS. HAVE NO STANDARD LAID DOWN THEREFORE A 30% COVERAGE WAS ASSUMED GIVING GOOD RESULT.

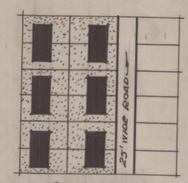
Scale 1 INCH = 100 FT. EACH SQUARE EQUALS 1 ACRE.

DEVELOPMENT CONTROL BY MINIMUM SIZED STANDS IN CONJUNCTION WITH COVERAGE.

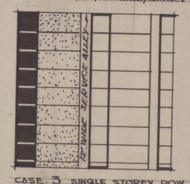
PLATE NUMBER BRA/K/



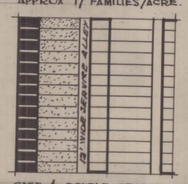
CASE 1. DETACHED HOUSES.
PLOT 62' x 45'
APPROX 14 FAMILIES/ACRE.



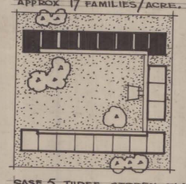
CASE 2. SEMI-DETACHED.
PLOT 35' x 62'
APPROX 17 FAMILIES/ACRE.



CASE 3 SINGLE STOREY ROW.
PLOTS 25' x 80'
APPROX 17 FAMILIES/ACRE.



CASE 4. DOUBLE STOREY ROW.
PLOTS. 15' x 133'
APPROX 28 FAMILIES/ACRE.



CASE 5. THREE STOREY FLATS.
1 ACRE PLOT 30% COVERAGE.
APPROX 57 FAMILIES/ACRE.

SYSTEM.

NO BUILDING OR BUILDINGS MAY COVER MORE THAN 30% OF SITE. THE FOLLOWING MINIMUM SPACING IS ADHERED TO; FRONT & REAR SPACE MIN. 50'-0" & SIDE SPACES OF 20'-0" CLEAR.
A BUILDING LINE OF 12'-6" WAS ALLOWED & AREA OF HOUSE 600 SQ.FT. AS BEFORE. TABLE SHEWS PLOT SIZES FOR DIFFERENT SIZED HOUSES, SEE PLATE BRA/K/

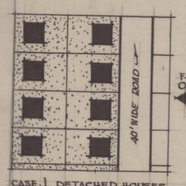
OBSERVATIONS.

CASE. 1. DETACHED, IS DICTATED BY SPACING OF BUILDINGS RESULTING IN ONLY 21.5% COVERAGE. THE RESULTANT 45'-0" FRONTAGE IS INTERESTING.
CASE. 2. SEMI-DETACHED, RESULT OF SPACING AGAIN, COVERAGE = 28 %
CASE. 3. SINGLE STOREY ROW IS BASED ON 30% COVERAGE ALONE.
CASE. 4. DOUBLE STOREY ROW AGAIN BASED ON COVERAGE.
CASE. 5. THREE STOREY APARTMENTS, BASED ON 30% COVERAGE.: SPACING DISTANCES MUST BE INCREASED WITH HEIGHT OF BUILDING AND THIS WILL BE STUDIED LATER.

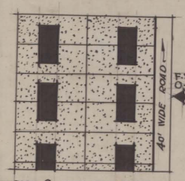
Scale: 1 INCH = 100 FT. EACH SQUARE EQUALS 1 ACRE.

DEVELOPMENT CONTROL BY COVERAGE IN CONJUNCTION WITH MIN. SPACES BETWEEN BLDGS.

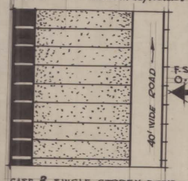
PLATE NUMBER BRA/K/



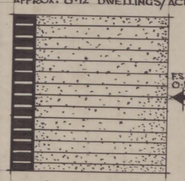
CASE. 1. DETACHED HOUSES.
PLOT. 50'x 70' : COVERAGE = 17.2%
APPROX. 8-12 DWELLINGS/ACRE.



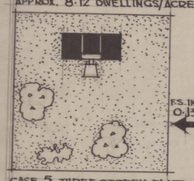
CASE. 2. SEMI-DETACHED.
PLOTS 40' x 92½' : COVERAGE 16·2%
APPROX. 8·12 DWELLINGS/ACRE.



CASE. 3 SINGLE STOREY ROWS.
PLOT. 25'x 160' : COVERAGE 15%
APPROX. 8·12 DWELLINGS/ACRE.



CASE 4. DOUBLE STOREY ROWS.
PLOT. 15' x 355' : COVERAGE = 7%
APPROX. 8·12 DWELLINGS/ACRE.



CASE. 5 THREE STOREY FLATS.
1 ACRE PLOT : COVERAGE 4.5%
APPROX 8·12 DWELLINGS/ACRE.

SYSTEM.

A FLOOR SPACE INDEX WAS SELECTED FROM OBSERVATIONS MADE ON A LAYOUT OF DETACHED HOUSES OF DWELLING AREA 600 SQ. FT. THE INDEX WAS 0·1333 AND OUR FORMULA READS
F.S.I = TOTAL FLOOR AREA = 0·1333
TOTAL SITE AREA
FLOOR AREA = ALL ROOFED AREAS & SPACE OCCUPIED BY ALL WALLING ETC.
SITE AREA = TOTAL SITE AREA INCLUDING ALLEYS, OPEN SPACES IF PROVIDED & HALF ROAD WIDTH SURROUNDING SITE TO A MAX. OF 20'-0" ONLY.

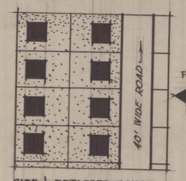
OBSERVATIONS.

GENERALLY: WITH A CONSTANT FLOOR SPACE INDEX DENSITY IS FIXED FOR VARIOUS UNIT TYPES, COVERAGE IS REDUCED WHEN NUMBER OF STOREYS ARE INCREASED. CORNER PLOTS HAVE GREATER COVERAGE AS ROAD AREA IS INCREASED.
CASE 1. & 2. ARE REASONABLE BUT OTHER CASES ARE TOO RIGIDLY CONTROLLED, ESPECIALLY CASE. 5.
THIS IS ONLY A DIAGRAMATIC ILLUSTRATION TO SHOW WAYS, THAT A FIXED FLOOR INDEX, EFFECTS VARIOUS TYPES OF LAYOUT.
THE PROPER APPLICATION IS SEEN ON PLATE BRA/K/ , IN ADDITION IT IS VERY USEFUL IN COMPARING DIFFERENT DENSITIES IN AN EASY & RAPID METHOD.

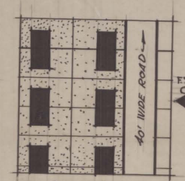
Scale: 1 INCH = 100 FT. EACH SQUARE = 1 ACRE.

DEVELOPMENT CONTROL BY CONSTANT FLOOR SPACE INDEX.

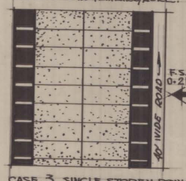
PLATE NUMBER BRA/K/



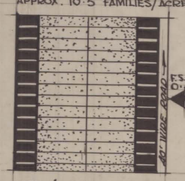
CASE. 1. DETACHED HOUSE.
PLOT. 50' x 70' : COVERAGE 17·2%
APPROX. 8·12 FAMILIES/ACRE.



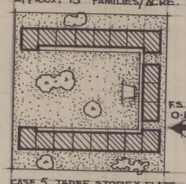
CASE. 2. SEMI-DETACHED.
PLOTS. 40' x 70' : COVERAGE 21.4%
APPROX. 10·5 FAMILIES/ACRE.



CASE. 3. SINGLE STOREY ROW.
PLOT. 25' x 90' : COVERAGE 26·7%
APPROX. 15 FAMILIES/ACRE.



CASE. 4. DOUBLE STOREY ROW.
PLOTS 15' x 90' : COVERAGE 27·7%
APPROX. 25 FAMILIES/ACRE.



CASE. 5. THREE STOREY FLATS.
1 ACRE PLOT. COVERAGE 30%.
APPROX 57 FAMILIES/ACRE.

SYSTEM.

BY OBSERVING F.S.I. ON SEVERAL LAYOUTS THE INDEX MOST SUITABLE TO EACH TYPE WAS SELECTED, SO THAT SIMILAR CONDITIONS COULD BE REPEATED. EACH TYPE OF HOUSING HAVING A DIFFERENT INDEX, TO OBTAIN THE BEST RESULTS IN EACH CASE.

INDEX	
DETACHED.	0·333.
SEMI-DETACHED.	0·167
SINGLE STOREY ROW.	0·218.
DOUBLE STOREY ROW.	0·455
FLATS 3 STOREY.	0·83.

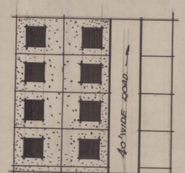
OBSERVATIONS.

FLOOR SPACE INDEX ALLOWS DESIGNER FREEDOM YET MAINTAINS THE CORRECT AMOUNT OF OPEN SPACE WHEN THE INDEX IS CORRECTLY CHOSEN.
BAD & GOOD LAYOUTS CAN BE QUICKLY COMPARED BY THEIR INDEX VALUES.
THE ABOVE CASES ARE PURELY ARBITARY IN THEIR INDEX SELECTION & MUCH RESEARCH MUST BE UNDERTAKEN BEFORE STANDARDS CAN BE LAID DOWN FOR SOUTH AFRICA.

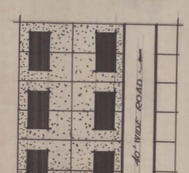
Scale: 1 INCH = 100 FT. EACH SQUARE EQUALS 1 ACRE.

DEVELOPMENT CONTROL BY VARIABLE FLOOR SPACE INDEX.

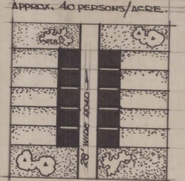
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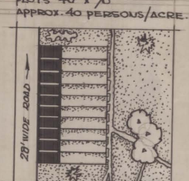
CASE. 1. DETACHED HOUSES
PLOTS 50' x 63'
APPROX. 40 PERSONS/ACRE.



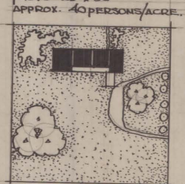
CASE. 2. SEMI-DETACHED.
PLOTS 40' x 70'
APPROX. 40 PERSONS/ACRE.



CASE. 3. SINGLE STOREY ROWS.
PLOTS 25' x 90
APPROX. 40 PERSONS/ACRE.



CASE. 4. DOUBLE STOREY ROWS.
PLOTS 15' x 90'
APPROX. 40 PERSONS/ACRE.



CASE. 5. THREE STOREY FLATS.
1 ACRE PLOT.
APPROX 40 PERSONS/ACRE.

SYSTEM.

A DENSITY OF 40 PERSONS/ACRE NETT IS IMPOSED ON A LAYOUT. IF DWELLINGS ARE DESIGNED FOR FAMILIES OF 4 PERSONS THEN 10 DWELLINGS/ACRE ARE REQUIRED. THE EXAMPLES SHOW A 600 SQ. FT. UNIT IN DIFFERENT UNIT FORMS HAVING IN EACH CASE WORKED TO 10 DWELLINGS TO THE ACRE.

OBSERVATIONS.

GENERALLY: THIS FORM OF CONTROL GIVES THE DESIGNER FREEDOM ONLY SO FAR AS NO LIMITATIONS ARE IMPOSED UPON HIM WITH REGARD TO TYPE OF UNITS. (IN NON-EUROPEAN HOUSING WHERE SINGLE STOREY DETACHED & SEMI-DETACHED UNITS ARE USED THE DESIGNER, IN THE CASE OF HIGH DENSITIES, HAS HIS HANDS TIED IF HE CANNOT RELIEVE THE CONGESTION OF DWELLING SPRAWL BY THE INTRODUCTION OF ROW HOUSES & FLATS.)
ONE FURTHER POINT TO NOTE IS THE FACT THAT A LAYOUT CAN BE DESIGNED FOR A PARTICULAR DENSITY, BUT WITHOUT CONTROL DURING OCCUPATION OF DWELLINGS OVER-CROWDING CAN EASILY DEVELOP FROM (a) LODGERS BEING ACCOMMODATED IN FAMILY DWELLING & (B) LARGE FAMILY OCCUPYING DWELLING DESIGNED FOR SMALL FAMILY UNIT (CAUSED BY LOWER RENTAL OF SMALLER UNIT.)
Scale: 1 INCH = 100 FT. EACH SQUARE = 1 ACRE.

DEVELOPMENT CONTROL BY CONSTANT DENSITY:- NUMBER OF PERSONS/ACRE, NETT.

PLATE NUMBER BRA/K/

BRA/V/508.

BRV 508

DEVELOPMENT CONTROL BY CONSTANT
DEVELOPMENT CONTROL BY VARIABLE
PLETORIA
BRA/V/508
D.M. CALDERWOOD
655 x 685