LAND-USE INTENSITY (LUI), THE CONCEPT AND ITS APPLICATION

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ABSTRACT

LAND-USE INTENSITY (LUI),
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by Carl C. Sustar, Jr.

The purpose of this study was to investigate the concept, workings, and application of Land-Use Intensity (LUI) as developed by the Federal Housing Administration. Land-Use Intensity was posed as a measurement (regulatory) system to supersede density measurements which were considered too ambiguous because of the variety of detail which they might or might not include. For example, gross or net dwelling unit density, depending upon the inclusion or exclusion of on-site streets, parking bays and other details, gives no indication of the size of the dwelling unit, which might be an efficiency apartment or a five bedroom house. Land-Use Intensity measures the overall structural bulk and relationship of open space of a developed property.

The study was made in two parts, theory and application. In theory the six ratio components of Land-Use Intensity, floor area, open space, livability space, recreation space, occupant car storage, and total car storage, were considered as

they are defined for use by the Federal Housing Administration and as they have been adopted for use in local land-use regulation. The relationships of these components, also considered in theory, were studied through flow diagrams developed from forms utilized by the Federal Housing Administration to compute Land-Use Intensity. The second part, application, was a consideration of the theoretical Land-Use Intensity as it has been adopted and modified with use. Possible alternative uses, beyond regulatory, were also considered in application.

The six components of Land-Use Intensity are presented as six curves, on a rectangular Cartesian coordinate scale, which may be read together as one intensity value. While the scale is simple and precise, it is, in context with definitions of the components and their interrelationships, neither simple nor always consistent. These latter attributes contribute to some confusion over the use and value of Land-Use Intensity and seem to account for, to a large degree, the limited use of Land-Use Intensity beyond its application by the Federal Housing Administration. Because of its sensitivity for details and definitions built around residential development, the Land-Use Intensity concept, as now defined, does not appear applicable for measurement of non-residential uses, such as commercial or light industrial, unless modified appreciably. The precision and details of Land-Use Intensity also demand

technical staff and extensive data collection for which many communities are not prepared.

The use of Land-Use Intensity is significant to planning in that it is, as used by the Federal Housing Administration, one of several factors outside of and independent of local land-use controls which influence land-use patterns. And it does offer an operational example of how floor area ratio, open space and other spatial factors can be related.

LAND-USE INTENSITY (LUI), THE CONCEPT AND ITS APPLICATION

By

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INTRODUCTION

The concept of Land-Use Intensity (LUI) is one of the primary measures of the minimum property standards for Federal Housing Administration mortgage insured projects. It was formulated as an universally applicable device to appraise residential development taking place under a variety of local land-use regulations, notably those having no meaningful standards for planned-unit development or multifamily housing.

Even though they are but one facet of governmental activities influencing the use of land, land-use regulations, especially zoning, have been singled out for criticism not only because of the manner of their administration, or lack thereof, but also because of dated conceptual premises. On the one hand, zoning administration has been characterized as

> a process under which multitudes of isolated social and political units engage in highly emotional altercations over the use of land, most of which are settled by crude tribal adaptations of medieval trial by fire, and a few of which are conducted by confused *ad hoc* injunctions of bewildered courts.[1]

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[1]Richard F. Babcock, *The Zoning Game* (Milwaukee: The University of Wisconsin Press, 1966), p. 154.

And on the other hand, the concept of zoning itself is indicted as an inflexible, dated mold. The failure to keep in stride with the times is the fault.

> It saw the ideal city as a great pattern of contrasting districts, rigidly separating incompatible types of land uses. It assumed that similar uses naturally tended to congregate in homogenous areas, that development takes place lot-by-lot on small parcels, that shifts of social groups and land values come about slowly, and that where and when and how development takes place can be predicted and regulated in advance. It did not reckon with the swift advances in technology, transportation, and communication, and the dynamic growth of American cities, which have wrought changes in every old neighborhood and rung in new kinds of suburban development.[2]

Moreover, zoning regulations are not necessarily related to other regulatory devices or to any community plan.[3]

Flexibility, or freedom of expression within some framework of law to protect the public interest, appears to be the focus of much of the critical attention to land-use regulations. The standard single-lot zoning envelope originally developed to preserve light and air where land was divided into many small lots restricts this flexibility, especially in large scale development. What little opportunity for creativity remains is eliminated by many builders

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[2]Dukeminier & Stapleton, "The Zoning Board of Adjustment: A Case Study in Misrule," Kentucky Law Journal, L (1962), 273, 339-40, cited by John E. Cribbet, "Changing Concepts in the Law of Land Use," Land-Use Controls: A Quarterly Review, Vol. I, No. 1 (1967), pp. 34-35.

[3]John Reps, "Requiem for Zoning," Planning 1964 (Chicago: American Society of Planning Officials, 1964), p. 58.

who believe that rising land costs require them to obtain the maximum internal space by filling the zoning envelope, the result being that the zoning ordinance "designs" the buildings and spaces in between them.[4]

One answer to the problem of flexibility has been planned-unit development, a concept which has been included in some ordinances for at least two decades.[5] Planned-unit development is land development which is controled by a single ownership and developed as a single entity for several dwelling units. It is usually included as a conditional use or special exception

> whereby height, yard, and type of dwelling requirement (single family only, or single family and duplex) could be waived through action of an administrative agency (usually the planning commission), with approval of the governing body, where the proposal did not include more dwelling units than the zoning district map would normally permit on that site.[6]

The quest for flexibility such as expressed in planned-unit developments does, however, pose questions

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[4]Eldridge Lovelace and William Weismantel, Density Zoning: Organic Zoning for Planned Residential Units, Technical Bulletin No. 42 (Washington: Urban Land Institute, 1961), p. 33.

[5]Ibid., 8. A community unit plan provision--the concept has several names--was enacted into the St. Louis County, Missouri ordinance in 1946.

[6]Ibid. Note, Fremont, California is an exception to this in that it allows, as a development incentive, a percentage increase in density for additional open space created in this type of development. Byron R. Hanke, Land-use Intensity Standards, the LUI Scale and Zoning (Washington: U.S. Government Printing Office, 1966), p. 17.

regarding certainty in standards and administration. While the standard zoning envelope is labeled by its critics as inflexibile, its supporters point to it as a standard of certainty. At least the land owner knows beforehand what he may or may not do. This facilitates an ease of administration that permits even the smallest village to handle zoning with greater speed and certainty.[7] The complex set of regulations for planned-unit development or other flexible innovations, looking like the "Internal Revenue Code," is not necessarily beneficial or inviting to the community to administer or to the developer to follow. Regulations serve as a mode of communication to the developer. He is interested in them only to the extent that they add to his ability to predict what will be required of him and what proposal will be acceptable to the local public authority.[8]

In this setting the Land-Use Intensity (LUI) concept made its appearance. In the same year that it was presented, 1963, it was acclaimed by some as "the clearest, most concise presentation of land-use regulations ever devised."[9] Today it is still being used by the Federal Housing Administration and has also been adapted into

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[7]Babcock, 132-133.

[8]Jan Krasnowiecki, et al., Legal Aspects of Planned Unit Residential Development, with Suggested Legislation, Technical Bulletin No. 52 (Washington: Urban Land Institute, 1965), pp. 15-16.

[9]"FHA's New MPS: Big Step to Good Apartments," House and Home, December, 1963, p. 130.

several zoning ordinances. In addition to serving in this regulatory capacity, it has also been indicated that Land-Use Intensity (LUI) is applicable to research aspects of planning. Among other things it has been suggested as an indicator of population density, traffic generation, utility load, and storm water runoff coefficients, all of which could be computerized.[10]

This thesis, an exploration of the workings and applications, existing and potential, of Land-Use Intensity (LUI) is prompted first by the land-use flexibility-control question and second, but to a greater degree, by questions raised about Land-Use Intensity (LUI) a seemingly prodigious concept about which few people are cognizant. For instance what exactly is Land-Use Intensity? How is it derived and applied? Why, if it is so clear and concise, is it not more widely used in planning? And to what areas of planning is the Land-Use Intensity (LUI) concept most applicable--research?--implementation? This investigation of the concept and its uses will hopefully provide answers or at least some insight into these and other questions.

The study consists basically of two parts: the theory of Land-Use Intensity (LUI) and its application.

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[10]Byron R. Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, Exerpts from spoken testimony before the National Commission on Urban Problems at its hearing on zoning, held in Houston, 10 August 1967 (Washington: by the author, 1967), p. 11.

The former describes the overall concept, its parts and the intensity determination and application processes (Chapters I and II) and the later views how theory is or is not used in actual operation (Chapter III). Chapter IV continues from an operational point of view and explores other uses and structuring of the concept. To facilitate the description in the first part, outline flow diagrams, developed from Federal Housing Administration processing forms, are used. These diagrams emphasize base input components rather than time or sequence to draw attention to the intricacies of the concept. They are aimed primarily at the intensity determination and application processes of the concept as used by the Federal Housing Administration since these constitute integral parts of the parent form of the concept.

CHAPTER I

THE LAND-USE INTENSITY (LUI) CONCEPT

The Land-Use Intensity (LUI) concept is most often presented as the precise scale which "reduces 200 pages of site-planning rules to a single page."[11] But this simplicity is deceiving because LUI is much more than a one page scale. Two aspects of LUI should be considered to understand the concept: LUI as applied by the Federal Housing Administration and LUI as adapted and applied in local ordinance form. The basic concept remains the same in both instances; however, the manner in which it is used to determine intensity level, the Federal Housing Administration's LUI being orientated to the individual site and the housing market and the local ordinance's LUI being orientated to zoning or predetermined districts, creates two distinct aspects of LUI.

LUI, the guideline to determine suitability for federal mortgage insurance

The Federal Housing Administration has three basic functions which were determined under provisions of the

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[11] "FHA's New MPS . . .," House and Home, December, 1963, 130. This scale is reproduced in Figure 1.

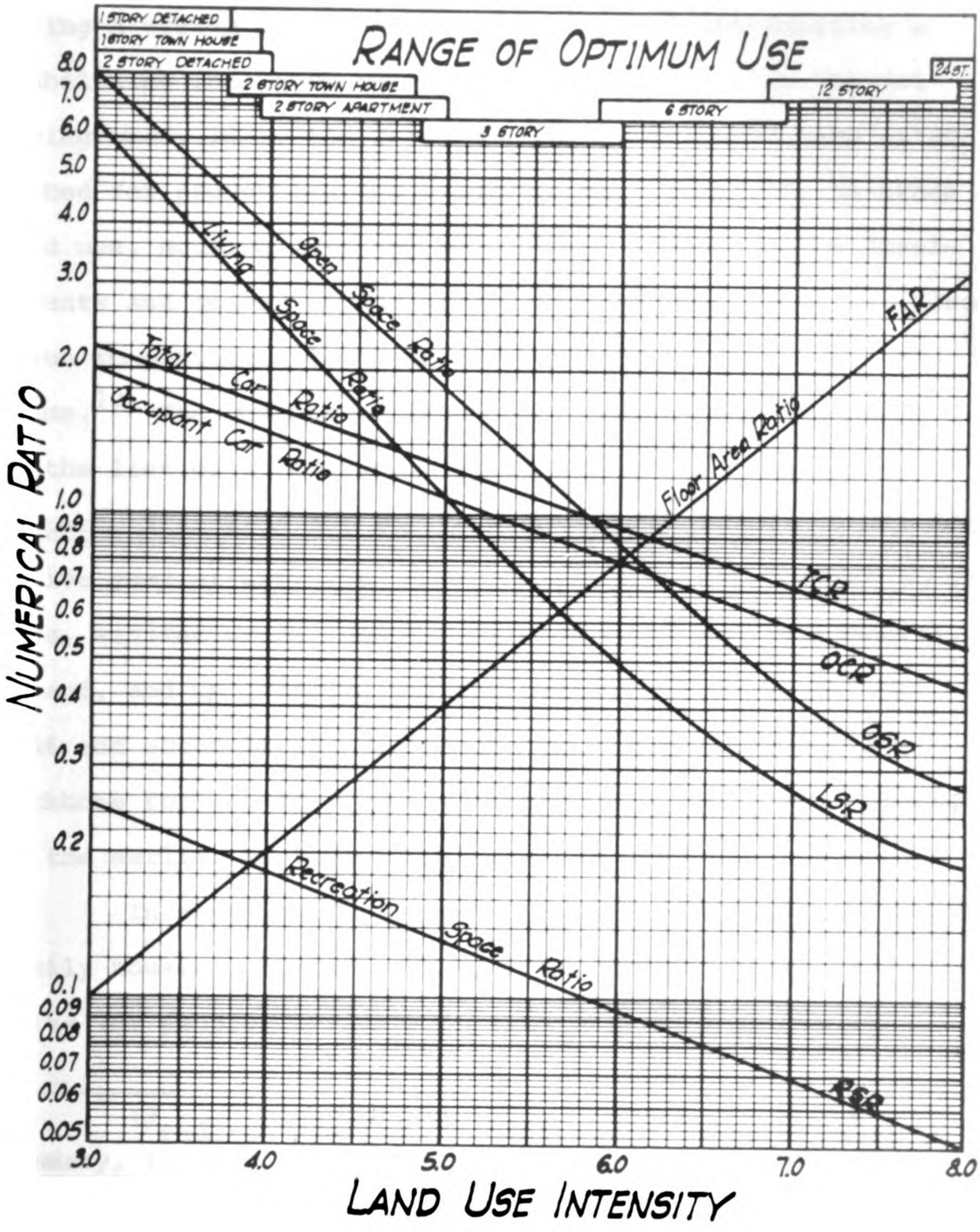

Figure 1. The Land-Use Intensity Scale

National Housing Act of 1934. They are: (1) encouraging improvement in housing standards and conditions, (2) providing a system of mortgage insurance, and (3) exerting a stabilizing influence on the mortgage market. In the following year, 1935, the first "minimum standards" were established for properties and subdivisions. Research, in urban land use, housing laws and regulations, construction developments and costs, an uncharted field at that time, was also begun to provide a foundation for the Administration's programs.[12] The concept of land-use intensity was admitted to the list of standards in 1963 as a part of Minimum Property Standards for Multifamily Housing, which culminated a five year effort, with consultation with two hundred agencies, manufacturers, and industry associations, to rewrite, expand, and up grade multifamily standards formulated in 1946 and accumulated since that year. LUI provided the backbone for a site planning section which had been lacking in the earlier Minimum Property Requirements.[13]

In revising the minimum property standards for multifamily housing, the concept of density, the number of living units (or people) per unit of land, was deleted and LUI

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[12]Federal Housing Administration, The FHA Story in Summary, 1934-1959, FHA 375 (Washington: U.S. Government Printing Office, 1959), p. 12.

[13]"FHA's New MPS . . .," House and Home, December, 1963, 130. A summary of the old standards may be found in Appendix A.

admitted in its place as a land-use measure. The reason given for the revision was that density, because of wide variation in the size of living units, the number of occupants of living units of any given size, and the question of gross or net density, is not really sensitive to nor indicative of the degree of land-use. In developing a site the basic concern involved is the building area in relation to the land area and the open space that is left over.[14] LUI expresses the degree of land-use in terms of floor area, people space, and vehicular space. Values for these components were determined through a sampling from local Federal Housing Administration offices of "successful" mortgage insured projects.[15]

The Federal Housing Administration defines land-use intensity to mean

> the overall structure-mass and open space relationship in a developed property. It correlates the amount of floor area, open space, livability space, recreation space and car storage space of a property with the size of its site, or land area.[16]

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[14]Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, 3. Mr. Hanke notes that this originally was the direction taken by zoning with its detailed regard for yards, coverage, and so forth.

[15]Interview with Mr. Wesley Furton, Area Site Planner, Federal Housing Administration, Detroit, Michigan, 24 April 1968.

[16]Federal Housing Administration, Land-Use Intensity, Land Planning Bulletin No. 7, HUDTS-6 (Interim edition, Washington: U.S. Government Printing Office, 1966), p. 1.

This correlation involves six related numerical ratios. The total residential floor area is related to the land area by the Floor Area Ratio (FAR). Open space, livability space, and recreation space are related to the floor area by the Open Space Ratio (OSR), Livability Space Ratio (LSR), and Recreation Space Ratio (RSR). In turn the number of occupant parking spaces and total parking spaces is related to the number of living units by the Occupant Car Ratio (OCR) and the Total Car Ratio (TCR).[17]

These might be better visualized in the following figure which shows the relationships of land use elements in a development with about eight dwelling units to the gross acre.[18] Out of one-hundred acres of land actually used for development, twenty acres of it are covered with houses and about four acres are covered with garages. Vehicular space (streets and open parking spaces) take up about twenty-four acres of the remaining land not covered by buildings. The remaining fifty-two acres of open space is left for people.[19]

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[17]The total number of parking spaces consists of occupant plus guest parking spaces.

[18]See Figure 2.

[19]Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, 7.

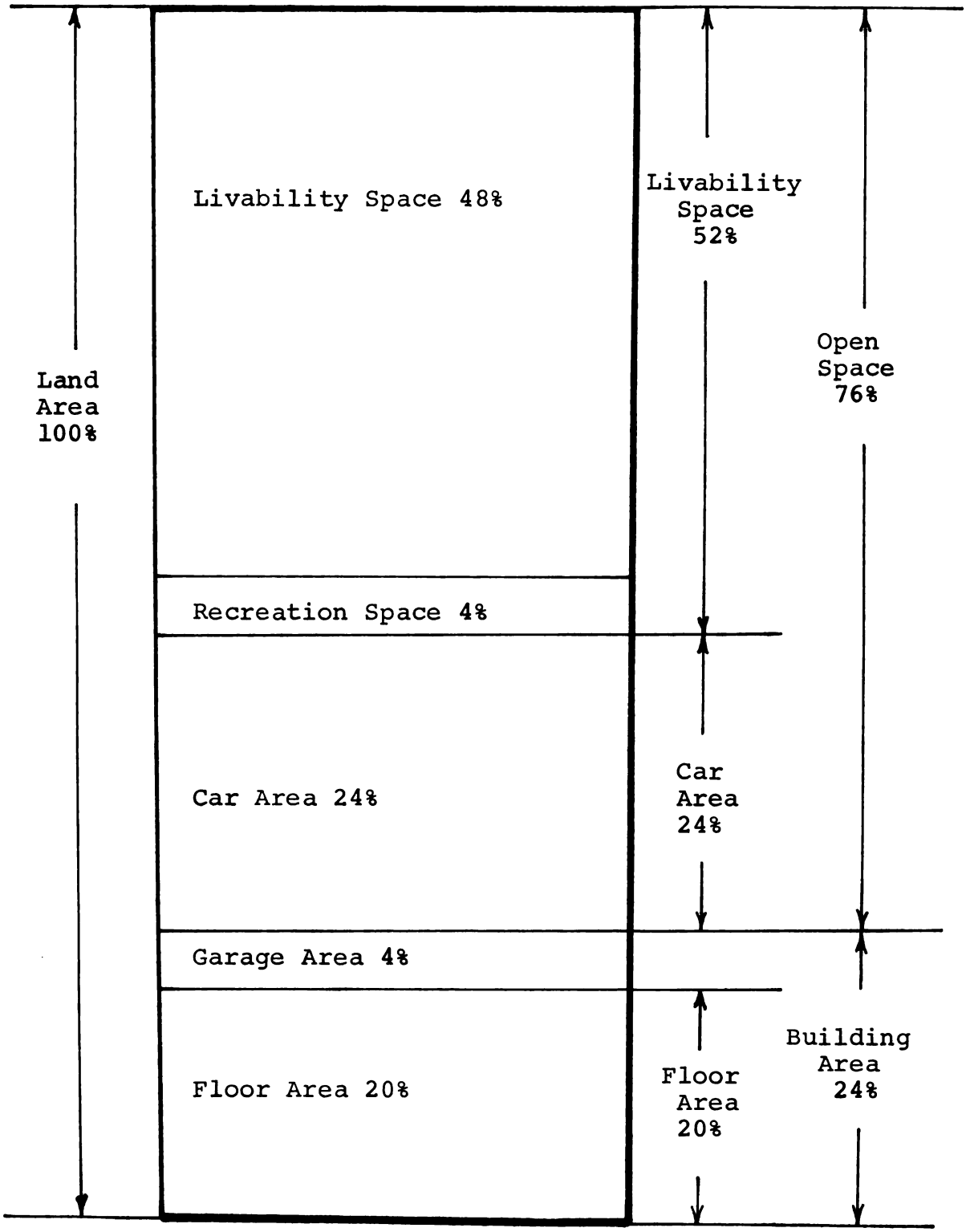

Figure 2. Land-Use Intensity Components. Source: Byron Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, Exerpts from spoken testimony.

From this and other actual examples, it was found that these land-use proportions, for a given living unit floor area, varied as the density was increased or decreased.[20] This variation in the land-use proportions, with a certain living unit floor area, can be presented in graphic form by plotting the values of the six ratios on rectangular cartesian coordinates of the numerical value of the ratio and the gross unit density. The data from these various graphs, by living unit floor area, have been summarized on a single set of coordinates known as the LUI scale which presents the numerical value of the ratios and the "intensity" for any given living unit floor area.[21]

The primary ratio of the LUI rating scale is the floor area ratio (FAR), the maximum square footage of total floor area permitted for each square foot of land area, as defined in Minimum Property Standards for Multifamily Housing. Floor area, with its dimensions being measured from the faces of the exterior walls, is defined to include:

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[20] Ibid.

[21] See Figure 1. The exact process of this reduction is not known. It is conjectured that since the scale of the ratio values is common to all the sets of coordinates, the numerical units of the "intensity scale" were adjusted until there was a certain degree of coincidence of all the ratio lines for each of the six ratios as determined by various densities.

> (a) halls, lobbies, stairways and elevator shafts, (b) basement or lowest story to extent used for residential purposes and for access to residential use, and (c) relatively-closed exterior balconies and other covered open spaces which are ineligible for inclusion in covered open space . . . and therefore are counted as floor area, unless exempted [as follows]. . . . The floor area does not include: (a) relatively-open exterior balconies and other covered open spaces which are eligible for inclusion in covered open space [defined below]; (b) any terrace, patio, atrium, porch or balcony which is not covered; (c) any area for special purpose for common use of all occupants, such as recreation, library or infirmary; (d) any garage or car port; (e) any area used for major mechanical equipment; or (f) any area used for commercial or other nonresidential purposes. . . .[22]

Land Area (LA) is computed as gross area for ease and accuracy of operation. It is defined to include:

> (a) the site area for residential use within the property lines; (b) plus half of any abutting alley or street right-of-way, (c) plus half of any abutting beneficial open space with reasonable expectance of perpetuity (such as a river or public park), except that the width of any abutting open space included in Land Area shall not exceed an amount in linear feet equal to 10 times the Land-Use Intensity Rating of the Site. Land Area, however, shall not include: (a) area not beneficial to the residential use due to its location or character, or (b) area used predominately for commercial or other nonresidential uses. . . .[23]

Gross land area, rather than net site area within the property lines, was considered to be a more realistic approach in that it considered all the land that "reasonably

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[22]Federal Housing Administration, Minimum Property Standards for Multi-family Housing, FHA 2600 (Washington: U.S. Government Printing Office, 1963), pp. 42-43.

[23]Ibid., 43. Half of any abutting alley or street right-of-way applies to those alleys and streets running parallel with the site property lines.

can be attributed to contribute primarily to the utility and amenity of the particular private property." By including a reasonable share of park, river, or other beneficial open space properties are measured on the same basis, "that is, all the land involved in the given use instead of taking only the privately owned parcel."

> If the street happens to be a private street, it is of no greater value to the adjoining building than if it's a public street. Yet, the typical zoning treats it differently. The measurement methods are wrong. You can't rely on net site area.[24]

The rationale for floor area as the base for LUI is for the most part a concern for open space, that is how to achieve an appropriate, sufficient, and usable amount of open space. Open space determined per dwelling unit is "unrealistic" in that it might vary in size from five hundred square feet to twenty-five hundred square feet.[25]

> The more realistic approach is on the basis of the number of people. But this is hard to measure on a set of plans. The closest you can get to this in practical operations is floor area. So we use open space in relation to floor area or open space ratio.[26]

The Open Space Ratio (OSR) determines the minimum amount of open space, in square feet, required for each square foot of floor area. Open space is defined as

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[24] Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, 17.

[25] Ibid., 15-16. This point should also be qualified by the amount of land covered by buildings.

[26] Ibid., 16.

> the total horizontal area of all uncovered open space plus 1/2 of the total horizontal area of all covered open spaces. . . . Uncovered Open Space (UOS) is the land area, minus the building area, plus the usable roof area. . . . Building Area (BA) is the total ground area covered by enclosed building space plus the total area of all covered open spaces at ground level, both eligible and ineligible as defined below. . . . It is measured from the faces of exterior walls (or the exterior line of omitted walls) at the mean grade level of each building, garage, car port and other accessory building. [Eaves and normal roof overhang are disregarded in these measurements.]. . . . Usable Roof Area (URA) is the total roof area of residential buildings, garages and accessory buildings which has been suitably improved as residential open space for use of occupants. Roof areas used for car storage are included.[27]

Covered Open Space (COS), that roofed exterior space with open sides, is defined to include:

> (a) roofed porches, (b) roofed car ports, (c) covered exterior balconies, and (d) exterior spaces covered by portions of buildings supported on columns or cantilevers, such as a porch, portico, loggia, arcade, breezeway, gallery, or pavilion which is at ground level, open on the sides (partially or wholly), and closed to the sky. Eligible Area. The horizontal area of any covered open space is eligible as covered open space (COS) to the extent to which it is not more than twice the sum of the clear, open and unobstructed portions of the open and partially open sides of the covered open space. Ineligible Area. Any remaining horizontal area of the covered open space is not eligible as covered open space (COS) in determining open space (OS . . .). It is counted as floor area (FA . . .) unless exempted under [conditions for floor area, see above]. . . . Together with eligible covered open space, it is considered in determining building area (BA . . .).[28]

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[27]Federal Housing Administration, Minimum Property Standards . . ., 44.

[28]Ibid., 44-45. For clarification the text also provides an illustrated example. A 25 feet by 40 feet covered open space at ground level has 20 feet of depth recessed behind the exterior face of the building wall and the other 5 feet projected beyond the wall and covered by

The Livability Space Ratio determines the minimum amount of square feet of non-vehicular outdoor area to be provided for each square foot of total floor area. Livability space is for people, planting and visual appeal and is defined as

> the open space, minus the car area within the uncovered open space, minus 1/2 any car area in that covered open space which was eligible and credited 50 percent to open space. . . . Car area (UCA and CCA) is open space area (uncovered and covered) used for car traffic and maneuvering and for car parking. Included are the paved trafficways and parking areas of all streets within the land area (LA), including the subject half of streets abutting the property.[29]

Passive and active recreation areas, livability space for common use, are required in accordance with the needs of the residents. Tot-lots, for example would most likely not be provided with housing for the elderly. The minimum area of recreation space is determined by the Recreation Space Ratio (RSR) again in relation to the total

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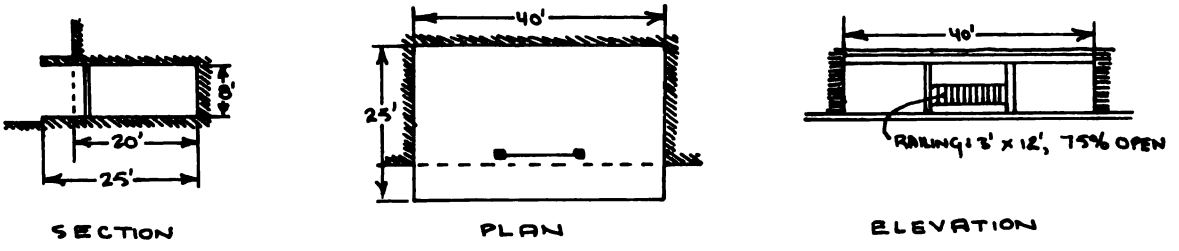
the projection of an exterior balcony on the floor above.



SECTION PLAN ELEVATION

Covered open space (COS) is computed as 1000 sq. ft. (25' × 40'). The total area of open sides is 400 sq. ft. (40' × 8' + 2 × 5' × 8'). Obstructions, piers and railing, are 25 sq. ft. (2 × 1' × 8' + 1 × 3' × 12' × .25), which leaves an open, unobstructed portion of 375 sq. ft. (400^{sf} - 25^{sf}). Maximum eligible covered open space is 750 sq. ft. (2 × 375^{sf}). Therefore eligible covered open space is 750 sq. ft. ($750^{sf} < 1000^{sf}$) and ineligible covered open space is 250 sq. ft. (1000^{sf} - 750^{sf}).

[29] Ibid., 46.

amount of floor area. Permanent recreation space abutting the property and available for use by the residents may be considered in recreation space calculations. All recreation area is qualified in that it is to be

> at least 20 feet away from any residential wall containing a window on the ground floor. Each recreation area counted in RSR shall have a minimum dimension of 100 feet, except that an area of lesser dimension is countable in RSR if: (a) the total required recreation space is less than 10,000 square feet, (b) the shape or topography of the site prevents compliance with the 100 foot least dimension, or (c) the recreation area consists of usable roof area, and the building size prevents compliance with the 100 foot minimum.[30]

The Total Car Ratio (TCR) and Occupant Car Ratio (OCR), which determine the minimum number of residential garages and car parking spaces, are based upon the total number of living units, occupant spaces being the number of garage and parking car-units available to occupants without time limits and total spaces being the sum of occupant spaces and spaces available for limited time periods (primarily for guests).

> Parking spaces available on the streets within and abutting the property are counted as occupant parking units in OCR if over-night on-street parking is permitted by local ordinance, has market acceptance, and, beyond any reasonable doubt, will continue to have such permission and acceptance over the long term. Otherwise street parking units are counted as guest parking units. . . . Additional parking facilities shall be provided for on-site commercial areas or office space at the minimum rate of 3 sq. ft. of parking compound area to 1 square foot of commercial and office floor area.[31]

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[30] Ibid., 62-63.

[31] Ibid., 47.

A numerical relationship among these six ratio components is established by plotting them all on one set of coordinates, the scales of which read "intensity" and the numerical values of the ratios. In this manner it is possible to express all six of them with a single intensity value. Upon assignment of an intensity number, the ratio values for each component can be read either from the graph or from a tabular presentation of the plotted curve values.[32] These ratio values are then converted into the respective component values according to the project land area, providing the developer-sponsor with basic acceptable site land-use proportions. From here the design task of fitting building forms and spaces commences.

Here again recall that the six LUI components do not function in a vacuum. In addition to the details and interrelations found in the definitions of the components, there are other interrelated standards and specifications, among them such items as yard dimensions which are determined by building height and length and wall window area.[33] Needless to say this makes the site fitting process a 3-dimensional operation and closely related with the building type and interior arrangement.

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[32]See Figures 1 and 3. For example, an assigned intensity number of 4.6 would have a 0.303 floor area ratio, a 2.4 open space ratio, a 1.5 livability space ratio, a 0.15 recreation space ratio, and parking space ratios of 1.2 and 1.4.

[33]Federal Housing Administration, Minimum Property Standards . . ., 48-53, 194.

LUI Land-Use Intensity	FAR Floor Area Ratio	OSR Open Space Ratio	LSR Livability Space Ratio	RSR Recreation Space Ratio	OCR Occupant Car Ratio	TCR Total Car Ratio	LUI Land-Use Intensity
3.0	.100	8.0	6.5	.25	2.0	2.2	3.0
3.1	.107	7.4	5.8	.24	1.9	2.1	3.1
3.2	.115	6.9	5.2	.23	1.9	2.1	3.2
3.3	.123	6.4	4.7	.23	1.8	2.0	3.3
3.4	.132	5.9	4.2	.22	1.7	1.9	3.4
3.5	.141	5.5	3.8	.21	1.7	1.9	3.5
3.6	.152	5.1	3.5	.20	1.6	1.8	3.6
3.7	.162	4.8	3.3	.20	1.6	1.8	3.7
3.8	.174	4.4	3.0	.19	1.5	1.7	3.8
3.9	.187	4.2	2.8	.19	1.5	1.7	3.9
4.0	.200	3.8	2.6	.18	1.4	1.6	4.0
4.1	.214	3.6	2.4	.18	1.4	1.6	4.1
4.2	.230	3.3	2.2	.17	1.4	1.5	4.2
4.3	.246	3.0	2.0	.16	1.3	1.5	4.3
4.4	.264	2.8	1.8	.16	1.3	1.5	4.4
4.5	.283	2.6	1.7	.15	1.2	1.4	4.5
4.6	.303	2.4	1.5	.15	1.2	1.4	4.6
4.7	.325	2.2	1.4	.14	1.2	1.3	4.7
4.8	.348	2.1	1.3	.14	1.1	1.3	4.8
4.9	.373	1.9	1.2	.14	1.1	1.3	4.9
5.0	.400	1.8	1.1	.13	1.1	1.2	5.0
5.1	.429	1.7	1.0	.13	1.0	1.2	5.1
5.2	.459	1.6	.91	.12	1.0	1.2	5.2
5.3	.492	1.5	.84	.12	.99	1.1	5.3
5.4	.528	1.4	.77	.12	.96	1.1	5.4
5.5	.566	1.3	.71	.11	.93	1.1	5.5
5.6	.606	1.2	.66	.11	.90	1.0	5.6
5.7	.650	1.1	.61	.10	.87	1.0	5.7
5.8	.696	1.0	.57	.10	.84	.99	5.8
5.9	.746	.91	.53	.10	.82	.96	5.9
6.0	.800	.85	.50	.10	.79	.93	6.0
6.1	.857	.80	.46	.09	.77	.90	6.1
6.2	.919	.74	.43	.09	.74	.87	6.2
6.3	.985	.70	.40	.09	.72	.85	6.3
6.4	1.06	.65	.38	.08	.70	.83	6.4
6.5	1.13	.60	.36	.08	.68	.81	6.5
6.6	1.21	.56	.34	.08	.66	.79	6.6
6.7	1.30	.52	.32	.08	.64	.77	6.7
6.8	1.39	.49	.30	.07	.62	.75	6.8
6.9	1.49	.46	.29	.07	.60	.73	6.9
7.0	1.60	.43	.27	.07	.58	.71	7.0
7.1	1.72	.40	.26	.07	.57	.69	7.1
7.2	1.84	.38	.25	.06	.56	.67	7.2
7.3	1.97	.36	.24	.06	.54	.65	7.3
7.4	2.11	.34	.23	.06	.52	.63	7.4
7.5	2.26	.32	.22	.06	.50	.61	7.5
7.6	2.42	.31	.21	.06	.49	.60	7.6
7.7	2.60	.30	.20	.06	.47	.58	7.7
7.8	2.79	.29	.20	.05	.46	.56	7.8
7.9	2.99	.28	.19	.05	.45	.55	7.9
8.0	3.20	.27	.19	.05	.44	.54	8.0

Figure 3. Land-Use Intensity Ratios in Tabular Form

> The predetermined quantities save the designer from false starts with inappropriate sets of components. But they do not of themselves assure the creation of a good design. This is the irreplaceable contribution of the designer working within the context of suitable physical components and the market requirements.[34]

LUI as adapted to local land-use controls

A recent study of urban problems, especially zoning and land-use controls, projected that the planned-unit development ordinance will "probably" be the future land-use control device in developed areas.[35] It continued, concluding that

> a number of communities now have planned unit development controls. In some cases these have been grafted on existing zoning ordinances and are not very satisfactory. The PUD concept also has some legal hurdles to overcome, including the adoption of enabling legislation, but these should be cleared reasonably soon in most states. New Jersey recently adopted PUD enabling legislation.
>
> One serious difficulty with PUD controls relates to the problems of lay administration and technical personnel shortage discussed earlier. The planned unit development ordinance is a hybrid of zoning, subdivision regulation, and design control. To administer such an ordinance in the best interests of the developer and the public, the community must forego the making of political decisions on technical matters, and it must use the services of professional personnel trained in planning, architecture, and engineering. Neither requirement will be easily met.[36]

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[34]Hanke, Land-Use Intensity Standards, the LUI Scale and Zoning.

[35]While many zoning ordinances include planned-unit development as a conditional use or special exception, some feel that it needs and will have greater status by being adopted in a specific ordinance.

[36]American Society of Planning Officials, Problems of Zoning and Land-Use Regulation, Prepared for the

The nature of regulations for planned unit development necessitates complexity because in permitting various housing types together in one unit aspects of their design and arrangement on various site conditions and their relationship to surrounding properties and neighborhood and public facilities must be considered. This does not refer to the simple cluster with reduction of lot size offset by open space and no departure from the single housing type permitted in the zoning district. As such planned unit development is a "direct challenge" to pre-set regulations "because it is impossible to pre-set all of the regulations for such development and satisfy the preference for simplicity in regulations."[37]

In view of the trend and complexity of PUD, the use of the LUI approach taken by the Federal Housing Administration has been recommended for adaption to local circumstances for two reasons.

> First, the standards, based on extensive experience, are excellently drafted and organized and provide a wide enough range so that they can be used in almost any situation. Second, since a very substantial amount of new development will be financed with FHA insurance on mortgages, use of the standards will reduce the complications which arise when several sets of regulations, all for approximately the same purpose, are slightly at variance with each other.[38]

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consideration of the National Commission on Urban Problems, Research Report No. 2 (Washington: Government Printing Office, 1968), pp. 43-44.

[37]Krasnowiecki, 15.

[38]Frederick H. Bair, "How to Regulate Planned-Unit Development for Housing--A Summary of a Regulatory Approach, Zoning Digest, June and July 1965, p. 186.

Since LUI was introduced by the Federal Housing Administration in 1963, it has been adopted or is being prepared for adoption into the ordinances of several communities, among them: Frederick County, Maryland; Fairfax County, Virginia; Norfolk, Virginia; Richmond and Virginia Beach, Virginia; Indianapolis and Marion County, Indiana; and the City and County of Honolulu, Hawaii, for a total of "something around 15-20 jurisdictions using it in one form or another."[39]

The manner of adoption-adaptation varies. On the one hand, as in Frederick County, LUI has been adopted by reference into a planned-unit development amendment. Maximum LUI ratings are pre-established in the Residence Districts (R-1, R-2, R-3). PUD is also allowed in the A-1 (Agriculture) District, where the LUI rating is determined by the Planning Commission which "shall follow the procedure in FHA's Land Planning Bulletin No. 7, entitled Land use Intensity Rating; dated September 1963,"[40]

On the other hand, as in Marion County, and the City and County of Honolulu, LUI has been absorbed or added on to the other zoning standards of the districts. In the instance of Marion County, LUI related ratio values for five of the six components have been assigned to each

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[39]Letter from Mr. Frederick H. Bair, Consultant, Bair and Associates, Auburndale, Florida, 29 April 1968.

[40]Hanke, Land-use Intensity, the LUI Scale and Zoning, 23. This amendment is reproduced in Appendix B.

applicable residential district. LUI as such is inferred.[41] In Honolulu, where LUI is to be applied in the multifamily and hotel districts, LUI ratings are to be determined according to scales of net zoning lot area established within each zone. The components, excluding parking which is treated separately, are determined by definitions very similar to those used by the Federal Housing Administration. Honolulu also may apply LUI to "Planned Development-Housing Districts." In such development the LUI rating is determined by a pre-set scale based on the residential or apartment district from which the PD-H district was formed.[42]

The pre-determination of the level of intensity, excluding Frederick County's agricultural district, is the primary distinction between local adoption of LUI and the Federal Housing Administration application in relation to each project site, surrounding development, and market acceptability. This will be explored further in the following chapter.

Thus far much of the discussion of LUI, especially in the local adaptation, has been in relation to planned-unit development (PUD). This does not mean, however, that

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[41] Extracted from Dwelling Districts Zoning Ordinance of Marion County, Indiana (Indianapolis: Metropolitan Planning Department, 1966). Only the total car ratio (TCR) is considered for parking space and off-street parking requirements are considered separately.

[42] Proposed Comprehensive Zoning Code (CZC) (Honolulu: Planning Department, City and County of Honolulu, 1968). This code was scheduled for final public hearing 10 May 1968.

the concepts are synonymous or interchangeable in application. LUI is not PUD.[43] Planned-Unit Development involves

> a land area which (1) has both individual building sites and common property such as a park, and (2) is designed and organized to be capable of satisfactory use and operation as a separate entity without necessarily having the participation of other building sites or other common property; the ownership of the common property may be either public or private.[44]

Land-Use Intensity (LUI) is a set of spatial proportions, primarily floor area and open space, based on floor area, for people and vehicles, which has been developed as one standard for PUD. Its application, however, is not restricted to the large, independent scale implied with PUD.[45]

The six component ratios of LUI, floor area, open space, livability space, recreation space, and occupant and total parking spaces, in addition to being related by definition, are related through forms which outline the process of determining and applying LUI. These will be considered in the following chapter.

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[43]Interview with Mr. Furton, 24 April 1968. Mr. Furton noted this confusion of terms as one source of problems involved in explaining land-use intensity to the public.

[44]Federal Housing Administration, Planned-Unit Development with a Homes Association, Land Planning Bulletin No. 6, FHA 1097 (Revision; Washington: U.S. Government Printing Office, 1964), inside back cover.

[45]Hanke, Lane-use Intensity Standards, the LUI Scale and Zoning, 4.

CHAPTER II

DETERMINATION AND APPLICATION OF THE LUI NUMBER

While form is quite important, the function or functioning of a thing needs also to be viewed to understand it, the two being complementary elements of the whole. In form LUI is to provide flexibility within a fixed standard which is expressed in the six ratio intensity scale. In terms of function, it is to establish

> a workable basis for the planning, construction and operation of a successful housing project--successful both as to market absorption and in long term values--successful whether the project is for rental or for home sales in a planned-unit development.[46]

The workable base consists of assigning a LUI number (level of intensity) and determining land-use and building proportions from that number. This action is preferably begun at "the preapplication stage of a multifamily housing proposal and the feasibility stage of a planned-unit development."[47] Responsibility for assignment of the LUI number

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[46]Federal Housing Administration, Land-use Intensity, 1.

[47]Federal Housing Administration, Instructions for Land-use Intensity Forms, (Washington: U.S. Government Printing Office, 1965), p. 2. The reason for this is expressed in a memorandum from Stratford E. McKenrick, Zone Operations Commissioner, to All members of Zone III Advisor Teams Trained in Land-use Intensity Analysis Procedure, 03 January 1966. "Occasionally, site plans for a PUD or multifamily proposal

is given to the Chief Underwriter of the Federal Housing Administration Field Office in which the project is proposed. His decision is based upon site inspection and data which has been collected, pooled, and analyzed by Federal Housing Administration personnel. Recommendations concerning the data come initially from two sources:

(a) The Appraiser--especially on matters related to broad economic forces affecting the area, and the immediate rentals and long term values of a successful project; and
(b) The Land Planners--especially on matters related to present and probable future community patterns, and those physical characteristics of the site and its surroundings which are likely to affect land-use intensity.

Upon recommendation of the Appraiser or Land Planner, or upon his own initiation, the Chief Underwriter also receives data and advice on matters affecting land-use intensity from:
(a) The Market Analyst--on general market conditions and economic growth of the locality;
(b) The Chief Architect--on building design and structure;
(c) The Site Engineer-on grading and drainage; and
(d) The Sanitary Engineer--on water-supply and sewage-disposal.[48]

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are submitted to FHA for mortgage insurance prior to insuring office site analysis. The land-use intensity number which can be derived from these premature plans represent the sponsor's judgment as to the desired intensity for the site development. In these cases, however, the insuring office must still make its own independent L-U-I analysis of the site, and so advise the sponsor. It should be noted that there may be a considerable difference between the L-U-I number proposed by the sponsor and the L-U-I number acceptable to the insuring office for mortgage insurance purposes based on the latter's knowledge and experience."

[48]Federal Housing Administration, Land-use Intensity, 7-8.

Intensity, a function of community patterns

It is held by the Federal Housing Administration that to achieve a successful housing project it is necessary that the assigned intensity level be appropriate to the site characteristics and to the development's location in the anticipated community pattern.

> While the characteristics of the site (steepness, shape, etc.) may affect the site intensity, the principal determinant of intensity is the location of the site in the anticipated community pattern. It is necessary, therefore, for the rating of site intensity to thoroughly consider community patterns.[49]

In order to consider the community patterns the Federal Housing Administration has isolated three variables of community patterns for its determination of a suitable site intensity. They are: (1) the spatial arrangement of land-use, (2) the intensity range of land-use, and (3) the time stage of land-use intensity.

The first variable, spatial arrangement of land-use, concerns consideration of the physical location of the site in relation to present and prospective land uses in the community. This ranges in scale from broad patterns of concentric zones, radial or strip development, or combinations of these, to the location of the dividing line between townhouse development and detached home development.[50]

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[49] Ibid., 1.

[50] Ibid.

The second variable, intensity range of land-use, is the consideration of the supply of usable land available to meet the present and long-term demands of the area. It is concerned not only with the opportunities and limitations of physical development, but also other studies and projections of industrial and other economic activity, population size and anticipated growth. These factors, especially population considerations, and the site accessibility (or degree of isolation) of the first variable are closely related to the third variable, time stages of land-use intensity.

Time stage of land-use intensity is the measure of the community's growth rate. This rate is characterized as "static" (as in a conservation area), "increasing," "explosive," "recessive" (as in a depressed area), or "regenerative" (as in a successful redevelopment area).[51]

To facilitate the above studies and the determination of the LUI level and its application to the project, three

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[51] Ibid., 2. These are general analytical divisions. In a memorandum from Mr. Earl J. Mann, Zone Site Planning Advisor, to Mr. Clement C. Costigam, Chief Underwriter, Cincinnati, Ohio, 17 September 1965 it is noted that "During the Washington Chief Underwriters' Conference, we were given the 22% cutoff point of 10-year population increase, based on Census figures, as the difference between an "increasing" and "explosive" type of population increase.

To my knowledge there is no other written matter to bear this out, so we have only Central Office word on this."

General analytical intent is emphasized in the caption for the figure illustrating the broad land-use patterns. Federal Housing Administration, Land-use Intensity, Figure A, p. 3. "It is not the intent to force this pattern or any other pattern in the growth of communities."

technical worksheets were developed. One, Form 1095, formulates the implied process for determining the LUI number of the site. A second, Form 1028, is used to extend the LUI number into a project program showing the possible physical components of the proposed project. And a third, Form 1029, is used to measure or check proposed physical components of a design.

> The LUI measurement of a project plan (Form 1029) is accurate, scientific and mechanical. It requires little or no judgement. However, the LUI analysis of a site (Form 1095) and the programming of a project (Form 1028) are not mechanical. They draw on experience, wisdom and judgment in evaluating data on the site, its community and the market.[52]

FHA Form 1095

The land-use intensity number of a proposed project represents the maximum intensity level that the Federal Housing Administration will accept for a site for current development. Form 1095 serves as a "guide" in determining the intensity level, but "it is not a crystal ball."[53]

Following the diagram in Figure 4, the analysis performed with the aid of Form 1095 is made in five steps.[54]

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[52]Federal Housing Administration, Instructions for Land-use Intensity Forms, 3.

[53]Ibid., 4.

[54]This diagram and the following, figures 10 and 12, have been developed from Federal Housing Administration Forms 1095, 1028 and 1029 respectively, as an aid for this research. Emphasis is on the imput elements which may be found on the left-hand sides of the diagrams. References to the Forms are made on the diagrams. Charts or tables referenced in the text are on the Forms. For better understanding of the Forms it is suggested that the diagrams be followed when reading the text.

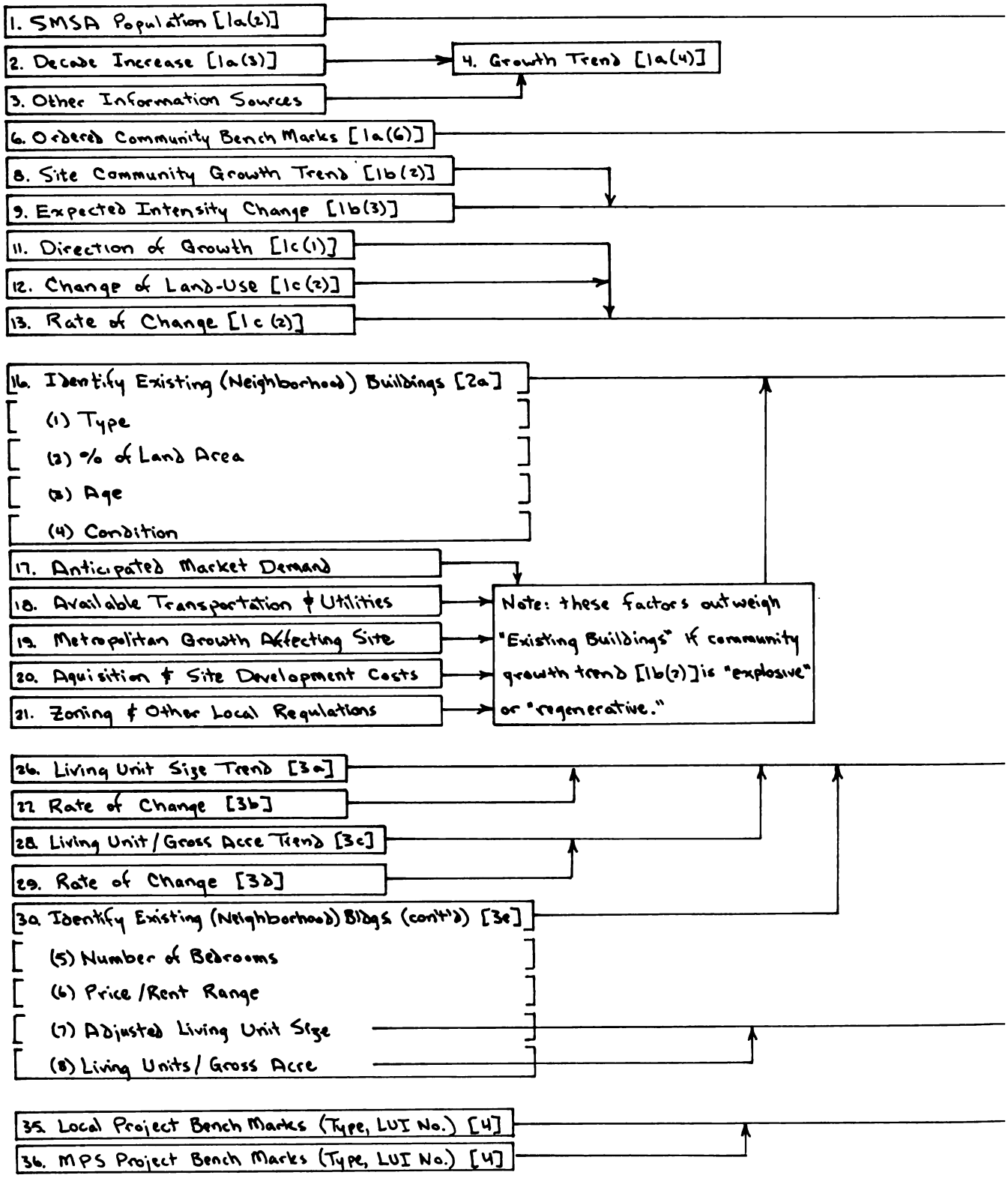
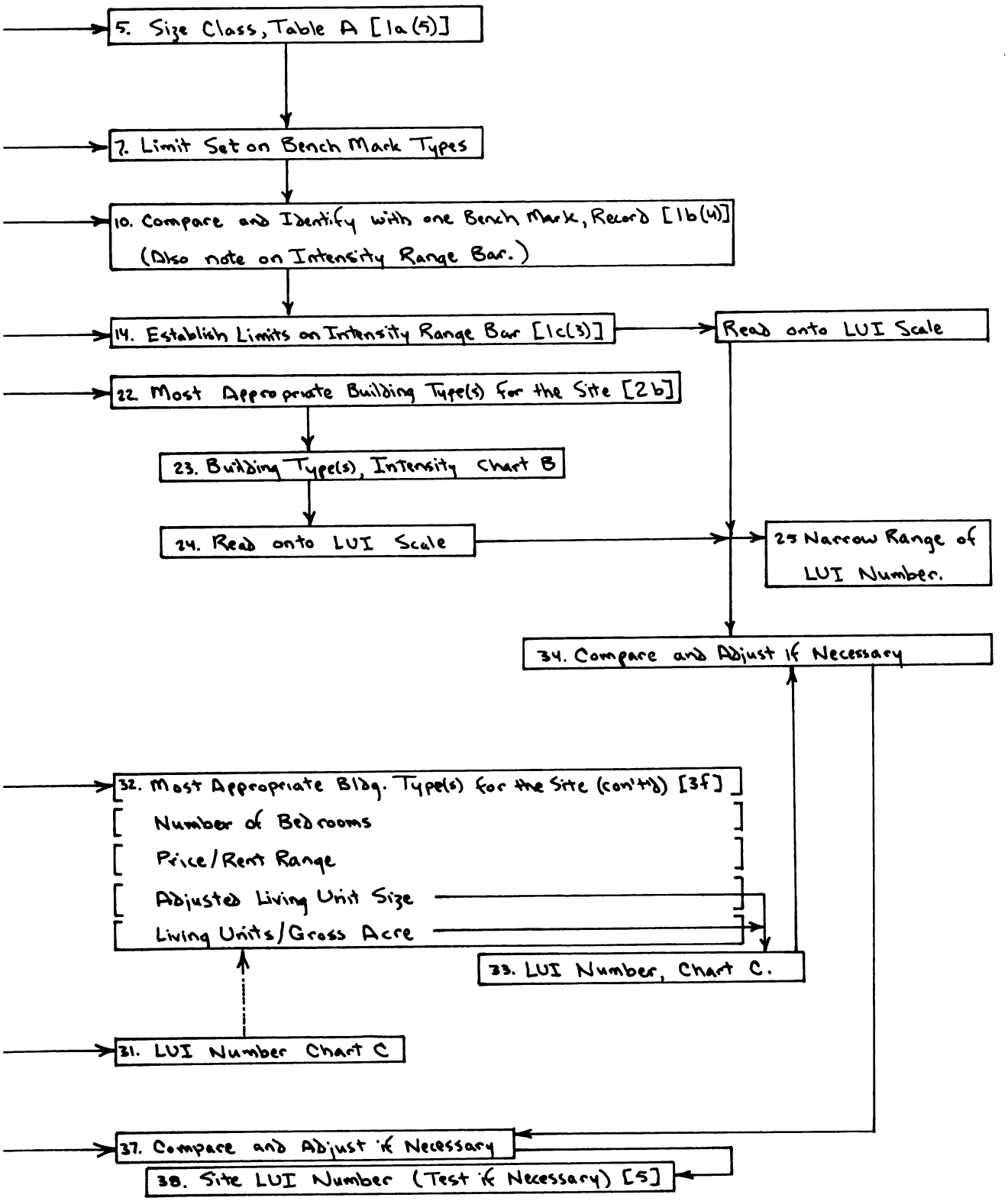


Figure 4. Schematic of FHA Form 1095



This diagram is derived from Form 1095. Box numbers refer to sequence. Bracketed numbers refer to the Form numbers. All input elements begin on the left-hand side of the page.

It begins with a general identification of the site area.[55] First, the metropolitan area and the local community in which the site is located are identified. Then, the present and probable future development patterns are considered in (a) the metropolitan area, (b) the community, and (c) that portion of the community where in the site is located. The metropolitan area is defined as the entire area of the Standard Metropolitan Statistical Area (SMSA) as utilized by the Bureau of the Census. Initial data is found in a report entitled "Current Population Reports, Standard Metropolitan Statistical Areas in the United States as Defined October 18, 1963."[56] Sites located outside of an SMSA are identified with the county or part of a county in which they are located and named by its principal urban community or other locally appropriate appellation.[57]

The Growth Trend, 4, is determined from base population data, decade population change, and other sources including local planning commissions and Federal Housing Administration market analyses.[58]

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[55]See Figure 5, Step 1.

[56]Federal Housing Administration, Instructions for Land-use Intensity Forms, 7. This is Technical Studies, Series P-23, No. 10, 05 December 1963.

[57]Ibid.

[58]Ibid. Please also see footnote 51.

FHA FORM NO. 1095 11 64 **LAND-USE INTENSITY OF SITE**

Project name FAIRWAY HILLS Section 1

Location 47TH & MAIN STS. WRIGHT CITY COL. Gross Acres 10 Date 1/8/65

STEP 1 – RELATE SITE TO COMMUNITY TYPE AND PATTERN

a. Urban Area and Benchmark Communities

(1) Urban Area HOWARD METRO. AREA (2) Population 350,000/'60 (3) Decade Increase 18%

(4) Growth Trend: ☐ Static ☒ Increasing ☐ Explosive ☐ Recessive ☐ Regenerative

(5) Size Class of Urban Area from Table A: ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7

(6) Benchmark Communities on Chart A: A GLENN OAK B MAPLEWOOD C STANTON D No. CENTRAL E F G

b. Intensity Range Bar Applying to Subject Community

(1) Community Name BURR OAK (SE. SECTION OF WRIGHT CITY)

(2) Growth Trend: ☐ Static ☒ Increasing ☐ Explosive ☐ Recessive ☐ Regenerative

(3) Expected Change in Intensity: ☐ Much Lower ☐ Lower ☐ Same ☒ Higher ☐ Much Higher

(4) Community Type and Its Intensity Range Bar on Chart A: ☐ A ☒ B ☐ C ☐ D ☐ E ☐ F ☐ G

c. Sector of Community Range Bar Applying to Subject Site and Immediate Surroundings

(1) Direction of Growth in Relation to Site: ☒ Toward ☐ Encompassing ☐ Away

(2) Change of Land-use in Vicinity of Site: ☐ None, or ☒ To TOWNHOUSES: ☐ Slow ☒ Moderate ☐ Rapid

(3) Sector of Range Bar Applying to Site and Immediate Surroundings ☐ Minimum ☐ Minimum-Medium ☐ Medium ☒ Medium-Maximum ☒ Maximum

CHART A – Intensity Range Bars for Community Types

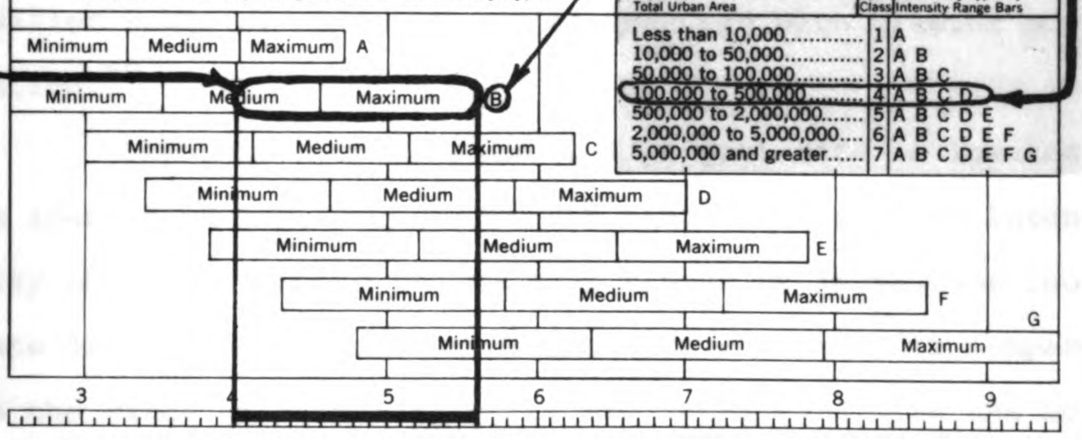

TABLE A – Usual Community Types

Population of Total Urban Area	Size Class	Community Types by Intensity Range Bars
Less than 10,000	1	A
10,000 to 50,000	2	A B
50,000 to 100,000	3	A B C
100,000 to 500,000	4	A B C D
500,000 to 2,000,000	5	A B C D E
2,000,000 to 5,000,000	6	A B C D E F
5,000,000 and greater	7	A B C D E F G

FIRST Land-use Intensity Scale

To begin the analysis of a 10 acre site in Burr Oak, a community in Wright City in the Howard Metropolitan Area, the site is studied in relation to the type and pattern of the community where it is located. Burr Oak is compared with previously-selected benchmark communities representing various ranges of land-use intensity; see line 1a(6). It is found to be similar to Maplewood which is represented by intensity range bar B on Chart A; see line 1b(4). As the intensity of the site and immediate surroundings is high in relation to other parts of Burr Oak, range bar B is narrowed appropriately, see line 1c(3) and bar B in Chart A. Vertical lines are then dropped from the narrowed portion of the range bar to the first LUI scale, indicating that the LUI of the site and immediate surroundings falls somewhere between 4.0 and 5.6.

Figure 5. Step 1 of FHA Form 1095

Bench Mark Communities[59] are identified, 6, and ordered by intensity range as in Chart A of the Form. Benchmark community "A" corresponds to intensity range bar "A"; benchmark "B" to bar "B"; and so on. Limits are set on the range of benchmark communities by the community size class, 5, which is determined by the population of the total urban area (table A). For example, an urban area with a population of 250,000 indicates a size class of "4", population 100,000 to 500,000, with a range of community types A, B, C, and D. A less populous urban area according to this table has a smaller range of community types than one with greater population.[60]

The community in which the project site is located is identified next and its growth trend and expected intensity change are noted in the same manner as above, see footnote 58. This information of the site community is compared to the range of community types and identified with the most

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[59]These are communities which are identified in order to compare land-use intensity ranges of each with the others.

"Generally, a community for this purpose has sufficient population to support a high school, a community center containing a wide variety of shops, stores, commercial recreation establishments, business and professional offices, and such public facilities as fire and police stations, branch library and branch post office. The population of such a community usually is over 10,000 and under 75,000.

A single set of benchmark communities is used in a metropolitan area for all LUI analysis. . . . year after year with little or no change . . . subject, however, to review and revision by the Chief Underwriter at any time." Ibid., 8.

[60]Ibid., 10.

similar benchmark community. The selection is recorded in the appropriate box, 10. The corresponding intensity range bar, Chart A, is also noted.

The analysis now proceeds from the community level to considerations on the level of the site itself. The direction of urban growth in relation to the site; the change, if any, of land-use in the vicinity of the site; and the rate of change, if any, are marked and used to further define the intensity range on the intensity range bar selected in element 10 above. This refinement, which may include the whole bar or a part of it, is read on the LUI scale at the bottom of the chart for the first step in progressively narrowing down the intensity range to the subject project.[61]

The second step further narrows the intensity range through an analysis of the most appropriate building type or types for the site.[62] Existing buildings in the "immediate neighborhood most directly affecting the site" are used to help determine the most appropriate type or types. This is to the extent that existing buildings are expected to remain in long range use. Factors involved are: building type,

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[61]This range may be altered if data in the subsequent steps warrent such a change. Ibid., 11.

[62]Acceptable building types, other than those selected as most appropriate in LUI analysis may be used when the sponsor plans the project. Ibid. This step is illustrated in Figure 6.

STEP 2 – RELATE THE SITE TO COMMON BUILDING TYPES

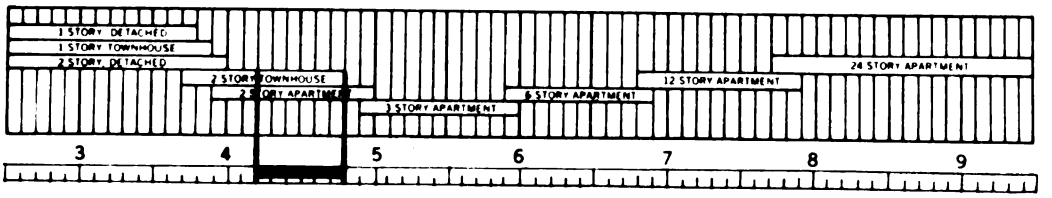
a. Existing Buildings in the Neighborhood

Land Area	Building Type	% Land Area	Age	Condition
A	1ST. DETACHED	40 %	20-30	FAIR-GOOD
B	2ST. TOWNH'SE	20 %	5-10	GOOD
C	2ST. TOWNH'SE	5 %	NEW	EXCELLENT
D	VACANT	35 %		

b. Most Appropriate Buildings for the Site

Land Area	Building Type	% Land Area	Sector of Range Bar Low	Med.	High
1	2ST. TOWNH'SE	100 %		✓	✓
2		%			
3		%			
4		%			

CHART B – Most Favorable Intensity Ranges for Common Building Types



SECOND Land-use Intensity Scale

All indications are toward more intensive development of the area. The medium to high ranges of 2-story townhouses are selected as appropriate and are entered in table 2b and on Chart B. Vertical lines drawn down from the medium to high range of 2-story townhouses narrow the LUI range found in Step 1 to a range of 4.2 to 4.8

Figure 6. Step 2 of FHA Form 1095

percentage of land area,[63] and age and condition of the structure. Other factors involved are: anticipated market demand, available transportation and utilities, metropolitan growth affecting the site, topography and other site features affecting acquisition and development costs, and consideration of local zoning and ordinances.[64]

Upon consideration of the above factors, and guided by wisdom and experience, the most appropriate building type or types is entered in table 2b. The percentage of gross land area for each particular building type is also entered in this table along with an indication of a suitable sector of the intensity range for each building type.

General categories of building type have been assigned positions on the LUI scale.[65] The sector or sectors indicated above in table 2b are marked on the appropriate building type bar and read on the LUI scale of Chart B. This range is to further narrow the range established in step one.

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[63]This is estimated by "visual survey" and refers to the gross land area developed for use with a particular building type. It does not refer to the percent of building coverage and open space on individual sites. Ibid.

[64]Where the community's growth trend, B, is "explosive" or "regenerative," the importance of existing buildings is outweighed by these "other factors." Ibid., 12.

[65]These bars represent the range of land-use intensity in which each building type is most advantageously used. "The shown ends of a range bar for a building type do not preclude the use of the building type at a higher or lower intensity." Ibid.

The third step defines a LUI number for the site in relation to density.[66] This is determined through further analysis of the characteristics of existing development and the most appropriate building type or types. In this step of the analysis the general trends in living unit size, 3a, and number of living units per gross acre, 3c, are established first. These indications also include the rate of change of the respective trends. Along with these trends, other characteristics of the existing neighboring buildings, identified above in 2a, are also considered. Additional characteristics include the number of bedrooms per unit, the price or rent range, adjusted living unit size,[67] and the number of living units per gross acre. These last two factors are used to determine a LUI number for the existing development. On Chart C, the adjusted living unit size is located and followed horizontally until it reaches the curve representing the number of living units per gross acre. At this point the line is dropped vertically to the LUI scale and recorded.

The characteristics of the most appropriate building type, number of bedrooms per living unit, price or rent

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[66] See Figure 7.

[67] The Form also notes a "Living Unit Size in Sq. Ft.," 3e(4) and 3f(4). The adjustment factor is used for multifamily structures to insure that all buildings are considered on an equal basis. "The living unit area in Chart C includes public areas such as entrance lobby, elevator hoistways, stairways and corridors in conformity with the definition of floor area (FA) in MPS-M 302-3.1." Federal Housing Administration, Instructions for Land-use Intensity Forms, 14.

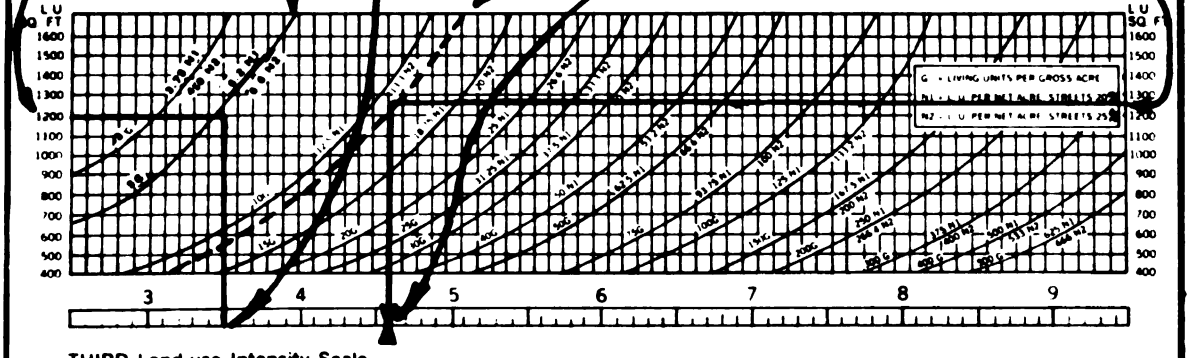
FHA FORM NO. 1095 **LAND-USE INTENSITY OF SITE**

STEP 3 – RELATE SITE TO DENSITY

a. Trend in Living Unit Size: Much Smaller | Smaller | Same | (Larger) | Much Larger
b. Which is Occuring: Slowly | (Moderately) | Rapidly
c. Trend in Living Units per Gross Acre: Much Fewer | Fewer | Same | (More) | Much More
d. Which is Occuring: Slowly | (Moderately) | Rapidly

	Data to Determine	e. Existing Neighborhood Use				f. Most Appropriate Use of Site			
		Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
(1)	Building Type	1 st. DETACHED	2 st. TOWNHSE	___st.	___st.	2 st. TOWNHSE	___st.	___st.	___st.
(2)	Number of Bedrooms per Living Unit	3	2			3			
(3)	Price or Rental Range	$14,500	$12,500	$	$	$13,500	$	$	$
(4)	Living Unit Size in Sq. Ft.	1200	1100			1250			
(5)	Adjustment Factor	0 %	0 %	%	%	0 %	%	%	%
(6)	Adjusted Living Unit Size in Sq. Ft.	1200	1100			1250			
(7)	Number of L.U. per Gross Acre	5	10			12			
(8)	LUI – Applying Chart C	3.5	4.3			4.6			

CHART C – Land-use Intensity According to the Number of Living Units per Acre for Various Unit Sizes



THIRD Land-use Intensity Scale

In this step the characteristic building types in the two tables in Step 2 are studied further. Then findings on living unit size and number per acre are converted directly to land-use intensity. For instance, the area of 1-story detached dwellings (Area A in table 3e) is LUI 3.5. To find this on Chart C, the horizontal line for 1200 square feet living unit size is followed to its intersection with the curved line for 5 living units per gross acre and a vertical line is drawn down to the Third LUI Scale. Analysis indicates a trend toward more bedrooms, larger living units and more living units to the gross acre. The most appropriate use of the site is entered in table 3f, converted to LUI 4.6 as described above, and marked LUI 4.6 in 3f(8) and the Third LUI Scale.

Figure 7. Step 3 of FHA Form 1095

range, adjusted living unit size, number of living units per gross acre, and corresponding LUI number, are determined in light of the information determined in the first parts, 25-30, of this step. The LUI number(s) for the most appropriate building type or types is found in the same manner as above, 30, by applying the adjusted living unit size to the desired density curve on Chart C. This LUI number(s) represents the most appropriate intensity level at the third step of the analysis. It is compared with the range of land-use intensities determined in steps 1 and 2. At this point "adjustment is made if appropriate."[68]

The forth step relates the site to established successful benchmark projects which have "location and environmental characteristics similar to the proposed site, and appeal to the same segment of the market."[69] These benchmark projects may be either local or include those found in Appendix C of the Minimum Property Standards.[70]

> The intensity ranges found in previous steps are compared with the selected benchmark projects. Physical characteristics and market considerations are studied. If appropriate, adjustment is made to the land-use intensities proposed for the project. If a major change of intensity is indicated, all previous steps are reviewed.[71]

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[68] Ibid., 16.

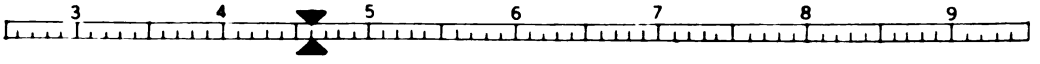
[69] Ibid., 17. See Figure 8.

[70] Federal Housing Administration, Minimum Property Standards . . ., 447-485. Suitable local benchmarks are preferred in that "they afford an opportunity to visualize the property development and market reaction that can be reasonably expected with the proposed land-use intensity." Federal Housing Administration, Instructions for Land-use Intensity Forms, 17.

[71] Ibid.

STEP 4 – RELATE THE SITE TO BENCHMARK PROJECTS

	Project Name	Project Location	Building Type	LUI
1	MANOR DEEN	WRIGHT CITY	2ST TOWNHOUSE	4.5
2	CARSON VILLAGE	WRIGHT CITY	2ST TOWNHOUSE	4.8
3	WELSLEY	WRIGHT CITY	2ST. TOWNHOUSE	4.5



FOURTH Land-use Intensity Scale

Three townhouse projects in Wright City are found suitable for comparative use as benchmark projects. Their land-use intensities are 4.5, 4.8 and 4.5. Consideration of these projects corroborate previous findings on the Burr Oak site. Therefore the previous recording of LUI 4.6 is entered unchanged on the Fourth Land-use Intensity Scale.

Figure 8. Step 4 of FHA Form 1095

The fifth step marks the culmination of the analysis by the appraiser, land planner, architect, and others under the Chief Underwriter; and the final decision on the land-use intensity number for the site.[72] If there is any reason to suspect that the number derived from the previous steps will not "permit development appropriate to the site and its community" or will not meet "the demands of the market at prices or rent that can be paid by the market," then one or both of two tests may be used to affect a final decision.[73]

The one test checks the physical practicality of the selected LUI number by making projections of the LUI components (open space for example) of the site with a proposed building type. This test[74] shows whether or not there is adequate open space and car space in relation to the maximum floor area.

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[72]"Where separate site areas for varied building types have been analyzed in steps 2 and 3, a separate LUI number is determined in Step 5 for each site area. A combined LUI number is also found for the total area. To find the combined LUI number, add the maximum floor areas for the separate site areas and divide the resulting total floor area by the total land area. This combined Floor Area Ratio (FAR) determines the combined LUI number by reference to the LUI Chart [Figure 1.]. At the discretion of the Chief Underwriter, FHA gives the Sponsor an LUI number for each site area or the combined LUI number." Federal Housing Administration, Instructions for Land-use Intensity Forms, 19. For an example of a site with several building types, see Appendix C. Also see Figure 9.

[73]Ibid., 18.

[74]This is Form 1028, which will be reviewed in the next section.

LUI Tests:
a. Planning Program (●) Tested ( ) Not Tested
b. Financial Workability ( ) Tested ( ) Not Tested

STEP 5 – DETERMINE LAND-USE INTENSITY NUMBER

Recommendations for Maximum Land-use Intensity					
Initials and Date	Area 1	Area 2	Area 3	Area 4	Total Area
Val.	4.6				
L.P.	4.6				
Arch.	4.6				
Other					

The Maximum Land-use Intensity Acceptable to the FHA for Current Use of This Site for FHA Mortgage Insurance is					
	Area 1	Area 2	Area 3	Area 4	Total Area
% Area	100				
LUI	4.6				

Chief Underwriter _____ Date 1/14/65

Appropriate staff members complete two tests of the LUI tentatively determined in Step 4. It is found to be consistent with the characteristics of the site and the market. After complete review of the LUI analysis, the Chief Underwriter concurs in the 4.6 LUI recommended by his staff.

Figure 9. Step 5 of FHA Form 1095

The other test is one of financial workability based on the project programmed in Form 1028, the test above, and data on Form 2012, "Request for Pre-Application Analysis of a Multifamily Proposal," or Form 2084, "Subdivision Information."[75]

When there is disagreement, which may be recorded in the left-hand table of Step 5 on the form, the processing and data are reviewed by all those concerned in an effort to reach concurrence. "In any event, the final LUI is determined by the Chief Underwriter, based on his judgment."[76]

FHA Forms 1028 and 1029

Form 1028 is more mechanical than Form 1095, but requires some judgment in fitting design considerations into the program. The purpose of this form is

> To test the land-use intensity of a site by projecting a planning program prior to planning, which will comply with the minimum property standards. The land-use intensity tested may be that assigned by the insuring office, or that proposed by the sponsor.[77]

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[75] Federal Housing Administration, Instructions for Land-use Intensity Forms, 19. The second and third forms are concerned with public acceptance and project marketability. Although an "authoritative judgment as to [financial] soundness of either multifamily or planned-unit proposals is not possible at this preplanning stage," the Federal Housing Administration feels that it is possible to set "limits of financial resonableness" through the use of techniques in Form 2484, "How to Test Financial Soundness of Rental Housing Properties."

[76] Ibid.

[77] Ibid., 23. Compliance with minimum property standards refers here to floor area, livability (non-vehicular space), and car space.

The form program begins with identification of the project site, LUI number and corresponding ratio values. There is also an identification of "basic data for the program": percent of land area programmed, building type, adjusted living unit area, and percentages of car parking spaces in garages, carports, and parking courts.[78] In essence the program ties together the component LUI ratios, basic data, and the elements of the site and proposed design.[79] Upon determination of these preliminaries the Gross Land Area of the site is computed. It is made up of the Net Land Area (the actual gross site area), abutting street area, and abutting beneficial open space.[80] Since the project may include some commercial or other non-residential use or be of mixed residential building types, a programmed percentage, as it applies, is taken from the gross land area leaving the Programmed Land Area, which forms the base for the remainder

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[78]See Figure 11, elements A, B, and C.

[79]These elements and the terms used in the following discussion are defined in Minimum Property Standards and reviewed in Chapter I under the LUI components.

The program itself as shown in the diagram, Figure 10, includes these preliminaries in the left-hand column of initial inputs. Form 1028 omits Occupant Car Space and Recreation Space from the computation. The prime necessity it was reasoned is to assure the program's compliance with the minimum standards for Open Space and Total Car Area. Federal Housing Administration, Instructions for Land-use Intensity Forms, 24.

[80]See footnote 23.

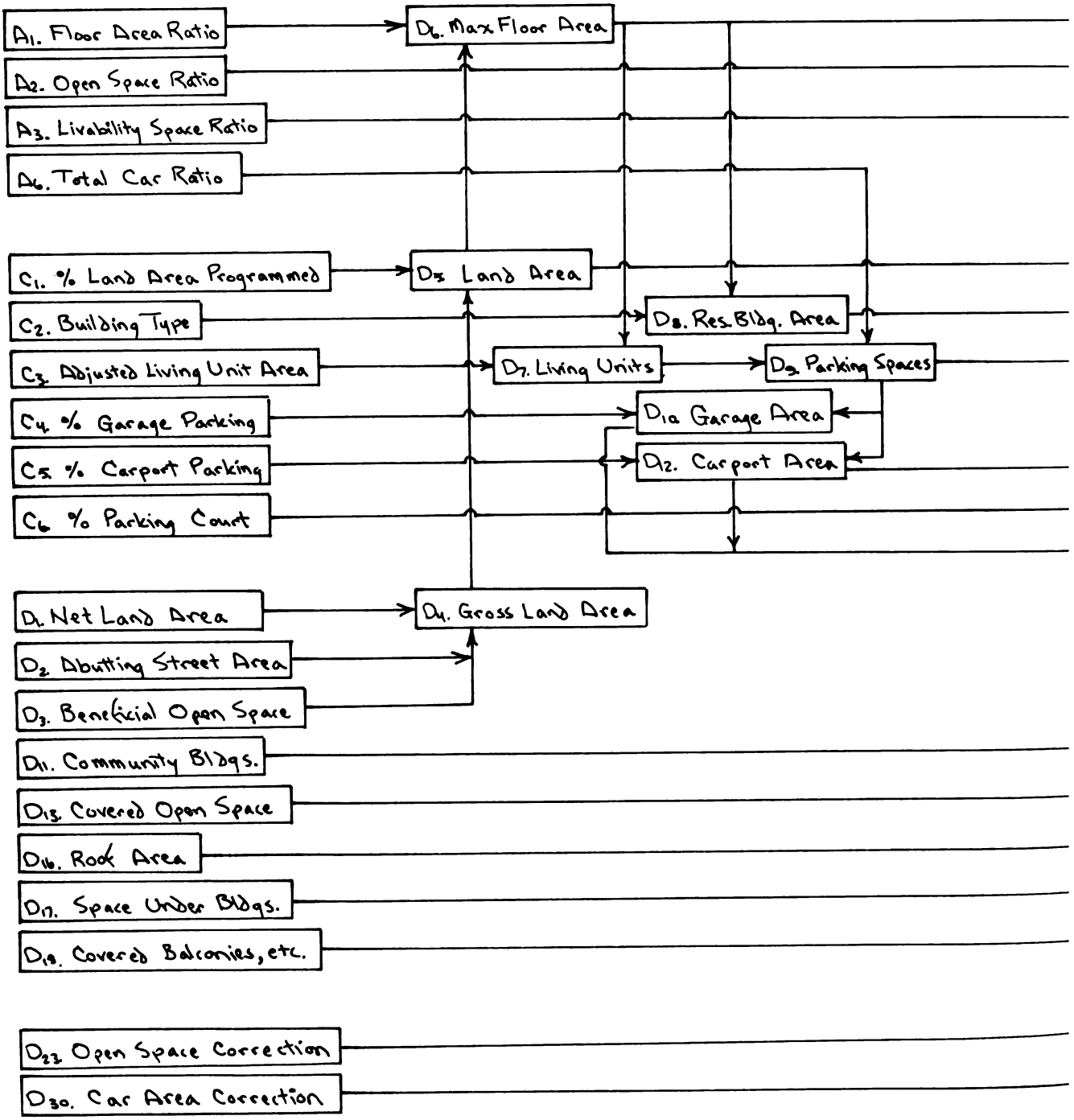
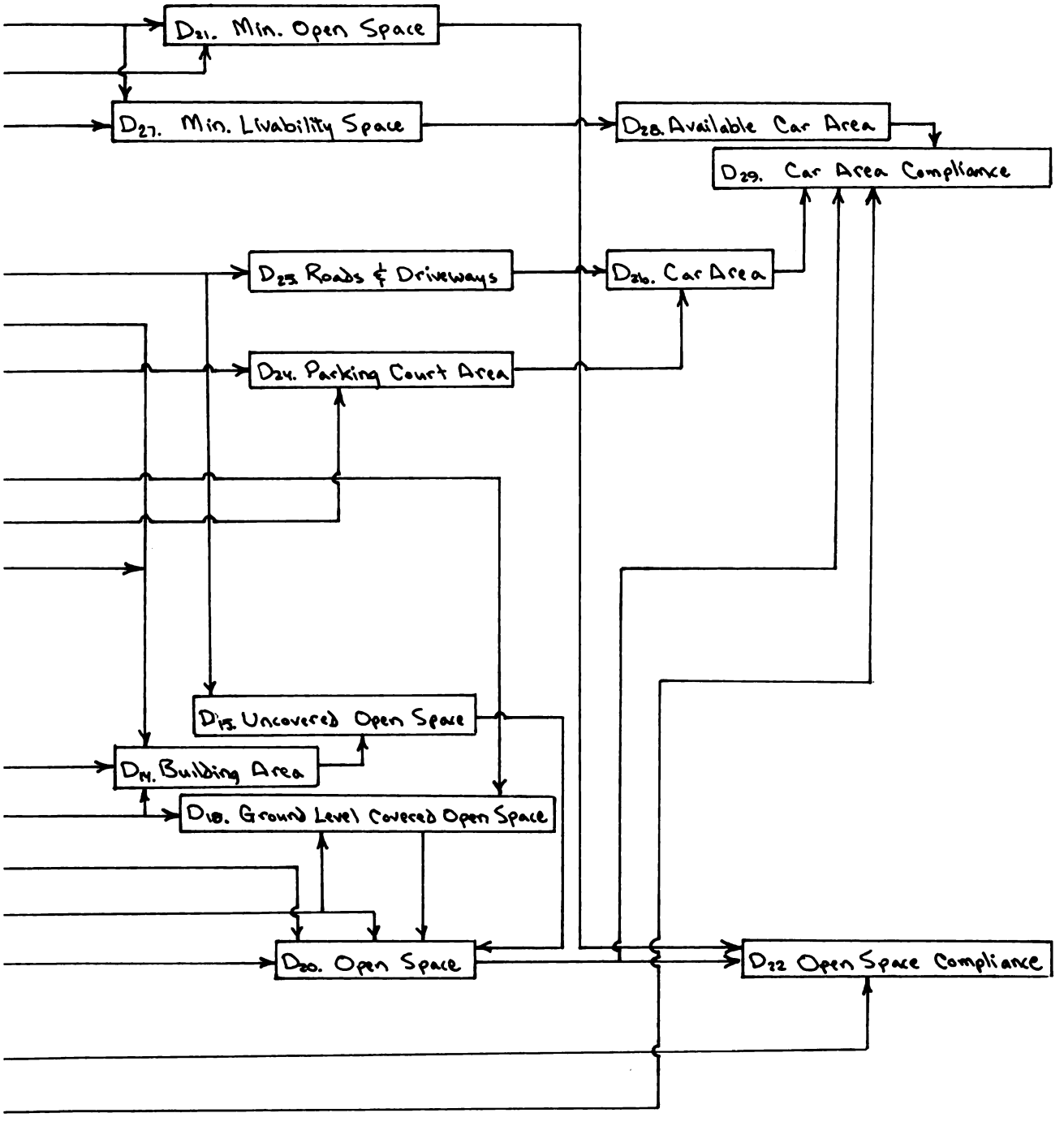


Figure 10. Schematic of FHA Form 1028



This diagram is derived from Form 1028. Box numbers refer to Form elements. All input elements begin on the left-hand side of the diagram.

FHA FORM NO. 1028 11/64 **PROJECT PLANNING PROGRAM**

Property FAIRWAY HILLS Section 1 Area 1 Sheet 1 of 1

Location 47TH & MAIN STS WRIGHT CITY Programmed by G.F.N. Date 1/11/65

A. LAND-USE INTENSITY FOR THE AREA: LUI 4.6

B. LAND-USE INTENSITY STANDARDS

1. Maximum Floor Area Ratio	0.5
2. Minimum Open Space Ratio	2.4
3. Minimum Livability Space Ratio	1.5
4. Minimum Recreation Space Ratio	0.15
5. Minimum Occupant Car Ratio	1.2
6. Minimum Total Car Ratio	1.4

C. BASIC DATA FOR PROGRAM

1. % of Land Area Programmed	100 %
2. Building Type	2 ST. TOWNHOUSE
3. Adjusted Living Unit Area	1250
4. % Car Spaces in Garages	0
5. % Car Spaces in Carports	100 %
6. % Car Spaces in Parking Courts	0

D. DEVELOPMENT OF PLANNING PROGRAM

WHAT TO DETERMINE	HOW DETERMINED			
1. Net Land Area	Site Area Excluding Perimeter Streets	M302-4	NLA	396,000
2. Abutting Street Area	½ Perimeter Street Area	M302-4	SA	39,600
3. Other Beneficial Open Space	River, Public Park, etc.	M302-4	BOS	0
4. Gross Land Area	L.D1 + L.D2 + L.D3	M302-4	GLA	435,600
5. LAND AREA (Programmed)	GLA x % LA Programmed	L.D4 x L.C1	LA	435,600
6. Maximum Floor Area	FAR x LA	L.B1 x L.D5	FA	130,680
7. Number of Living Units	FA ÷ LUA	L.D6 ÷ L.C3	LU	104
8. Residential Building Area	FA ÷ Number Stories	L.D6 ÷ L.C2	BA(1)	65,340
9. Number of Parking Spaces	TCR x LU	L.B6 x L.D7	PS	145
10. Individual Garage Building Area	Garage % x No. Spaces x 200 (Estimated)	L.C4 x L.D9 x 200	BA(2)	0
11. Other Enclosed Building Area	Group Storage Garage, Community Building, Storage, etc.	M303-5	BA(3)	1200
12. Carport Building Area	Carport % x No. Carspaces x 200	L.C5 x L.D9 x 200	BA(4)	29000
13. Other Covered Open Space at Ground Level	Covered Porches, Breezeways, etc.	M303-7	BA(5)	11,160
14. BUILDING AREA	L.D8 + L.D10 + L.D11 + L.D12 + L.D13		BA	106,700
15. Basic Uncovered Open Space	LA – BA	L.D5 – L.D14	UOS(1)	328,900
16. Other Uncovered Open Space	Improved Roof Area etc.	M303-4	UOS(2)	0
17. Covered Open Space under Buildings	Bldgs. Supported on Columns	M303-7.1D	COS (1)	0
18. Covered Open Space at Ground Level	Carports, Breezeways, etc.	L.D17 + L.D12 + L.D13	COS(2)	40,160
19. Covered Open Space above Ground Level	Covered Balconies, etc.	M303-7	COS(3)	0
20. OPEN SPACE	L.D15 + L.D16 + ½(L.D17 + L.D18 + L.D19)		OS	348,980
21. Minimum Open Space	OSR x FA	L.B2 x L.D6	MOS	313,632
22. Open Space Compliance	L.D20 must exceed L.D21		OSC	OK
23. Correction for Non-compliance	Add Balconies, Improve Roof Areas or Change Building Type. Reprogram, if a major change.			
24. Car Parking Courts	Parking Court % x No. Spaces x 300	L.C6 x L.D9 x 300	CPA	0
25. Streets, Roadways, Driveways	20% x LA	20% x L.D5	SRD	87120
26. CAR AREA	CPA + SRD	L.D24 + L.D25	CA	87120
27. Minimum Livability Space	LSR x FA	L.B3 x L.D6	MLS	196,020
28. Available Car Area	OS-LS	L.D20 – L.D27	ACA	152,960
29. Car Area Compliance	L.D28 must exceed L.D26		CAC	OK
30. Correction for Non-compliance	Provide Parking in Building, Underground, or Increase Open Space. (See L.D23) Reprogram, if a major change)			

FORM NO. 1028 PROJECT PLANNING PROGRAM

Figure 11. FHA Form 1028

of the program.[81] From the programmed land area the total maximum floor area is determined through application of the floor area ratio (FAR).

The maximum floor area, 6, in turn, directly influences four other elements. First, the minimum amount of open space, 21, permitted by the LUI number is found by multiplying the maximum floor area by the Open Space Ratio. Second, minimum livability space, 27, as allowed by the LUI number is determined by multiplying the maximum floor area by the Livability Space Ratio. Third, the number of living units, 7, is found by dividing the adjusted area of the proposed living units into the total maximum floor area. And fourth, the ground area covered by residential buildings, 8, is found by dividing the number of stories of the building type into the total maximum floor area.[82]

To further determine the amount of land that will be covered with structures, the number of living units, 7, is multiplied by the Total Car Ratio to find the total number

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[81]Each residential building is programmed separately. In a project consisting entirely of townhouses this percentage might be 100%. In another project with one-third townhouses and two-thirds high-rise apartments, one program might be 33% for the townhouses and the other program 66% for the apartments. When a project has more than one [building] type or has several LUI numbers assigned, each type and number is programmed separately on its own form. Federal Housing Administration, Instructions for Land-use Intensity Forms, 23.

[82]Since each building type is programmed separately it is assumed that each building will have the same number of stories.

of parking spaces required. By computing the number of spaces allotted to garages and carports, from percentages in the "basic data," 10 and 12, and multiplying by 200 square feet, Garage and carport area is determined.[83] Garage and carport area, and residential building area, along with other enclosed building area such as community buildings or storage areas, and covered open space at ground level, all together equal Building Area.[84]

Next Open Space is programmed. Basic uncovered open space is the programmed land area minus the building area which was just computed. Carport area and the covered open space used above for building area are again used to determine covered open space at ground level. At ground level, covered open space also includes usable space under buildings, such as found under a structure raised on columns. The basic uncovered area, plus one-half of the covered open space at ground level, plus covered open space above ground level such as covered balconies, together make up Open Space.[85] It is checked for compliance against the minimum amount of open space as determined from the Open Space Ratio and total floor area of the project.[86]

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[83]For estimating purposes 200 square feet is allowed for one parking space. Ibid., 24.

[84]See element 14.

[85]See element 20.

[86]If there is none compliance then the program must be adjusted by adding balconies, improving root area, or

Finally, car area is computed and checked for compliance. The area of the car parking courts is determined by multiplying the minimum required number of parking spaces by the percentage allotted to parking courts and by 300 square feet.[87] Car area equals the parking court area plus land area needed for streets and drives.[88] In order to determine the compliance of car area, minimum livability space area (non-vehicular) is substracted from the total open space area leaving an area "available" for vehicular use. Car area may not exceed this available area; if it does the program is adjusted or reprogrammed.[89]

Form 1029 represents the basic relationships among the six intensity components, and site and building design data. As such it is quite mechanical. However, because of

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changing building type. If the change is major the area should be reprogrammed. Federal Housing Administration, Instructions for Land-use Intensity Forms, 24.

[87]"For estimating purposes, a car space in a parking court is 300 sq. ft. (200 sq. ft. for the parking space and 100 sq. ft. for the turning space)." Ibid.

[88]"In estimating the land area that will be needed for streets and driveways (both on-site and abutting the project), 20% of the gross [sic] land area is used unless more exact information is available." Ibid. "Gross" is perhaps a misprint for "programmed," note Form 1028, D-25. It should also be noted here that "car area" does not include garage or carport area.

[89]Ibid. Note that Form 1028 suggests that to make an adjustment additional parking spaces may be provided in buildings or underground, or open space may be increased to accommodate car area.

the site and building design elements, covered and uncovered open space for example, its form is not unlike Form 1028. The primary difference between these two forms is direction. Form 1028, generally for pre-design layout, proceeds from LUI ratios to plans. Form 1029, to check design or construction, proceeds from plans or construction to LUI ratios. The purpose of Form 1029 is

> to provide a convenient form and procedure for computing the land-use intensity of a plan, either to check the plan's compliance with an assigned land-use intensity or to determine the LUI number of a typical benchmark project.[90]

Form 1029 is designed to compute the six LUI components and gross density of the site; in diagram it is basically a series of four steps which correspond to the ratios.[91] Very briefly, since the details are quite similar to those of Form 1028, Form 1029 in this sequence consists of the determination of the floor area ratio, the open space ratio, the livability space ratio, and the car parking ratios with gross density included in the last step. As in Form 1028, the strong influence of floor area and the close involvement of building details, covered and uncovered open space, in computing open space, might be noted as characteristic of the LUI concept.

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[90] Ibid., 26. Land-use intensity is the lowest LUI number at which all computed ratios comply with standard ratios on the LUI graph or derived chart, see Figures 1 and 3.

[91] See Figures 12 and 13. For all practical purposes, based on inputs, the occupant car and total car ratios might be combined. The livability and recreation space ratios might also be so combined. See footnote 79.

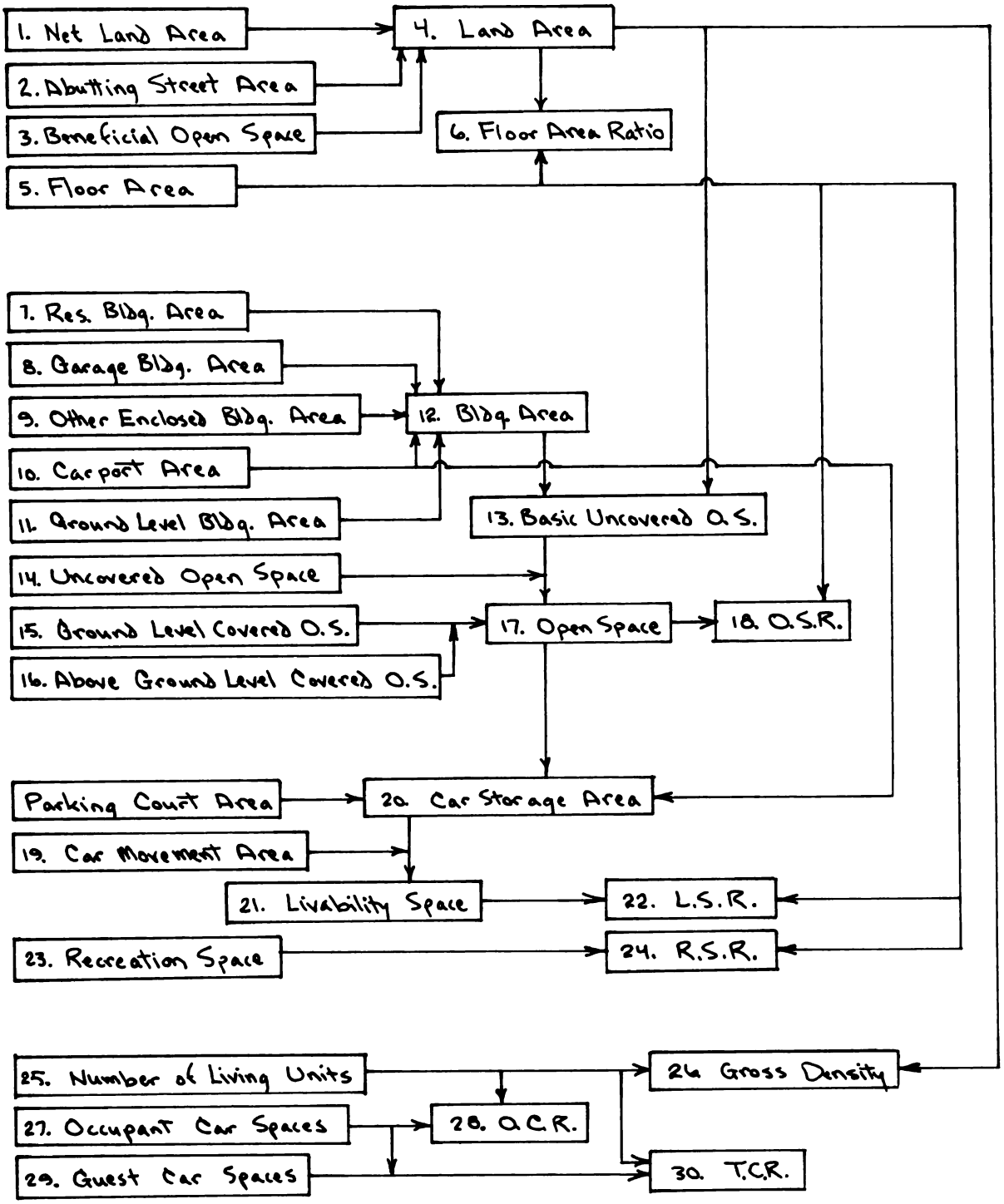

Figure 12. Schematic of FHA Form 1029. This diagram is derived from Form 1029. Box number refer to line numbers of part B of the Form. All input elements begin on the left-hand side of the page.

FHA FORM NO. 1029 LAND-USE INTENSITY OF A PROJECT PLAN
11/64

Property FAIRWAY HILLS Section 1
Location 47TH & MAIN STS. WRIGHT CITY Analyzed by G.F.N. Date 2/23/65
Plans Analyzed SITE & ARCHITECTURAL PLANS DATED 2/18/65

A. ASSIGNED AND COMPUTED LAND-USE INTENSITY

	Assigned to the Site			Computed for the Plan		
1. Land-use Intensity (LUI)	Assigned	LUI	4.6	Computed	LUI	4.6
2. Floor Area Ratio (FAR)	Maximum	FAR	0.3	Line B6	FAR	0.29
3. Open Space Ratio (OSR)	Minimum	OSR	2.4	Line B18	OSR	2.7
4. Livability Space Ratio (LSR)	Minimum	LSR	1.5	Line B22	LSR	1.8
5. Recreation Space Ratio (RSR)	Minimum	RSR	0.15	Line B24	RSR	0.16
6. Occupant Car Ratio (OCR)	Minimum	OCR	1.2	Line B28	OCR	1.2
7. Total Car Ratio (TCR)	Minimum	TCR	1.4	Line B30	TCR	1.67

B.

WHAT TO DETERMINE	HOW DETERMINED		DETERMINATION	
1. Net Land Area	Site Area Excluding Perimeter Streets	M302-4.1a	NLA	396,000
2. Abutting Street Area	½ Perimeter Street Area	M302-4.1b	ASA	39,600
3. Beneficial Open Space	River, Public Park, etc.	M302-4.1c	BOS	0
4. LAND AREA	Project LAND AREA	L.B1 + L.B2 + L.B3	LA	435,600
5. Floor Area	Floor Area on All Floors	M302-3	FA	128,750
6. FLOOR AREA RATIO	FA ÷ LA	L.B5 ÷ L.B4	FAR	0.29
7. Residential Building Area	Residential Floor Area at Ground Level	M303-5	BA(1)	64,370
8. Garage Building Area	Enclosed Car Parking Area	M303-5	BA(2)	0
9. Other Enclosed Building Area	Community Building, Storage, etc.	M303-5	BA(3)	1180
10. Carport Building Area	Covered Car Parking (Open Sides)	M303-5	BA(4)	24,960
11. Other Building Area at Ground Level	Covered Porches, Breezeways, etc.	M303-5	BA(5)	10,700
12. BUILDING AREA	Enclosed BA + COS (L.B7 + L.B8 + L.B9) + (L.B10 + L.B11)		BA	101,210
13. Basic Uncovered Open Space	LA − BA	L.B4 − L.B12	UOS(1)	334,390
14. Other Uncovered Open Space	Improved Roof Area, Open Balconies, etc.	M303-6	UOS(2)	0
15. Covered Open Space at Ground Level	Open Space under Buildings on Piers, Carports, Breezeways, etc.	M303-7	COS(1)	35,660
16. Covered Open Space Above Ground Level	Covered Balconies, etc.	M303-7	COS(2)	0
17. Open Space	UOS + ½COS (L.B13 + L.B14) + ½(L.B15 + L.B16)		OS	352,220
18. OPEN SPACE RATIO	OS ÷ FA	L.B17 ÷ L.B5	OSR	2.7
19. Car Movement Area	½ Roadways of Abutting Street, On-site Roadways and Drives	M304-4	CMA	84,500
20. Car Storage Area	½ Carport Area + Parking Courts	½L.B10 + P.C.	CSA	27,480
21. Livability Space	OS-CA	L.B17 − (L.B19 + L.B20)	LS	240,240
22. LIVABILITY SPACE RATIO	LS ÷ FA	L.B21 ÷ L.B5	LSR	1.8
23. Recreation Space	L.S. Countable as RS	M315	RS	21,500
24. RECREATION SPACE RATIO	RS ÷ FA	L.B23 ÷ L.B5	RSR	0.16
25. Number of Living Units	Count All Floors of All Buildings		L.U.	104
26. Gross Density	LU ÷ LA	L.B25 ÷ L.B4 (in acres)	GD	10.4
27. Number Occupant Car Spaces	No. Spaces (without time limit)	M305-2	OCS	124
28. OCCUPANT CAR RATIO	OCS ÷ LU	L.B27 ÷ L.B25	OCR	1.2
29. Number Guest Car Spaces	No. Spaces (time may be limited)	M305-3	GCS	50
30. TOTAL CAR RATIO	(OCS + GCS) ÷ LU	(L.B27 + L.B29) ÷ L.B25	TCR	1.67

FORM NO. 1029 LAND-USE INTENSITY OF A PROJECT PLAN

Figure 13. FHA Form 1029

Local determination and Application

Just as the form of LUI varies from community to community when it is adopted locally, so does the manner of local determination of intensity level vary. In the several communities adopting LUI and about which information was obtained,[92] all LUI numbers are predetermined, with the exception of the agricultural zone in Frederick County where the Planning Commission determines the number along lines used by the Federal Housing Administration.[93]

Most predetermined intensity levels appear to be based on existing zoning districts. In Honolulu, for example, the LUI number is related to lot size and district. The LUI ratings in the various districts were arrived at by "assigning an LUI rating to a district at a comparable floor area in [the] existing ordinance."[94]

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[92]These include Frederick County, The City and County of Honolulu, and Indianapolis and Marion County.

[93]See Appendix B, Planned-unit Development Amendment for Frederick County, under "(d) Plan Review."

[94]Letter from Mr. Wallace S. W. Kim, Deputy Planning Director, Planning Department, City and County of Honolulu, 06 May 1968. Mr. Kim cites the example of an existing medium density apartment district which allowed 100% FAR. In the new medium density districts (A-2 and A-3) LUI 63 (FAR 100%) was assigned to the minimum (10,000 square feet) sized lot. Smaller lots have lower LUI numbers and larger lots have higher LUI numbers. "This is an attempt to encourage consolidation of lots for apartment and hotel development." Honolulu has a "very serious problem in that large areas are zoned for apartments and hotels with lots too small to provide adequate higher density development." The proposed

Other communities such as Norfolk and Virginia Beach have developed "bands" of land-use intensity.[95]

It might be well to interject here that the Department of Defense has adopted LUI to Military Multi-Family Housing requirements. In this situation LUI is a five component scale with car space ratios combined and maintained at at least 1.5 spaces per living unit "unless lack of land area requires use of Land-Use Intensity Rating greater than

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Comprehensive Zoning Code lists (p. 148) the A-2 Apartment district LUI numbers as follows:

Net Lot Area In Square Feet	LUI Rating
0- 3,000	46
3,001- 3,200	47
3,201- 3,500	48
3,501- 3,700	49
3,701- 4,000	50
4,001- 4,300	51
4,301- 4,600	52
4,601- 5,000	53
5,001- 5,300	54
5,301- 5,700	55
5,701- 6,100	56
6,101- 6,500	57
6,501- 7,000	58
7,001- 7,500	59
7,501- 8,000	60
8,001- 8,500	61
8,501- 9,999	62
10,000-19,999	63
20,000-29,999	64
30,000-39,999	65
40,000-49,999	66
50,000-59,999	67
60,000-69,999	68
70,000 and over	69

[95]Letter from Mr. Frederick Bair. It was not stated whether or not these bands coincide with previous zoning districts or how they were determined.

4.50 in which case the ratio of 1.3 shall be maintained."[96] It also varies from the Federal Housing Administration's LUI in that computing Residential Land Area community facilities such as swimming pools or tennis courts are not included. The LUI numbers are predetermined by the project's intended occupants' military grade. They are as follows:

> Living Units for Enlisted Personnel and Company Grade Officers:
> An LUI of 4.1 normally shall be utilized, with an acceptable range from 4.0 to 4.5.
>
> Living Units for Field Grade Officers:
> Single detached units--LUI of 3.2 with an acceptable range from 3.0 to 3.5.
> Semi-detached units--LUI of 3.7 with an acceptable range from 3.5 to 3.9.
>
> Living Units for Colonels, Generals or Equivalent:
> Normal design effort shall be on the basis of an LUI of 3.0 for Colonels and 2.7 for Generals. However, due to the small number of such units usually involved in any project, site planning should be on a project case basis.[97]

The military, to compute and apply LUI, use military rank and a form quite similar to the Federal Housing Administration's Form 1029 reviewed above. The other local adoptions apply predetermined LUI numbers as one part of other planned-unit development requirements or as another standard of a particular zoning district's regulations. Frederick County's Planned-Unit Development Amendment is an example of

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[96] Ned H. Abrams and Ken F. Mitchell, Site Planning Introduction (Washington: Department of Defense-Family Housing, 1966), sheet 1.

[97] Ibid.

the former; the zoning ordinances of Honolulu and Marion County are examples of the latter.[98] Frederick County alone, in its agricultural district, has a non-fixed LUI determination process.

In summary, LUI is the numerical relationship of six elements of residential land-use: floor area, open space, livability space, recreation space, and occupant parking and total parking spaces. Floor area is the primary element in that the others are derived from it. The proportions of each element in relation to the whole site area are determined on a sliding scale which is read in intensity levels. The level of intensity, LUI number, of a site proposed for development is determined through an analysis of community patterns or some pre-established zone or band of intensity. Using site and building data and the appropriate LUI number, the proportion of each element is projected from the sliding scale. Based on experience these proportions can provide a substantial basis for design and successful development.

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[98]See Appendix B for Frederick County's Amendment. Honolulu's apartment and hotel district LUI number are set by lot size within a particular district. Marion County's LUI numbers are set by building use and height within a particular district. Half of Marion County's twelve dwelling district classifications are project (more than one lot) oriented and include LUI, along with other standards, as "Development Amenities." As an example, one of these, district D-9, Attached Multi-Family Dwellings, has four sets of LUI ratios according to the proposed structures height. In this district, LUI is distinguished at less than 4 stories, at 4 to 5 stories, at 6 to 11 stories, and at 12 stories or more.

CHAPTER III

USE AND NON-USE OF THE LUI CONCEPT

On paper, in theory, it is possible to isolate LUI and its parts and relationships for discussion, but in practice, LUI's abstractness and other regulations required for development obscure and hinder its being as well understood as in theory. In order to provide something more tangible for this part of the study an analogy is drawn between LUI and a ram-jet engine. As with other analogies it is not exact, but it does bring out the major points.

In the late 1940's, the ram-jet appeared to be a major breakthrough in aviation propulsion technology. The ram-jet or "flying stove-pipe" as it was called because of the close resemblance in form is

> a simple tube gulping air that is compressed by the ram effect of its own forward movement. The air is sprayed with fuel, burned in a combustion chamber, and spewed out the tail at high velocity.[99]

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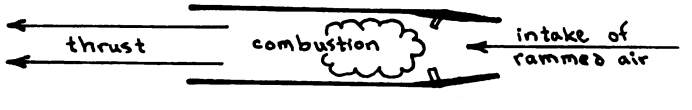
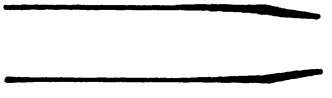
[99]Herbert Johansen, "Riding the Ramjet," Popular Science, Vol. 154, No. 1 (January 1949), p. 130. In diagram the ram-jet appears as follows:



The great value of the ram-jet was its potential as supplementary power in high speed aircraft. It was the "simplest" engine in use, having no moving parts except in the fuel system, and it provided more thrust per pound of engine weight than any other type of aircraft power plant. However, it could not operate in flight until sufficient speed had been obtained to enable it to scoop up enough air for combustion. This speed had to be provided by the aircraft on which the ram-jet was used.[100] In a stationary position, on the ground, it could operate only when high-speed air was forced into its air intake.[101]

The analogy of LUI and the ram-jet begins with the form and functioning of that form. Just as the shell of the "stove-pipe" jet gives an immediate impression of simplicity, so too the six component LUI scale presents the epitome of land-use regulations.[102] The six LUI ratios form a shell which shapes the proposed land-use



as it passes through the system. This is much like the

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[100]Jack Charshafian, Manager of the Wright Aeronautical Corporation's ram-jet division, states in "Ram Jet Grows Up," Newsweek, Vol. 35, No. 7 (13 February 1950), p. 50 that the ram-jet "will outperform all other jet and rocket engines in the 1,500- to 2,500-mile-an-hour range."

[101]"Test Chamber Simulates Air Speeds and Altitudes," Science News Letter, Vol. 57, No. 6 (11 February 1950), p. 84.

[102]See Figure 1.

shell of the jet as it channels the rammed air.[103] The floor area ratio (FAR) is similar to the fuel and ignition system of the ram-jet. It is an integral part of the form,

setting the relationship for the other ratios, and provides the spark to activate the system.

The ram-jet's operations air intake, combustion, and thrust are also comparable to the functioning of LUI.

Air rammed at high velocity is required for the operation of the ram-jet. LUI requires data; not just any data, but specific site, structural, and program data as inputs for operation. Combustion of the rammed air and injected fuel

might be compared to the interaction of the input data and LUI ratios, sparked by the floor area ratio. However, the LUI reaction, data and ratios, should not be as violent as

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[103] While both of these forms are considered "simple," the level of technology: knowledge of dynamics, metallurgy, and machine tooling in the jet and background research, data processing, and concept design in LUI should not be ignored.

the ramjet's. The resulting thrust of the ram-jet is dependent upon the interaction of both the shell and ignition components and the rammed air intake. The resultant LUI proportions, as obtained in Form 1028, are no less dependent upon both the LUI ratios and input data.

The analogy further applies to another aspect of the ram-jet and LUI. This is the overall operational aspect and how they fit into this larger framework. While the form and internal functioning of both LUI and the ram-jet are important, the point is that neither is able to operate independently in a vacuum. Outside of a test chamber the ram-jet requires an aircraft with another, primary, propulsion system that is capable of attaining the speed at which the ram-jet can begin to function. It is also a prerequisite that the aircraft be able to operate at the speeds provided by the ram-jet.[104]

Similar to the ram-jet, LUI needs a "vehicle" such as the Federal Housing Administration's mortgage insurance program or a local land-use ordinance. This vehicle should have certain characteristics to benefit from the "thrust" provided by LUI. First, there should be the capacity, in

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[104]It should be noted here that a propulsion system, such as the ram-jet is not necessarily feasible or desirable for all types of aircraft. A small, short-range aircraft, for example, is not built for such high speeds.

technical staff,[105] to gather, to process, and to use data to initiate and maintain the use of LUI. And second, there should be provision for meaningful, complementary, supporting criteria by which to judge the design resulting from the prescribed LUI ratios. These, for instance, might be standards for spacing buildings.[106] As with the ram-jet, LUI is not necessarily feasible or desirable for all land-use control or development situations, because of the above two conditions.

Federal Housing Administration usage

To continue the analogy, the Federal Housing Administration, in its mortgage insurance program, may be said to have a "high velocity, long-range jet aircraft," and is therefore able to benefit from the "thrust" provided by LUI. There are three points of significance in the Federal Housing

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[105]The increasing need for technical staff is indicated in the report Problems of Zoning and Land-Use Regulation, pp. 40-42, and in conversation with and letters from Mr. Wesley Furton and Mr. Wayne Depew.

[106]In a way these standards are analogous to the weight of the aircraft. Light weight loading is desirable for maneuverability (flexibility) and yet the power plant, fuel, instruments, and other accessories required for the functioning of the aircraft all contribute to its weight and lessen performance possibilities. Mr. Peter Svirsky, senior planner, Department of City Planning, City and County of San Francisco writes in Problems of Zoning and Land-Use Regulation, 27 that "there is much vagueness in written standards, intentional or unintentional, which causes confusion and often prevents effective administration of the ordinance. The ordinance should be well drafted to begin with, but, failing that, those administering it should issue interpretive material as an aid to the public and to themselves."

Administration's use of LUI. The primary point is that LUI has been modified--"streamlined."

As of 27 April 1967 the application of LUI standards was "streamlined" to speedup "FHA processing and [to continue] reaching sound technical determinations."[107] This came as a result of a backlog of otherwise approved projects in the pre-application and feasibility stages of the insurance program which lacked LUI ratings.[108] The cause of the lag was placed largely on the processing of Form 1095 which was used to determine the intensity number for the project. While it is a logical process it was much too time consuming to prepare. The streamline notice modified the selection of the LUI number, stating that

> the essence of the LUI system is that the Chief Underwriter decides on the density and average living-unit-size appropriate for the site and then selects a set of site planning requirements by converting these decisions into an LUI number.[109]

The essence of the modification was time. Its purpose was to facilitate an agreement with the sponsor on the project's physical characteristics and components at the earliest possible date. Form 1095 was to be used as a "guide"

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[107]Department of Housing and Urban Development, Federal Housing Administration, "Streamlined Application of Land-Use Intensity Standards," A notice, Control No. F-1249, 27 April 1967.

[108]Conversation with Mr. Furton, 24 April 1968.

[109]Department of Housing and Urban Development, Federal Housing Administration.

to be used or modified as appropriate to reach a sound conclusion on a particular site in a "minimum of time."[110] It was concluded that

> for some sites the Chief Underwriter alone can make an immediate determination of the appropriate number of living units per acre and average living unit size on the basis of recent analyses of nearby properties or with very little additional analysis. At the other extreme, the density and size determinations may take several hours of staff analysis in an unfamiliar or complex situation.[111]

The land-use intensity determination process is now, in effect, reduced to step 3 of Form 1095.[112] Three additional tables, further expanding Chart C of step 3 of Form 1095, were included with the streamline notice. These tables, one for walk-up apartments, one for elevator apartments, and one for all building types, relate living unit floor area, LUI, and gross density. LUI is determined by reading down the appropriate floor area column to the appropriate gross density and then across to the LUI number.[113]

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[110] Ibid.

[111] Ibid. Other than "economic feasibility, there is no comment as to how or by what criteria the "appropriate" density and living unit size will be determined. As stated in Instructions for Land-Use Intensity Forms, p. 5, the deciding factor in LUI determination is "judgement based on knowledge and experience."

[112] See Figure 7.

[113] See Figure 14. Citing the same example, the elevator apartment table would allow a LUI of 4.7+, while the table for all types (townhouse or single family) would allow a LUI between 4.4 and 4.5.

Figure 14. Density for Walk-Up Apartments. Maximum number of living units per gross acre in walk-up apartment buildings by LUI number and net floor area. Ten percent of gross floor area is allowed for common use in halls, stairs, etc.

LUI	LIVING UNITS BY NET FLOOR AREA														LUI
	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	
3.5	13.9	11.1	9.24	7.92	6.93	6.16	5.54	5.04	4.62	4.27	3.96	3.70	3.46	3.26	3.5
3.6	14.9	11.9	9.90	8.49	7.42	6.61	5.94	5.40	4.95	4.57	4.25	3.96	3.72	3.49	3.6
3.7	15.9	12.7	10.6	9.10	7.96	7.07	6.37	5.79	5.31	4.90	4.54	4.25	3.98	3.74	3.7
3.8	17.1	13.6	11.4	9.75	8.53	7.59	6.82	6.21	5.69	5.25	4.88	4.55	4.27	4.01	3.8
3.9	18.3	14.6	12.2	10.4	9.14	8.13	7.32	6.65	6.09	5.62	5.23	4.88	4.57	4.30	3.9
4.0	19.6	15.7	13.1	11.2	9.80	8.71	7.84	7.13	6.53	6.03	5.60	5.23	4.90	4.62	4.0
4.1	21.0	16.8	14.0	12.0	10.5	9.33	8.41	7.64	7.00	6.46	6.00	5.60	5.26	4.94	4.1
4.2	22.5	18.0	15.0	12.9	11.3	10.0	9.01	8.19	7.51	6.93	6.44	6.00	6.63	5.30	4.2
4.3	24.1	19.3	16.1	13.8	12.1	10.7	9.66	8.78	8.05	7.42	6.89	6.44	6.04	5.68	4.3
4.4	25.9	20.7	17.2	14.8	12.9	11.5	10.4	9.41	8.62	7.96	7.39	6.90	6.47	6.09	4.4
4.5	27.7	22.2	18.5	15.8	13.9	12.3	11.1	10.1	9.24	8.53	7.92	7.39	6.93	6.52	4.5
4.6	29.7	23.8	19.8	17.0	14.8	13.2	11.9	10.8	9.90	9.14	8.49	7.92	7.42	6.99	4.6
4.7	31.8	25.5	21.2	18.2	15.9	14.2	12.7	11.6	10.6	9.80	9.10	8.50	7.96	7.49	4.7
4.8	34.1	27.3	22.8	19.5	17.1	15.2	13.6	12.4	11.4	10.5	9.76	9.10	8.53	8.03	4.8
4.9	36.6	29.3	24.4	20.9	18.3	16.3	14.6	13.3	12.2	11.3	10.4	9.76	9.14	8.61	4.9
5.0	39.2	31.4	26.1	22.4	19.6	17.4	15.7	14.3	13.1	12.1	11.2	10.4	9.80	9.22	5.0
5.1	42.0	33.6	28.0	24.0	21.0	18.7	16.8	15.3	14.0	12.9	12.0	11.2	10.5	9.88	5.1
5.2	45.0	36.0	30.0	25.7	22.5	20.0	18.0	16.4	15.0	13.8	12.9	12.0	11.3	10.6	5.2
5.3	48.3	38.6	32.2	27.6	24.1	21.4	19.3	17.6	16.1	14.8	13.8	12.9	12.1	11.4	5.3
5.4	51.7	41.4	34.5	29.6	25.9	23.0	20.7	18.8	17.2	15.9	14.8	13.8	12.9	12.2	5.4
5.5	55.4	44.4	37.0	31.7	27.7	24.6	22.2	20.2	18.5	17.0	15.8	14.8	13.9	13.0	5.5
5.6	59.4	47.5	39.6	34.0	29.7	26.4	23.8	21.6	19.8	18.3	17.0	15.8	14.9	14.0	5.6
5.7	63.7	51.0	42.5	36.4	31.8	28.3	25.5	23.2	21.2	19.6	18.2	17.0	15.9	15.0	5.7
5.8	68.3	54.6	45.5	39.0	34.1	30.3	27.3	24.8	22.8	21.0	19.5	18.2	17.1	16.1	5.8
5.9	73.2	58.5	48.8	41.8	36.6	32.5	29.3	26.6	24.4	22.5	20.9	19.5	18.3	17.2	5.9
6.0	78.4	62.7	52.3	44.8	39.2	34.8	31.4	28.5	26.1	24.1	22.4	20.9	19.6	18.4	6.0
6.1	84.0	67.2	56.0	48.0	42.0	37.4	33.6	30.6	28.0	25.9	24.0	22.4	21.0	19.8	6.1
6.2	90.1	72.0	60.0	51.5	45.0	40.0	36.0	32.8	30.0	27.7	25.7	24.0	22.5	21.2	6.2
6.3	96.5	77.2	64.4	55.2	48.3	42.9	38.6	35.1	32.2	29.7	27.6	25.7	24.1	22.7	6.3
6.4	103	82.8	69.0	59.1	51.7	46.0	41.4	37.6	34.5	31.8	29.6	27.6	25.9	24.3	6.4
6.5	111.	88.7	73.9	63.4	55.4	49.3	44.4	40.3	37.0	34.1	31.7	29.6	27.7	26.1	6.5
6.6	119	95.1	79.2	67.9	59.4	52.8	47.5	43.2	39.6	36.6	34.0	31.7	29.7	28.0	6.6
6.7	127.	102.	84.9	72.8	63.7	56.6	51.0	46.3	42.5	39.2	36.4	34.0	31.8	30.0	6.7
6.8	137.	109.	91.0	78.0	68.3	60.7	54.6	49.6	45.5	42.0	39.0	36.4	34.1	32.1	6.8
6.9	146	117.	97.5	83.6	73.2	65.0	58.5	53.2	48.8	45.0	41.8	39.0	36.6	34.4	6.9
7.0	157.	125.	105.	89.6	78.4	69.7	62.7	57.0	52.3	48.2	44.8	41.8	39.2	36.9	7.0

For example, if the analysis of a proposed site shows a living unit floor area of a net 1400 square feet and a gross density of 8.49 as most appropriate, then the LUI number for walk-up apartments would be 4.6.

These tables are also used by the sponsor, in reverse, to determine density or how many living units are permitted at the assigned intensity level. With all this concern over density, one is apt to wonder about the earlier rejection of density in favor of LUI.[114] Perhaps density is not all so insensitive and useless? Going back to the ram-jet analogy, it would seem to indicate that LUI, while a strong force in shaping site development, is not the primary moving force in this process.

Also significant in the Federal Housing Administration's use of LUI is the strong emphasis and reliance on marketability.[115] This point is evidenced in both the application procedure and in Form 1095 and its streamline version.

The Federal Housing Administration suggests that the most desirable time for determination of the LUI number is at the "pre-application stage of a multifamily housing proposal and the feasibility stage of a planned-unit

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[114] See pages 9 and 10.

[115] Mr. Furton in a letter of the 15th of May 1968 writes that LUI, compatible with established local density zoning to provide elements of livability, is one key to sustaining a continuing housing market.

development."[116] Both of the stages are the initial steps in application for the respective mortgage insurance programs.

The pre-application stage is conducted through a series of conferences between the potential sponsor and the Federal Housing Administration administration and technical personnel. It is a "standardization" process to provide prompt service to the sponsor, to expedite analysis of the proposal, to eliminate unsound proposals, and to save the sponsors fees and other expenses should the proposal be unacceptable.[117] The sponsor is to provide the following data:

(a) A request for Preapplication Analysis of Multifamily Housing Proposal, setting forth basic information concerning the site and project.
(b) A location map or sketch positively identifying the site.
(c) A sketch plot plan indicating dimensions of the site. (This exhibit may serve also as a location sketch if street intersections, distances, and compass points are shown.)
(d) Evidence of title to the land, option to purchase, or owner's authorization to inspect the site for the purposes requested.
(e) An Equal Employment Opportunity Certification.
(f) Any additional exhibits that may be required for special programs.[118]

The proposal is studied and the Federal Housing Administration makes an analysis which "is limited to a

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[116]Federal Housing Administration, Instructions for Land-Use Intensity Forms, 2.

[117]Federal Housing Administration, A Handbook for FHA Multifamily Projects, FHA No. 2605 (Washington: U.S. Government Printing Office, 1965), p. 5.

[118]Ibid., 2.

determination as to whether or not, in the opinion of FHA, a market exists at the specific location for the proposed number of units of the stated room composition at the specific rents proposed. A determination is also made as to the suitability of the proposed site."[119] This stage is terminated with either a letter of disapproval, which states in full why the project was found inadvisable, or a letter of approval, which includes a LUI rating, required modifications (if any), and an invitation to make a formal application with fee within three months.[120]

The processing of planned-unit development for mortgage insurance is similar to that which the Federal Housing Administration uses for subdivisions; the Feasibility Stage corresponds to the pre-application stage of the multifamily analysis above with more emphasis on the land-use. It is centered around FHA Form 2084, Subdivision Information, which includes data about proposed building type and land-use. Also included for study are simple location and site sketches. This stage is concluded with the issuance of a "feasibility letter containing recommendations about the development program. This includes FHA's Land-use Intensity Rating of the site, and FHA's tentative

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[119] Ibid., 3.

[120] Ibid., 3-4.

conclusions on such essentials as acceptable price range, building type, and lot size."[121]

In the streamline notice it is stated that

> the agreement [on the determination of LUI] should be based on economic feasibility and should allow flexibility for creative project design.[122]

Backing up to its original form, Form 1095, it may be noted that step 3, which pin-points the LUI number, is primarily a market analysis of the suitable building type.[123] This building type, determined in step 2, is also markedly influenced by market conditions.

Actual physical factors, such as topography, are considered in light of acquisition and site development costs. Local land-use regulations are also considered. However, unless it is implied somehow in the elements of Form 1095, there is no planning consideration of what effects the proposed intensity, appropriate building type, or influx of people will have on the site and community. Available transportation and utilities are considered but in regard to determination of the most appropriate building type.

A third small, but significant point is that with the usage of LUI such elements of design as outdoor

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[121]Federal Housing Administration, Planned-Unit Development with a Homes Association, 58.

[122]Department of Housing and Urban Development, Federal Housing Administration.

[123]See Figure 7.

livability, vehicular movement area, pedestrian area, parking, and recreation area, the LUI components, are of "concern to [Federal Housing Administration] underwriting staffs, who until recently were not cognizant of these values or relationships."[124] Previous to the use of LUI all the Minimum Property Requirements involved was density in two ranges, above and below 25 families per net acre, and building coverage, a percentage of the lot size.[125]

Sponsor Usage

While the Federal Housing Administration may be said to have a jet aircraft, this cannot be said for the sponsor, who is, perhaps, more analygous to a passenger on a commercial flight. In this respect, as a paying passenger (application fees, development costs, etc.), he is more concerned with where and how he is going than with the ram-jet propulsion of the craft. It should also be considered that he may only want to take a short surface trip, in which case the ram-jet flight may be quite unnecessary.

Here, in the sponsor's usage, it is not as easy to isolate LUI as was done in theory. Basically this is because LUI is viewed by the sponsor as just one more restraint on his development, that is if he makes a distinction between LUI ratios and other requirements.

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[124]Letter from Mr. Furton, 15 May 1968.

[125]See Appendix A.

An example of this situation is the St. Vincent Court project, a 56 unit, non-profit organization sponsored development on the south side of Lansing, Michigan.[126] In conversation with the president of the project, he recalled certain requirements for "playgrounds and parking," but made no claim to understand them or the other design requirements.[127] The responsibility for such matters, he said, was placed in the hands of professionals. The professionals in this instance were site planners and landscape architects[128] and had the following comments:

(1) LUI directs and limits possibilities of design, but as such good design is not encouraged, particularly with the other (Federal Housing Administration) standards also in force. There are too many rules.

(2) LUI and the other standards tend to standardize development.[129]

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[126] The Catholic Weekly (Diocese of Lansing), 31 May 1968, p. 1. The project is sponsored by the Lansing Particular Council of St. Vincent de Paul.

[127] Conversation with Mr. John Fuller, East Lansing, Michigan, 08 July 1968. Mr. Fuller is not a developer by profession.

[128] Jack A. Drew Associates, Inc., Site Planning-Landscape Architects, Lansing, Michigan.

[129] Site plans, of existing developments, from a 1946 Federal Housing Administration publication and recent Benchmark plans may be found in Appendix D for comparison.

(3) LUI proportions were difficult to fit into the topography.[130]

(4) Because LUI and the other standards were required, more attention was demanded and professional costs were raised above normal operation.[131]

From just the aspect of the forms (Forms 1028 and 1029) used by the sponsor to project or check site proportions there are some difficulties. In addition to time consumed adjusting or reprogramming such elements as covered and uncovered open space or parking area, certain steps of the forms are confusing. Three of them in particular stand out.

(1) In Form 1028, Land Area, line 5, is computed as programmed gross land area, since the project may have several LUI numbers or several building types. This is logical if one assumes that the amenities derived from the site area, abutting street area, and beneficial open space are enjoyed in the same proportions as the building types or LUI numbers. For example, it assumes that if the project is programmed for 50% townhouses, then 50% of the amenities of the land will be enjoyed by the townhouse residents. The confusing inconsistency, however, is in Form 1029, if this

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[130]A sketch of the St. Vincent Court site plans may be found in Appendix D. The shape of the site may also be of interest.

[131]Conversation with Robert Leighton, staff member of Jack Drew Associates, Inc., 09 July 1968.

form were used to check the same example project. In Form 1029, Land Area, line 4, is simply gross land area with no consideration of programmed proportions. In this instance the townshouse residents would enjoy the amenities of the total land area.

(2) There is another inconsistency between Form 1028 and Form 1029 in the computation of livability space (non-vehicular open space) and vehicular area (vehicular open space). In Form 1028, vehicular space, line 28, is computed as open space left over after the compliance of livability space is met. By contrast Form 1029 subordinates livability space to vehicular space, that is livability space is open space after vehicular area has been determined. In addition to this shift of emphasis, vehicular area is computed in two different ways. In Form 1028, vehicular area is 20% (if more accurate figures are not available) of the programmed gross land area, plus the area of car parking courts (non-covered parking). By taking a percentage of the programmed gross land area a percentage of off-site beneficial open space (if there is such) is gained in the computation. In Form 1029, vehicular area is computed as 1/2 of the roadway area of abutting streets, plus on-site roadways and drives, plus the area of parking courts, plus 1/2 of the carport area.

(3) In computing the number of living units allowed and residential building area, lines 7 and 8 of Form 1028, the programmer is presented with a dilemma, because the two

factors are determined independently. While the building type (number of stories in particular) and adjusted living unit area are hopefully related in the "basic data for the program," the manner in which they are programmed causes a discrepancy for which the programmer is either penalized by losing open space or forced to adjust the "adjusted living unit area to the maximum floor area." Using the sample in Figure 11 may help to visualize this situation.

The programmer, Fairway Hills, has decided to build 2 story townhouses with an adjusted living area of 1250 square feet. These two factors are related in a design concept and determined before the maximum floor area allowed was computed. Following the form's procedures it is computed that he can build 104 units, of the type he decided upon above, which will have a total building area of 65,340 square feet. But stopping to check his figures, he finds that with 104 units and 65,340 square feet of coverage he could have an adjusted living unit area of 1256+ square feet.[132] Conversely, he finds that if he maintains his original adjusted living unit area of 1250 square feet, then an extra area of 1,840 square feet[133] is credited to building coverage area. This is deducted from basic uncovered open space, a valuable asset in this system, in subsequent computation. Should he

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[132] (65,340 sq. ft. ÷ 104) × 2 stories.

[133] (65,340 sq. ft.) - [104 × (1250 sq. ft. ÷ 2 stories)].

adjust his adjusted living-unit floor area to the computed total maximum floor area, to fit the numerical envelope or should he take the penalty or will he even notice the variation?

While the sponsor does not appear to fully appreciate the usage of LUI, there has been occasion when he has used LUI to his own advantage. For example in staged development, where a project area is divided into several smaller areas to be developed according to a project plan at different scheduled time intervals, the sponsor has come out "ahead" (developing at a higher LUI than prescribed) by first developing the most intensely used parcel. After the development of the first parcel it has happened that a "change of ownership, a collapse of market demand or other conditions beyond the control of the sponsor" has allowed the remaining parcels to be developed at a higher intensity than specified for the total project. The Federal Housing Administration has limited such development by generally requiring lower intensity areas to be developed first and, if necessary, requiring "a recorded land-use agreement that no remaining site area will be developed at a higher intensity than specified inthe agreement and which retain the overall LUI number for the total site."[134]

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[134]Waldemar Weichbrodt, Director, Appraisal & Mortgage Risk Division, "Compliance with LUI Numbers on Staged Development Projects," FHA Memorandum to James Smith, Multifamily Housing Representative, Chicago, 11 March 1965.

City and planning usage

Again using the ram-jet analogy, the city and its planners are in a choice situation. They either continue to fly their small crafts, and perhaps, if they are not careful, occasionally catch some "back thrust" from a big jet or they too acquire a big jet for their own use.

In the first instance, the city and the planner select to maintain or improve, by means other than LUI, their conventional land-use regulations. The "back thrust" alluded to is pressure, usually from the sponsor, for change or amendment of existing local land-use regulations because of more permissive densities, for example, allowed by the Federal Housing Administration's determination of LUI. The Federal Housing Administration tries to avoid such situations and as a matter of policy "coordinates its activities with those of the local regulation authorities as much as possible and supports local planning and zoning based on sound principles."[135] In the instance of a planned-unit development, however,

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[135]Federal Housing Administration, Underwriting Procedures: Home Mortgages (Washington: U.S. Government Printing Office, 1959), paragraphs 70407-70412, 70507 and 70545, cited by Hanke, Land-use Intensity Standards, the LUI Scale and Zoning, 16.

Mr. Furton alludes to this problem in his letter of 15 May 1968. ". . . its [LUI] most advantageous use is not assignment, but the relationship of a compatible L.U.I. with local density zoning."

> FHA releases its LUI number for a PUD even though higher than the zoning equivalent if the local authority may consider a change and does not object to the release of the FHA number in advance of its own decision.[136]

In the second instance, the adoption and use of LUI into or as a base for local land-use regulations, LUI is no small matter. In the only published material, that goes into any depth on the local adoption of LUI, its author, after presenting LUI and other regulations for yards, courts, building spacing improvements and so on concludes that "it should now be apparent why complexity is necessary for flexibility."[137]

A senior planner from the Metropolitan Planning Department of Marion County wrote along the same vein.

> L.U.I. should be handled carefully and should not be applied--particularly in the smaller communities that do not employ professional staff--without an adequate training program for the local administrators. As with any regulatory device of this nature, it is possible to overpopulate a zoning district, therefore controls in addition to the L.U.I. factors may be desired--such as maximum height of buildings, minimum floor area per d.u., or gross d.u. per acre--that still permit the effective functioning of L.U.I. but within the community's desires for maximum limitation of skyline or in relation to public facilities capacities, etc.[138]

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[136]Hanke, Land-use Intensity Standards, the LUI Scale and Zoning, 16.

[137]Bair, "How to Regulate Planned-Unit Developments for Housing--A Summary of a Regulatory Approach," Zoning Digest, 195.

[138]Letter from Mr. Depew, 02 May 1968.

In addition to complexity and the need for professional staff, there appears to be some apprehension about the effectiveness of LUI. For example Mr. Depew expresses the need for other controls since with LUI "it is possible to overpopulate a zoning district."[139] Theoretically, because of the reliance on floor area rather than the number of living units, LUI is much more indicative of population than living unit density. An example of this is the situation of an efficiency and a five bedroom residence, both of which are one living unit, but whose population expectation vary widely and more closely with floor area.[140]

This apprehension coupled with complexity and staff requirements are perhaps the reasons for the limited use of LUI in local regulations.[141] To what extent and how

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[139] Ibid.

[140] Frederick Bair, "Applying Land Use Intensity to Public Regulation," Urban Land, Vol. 26, No. 4 (April 1967), p. 3. Also see footnote 114 of this thesis.

[141] Mr. Bair, in his letter of 29 April 1968, rephrases the first reason. "Since planners tend to be traditionalists, they are slow to adopt new ideas [such as LUI] particularly when the ideas are complex and the planners have to think."

The ranks of traditionalists should perhaps be expanded to include the "vocally hostile" residents of the one family resident districts which adjoin Planned Development-Housing districts (based on LUI) in the Honolulu ordinance. To pacify these people the authors of the ordinance have required screening and open space transition areas around the edges of the development "to protect occupants of adjoining residential districts [single

satisfactorily LUI is being used locally was not conclusively ascertained in this study. While the literature about LUI speaks of locally adopted LUI in the present and past tenses, the only response to letters inquiring about the usage of LUI came from two communities which had not yet actually used LUI. The new zoning code for Honolulu, which was structured around LUI, was scheduled for final public hearing on the 10th of May 1968.[142] In Marion County, the LUI rating system has been introduced in only one community and "that community has not yet adopted the proposal."[143]

LUI is simplicity in itself yet complexity in an operational context, which may account for its limited use.

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family] from adverse views into the district, particularly of off-street parking and service areas." Bair, "Applying Land Use-Intensity to Public Regulation," Urban Land, 6. In the instance of the St. Vincent Court project in Lansing, Mr. Fuller commented that it wasn't so much LUI and the other standards to which people objected as it was the rent subsidy of 10% of the units. This confused the issue. Neighborhood people thought the project was fine, but did not want it in their backyards.

[142] Letter from Mr. Kim.

[143] Letter from Mr. Depew. An article, Byron Hanke, "Planning Developing, and Managing New Urban Areas," Soil Water and Suburbia (Washington: U.S. Government Printing Office, 1968), p. 114, refers to Marion County as follows: ". . . in 1963, the city of Indianapolis and Marion County, Ind., adopted the, LUI concept for multiple-dwelling districts. In 1966 they adopted it for all residential districts."

But rather than discount LUI as too far ahead of its time or as impractical because of its operational prerequisites, it might be better to re-regard its form and functioning and the operational context into which it has been placed. There may be other possible applications of LUI. There is one aspect of LUI, measurement, which, while considered indirectly, in these first chapters, will be treated in more detail in the following chapter.

CHAPTER IV

LAND-USE INTENSITY IN THE FUTURE

Proponents of LUI have allowed that it takes time for a new concept to be refined and to become accepted. Looking forward to the future several steps have been suggested to make the LUI approach a better measurement method in zoning, planning, and development. Continued public relations to make LUI known and understood is considered the first step. Another step qualifies the first in that the information should be consolidated into a concise, easily understood, illustrated bulletin such as Planned-Unit Development with a Homes Association, published by the Federal Housing Administration.[144] The expansion of the LUI technique into industrial and commercial land-use, plus further research and testing of LUI in local regulations, is called for in other steps.[145]

LUI is described here as "simply a measurement system concerned with the physical components of urban

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[144]This is Land Planning Bulletin No. 6, FHA 1097. See footnote 44.

[145]Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, 14.

development."[146] In operation, thus far, its primary function has been regulatory, the application of measure, either as a guide for eligibility for federal mortgage insurance or as a local land-use standard. However, LUI is still a measure and it is suggested that LUI, in map form, "can be a key communicator and a common denominator in the general plans for the physical development of an urban area."[147] Although the present LUI system is directed primarily at residential development, it could be "expanded [to be comprehensive] to cover commercial and industrial development."[148] The LUI map would be a contour map, the contour lines indicating the existing and proposed intensity levels of land-use in a metropolitan area or other locality. Since the LUI components are "key indicators of population density, school enrollment, traffic generation, utility load, runoff coefficients for storm drainage, and other factors in the comprehensive physical plans for an urbanized area,"[149] these factors could also be projected from the map. The significance of LUI in the future, and now, lies in its

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[146] Ibid., 2.

[147] Ibid., 11.

[148] Ibid.

[149] Hanke, "Planning, Developing, and Managing New Urban Areas," Soil, Water, and Suburbia, 114.

potential as a universal mode of expression and of measurement in land-use planning and regulation.[150]

This chapter is an analysis of the above propositions for the betterment and future use of LUI. Specifically it will consider LUI as a measurement system, a device to indicate and represent elements of physical reality,[151] which can be expanded beyond its present residential framework to include commercial and industrial development. While the measurement potential suggested, especially the role of key indicator for other physical planning factors, refers to elements of the six LUI components, such as floor area and building coverage, it is not specified whether or not the measurement of such elements is conducted within the framework of the component ratios, as established by the Federal Housing Administration or within a framework of the six components the ratios of which are to be fixed as a part of the measurement process. Although it might be assumed that it is the LUI ratios established by the Federal Housing Administration which are to be utilized, this study will consider both possibilities. The established ratios, however, are of major concern.

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[150]Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, 11. This is through the use of common terminology and definitions.

[151]While LUI in previous chapters was indirectly considered as a measurement system, the emphasis was not on its potential to indicate physical reality as it is.

The beginnings and trends

In order to have an applicable measure for land-use regulation, there should be a framework for study of the existing land-use and of the land-use that ought to be, such as expressed in a land-use plan. The ratios of the LUI scale reflect the study of what ought to be as determined through analysis of successful residential projects. The study of what is is provided for each site proposed for Federal Housing Administration mortgage insurance through an analysis of marketability and feasibility. A part of this study is to include consideration of gross unit density, unit floor area, and building type. On the local level what ought to be is reflected in a plan, and where LUI has been adopted, in the LUI ratios. The local study of what is, for communities utilizing LUI, is reflected in a map of intensity zones or bands--these also reflect what ought to be.[152] In that these site analyses and maps reflect physical reality, it might be said that the initial stages of LUI, as a measurement system, have already begun. Further, the application of LUI to industrial and commercial development has been initiated.[153]

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[152]For example, the Honolulu ordinance's intensity zones reflect the average floor area of those zones.

[153]Mr. Bair, in a letter of 29 April 1968, wrote that "in Richmond [,Va.] we are proceeding to use it [LUI] for commercial and industrial regulation as well [as residential], working on floor area ratios primarily, but probably adding in material or landscaped open space."

Although the usage of LUI as a measure has already begun, there has been a trend to simplify its use as a measure. There has been no apparent (public) use, for measurement, of the elements of the six components as defined by the Federal Housing Administration, except in the analysis and establishment of "benchmark" communities and the compliance analysis of proposed projects.[154] Much less, the framework provided in the combination of the LUI components, without pre-established ratios has not apparently had any further measurement application since it was utilized by the Federal Housing Administration for the LUI study.

Some current studies use a framework which is similar to LUI; for example, the list of preliminary statistical information compiled for the Detroit City Planning Commission on recent central city redevelopment. These studies, however, omit or make substitutes for basic LUI elements such as floor area.[155]

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[154]See Form 1029.

[155]The list, referenced by Mr. Furton during discussion about LUI, is entitled "Land Use Components, Acreages, and Densities in the Gratiot-Lafayette Development Project." It provides the following information for each development: area in square feet and acres; percentage of land for streets; and areas of public walkways, parks, commercial parcels, schools, and residential parcels. The residential data was further broken down to include the type of housing (high or low rise), number of bedrooms per unit, net dwelling unit density, parking space, and, in some instances, building coverage. In this case the number of bedrooms was substituted for floor area.

Even in the determination of an appropriate LUI level for a proposed Federal Housing Administration mortgage insured project or of a zone or band of a local land-use ordinance, using Federal Housing Administration established ratios, only certain elements of the six components are being or have been used.[156]

It is possible that for the most part this simplification trend is a result of the complexity and technical staff requirements which were noted in the previous chapter as limiting the regulatory use of LUI. It is also possible that the meaning of LUI and land-use intensity are not really understood.[157] And further it is possible that the six LUI components, as they are now defined, encompass more than the essence of land-use. This is to suggest that there are essential elements and qualitative details mixed within the LUI scale.[158] Considering this last possibility, the

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[156]The Federal Housing Administration (see streamlined application) relies primarily on adjusted unit floor area and gross unit density by building type to determine the LUI number for a proposed project. In the Honolulu ordinance determination of zone intensities was based on the existing average floor area.

[157]That there is misunderstanding was mentioned by Mr. Furton. This is further substantiated in the Federal Housing Administration's concern for a consolidated, clear presentation of LUI.

[158]Another intensity measurement system, devised by Robert Katz, Intensity of Development and Livability of Multi-Family Housing Projects (Washington: U.S. Government Printing Office, 1963), considers two aspects of intensity. Intensity, itself, is measured as a combination

question of the use of LUI becomes not so much the complexity as it is the details of LUI and the precision with which these details are treated. Figure 15 may help visualize the precision of LUI as a measurement system.[159]

Precision and point of emphasis

While it is not disputed that off-site amenities (streets and beneficial open space), improved roof area,

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of net unit density, building coverage, floor area ratio, building type and size, and spacing between buildings. Other aspects such as privacy, usable open space, individuality, diversity of housing type, location, proximity to community facilities, safety and health, circulation (vehicular and pedestrian access and movement), automobile storage, blending of the new housing into its surroundings, site details (walls, steps, benches, light fixtures, plant materials, etc.), and views to and from the site are considered aside from intensity as qualitative aspects of livability. It would seem that this system's sensitivity and operability are increased by making the distinction between basic and qualitative elements of intensity.

[159]This figure, an elaboration of Figure 2, includes other variations which might occur under conditions other than in that specific example. The example refers to a single story building type, since "floor area" does not exceed "building area," and the building includes no improved roof area, balconies, etc., since there is no additional "open space" beyond the land area."

In the figure all dimension arrows represent two dimensional horizontal areas of the site or structure(s). For example 1000 sq. ft. of open space might be composed of 550 sq. ft. of livability space, 50 sq. ft. of balconies, and 400 sq. ft. of vehicular space. The reduction of these areas to a lineal scale is to facilitate the representation of their relationships.

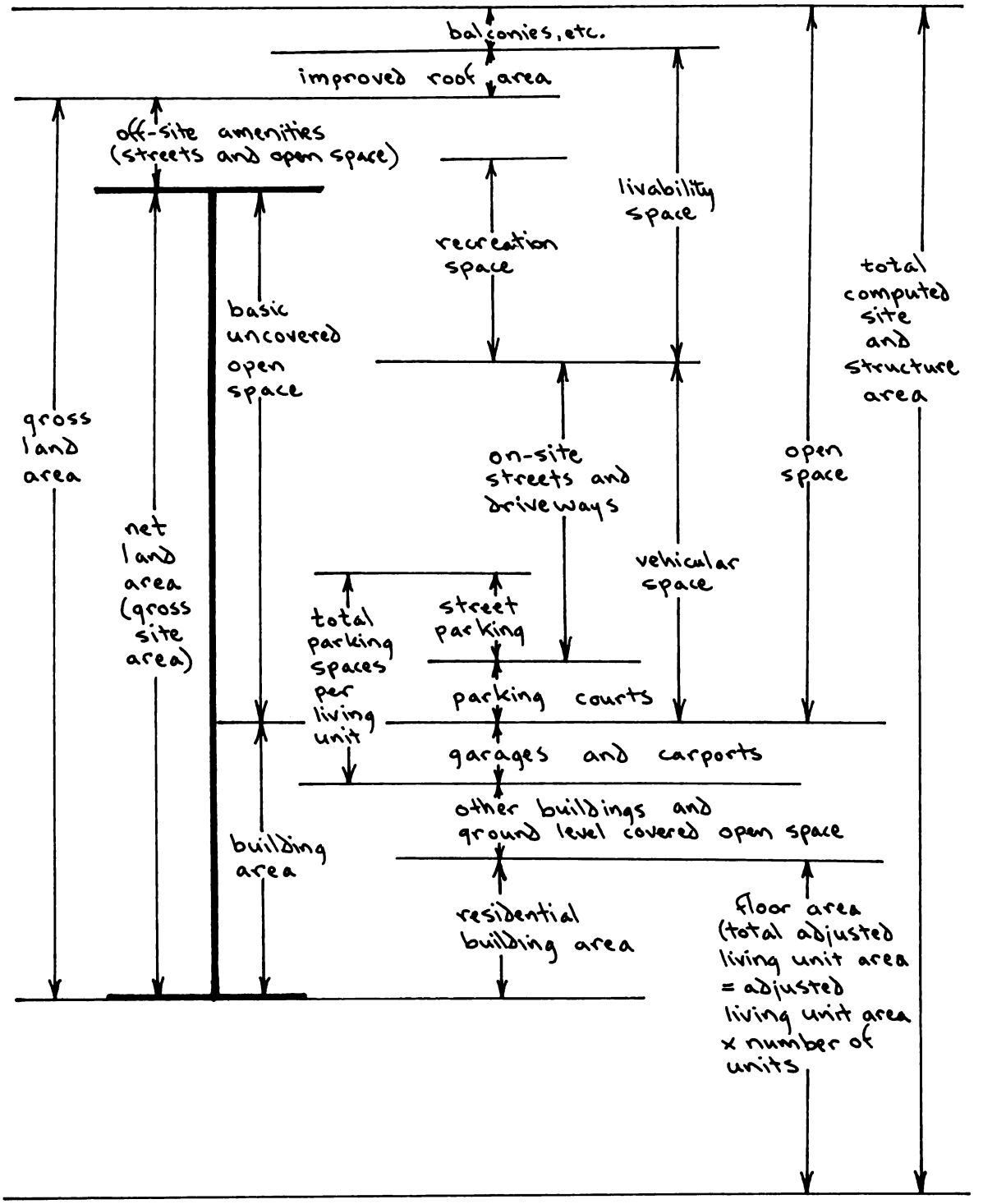

Figure 15. Schematic of LUI Site and Structural Areas. The Schematic, expressing areas as lined dimensions, illustrates the relationships of the elements of the total computed horizontal site and structural area.

balconies, parking allocation and other details are aspects of intensity, their weighted values are questioned.

It was cited earlier that "actually, how we develop the site involves the basic question of the building area in relation to the land area. What is left over is the open space we are so concerned about." (Italics mine.)[160] It can be seen from the diagram that "basic uncovered open space" ("open space" in Figure 2) and "building area" are not nearly the determinants that they appear to in Figure 2. This deviation from the "basic question" occurs generally in multi-storied building types which have improved roof areas, balconies, etc. computed as part of their open space. In such instances the six LUI components, rather than reflecting building area and basic uncovered open space, become dependencies of off-site amenities; improved roof area, balconies, etc.; and how the parking area is distributed (either covered or a part of open space). The Federal Housing Administration defined LUI elements are more sensitive to the qualitative and architectural details of the project than they are to land-use coverage and building bulk.[161]

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[160] Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, 3. Also see footnote 14.

[161] Some of these details lack much meaning too, for example, the abutting street area in the computation of gross land area. According to the Minimum Property Standards, p. 43 this area is "half of any abutting alley or street sight of way." (Italics mine.) Whether this is a 10 foot access alley or a 210 foot limited access freeway apparently does not matter--except as calculable area number.

If building area, basic uncovered open space, along with floor area are the basic question then details belong on another level of consideration. LUI, as it is defined now, in both its elements and its ratios, locks in, as determinants and equals, these qualitative aspects of exterior space and architectural detail.

This emphasis is fine for use as a guide to judge suitable and likely successful mortgage insured projects--to determine what ought to be in these respects. To determine, measure, what is, however, this detail becomes a laborious distraction since off-site amenities, improved roof area, balconies, parking space allocation and other details present an unlimited variety of possible combinations. (This assumes the use of LUI as a measurement framework without the fixed ratios. This instance is, perhaps, more applicable to use by a community rather than in a site analysis.) Fixed ratios only complicate the matter, requiring that what is be fit into a scale of what ought to be.[162]

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[162]According to the Federal Housing Administration's Instructions for Land-use Intensity Forms, p. 26, "the computed land-use intensity is the lowest LUI number at which all computed ratios comply with standard ratios." (Italics mine.) By such criteria, an existing medium intensity site (as determined by the floor area ratio), in close proximity to, but not abutting beneficial open space (a park); lacking improved roof area and balconies; and having predominantly open court parking facilities, in place of garages, could easily be classified as having a much higher intensity because the details of "open space" and "livability space" do not match the successful standard established by LUI.

The super precision in details, unless modified substantially, is also likely to make residentially oriented LUI incompatible with the idea to expand its usage to the measurement of commercial and industrial development. Little, if any, of the residential detail is applicable to commercial or industrial uses. Improved roof area and parking requirements, for example, hardly have a common base in these three uses. A real common denominator seems to be the prerequisite unless consequences of the same nature as the example in footnote 162 do not matter. It should be recalled that the effort so far to expand into this area (one instance, for regulation) has utilized only the floor area ratio with thoughts of eventually including landscaped open space.[163]

The purpose for suggesting the extension of LUI to include commercial and "light industrial" uses is that

> the LUI system conceivably could become a basic guidance measure [italics mine] anticipating and permitting a mixture of land-use types while maintaining compatible environmental relationships.[164]

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[163] See footnote 153.

[164] Byron R. Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, written statement of testimony before the National Commission on Urban Problems at is hearing on zoning, held in Houston, 10 August 1967 (Washington: By the author, 1967), p. 23. Mr. Hanke further states that a floor area ratio and a livability space ratio would be applicable in this situation, for regulation. He does not comment further how an appropriate "comprehensive" intensity level might be established. Since LUI has the properties of comprehensiveness, it would be of interest to see how schools and other public places would fit into this schema for measurement.

When LUI was spoken of in map form, "measurement" of both existing and proposed development was noted as a particular advantage in the use of LUI. From his written testimony, however, Mr Hanke appears to be referring primarily to measurement of proposed development.[165] While this is advantageous in the evaluation of a proposed project, it may be of no particular value, despite its "comprehensiveness," to a community desirous of mapping what is to judge what ought to be.

Again because of its precision for details the use of LUI as a measurement system may involve a problem of delimiting an intensity area (zone or band). For regulatory purposes, which includes some measure of what is, it has been suggested that "land-use intensity area boundaries should be established on the official zoning map according to the same procedures used in establishing zoning district boundaries."[166]

The establishment of zoning district boundaries begins with the gathering of factual data regarding land-use, population, and so on, which is "best presented in

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[165]Since for new development it is not required that one apply for Federal Housing Administration mortgage insurance, the Administration does not "regulate." Proposed development is "measured" for compliance with standards.

[166]Bair, "How to Regulate Planned-Unit Developments for Housing," Zoning Digest (July 1965), 222.

map form."[167] According to a plan, the population size of the community, and "distinctive local conditions" the number and types of districts needed are also determined.[168]

> Once these comprehensive studies have been completed and the maps prepared, the zoning commission has a detailed and factual foundation upon which to base its zoning plan [sic]. From these studies a logical delineation should evolve for the several zone or districts needed and the regulations necessary pertaining to each.[169]

The process is reasonable, but with an exacting measurement base such as LUI, as compared to density based on lot size, can meaningful intensity districts or bands

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[167]Martin Rody and Herbert Smith, Zoning Primer (West Trenton: Chandler-Davis Publishing Company, 1960), p. 19.

[168]The International City Managers' Association, Local Planning Administration (2nd ed., Chicago: The International City Managers' Association, 1950), p. 237. The example is given that most self contained cities of 25,000 to 250,000 population will need at least the following types of districts: one-, two-, and multiple-family residential; neighborhood, general, and central business; and light and heavy industrial. This process is not unlike step one and Chart A of Form 1095.

[169]Rody. Some zoning advocates get carried away with terminology. The International City Managers' Association further clarifies the process with the following two points. "Under an ideal arrangement, each zoning district is bordered by the next less restricted or more restricted district. For example, a central business district may be bordered by an apartment-house district followed by a single family district. This arrangement is, of course, not always feasible; and a logical allocation of zoning districts should not be warped to obtain easy transition, desirable as it is.

As a general rule it is more desirable to place the boundary line between two zoning districts in the interior of a block along the rear lot lines than in the center of the street [for ease in transition]."

be as easily or as exactly evolved as the zoning district? The process may be simplified as it was in the instance of the Honolulu ordinance. There intensity zones were based on floor area and lot size--using previously established zones as a guide.[170] But are floor area and lot size, a floor area ratio, an indication of existing intensity? Is this indication of intensity comparable to intensity as defined by LUI--considering off-site amenities, balconies, parking allocation and other details?[171] If this indication of intensity is reliable, wouldn't it be more reasonable to state that on the basis of the study, such and such open space at such and such floor area are desirable in this and that district, rather than go through this rigorous study of what is just to provide some relationship to LUI ratios which have been determined appropriate for federal mortgage insured projects?[172]

On the other hand, if a community were to measure existing intensity, without the aid of some previously

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[170]Letter from Mr. Kim, 06 May 1968. The process used by other communities adopting LUI is not known.

[171]See footnote 162.

[172]The Federal Housing Administration's Land Planning Bulletin No. 7, Land Use Intensity, 8, states that "FHA's requirements and those of zoning and other local regulations seldom are identical. This is not surprising since they are made for different purposes." Furthermore, the Federal Housing Administration acknowledges in the Minimum Property Standards, 24, that adjustment may be necessary for local topographic conditions. Honolulu does have topography and setting other than the standard successful residential project of an average mainland community does it not?

established districts, where, using LUI, would it begin to define the boundaries and dimensions of "gross land area"? Since LUI is sensitive to such decisions, should a boundary line be drawn through beneficial open space and at what point? What is "off-site" beneficial open space? Should a boundary line be drawn in the interior of a block rather than down the center of the street? Depending upon where the line was drawn a particular area could have several intensity levels--even before the other qualitative details were studied.

LUI is oriented to the individual site, which has definite, established legal boundaries. Without some pre-establish bounds the application of LUI, with its six components, as a device to measure existing intensity, is operationally impractical because of its precision in details.

The other factors, population density, traffic generation, utility load, and storm water runoff coefficients, of which the LUI components are key indicators, increase the utility of LUI, if LUI is an accurate measure of existing land-use intensity. While the first three might be projected from floor area alone,[173] it is not

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[173] V. Joseph Kostka, Neighborhood Planning (Winnipeg: By the author, 1957), pp. 22-24, sponsored by The Appraisal Institute of Canada, writes that "residential density, indicated as the number of families, or persons, or dwellings per either the 'gross' or the 'net' acre is

evident how storm water runoff coefficient can be projected from LUI components. Paved streets, parking lots, sidewalks, and roofed areas are factors which increase runoff and reduce infiltration and percolation of precipitation into the ground, but these factors are the elements which are allowed "flexibility" under the LUI system. The only component which might be indicative of paved or covered area is the number of parking spaces--if unit density is known. The others such as building area and open space vary with the number of stories, roof area, balconies, etc., and do not necessarily indicate total ground coverage. To project a runoff coefficient would require a complete analysis, such as in Form 1029, of all development within a LUI band or zone.

If such factors as storm water runoff, soil, and topography are important in the development of the community, then it might be more advisable to do a complementary terrain analysis in coordination with the study of intensity--noting

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an ambiguous indication since it does not take into account or express the two fundamental variables as follows: first, the amount of unbuilt land per dwelling available for private and public use; and second, the type of dwelling unit and its height. These variables can fluctuate considerably and thereby affect the livability [italics mine] of the environment, yet the density figure remains the same." The floor area ratio is suggested as a supplementary means of density control to account for the three-dimensional space in which the buildings exist. Conversely, "the building bulk expressed as a floor area ratio does not [italics mine] reflect population density. The latter [population density], however, is needed in order to determine, for example the total population for which the neighborhood is planned."

ground coverage. Such analysis has been suggested in map form. It includes classification of soil type, topographic slope, drainage conditions, and the depth of bed rock. These factors, together, can be used to determine the suitability of the terrain (from the point of view of the physical characteristics of the land) for residential or industrial development.[174]

LUI may be an appropriate measure to guide what ought to be for a defined site. It can serve as a detailed framework to measure residential development that is, but it is not a deus ex machina.

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[174]Ralph W. Kiefer, "Terrain Analysis for Metropolitan Fringe Area Planning," Proceedings paper 5649, Journal of the Urban Planning and Development Division, American Society of Civil Engineers, Vol. 93, No. UP4 (December 1967), pp. 120-121.

CHAPTER V

SUMMARY AND CONCLUSIONS

The six component LUI scale, floor area ratio, open space ratio, livability space ratio, recreation space ratio, and the occupant and total parking space ratios, created some excitement when it was introduced in 1963. LUI offered a standard against which large scale development, such as planned-unit development or clustering, could be judged. Although LUI is offered as an universal standard, the manner in which its ratios are defined and designed orientate it to a purpose--specifically the appraisal of residential development proposed for Federal Housing Administration mortgage insurance. As one of the minimum property standards, it is to "encourage the provision of housing projects that meet the special needs of urban families and to protect the interests of the Federal Housing Administration in the projects."[175] The emphasis of this latter purpose requires that it be considered "in relation to other factors affecting marketability, tenant appeal, and economic feasibility."[176] The market orientation of LUI is reflected in

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[175]Federal Housing Administration, Minimum Property Standards . . ., 1.

[176]Ibid.

the precise manner in which qualitative details of intensity, such as off-site amenities, balconies, and parking allocation, are treated.

Because of the precision given to these details, LUI is suitable to judge residential development, but not entirely satisfactory to evaluate commercial or industrial uses. Certain proponents of LUI have applied floor area ratio to commercial and industrial uses claiming this as LUI in one form or another, but it would appear that this is still an application of floor area ratio.

Even though LUI is offered as a description of both existing and proposed land-use intensities, it is more applicable as the design of the proposed or what ought to be. As a measure of existing land-use intensity, the use of LUI is hampered partly by complex, often inconsistent, definitions of the involved elements and their relationships, and partly by the precise treatment of details. While the use of certain elements of LUI, such as floor area, have been measured, projected to other elements of the scale, and termed an application of LUI as a measure of existing intensity, this again appears to be stretching the meaning of the term. The accuracy of such measurement and projection is questionable since what is existing is not necessarily congruous with what ought to be as determined through the LUI ratios.

In addition to some of these technical difficulties, which might be corrected with use in time, there are difficulties of a more man-made nature, which discourage a wider utilization of LUI.

First, planned-unit development, to which the application of LUI is most appropriate, has no specific legal base in most states. New Jersey is the first state to enact planned-unit development legislation not only to permit but also to encourage its use.[177] In many states the lack of enabling legislation poses problems. Planned-unit development is a hybrid of zoning subdivision control, and design regulation, but the authority and administration of zoning regulations and subdivision control regulations are distinguished as two entities and separated in enabling legislation.[178] While some communities have adopted planned-unit development as a special or conditional use, the lengthy procedure outweighs most advantages gained in its use. Although LUI could provide certain basic standards, the process is still subject to hearing and pressure group arguments.[179]

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[177] House and Home, Vol. 32, No. 2 (August 1967), p. 5. This was enacted in May 1967.

[178] Fred A. Mauck, "New Development Powers for Fairfax County," Land Use Controls, Vol. 1, No. 4 (1967), p. 27.

[179] The American Society of Planning Officials, Problems of Zoning . . ., 38, acknowledges this as a problem. ". . . most people feel expert on land-use and urban problems simply because they live in a city or own land, or at

Second, the attributes and potential of LUI have been presented in an often misleading manner which creates nor only misunderstanding (confusion) about LUI, but also a wariness and apprehensiveness of its true values. The LUI scale is clear and concise, but the definitions and relationships of elements necessary to compute LUI are neither simple nor always clear. For example, the particular value of half of the area of an abutting off-site street, in the computation of gross land area, over the whole area of the street or no consideration of the area is not apparent. If the basic question in land development is the building area in relation to the land area and the resulting open space,[180] and this is part of the concern for which LUI was developed, then it should be sufficient and essential that LUI meet this end rather than trying or claiming to measure or project every other quality of land-use intensity. Much of the presentation of LUI has been like the inflating of a toy balloon--it grows bigger and bigger with much more chance of breaking. LUI, among other things is not a "two digit number . . . which will produce a balanced, well-designed project."[181]

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least rent. The growing body of research . . . shows that land-use problems are neither simple nor capable of intuitive solution."

[180]Hanke, Land-Use Intensity, A Guidance System for Housing and Urban Development, exerpts from spoken testimony, 3.

[181]Don L. Ralya, "Planned Unit Developments--the FHA Program," The Real Estate Appraiser (February 1967), p. 5.

Despite these difficulties and shortcomings, the usage of LUI does have a significant relevance to land-use planning and should be of concern to the planner. This significance and cause for concern can be viewed from two aspects: the Federal Housing Administration's use of LUI and the potential of LUI, itself, as a regulatory system.

LUI, considering it as a guide--a prerequisite--for federal mortgage insurance issued by the Federal Housing Administration, is a governmental activity outside of and independent of zoning and subdivision regulation which influences the local use of land.[182] If the planner is concerned with the overall development and relationships of land use, then he must be concerned with and cognizant of these activities, including LUI. He must know how they function, their impact on land use and how they are related to each other and to local land-use regulations.

LUI, as a regulatory system is significant to planning in that it offers an operational example of how floor area ratio, open space, and other spatial factors can be related in situations other than single lot development.[183]

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[182]The American Society of Planning Officials, Problems of Zoning . . ., pp. iii, 7, concludes that although zoning and subdivision controls are widely thought of as the primary land use control devices, they often exert less influence on land use patterns than do such factors as: water, sewer, and expressway location; tax and assessment policies; and federal incentive programs--mortgage insurance.

[183]It is acknowledged that local land-use controls are not the only factors influencing land development. It is,

The key here, however, for future application to planning would seem to lie in the use of the floor area ratio rather than the six intensity components. Emphasis on the floor area ratio rather than the details of open space would be a means of clarifying (and perhaps simplifying) what is meant by intensity. Emphasis on floor area ratio would also facilitate application of this system to uses other than residential. Such a system, called "degree of utilization," was begun in Copenhagen, Denmark in 1939. It took into consideration the gross floor area of all uses of the total building area of the site in relation to the gross land area of the site. In support of the degree of utilization, there were regulations for spacing between buildings, height in proportion to breadth of street and to neighboring boundaries as well as on the nature and application of the unbuilt area.[184]

LUI is a device which can provide a basis for numerical proportions regarding land-use and as such it can provide a flexibility not found in the traditional zoning envelope. It is only a numerical device, however, and not a substitute for personal involvement and concern in the development of a healthy, safe, and livable physical environment for people. This personal involvement is necessary if

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however, held that there is still a need for development standards, unless land development today is inspired by a conscious co-ordinated public interest rather than the private or profit motives which brought about the earlier controls.

[184]International Congress for Housing and Town Planning, Housing Density (Edinburgh: International Congress for Housing and Town Planning, 1954), pp. 32-34.

LUI is to have meaning beyond its present economic orientation.

In its design determining function, LUI should receive further study with value orientations other than economic. Emphasis on physical and mental health or cultural values, for example, may noticeably change the ratio proportions of the six components. Other components, such as topography, should also be explored in any further study.

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APPENDICES

APPENDIX A

A SUMMARY OF DENSITY STANDARDS FROM THE MINIMUM PROPERTY REQUIREMENTS

Under the old standards a proposed site was one of two types.

> "Type A. Areas are areas which are suitable for residential uses at high densities, and may usually be identified by the existence or imminent use of typical properties for high density apartments or high density row houses. Type A Areas shall include only the following:
>
> a. Residential areas in which typical existing land uses are established and stabilized with dwellings at more than 25 families per net acre.
>
> b. Additional areas determined by the Chief Underwriter as appropriate for sound long-term residential use at more than 25 families per net acre by reason of the presense of each of the following:
>
> (1) Market demand for additional area for high density use.
>
> (2) Close proximity to good facilities for shopping, transportation and other community services. Where the amount of land so located is greater than the amount needed to meet the demand for high density use, only the most favorably located portions of such land shall be considered for additional Type A area.
>
> (3) Appropriateness of other characteristics of the area for purposes of long-term high-density residential use.
>
> Type B Areas are areas which are suitable for residential uses at medium or low densities of 25 or less families per net acre and may usually be identified by the existing or imminent use of typical properties for detached and semi-detached dwellings for one or two-families, for medium and low density row houses, or for two-story garden apartments with generous open spaces. Type B areas shall include all land exclusive of both Type A areas and areas unsuitable for residential purposes."

These two types established both building coverage and density for the site area. The building coverage of a

Type A property was not to exceed 35% for an interior plot and 45% for a corner plot. The Chief Underwriter, however, could consider modification of these minimums. The coverage of Type B property was not to exceed 25%.

The density of a Type A property was not to exceed 40 living units per net acre for an interior plot and 50 living units per acre for a corner plot. "That portion of a property at the intersection of two streets to the extent of 22,500 square feet for each such corner shall be considered as corner plot; the balance shall be considered as interior plot." Again the Chief Underwriter could consider modification of these maximums. The density of Type B property was not to exceed 25 living units per net acre.

These standards are found in the Federal Housing Administration's Minimum Property Requirements for Properties of Three or More Living Units, reprinted to include all revisions through March 1961, pp. 5, 7, 8.

APPENDIX B

Zoning Amendment for Planned-unit Development Including FHA Standards by Reference. Adopted by Frederick County, Maryland. October 1964.

Section 40-1. Definitions

HOME ASSOCIATION. AN INCORPORATED, NON-PROFIT ORGANIZATION OPERATING UNDER RECORDED LAND AGREEMENTS THROUGH WHICH, (A) EACH LOT AND/OR HOME OWNER IS A PLANNED UNIT OR OTHER DESCRIBED LAND AREA IS AUTOMATICALLY A MEMBER AND (B) EACH LOT IS AUTOMATICALLY SUBJECT TO A CHARGE FOR A PROPORTINATE SHARE OF THE EXPENSES FOR THE ORGANIZATION'S ACTIVITIES, SUCH AS MAINTAINING A COMMON PROPERTY, AND (C) THE CHARGE IF UNPAID BECOMES A LIEN AGAINST THE PROPERTY.

Section 40-23. Planned Unit Development.

(a) Purpose: The purpose of this section is to permit such flexibility and provide performance criteria which can result in planned developments which produce:

1. A maximum choice in the types of environment and living units available to the public.
2. Open space and recreation areas.
3. A pattern of development which preserves trees, outstanding natural topography and geologic features and prevents soil erosion.
4. A creative approach to the use of land and related physical development.
5. An efficient use of land resulting in smaller networks of utilities and streets and thereby lower housing costs.
6. An environment of stable character in harmony with surrounding development.
7. A more desirable environment than would be possible through the strict application of other sections of the ordinance.

The Planned Unit Development section is designed to provide for small and large scale developments incorporating a single type or a variety of residential and related uses which are PLANNED AND DEVELOPED AS A UNIT. Such development may consist of individual lots or it may have common building sites. Common land must be an essential and major element of the plan which is related to and effects the long-term value of the homes and other development.

A planned-unit shall be a separate entity with a distinct character in harmony with surrounding development. In a Planned Unit Development there shall be no maximum building height, no minimum lot, no minimum lot width. However, no single family dwelling (except in a town house or semi-detached dwelling), and no addition to any single family dwelling shall be erected within a distance of less than sixteen (16) feet from any other single family dwelling.

(b) Location: The Planned Unit Development may be established in the R-1, R-2, or R-3 Residence Districts as authorized in subsection (h) of Section 40-72 and Sections 40-78 and 40-84. If the proposed project is in an A-1 district the desired residential rezoning shall be requested after the location and plans for the project have been approved by the Planning Commission. The criteria used in evaluating the appropriateness of a Planned Unit Development in an A-1 District shall be the same as that required for rezoning plus guide lines spelled out or indicated in other parts of the Comprehensive Development Plans. A zoning certificate for any structure in a planned unit development shall be issued only after the plans for such development have been approved by the Planning Commission. All structures in a planned unit development shall be constructed as shown on the approved plans.

(c) Submission of Plans: The developer shall present plans, reports and related information in sufficient detail to enable the Planning Commission to evaluate the proposed development in accordance with the provisions of this section. Any applicable standards of design and construction and procedure for submission of plans that may be adopted relating to subdivisions shall be followed.

(d) Plan Review: The Planning Commission shall investigate and ascertain that the plans for a Planned Unit Development meet the following conditions:

1. That the tract of land for the project comprises not less than ten (10) acres. It may be owned, leased or controlled either by a single person, or corporation or by a group of individuals or corporations.
2. That the standards for maximum floor space permitted and for minimum recreation space, outdoor living space, open space and parking space requirements are related to a land use intensity rating (LIR). The relationship between ratings and standards are established by the Minimum Property Standards for Multi-family Housing (FHA 2600) dated November 1963. The land use intensity rating for a planned-unit development shall relate to the zoning districts. The overall maximum rating for projects, (excluding commercial and industrial areas) permitted in each district is:

District	Rating (LIR) (LUI)
R-1	3.7
R-2	4.5
R-3	5.3

In the A-1 District the land use intensity rating for planned-unit development shall be determined by the Planning Commission. The Commission in determining the rating shall follow the procedure in FHA's Land Planning Bulletin No. 7, entitled Land use Intensity Rating; dated September 1963. The determination of the land use intensity rating in the A-1 District shall be completely documented including all facts, opinions and judgments justifying the selection of the rating.

3. That the buildings are to be used for residential purposes except where:
   a. the development contains 100 or more dwelling units, 2400 square feet of floor area for every 100 dwelling units may be for limited commercial use. This commercial area may be in a separate building or incorporated with a two family or a multi-family structure. The following requirements shall be met before such commercial use may be incorporated.
      (1) The structure if separate shall be of an architectural design compatible with that of the dwelling units.
      (2) Any single commercial area shall be limited to 2400 square feet of floor area.
      (3) One parking space for every 400 square feet of floor shall be provided.
      (4) Signs shall be limited to an identification sign for each point of access. The signs shall not exceed two square feet in area, shall not be directly lighted and shall be attached flat against the face of the buildings or other architectural structure.
   b. the development contains 500 or more dwelling units, one acre of land for every 100 dwelling units may be used for commercial purposes. Only uses permitted in the B-1 and B-2 districts may be included. Where the development contains 1,000 or more dwelling units five (5) acres of land for every 100 units may be used for light industry (uses permitted in the M-1 district). Individual industrial areas shall be a minimum of 50 acres. Customary, accessory or associated uses, such as private garages, storage spaces, recreational and community activities, churches and schools are also permitted.

4. That the proposed project will constitute an environment of sustained desirability and stability, that it will be in harmony with the character of the surrounding neighborhood.
5. That the project is in conformity with the policies and goals of the Comprehensive Development Plans, and will be consistent with the intent and purpose of this chapter.
6. That the property adjacent ot the proposed development will not be adversely affected.
7. That every structure containing dwelling units have access to a public street directly or via a court, walkway or other area dedicated to public use or owned and maintained by a Homes Association, but need not front on a road as defined in Section 40-1 and Section 40-10.
8. That the elements of the plan, (houses, streets, parking areas, walks, service areas, plant material, open space, recreation areas and facilities, walk and screening, lighting, community buildings, and maintenance and storage facilities) are arranged and designed to reflect the principles and objectives outlined in sections 5 and 6 of the FHA's Land Planning Bulletin No. 6, entitled "Planned Unit Development with a Homes Association," dated December 1963.

(e) Utilities: The method for providing water and sewerage for the development must be approved by the Health Department before the Planning Commission approves the plans.

(f) Homes Association: A Homes Association will be required if other satisfactory arrangements have not been made for improving, operating and maintaining common facilities including streets, drives, service and parking areas and recreation areas. When required, the owner(s) must establish a Homes Association in accordance with the requirements and procedures outlined by FHA in Sections 7 and 8.2 of the Land Planning Bulletin No. 6, entitled, "Planned Unit Development with a Homes Association," dated December 1963.

APPENDIX C

FHA FORM 1095, WITH SEVERAL BUILDING TYPES DETERMINED

FHA FORM NO. 1095 11 64

LAND-USE INTENSITY OF SITE

Project name COLUMBIA PARK Section 1 & 2

Location 12TH & SCOTT STS. JEFFERSON LIB. Gross Acres 40.0 Date 12/29/64

STEP 1 – RELATE SITE TO COMMUNITY TYPE AND PATTERN

a. Urban Area and Benchmark Communities

(1) Urban Area JEFFERSON METRO (2) Population 2,156,000 (3) Decade Increase 30 %

(4) Growth Trend: ☐ Static ☐ Increasing ● Explosive ☐ Recessive ☐ Regenerative

(5) Size Class of Urban Area from Table A: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ● 6 ☐ 7

(6) Benchmark Communities on Chart A: A SPRING VALLEY B BEAVER PARK C ADAMS D ELLIS E So. CENTRAL F CENTRAL G

b. Intensity Range Bar Applying to Subject Community

(1) Community Name NORTH PARK

(2) Growth Trend: ☐ Static ☐ Increasing ☐ Explosive ☐ Recessive ● Regenerative

(3) Expected Change in Intensity: ☐ Much Lower ☐ Lower ☐ Same ● Higher ☐ Much Higher

(4) Community Type and Its Intensity Range Bar on Chart A: A ☐ B ☐ C ☐ D ● E ☐ F ☐ G

c. Sector of Community Range Bar Applying to Subject Site and Immediate Surroundings

(1) Direction of Growth in Relation to Site: ☐ Toward ● Encompassing ☐ Away

(2) Change of Land-use in Vicinity of Site: ☐ None, or ● To HIGH RISE APTS. TOWNHOUSES ☐ Slow ☐ Moderate ☐ Rapid

(3) Sector of Range Bar Applying to Site and Immediate Surroundings ☐ Minimum ● Minimum-Medium ● Medium ● Medium-Maximum ☐ Maximum

CHART A – Intensity Range Bars for Community Types

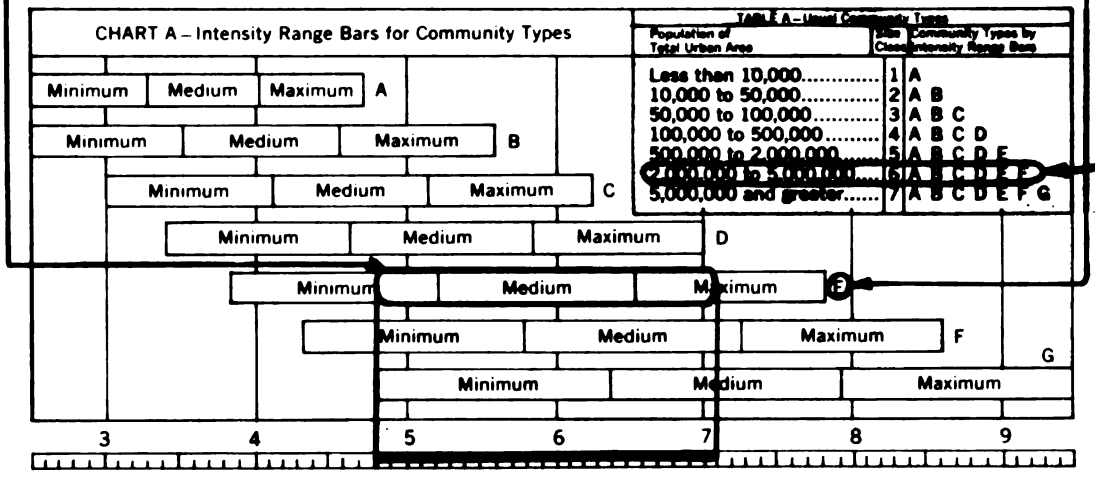


TABLE A – Usual Community Types

Population of Total Urban Area	Size Class	Community Types by Intensity Range Bars
Less than 10,000	1	A
10,000 to 50,000	2	A B
50,000 to 100,000	3	A B C
100,000 to 500,000	4	A B C D
500,000 to 2,000,000	5	A B C D E
2,000,000 to 5,000,000	6	A B C D E F
5,000,000 and greater	7	A B C D E F G

FIRST Land-use Intensity Scale

STEP 2 – RELATE THE SITE TO COMMON BUILDING TYPES

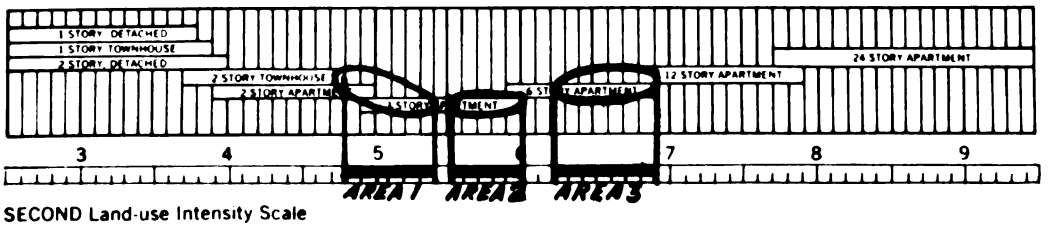
a. Existing Buildings in the Neighborhood

Land Area	Building Type	% Land Area	Age	Condition
A	8ST APTS.	20 %	8	GOOD
B	6ST APTS.	5 %	5	GOOD
C	VACANT	75 %		
D		%		

b. Most Appropriate Buildings for the Site

Land Area	Building Type	% Land Area	Sector of Range Bar Low	Med.	High
1	2 & 3 ST. TO'HSE	35 %			✓
2	2 & 3 ST. APTS.	10 %			✓
3	5-8 ST APTS.	55 %			✓
4		%			

CHART B – Most Favorable Intensity Ranges for Common Building Types



SECOND Land-use Intensity Scale

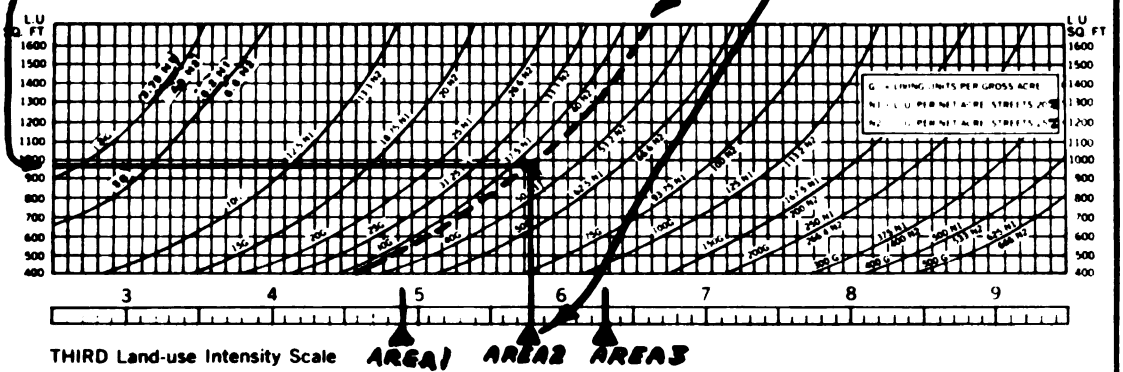
FHA FORM NO. 1095 — **LAND-USE INTENSITY OF SITE**

STEP 3 – RELATE SITE TO DENSITY

a. Trend in Living Unit Size: [ ] Much Smaller (S) Smaller TO (S) Same [ ] Larger [ ] Much Larger
b. Which is Occuring: [ ] Slowly (M) Moderately [ ] Rapidly
c. Trend in Living Units per Gross Acre: [ ] Much Fewer [ ] Fewer Same (S) More TO (S) Much More
d. Which is Occuring: [ ] Slowly [ ] Moderately (R) Rapidly

Data to Determine	e. Existing Neighborhood Use				f. Most Appropriate Use of Site			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
(1) Building Type	2 st. APTS.	6 st. APTS.	___st.	___st.	2&3 st. TOWNHSE	2&3 st. APTS.	6 st. APTS.	___st.
(2) Number of Bedrooms per Living Unit	2&3	1,2&3			2&3	1,2&3	0,1&2	
(3) Price or Rental Range	$150	$175	$	$	$225	$160	$180	$
(4) Living Unit Size in Sq. Ft.	850	800			1400	800	750	
(5) Adjustment Factor	— %	20 %	%	%	0 %	20 %	20 %	%
(6) Adjusted Living Unit Size in Sq. Ft.	850	960			1400	960	900	
(7) Number of L.U. per Gross Acre	15	40			12	32	50	
(8) LUI – Applying Chart C	4.5	6.1			4.9	5.8	6.3	

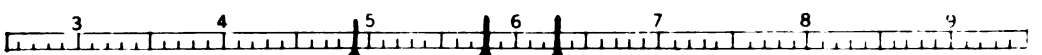
CHART C – Land-use Intensity According to the Number of Living Units per Acre for Various Unit Sizes



THIRD Land-use Intensity Scale — AREA 1 AREA 2 AREA 3

STEP 4 – RELATE THE SITE TO BENCHMARK PROJECTS

Project Name	Project Location	Building Type	LUI
1 POMEROY GREEN	MPS FIG. C2	2ST. TOWNHOUSE	4.8
2 PARK LANE TOWERS	MPS FIG. C3	6ST. APARTMENT	6.4
3 WELSON TOWERS	BULLETIN #7	8ST. APARTMENT	6.5



FOURTH Land-use Intensity Scale — AREA 1 AREA 2 AREA 3

LUI Tests:
a. Planning Program — Tested — Not Tested
b. Financial Workability — (X) Tested — Not Tested

STEP 5 – DETERMINE LAND-USE INTENSITY NUMBER

Recommendations for Maximum Land-use Intensity

Initials and Date	Area 1	Area 2	Area 3	Area 4	Total Area
[illegible]	4.9	5.8	6.3	–	5.9
[illegible] L.P.	4.9	5.8	6.3	–	5.9
[illegible] P.L.P. Arch.	4.9	5.8	6.3		5.9
Other					

The Maximum Land use Intensity Acceptable to the FHA for Current Use of This Site for FHA Mortgage Insurance is

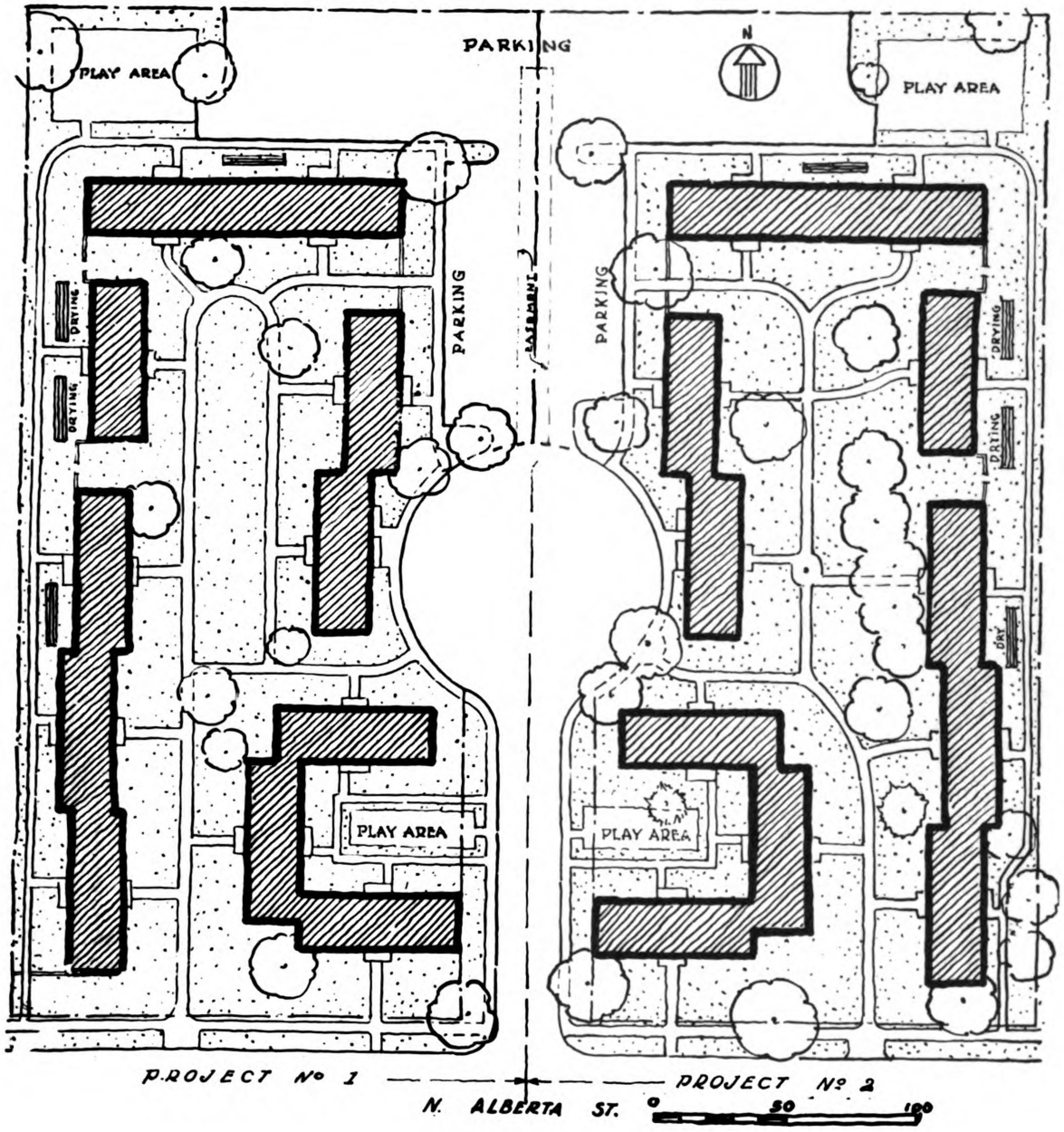
	Area 1	Area 2	Area 3	Area 4	Total Area
% Area	35	10	55		100
LUI	4.9	5.8	6.3		5.9

Chief Underwriter [signature] Date 12/29/64

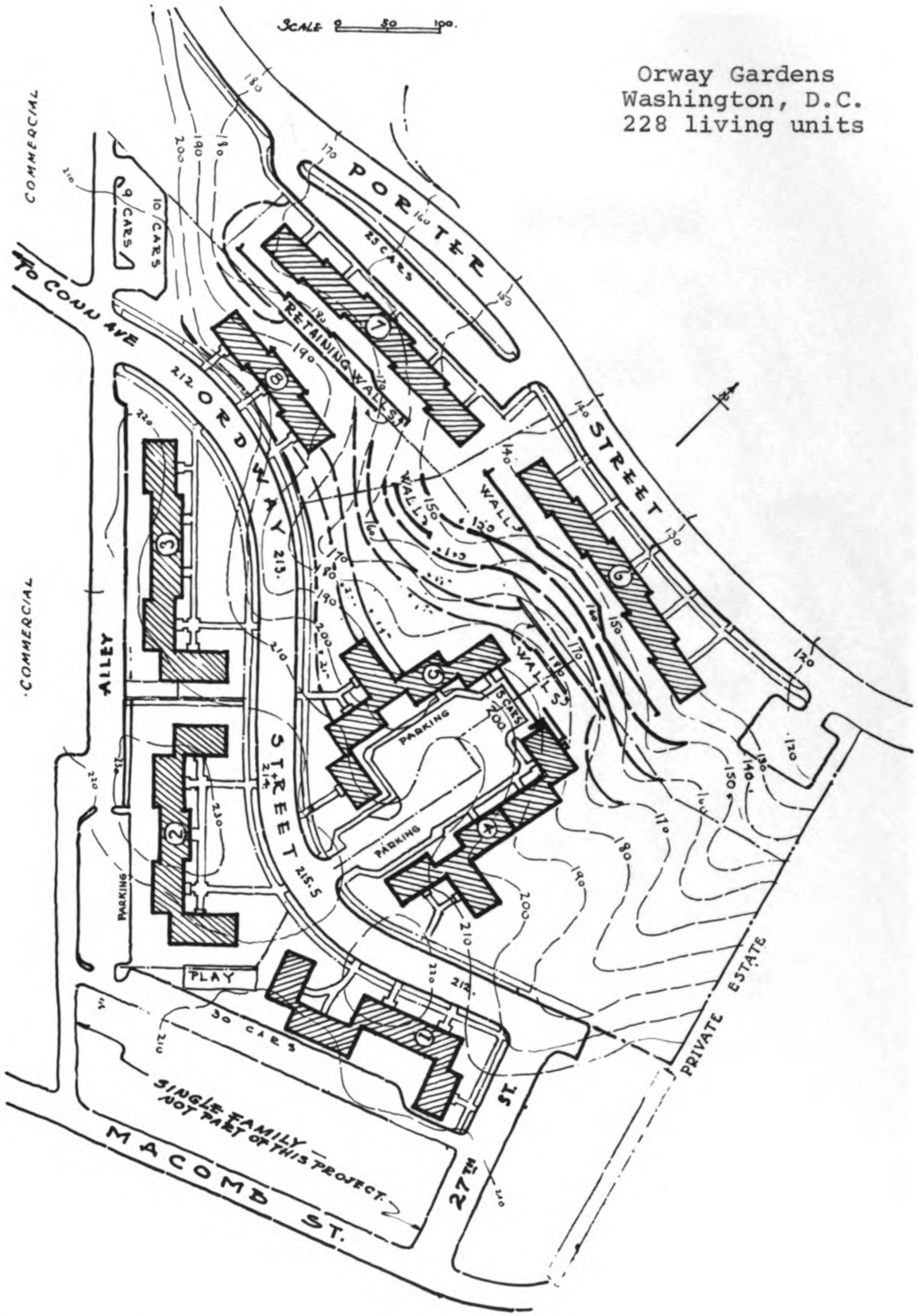
APPENDIX D

SITE PLANS OF 1946 DEVELOPMENT, CURRENT BENCHMARK DESIGN, AND THE ST. VINCENT COURT PROJECT

Killingsworth Park Apartments
Portland, Oregon
88 living units

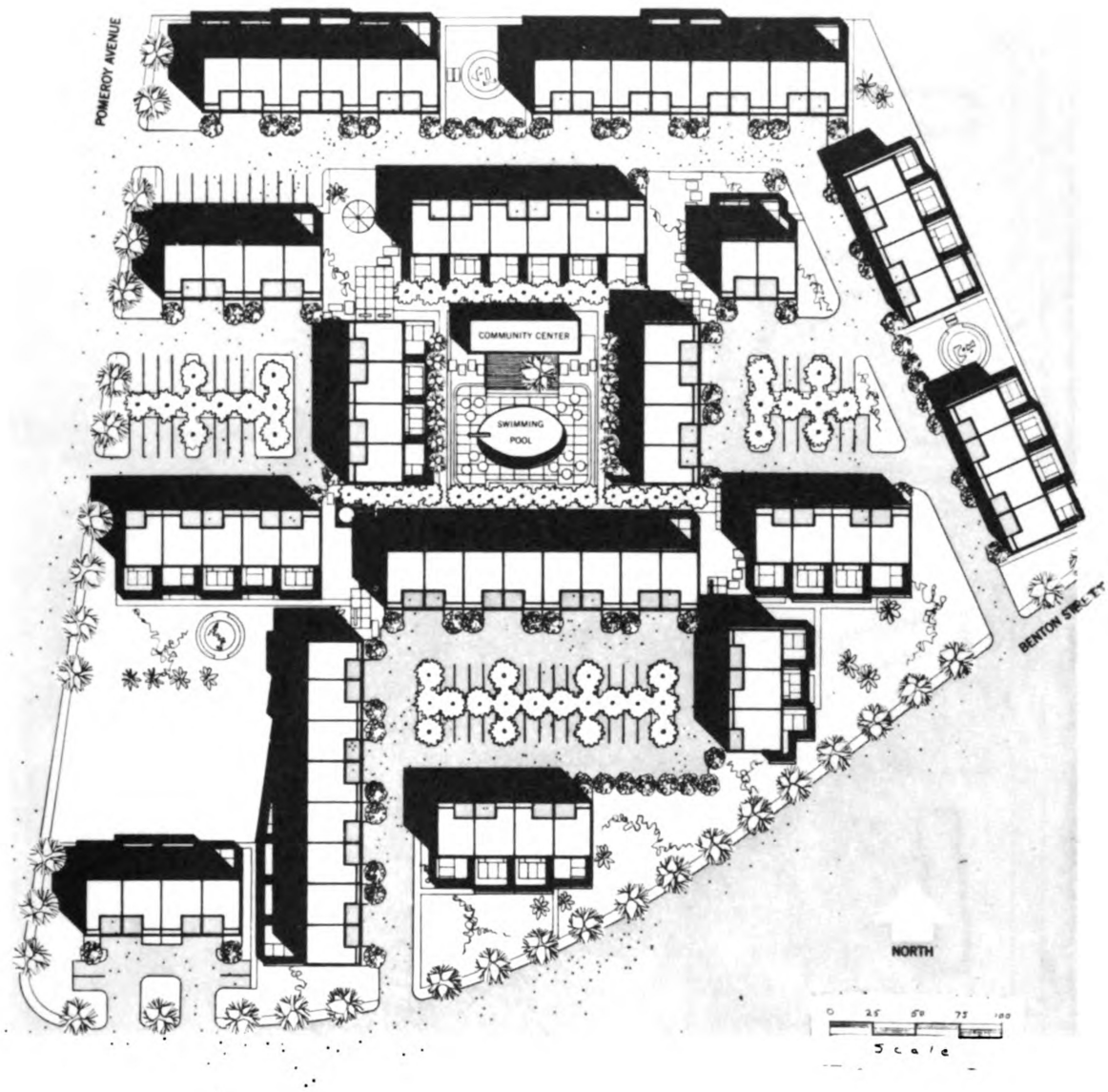


Source: Federal Housing Administration, Neighborhoods Built for Rental Housing, 8.



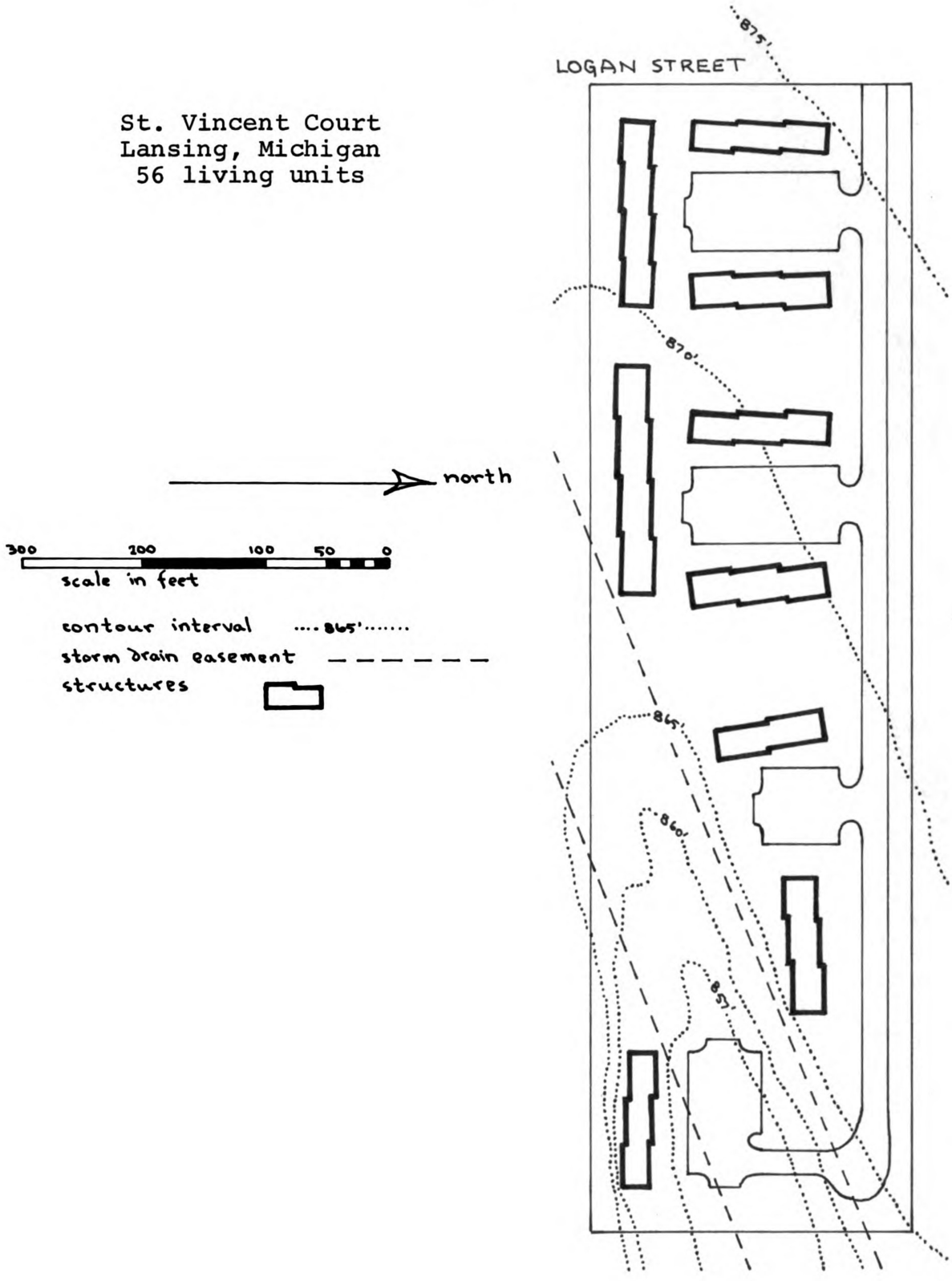
Source: Federal Housing Administration, Neighborhoods Built for Rental Housing, 17.

Pomeroy Green
Santa Clara, California
78 living units



Source: Federal Housing Administration, Minimum Property Standards for Multifamily Housing, 481.

St. Vincent Court
Lansing, Michigan
56 living units



Source: Sketched from drawings of the Department of City Planning, Lansing, Michigan.