URBAN ARCHITECTURAL ORGANIZATION

by

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Accepted by _____
Chairman, Departmental Committee
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Dean Lawrence B. Anderson
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Dear Dean Anderson:

In partial fulfillment of the requirements for the degree of Master of Architecture I hereby submit this thesis entitled "URBAN ARCHITECTURAL ORGANIZATION".

Respectfully,

Oliver R. Jones, Jr.

ABSTRACT

This thesis is an examination of the urban phenomenon through the eyes of architecture. Emphasis is laid on urban problems, as form determinants, in the establishment of an architectural vocabulary suitable for a high density environment. An analysis is performed on the requirements of various urban functions and facilities in an effort to make the proposed architectural organization operationally meaningful. The study is conducted within the framework of the Germantown new town problem. The ideas of the thesis are presented in the form of a design proposal for the new community.

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I Architectural Organization and the Urban Dilemma

It is no secret that the contemporary city of America is currently facing a multitude of serious, complex, and interwoven problems. Pollution, congestion, crime, lack of open space, economic decline, slums, stagnation, and just plain ugliness, to name a few, plague most U.S. cities to one degree or another. Concern for the problems confronting the successful operation of contemporary cities is shared by a wide range of academic and professional disciplines. Sociology, medicine, planning, and economics, for instance, are all involved in the search for satisfactory urban environments.

Some of these urban problems, however, suggest an architectural resolution. Concerned as it is with the physical ordering and organization of the environment, in space, architecture is in a position to offer suggestions about the concrete city fabric. This thesis will address itself to these city problems which lend themselves to architectural handling. Going beyond the level of the single building, it will deal with those problems which are related to the organization and distribution in space of city facilities, activities, and spaces. It will attempt to solve these problems through a more careful and rational architectural ordering of the urban environment.

One problem which is directly related to the physical organization of the urban environment is self-mobility, the capability of individual independent movement. In the present

city, it is often difficult to move at certain times of the day, over long distances, or to specific destinations. Similarly, as the Chicago Area Transportation Study has shown for that city, traffic in metropolitan areas exhibits the characteristics of tidal flow with predictable high and low tides.[1] Movement systems are inefficiently used and breakdown under peak loads. Self-mobility is impaired.

The opposite side of the self-mobility coin is accessibility: the access to a specific function by its potential market. Specialized functions, catering to specialized markets, rely heavily on the successful flow of people over wide areas. Neither a symphony orchestra nor an Eskimo restaurant could subsist on support only from its immediately adjacent area. Both are impaired by any friction along the access systems to them.

Self-mobility and accessibility are functions of the flow systems of the urban complex. The inefficient and directional characteristics of those flow systems indicate possible deficiencies in the organization of the urban areas they serve. A concentration of a single use, for instance, draws people from a wide area to a single point, causing congestion. The accessibility needs or urban functions, however, require flow systems of maximum efficiency and availability. One objective of this thesis is the facilitation of self-mobility and accessibility

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1. Chicago Area Transportation Study, Final Report Survey Findings, (Chicago, 1959), Vol. 1, p. 35.

through an organization of trip generators, points of origin, and flow systems.

Many of the criticisms of Jane Jacobs are also related to the physical organization of cities. She discusses at great length such problems as the lack of personal safety in public places, the unsuccessful operation of public spaces at various hours of the day or night, the lifelessness of public streets and open spaces, and the drab sameness of so many urban areas. To her, all of these problems result from an inability, by design or default, to achieve functional, close-grained diversity at the local urban level. These areas lack a mixture of ". . .uses that give each other constant mutual support, both economically and socially."[2].

It is beyond the scope of this thesis to evaluate her views from the varied conceptions of the urban phenomenon. Her arguments appear strong enough, however, to warrant an architectural investigation of diversity. Another objective of this thesis, therefore, is the achievement of an architectural organization in which diverse functions can operate together.

Another major problem related to the urban organization is the unsatisfactory condition of the urban residence. The lack of outdoor space and the lack of facilities for children are well known deficiencies. This thesis will present an urban complex in which these conditions can be rectified.

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2. Jane Jacobs, The Death and Life of Great American Cities, (New York, 1961), p. 14.

These problems go beyond the individual unit or system in question. The residential problems cannot be solved without regard for neighboring spaces and facilities. The movement problems cannot be solved without regard for the trip generators and points of origin. These problems involve the organization and location in space of all of the activities and facilities within the urban whole. They involve basic city structure and fundamental city operation.

This thesis is an architectural examination of that basic city structure and operation. It is a series of architectural suggestions for the above problems. In the light of those problems, it is an analysis of the operational requirements of urban spaces and facilities and a synthesis of them into an urban organization. It is an architectural urban organization to facilitate self-mobility, accessibility, diversity, and the successful urban residence.

II The Contextual Framework for an Architectural Complex

The study takes place within definite contextual limits. Certain restrictions have been assumed in order to facilitate and simplify the project. These limits must be made explicit, however, for an understanding of the work.

The first of these is the assumption of a high density environment. A population-density minimum of 200 people per acre was selected as being commensurate with successful urban functioning.[3] By "density" is meant the ratio of a given residential population to that land required to satisfy all of the activity needs, including residential, of the same number of people although not necessarily the same people. The area used in the density calculation is that area needed for adequate residential space, work space, recreational space, view space, transportation space, etc., for the number of residents in question. It is necessary to include the low-intensity industrial area or the open edge condition in the determination.

The choice of a high-density environment is not intended to imply a value jugement for that type of city or city life. Other types of environments, such as low-density areas linked with high-speed transportation, are certainly feasible. The high density condition is simply one of the many possibilities for the human community, one which is currently beset with many

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3. Jane Jacobs, The Death and Life of Great American Cities, (New York, 1961), p. 200.

problems.

Another major set of limits is included in the selection of a new-town problem as a contextual framework for the study. A new city, one which is to be built entirely from scratch, offers many advantages for this type of study. It has fewer restrictions from existing conditions to inhibit the investigations. It has no structural or circulation organizations which may have been derived from criteria that are no longer valid. It has no developed social, political, or economic patterns which must be given careful consideration in the work on an existing city. Similarly, it is not troubled by the vast range of problems that characterize present cities but which are beyond the scope of this thesis.

The new town does present, however, a concrete reality of its own. It is a real problem facing planners and urban designers today. The demand for community and urban environments has necessitated the construction of new facilities. Recent years have seen the construction of complete cities and towns, ranging in size and complexity from the suburban tract to the national capital.

The new town selected for this thesis is a project under current study by the Maryland Planning Commission as a satellite community for Washington, D. C.: Germantown, Maryland. See drawing 1. Certain aspects of the Germantown problem were selected as design limits and program requirements for this study. The

projected population figures and breakdown were used as a guide to the footage and activity requirements to be met by the design. See Appendix 1. The geographical conditions of the site were also utilized in the study, including the topography, soil conditions, vegetation, drainage, orientation, and climate. Access to the site, both by rail right-of-way and expressway, and the existing facilities, notably the Atomic Energy Commission complex and the Germantown village, helped to provide a contextual framework for the study.

It should be noted that the object of this study is not to produce a satellite community for Washington, D.C., but to use the conditions of Germantown as a vehicle for the study of urban problems. A satellite community has much different goals, in terms of density, form, and facilities, than are intended or will be provided by this thesis.

Other assumptions have been made from the conditions in the present human community. It is assumed, for instance, that mechanized self-mobility will continue to be provided by individually operated vehicles. Quantitative changes of the existing automotive system will undoubtably occur but the qualitative requirements of the self-operated, individual vehicle system will remain. The system will retain its linear qualities with definite turning radii, its need for storage space, and its various relationships to activities and other flow systems. In

this study, the requirements of the automobile have been utilized.

It has also been assumed that ownership of the various spaces and facilities within the city will not be concentrated in the hands of a single agency or authority. The proposed organization must lend itself to diversified ownership by a variety of individuals or groups. The size of a single development must be equivalent to the size of individual projects currently seen in American cities.

It should be pointed out that the capability for diversified ownership results in political problems in any attempt to integrate all of the projects into a single urban organization. Some control over the design of these projects must be exercised for cohesive urban operation although such control is beyond the scope of this thesis. It is assumed to lie within the range of spatial zoning and public construction.

A final limit, related to the ownership assumptions above, is the assumed pattern of urban growth and change. Cities are not stagnant entities. They undergo a constant evolution in time. They expand, contract, move, and change their form.[4] The urban complex of this thesis must be capable of such evolution. Its organization must be responsive to changing forces acting upon it and to the requirements of its inhabitants. The

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4. Graeme Alyward, Environmental Adaptability, M.I.T. Thesis, (Cambridge, 1966).

requirement for growth and change, as that of non-concentrated ownership, implies independent structural projects. Large, structurally related facilities, or megastructures, are not compatible with physical change which is not even predictable at this time. This study, therefore, will utilize the smaller complexes that were also suggested by the ownership requirements.

All of the above assumptions and limits have an effect on the final statement or architectural organization. Each is represented in the solution of the Germantown problem.

III Urban Architectural Organization

Having stated the problem and the context of the problem's solution, it is possible to turn to the actual solution. The urban complex of this thesis is an organization of the physical elements of the urban environment in the light of certain present problems. Before proceeding with the organization, however, it is necessary to explicitly define those elements being organized. Each element must be classified, or described, in such a way as to make its place in the organization, and its relationship to other elements, clear.

In the case of those functions which utilize enclosed space, such as commercial establishments, residential units, hospitals, etc., an obvious definition is by the function itself. But a definition by function has many disadvantages. There are far more functions, and variations of functions, than can be handled by the single designer. When they are coupled with their operational requirements, the number of variables increases far beyond the capability of the human mind. Although a computer could handle the large number of variables, there are other equally important disadvantages to a definition by function. Functions change at a rate faster than the structures in which they are housed. A given physical structure is likely to house several functions in its lifetime and must be able to meet the requirements of them all.

Additionally, a definition by function must assume life

patterns. The assessment of the requirement of "residential," for instance, implicitly assumes a way of living. If a function includes several patterns of life, as "residential" can include a Levittown, a Habitat, a Mies van der Rohe tower, and a Beacon Hill, some must be excluded in a working definition. Such exclusion not only eliminates much of the richness and diversity of the city, but fails to meet the realities of the urban situation. In addition, life patterns change. If a definition by function is used, a difficult prediction of changing life patterns must be made.

Furthermore, a definition by function says nothing about the way a function relates to neighboring or distant activities. The interdependency of functions and spaces has no basis for realization in physical form. Each function is treated as an independent entity without regard for its urban environment. For these reasons, the functional definition of an activity, needed for the architectural design of the unit, is inadequate for an urban architectural organization.

The last objection to a definition by function of the elements in an urban organization suggests a more meaningful way to define them. Functions do not exist in a vacuum but in a certain environment. They need certain environmental conditions in order to exist as a particular function. A commercial establishment, for instance, has a much different relationship to the pedestrian ways used by shoppers than does a parking garage or a

residence. It could not function properly if its environment were that of the other two.

These functions, or elements of the urban organization, will be defined in terms of their dependent relationships to their environment. They will be defined in terms of those environmental relationships which enable them to function as intended and from which a given space is able to derive its functional meaning. More simply, they will be organized on the basis of those environmental aspects to which they are directly connected and from which they are separated. Environmental connection and separation are the means of definition for the elements in the urban organization of this thesis.

Various functions or uses of the present city have been analyzed in terms of the environmental aspects to which they are connected or from which they are separated. The analysis appears in Appendix II. Where various patterns of life have existed within a function, as in residential, they have been included.

From this analysis, it has been possible to establish a spatial typology based on connection and separation. The typology can be seen in Diagram #1 and is the basis for the urban organization as seen in the drawings. It should be noticed that some functions with different patterns of operation within them, again as residential, fall into more than one category of the typology.

An exception to the use of the typology appears in the model of Germantown. The model is intended to show the diagramatic

Category	Typical Uses	Major Connections
A	Levittown Habitat Classroom - Lower Grades Classroom - Upper Grades	Natural Light and Air Private Horizontal Space Minor Pedestrian Circulation Similar Units (Repetitive)
B	Office Reserach Mies Tower Beacon Hill Hotel Room Hospital Room	Natural Light and Air Minor Pedestrian Circulation Similar Units (Repetitive)
C	Local Commercial Regional Commercial Restaurant Public Lobbies	Major Pedestrian Circulation Natural Light & Air Desirable Similar Units (Repetitive) Public Horizontal Space
D	City Hall Museum Art Gallery Place of worship Gymnasium Multi-purpose Hall Swimming Pool Library	Major Pedestrian Circulation Natural Light Desirable Isolated from other Units Tend to become focal points Public Horizontal Space
E	Cinema Auditorium Theater Bowling Alley	Major Pedestrian Circulation Public Horizontal Space
F	Industry Warehouse Transit Station Parking	Major Vehicular Circulation Natural Air Desirable

DIAGRAM 1: SPATIAL TYPOLOGY

three dimensional form of the ideas of this thesis. It shows the resulting massing and grouping of forms from these ideas but does not graphically utilize the spatial typology. Because the urban residence is a major consideration of this thesis, however, the function of "residence" has been shown as a function. The model utilizes a symbolic form of "residence" in order to portray the variety of residential situations possible in the organization.

Still to be defined are those elements of the urban complex which comprise the transportation systems or flow systems. Germantown has two major means of access from Washington: an expressway and a railroad or rapid transit line. The expressway generally utilizes the privately controlled vehicle as dis= cussed earlier, in this case, the automobile. The rail line provides what is generally considered public transportation. These two elements form the basis of the flow systems of the town.

The privately controlled vehicle currently performs a variety of services. These range from a very rapid, coarse-grained, regional distribution, as performed by the interstate and expressway highway systems, to a slow, fine-grained, local distribution, as performed by the network of city streets. Because these services are incompatible with each other, they often occupy separate rights-of-way. Multiple use of a given

right-of-way, such as a city artery, results in a decreased effectiveness of both or all of the vehicular services included.

This hierarchy of vehicular services and rights-of-way has been retained in the Germantown problem. The urban organization of this thesis includes an expressway, as it exists, a major vehicular system, and a minor vehicular system. The major system is an intra-city, coarse-grained system designed for continuous, 35 mph movement with a minimum of friction. Accordingly, it has no grade-level intersections with itself and its radii of curvature permit the designed speed. The minor system, on the other hand, is a fine-grained distribution system in which friction is allowed but in which distances are short. It is the minor system which actually makes connections to the various city activities, vehicular facilities. etc. It is these connections which cause much of the friction along the minor system.

No differentiation is made between those rights-of-way used by people and those used by material goods. Because most urban functions require service by both, separation of rights-of way in this manner would result in unnecessary duplication.

The same hierarchy of systems is utilized in the public transportation sector of movement, or those flow systems which do not utilize independent, privately controlled vehicles. The urban organization of this thesis includes the existing rapid transit line, a reinforced pedestrian system, a major pedestrian

system, and a minor pedestrian system. The reinforced pedestrian system is a coarse-grained distribution system designed to move the pedestrian and those goods he can carry over large distances within the city. The actual equipment can be a minibus or a moving sidewalk: a right-of-way is provided for either. The equipment determination depends on the specific transportation demand, which is beyond the scope of this thesis. The major pedestrian system is a very fine-grained distribution system designed in accord with the characteristics of pedestrian movement. It includes the various open spaces, parks, play areas, etc. required in a city and is intended for large numbers of people and heavy use. Very slow, pedestrian-scale vehicles could be used on it.

The elements of the urban complex of this thesis thus include the various spaces of the spatial typology plus the various flow systems which link them together. An organization of these many units must now be produced which will resolve the previously stated problems. In his article, "A City is not a Tree," Christopher Alexander discusses two ways in which many small systems, such as have been defined here, can be organized into a larger organization. Those two ways have relevance to the concerns of this thesis. The first organizational structure, which he calls a "tree," is one in which the various sub-systems retain their independent identity and are related to each other

through a hierarchial linkage system. A leaf of a tree, for instance, is only connected to other parts of the tree, including other leaves, through a hierarchy of branches. There are no sub-connections to other leaves, roots, etc. Furthermore, "No piece of any unit is ever connected to other units, except through the medium of that unit as a whole."[5]. Through its various sub-systems the leaf only relates to the branch in terms of the entire leaf. A part of the leaf is not connected to the branch while another part is connected to a root.

In terms of a urban organization, this type of thinking results in "residential communities," "industrial parks," linear or circular transportation systems, etc. It results in single-use areas related to each other through some hierarchial movement system. See diagram 2.

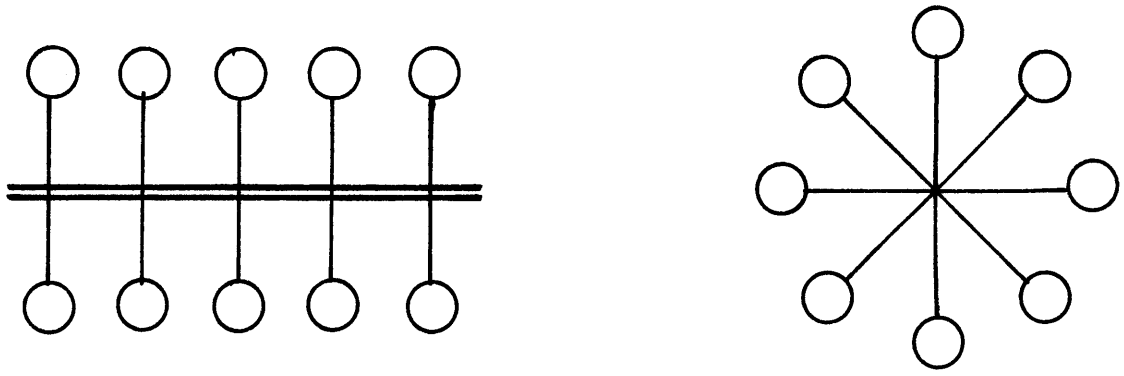

DIAGRAM 2: TREE STRUCTURE

5. Christopher Alexander, "A City is not a Tree," Design, February, 1966, p. 51.

This organizational structure actually causes rather than solves the problems of this thesis. Diversity cannot exist if the sub-systems of the city are isolated from each other and retain their independence. Auto-mobility and accessibility cannot be facilitated if movement is funneled through a few concentrated points, or limited to a single route between single use areas. The movement is directionally tidal, such as from residential area to an industrial park in the morning and vice versa in the evening, and results in congestion at the peak periods. Because the peak load occurs only a few hours daily, design for them is inefficient and uneconomical.

Furthermore, a break in the movement system, such as a traffic accident, kills the areas it serves in the same way that a broken tree branch kills the leaves attached to it. The social implications of this structure are well covered by Alexander and will not be discussed here. It is sufficient to say that this type of thinking, which is relevant perhaps to general architecture, is irrelevant to the urban complex of this thesis.

The other type of structural organization is what Alexander calls a "semi-lattice."[6]. It is a structure in which the various sub-systems overlap each other, and the overlap has an identity of its own. A single element, for instance, can belong to more

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6. Christopher Alexander, "A City is not a Tree", Design, February, 1966, p. 51.

than one system at a time. The systems overlap in that element. It is the urban park in which children play, office workers eat lunch, birds find shelter, and under which cars park. The park is simultaneously part of many systems or performing many roles. The systems of which the park is a part, play, eating, parking, and shelter, are organized in what Alexander calls a "semi-lattice."

The "semi-lattice" organization is Alexander's way of describing Jane Jacobs' "diversity." She writes about multi-use areas which are kept alive because of the various people using the various uses at various times of the day.[7] In other words, different systems overlap each other in the specific area.

In terms of movement, a "semi-lattice" structure implies distributed, non-concentrated traffic. A variety of connections and routes between units is implied so that leaf to leaf communication is possible without engaging the entire hierarchy of the branch structure. A hierarchy is possible, but one in which all the minor routes are connected to each other in addition to being connected to the major routes. The movement systems overlap in such a way that one or many could be utilized between any two points. Such a structure facilitates auto-mobility and accessibility. Distances are shorter and more direct. The structure is not fragile in terms of breaks. Traffic is not concentrated at a few points and is not as directional or tidal in flow. The "semi-lattice" structure implies a traffic load

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7. Jane Jacobs, The Death and Life of Great American Cities, (New York, 1961), Ch. 8.

more balanced in time and distributed in space.[8.]

For these reasons, the urban complex of this thesis is organized as a "semi'lattice" structure, or as a series of overlapping systems and networks. More specifically, the scale at which the "tree" structure occurs will be reduced from the level of the neighborhood or usage district to that of the single building or architectural complex.

The "semi-lattice" organizational structure contains form implications for both the flow systems and the spatial elements. The flow systems must have the capability of moving anyone anywhere in a short and direct manner without utilizing the entire transportation network. This capability requirement immediately suggests a circulation grid or a series of overlapping grid networks. The major vehicular circulation system, therefore, becomes a grid. Drawing 2 illustrates the various generic circulations grids from which the Germantown major system developed. Drawing 3 shows the synthesis of those generic systems into the terrain of Germantown and the final solution.

The minor vehicular system also takes the form of a grid. It cannot be a series of distributional cul-de-sacs from the major system as such a solution would result in a "tree" structure. It is a continuous grid system which overlaps the major

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8. Richard Smith, Transportation and Urban Form, M.I.T. Thesis, (Cambridge, 1966), p. 41-48.

system but makes connections to it. See drawing 4.

Similar implications from the "semi-lattice" structure exist for the organization of the spatial elements. Rather than single-use areas, Germantown is a series of overlapping-use networks. A given area contains a variety of spatial types, the proportion of each varying according to the nature and character of the area. An area may have a high proportion of commercial space, for instance, but other spatial types to provide diversity and its benefits. All areas contain residential space.

Within an area, the spatial types are organized according to their required environmental connections. Large spaces of type E which require little natural light and air, for instance, are enclosed by spatial types A or B which do require both. These structures have large roof tops which provide the semi-public open spaces for the surrounding residents or office workers. See drawings, 5, 7, and 8.

The final design considerations involve the organization of the various flow systems to each other. A vehicular system is a linear right-of-way with rigid requirements for grade, turning radii, dimension, etc. Pedestrian movement, on the other hand, has not the requirements of orthogonal linearity as have the vehicular systems. A group of pedestrians, moreover, exhibits non-linear characteristics.

If pedestrian and vehicular levels are on the same grade

level, they will greatly interfere with each other, as in contemporary cities. The assumption of a friction-free major vehicular net, and its relationship to the minor vehicular net, implies level separation from pedestrians.

The decision was made to put the vehicular systems over the major pedestrian network, and to put the latter on the ground. Because the vehicular systems are of a coarser grain than the pedestrian net, it will cast fewer shadows and create fewer tunnels than an elevated pedestrian net. The light, air, and ventilation problems are much less than they would be if the roads were enclosed. By elevating the roads rather than the pedestrians, it is possible to retain the visual relationship between the two, and the staccato rhythms of both, which are an important part of today's urban spaces. Connections between the two are then made at the points of vehicular storage.

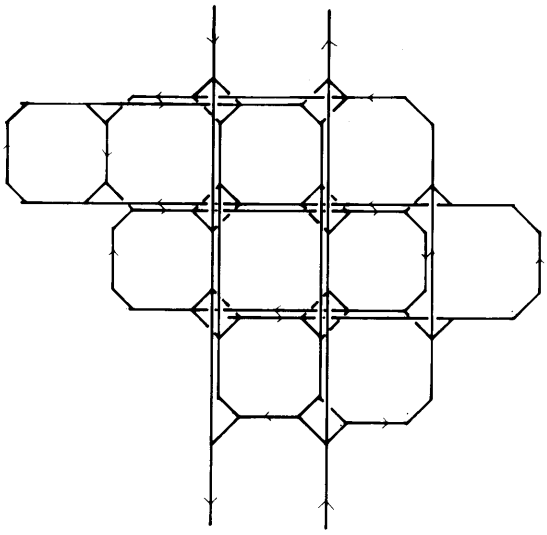
Because the horizontal roadways are reasonably uniform, they can be prefabricated. Facilities for the other utility flow systems can be integrated into it resulting in a single flow structure. The vertical supports, which must vary with the terrain, can be integrated into the building fabric of the city thus utilizing the space under the roads. Construction of the road system, however, must be done in fairly large units. Because the vehicular systems are organized as grids, they can be built in increments of closed loops. See drawing 9.

The incorporation of these ideas into the Germantown problem can be seen in the following drawings and photographs. It is an urban architectural complex based on certain organizational ideas and problems of contemporary cities. It is a series of architectural suggestions for the current urban dilemma.

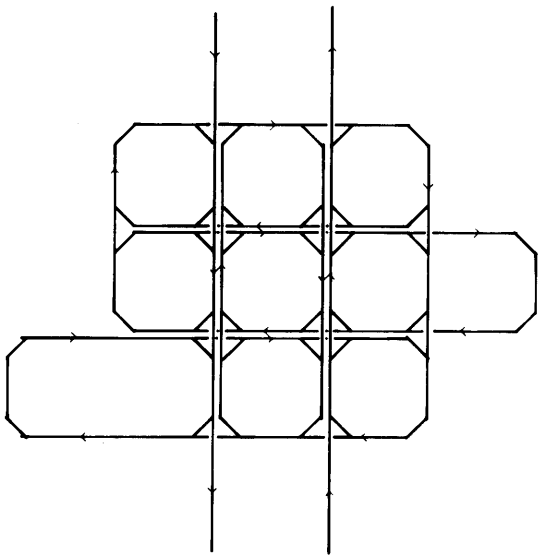
IV Germantown

AREA MAP

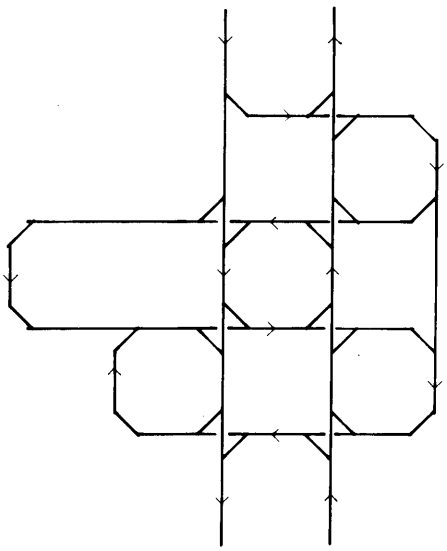
SCALE: 1" = 2000'



1

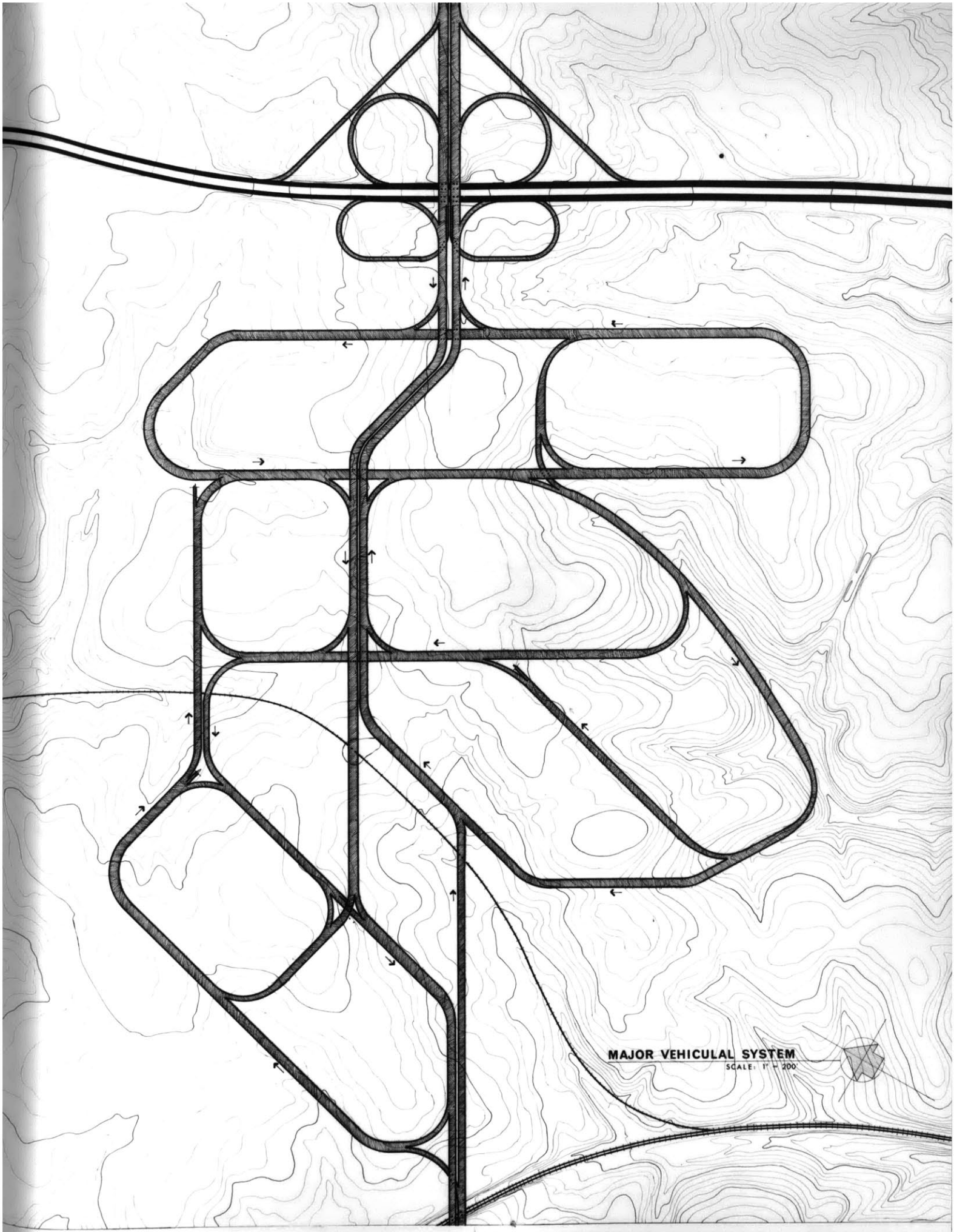


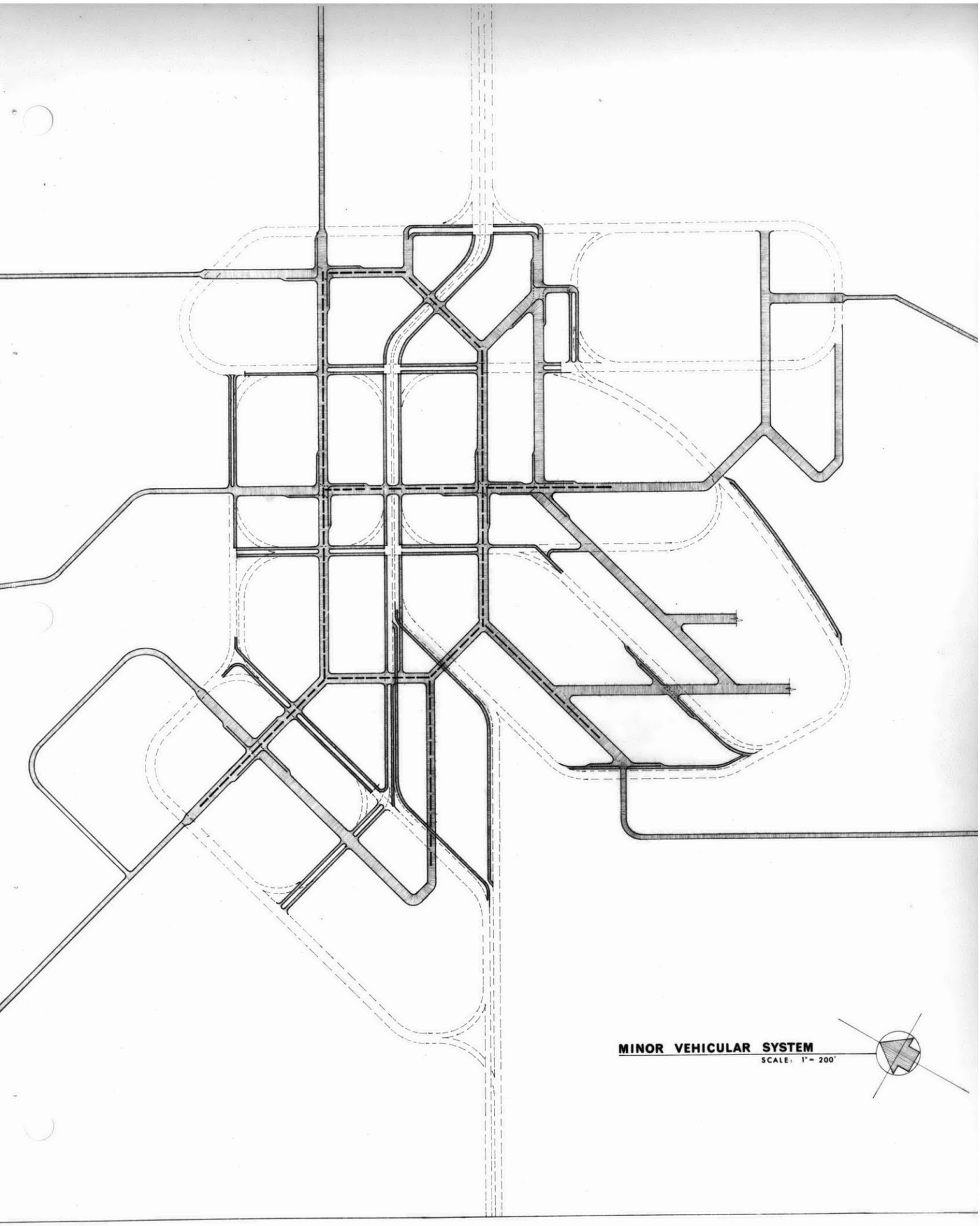
2



3

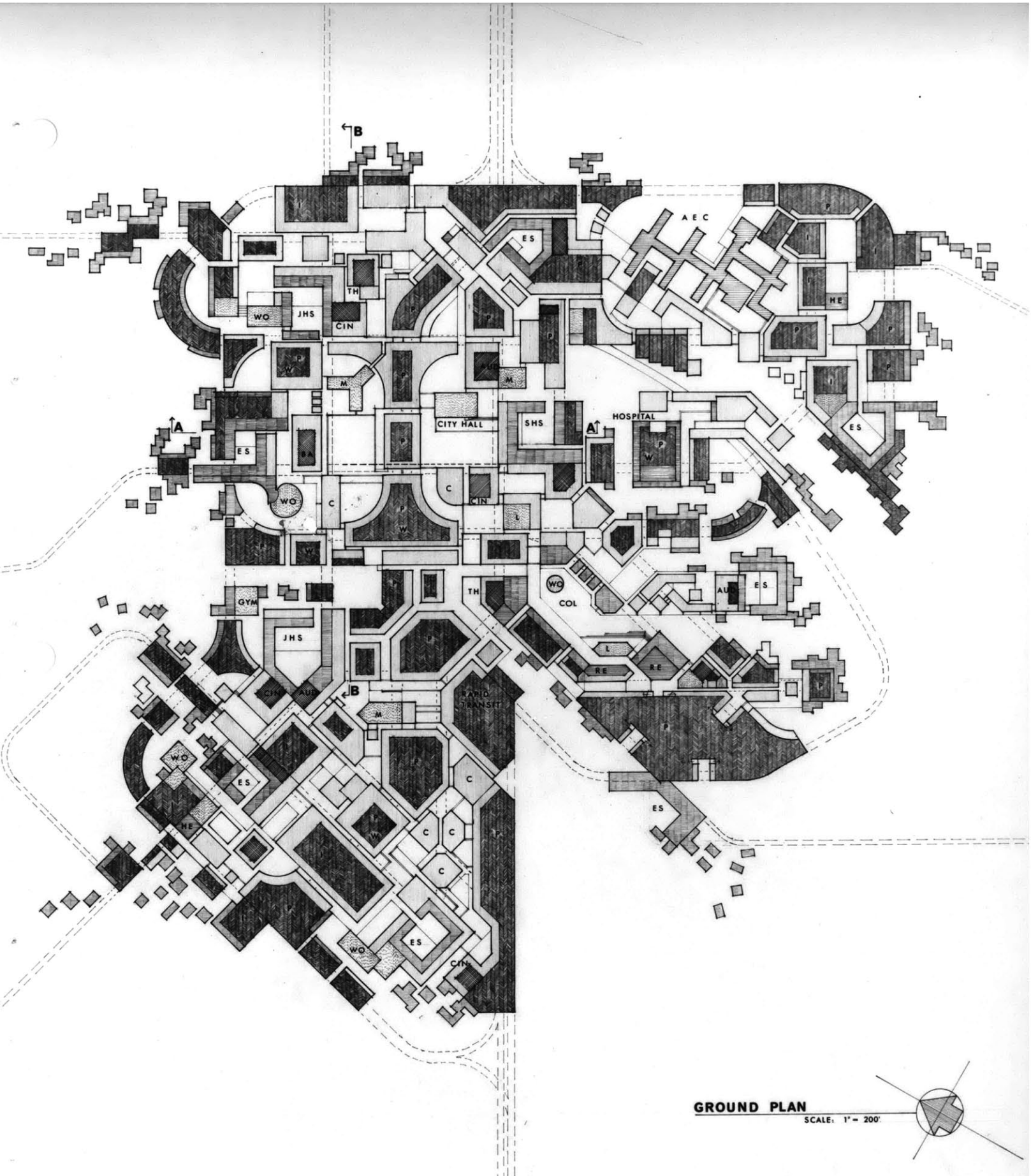
GENERIC CIRCULATION


MAJOR VEHICULAL SYSTEM
SCALE: 1" = 200'



MINOR VEHICULAR SYSTEM

SCALE: 1" = 200'

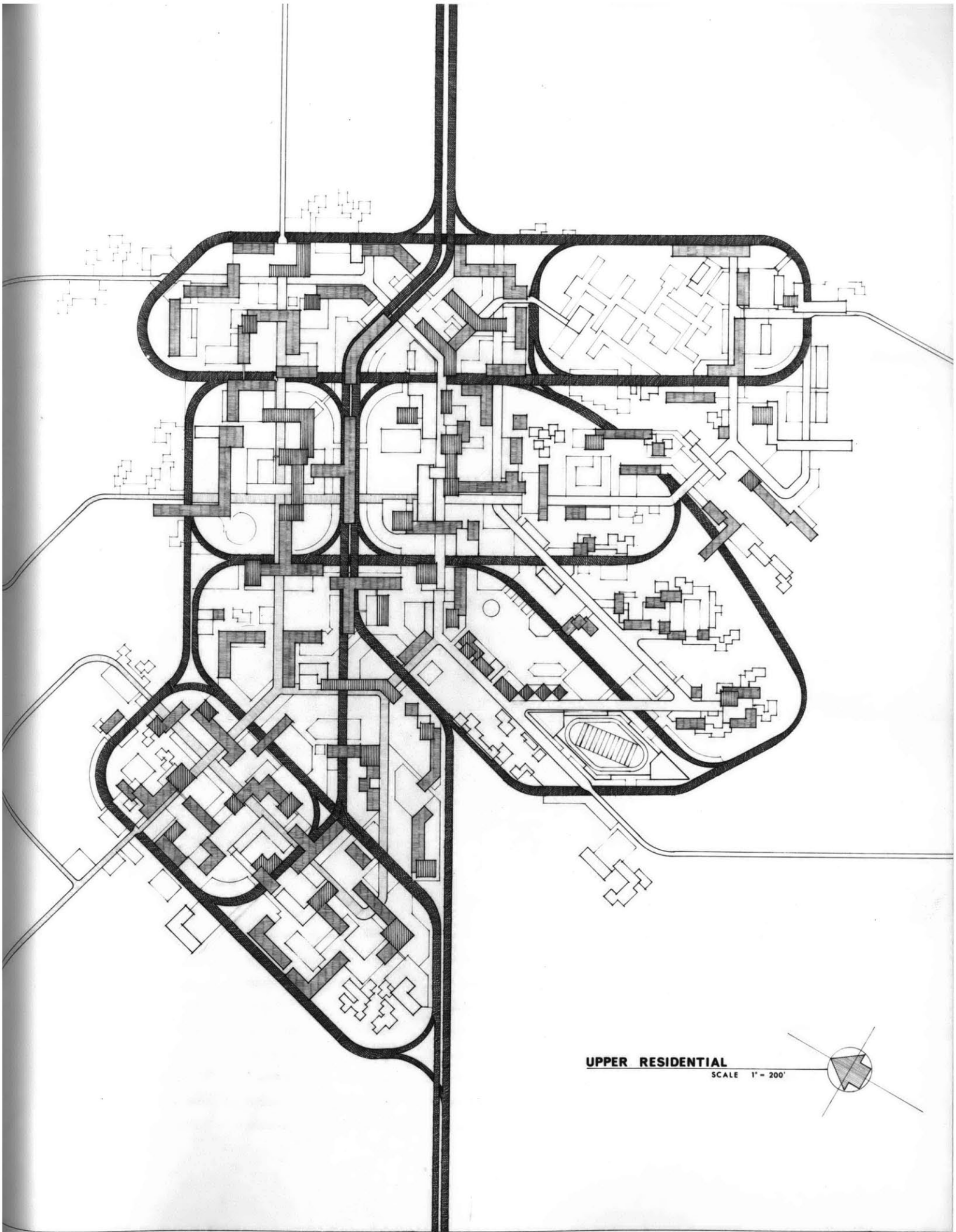


GROUND PLAN

SCALE: 1" = 200'

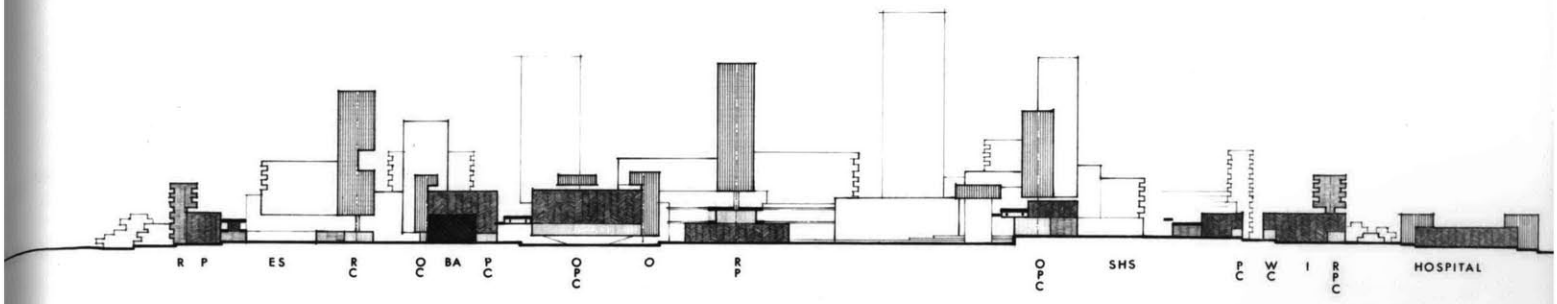
UPPER ROAD LEVEL

SCALE 1" = 200'

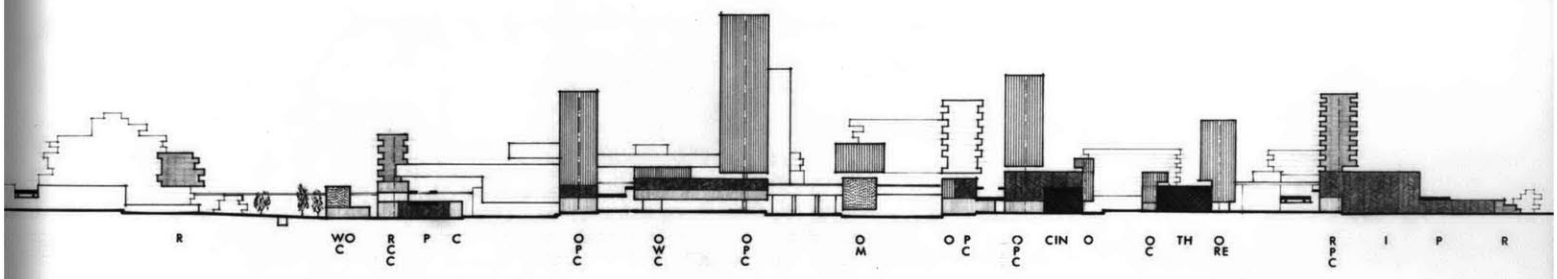


UPPER RESIDENTIAL

SCALE 1" = 200'



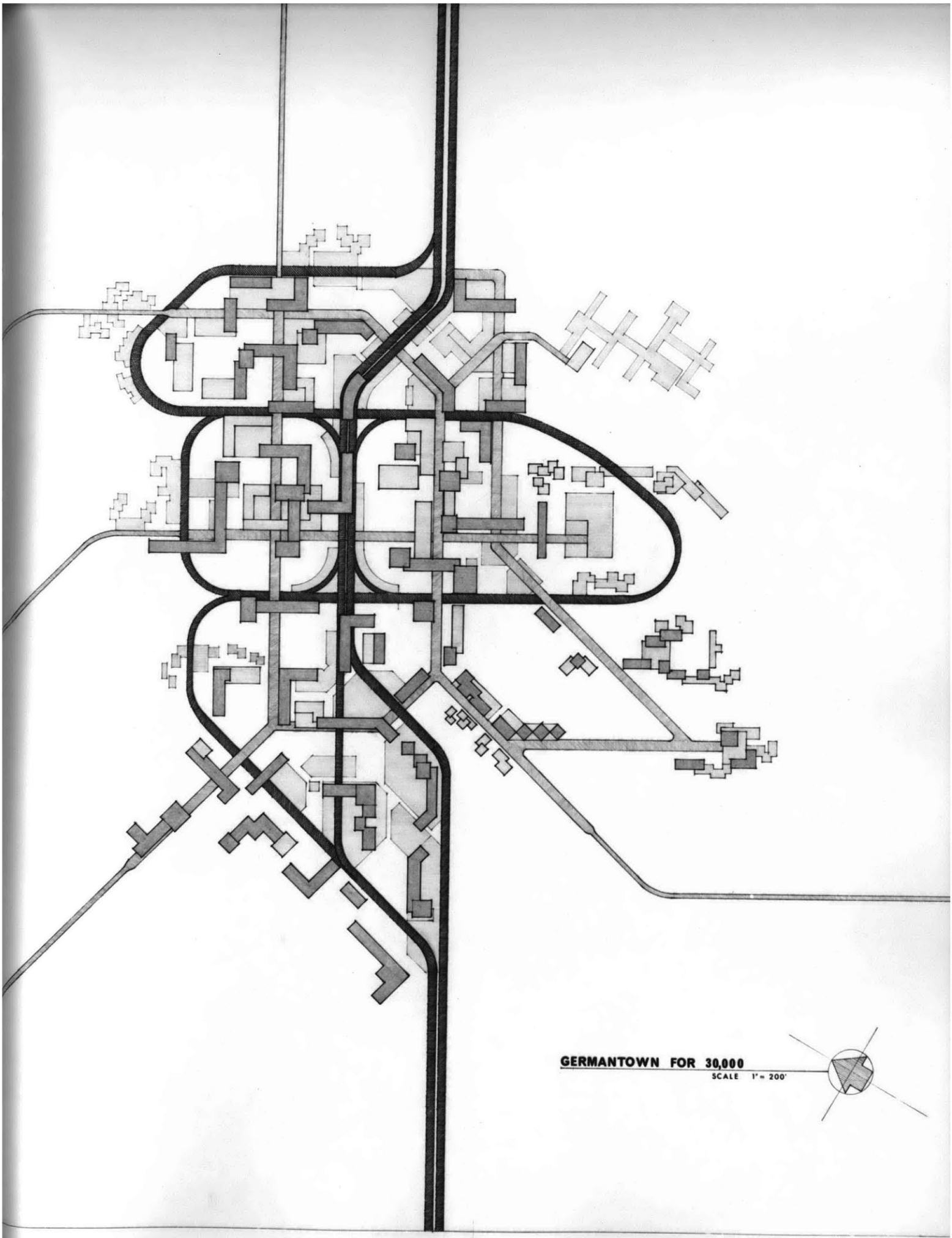
S E C T I O N **A – A** SCALE: 1" = 100'



S E C T I O N **B – B** SCALE: 1" = 100'

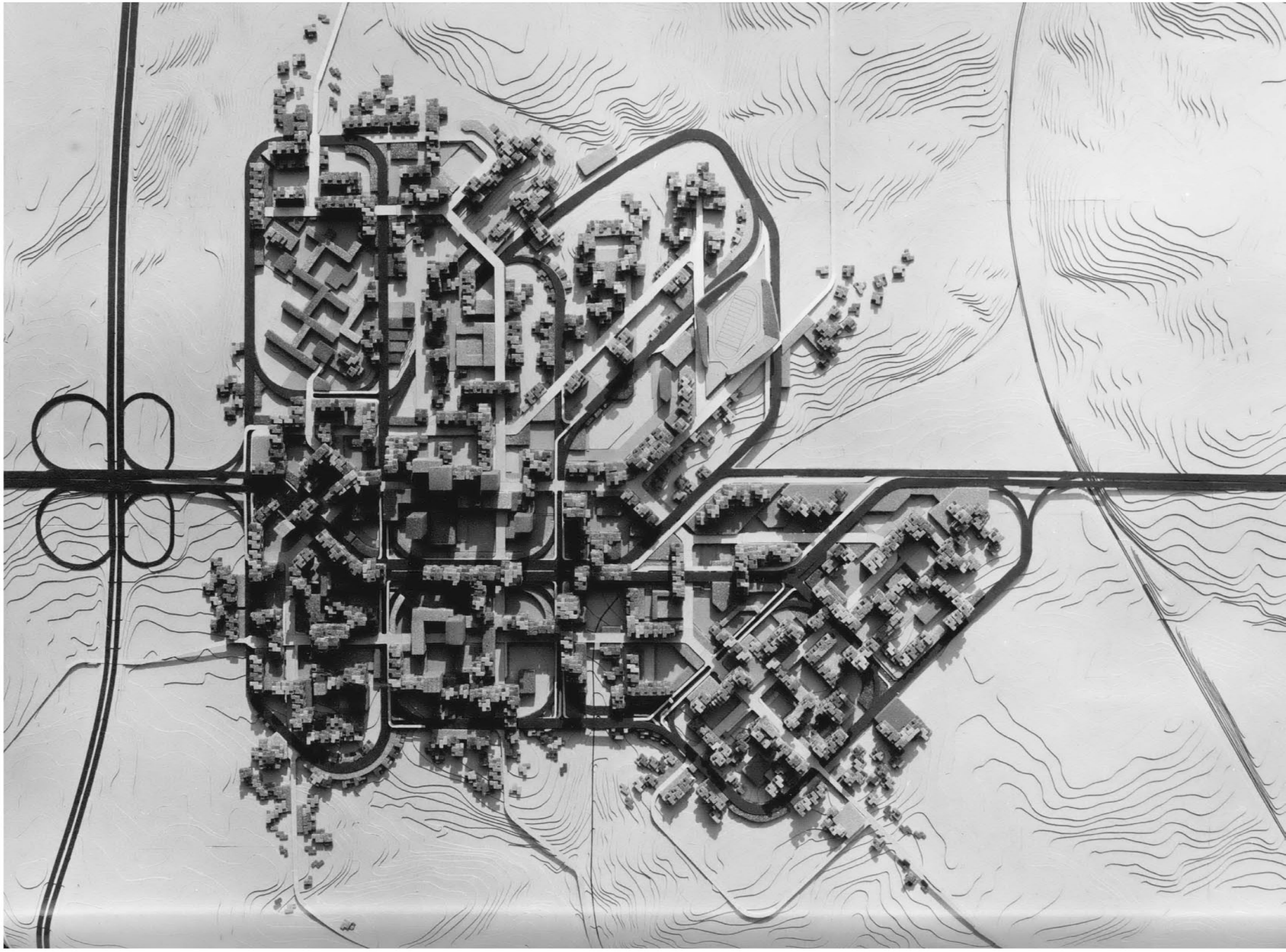
AUDITORIUM	AUD.	ELEMENTARY SCHOOL	ES	PARKING	P	A	
ADMINISTRATION OFFICES	A.O.	GYMNASIUM	GYM	RESEARCH LABS	RE	B	
BOWLING ALLEY	BA	HEALTH CENTER	HE	RESIDENCE	R	C	
BUS STATION	B	HOTEL	H	RESTAURANT	RES	D	
CINEMA	CIN	INDUSTERIES	I	THEATER	TH	E	
COLLEGE	COL	JUNIOR HIGH SCHOOL	JHS	SENIOR HIGH SCHOOL	SHS	F	
COMMERCIAL	C	LIBRARY	L	SWIMMING POOL	S	MAJOR RD.	
COURT	CO	MUSEUM	M	WAREHOUSE	W	MINOR RD.	
DELIVERY	D	OFFICE	O	WORSHIP	WO	REIN. PED.	

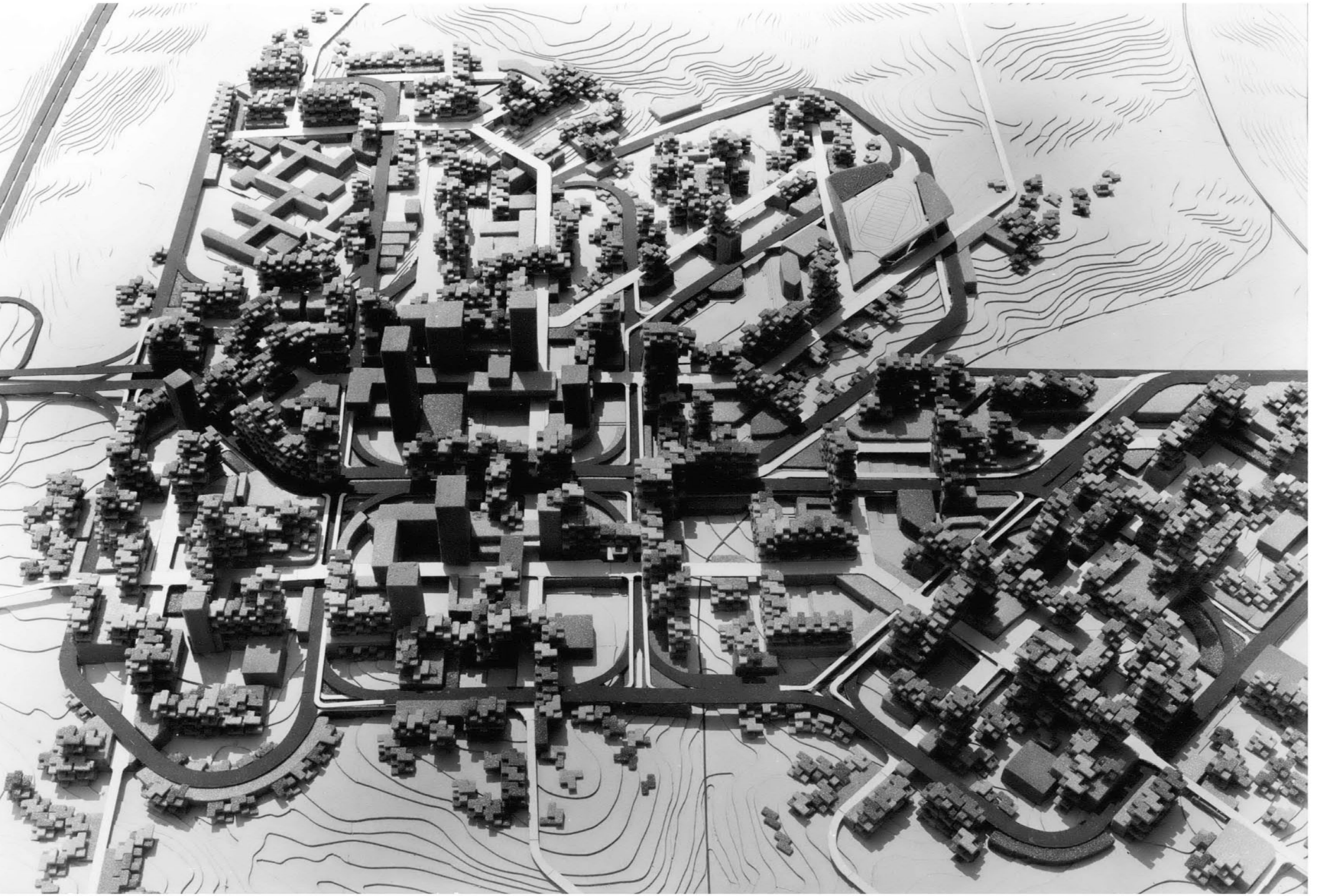
L E G E N D

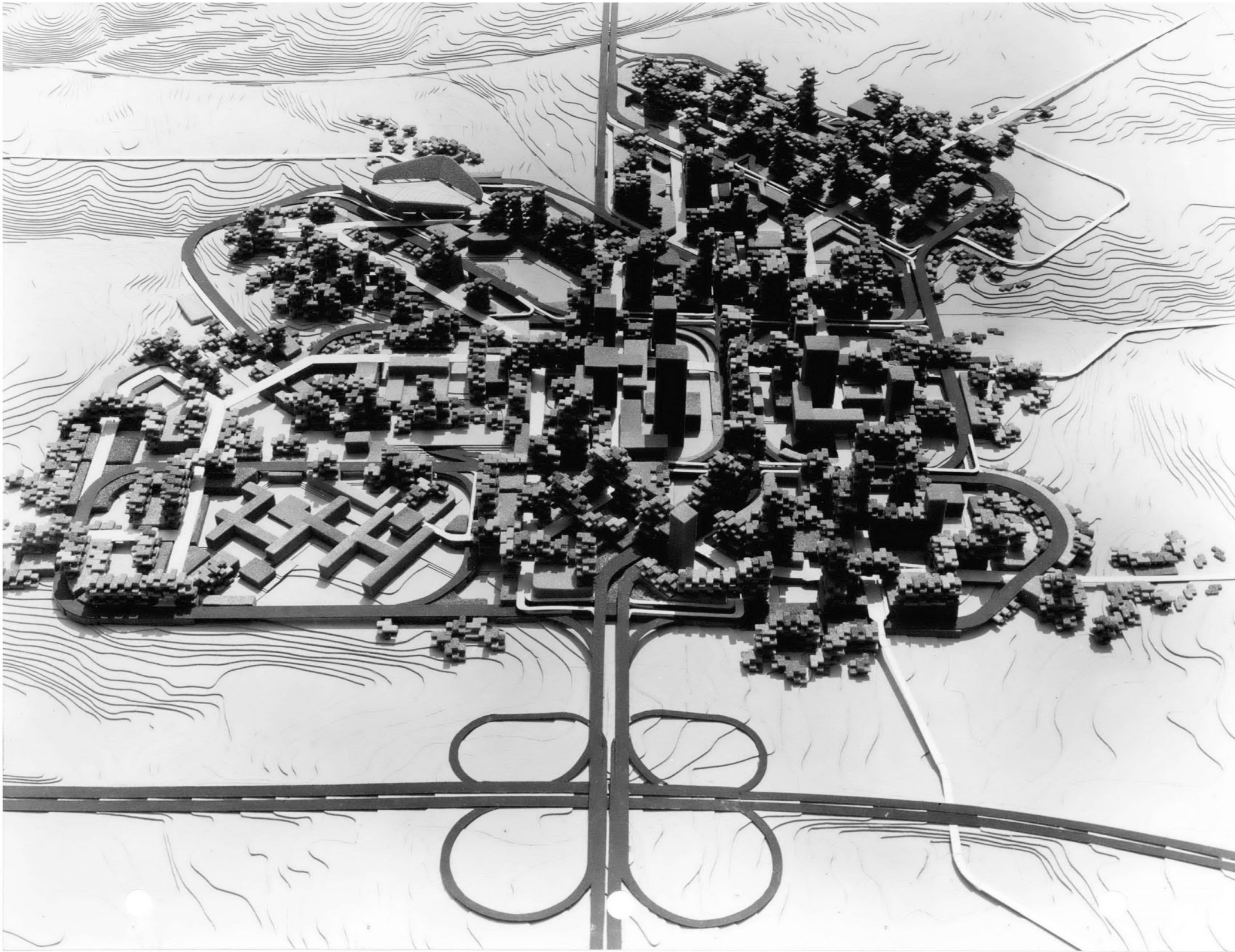


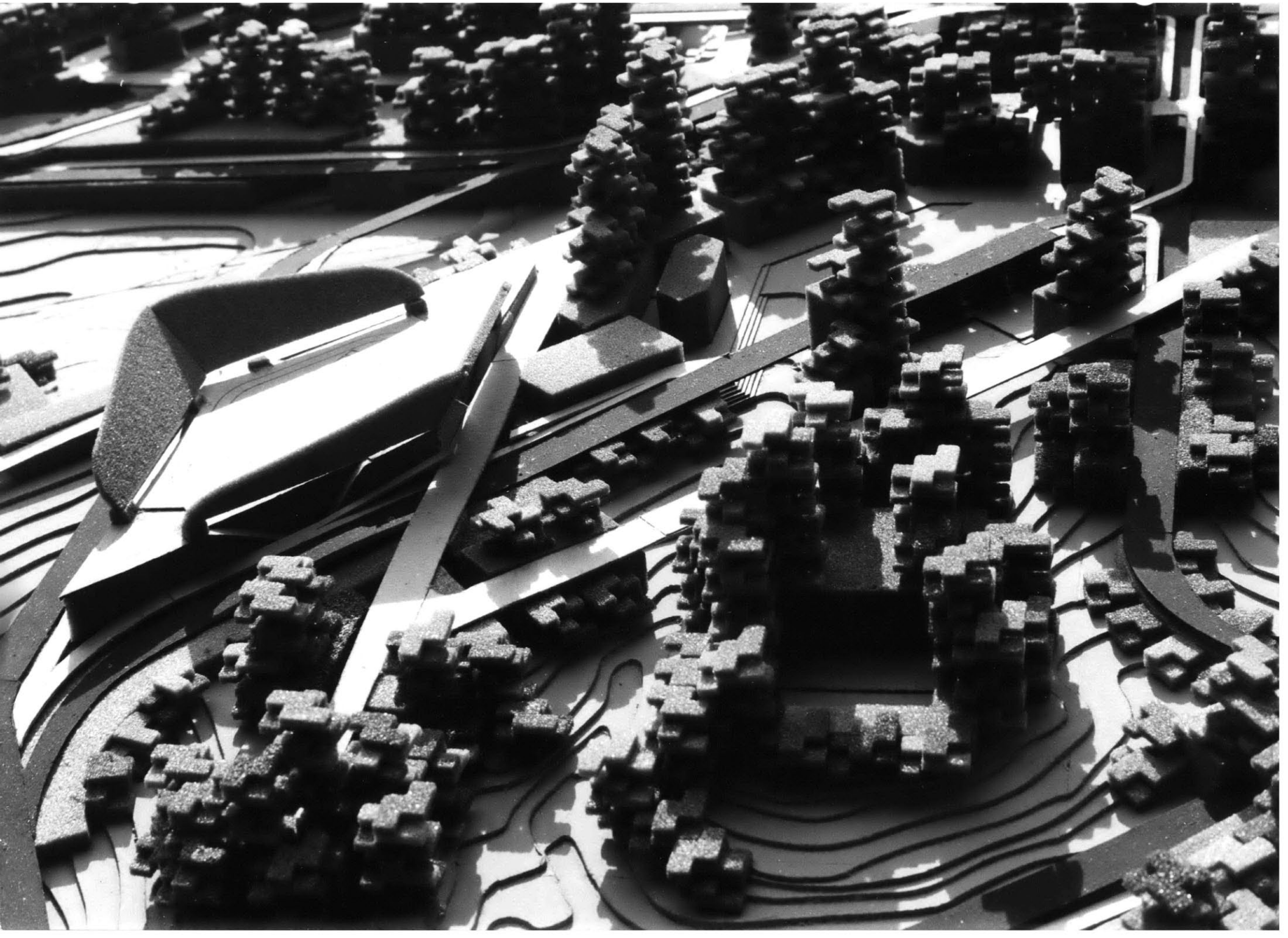
GERMANTOWN FOR 30,000

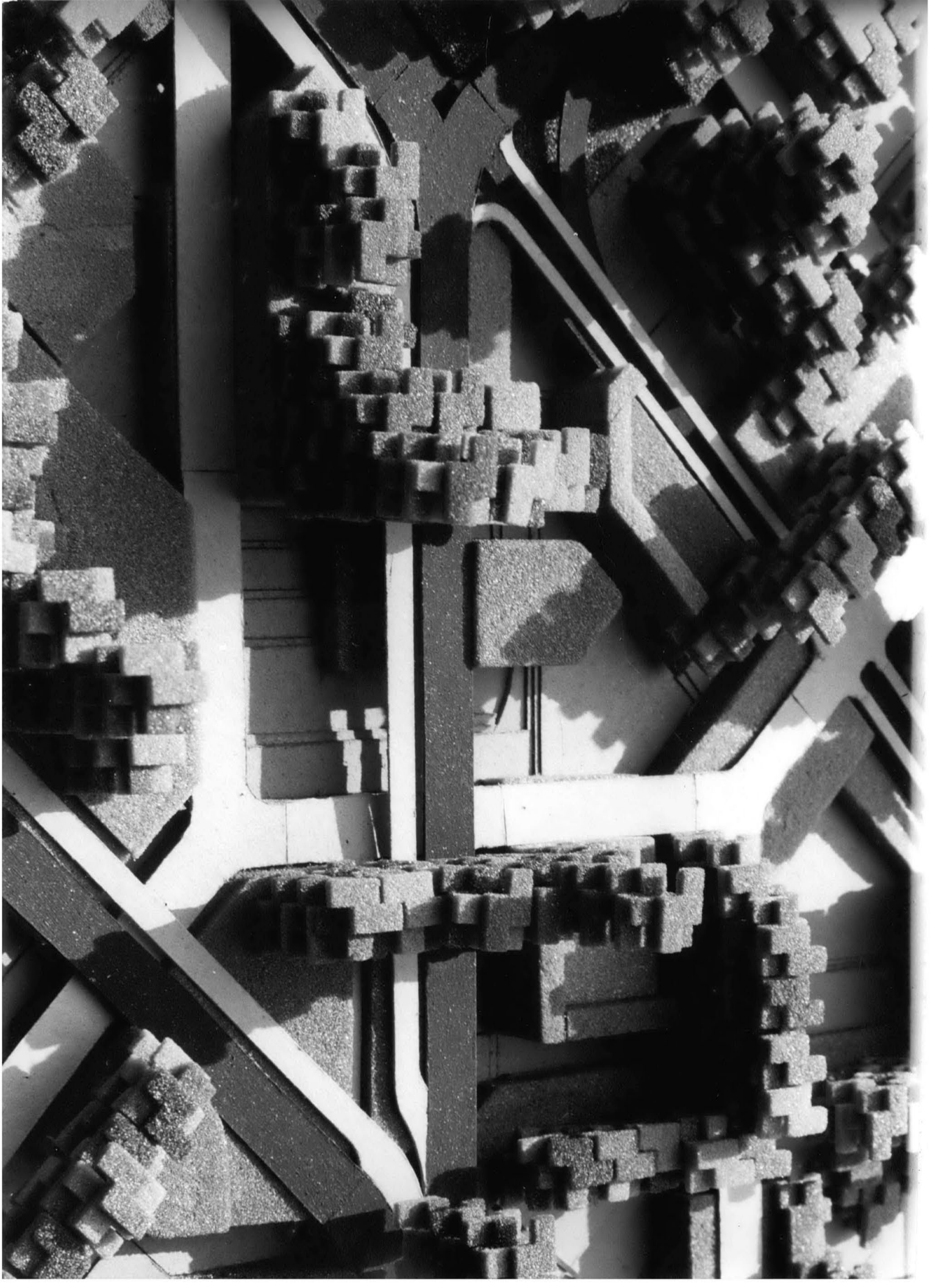
SCALE 1" = 200'

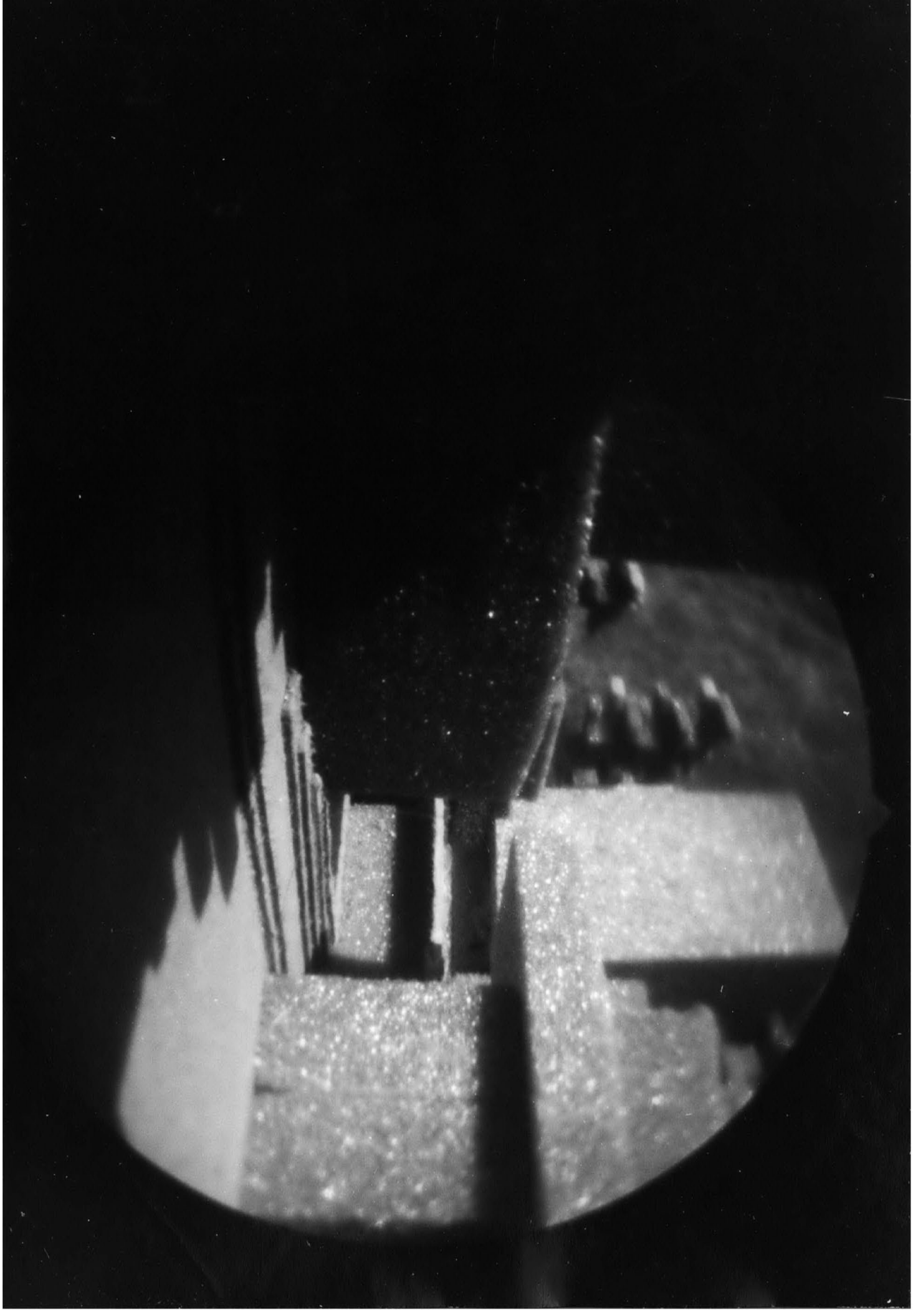


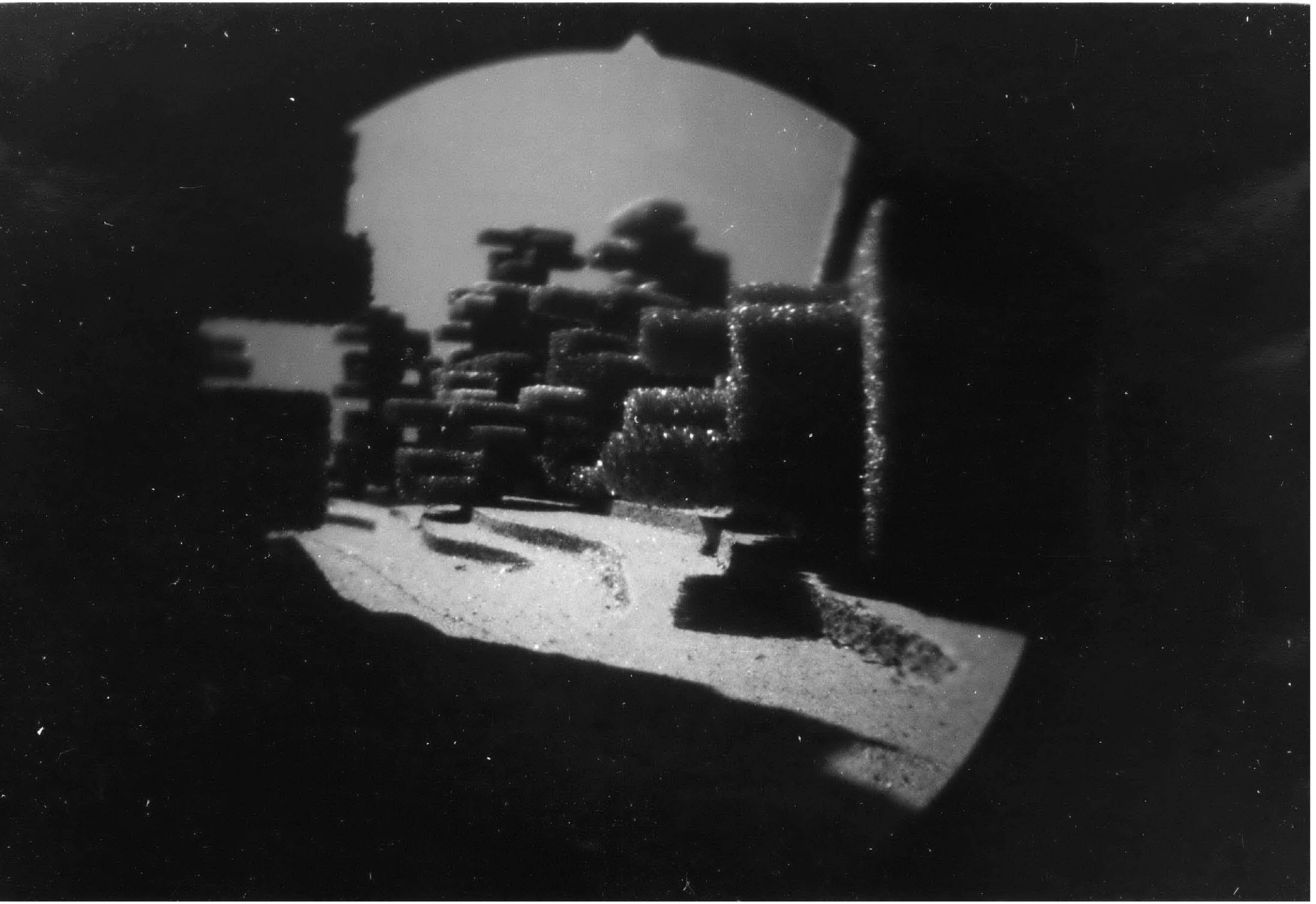












Appendix I

Footages for 60,000 people

Function	Units	Sq.Foot/Unit	Sq.Foot
Auditorium	1	24,000	24,000
Bowling Alley	2	20,000	40,000
Bus Station	1	30,000	30,000
Cinema	5	10,000	50,000
City Hall	1	24,000	24,000
College	1	200,000	200,000
Commercial	-	-	2,000,000
Court	1	30,000	30,000
Elementary School	7	80,000	560,000
Gymnasium	5	20,000	100,000
Health Centers	4	100,000	400,000
Hotel	-	-	400,000
Hospital	1	300,000	300,000
Industry & Warehouse	-	-	2,000,000
Junior High School	2	125,000	250,000
Library	1	20,000	20,000
Multi-purpose Halls	7	10,000	70,000
Museum	2	20,000	40,000
Office	-	-	1,500,000
Parking	-	-	6,000,000
Rapid Transit	1	50,000	50,000
Research Labs	-	-	300,000
Residential	16,200	1,250	20,250,000

Function	Units	Sq.Foot/Unit	Sq.Foot
Theater	2	5,000	10,000
Senior High School	1	140,000	140,000
Swimming Pool	3	20,000	60,000
Worship	10	10,000	100,000

Appendix II

The following analysis is an examination of the dependent environmental relationships of various urban functions. It is an examination of those activities, from outside the spaces within which they operate, as if they were black boxes with attached life-lines. It is a determination of that to which they are connected and that from which they are separated. No attempt has been made to analyze the interior spatial requirements, structural requirements, etc. of the various activities.

The analysis is of existing connections and separations in the present urban fabric. It is not intended to justify the present form of those connections and separations but merely the need of activities for them. A museum, for instance, tends to be a focal point and is, therefore, freestanding. It could easily remain a focal point but be physically connected to other enclosed spaces.

The legend for the analysis is as follows:

Primary connections 

Secondary connections 

Primary separations 

Secondary separations 

The word "primary" is used to indicate connections or separations which occur at the edge or border of the space in question. "Secondary" indicates a connection or separation required by the

space but not at its border.

The various activities have been organized, by connections and separations, into six categories. These categories are presented on page 18 and representive examplex of each are included here.

The resulting categories, or spatial typology, has facilitated the design of Germantown. It has indicated which spatial types need to be grouped with similar spaces and which with dissimilar spaces. It has shown how dissimilar spaces can be grouped together and acted as a check on that organization. It has also aided in the location of these groupings in space. The relationship of these groupings to flow systems, to public space, etc. was brought to light by the analysis.

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION / SEPARATION

		PHYSICAL										SENSUAL										
		STRUCTURAL	LINKAGE									VISUAL	AUDITORY									
FLOW SYSTEMS	RAPID TRANSIT																					
	MAJOR VEHICULAR																					
	MINOR VEHICULAR		■										●									
	MAJOR PEDESTRIAN		□										○									
	MINOR PEDESTRIAN		■										●									
	CENTRAL AIR																					
	NATURAL AIR		■																			
ENCLOSED SPACE	SIMILAR UNIT - OPEN																					
	SIMILAR UNIT - CLOSED												●									
	DISSIMILAR UNIT - OPEN																					
	DISSIMILAR UNIT - CLOSED																					
UNENCLOSED SPACE	VIEW SPACE																					
	PUBLIC HORIZONTAL																					
	PRIVATE HORIZONTAL		■									■										
	SUNLIGHT		■									■										
	NATURAL LIGHT		■									■										

ACTIVITY : RESIDENTIAL - LEVITTOWN
GROUP : A

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION

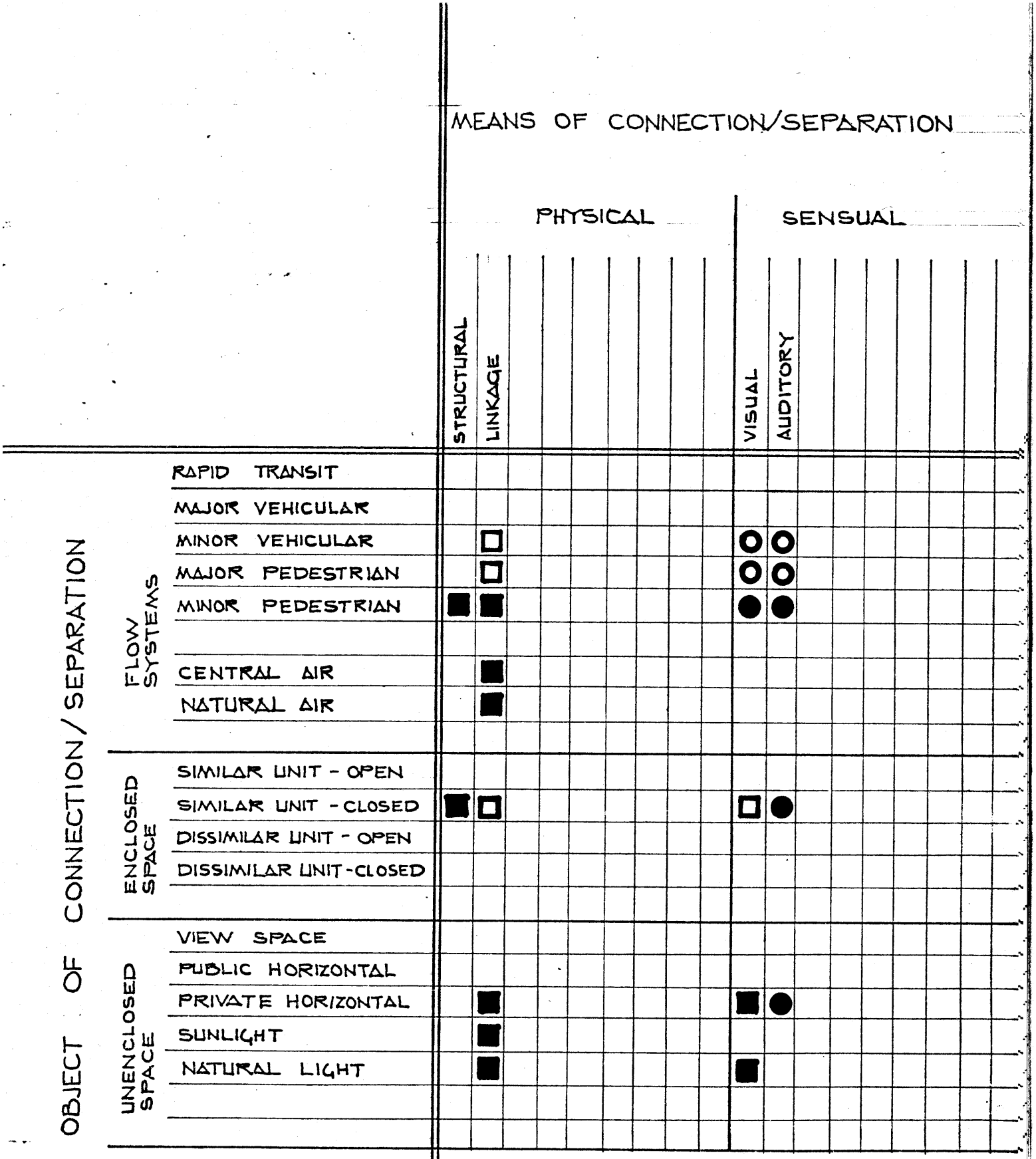
		PHYSICAL										SENSUAL									
		STRUCTURAL	LINKAGE									VISUAL	AUDITORY								
FLOW SYSTEMS	RAPID TRANSIT																				
	MAJOR VEHICULAR																				
	MINOR VEHICULAR		□										○								
	MAJOR PEDESTRIAN		□										○								
	MINOR PEDESTRIAN	■	■									●	●								
	CENTRAL AIR		■																		
	NATURAL AIR		■																		
ENCLOSED SPACE	SIMILAR UNIT - OPEN																				
	SIMILAR UNIT - CLOSED	■										□	●								
	DISSIMILAR UNIT - OPEN																				
	DISSIMILAR UNIT - CLOSED																				
UNENCLOSED SPACE	VIEW SPACE		■									■									
	PUBLIC HORIZONTAL																				
	PRIVATE HORIZONTAL	■	■									■									
	SUNLIGHT		■									■									
	NATURAL LIGHT		■									■									

ACTIVITY : RESIDENTIAL – HABITAT

GROUP : A

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION



ACTIVITY : CLASSROOM - UPPER GRADES

GROUP : A

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION / SEPARATION

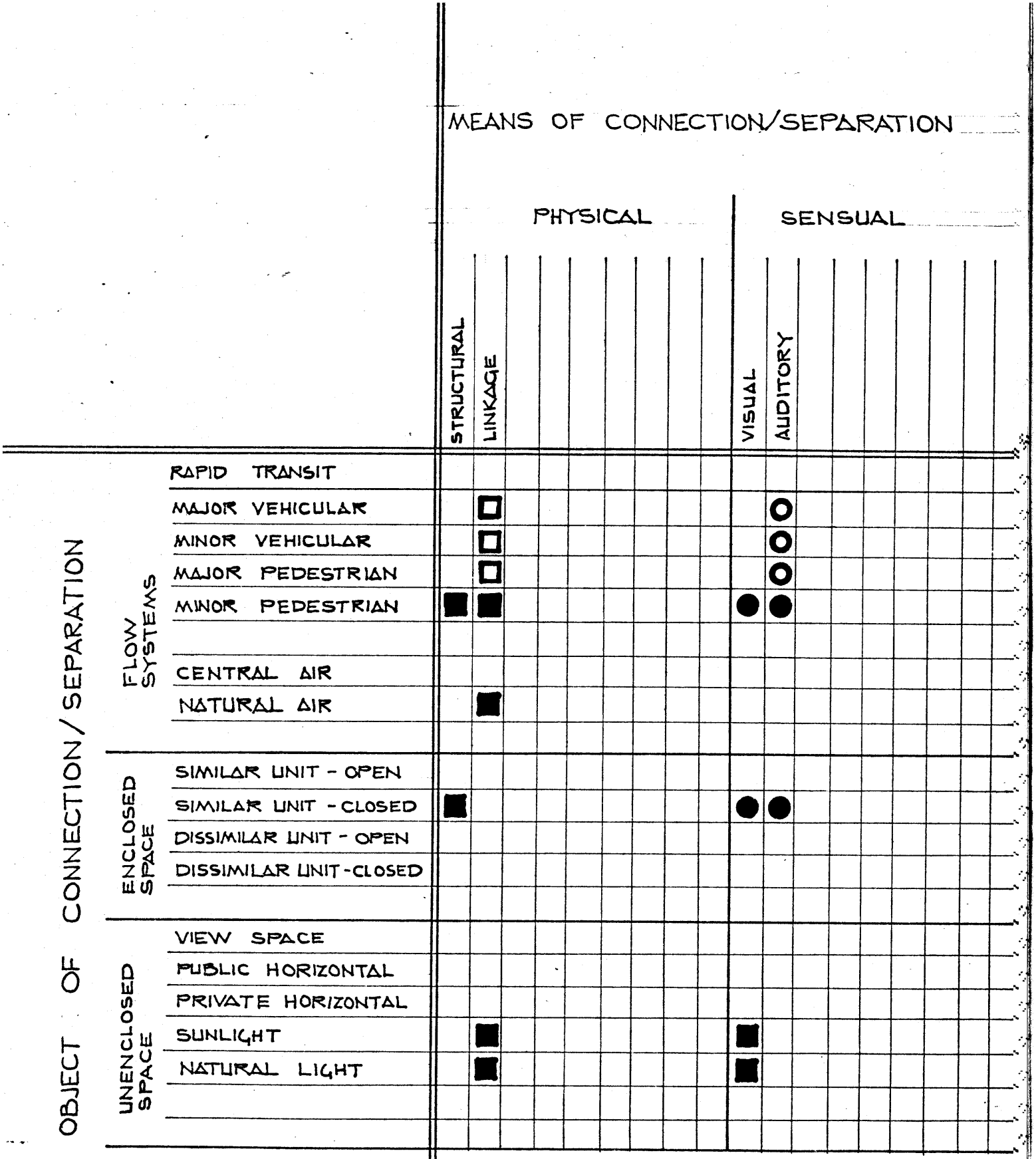
		PHYSICAL										SENSUAL										
		STRUCTURAL	LINKAGE									VISUAL	AUDITORY									
FLOW SYSTEMS	RAPID TRANSIT																					
	MAJOR VEHICULAR																					
	MINOR VEHICULAR		□									○	○									
	MAJOR PEDESTRIAN		□									○	○									
	MINOR PEDESTRIAN	■	■									●	●									
	CENTRAL AIR		■																			
	NATURAL AIR		■																			
ENCLOSED SPACE	SIMILAR UNIT - OPEN																					
	SIMILAR UNIT - CLOSED	■	□									□	●									
	DISSIMILAR UNIT - OPEN																					
	DISSIMILAR UNIT - CLOSED																					
UNENCLOSED SPACE	VIEW SPACE																					
	PUBLIC HORIZONTAL																					
	PRIVATE HORIZONTAL		■									■	●									
	SUNLIGHT		■																			
	NATURAL LIGHT		■									■										

ACTIVITY : CLASSROOM - LOWER GRADES

GROUP : A

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION / SEPARATION

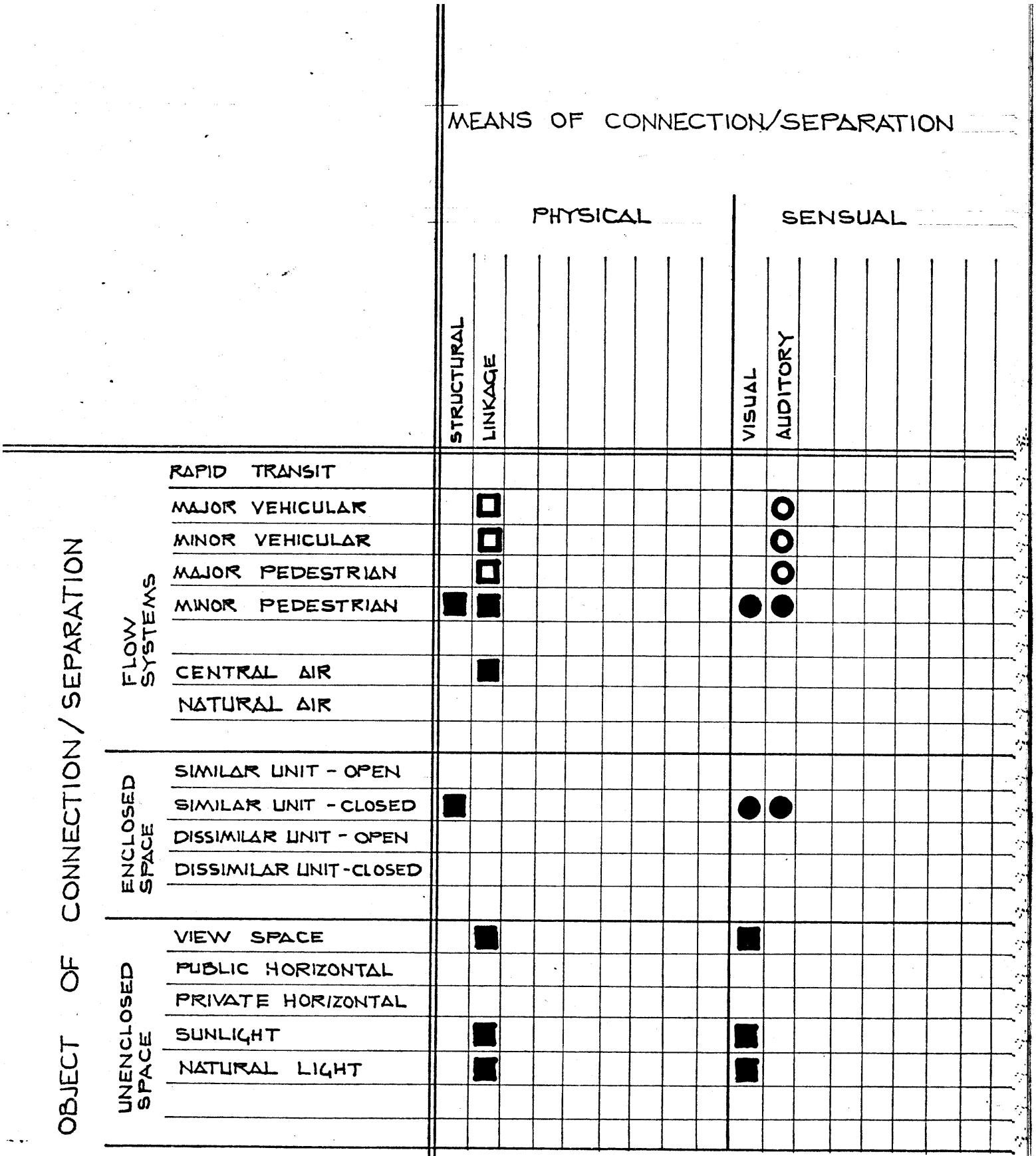


ACTIVITY : RESIDENTIAL – WALK-UP

GROUP : B

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION



ACTIVITY : RESIDENTIAL - TOWER
GROUP : B

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION

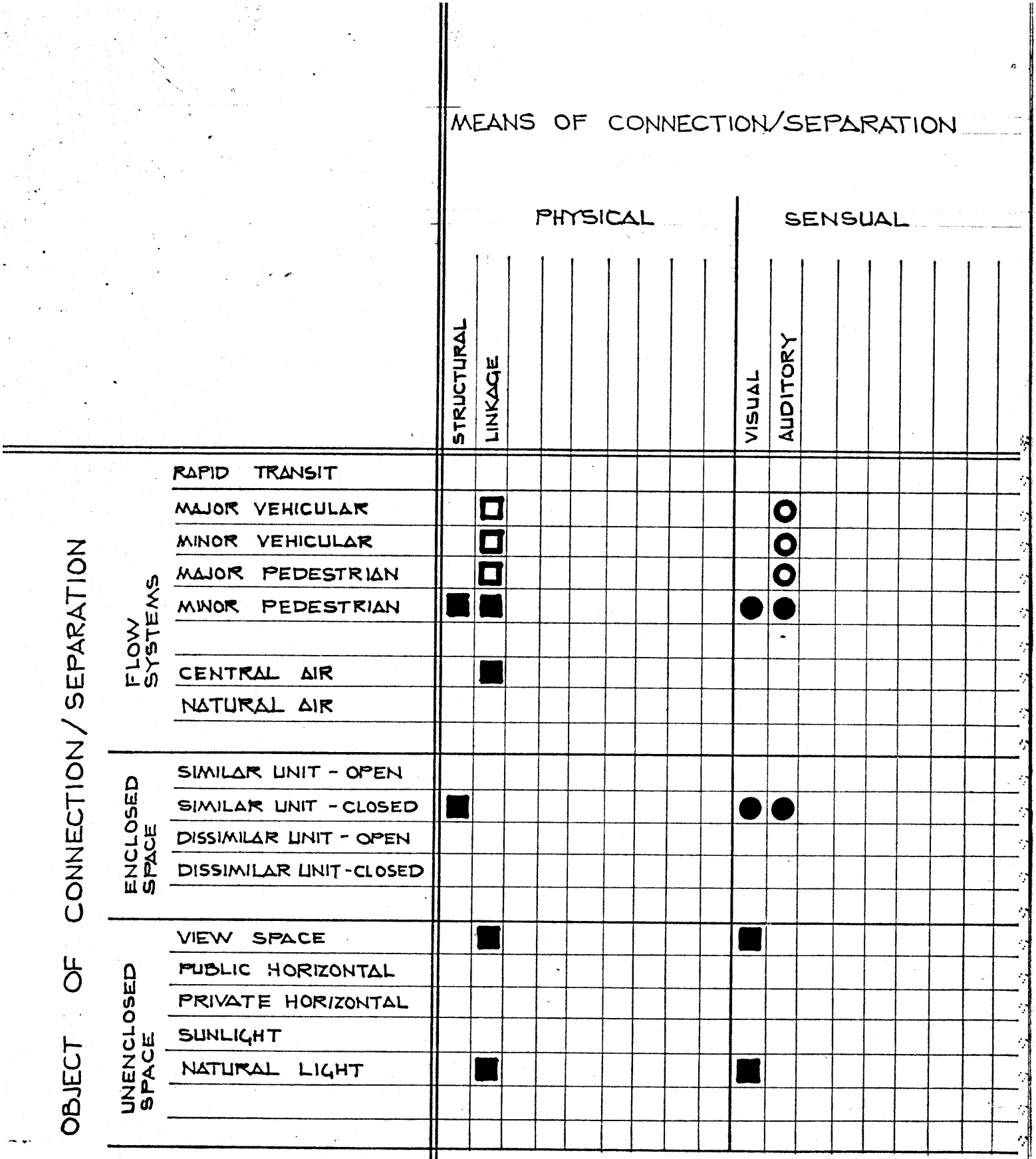
		PHYSICAL										SENSUAL										
		STRUCTURAL	LINKAGE									VISUAL	AUDITORY									
FLOW SYSTEMS	RAPID TRANSIT		■										○									
	MAJOR VEHICULAR		■										○									
	MINOR VEHICULAR		■										○									
	MAJOR PEDESTRIAN		■										○									
	MINOR PEDESTRIAN	■	■									●	●									
	CENTRAL AIR		■																			
	NATURAL AIR																					
ENCLOSED SPACE	SIMILAR UNIT - OPEN																					
	SIMILAR UNIT - CLOSED	■										●	●									
	DISSIMILAR UNIT - OPEN																					
	DISSIMILAR UNIT - CLOSED																					
UNENCLOSED SPACE	VIEW SPACE		■									■										
	PUBLIC HORIZONTAL																					
	PRIVATE HORIZONTAL																					
	SUNLIGHT		■									■										
	NATURAL LIGHT		■									■										

ACTIVITY: HOTEL ROOM

GROUP: B

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION



ACTIVITY: OFFICE - TOWER
GROUP : B

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION

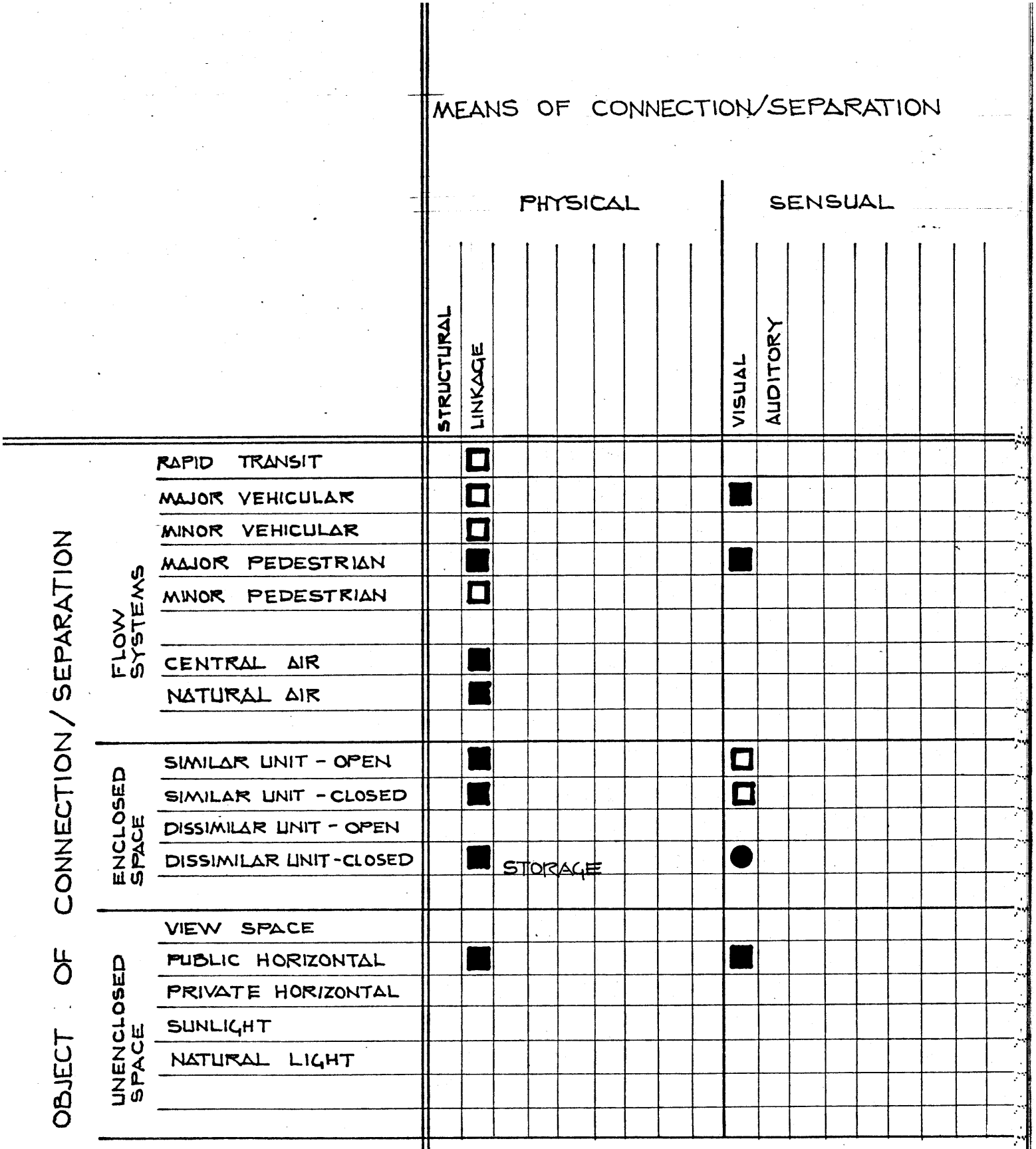
		PHYSICAL									SENSUAL									
		STRUCTURAL	LINKAGE								VISUAL	AUDITORY								
FLOW SYSTEMS	RAPID TRANSIT																			
	MAJOR VEHICULAR		■								■									
	MINOR VEHICULAR		■																	
	MAJOR PEDESTRIAN		■								■									
	MINOR PEDESTRIAN		■																	
	CENTRAL AIR																			
	NATURAL AIR		■																	
ENCLOSED SPACE	SIMILAR UNIT - OPEN																			
	SIMILAR UNIT - CLOSED		■								■									
	DISSIMILAR UNIT - OPEN																			
	DISSIMILAR UNIT - CLOSED		■	STORAGE							●									
UNENCLOSED SPACE	VIEW SPACE																			
	PUBLIC HORIZONTAL		■								■									
	PRIVATE HORIZONTAL																			
	SUNLIGHT																			
	NATURAL LIGHT		■								■									

ACTIVITY : LOCAL COMMERCIAL

GROUP : C

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION



ACTIVITY: REGIONAL COMMERCIAL

GROUP : C

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION

		PHYSICAL										SENSUAL									
		STRUCTURAL	LINKAGE									VISUAL	AUDITORY								
FLOW SYSTEMS	RAPID TRANSIT																				
	MAJOR VEHICULAR		▣									■									
	MINOR VEHICULAR		▣																		
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	MINOR PEDESTRIAN		▣																		
	CENTRAL AIR		■																		
	NATURAL AIR		■																		
ENCLOSED SPACE	SIMILAR UNIT - OPEN																				
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UNENCLOSED SPACE	VIEW SPACE																				
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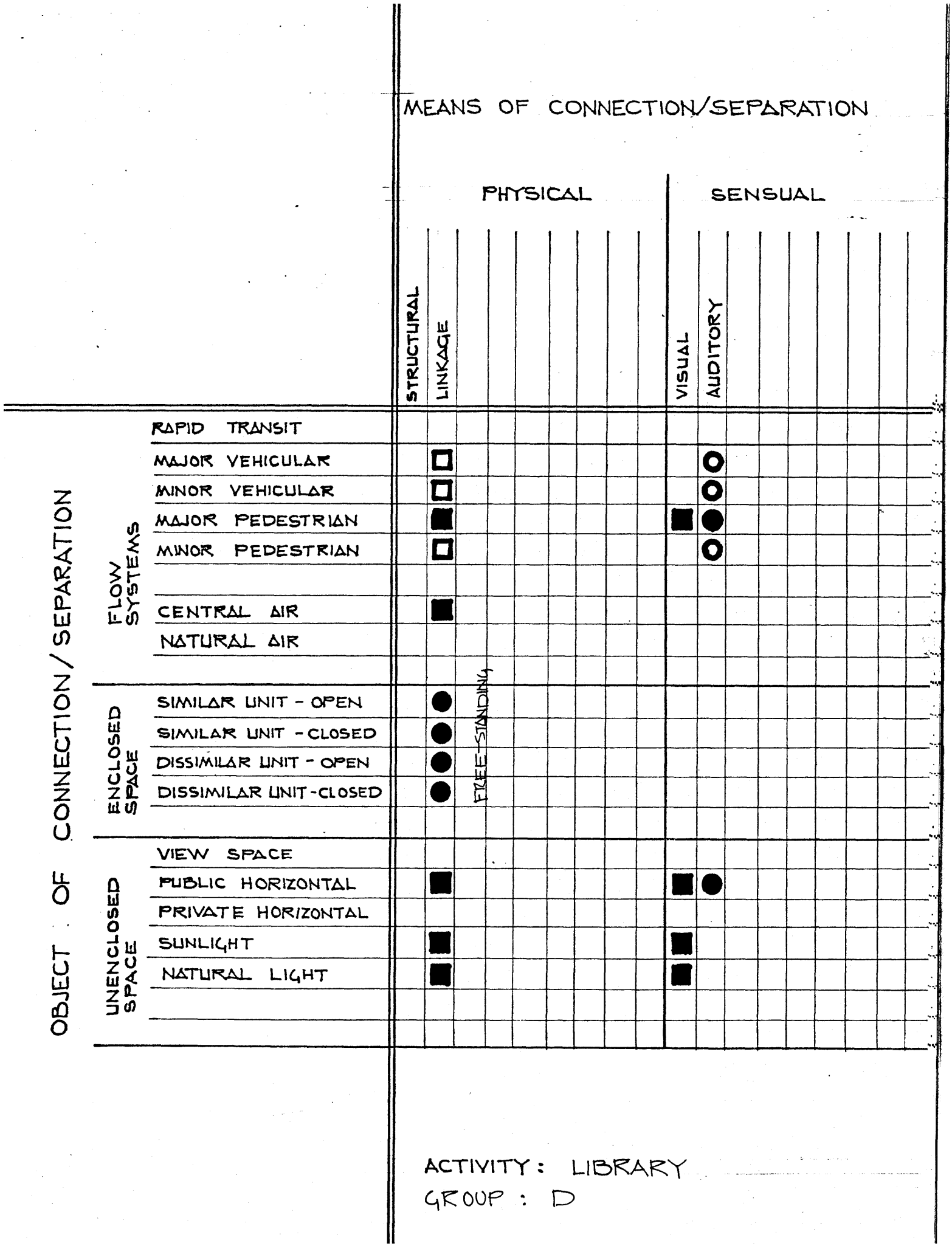
ACTIVITY: PUBLIC LOBBY

GROUP : C


MEANS OF CONNECTION/SEPARATION
PHYSICAL
SENSUAL
STRUCTURAL
LINKAGE
FREE-STANDING
VISUAL
AUDITORY
OBJECT OF CONNECTION/SEPARATION
FLOW SYSTEMS
RAPID TRANSIT
MAJOR VEHICULAR
MINOR VEHICULAR
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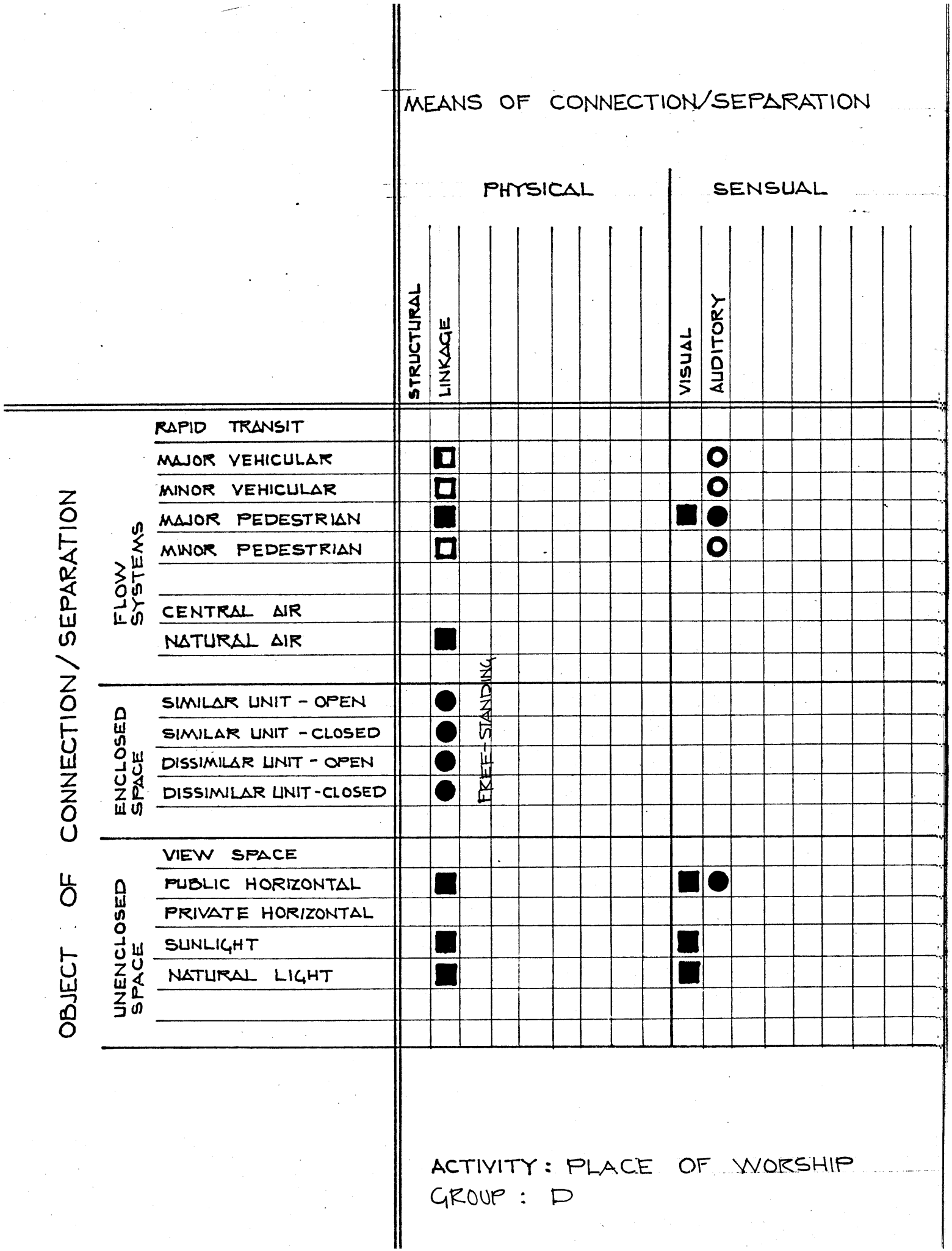
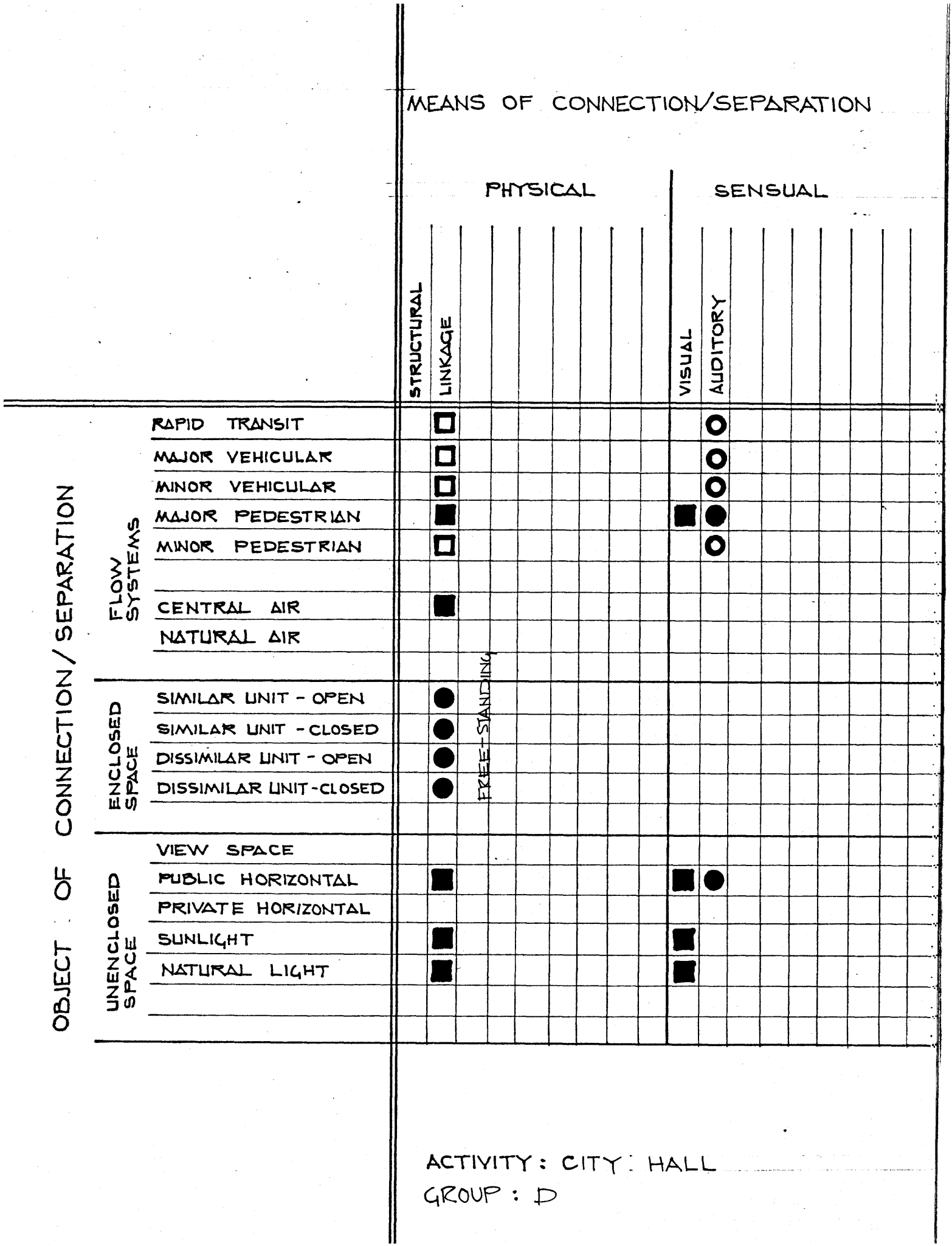
DISSIMILAR UNIT - CLOSED
UNENCLOSED SPACE
VIEW SPACE
PUBLIC HORIZONTAL
PRIVATE HORIZONTAL
SUNLIGHT
NATURAL LIGHT
ACTIVITY: LIBRARY
GROUP : D



ACTIVITY: PLACE OF WORSHIP

GROUP : D


MEANS OF CONNECTION/SEPARATION
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PUBLIC HORIZONTAL
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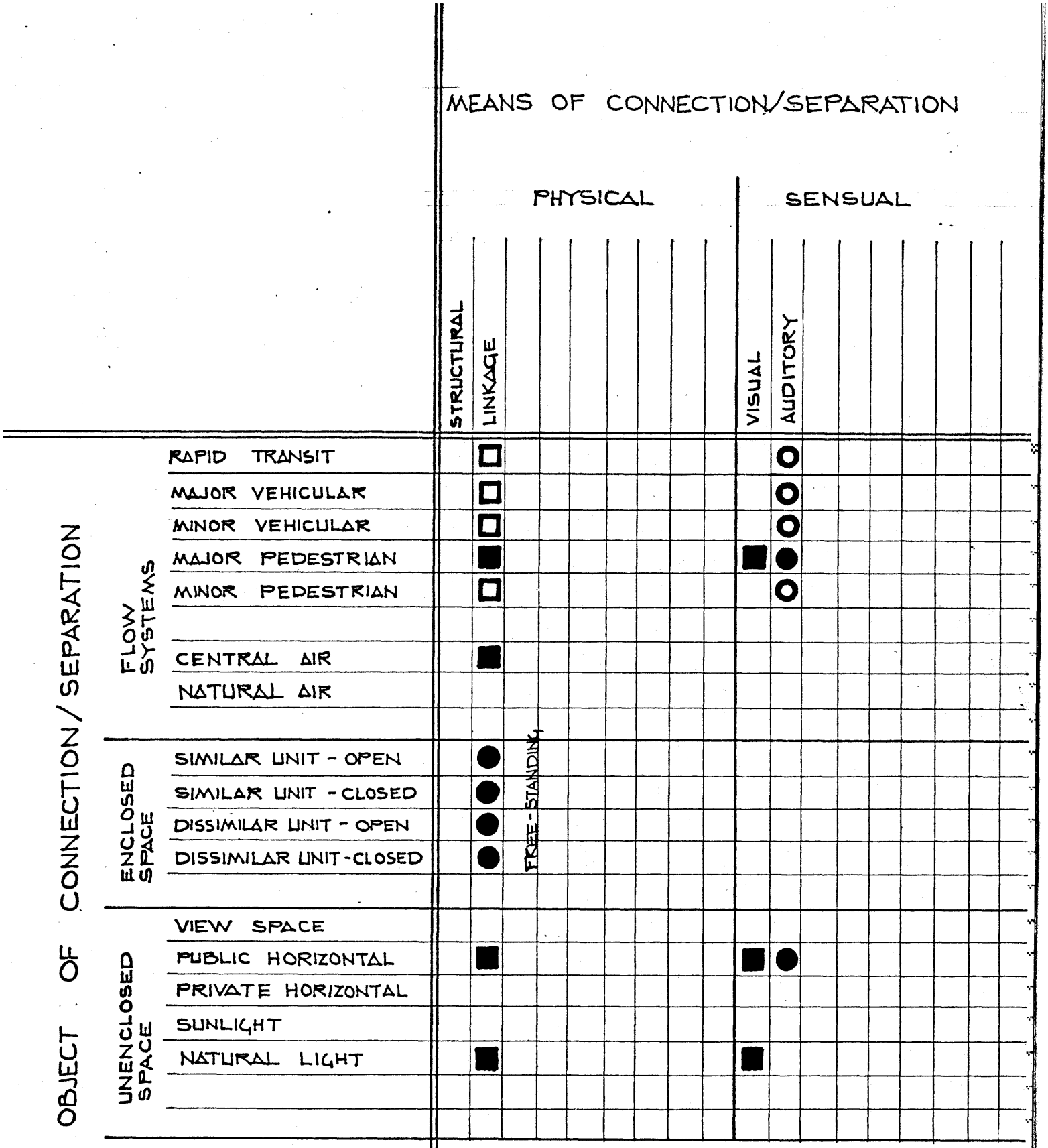
SUNLIGHT
NATURAL LIGHT
ACTIVITY : CITY HALL
GROUP : D

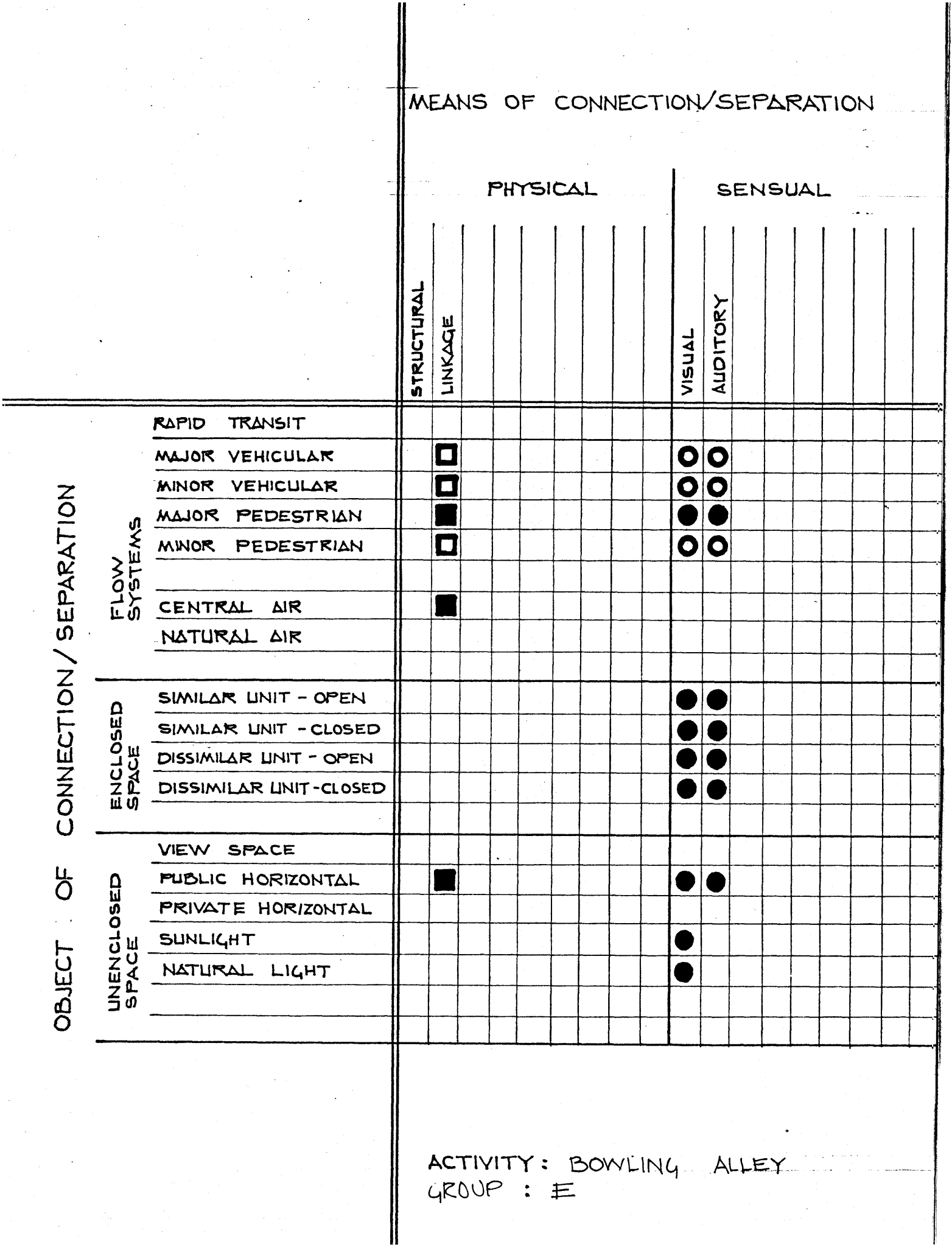
MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION



ACTIVITY: MUSEUM

GROUP : D


MEANS OF CONNECTION/SEPARATION
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OBJECT OF CONNECTION/SEPARATION
FLOW SYSTEMS
RAPID TRANSIT
MAJOR VEHICULAR
MINOR VEHICULAR
MAJOR PEDESTRIAN
MINOR PEDESTRIAN
CENTRAL AIR
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DISSIMILAR UNIT - OPEN
DISSIMILAR UNIT - CLOSED
UNENCLOSED SPACE
VIEW SPACE
PUBLIC HORIZONTAL
PRIVATE HORIZONTAL
SUNLIGHT
NATURAL LIGHT
ACTIVITY: BOWLING ALLEY
GROUP : E

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION

		PHYSICAL										SENSUAL									
		STRUCTURAL	LINKAGE									VISUAL	AUDITORY								
FLOW SYSTEMS	RAPID TRANSIT																				
	MAJOR VEHICULAR		▢									○	○								
	MINOR VEHICULAR		▢									○	○								
	MAJOR PEDESTRIAN		■									●	●								
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	CENTRAL AIR		■																		
	NATURAL AIR																				
ENCLOSED SPACE	SIMILAR UNIT - OPEN											●	●								
	SIMILAR UNIT - CLOSED											●	●								
	DISSIMILAR UNIT - OPEN											●	●								
	DISSIMILAR UNIT - CLOSED											●	●								
UNENCLOSED SPACE	VIEW SPACE																				
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	PRIVATE HORIZONTAL																				
	SUNLIGHT											●									
	NATURAL LIGHT											●									

ACTIVITY : CINEMA
GROUP : E

MEANS OF CONNECTION/SEPARATION

OBJECT OF CONNECTION/SEPARATION

		PHYSICAL									SENSUAL									
		STRUCTURAL	LINKAGE								VISUAL	AUDITORY								
FLOW SYSTEMS	RAPID TRANSIT																			
	MAJOR VEHICULAR		■																	
	MINOR VEHICULAR		■																	
	MAJOR PEDESTRIAN																			
	MINOR PEDESTRIAN		■																	
	CENTRAL AIR																			
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	DISSIMILAR UNIT - CLOSED																			
UNENCLOSED SPACE	VIEW SPACE																			
	PUBLIC HORIZONTAL																			
	PRIVATE HORIZONTAL																			
	SUNLIGHT																			
	NATURAL LIGHT																			

ACTIVITY : PARKING
GROUP : F

MEANS OF CONNECTION/SEPARATION

PHYSICAL | SENSUAL

OBJECT OF CONNECTION/SEPARATION		STRUCTURAL	LINKAGE								VISUAL	AUDITORY							
FLOW SYSTEMS	RAPID TRANSIT																		
	MAJOR VEHICULAR		■																
	MINOR VEHICULAR		■																
	MAJOR PEDESTRIAN																		
	MINOR PEDESTRIAN		■																
	CENTRAL AIR																		
	NATURAL AIR		■																
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	SIMILAR UNIT - CLOSED																		
	DISSIMILAR UNIT - OPEN																		
	DISSIMILAR UNIT - CLOSED																		
UNENCLOSED SPACE	VIEW SPACE																		
	PUBLIC HORIZONTAL																		
	PRIVATE HORIZONTAL																		
	SUNLIGHT																		
	NATURAL LIGHT																		

ACTIVITY : INDUSTRIAL / STORAGE
GROUP : F

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